

DOCTOR OF PHILOSOPHY

An Exploration of Subtle Agroecological Practices in the Context of the Agricultural Decolonisation Discourse

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Award date:
2023

Awarding institution:
Coventry University

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An Exploration of Subtle Agroecological Practices in the Context of the Agricultural Decolonisation Discourse



By

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PhD

January 2022



Certificate of Ethical Approval

Applicant: Janus Bojesen Jensen
Project Title: Farmer's Survey for non-Material Agroecological Practices

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

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Abstract

Subtle agroecologies is a set of practices grounded in the concept that there exists an invisible ‘half’ to agroecology. This study researches into these practices, identifying and categorising them into a typology, investigating their purported effects and exploring challenges and opportunities relating to their uptake. It is hoped that this will lay a foundation for future research into the various practices. The exploration presented below is informed by a decolonisation framework, underpinned by indigenous knowledge systems and Otto Scharmer’s Theory U as a theory of change. The decolonisation praxis advocating radical change is emergent within conventional and alternative farming systems and, it will be argued, in keeping with the use of subtle agroecologies in that it advocates for a plurality of epistemologies and recognition of the subtle dimension. Likewise Scharmer’s Theory U has informed this paper as a process to enter into conscious relationship with the ‘deeper source level’ from a current state, identify the invisible roots of dysfunctional social patterns and systems, acknowledge and renounce them, and co-create new pathways and structures that may facilitate profound societal transformation. The study begins by presenting a history of agriculture and colonisation, going on to explore why contemporary alternative agriculture movements might be open to subtle agroecologies as a supplement to their existing practices. A triangulation of research methods were used, consisting of a field trial to test selected subtle practices on spring wheat, a systematic review of existing research evidence, a virtual international farmers’ survey and case studies of Sustainable Yogic Agriculture in India and aspects of biodynamic farming in the UK.

The results of the one-year field trial showed some significant difference compared to controls but the short duration and insufficient training in the practices highlighted the challenges of undertaking empirical research on subtle practices. The systematic review identified 201 existing empirical studies with sufficiently robust methodologies, wherein 76% provided statistically significant evidence of the impacts of subtle practices on agroecological parameters ranging from crop yield to air quality. The farm survey elicited that between one to two thirds of farmer respondents (n=52) are inclined to believe in specific subtle practices with a majority already practising at least one such practice, in particular nature communication. The main challenges to the adoption of subtle agroecologies were identified as inconsistent results, lack of knowledge, and availability of scientific evidence. These findings were complemented by the case studies which highlighted the importance of

embedding subtle agroecological practices within the broader agricultural system and cultural setting.

This research reveals a distinct level of interest in the subject matter, both from within academic research and from farmers who themselves report positive results. It broadens the decolonisation framework by presenting a gateway for serious discussion of subtle agroecological practices within the alternative agricultural movements. It also highlights indigenous farmers' wisdom and worldviews as a decolonised praxis, presenting an alternative approach to the sole focus on material practices currently prevalent in these movements. Based on Scharmer's model, the practice of subtle agroecologies falls within an emerging co-creative eco-system model of regenerative agricultural renewal and development and the study concludes by calling for further research to be undertaken in this area. Specifically, it suggests that field trials carried out by skilled experts in the practices would be useful, as well as more in-depth case studies of existing global practices.

Dedication

I dedicate this PhD for the intended benefit to regenerative farmers and their allies everywhere. Marcus Aurelius said that ‘everything we do echoes in eternity’ and the push towards a truly radical global transformation of agriculture is now more timely and possible than ever before.

Acknowledgements

A PhD like anything else in life is not a solitary endeavour and its manifestation before you here would not have been possible without the help of many to whom I am greatly indebted. My first and deepest gratitude and thanks go out to my Director of Studies Dr. Julia Wright whose patience, insights, support, constant encouragements and belief in this work throughout helped me put this thesis across the finish line after five long and challenging years.

In addition, I would like to express my gratitude and thanks to the other members of my supervisory team, Dr. Barbara Smith and Jonathan Code. Their critical (but not critiquing) comments have made this a more balanced and coherent thesis than it would otherwise have been.

I would also like to thank the Brahma Kumaris Spiritual University for allowing me to do field research and learn from them at their headquarters in Mount Abu, India. Last but not least, I would like to thank my wife Gita and my two children Zak and Reem for their patience with me throughout what was a long arduous and often frustrating ‘birthing’ process producing this work. This endeavour would not have been completed without all the support I had received though of course its faults and limitations belong to me alone.

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Chapter 1 : Food Systems at Cross-roads – Why Explore Subtle Agroecological Practices?

Research Aims

The primary aim of this research is to contribute to the unfoldment of the next transformative phase of agricultural research, moving into the ‘next frontier’ where most proponents advocating regenerative farming systems hesitate to venture. There is urgent work to do in the material realm healing and regenerating the Earth and all involved in this endeavour deserve recognition and respect. Increasingly, however, critiques have arisen (e.g. Wright, 2021; Smitsman and Currivan, 2021; Eisenstein, 2018) that this focus appears one-sided and ‘left-hemisphere’ brain oriented and thus not truly holistic, as outlined in the work of McGilchrist (2009)¹. This research goes further looking more in the ‘right-hemisphere’ way of being and living in the world, focusing on practical methods in farming. The provisional name for the research topic was ‘quantum-based agriculture.’ This was first selected since it was envisaged that many, but not all, the workings behind the practices could be explained by quantum mechanics informed principles such as superposition, entanglement, uncertainty, non-locality and undivided wholeness (Chapter 2, Section 2.3). There exists a precedent for its usage in the agricultural field; several practitioners (Lovel, 2014 and Kieft, 2006) with whom the researcher was in contact were using the term ‘quantum agriculture’ since 1986 (Quantum Agriculture, ND), but has now been termed as ‘subtle agroecology’, a new research area proposed to explore this ‘hidden half’ of nature (Wright, 2021) investigating and learning about ‘non-material’ agricultural practices that were commonly recognised in pre-colonial and pre-industrial times.

Subtle agroecology is a counterpart to visible-material agroecological systems and practices and includes techniques such as meditation, ritual-based practices and active communication with the other-than-human world which have been practiced for millennia through ancient wisdom traditions and indigenous knowledge systems. The criteria for selecting these practices were those that had been in the public domain as a result of work done by field practitioners and reported on in the grey literature and other sources, often at the margins of mainstream academic research.

¹ The role of consciousness in agriculture will be covered in detail in Chapter 2

Based on their lineage and history, this research considers these subtler practices worthy to explore for inclusion in a toolkit for a ‘pluriverse’ (Kothari *et al.* 2019) of a truly alternative and transformative agriculture. The secondary aim is to offer a scholarly contribution towards a ‘decolonisation’ of agriculture by exploring subtle agroecological farming practices from within the academy. These are generally unknown, understated or dismissed in this domain but are nevertheless given credence through the perspective not only indigenous ontologies, but also the principles behind Western branches of science, such as quantum mechanics.

At the Oxford Real Farming ² conference several years ago, I was discussing my research with a permaculture practitioner who told me that given all the problems we are facing in the material world at present, it was the material dimension where he was going to provide his focus and attention, implying that delving into subtler dimensions is of secondary importance in these critical times that call out for urgent actions to ‘fix’ the climate emergency. From a modern Western perspective, this view is understandable in light of the current knowledge of breakdowns of the fragile ecological balance of the Earth’s life support systems as a clear and present danger, which are certainly tangible, real and cannot be wished away or retreated from by any kind of ‘spiritual bypassing’.

Nevertheless, this exploratory research is grounded in the concept that insufficient attention has been given to the root cause of the dire state of world affairs. This cause is a mode of consciousness, also prevalent in the so-called alternative farming movements. Without a willingness to move beyond modern mainstream materialist methods, I believe they will likely remain as peripheral niches within the dominant modern industrial agricultural paradigm. My own life journey has led me to take this position which is why I decided to undertake this exploration. I grew up in a non-religious Danish family and spent most of my childhood traveling around the world attending elite private schools that had acculturated me into mainstream modern thinking and materialism. Subsequently I studied Business Administration in university, embarked on a career in consulting and achieved a fair level of success in conventional terms. However, a feeling of lack of purpose and dissatisfaction though persisted once I had achieved all the boxes of material success in my early thirties. Over a decade ago I purchased an insolvent 17th century farm on a small island in Denmark. It was intended as a holiday getaway from my full-time job as a freelance IT Consultant as

² A UK-based conference for agroecology, including organic and regenerative agriculture (<https://orfc.org.uk/>)

well as a retirement place for my parents. Little did I know at that time what a profound effect that the acquisition of that old farm would mean for the future trajectory of my life. As I spent more time working intimately with the land I came to experience what can only be described as a ‘consciousness shift’ that imbued in me a strong calling and sense of purpose that I was guided to work with the land. It is not possible to describe these ‘messages’ I had received there except that they were intuitively felt but very ‘real’, more so than any other internal guidance I had ever received. The ‘compulsion’ I felt to start over into a new field this was challenging since I was already in middle age, well-established in my career, settled into family life and had no land-based training or skills to begin with. Possibly it was in my DNA as my paternal line had a long history of farmers and I had fond memories of long silent walks in the fields with my grandfather. My father as the youngest son did not inherit the farm so I had spent all my life in cities and the ancestral farm was no longer in the family after my uncle sold it as a result of bankruptcy in the 1980s. Nevertheless, without any practical background, I knew from the beginning that I wanted to farm organically with what I perceived to be an enlightened and different way of farming. I therefore enrolled in a Msc in Organic Farming at SRUC (University of Glasgow), no small commitment while still in full-time work and married with two young children. Although I did well in my studies, I felt a lack of attention paid to the ‘spiritual’ dimension of farming I had experienced many times. This led me to believe that the ‘shallow’ focus on a greener form of what was industrial farming did not go far enough to what was needed to reform agriculture. As a curiosity driven ‘out of the box’ thinker, I developed a keen interest in novel plants and agroforestry and wrote my Msc dissertation on the potential of the Paulownia species for NW European climates that has garnered significant academic interest with almost 12,000 reads as of this writing (Jensen, 2016) and several contacts with companies planning large-scale commercial plantings. My readings outside the curriculum led to me learn about biodynamic agriculture which resonated deeply with me and I learned all I could about it. This led to reading the books by Tompkins and Bird (1989;1973, 1998) and a whole new world opened up to me, leading me to wonder why if these practices held such huge promises they remained virtually unknown outside a small niche group of farmers. My attending lectures on biodynamics led me to Coventry University where I had a serendipitous opportunity to enrol in a pioneering PhD program researching these methods in an agroecological context and it felt that this was the avenue I had been searching for every since I decided to work in agriculture.

This overview of my background towards the study is important to include here to establish my credentials that I have an existing background in Organic Farming where I graduated with distinction at the top of my class and also hold a PDC in permaculture design, so I am well

versed in the ‘material’ dimension of alternative agriculture. This study while building on my previous knowledge and experience however offers a complimentary perspective and presents a challenge in calling for a radical counterculture, going far beyond what is presently suggested even in the more mainstream agroecological and regenerative farming movements today. Radical means going to the root; Thoreau (2006; 1854) summarised the inadequacy of treating symptoms rather than root causes in stating that ‘there are a thousand hacking at the branches of evil to one who is striking at the root (p.80).’ Few would argue the fact that the world is in crisis on many dimensions, economic, social, political and ecological. The Chinese word for ‘crisis’ also means turning point, the opportunity to reshape things anew. Perhaps the time has now come, for agricultural research to dare to go deeper beyond the material dimension, to ‘speak of many things’ as the Walrus said in Lewis Carol’s fairy tale.

Crisis of course also denotes danger and it has been an on-going concern by many leading figures in the emerging agricultural movements established in the last century (Conford, 2001; Mollison, 1991) that including any praxis that has not been validated by Western mainstream science will lead to ridicule and increased charges as being ‘anti-scientific’, a type of modern heresy and relegate their movements further to the periphery where their impact will be minimal. Hence a necessary step when researching these practices is seeking further understanding about the challenges and barriers to adoption since this will likely not be an easy shift.

The contemporary philosopher Eisenstein (2013) suggests that the struggle of this time in the 21st century is about far more than reductively addressing isolated issues such as healthier food, sequestering carbon and reversing global warming or biodiversity declines; these are rather symptoms of a mode of consciousness, whereby many in the modern world have separated ourselves from each other and the other-than-human world. Critiquing the dominant perspective on world agriculture, both modern industrial and alternative, through a different epistemological lens based on a history of consciousness and decolonisation framework justifies and sets the context for the specific research aims of this study into subtle agroecological practices.

From this point of view, agriculture as it is practiced today, in particular its most destructive manifestation as modern industrial agriculture, is not the direct cause of many of the world’s ills but rather a symptom of a deeper cultural, spiritual, ethical malaise in modern culture. This malaise is a worldview that had arisen from a state of consciousness. Its modern present face has now become the *modus operandi* in large parts of the world (Barton, 2014), in particular in the Global ‘North’ and now a global phenomenon primarily because of

colonialism and globalisation which arose as a brainchild from this same state of consciousness. Decolonisation has been identified as one process to ‘deprogramme’ from this consciousness. The first step in this process starts with the mind by questioning and challenging this dominant worldview and consciousness which is now a possible hindrance for a deep and lasting social and ecological transformation.

It is relevant here to note that agroecology extends beyond a science and is also a movement (Wezel *et al.*, 2009) which has links to decolonisation theory and praxis (Ferrando *et al.*, 2021; Bradley and Herrera, 2016; Grey and Patel, 2014) in its championing of indigenous rights and peasant knowledge. Part of this decolonisation process of the mind also involves delving into the investigation of other transformative ways of knowing and being in the world and from there to explore how agriculture can become decolonised at the root level. This conceptual framework is further elaborated in Chapter 2.

At the Threshold of a ‘New’ Agriculture?

This exploration into the subtle realms within agriculture will speak of many topics and modes of thought that to date has been under-reported in both conventional and ‘alternative’ agricultural movements³. Moving into these little explored areas is considered important given the present emergency which demands abandoning ‘business as usual’ and instead putting forth radical suggestions. Haverkort and Reijntjes (2006) describes the current world in a state of ‘polycrisis’ consisting of ecological breakdown, inequality, social, political and economic tensions. All of these tensions manifest to some degree in the primary models of contemporary agriculture, with the most destructive being modern industrial agriculture (Chapter 3).

The world situation presents many dangers and challenges, but could also be seen as the birth pangs for a possible evolution towards a more mature and holistic worldview. Bellah and Joas (2012) draws parallels to the advent of the first axial age approximately 2500 years ago that brought forth all modern religions, philosophies and worldviews. In this context Swidler (2002) suggests that at the early decades of the 21st century, global humanity stands at the cusp of a similar global ‘macro-paradigm shift’ from an Age of Monologue into an Age of Dialogue. Part of this dialogue means respecting and acknowledging the ‘Other’ a term used by decolonisation author Said (1978) describing how colonial empires mis-represented and denigrated other cultures not within or originating from Western Europe insisting they needed

³ To be discussed further in Chapter 5

Western interventions for their own good rather than a respectful exchange. This same colonial logic can also be extrapolated to the other-than-human world which has also been ‘Othered’ in the dominant modern consciousness. Here ‘Nature’ has either been viewed at worst as a resource to be dominated and exploited, or at best to be assisted and managed with care, or at its extreme to be segregated with no or as little active human intervention as possible. The former is exemplified in modern industrial farming and the latter typified in the ‘rewilding’ debate (Monbiot, 2014), which stands in stark contrast to most indigenous and pre-colonial worldviews in many cultures worldwide (Adams and Mulligan, 2003) that see the other-than-human world as a space for ethical and persistent human interaction.

As noted by environmental philosopher David Abram (1996) describing modern humanity’s separation from the other-than-human world:

‘Caught up in a mass of abstractions, our attention hypnotized by a host of human-made technologies that only reflect us back to ourselves, it is all too easy for us to forget our carnal inherence in a other-than-human matrix of sensations and sensibilities. Our bodies have formed themselves in delicate reciprocity with the manifold textures, sounds, and shapes of an animate earth — our eyes have evolved in subtle interaction with other eyes, as our ears are attuned by their very structure to the howling of wolves and the honking of geese. To shut ourselves off from these other voices, to continue by our lifestyles to condemn these other sensibilities to the oblivion of extinction, is to rob our own senses of their integrity, and to rob our minds of their coherence. We are human only in contact, and conviviality, with what is not human. (p.22)’

The process toward decolonisation of the mind requires conscious consideration of the degree to which each individual has been affected by not only the physical aspects of colonisation, but also the psychological, mental, and spiritual aspects (Waziyatawin and Bird, 2012). More voices are rising within academia that one starting point here is to recognise that higher education based on the dominant Western model has at least to a degree historically furthered colonial enterprises in dismissing other ways of knowing as ‘myth’ and ‘superstition’ (Richardson, 2018) which this research aims to offer a contribution to counter specifically in the domain of agriculture. Smith (2012) notes that in decolonisation research, the emphasis on solely individual actions will be called into question as a growing awareness arises of being deeply interconnected with other life, both human and other-than-human, and as such agriculture as a system comprises a powerful interface between human culture and the other-than-human world to work from. The path towards decolonisation and imagining future indigenous and ‘neo-indigenous’ farming systems is complex, sensitive and multi-faceted. It

has no definitive answers (Tuck and Yang, 2012) but this research proposes that one possible avenue is to seriously explore subtle agroecological farming practices and their applications with epistemic humility. Re-establishing this connection to the other-than-human world, on all levels of society at this critical juncture of time, is likely the most important work of all generations alive today; Fandon (1967), a decolonisation author, stated that ‘each generation must discover its mission, fulfil it or betray it, in relative opacity...we must shed the habit of decrying the efforts of our forefathers or feigning incomprehension at their silence or passiveness. They fought as best they could with the weapons they possessed at the time, and if their struggle did not reverberate throughout the international arena, the reason should be attributed not so much to a lack of heroism but to a fundamentally different international situation. (p. 145-146).’

However, decolonisation is a sensitive subject to venture into and nuances are critical in this debate how to move forward in this global struggle that ultimately involves everyone without adding further divisions in an already polarised world. Decolonisation literature, despite its immense relevance to this struggle, often includes references suggesting a simple binary of the colonial ‘North’ in opposition to the global ‘South.’ This is not the approach taken in this study where the underlying problem is not geography, gender, political leaning, economic system or ethnicity. It is rather a mode of consciousness that is now global at least to some degree, resulting from a long process of colonialism dating back millennia and continuing in the latest phase of globalisation manifesting as an ‘informal empire’ (Barton, 2014).

Many other epistemologies from within Western philosophy and even quantum mechanics that are at odds with the modern dominant industrial consciousness could also have been chosen to make the case for subtle agroecological practices (Cox, 2014b; Holdrege, 2005; Capra, 1988; Whitehead, 1978; 1929). Nevertheless, the chosen ontological foundation whereby this research is inspired is via the decolonisation framework, because of its strong element of praxis as opposed to mere theory by looking at the lens of indigenous epistemologies from the ‘South’ towards radical change (Santos, 2012). This delineation of epistemologies is not geographic, but rather concern ‘the production and validation of knowledges anchored in the experiences of resistance of all those social groups that have systematically suffered injustice, oppression, and destruction caused by capitalism, colonialism, and patriarchy.’ (Santos, 2018, p. 1).

Research Objectives

The overarching objective of this research is to provide a critical exploration and review of prominent subtle agroecological practices based on their application and purported benefits.

A high-level critical overview assessment of these practices will be presented in terms of typology, historical overview, current evidence of their efficacy and future potential from research results based on a field trial experiment, a systematic review, two case studies and a farmers' survey. Possible barriers to adoption will also be discussed with possible remedial actions offered based on data gathered from these research methods.

The research sets out to explore the following three questions:

- 1) What are the characteristics of subtle agroecological practices?
- 2) What evidence is there of their efficacy?
- 3) What are the barriers to implementing subtle agroecological systems?

The starting point (1) is to identify and categorise the subtle agroecological practices and (2) to undertake a critical review on what are the potential impacts both positive and negative of applying these subtle practices on a farm scale. Having identified and assessed the practices in terms of their impact (3) aims to shed light on the barriers and possible mitigating solutions towards implementing such practices in a systems context.

Expected academic and societal impacts of this research

From mapping the topography of subtle agroecological practices (Chapter 4) and experimenting directly with some of these practices, the objective is to create a unique and seminal work to stimulate debate on this subject and spur further experimentation and practice. The findings will expand on the existing limited knowledge of subtle agroecological practices published in the academic domain and the outcomes are intended to stimulate further research and trials in the future. This knowledge dissemination work has already been started by Wright *et al.* (2017) where the lead author conducted a quantum agriculture workshop at the IFOAM Organic World Congress and the International Permaculture Convergence in India (Le Net, 2017), recently published an academic book on subtle agroecologies (Wright, 2021), presentation at the Oxford Real Farming conference (Wright *et al.*, 2022) and the publication of a case study in a UNDP publication (Wright and Jensen, 2022).

Thesis Structure

It would be an understatement to say that this thesis is not on a conventional subject and hence it will sometimes not follow a conventional format. Given the controversial nature of the subtle agroecologies, a significant and lengthy overture will be presented leading into the specific subject area. This has been deemed necessary with a total of 5 chapters setting the overview, framework and context for why this research is deemed important before

presenting the methodology. This is also because the practices to be explored will likely be less understandable without taking this background into account.

Chapter 1 covers the research questions and aims of the thesis, briefly justifying why the exploration of subtle agroecological practices is necessary at this time.

Chapter 2 outlines a conceptual framework for the research drawing from decolonisation theory, consciousness studies and indigenous knowledge systems. A brief overview is also provided about how the principles in quantum mechanics could serve as a possible bridge between modern science and indigenous worldviews. Additionally, a brief description of transpersonal agroecology and Theory U as a model of change are presented as recent modern frameworks aligned with the project aims. Agriculture is highlighted as the foundation for most modern cultures and thus identified as a key lever for broader radical societal change. It also presents alternative ways of knowing originating from indigenous knowledge, and outlines how and why the dominant epistemology persists today but faces increasing opposition from both within and outside the establishment.

Chapter 3 draws from the historical overview of the shift in consciousness from the context set in the previous chapter and delves into the contemporary deeper problems linked with modern industrial agriculture setting the argument for the urgency of exploring radical alternative solutions. This chapter highlighting the flaws of the unbalanced industrial ‘left-hemisphere’ dominant model, presents a brief overview of agriculture from which this mind-set originates and sets the stage for the presentation the actual subtle agroecological ‘right-hemisphere’ practices to be explored later in the thesis.

Chapter 4 forms the starting point of the research with reporting the results of a typology developed from an analysis of the subtle agroecological practices identified. A brief explanatory overview is presented of these subtle agroecological practices with their methods, history, and some notable research trials to date.

Chapter 5 describes the prime demographic for possible adoption of subtle agroecological practices within the five main alternative agricultural movements (biodynamic agriculture, organic agriculture, agroecology, permaculture and regenerative agriculture) with a brief overview of their history, philosophy and future outlook. This is followed is a brief analysis of the five main alternative agricultural movements and their stance towards the possibility of openness towards a ‘new’ mode of consciousness and the impact of decolonisation on these movements. From this it presents the current situation wherein subtle agroecological practices

could be potentially seen as real and valid possibilities in the toolkit for regenerative agricultural systems.

Chapter 6 describes the high level methodological framework undertaken to answer the research questions explored in this thesis. A summary of the triangulated set of research instruments (field trial systematic review, case studies and survey) are presented along with their justification within a decolonisation framework in noting that they are mainstream methods. The detailed methodology for each research method will be prefaced in Chapters 7, 8, 9 and 10.

Chapter 7 reports on the outcome of the field trial with spring wheat using a selection of subtle agroecological practices conducted in 2018 at Coventry University, UK. It covers the process and results using this method using both statistical analysis on the yields and qualitative reflections from a Goethean analytical approach.

Chapter 8 presents the results of a systematic review of all identified published peer-reviewed empirical trials conducted on subtle agroecological practices worldwide and reports key results.

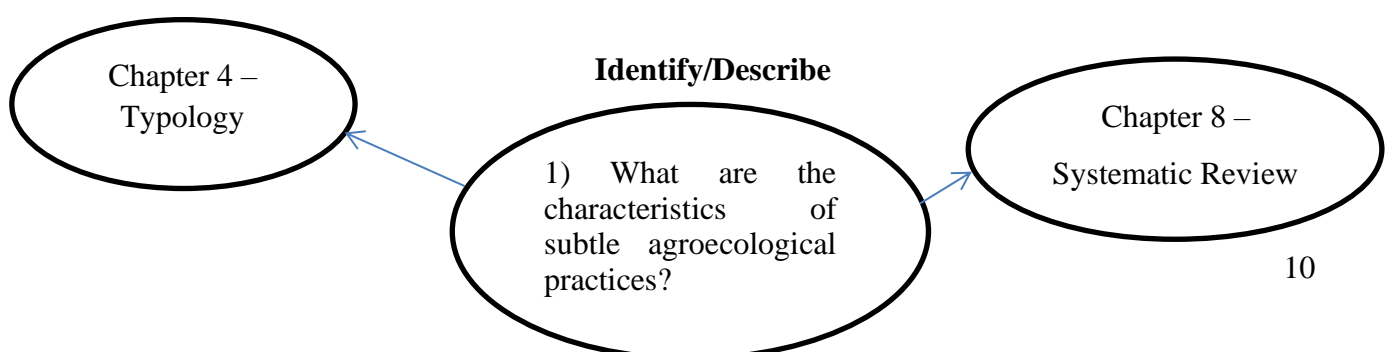
Chapter 9 reports on the field work carried out into subtle agroecological ‘systems’ via two case studies, one conducted in India on Sustainable Yogic Agriculture (SYA) and another on a biodynamic farm in the United Kingdom.

Chapter 10 presents the results of a farmers’ survey sent to farmers worldwide via Facebook to learn their views and practices of subtle agroecological practices, as well as challenges and barriers to adoption.

Chapter 11 discusses the three research questions in a broader context based on the results of the field trial, systematic review, case studies and farmers’ survey.

Chapter 12 summarises the total research findings, their intended contributions to academic knowledge, farmers and society and concludes the study with recommendations for further work into researching subtle agroecological practices.

In summary, the layout of how each chapter corresponds to and addresses each of the research questions in this thesis is described in Figure 1.1.



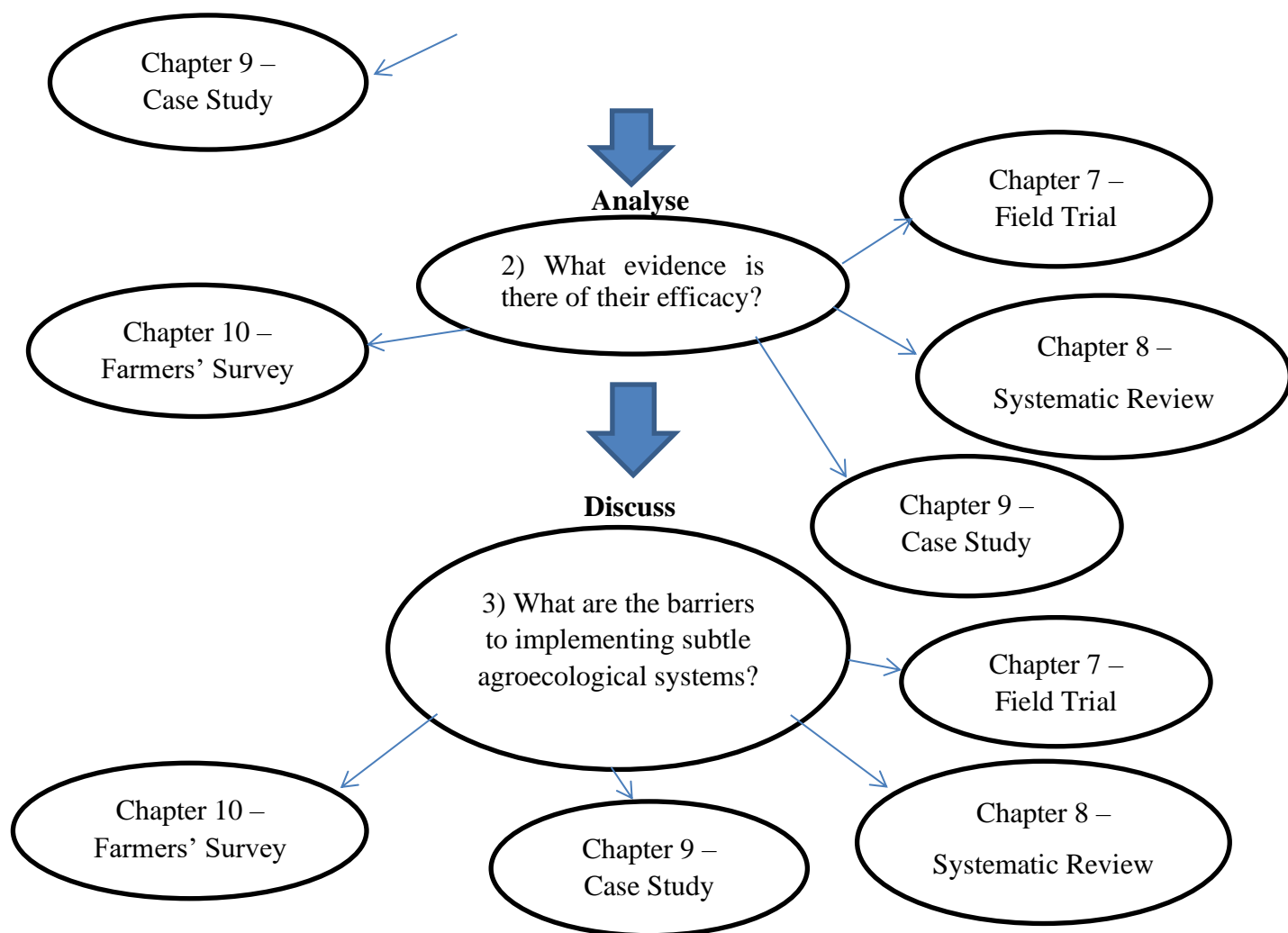


Figure 1.1 - Thesis Layout for Research Questions

Chapter 2 : Review of Decolonisation Literature with Relevance to Subtle Agroecologies

2.1 Could Subtle Agroecology be Part of the Decolonisation Paradigm?

It is suggested that the precarious precipice on which the global ‘world-system’ (Wallerstein, 2011) stands at present requires an open discussion to talk of many things commonly dismissed in academia. This chapter will expand upon the proposal stated in Chapter 1 that one avenue, but by no means the only one, to open up such a conversation joined with actual praxis is looking via the ‘decolonisation framework’ whereby other epistemologies are given due consideration even where they diverge from the dominant Western mind-set prevalent in most academic institutions worldwide. Addressing the present power imbalance between ways of knowing is a key factor in the decolonisation process (Santos, 2014). It is posited that the time is now for indigenous, pre-colonial and non-indigenous post-colonial knowledge systems to emerge from their relative obscurity and receive serious respect and consideration to become synergised with the numerous benign applications of modern 21st century Western science as an integral part of a global transformation towards an ecological worldview.

The conceptual framework of this research is grounded in a ‘decolonisation’ paradigm that has already received extensive coverage in academia in many different spheres, such as social justice (Santos, 2018), education (Icaza and Vázquez, 2018), research methodologies (Smith, 2012), nature conservation (Adams and Mulligan, 2003) and more. This research takes decolonisation framework into the new sphere of subtle agroecological practices. As such, its remit extends beyond being focused on important topics such as on land repatriation and restorative justice, but rather is concerned with the subtler effects of ‘colonisation of the mind.’ The starting point of this exploration is an overview of the history of consciousness studies in particular centered on the decolonisation framework as a suggested remedy. Within this foundation, this research is drawing heavily upon theories by Santos (2014; 2018) arguing that the time of the dominant Western epistemology that has been in global hegemony for over 500 years during the last phase of colonialism is now waning and is now actively being superseded by a ‘pluriverse’ of epistemologies working together.

Colonisation Unpacked

Colonisation is a complex and sensitive topic that means many things to many people. Colonisation still carries an implicit positive connotation in modern scientific parlance when discussing extra-terrestrial settlements (e.g. Levchenko *et al.* 2021) and hence the definition requires some elaboration. Said (1978) defines colonialism as ‘the expansive force of a people, it is its power of reproduction; it is its enlargement, and its multiplication through space; it is the subjection of a universe or a vast part of it to that people’s language, customs, ideas and laws (p. 219).’ Osterhammel (2005) elaborates it to be ‘a form of relationship in which ‘an entire society is robbed of its historical line of development, externally manipulated and transformed according to the needs of the colonial rulers who believe they are working towards the fulfilment of a universal mission (p. 15) but also acknowledges that it is a term of ‘colossal vagueness’ (p. 4). Both authors concur on the same points of subjugation of the ‘Other’ and the attempted erasure of alternative ways of being, but Osterhammel (2005) also points to the universal aspect of colonial endeavours, which as noted by Barton (2014) persists today in the creation of the ‘informal empire’ or ‘one world culture’ that is a direct consequence of Western colonialism, citing some examples of strands of Western culture that now appear ‘universal’ worldwide even after the ‘formal empires’ have disbanded such as industrialisation, professional bureaucracy, democratic capitalism, socialism, ‘free trade’, environmentalism and consumerism.

Smith (2012) puts colonialism under the larger framework of imperialism consisting of (1) economic expansion; (2) subjugation of ‘Others’ (3) idea or spirit with many forms of realisation; (3) discursive field of knowledge. A different author, Smith (2016) outlines a framework to understand imperialism whereby ‘white supremacy’ consists of three distinct but interrelated logics which are ‘Slavery’, ‘War’ and ‘Genocide.’ However, the term ‘white supremacy’ needs to be critiqued in a decolonisation context to move beyond ethnicity. Ignatiev (1995), a historian, considers race to be a social construct but noted that ‘whiteness’ is first and foremost a ‘class’ in the dominant social hierarchy. He provides evidence that different ethnicities could gradually become assimilated into ‘whiteness’, using the American context that Irish immigrants were not initially considered white by the mainstream culture. Furthermore, as Barton (2014) notes that the dominant ‘Western’ worldview is now held by many ‘non-whites’ around the world so this is no longer about ethnicity, if it ever was. As noted by DiAngelo (2018) race is essentially a fiction and a product of social forces that remain in flux but even today tends to afford additional privileges to people who have ‘whiter’ skin.

Whereas most decolonisation literature focuses on the last phase of colonialism from 1492 CE onwards, my study takes a different path and starts back further in time. According to Eisler (1987) and Gimbutas (1997), the indigenous cultures of 'Old Europe' from around 4000 BCE experienced the same patterns of cultural annihilation and forced assimilation that were carried out later worldwide by ancient colonial civilisations and their modern successors. Illustrating this, the main colonial powers of the modern age (Great Britain, France, Spain, Portugal, Netherlands and Belgium) were former Roman colonies. Having experienced similar trauma and repressions carried out on their own indigenous cultures, but after their own colonisation they in turn carried out the same policies both on their own remaining indigenous populations and abroad

How is the Modern World still Colonised?

Colonialism when viewed as a symptom of an unbalanced mode of consciousness still operates as a process in the present time; it intersects ethnicity, gender and class, both within and outside the dominant culture. In effect, Barton (2014) notes that the vast majority of people living in 'dominator' cultures have also - at least to some extent - experienced its adverse effects on their social, economic and political spheres in addition to its damaging effects on overall planetary health.

Illustrating how this consciousness directly translates to the social sphere and ecological degradation, Dworkin (1989), a feminist writer identifies four elements of subordination that describe characteristics of 'colonial' thinking as applied towards women, different ethnic groups, 'lower' social groups within the culture.

- 1. Hierarchy:** One group ("bottom") has less power and fewer rights and resources than another group ("top"), and is seen and treated as inferior to the top group.
- 2. Objectification:** Members of the bottom group are treated as thing-like, as mere instruments of other's use, often as commodities and/or property.
- 3. Submission:** Bottom group typically complies with wishes and self-defined "needs" of the top group - doing so is essential for their survival, and is then used as proof of their inferiority.
- 4. Violence:** Committed by members of the top group against members of the bottom group: routine, systematic, seen as right, necessary, inevitable, and natural.

It is not difficult to see how the above elements can also translate directly to how modern humans in the dominant culture view and treat the other-than-human world. Plumwood

(2003) states that in essence the colonial worldview is based on human supremacy, separateness from 'Nature' and others via a hierarchy to justify domination of the 'Other'.

What Led to the Dominance of the Modern Western Knowledge System?

Pinker (2018), a prominent cognitive psychologist, and Rosling (2018), a respected academic eloquently perpetuate the modernist view that the present dominant world system is functioning well overall for the majority and that humanism, reason, progress, science and technology will ultimately overcome any of the problems faced today. Both authors, notably writing from the Global 'North' however gloss over any ecological calamities and historical injustices in particular the last 500 years of colonialism still perpetuated into the present day. Such optimism appears thoroughly acculturated by the Western notion of linear progress which seems blinkered given the calamity of crises faced on a global level. These 'four denials' that are commonly found in modern Western discourse are summarised as follows (Decolonial Futures, ND):

- 1) **Violence:** Denial of systemic violence and complicity in harm (the fact that modern comforts, securities and enjoyments are subsidised by expropriation and exploitation somewhere else)
- 2) **Unsustainability:** Denial of the planet's limits, the fact that the planet cannot sustain exponential growth and consumption
- 3) **Entanglement:** Denial of entanglement, insistence in seeing ourselves as separate from each other and the land, instead of 'entangled' within a living wider metabolism that is bio-intelligent
- 4) **Depth of the Problem:** Denial of the depth and magnitude of the problems being faced.

Decolonisation authors in contrast (e.g. Santos, 2018; Mignolo and Walsh, 2018) provide a counter narrative that the present world system now dominated by one Western thought pattern is unbalanced, unjust and unsustainable. On the assumption that the present world system can not last much longer, Fandon (1967) believed that rebuilding culture (decolonisation) for colonised peoples involved coming to terms with colonialism's impact on the psyche and the inner life. Explicitly, Fandon (1967) highlighted that a consciousness shift via an internal 'decolonisation' process is necessary as a precondition for any meaningful and lasting change.

Decolonising the Mind?

The necessity of ‘inner work’ in the decolonisation process is echoed by Ngugi (1986) when describing colonisation efforts in Kenya that argued economic and political control ‘can never be complete without mental control’ and that colonialism’s ‘most important area of domination was the mental universe of the colonised, the control, through culture, of how people perceived themselves and their relationship to the world (p.16).’ It needs further re-emphasising that the roots of the current convergent crises stem not from colonialism, but rather a specific mode of consciousness that gave rise to its manifestation which itself results from a historical shift initially forcibly imposed by ‘dominator’ cultures and have since become generally normalised.

Ending Epistemicide through Decolonisation

According to Santos (2018) decolonisation cannot be achieved without recognising that a massive epistemicide has been brought about by colonisation that requires a process towards a returning to a ‘pluriverse’ (Kothari *et al.* 2019) of localised knowledge systems coexisting peacefully. Waziyatawin and Bird (2019) elaborate further that decolonisation is two-fold; firstly, it is an event concerned with ‘reaching a level of critical consciousness, an active understanding that you are (or have been) colonised and are thus responding to life circumstances in ways that are limited, destructive, and externally controlled (p.3).’ Secondly, it is described as a process which ‘means restoring cultural practices, thinking, beliefs, and values that were taken away or abandoned but are still relevant and necessary to survival; and it means the birthing of new ideas, thinking, technologies, and lifestyles (p.3).’

Freire (1968) asserted that the fight for liberation must comprise of two stages: reflection on the nature of oppression, and then concrete action to change it. Forbes (2009) and others advocate that ‘wetiko’ as a spiritual sickness must be cured before it would be possible to build a just society. Going further than Freire, Forbes (2009) states that ‘helping people to understand the social-political world around them is vital, and yet something is missing... a critical method *limited* to the arena of socio-political human behaviour as perceived through materialism is one which will never solve the problem of wetikoism. Why? Because one must take ‘critical awareness beyond the limits of purely human situations in order to fully grasp the milieu in which we humans actually have our existence...For those efforts to be successful must rest on the spiritual regeneration of each of us who are engaged in such struggles (pp. 172-173).’ This assertion indicates that inner work therefore appears as a pre-requisite for truly effective change in the outer world.

A Decolonial Future in the Making – Many Questions, No Clear Answers

While diagnosis is the first step, the process to reverse the effects of this unbalanced mode of consciousness is certainly part of the decolonisation process, but the identified literature gives no clear answers beyond identifying the problem. For Tuck and Yang (2012), decolonisation ‘implicates and unsettles everyone (p. 7)’. Recognising that what a post-colonial future would look like is not yet fully in view and cannot be as long as decolonisation is merely considered a metaphor as a synonym for cosmetic changes in the dominant culture, these authors argue it must involve radical changes in power relations. Sium *et al.* (2012) further outline that ‘decolonisation is in direct opposition to colonial thinking and central to the project of decolonisation is the reformulation of the genre of the human through a multiplicity of epistemologies, ontologies and axiologies that remake the very way in which the human has come to be known and classified (p. 11).’ Fandon (1967) sees decolonisation as a historical process towards not only knowing the world but transforming it.

The secular-material ideas in our modern worldview that arose during the late medieval and Enlightenment phases in Europe were not universal, but arose out of a specific geographic and cultural context (Whitehead, 1925). The emergence of this worldview in turn led to subsequent scientific and technological advances which directly facilitated the further exploitation of lands and people worldwide by emerging imperial powers. As described by Brooke (1995), even within the imperial context, these modern ideas achieved dominance not so much because they were arrived at through scientific consensus but rather because they were considered more amenable to the economic and political interests of the powerful within the establishment.

This transition of the dominant pre-industrial ontological and epistemological worldview shared to some degree by all cultures and religions from viewing the cosmos as a living organism viewed with awe and reverence to a uniquely Western idea (at the time) of a lifeless machine that can be tinkered with, gained prominence with the onset of global capitalism and colonialism. Whether this shift from a ‘participative consciousness’ to more of an ‘observer consciousness’ that led to ‘Othering’ occurred prior and led to development of capitalist economies or happened as a result of capitalism cannot be determined. Nevertheless, this shift in worldview gradually became a global phenomenon and was accompanied by increasingly exploitative outlook towards women and the other-than-human world (Griffin, 1978; Merchant, 1980). It is noteworthy that the father of modern science Francis Bacon’s view in the 16th century that ‘knowledge is power’ gained prominence at the dawn of global capitalism and colonialism by the imperial European powers of the time. Looking from this historical context, modern mainstream science therefore cannot be separated historically from

the Western colonialist worldview. This same hierarchical grouping of knowledges, whereby Western scientific knowledge is the highest, purest and universal form of knowledge, remains an enduring colonial legacy in the dominant discourse today. Quijano (2007) describes this legacy of European rationality/modernity presented as that which is universally desired, as ‘coloniality’ explaining that this remains the general form of domination in the world today even after colonialism as an explicit political order has been destroyed:

‘The alternative, then, is clear: the destruction of the coloniality of world power. First of all, epistemological decolonisation, as decoloniality, is needed to clear the way for new intercultural communication, for an interchange of experiences and meanings, as the basis of another rationality which may legitimately pretend to some universality. Nothing is less rational, finally, than the pretension that the specific cosmic vision of a particular ethnies should be taken as universal rationality, even if such an ethnies is called Western Europe because this is actually pretending to impose a provincialism as universalism. (p. 177)’

An illustrative overview of the conceptual framework for this study has been presented in Figure 2.1 below.

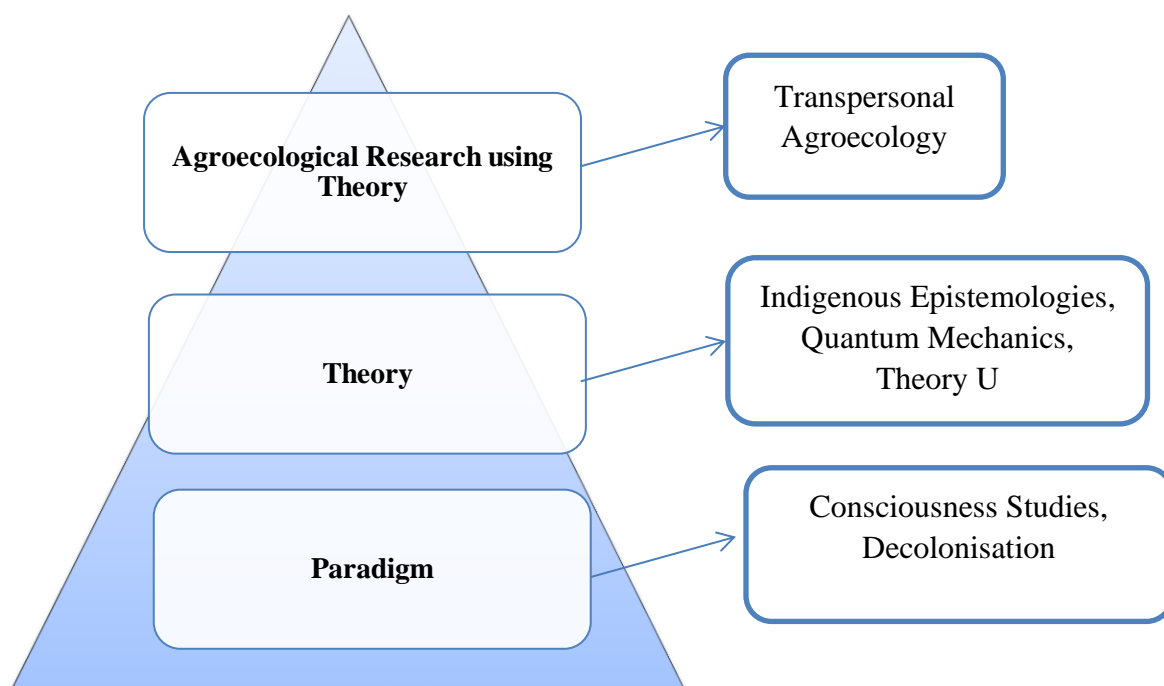


Figure 2.1 - Conceptual Framework for Subtle Agroecologies Research

Within this framework it is asserted that the dominant modern scientific worldview of secular-materialism does not need to be abandoned and replaced with another all-pervading one. Rather it is proposed that the insights arisen from modern science affords such as material and technological advancements in the physical dimension be accommodated within

a ‘pluriverse’ of perspectives where many worlds fit to bring forward a healthier, saner and sustainable agriculture. The intent is, as Kothari *et al.* (2019) note that ‘all people’s worlds should be treated with dignity and peace without being subjected to diminishment, exploitation and misery. A pluriversal world overcomes patriarchal attitudes, racism, casteism and other forms of discrimination. Here, people re-learn what it means to be a humble part of ‘nature’, leaving behind narrow anthropocentric notions of progress based on economic growth (p xxviii).’

False Binaries in Decolonisation Literature

A review of decolonisation literature however reveals some antagonistic and simplistic binaries (e.g. coloniser/colonised, Global ‘North’ / Global ‘South’, indigenous/settler) for analysis but the map here is not the territory and the situation is more complex. To some extent virtually everyone in the modern world is ‘colonised’ to at least to a degree (Barton, 2014). In the long run, everyone will be a victim of a global ecological collapse and while recognising the necessity of restorative justice towards colonised peoples and the other-than-human world is essential as part a necessary global healing process, it is ultimately in the global interest to find common grounds for moving forward rather than excluding, belittling or labelling at either side of the divide. It is often easy to lose sight in this literature of the ‘allies’ and supporting worldviews striving towards decolonisation that have also arisen within Western culture, both historical and modern, that could assist in this transition towards an ‘Age of Dialogue.’

Indeed the support for a ‘pluriverse’ of worldviews coexisting and respecting each other is not solely advocated by non-Western indigenous peoples. For example, Steiner (2004, 1914) in one of his lecture series argues that there are in total 12 ‘world-outlooks’ or ‘moods’ that are all true and valid in their own sphere but there is a human tendency to be one-sidedly influenced by only one.

Theory U as a Model of Change

Theory U (Scharmer, 2018) also provides an elegant Western-derived framework, movement and methodology to bridge the ecological, social and spiritual divides of modern times that fits into the decolonisation praxis. In Theory U ‘form follows consciousness’ and focuses on how individuals, groups and systems can unfold into their potential and provides a way of sensing and shaping emerging future possibilities. The process involves moving from a current state down into ‘blind spots’ intentionally into the unknown before again moving

upwards into a future state as new possibilities emerge. Scharmer and Kaufer (2013) expand upon this process as follows:

‘What’s being born is less clear but in no way less significant. It’s something that we can feel in many places across Planet Earth. This future is not just about fire fighting and tinkering with the surface of structural change. It’s not just about replacing one mind-set that no longer serves us with another. It’s a future that requires us to tap into a deeper level of our humanity, of who we really are and who we want to be as a society. It is a future that we can sense, feel, and actualize by shifting the inner place from which we operate. It is a future that in those moments of disruption begins to presence itself through us. This inner shift, from fighting the old to sensing and presencing an emerging future possibility, is at the core of all deep leadership work today. It’s a shift that requires us to expand our thinking from the head to the heart. It is a shift from an ego-system awareness that cares about the well-being of oneself to an eco-system awareness that cares about the well-being of all, including oneself (p.1)’

In essence, there are three steps in this process.

1. Going down the U.
2. Tapping into your blind spot at the bottom of the U.
3. Going back up the U to implement your ideas.

Scharmer (2009) outlines the 6 inflection points in this process on this journey along the U, which consists of (1) suspending, (2) redirecting and (3) letting go of past patterns. Going down the U involves gathering information in a non-judgmental and accepting way. It requires a ‘beginner’s mind’ which allows openness to new possibilities. At this point, it is important to ‘to hear them out’ without trying to impose a specific point of view. This is not a passive process and requires actively studying relevant ideas. The bottom of the U involves presencing or ‘connecting to Source’ asking ‘what is my self?’ and ‘what is my work?’ The second step of the U-process is tapping into your blind spot. This is the moment when a person intentionally enters the unknown. It is required here to let go of all past and future knowledge and become attuned to what is felt intuitively in the present. Scharmer (2018) argues that listening to the blind spot is even more important than gathering information while ‘going down the U’ since when someone really tap into it, the right answers present themselves. By passing through the threshold of the bottom of the U involves presencing and ‘connecting to Source’ that leads to the space of crystallising vision and intention. Finally, the third step of the process is going back up the U. The upwards inflection points are (4) letting

come, (5) enacting and (6) embodying. This involves bringing the solutions found in the blind spot from the realm of ideas to the physical world. Scharmer (2009) elaborates that the threshold of redirecting from the exterior to the inner way of seeing (downwards) turns into the threshold of redirecting from the inner vision to the exterior action in order to enact a rapid-cycle prototype (upwards) which in turn leads to ‘embodying’ the new ways of seeing in actions, infrastructures, and practices. This complete model is illustrated in Figure 2.2 below.

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Figure 2.2 - Theory U with the Six Inflection Points

(Scharmer, 2009)

The model has practical applications in all areas of human life, from the individual to the organisational and systems level. In a farming context, Scharmer (2018) proposes the inclusion of spiritual elements to farming systems as the most advanced 4.0 model that he suggests is currently in emergence as described in Figure 2.3:

Figure 2.3 – Theory U Agriculture Models

(Scharmer, 2018)

The 4.0 model in Scharmer's framework lends support to this thesis that the balanced and critical consideration of subtle agroecological practices in agriculture may contribute to a step-change away from the one-sided dominant worldview of modern industrial-chemical agriculture that has been prevalent over the last two centuries, now gradually moving towards sustainable practices but will ultimately need to go beyond 'organic' and consider the spiritual dimension also.

Incorporating subtle practices is not a radical suggestion but is in fact a very old tradition. Over 10,000 years of farming by humanity (Bellwood, 2005) has seen spiritual elements incorporated into agricultural practice at least to some extent up until very recent times in the West, and still so in the global 'South' which comprises the world's social majority (Apffel-Marglin, 2012). The incorporation of spiritual elements in agriculture did not die out entirely in the West either and is experiencing a resurgence as exemplified in the growth of biodynamic agriculture (Demeter, 2006).

Indigenous knowledge systems (IKS) are more aligned to the theoretical foundation of subtle agroecological practices than the dominant scientific principles emphasising abstraction and ‘control’ over the other-than-human world. IKS offer a dimension that will make the dissemination of subtle agroecological practices more palatable to a broader section of small-scale farmers in the Global ‘South’ who are less likely to be convinced by findings of the Western scientific establishment given its colonial history (Whitt, 2014).

What does It Mean to Be Indigenous?

As stated earlier decolonisation literature often draws distinctions between settler/coloniser cultures and ‘indigenous’ cultures with a focus on the last 500 years of European colonisation, so it is important to briefly indicate what could constitute being ‘indigenous’ first, recognising that these are complex and sensitive topics across both sides of the divide.

‘Indigenous’ as a term is not globally agreed upon but generally indigenous peoples have their own distinct languages, cultures, and social and political institutions that may vary distinctly from those of mainstream society (Sarivaara *et al.* 2013). The UN (ND) notes that there are 370 million indigenous peoples living in over 90 countries holding ‘unique languages, knowledge systems and beliefs and possess invaluable knowledge of practices for the sustainable management of natural resources. They have a special relation to and use of their traditional land. Their ancestral land has a fundamental importance for their collective physical and cultural survival as peoples. Indigenous peoples hold their own diverse concepts of development, based on their traditional values, visions, needs and priorities.’

The UN furthermore importantly states that indigenous peoples are those who inhabited a country or a geographical region at the time when people of different cultures or ethnic origins arrived. The new arrivals later became dominant through conquest, occupation, settlement or other methods.

Hence in summary, the specific criteria of the UN (ND) are:

- Self-identification as indigenous peoples at the individual level and accepted by the community as their member.
- Historical continuity with pre-colonial and/or pre-settler societies
- Strong link to territories and surrounding natural resources
- Distinct social, economic or political systems
- Distinct language, culture and beliefs
- Form non-dominant groups of society

- Resolve to maintain and reproduce their ancestral environments and systems as distinctive peoples and communities

Supporting this, Yunkaporta (2020) notes that ‘an indigenous person is a member of a community retaining memories of life lived sustainably on a land-base, as part of that land-base. Indigenous knowledge is any application of those memories as living knowledge to improve present and future circumstances (p.34).’

The ‘Non-Indigenous’

Aside these estimated 370 million people, the remainder of the world’s ‘non-indigenous’ population are even more difficult to describe given that every geographic region has had its own unique history of migrations, invasions, displacements and forcible conversions. However, it is doubtlessly simplistic to group them together in monolithic terms such as ‘settler’ against ‘coloniser’. It is not within the remit of this research in agriculture to further classify or distinguish these ‘two’ groups, only to posit that traditional indigenous knowledge systems are on the whole more conducive to the subject of this type of exploration than that of the dominant Western ‘left-hemisphere’ consciousness which will be covered further. It is also important to emphasise that there are divergences of thought both in indigenous and Western cosmologies.

Rasmussen (2021), speaking from a Nordic animist perspective, expresses reservations over modern people who do not belong to an oppressed minority group calling themselves ‘indigenous’ since the broader usage of the term draws away focus from peoples who are presently struggling to retain their traditions and cultures from the effects of modernity and colonisation, preferring the term ‘traditional’ instead for those seeking to recover their ancestral knowledges.

By accepting this premise, those of us who have lost our traditional knowledge are therefore no longer indigenous and part of the necessary decolonisation work means reclaiming this knowledge as part of one’s ‘inner work’. It would entail re-establishing connections to a land-base, in essence to ‘re-indigenise’ (Nelson, 2018), possibly via a bioregionalism framework rooting ourselves and forming community in a landscape once again (Thayer, 2003; McGinnis, 1999). Supporting this, mythologist and poet Martin Shaw (2018) also notes that ‘indigenous’ is a complicated word, especially for those of us of European descent who do not come from an intact indigenous culture often having lost this centuries or even millennia ago, but muses that the process forward towards becoming indigenous means being not ‘from’ but ‘of’ a place which also has a spiritual dimension:

‘To be of is to hunker down as a servant to the ruminations of the specific valley, little gritty vegetable patch, or swampy acre of abandoned field...To labour under a related indebtedness to a stretch of Earth that you have not claimed, but has claimed you ...To be of means to listen. To commit to being around, to a robust pragmatism as to what this wider murmuring may require of you. It’s participation, not as a conqueror, not in the spirit of devouring, but of relatedness. I think this takes a great deal of practice... It means not talking about a place but with a place – and that’s not a relationship available indiscriminately, wherever you travel, but something that may claim you once or twice in a lifetime. It means staying when you don’t feel like staying.’

Jackson (1994) writing from a non-indigenous agricultural perspective concurs with the importance of becoming ‘native’ to a place again, noting that for Western civilisation, ‘we have been through the hypocrisy of the church, the atrocity of the nation-state that peaked with Hitler, and now we are devotees of economics, the encoded language of human behaviour that directs us toward ecological bankruptcy. It is time to move more aggressively on to the fourth phase, already under way, ecology (p. 90).’

Scharmer and Kaufer (2013) provides the Theory U model for such a process describing an emerging global shift in societies to ‘4.0’ moving from ‘ego-centric consciousness’ (‘me’) to an ‘eco-centric consciousness’ (‘we’). The purpose of Theory U according to Scharmer and Kaufer (2013) is to enable practitioners to enter into conscious relationship with the ‘deeper source level’ p. 18) from which they act, helping them to recognise the invisible roots of dysfunctional social patterns and systems, to acknowledge and renounce them, and to co-create new pathways and structures that may facilitate profound societal transformation.

The process of becoming ‘native’ to a place is a difficult one for the majority of the world’s people since most of us, at least in our mental landscapes have become ‘colonised’ and lost our land-based communities, cultural heritages at least to some degree (Barton, 2014). Forbes (2009) indicates a key component towards a shift away from the dominant mode of consciousness is letting go of certainty and ‘arrogance’ and having the humility to ask questions that do not have easy answers in moving towards a ‘tangible unknown’ (Sium *et al.* 2012, p. 12) into the future.

‘Inner Decolonisation’ as First Step to Re-Indigeneity?

Grappling with this difficult question of consciousness would entail that an ‘internal’ decolonisation is required first and this would mean becoming cognisant of how one’s own conditioned thought patterns and assumptions about the world may be subjective and not

‘universal.’ Whitehead (1925), a Western philosopher, explicitly outlines how the dominant materialist scientific principles describing how the universe works are not universal but could only have evolved within a unique Western European historical context. Other cultures, in particular those of indigenous peoples, evolved their own ontological and epistemological frameworks in parallel and could equally claim legitimacy, possibly more so given that they have often been integrated into their environments for centuries. In contrast to the virtual eradication of older knowledge systems in Europe, some of these non-Western cultures with their knowledge systems remain relatively intact with a pre-industrial worldview that has great relevance for the process of decolonisation. Smith (2012) notes that ‘as Europeans began to colonise other parts of the world, notions of rationality and conceptualisations of knowledge became the convenient tool for dismissing from serious comparison with Western modes of thought those forms of ‘primitive’ thought which were being encountered (p.72).’ Santos (2014) has termed this as ‘epistemicide’ and Scharmer (2010) refers to this as ‘attentional violence’ where indigenous perspectives have been ignored in the dominant scientific discourses.

What is often unclear from the decolonisation authors is who is ‘ourselves’ whether it is targeted primarily towards indigenous peoples only or the wider global culture, most of whom are no longer ‘indigenous’ with reference to the earlier definition by Yunkaporta (2020). My study takes the view that decolonisation must be all-encompassing taking everyone’s lived experiences into account, including Europeans and their descendants who have also been adversely affected by the modern mode of consciousness. While the decolonisation authors cited here all share their opposition to the ‘colonial’ mentality based on modern Western thinking which is understandable in light of historical atrocities, their critiques can also appear one-sided in that it is portrayed as a simple juxtaposition between coloniser and colonised. The reality is that the picture is more ‘grey’ and complex, in that for example there are segments in the ‘Global North’ that are more aligned with an ecological indigenous worldview. Also, there are evidently segments in the ‘Global South’ who are dedicated aspirants and adherents to the Western mind-set and way of life. In balance therefore it is not a ‘black and white’ argument. For instance, it is worth noting that many benign technological and cultural contributions of the West have been readily adopted by other cultures. Generalising or belittling a specific ethnic group, Europeans or their descendants which is often explicit in a decolonisation context. Portraying them for example as one-dimensional ‘settlers’ and personally culpable for historical wrongs is problematic and possibly counterproductive for a worldwide consciousness shift that also need to take place within in the dominant culture, perhaps first and foremost. In perspective, while historical

wrongs should be acknowledged and where possible made amends for, I believe it is essential to realise that moving forward ‘we are all in this together’ as one humanity with recognition that there have been significant benign technological and cultural advances from within Western cultures that are also valuable and transferable in contributing to regenerative cultures worldwide.

A Process towards Decolonisation and how this might affect our Relationship with Agriculture and Nature?

With the understanding of how a shift of consciousness became misaligned or ‘diseased’ and gave rise to colonialism and other modern ills, the next step is to explore processes to move towards a healthier state of consciousness. Joanna Macy, a prominent veteran environmental activist outlines a process how this can be achieved (Macy and Brown, 2014) stating that embarking on this process of ‘decolonising the mind’ is possible for everyone but postulates it is more difficult to access for those whose ancestors were focused on colonisation, conquest and enslavement.

Waziyatawin and Bird (2012) define decolonisation as ‘the meaningful and active resistance to the forces of colonialism that perpetuate the subjugation and/or exploitation of our minds, bodies, and lands. Decolonisation is engaged for the ultimate purpose of overturning the colonial structure (p.3).’ Recognising that the consciousness that led to colonisation cannot be left unexamined and intact in any serious decolonisation endeavour, Macy and Brown (2014) provide three dimensions to assist the ‘Great Turning’ from an Industrial Growth Society to a Life-Sustaining Society:

- 1) Actions to slow the damage to Earth and its beings
- 2) Analysis and transformation of the foundations of our common life
- 3) A fundamental shift in worldview and values

Macy and Brown (2014) argue that the first two dimensions are in themselves insufficient without being accompanied by a fundamental shift in consciousness. It is primarily in this third dimension that my endeavour in exploring subtle agroecological practices is situated as a pre-requisite for their broader implementation in the second dimension that will then in turn facilitate the first.

2.2 Can Modern Western Science and Indigenous Science Co-Exist?

Haverkort (2021) highlights the many impressive achievements and benefits that modern Western science has bestowed on the world scene, but has ultimately been unsuccessful on its

own in fulfilling its promises to serve human needs and thus calls for the incorporation of different worldviews in agricultural practices. In this context it is right to be upfront and cognisant of the many calamities that the applications of modern Western science when it has been divorced from ethics have inflicted on peoples and ecosystems worldwide. However, in balance one can also be respectful of its historical technological and medical advances and potential through its methods for global regeneration as a complement to other ways of knowing rather than the exclusive one. The aim therefore is not to denigrate modern science as a methodology but criticise its presumption (pretention) held by some of its proponents elevating reason (e.g. Pinker, 2018; Dawkins, 2006) about all ways of knowing. This is in essence a monolithic and restrictive worldview which remains at its core a colonialist perspective.

Modern scientific methodology itself is necessary and useful in a ‘pluriverse’ to complement both other Western epistemologies (e.g. quantum mechanics and Goethean science) and non-Western ways of knowing, and this is the reason that it has also been included as a research method of this thesis with a field trial (Chapter 7) and also given serious attention in the systematic review (Chapter 8). In agreement to this, Mignolo and Walsh (2018) as decolonisation authors critique the Western materialist notion that the world consists of a single temporality but notes this does not mean an outright rejection or negation of Western thought which is also part of a ‘pluriverse’ and although it lives in most/all of us this does not mean a blind acceptance of all its precepts.

Indigenous knowledge systems similarly are very diverse and also cannot be neatly put into a single category. Notwithstanding, the cosmologies of indigenous peoples and the hundreds of millions of small-scale farmers in the Global ‘South’ tend to have a similar ontology and unifying principles that are far more amenable to a more holistic ecological worldview, which also align better with the principles of quantum mechanics discovered in modern Western science in the early 20th century. An overview of the modern scientific and indigenous epistemologies will be covered next with the suggestion that quantum mechanics could possibly serve as a bridge between them.

‘Two’ Sciences - Either/Or or Both/And

Recognising that there are differences and divergences within each of the ‘Western’ and ‘indigenous’ knowledge systems, their juxtaposition in two broad groupings can be helpful to draw a map in order to facilitate discussion for the purposes of this study. It needs re-stating however, that it is not a black and white question of ‘either-or’ but rather ‘both-and’.

Battiste and Henderson (2000) describe indigenous worldviews as an expression of the vibrant relations between people, ecosystems and the other living beings and spirits that share their lands. Craven and I'poyi (2009) identified some main tenets of indigenous science as follows as illustrated in Table 2.1. To further illustrate the commonalities and divergences between modern 'Western' science (positivism) and indigenous sciences according to these authors Aikenhead and Michell have (2011) have provided a summary in Table 2.2.

Table 2.1 Key Tenets of Indigenous Science

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Craven and I'poyi (2009)

Table 2.2 - Commonalities and Divergences - Indigenous and Modern 'Western' Science

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Aikenhead and Michell (2011)

Furthermore, according to Aikenhead and Michell (2011), indigenous knowledge is intimate, subjective, moral, and ethical and correlated to human action with respect to seven future generations. In juxtaposition, 'Western' science is formal and 'objective,' and thus is not involved with normative prescriptions of human action. The end motive for action in indigenous knowledge is to achieve a harmony with Mother Earth for survival and wise stewardship, whereas Western science is motivated by power and dominion over nature for materialistic progress, political power, healthy well-being and academic curiosities.

While instructive and raising valid points for reflection, the premise of 'two sciences' with few common grounds is criticisable for several reasons. First, it represents as a false binary and a simplification, as well a caricature of each way of knowing. Indigenous science has also its own intellectual components being also concerned with 'how' Nature works to ensure their cultural survival. Secondly, there are also reflective albeit marginal traditions within Western science too such as Goethean science (Holdrege, 2005; Hoffman, 1998) which will be elaborated on in Chapter 7.

It is an old tradition from the Western Enlightenment since the 18th century to romanticise and idealise pre-contact cultures living in harmony with Nature before European influence (e.g. Rousseau 1979; 1762). As noted by Welch (2002), this idea is still perpetuated in some modern Western spiritual movements like New Age and Paganism. However, the picture presented herein of indigenous peoples is still that of an 'Other' (although in this case positive), and even if well-intended is a colonised way of thinking. It is equally problematic to denigrate anything 'Western' as it is to idealise indigenous cultures and worldviews. Rather than the 'Noble Savage' stereotype, Marshall (1992), a historian, noted that many Native American tribes were "intolerant, patriarchal, hierarchical and warlike" (p. 148). In a 'pluriverse' of worldviews, the premises of both 'Western' and indigenous systems are both valued and balanced for what they can offer to the 'orchestra' of human knowing, each can be beneficial within their own framing and context so it is not that one is 'bad' and the other is 'good' when viewed from this lens within a decolonisation context.

With the above elaboration, it is clear from the above distinctions by Aikenhead and Michell (2011) that many divergences in worldview exist between the 'Western' dominant science and indigenous worldviews. It is also evident that there is a power imbalance favouring the colonial dominance of Western science over indigenous knowledge systems with the former usually eclipsing the latter.

Moving into the agricultural domain specifically, agroecologists Norgaard and Sikor (1995) classifies the two ways of knowing broadly into ‘dominant’ and ‘alternative’ as described in Table 2.3:

Table 2.3 - Dominant and Alternative Premises in Science

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Norgaard and Sikor (1995)

The same authors argue that the ‘alternative’ premises are generally more optimal for agroecologists working with living ecosystems and small-scale farmers. However, Norgaard and Sikor clarify that this does not mean rejecting the ‘dominant’ premises in science, in stating (with my emphasis in italic):

‘The five dominant isms are perfectly good suppositions from which to reason. They have facilitated a level of prediction and control beyond that known before. The prediction and control of science following the dominant isms has proven to be more limited, systemically and temporally, than has been believed by conventional scientists. These limitations are at the root of the unexpected consequences, the problems which occur to other parts of the agroecosystem, off the farm, and in later years. *Had modern agricultural technologies and institutions not been based too solely on these premises, had other patterns of understanding been given equal respect, the long-term and systemic consequences for people and for agroecosystems might have been foreseen, ameliorated, or avoided. The problems of conventional agriculture result from the dominance of these isms (p. 24).*’

2.3 A Change of Perspective in ‘Western’ Science?

There are some indications of a changed perspective on the dominant culture’s exclusivity and perceived superiority compared with indigenous knowledge systems in the light of modern scientific understandings of the nature of reality, most notably quantum mechanics. This was expressed by the theoretical physicist F. David Peat (2005). Peat lived among the Blackfoot, a Native American tribe where he found that they were already aware of quantum principles ‘discovered’ by 20th century Western scientists such as superposition, entanglement, uncertainty, non-locality and undivided wholeness, concluding that:

‘During the first contact, Europeans were confident that they were the bearers of truth, truth about religion and government, truth about science and law. But today that confidence has been shaken. For some people, the truths of institutional religions are no longer self-evident,

or even credible. And science, which has been through two great revolutions—quantum theory and relativity—is much less confident about the nature of objective truth. (p. 45)’

A problem addressed here is of ‘fundamentalism’ or the tendency to generalise that has been prevalent in modern ‘Western’ science and its tendency to specialise wherein what appears to work in a laboratory then becomes regarded as generalisable into an inflexible worldview that there is ‘One Truth’ (e.g. Scientism). According to Frankl (1969) the problem with the state of current science (reductionism) is not so much the specialisation by scientists, but rather that specialists were generalising. Concurring with this and noting how science strayed from its original remit of modest investigation into the physical world to make assertions about nature as a whole, the quantum physicist Heisenberg (1958) notes that ‘the scientific worldview has ceased to be a scientific view in the true sense of the word (p. 29).’

One of the aims of the decolonisation praxis is to provide a counterbalance with divergent perspectives which is why this research’s conceptual framework bases indigenous epistemological underpinnings as the primary, but not exclusive basis for exploring subtle agroecological practices. It appears that there has long been a wide chasm between modern science and other ways of knowing but this is no longer the case. Heisenberg (1958) among others indicate that recent advances in quantum mechanics from within the modern ‘Western’ scientific tradition has identified startling insights into the sub-atomic realms that could potentially present a mutually respectful acknowledgement and accommodation with the other ways of knowing, such as indigenous knowledge and ancient wisdom traditions.

Quantum Mechanics – A Bridge from Modern Western Science to Indigenous Knowledges?

Quantum mechanics have been described by Peat (2005) to share many principles with indigenous knowledge systems, specifically his observations of the Blackfoot tribe in the United States. In order to provide a balanced perspective indicating that 20th century scientific ‘discoveries’ align with indigenous practices, some of the principles are mentioned here which run counter to Cartesian-Newtonian science that remains the dominant mode of thought in modern mainstream pure and applied sciences. A selection of the most pertinent principles are summarised here with my own interpretations how they could link to the decolonisation of agriculture.

- 1) **Superposition:** One of the most revolutionary discoveries in 20th century physics established that it is possible for a tiny piece or ‘quanta’ of matter to exist in its potentiality as both a wave and a particle until the moment the quanta is observed.

This was discovered in the famous ‘double-slit’ experiment where electrons were fired at a screen with two slits. When the screen had one slit, the electrons (previously thought to be particles only) that went through the screen registered as a particle pattern, but when two slits were opened, the particles that went through registered as a wave pattern. Also, referred to as ‘wave-particle duality’, this indicated that it is possible for a sub-atomic particle to exist potentially as both a wave and a particle simultaneously before it passed through the screen.

What was particularly extraordinary about this experiment was that when an observation device was set up to monitor how this was possible, the behaviour of the electrons changed into a particle pattern again. This indicated that there was an ‘observer’ effect and that the scientist is not a neutral, separate or disembodied entity observing a discrete mechanical universe. Instead the object studied interacts with the observer (Albert, 1992). Reality, thus, can be viewed as dependent of observation on the micro-level and not independent in itself. The ‘double-slit experiment’ revealed that the very act of observation will determine how the focus of study will interact. As such, it is a mutually interactive relationship that is also potentially personal. The implication is that the result obtained by one researcher with a specific treatment on a field at a specific point in time and space cannot be assumed to be universalised (Albert, 1992). Every person, every plant, every animal and every field is unique and thus allows for potentially infinite variations to occur.

- 2) **Non-Locality:** Particles observed in the quantum state have the ability to “know” each other’s quantum state irrespective of location and thus communicate ‘superluminally’ (Popescu, 2014). Non-locality or ‘entanglement’ contravenes the principle of locality, namely that distant objects cannot have a direct influence on each other. Non-locality also challenges Einstein’s theory that no object or signal can move faster than the speed of light; conversely it states that two particles can affect each other simultaneously at any distance apart (Al-Khalili, 2003).

As noted by Capra (1996) ‘living systems are integrated wholes whose properties cannot be reduced to those of smaller parts and that ‘there are no parts at all; what we call a part are merely a pattern in a set in an inseparable web of relationships (p. 36).’ One proposed implication of this is that human beings and living things are not separate from each other but all are connected via an energy field (Lipton, 2005). Non-locality entanglement posits that two particles having had an earlier mutual interaction continue to behave in ways that cannot be described independently of each

other despite being spatially separated even over long distances. What affects one living thing hence affects all via this energy field. (Bohm, 1980, p.225) describes this energy field as the 'implicate order' where 'everything is enfolded in everything'

The notion that objects apparently separate on the macro level can impact each other at spaces and distances that are not measurable or determined presents many additional variables into the farming context to further complexity. Potentially, the plants or seeds in an experiment will have had 'experiences' that have left an imprint on them that could be carried forward into the experiment. For example, in a universe consisting of a multitude of relationships that are more complex than those revealed by sensory perception, it is not inconceivable to suppose that a planetary alignment could affect a crop growing cycle or a research experiment.

- 3) Uncertainty:** The uncertainty principle theorises that the building blocks of the universe on a subatomic level are not mechanical and fixed (Heisenberg *et al.*, 1962). Certainty in a fixed outcome has been replaced with a probability and this sense of 'mystery' could instil a sense of humility in the researcher. Quantum research has shown that the sub-atomic building blocks of the universe do not behave in a deterministic fashion and could allow for free will and/or an element of randomness in events. In the quantum view of the universe, definitive 'proof' is elusive with the universe being in constant evolution and flux, meaning that observations cannot be predicted and a range of possibilities exist (Lipton, 2005). The belief that at the deepest level we cannot truly 'know' or 'control' but instead seek to 'understand' or 'dance' with the universe comes much closer to ancient Eastern and indigenous knowledge systems than Western Cartesian-Newtonian science.

Arguably one of the most hubristic tenets of Newtonian science is its claim to 'certainty' and that the 'laws' of the universe can be understood and at least in theory understood with complete precision through human reason. Schrödinger's experiments in the sub-atomic realm indicate that the best that can be aimed for is a degree of certainty and probability rather than complete assurance. With the appropriate knowledge and skill, one can therefore aim to influence events towards a certain outcome but the end result can never be known until it is actually produced. Sheldrake (2012) speculates that the regularities observed in natural phenomena are more like evolving habits than fixed universal laws.

- 4) Undivided Wholeness:** The physicist David Bohm whom Einstein once referred to as his intellectual successor developed the theory of ‘explicate’ and ‘implicate’ order. The explicate order was the physical world and the implicate order was its source with both kinds of order constantly unfolding and enfolding into each other.

Bohm (1980) envisaged the universe as informed by quantum physics as ‘a sea of energy’ (p.242) theorising a ‘new general physical description in which everything implicates everything in an order of undivided wholeness (p.196-197)’ consisting of ‘a single, unbroken, flowing actuality of existence as a whole, containing both thought (consciousness) and external reality (p.xi)’. Furthermore, Bohm posited that ‘we have to regard the universe as an undivided and unbroken whole’ to bring about a new worldview radically different and in juxtaposition to the ‘crude abstraction and approximation’ (p.158) as that of Newton and Galileo.

This notion that the external visible universe that we interact with as a living experience is actually enfolded in an ‘implicate’ order of immaterial sea consciousness that connects everything together and as such ‘consciousness and reality would not be fragmented from each other (p.xiv) is possibly the most controversial principle arising from David Bohm’s work. When fully absorbing the implications of Bohm’s theory, a radical transformation of the researcher would entail becoming mindful of the following consideration: if the Universe is conscious and intelligent, then human consciousness is not unique and paramount. If everything in the material world is derived and informed from the conscious invisible world, then this warrants careful attention and respect not only for the consciousness that may live behind the material objects in the other-than-human world in general, and the farm in particular. Taken on a further level, ‘invisible’ other-than-human intelligences that may be more or less conscious than humans may also be present and actively participating in the experiment and could alter the results if they choose to do so. The implication of a conscious universe also reintroduces a moral dimension into the experiment where all actions taken that are ‘out of balance’ to general harmony could have possible negative implications.

2.4 Transpersonal Agroecology

What indigenous knowledge systems acknowledge and quantum mechanics strongly indicates is that the role of consciousness plays an active pivotal role in humanity’s

engagement with the wider world. In the agricultural domain, an existing framework that also recognises this is transpersonal agroecology (TPAE), which offers further support in providing the basis for subtle agroecological practices.

TPAE is a theoretical framework outlined by Cox (2014a) drawing from a psychological perspective which is aligned with indigenous knowledge systems and the views of many visionary farmers and authors worldwide. It recognises that farming is about far more than a productionist mentality but also informed by values, alternative methodologies, and spirit. Herein it is intended to transform a farmer's mind-set with the proposition that the farmer's internal state is just as vital for alternative agriculture as the external practices. In particular, TPAE's framework is grounded in transpersonal ecology (Fox, 1995) and the collective learnings of 20th century non-indigenous spiritual farmers (e.g. Fukouka (1993; 1978), Berry (2015; 1981), Jackson, (1994; 1980) and environmental philosophers (e.g. Leopold (1949), Callicott (2010; 1999) Steiner (2012; 1924), Bailey (1995a, 1995b), Berry (1999, 1988).

TPAE as described by Cox (2014b) 'goes beyond traditional Western concepts of the "self" of a farmer, taken for granted from the dominant Western view of science and Judeo-Christian religions. Within this conceptual framework, this sense of self is changed thoroughly, as are the farming practices...whereby the farmer comes to identify with the farm and the beings on the farm. The particulars of transpersonal agroecology are derived from the commonly held beliefs of various theorists, including some of these specified earlier. First, they advocate for a reshaping of the alternative farmer's very identity, based on a revised relationship with the beings on the farm, as well as the awareness that this revised sense of self is an outcome of the process of being in the new relationships. Second, these agricultural theorists see alternative methodologies and epistemologies as relevant, believe a conversation about values is necessary, and recognize that this paradigm shift also has spiritual implications. Finally, they argue against scientism and economism, which typify the ideology of modern conventional agriculture. (p. 62-63).'

Cox (2014b) expresses concern over the 'subtle materialism' of other alternative agricultural movements stating that 'by default, a practitioner of these alternative agricultural practices must diverge from a reductionistic, mechanistic, materialistic epistemology in order for the spiritual to play a role (p.48).' This topic will be delved into further in Chapter 5 of this thesis with a review of all the major alternative agricultural movements' possible receptivity to including the spiritual dimension in their praxis.

Cox (2014b) states (my emphasis in italics) that 'addressing the farmer's inner attitude was the intent of TPAE, the necessary step is the development of *agricultural practices*. Taken

collectively, integral agriculture provides an intellectual and philosophical space - with an eye to the practical implications - to ask a very important question in the quest for a truly sustainable agriculture: *What would the practices of a sustainable agriculture look like that take seriously the mind-set of the farmer and the interiority of the more than human world?*. Some answers were put forward — the practices are loving ones, sensitive to the ‘creatureliness’ of the beings to which the farmer is relating. This gives the farmer a realistic appreciation of the interconnections between self and other, and as a result of the extended conversations between them, the farmer embodies a sacred, non-dual, integral way of practicing agriculture, exhibiting right relations between herself and the more than human world (p.135)’. One of the positive attributes of TPAE, both in its formation and progression, is its framework is broad enough to incorporate other ‘non-indigenous’ worldviews as evident from the diverse writings of Bailey (1995a, 1995b) including Christianity, Fukuoka (1978, 1993) with Shinto/Zen and Steiner (2012; 1924) for Anthroposophy, an esoteric Christian spirituality.

In summary from this overview, there are many epistemological frameworks that can give credence to subtle agroecological practices, both from indigenous cultures, ‘Western’ quantum mechanics and a wide selection of writings from influential agricultural authors worldwide described whose views are synthesised in transpersonal agroecology. Radically different shifts in worldviews and practices are considered necessary to regenerate the Earth now at this time when modern industrial agriculture having been developed from a ‘colonial’ can not sustain itself much longer. It is this overview of the origins and end-game of industrial agriculture which will be the subject of the next chapter.

Chapter 3 : A Synopsis of the Failings of Industrial Agriculture and its Origins

A Time of Transition?

At the time of finalising this thesis, in 2022, we are living in a time of upheaval, when radical transformations in the dominant culture are necessary in light of challenges of such a magnitude never faced before. The ecological challenges posed by climate change and mass extinctions, alongside the worldwide financial crash in 2008, a global pandemic in 2020-2022, political shifts towards isolationism and populism and continuing global inequality worldwide are at levels no longer sustainable (Hickel, 2020; Hickel, 2017 and Hardoon *et al.*,

2016) and have all led to growing hostility and disillusionment with existing structures and their underlying thought patterns. Past roadmaps no longer seem appropriate and the new ones still being formed have made evident that we in Western modernity are living in a confusing time of transition, described as ‘the space between stories’ (Eisenstein, 2013), or between the ‘No Longer’ and ‘Not Yet’ (Santos, 2014).

It is suggested by Cotgrove (1982) that a paradigm is dominant not because it is held by the majority of the population in a society but because it is held by dominant groups. Indications are that the established powers are losing control and that the problems created from the cultural and political confines of Western modernity have no modern solutions (Santos, 2014). Indeed, there are tangible signs that a realisation of this is emerging and actual progression towards more holistic ecological and social awareness is already well under way; the largest social movement in history exists that is working towards social justice and ecological awareness with up to two million organisations worldwide (Hawken, 2007). These movements span all spheres of human life trying to emerge into a coherent pattern. Hawken (2007), classifies this as a type of spiritual awakening, in that:

‘It has been said that we cannot save our planet unless humankind undergoes a widespread spiritual and religious awakening. In other words, fixes won’t fix unless we fix our souls as well. So let’s ask ourselves this question: Would we recognize a worldwide spiritual awakening if we saw one? Or let me put the question another way: What if there is already in place a large-scale spiritual awakening and we are simply not recognising it (p. 191)?’

Considering Hawken’s account of this rising global movement is from 14 years ago, this shift has accelerated rapidly further since then and shows no sign of diminishing in size and effect considering the emergence of Extinction Rebellion (2021), the Fridays for a Future (2021) youth movement and the recent popular COP26 protests (BBC, 2021) as only some recent examples. This ‘end-game of empire’ countered by emerging alternative ecological and socially focused movements is particularly apparent in the dominant model of modern Western industrial-chemical agriculture which has been exported to and also to a degree now adopted by the rest of the world. The origin of a global ‘monoculture’ was conceived historically via colonialist endeavours and today continues via its offspring global neoliberalism and this generally speaking transfers wealth and resources from the ‘South’ to the industrialised ‘North.’ It must be emphasised again here that the extraction of wealth from the rest of the world towards the colonial heartland is of course not a black/white picture and a simplification of a complex status quo; for instance, there are wealthier segments in the

‘South’ benefiting from this situation, and a large and sometimes prosperous diaspora from the former colonies now living and working in the global ‘North’.

What Led to the Modern Crisis in Agriculture?

As described earlier in Chapter 2, it is posited that the roots of colonialism and exploitative patterns towards not only people but also the natural world date back over 6000 years from the first empires that led to the subjugation of more peaceful agrarian cultures in Europe and Asia (Eisler, 1987). In this sense colonisation is not just a South-North issue. There are no long-term winners in the present system and the dismantling of an ideology of domination and its associated practices, such as colonisation, that have been imposed upon the world’s lands and people is more critical than ever. The scale of human dominance on the planet now means although only consisting of 0.01% of total global biomass, at present 96% of all global biomass of mammals consist of humans and farm livestock, with the remainder 4% for wild mammals (Bar-On *et al.*, 2018). With the current world population at 7 billion and expected to increase to 9.7 billion by 2050 (UN, 2015) more lives are dependent on agriculture than ever before in history and its transformation towards a saner model has become critical and urgent.

The industrialisation of agriculture, operating within the domination paradigm, is reliant on mechanisation, chemical inputs, biocides, ‘improved’ varieties and economies of scale via specialisation. Over the last decades this has led to both increased food-commodity production and associated population increases worldwide, but also to tremendous ecological and social calamities in its sway (e.g. Shiva, 2016a). There are multiple other approaches to enable the world to feed itself; it being a persistent false myth that organic farming necessarily results in lower yields. Studies (e.g. Pretty and Bharacha, 2014) indicate that if similar investment and focused effort was put into agroecological development, similar production gains could have been achieved in a far more sustainable manner.

The environmental philosopher Callicott (1999) states that the contemporary scientific worldview is supposed to be empirical and practical - based on what ‘works’- but that modern –industrial-chemical agriculture has failed this test of workability, stating that:

‘Notoriously it is not working, at least not sustainably and it is based on a bankrupt metaphysics, a worldview that has not sustained critical scrutiny and that is in fact, dead in pure science even though it lives on in applied science...soil compaction, erosion and the loss of fertility, the unforeseen exhaustion of fossil fuels and fossil waters, agrochemical pollution of air, surface and ground waters; and food itself; cyclic outbreaks of pests and the ensuing

dialectic of ever more toxic and intensively applied pesticides; the loss of genetic diversity and the loss of wild ancestors and relatives of our cultivars; rural depopulation and disruption of rural patterns of life; the corollary loss of centuries of transmitted agricultural experience and knowledge, the desiccation, in short, of the culture of agriculture; concentration of land ownership and the proletarianisation of farm labour...all bode ill for the sustainability of modern agriculture (p.270).’

To illustrate this scale of destruction, modern industrial-chemical agriculture is estimated to be responsible for 80% of deforestation worldwide (Kissinger *et al*, 2012), and soil degradation and desertification means that 1.3 billion people are trapped on degraded agricultural land as a result of agribusiness activities (UNCCD, 2017). According to Vallianatos (2001), this type of large-scale agriculture has led to the loss of 75% of varieties of food crops at great risk to resilience in the event of climate change.

Furthermore, the limited range of just a dozen animal species providing 90% of animal protein, and four plant species globally providing half of plant-based calories in the human diet (FAO, 2009), poses further health concerns in terms of nutrient deficiencies. Evidence is also mounting that this food produced under industrial agriculture using chemical fertilisers is deficient in vital micronutrients compared to organic food (Acharya and Kendra, 2013). Also, pesticide residues have been shown to impact human health in the general population worldwide (IARC, 2015) as well as for farmers in particular (Kirkhorn and Schenker, 2001).

In terms of the ‘feeding the world’ argument used by advocates of modern industrial-chemical agriculture to justify their practices, the promises of health, prosperity and abundance using technology and scale have not been met; in 2019 821 million people (1 in 9) still do not have enough food to live a healthy life (WFP, 2019), and conversely over 1.9 billion people are overweight with 650 million of these being obese (WHO, 2016).

As further evidence of this flawed model, the commercialisation of agriculture has resulted in over a third of the food harvested every year going to waste (FAO, 2016) thus demonstrating that the problem at present lies largely with distribution, due to governance, social inequality and postharvest issues rather than to yields and productivity.

In relation to climate change, on a global scale, agriculture contributes directly to 17% of all greenhouse gases (GHG) with an additional 7-14% caused for land use changes that are mainly agricultural (OECD, 2015). Farming is forecasted to become more unpredictable with increasing droughts, storms and flooding (UNCTAD, 2013; IAASTD, 2009a) and unprecedented forest wildfires setting ablaze millions of hectares worldwide (WMO, 2020).

The ecological degradation resulting from modern industrial-chemical agriculture was not fully understood by farmers in the early decades of the 20th century and did not enter into the general Western consciousness until Rachel Carson (2000; 1962) published the book 'Silent Spring' which exposed the indiscriminate use of pesticides and its impact on humans as well as on the other-than-human world with over two million copies sold worldwide (Griswold, 2012). It is this lack of modern understanding of how humans are intimately entangled in the natural world (both visible and invisible) that McGilchrist (2009) has termed as a failure of the dominance of the 'left' brain hemisphere that needs urgent balancing.

How is the Current Agricultural Model Failing?

While the industrial-chemical farming model has become increasingly alienated from the general public, its consequences have also become clearer to many farmers in recent years. Many have been trapped in a debt cycle from having such intensive and specialised agricultural systems reliant on external inputs, and find themselves on a chemical 'treadmill.' Millions of farmers in the global 'South' have felt compelled to borrow money to purchase such inputs, and when harvests fail they become impoverished, resulting in urban migration and epidemics of suicides (CHRGJ, 2012). In Europe, industrial-chemical farmers have become dependent on high external inputs in order to combat the increasing soil degradation and diseases, and low market prices make them reliant on public subsidies to stay profitable (Eurostat, 2015). Organic farmers working in this same paradigm too only earn marginally more on average than conventional farmers, their lower yields being partially offset by fewer inputs and premium selling prices, but nevertheless are also dependent on subsidies to stay in business (EU, 2013). In short, the failure of the status quo model in modern agriculture has become increasingly evident.

Ecological indicators too show that a transition in agriculture within the dominant culture is urgent and overdue. There is little time left, with the FAO estimating that the world has on average just 60 more years of growing crops if current patterns of soil degradation continue (Arsenault, 2016). A recent IPCC report (2019a) sets the global deadline for implementing drastic changes as being before 2030 in order to prevent a global increase in temperatures of above 1.5 Celsius and ensuing catastrophic effects of climate change. As a result of the scale of the problem becoming increasingly clear, a shift in thinking has begun in recent years and several major international institutions (UNCCD, 2017; UNCTAD, 2013; De Schutter, 2010; IAASTD, 2009a) are now advocating small-scale farming, agroecological practices and short food supply chains to replace the current dominant model.

Does Alternative Farming Go Far Enough?

There is no shortage of alternative approaches with organic farming, agroecology, regenerative farming and permaculture movements on the rise. However, it is suggested that the remedy to problems associated with farming worldwide goes far beyond tinkering with the economic system or farming methods to make them more ‘humane’ by for example merely changing farming methods or even land distribution in itself will not suffice when the underlying worldview or ideology of the dominant system remains intact and unchallenged.

As described in Chapter 2, the unsustainability of agriculture is merely one symptom of a systemic failure of global industrial civilisation due to its destructive impacts not only on the environment but also on the human societies that have been colonised worldwide over a long historical process. Writing from a Western perspective, Eisenstein (2013) notes that it has become evident to many in the early 21st century that materialism, technological reliance and faith in economic ‘development’ and ‘modernisation’ has not led to overall human happiness and harmonious social structures for the vast majority. This is the case for populations both within the wealthier Western countries and their former colonies with the latter still entangled in the web of global neoliberalism and have moved towards emulating the Western model of thinking. Once again, this is a more complex picture in that many in the ‘South’ want to emulate the Western model of modernity. In 1954 for example Haberman (2006) reports that shortly following independence from Great Britain, India’s then Prime Minister Nehru constructed large hydroelectric dams and hailed them as ‘temples of a modern India (p. 5)’.

It cannot be denied however that the spread of Western ideas and technologies have been and still are facilitated by a power imbalance from the ‘West’ in the ability to inflict large-scale violence. As Huntington (1996) notes, ‘the expansion of the West was also facilitated by the superiority in organisation, discipline, and training of its troops and subsequently by the superior weapons, transport, logistics, and medical services resulting from its leadership in the Industrial Revolution. The West won the world not by the superiority of its ideas or values or religion...but rather by its superiority in applying organised violence. Westerners often forget this fact; non-Westerners never do (p.59).’

In light of increasing awareness of modern humanity’s predicament, some attention has been given by modern academia and policy makers as to the possibility of preventing this downward trajectory (e.g. Dasgupta, 2021) but many of these initiatives although well intended still operate within the straitjacket of an economical paradigm that is also a by-product of ‘colonial’ thinking. Looking at Nature in terms of supply and demand and an ‘asset’ or trying to preserve it for its ‘ecosystem services’ can be perceived as anthropocentric and transactional perspectives. Modern humanity’s perceived primary dependence on the

economy rather than nature indicates some truth to the phrase attributed to Marxist Fredric Jameson that is now easier to imagine the end of the world than it is to imagine the end of capitalism (Fisher, 2009). From a decolonisation perspective which dismisses false binaries, it is unlikely that the replacement of global capitalism with communism, being another secular-materialist Western-derived hegemonic global economic system, would go far enough. As noted in a speech by Lakota activist Russell Means (2011), both capitalism and Marxism as doctrines are not culturally universal. Rather they belong to the modern European intellectual tradition that despiritualised the universe, furthermore stating that:

‘There is another way...It is the way that knows that humans do not have the right to degrade Mother Earth, that there are forces beyond anything the European mind has conceived, that humans must be in harmony with all relations or the relations will eventually eliminate the disharmony. A lopsided emphasis on humans by humans--the Europeans' arrogance of acting as though they were beyond the nature of all related things--can only result in a total disharmony and a readjustment which cuts arrogant humans down to size, gives them a taste of that reality beyond their grasp or control and restores the harmony. There is no need for a revolutionary theory to bring this about; it's beyond human control. The nature peoples of this planet know this and so they do not theorise about it. Theory is an abstract; our knowledge is real.’

In the dominant discourse among modern policy-makers, many of the proposed ‘green’ initiatives emerging today involves primarily tinkering on the edges of the existing dominant economic system to make it more ‘fair’, ‘green’ or ‘sustainable’ through specific policy changes. Under Macy and Brown’s model (2014) in the previous chapter, these initiatives may serve a useful transitional purpose in slowing the damage to the other-human-world in the short-term but will likely not be sufficient in themselves. Other initiatives which are more problematic in the long-term also stemming from left-brain hemisphere thinking are made to ‘solve’ the problems via a circular loop that deploys more scientific and technological innovations like geo-engineering that have undetermined side effects of the kind that led to the existing environmental problems in the first place. According to an earlier historical review of revolutionary potential by Steele (1976) all the necessary dimensions (political-legal, socio-economic, ideo-cultural, techno-demographic and natural-geographic) are flailing that are preconditions in triggering revolutions are even more manifest now in the early 21st century.

Since Marxism’s failings in the 20th century led to the discrediting and collapse of that system in most of the world and the precarious situation the world stands on as a result of late-stage

capitalism, the zeitgeist now appears ripe for new directions and possibilities. In essence, my study is based on the view that the root problem of modern agriculture and the Western industrial paradigm at large results from a ‘dominator’ consciousness which can be addressed as one way using the ‘decolonisation of the mind’ process as its remedy. The following section provides a brief historical overview into how farming systems specifically fit into this larger frame of consciousness and colonisation described earlier in Chapter 2.

How Have Farming Systems been Colonised?

In her book on decolonising methodologies Smith (2012) highlights the importance for researchers to gain an understanding of the complex ways that people were brought into the imperial system and to analyse the origins and effects of colonisation on peoples worldwide. According to this author, the fundamental objective of such work is not academic but rather to ‘retrieve what we were and remake ourselves’ (p.4) starting from a need to decolonise our minds and recover ourselves to develop an authentic sense of humanity driven by ‘a very powerful need to give testimony to and restore a spirit, to bring back into existence a world fragmented and dying’ (p. 72).

It is for this purpose that a brief historical review is necessary here to set the context for this research. However, a common misconception in historical analysis is to view the past and its norms from the perspective of present-day awareness. In contrast, human practices such as agriculture, and the ethical and social frameworks underlying them, have always been, and continue to be, evolving, and the way we see the world now will most likely not be the *modus operandi* of the future.

Most scholars concur that broad-scale adoption of agriculture arose 10,000 years ago (Bellwood, 2005), and it has been well-documented that for most of this period, agriculture was more a way of life than a specialised profession, and functioned as the interface between human culture and the other-than-human world. In this context, supplicatory measures to cooperate and work with respect and harmony with non-material and invisible forces have historically been embedded in agricultural practices in order to ensure good harvests (Botica, 2013; Kloczek, 2013; Storl, 2013; Vallianatos, 2012; Eliade, 1958).

Considering its long history, progress in agriculture has been generally slow with few technological innovations. There is well-documented historical evidence (Montgomery, 2007; Hyams, 1952) that many ancient civilisations such as Egypt, Sumeria, the Indus Valley civilisation and the Inca Empire weakened and collapsed by depleting their land bases due to abandoning holistic stewardship. In a consistent pattern, political, economic and social drives

occurring within the power structures of these empires eventually led to soil exploitation and collapse. The time lines of these historical civilisations and their collapses fit within the consciousness shift evolution theories of Wilber (1983), Neumann (1949), Gebser (1984) and Steiner (2009;1923) indicating that this development of an ego-based consciousness separated from the other-than-human world pre-dates the most recent phase of colonisation from 1492 onwards.

Crop failures led to occasional famines and many other factors additionally resulted in overall slow population growth, with the world population only doubling from 14 CE to 1650 CE (Grigg, 1987). Up until the 18th century, agriculture in the West and elsewhere was not very different from that practiced by farmers in the Middle Ages. Duplessis (2019) describes a summary of transition in agrarian relations in Europe where up to that time at least four-fifths of Europeans lived in small towns and villages or on individual farmsteads with access to live off the land with significant autonomy that they would manage autonomously in return for rent paid to lords or clergy. Gradually however, the relationship to the land began to undergo even further dramatic changes than had occurred over the previous millennia as a result of social, political and economic changes in Western Europe where the capitalist and scientific revolutions began. There were many historical, geographical, demographic and political factors that put Europe in a favourable position for global hegemony described in detail by Duplessis (2019). Wallerstein (2019) also cites agronomical inventions arising from use of animal draught-power and worldview, but also that the exploitation of colonial possessions, firstly on the peripheries of Western Europe and later overseas for the Western emergence as the dominant force in the modern 'world-system'. One result of this capitalist emergence replacing the previous feudal structures facilitated by the political and economic elite for 'productive' agriculture in order to make way for more profitable sheep farming or other 'improvements' of the land. This occurred despite the resistance of its indigenous occupants, in this case the local rural populations across Europe who were increasing being displaced from their land.

As a consequence of evictions and poverty, and also of persecution, millions of the poor had the choice to either starve or to emigrate to the colonies. It is estimated that from 1500 to the middle of the 20th century, 60-65 million Europeans emigrated overseas (Etamad, 2007) which in turn lead to the subjugation, killing and displacement of the indigenous cultures already living in those lands (Hoerder, 2002). Pulxaneeks, an indigenous activist has likened the arrival of the early settlers into North America to 'runaway teenagers from a broken home' who then projected their trauma towards indigenous populations there (MacKenzie,

2020). These traumatic events illustrate how agriculture and its practices have never been and cannot truly be separate from the larger socio-political-economic context.

Thus within that same timeframe (1492 CE-1945 CE), genocides in the colonies and internal displacements in the colonial heartlands were some of a multitude of factors that gradually led to an increasingly depopulated countryside, paving the way for modern industrial agriculture. Although of benefit for the emerging industrial class, the trends of rural depopulation and urban concentrations however were viewed by much of the general rural population as being neither inevitable nor desirable, as exemplified in the British context even in the imperial heartland. Clare (1831), the ‘peasant poet’ wrote with lament on the dissolution of English farming communities in light of enclosures and industrialisation and there was significant resistance to this process as documented by Empson (2018) and Fairlie (2009).

The advent of large-scale commodity agriculture for export led to monoculture plantations being established in the colonies which set the foundation for the present-day industrial farming systems still operating today in those regions. Williams (1944) in his book ‘Capitalism and Slavery’ notes that slavery of Africans was set up as an institution to perform the monotonous work in industrial plantations in tropical regions a precursor to this was a system of white European indentured servitude and convicts often forcibly sent to the colonies, the regions where colonists had earlier displaced or murdered the indigenous populations.

This process continues. The eviction of indigenous populations from their ancestral lands, lack of means to make a living from the land and subsequently the migration of rural occupants into the cities or overseas for better opportunities was an early precursor of the process of rural depopulation and urbanisation that is still happening at the present time in the Global ‘South’. This global trend set about by industrialisation and the mechanisation of agriculture has escalated to the extent that now 4 billion people, or more than half the world’s population, live in urban areas (Ritchie, 2018) of which over a billion of these live in slums (UN, 2019).

Is This the Last Phase in Industrial Agriculture?

It is also relevant to highlight here how the world’s population increased exponentially from an estimated 1 billion in 1800 CE to 7.8 billion in 2020 as a result of the land transformation from industrial agriculture (Grigg, 1987). This exponential rise in population can be partially explained by the major scientific developments relevant to agriculture. One such

development was made by the German chemist Justus von Liebig, considered as the initiator of modern chemical agriculture. By inspecting the ashes of burned plants, Liebig determined the amounts of nitrogen, phosphorus and potassium that these plants required and supplied these via chemical soluble fertilizers. Despite improved crop rotations using legumes, the availability of nitrogen had remained a limiting factor and organic matter was the only other possibility. In 1850 CE Liebig advocated introducing chemical fertilisers on a commercial scale. As industrialisation and advances in sciences progressed, the stage was set for this game changer in agriculture that led to an exponential population growth worldwide. It is not well-known however that Liebig in the latter part of his life regretted his contribution to this development making farmers reliant on chemical solutions to replace organic matter after having witnessed the beginnings of the industrial-chemical approach to agriculture. Liebig (1989; 1873) summarised his later thoughts (translated by Lovel, 2014):

‘The worship of false doctrines must be destroyed. I’ve long thought it sufficient in science to teach the truth and to spread it. However, the glorification of falsehood must be annihilated to establish a firm foundation for truth, and I’ve recently realized my error in agriculture was not pursuing this further. As my final wish, I pass on the mission to cleanse my teachings of the accumulated lies others have used to obscure them, these many years. In truth, agriculture is both contemplative and spiritual...Unfortunately almost no one realizes the true beauty of agriculture—its inner spirituality and beingness. It warrants the best efforts of science—not only because of its produce and the benefits it bestows on those who understand the language of nature—but because it stands above all other vocations....At one time, the view permeated my every fibre that plants obtained their nourishment in soluble form. This view was false and was the source of my errant behaviour, but the human mind is a curious thing and it sees nothing beyond its field of vision.’

Evidence of the modern industrial culture’s attitude towards the land can be seen today on a global scale. Contemporary examples of the destructive effects of the exploitative agricultural system on the environment and local population in the global ‘South’ have been documented by many authors (e.g. Shiva, 2016a; Vallianatos, 2001). The same effects of land concentration, disconnection and rural displacements have continued to occur in the heartlands of industrialised countries in the West over the last few decades (Berry, 2015; Pollan, 2001; Logsdon, 1994; Jackson, 1980).

Can Agriculture be Redeemed?

Considering that 2.6 billion people rely on agriculture as a livelihood (IAASTD, 2009a) and this land use accounts for 36% of the land in the world (World Stat Info, 2016), agricultural transformation is a major instigator for broader change, and changes in practices in this area could form the basis for new regenerative cultures worldwide.

There are many historical references to the social, economic and ecological problems linked to agriculture, even before the industrial-chemical model (Montgomery, 2007; Hyams, 1952) compared to a hunter-gatherer lifestyle. However, the current state of depleted land base and high population means that the planet at the present time cannot support ‘going back’ to pre-farming cultures for the majority in the near term. With only an estimated 10 million people worldwide presently living as hunter-gatherers (Burger and Fristoe, 2018), the remainder of humanity comprising the overwhelming majority of people worldwide is globally dependent on a healthy agriculture, which also include the several hundred million pastoralists who manage up to a third of the world’s range land with their livestock (FAO, NDa), albeit their practices follows pre-farming patterns. Steiner (2012; 1924) summarised the multifunctional importance of agriculture in his agricultural lectures which inspired the biodynamic farming movement to be discussed in Chapter 5, in that ‘the interests of agriculture are bound up, in all directions, with the widest spheres of life. Indeed there is scarcely a realm of human life which is outside our interest. From one aspect or another, all interests of human life belong to agriculture (p.3).’ This overlap of agriculture with other sectors can be summarised in Figure 3.1.

Figure 3.1 - The Inescapable Interconnectedness of Agriculture's Different Roles and Functions

(IAASTD, 2009b)

This overview presented up to this point is broad and covers a vast variety of topics. These could certainly be debated at length with arguments and ‘facts’ for and against, and whether causes were effects or vice versa, and interpretations of this in setting the context for this research are ultimately my own.

In summary, my thesis suggests from the presented sources that a consciousness shift occurred several thousands of years ago that led to the enhanced development of an individual ego at the expense of separating from a more interdependent worldview entangled in the living world. Whether this shift was an ‘evolution’ or a ‘mind virus’ is debatable but significant evidence points that modern humanity is at a turning point towards a new global shift already underway (Capra, 1988; Scharmer and Kaufer, 2013; Scharmer, 2018). Part of the decolonisation praxis involves challenging and seeking alternatives to the outcomes of this shift which were imperialism, colonialism, capitalism, industrialism and modern mechanistic science which in this last phase of the modern age was developed and propagated by Western imperial powers whose ideas have now become the modus operandi of most of the world’s population.

The ‘polycrisis’ highlighted at the beginning of this chapter and its possible origins are controversial but many authors have argued that it arose from a change in consciousness (McGilchrist, 2009; Taylor, 2005; Tarnas, 1991). Rather than attempting to provide a definitive answer, it is this question that guides the specific topic of this research, which is agriculture: Is the presentation of an epistemological alternative to the dominant status quo the necessary first step toward a truly decolonised agriculture that could in turn serve as a lever to a broader social and ecological transformation?

Can Agriculture be Decolonised – Inside-Out?

In providing a holistic overview of present developments, Western authors (Scharmer and Kaufer, 2013; Eisenstein, 2013; Taylor, 2005; Swidler, 2002; Capra, 1988) indicate that a unique and opportune moment exists at the present time to bring about a major consciousness shift worldwide. This has been gradually building up over the last several decades and is potentially nearing its fruition. Archimedes is attributed with saying ‘Give me a lever long enough and a fulcrum on which to place it and I shall move the world.’ A worldwide radical transformation of agricultural praxis could possibly be such a ‘lever’ towards this and deserves serious attention for discourse in academic research.

Before the present time geopolitical conditions have meant that the necessary shift towards a truly sustainable agriculture has been either implemented locally in isolation from the rest of the world or postponed for future generations to address. Historical reviews reveal that when dominant civilisations had depleted their natural resource base, the effect had generally been localised to a particular region or continent (Montgomery, 2007; Hyams, 1952). In such cases where a civilisation collapse was averted, a potential paradigm shift was effectively postponed by the dominant powers since other regions could be occupied and similarly exploited via colonisation. Some notable examples of this are ancient Greece and Rome, leading to their expansions from city-states into empires, and more recently from Europe to the establishment of colonies in North America, South America, Africa and Australia.

The situation is different now, however, with the impacts of the ‘Great Acceleration of the Anthropocene’ that started in the 1950s (Kunnas, 2017) with modern industrial civilisation having occupied vast areas of the world at least to some extent in terms of ideas and land use and with everyone ultimately impacted by climate change. It is difficult to estimate maximum carrying capacity for the Earth due to the many variables to consider (Cohen, 1995) but logic dictates that this carrying capacity is decreasing in light of further ecological devastations of sea and land. A study by Fischer *et al.* (2001) indicates that most of the land considered suitable for cultivation in Europe, North America and Asia is already in use; 80% of the land

remaining for cultivation in the future exists in Africa and South America but at a great environmental and developmental cost. At present, the world population is expected to increase to 9.7 billion by 2050 (UN, 2015) along with moderate to severe soil degradation having occurred on 14% of land already in cultivation for crops and at least 28% of pastoral land used for livestock grazing with persistent declining trends in productivity apparent in 20% of cropland, 16% of forest land, 19% of grassland, and 27% of rangeland (UNCCD, 2017).

This situation urgently necessitates a rapid and radical new approach to the modern human relationship with land. Scholars suggest a number of areas for change, including in the political sphere with major land reform to break up existing industrial-scale farms into smaller more productive holdings (Borras, 2009) and furthermore processes to repatriate land back to stewardship by indigenous peoples (Tuck and Yang, 2012). A recent UN report (IFAD, 2013) has already recognised that smallholders are relatively more productive per hectare than large-scale industrial farms. Such dismantlements of large landholdings to a human scale are necessary but the question remains how this ‘external decolonisation’ transition will unfold in practice and how effective they would be without a parallel ‘inner decolonisation’.

Although land reforms and restorative justice for displaced people would absolutely need to form part of the decolonisation process, many authors (e.g. Cox, 2014; Eisenstein, 2013; Berry, 1998) propose that not merely a change in ownership but a change in consciousness and relationship to the land and the other-than-human world in general is critical at this time. Questioning the established mode of consciousness in modern industrial society with its one-sided emphasis on materialistic science and anthropocentrism is perhaps one of the last ‘taboos’ of our time but this is also crumbling. For example, the last few years have shown progressively more open discourse not only about indigenous rights, systems change, and decolonisation but also subtle agroecological practices at an important national farming conference in the UK, the Oxford Real Farming Conference, alongside more mainstream agroecological practices (ORFC, 2021, Wright *et al.* 2022).

It may therefore be an opportune time at this critical juncture in history to seriously explore subtle agroecological practices from beyond their niches into a broader awareness in both academic and agricultural circles. The main target groups for adoption would likely be the current alternative agricultural movements that arose out of the dominant industrial-chemical model. The next chapter will delve deeper into histories, philosophies and future outlooks of

these movements to determine whether there is possible receptivity to go 'beyond' organic and promote a radical different alternative agriculture to the status quo model.

Chapter 4 : Review of Subtle Agroecological Practices

4.1 Methodology

This chapter aims to address the first research question:

- 1) What are the characteristics of subtle agroecological practices?

The methodology for this exploration is to firstly map the high level ‘topography’ of the landscape of subtle agroecological practices through creating a typology or classification of the practices, based on selected key references in an extensive literature review. This conglomeration enables such techniques to be identified, compared and contrasted, and serves as a foundation for expansion by future research. It provides a broad picture of the nature of these practises whilst avoiding lengthy descriptions.

Crafting a Typology of the ‘Topography’ of Subtle Agroecologies

The preparation of a systematic classification framework is helpful to develop common reference points in any field, such as in the natural sciences illustrated by detailed plant and animal biology by the efforts of Carl Linnaeus and Charles Darwin. In an emerging field like the exploration of subtle agroecologies, a similar organisational framework is equally essential albeit with the caveat that classifying and picking apart each of the subtle agroecological practices identified can be problematic. Attempting to characterise each practice in isolation follows the reductionist approach which, as noted in the conceptual framework in Chapter 2, is not optimal for agroecological research and that fragmentation generally speaking is a process to be avoided when trying to understand living complex systems. In a holistic framework it is likely that some of these techniques overlap with each other and synergies may exist that could possibly not be identified in isolation, as described by Wright (2021).

4.2 – Identifying and Classifying the Subtle Practices

The first step in the research had been to establish a structured approach to exploring the practices. Typologies in agroecological research provide a useful theoretical and practical framework to present the diversity of farming systems and associated practices, such as the AgroEcological Farming Systems (AEFS) by UNISECO (2019). For the current study, it was necessary to devise a working typology in order to answer the first research question, ‘what are the characteristics of subtle agroecological practices?’ This was a difficult endeavour

since there was no prior academic literature specifically examining this research area as a unified whole. However, hundreds of papers both in grey literature and academia were found covering a wide array of diverse practices. A broad categorisation was compiled based on my own previous research into this area, as well as a publication from academic and field experts (Wright *et al.* 2017). One main limitation in typologising the practices was that separating them from their larger context was in one sense a reductionist approach, open to critique by some in the agroecological movement (e.g. Norgaard and Sikor, 1995). Another challenge in attempting classification involved recognising that some of the practices could not clearly be delineated from each other and that some shared overlaps existed. For instance, some of the components of biodynamic agriculture include several practices (biodynamic preparations, astronomical plantings, communication with Nature intelligences) that could be considered as building upon and enhancing each other, but can also be considered as separate stand-alone practices. This possibility of a ‘cocktail effect’ among subtle practices is speculative however and was not identified as a problem in the literature reviewed. Nevertheless, taking a specific practice aside from its worldview as something separate to be studied, applied and analysed may well pose a limitation to being able to produce holistic research. In the physical realm, both biodynamic researchers (Brock *et al.* 2019) and homeopathic researchers Boff *et al.* (2021) recognise that the external factors play an important role for the efficacy of the practices explored.

This initial attempt at a classification consists of eleven core subtle practices which are presented as a ‘flower’ in Figure 4.1, with each petal denoting a category. This model aims to bring together the various practices into a single umbrella framework to conglomerate and thus become a unified reference for practices in which several also contain extensive literature reviews from robust studies (e.g. Brock *et al.* (2009) for biodynamics and Teixeira and Carneiro (2017) for homeopathic treatments).

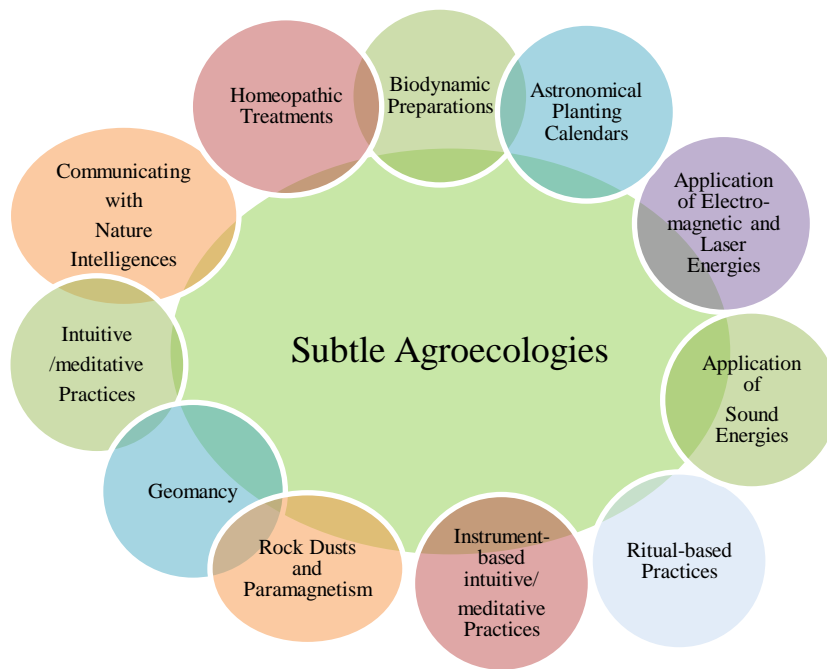


Figure 4.1- The Subtle Agroecologies ‘Flower’

For some of these practices, specific sub-categories have also been identified with inspiration for these classifications having been drawn from Wright (2021) and Kieft (ND). Some of these petals overlap where indications were found in grey literature of possible synergies between them. In future iterations, more petals could be added to this framework, including further ‘sub-petals’ under each practice, e.g. sustainable yogic agriculture (SYA), linked to personal intuitive/meditative practices. This was not done at the present time to avoid introducing further complexity to this emerging field where a high level framework was deemed better at this stage to build upon in future research. Although a reductionist framework is of recent modern origin, the model is only partly based on a reductionist approach; the ‘flower’ diagram serves as a more symbolic representation of the connections between the practices.

Relevance of the Model in for the Decolonisation of Agriculture

Models of this nature present a linkage between modern mainstream science and indigenous knowledge systems. The typology and associated diagram therefore fit into the decolonisation framework, challenging the modern materialist notion that diminishes or denies the reality of the spiritual dimension. Subtle agroecologies, in juxtaposition, as described by Lovel (2014) support a holistic view whereby nothing is left out of consideration and where many long-ignored practices may turn out to be of prime importance. It is emphasised here that the overview presented in this exploratory typology is dynamic, flexible and that the map is not the territory. Its intended aim is to serve as a high level starting point, illustration and

guidepost to future researchers. There are likely to be some fields that will be of more interest to these than others, which is why a ‘separation’ of practices is helpful.

The identified strengths and weaknesses of this typology are described in Figure 4.2

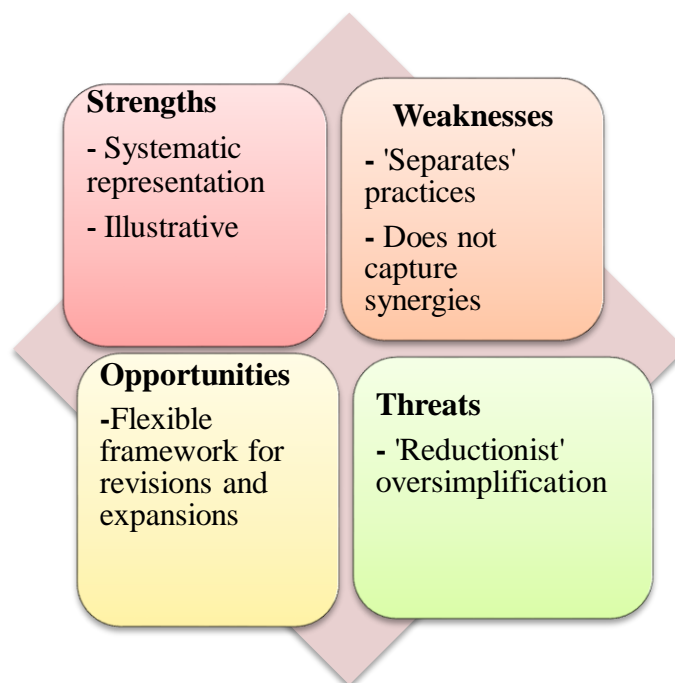


Figure 4.2 - SWOT Analysis of Subtle Agroecologies Typology

Sifting the Literature

Another challenge in reviewing both grey literature and academic literature related to how to address a vast scope of existing knowledge that could have provided a descriptive and comprehensive richness to each practice. It was tempting to add this extra depth, but it was not the original intention of the project. The typology in its final form was slimmed down to contain all but the essentials and some key references to academic papers of particular interest.

The limitation of this exploratory study as a whole has been its extent and coverage of a multitude of practices. It would have been easier to have given increased focus to one, or several of the subtle practices in more depth and thus present a more granular picture. However, it was considered that presenting a high level view of a larger number of practices provides a more valuable overall topography of the ‘landscape’ of the subtle agroecological practices at this stage. This was deemed to be of greater interest and contribution to academic research and farmers while the field is still in its infancy.

Further elaboration of each of the practices is therefore being left for future publications. In summary, while I had to content myself with the high level picture that emerged from this typology, recognising its rather rudimentary format, this nevertheless forms a foundation for future expansion and development as the field of research into subtle agroecologies enters into its next phase.

Literature Review

A general literature review was conducted to provide an introductory description of each category of subtle agroecological practices identified from prior readings on this topic. These were subsequently discussed with academic experts in this field and presented as a historical summary drawing from academic and non-academic sources. Publications in this review included grey literature such as non-academic books, theoretical and descriptive papers and websites. Data from particularly noteworthy and robust research trials found in the systematic review (Chapter 8) and literature review summaries were also presented. The compilation of sources in this chapter did not follow any systematic process; it was carried out from September 2016 – December 2020 with key words into Google. Although not as structured and rigorous as the systematic review presented in Chapter 8, this additional perspective was to provide a more rounded view from researchers and practitioner perspectives, in that there also would be some degree of value from information gathered outside peer-reviewed empirical trials, deemed appropriate in a study grounded in decolonisation with the aim to include a serious coverage of marginalised practices from the periphery.

The following sub-sections provide a synthesis of each practice presented with several key sub-practices, classified using the criteria listed in Table 4.1.

Table 4.1 - Practice Descriptors

Brief Overview	Descriptive summary of the practice
Date of Origination	Indicated where known
Geographical Spread	Indicated where known
Farmers Practicing	Approximate number of farming practitioners where known

Materials Required

Physical materials needed for the practice

Synergies with other Practices

Linkages identified with other subtle practices

Reference Site

One notable location where the practice is applied in a farming context

Reported Benefits

Drawn from peer-reviewed empirical research firstly, however it is recognised that only quantitative benefits are listed in these papers and there are possibly multiple other benefits not sought after in these trials. References are also included from non-peer reviewed research marked with an asterisk.

Main Challenges and Critiques

Summary of criticisms found in peer-reviewed literature

4.2 Biodynamic Preparations

Brief Overview

The biodynamic preparations come from biodynamic agriculture, an alternative farming system that has its basis in lectures by Austrian philosopher and social reformer Rudolf Steiner. Its basis are seven ‘preparations’ derived from Steiner’s esoteric guidelines. Steiner believed that matter and spirit were closely intertwined and that it was not possible to separate the two. He spent his final years developing new social initiatives, including agriculture because he believed that the insufficient quality of food produced by damaging agricultural practices prevented modern people from gaining an understanding of spiritual dimensions that had been possible in previous times.

Biodynamic agriculture is a holistic system of agriculture that places great emphasis on a unique and local context specific ‘farm organism’ where keeping diverse livestock and maintaining a diverse crop and natural ecosystem is encouraged along with the general organic practices. It is therefore not ideal to look at the biodynamic preparations in separation from this greater farming system since these are not merely inputs and cannot be reductively separated from the overall farm ecosystem. Nevertheless, the preparations represent the obvious ‘subtle’ and most controversial element in the system. Extensive research has been carried out to ascertain their effects, although this has its limitations and challenges (Chalker-Scott, 2013).

Date of Origination	1923
Founder/source	Steiner, (2012; 1924), Germany, Europe
Geographical Spread	Practiced worldwide in over 60 countries, but primarily in Europe and Australia
Farmers Practising	8000+ (certified), actual number is expected to be higher since non-commercial small farmers and growers and producers would not seek certification
Materials Required	Biodynamic preparations BD500 – 507, can be made on farm or purchased
Synergies with other Practices	Astronomical Planting Calendars Steiner, (2012; 1924), Homeopathic Treatments (Steiner, (2012; 1924). Minor references in Agriculture lectures Steiner, (2012; 1924) also linked to Person-based intuitive and Meditative Practices, Ritual, and Communicating with Nature Intelligences
Reference Site	Tablehurst Farm, UK

Reported Benefits (from Peer-Reviewed Literature)

Soil	Soil fertility (Garcia <i>et al.</i> , 1989), Soil microbiology (Bougnum <i>et al.</i> 2012), Soil quality (Krauss <i>et al.</i> 2020), Compost development (Reeve <i>et al.</i> 2010).
Plant	Biodiversity (seed bank) (Rotchés-Ribalta <i>et al.</i> , 2020), Anti-oxidant activity (Jarienè <i>et al.</i> 2017), Nutritional quality (Turinek <i>et al.</i> , 2017), Chemical composition (Jakopic <i>et al.</i> 2013), Growth parameters (Verma <i>et al.</i> 2011), Seed germination (Zaller, 2007).
Animal	Milk fatty acid composition (Baars <i>et al.</i> 2019), Biodiversity (earthworms) (Pfiffner and Mäder, 1997), Biodiversity (carabids, spiders and other arthropods) (Pfiffner and Niggli, 1996).
Human	None found in publications in systematic review; however this was not the subject of any of the trials found.
Other	None found in publications in systematic review; however this was not the subject of any of the trials found.

Main Critiques

The setup of the DOK trial experiment has been criticised by Chalker-Scott (2013) in that the biodynamic treatment received farm-sourced, aerobically composted manure along with biodynamic preparations, whereas the organic treatment received slightly rotted manure sourced from a different farm source (Heinze *et al.*, 2010) and additions of rock dust, potassium, and magnesium. In addition, a broad spectrum fungicide was used on the organic treatment plots up until 1991, making direct comparisons between organic and biodynamic treatments untenable. Same author notes that many trials

are done by a small number of research groups.

However, numerous comparative analysis in trials identified in this study do separate organic from biodynamic systems when comparing to conventional systems. Biodynamics is a holistic system, and it is not easy to explore the complexity of the interactions among plants, environment and human practices in a reductionist framework.

4.3 Homeopathic Treatments

Brief Overview

Homeopathy originated as an alternative medical science was founded by the German physician Samuel Hahnemann (2016; 1842). The word ‘homeopathy’ is derived from Greek origins meaning ‘similar disease.’ Its methodology is based on the idea that a small quantity of a natural substance such as a plant extract or a mineral triggering a similar symptom in a healthy individual can be diluted in water or alcohol and ‘potentised’ or ‘dynamised’ via a specific shaking process called ‘succussion’ in order to become a treatment for an ailing patient. The usage of homeopathic medicine for humans and animals is quite established, and its further applications on plants have already been identified by several researchers (Boff *et al.*, 2021; Toledo *et al.*, 2011; Bonato *et al.*, 2009; Kaviraj, 2006; Baumgartner *et al.* 2000). Agrohomeopathy is aligned with agroecological principles and addresses many of the negative effects of industrial-chemical agriculture. In juxtaposition to the allopathic model, homeopathic treatments are ecological, inexpensive, low-input, informational, and leave no harmful residues in the produce or the environment.

Date of Origination	1842
Founder/source	Hahnemann, S. (2016; 1842), Germany, Europe (homeopathy) Kaviraj, V.D. (2006), Netherlands, Europe (agrohomeopathy)
Geographical Spread	Worldwide, particularly prevalent in Europe, South America and India
Farmers Practising	Unknown- estimated thousands
Materials Required	Homeopathic remedies, can be made on farm or purchased
Synergies with other Practices	Undetermined based on publications found in this review
Reference Site	Eureka Institute, Italy https://www.dimensione-eureka.it/

Reported Benefits (from Peer-Reviewed Literature)

Soil	None found in publications in systematic review; however this was not the subject of any of the trials found.
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Plant	Growth parameters (Dandaro <i>et al.</i> 2019), Dry mass (Pulido <i>et al.</i> , 2017), Height (Pulido <i>et al.</i> , 2017), Length (Pulido <i>et al.</i> , 2017), Pathogen reduction (Klocke <i>et al.</i> 2010), Yield (Abasolo-Pacheco <i>et al.</i> , 2020), Reduced fruit rot (Khanna and Chandra, 1976, 1978).
Animal	Reduction in diarrhoea (pigs) (Camerlink <i>et al.</i> , 2010), Weight gain (pigs) (de Paula Coelho <i>et al.</i> , 2015), weight gain (cattle) (Zábranský <i>et al.</i> , 2014), Disease reduction (pigs) (Albrecht and Schütte, 1999), Fertility and reduction of still-births (pigs) (Deni <i>et al.</i> , 2015), Disease incidence (cattle) (Martini <i>et al.</i> , 2012), Reduced SCC (cattle) (Wagenaar <i>et al.</i> , 2011), Reduced FEC (sheep) (Benvenuti, <i>et al.</i> , 2011), Reduced lesions (cattle) (Chand <i>et al.</i> , 2018).
Human	Homeopathy has been extensively researched on human health, but this is not the remit of this research unless they are identified in a specific agricultural context where none were found in the systematic review.
Other	None found in publications in systematic review; however this was not the subject of any of the trials found.
Main Critiques	In homeopathy, a holistic view of disease is emphasised and individual judgement and treatment is important. This implies that when choosing the homeopathic remedy, attention is focused on the totality of the organism as a whole, including personality and behaviour, and not merely on symptoms related to the affected organ system, which makes it challenging to test in a reductionist empirical trial.

4.4 Application of Sound Energies

Brief Overview

Primordial music and sound feature prominently in many of the world's creation myths (Leeming, 2010). Sound is a vibration that typically propagates as an audible wave of pressure via a transmission medium such as a gas, liquid or solid, and each sound is characterized by its wavelength hertz (Hz), intensity (decibel), speed, and direction (Shipman *et al.*, 2012). The audible sound that is perceptible by humans has frequencies from about 20 to 20,000 Hz, and above it is ultrasonic. Sound is pervasive everywhere throughout the world and produced and perceived by animals and plants even without an eardrum (Gagliano *et al.*, 2012). The effects of sound impact not only human beings but the natural world at large and have been proven to be a key component in many ecological processes. For example, specific frequencies of bee buzzing facilitate the pollination of flowers as these sounds induce the releasing of pollen from their anthers (De Luca and Vallejo-Marin, 2013). It follows from this that the application of specific sound waves could have a positive impact in an agricultural context. For example, one company, Genodics (Prévost *et al.*, 2021) has produced devices which reproduce certain characteristics of the targeted proteins via a succession of audible frequencies establishing a structured melody.

Date of Origination	Unknown, likely thousands of years old
Founder/source	Unknown – indications are that it has been used across cultures worldwide
Geographical Spread	Worldwide, particularly prevalent in Asia, based on publications found in systematic review
Farmers Practising	Unknown - at least in the hundreds. Prévost <i>et al.</i> (2021) indicate 180 farms use the 'Genodics' devices on 2500 hectares
Materials Required	Yes –Numerous devices are commercially available with a few examples and costs provided below: Sonic Transmitter (€300) https://www.electroculturevandoorne.com/store/p41/emetteursonic.html#/ Genodics Device (Price N/A)

	https://www.genodics.com/
Synergies with other Practices	Undetermined based on publications found in this review.
Reference Site	Damanhur Foundation, Italy https://www.damanhur.foundation/project/the-music-of-the-plants/
Reported Benefits (from Peer-Reviewed Literature)	
Soil	None found in publications in systematic review; however soil testing was not the subject of any of the trials found.
Plant	Total Flavonoid content (Kim <i>et al.</i> , 2020), Biomass (Weinberger and Measures, 1978), Growth rate (Weinberger and Measures, 1978), Growth parameters (Weinberger and Measures, 1978).
Animal	Sperm quality (bulls) (Yadav <i>et al.</i> , 2018), Weight (chickens) (Donofre <i>et al.</i> , 2020), Hatchability (chickens) (Donofre <i>et al.</i> , 2020), Feed conversion (chickens) (Gvaryahu <i>et al.</i> , 1989), Reduced aggression (piglets) (De Jonge <i>et al.</i> , 2008).
Human	None found in publications in systematic review; however this was not the subject of any of the trials found.
Other	None found in publications in systematic review; however this was not the subject of any of the trials found.
Main Critiques	None found.

4.5 Application of Electromagnetic and Laser Energies

Brief Overview

Although a natural force, practical applications for electricity were few for most of recorded human history and it was not until the late 19th century that it was possible to put into application of this force to industrial and residential use. It was also during this time that the first experiments were carried out on how to harness electricity to enhance agricultural production with early trials described by Hull (1898) in his book ‘Electrohorticulture.’

Expanding on these earlier practices, the application of electromagnetic pulses and laser light treatments emitting monochromatic coherent light waves in a controlled manner are other recently developed biophysical methods for enhancing germination, shooting, rooting and plant growth and building resilience to various types of plant stressors, including drought as documented in a literature review by Rodríguez *et al.* (2021).

Date of Origination	1898
Founder/source	George Hull, United States (electrohorticulture).
Geographical Spread	Worldwide, particularly prevalent in Europe and Asia, based on systematic review findings
Farmers Practising	Unknown- estimated hundreds
Materials Required	Yes – but no devices found that are commercially available for farmers
Synergies with other Practices	Undetermined based on publications found in this review
Reference Site	None found

Reported Benefits (from Peer-Reviewed Literature)

Soil	None found in publications in systematic review; however this was not the subject of any of the trials found.
Plant	Growth parameters (Payez <i>et al.</i> , 2013), Weight (Olaniyi and Ogunlela, 2017), Germination %, (Mildažienė <i>et al.</i> , 2020) Yield (Bilalis <i>et al.</i> , 2012), Palmitic acid content (Sharaf-Eldin, 2016).

Animal	None found in publications in systematic review; however this was not the subject of any of the trials found.
Human	None found in publications in systematic review; however this was not the subject of any of the trials found.
Other	None found in publications in systematic review; however this was not the subject of any of the trials found.
Main Critiques	There are possible concerns over the health and safety of applying certain electromagnetic frequencies to living beings (SCENIHR, 2009).

4.6 Rock Dusts and Paramagnetism

Brief Overview

All agronomists and farmers agree that soil has four main components: mineral solids, water, air and organic matter (Magdoff and Van Es, 2009). The first amongst these, mineral solids, however is arguably the least emphasised even in the alternative agricultural movements. In addition to these, subtle agroecological practices go beyond these and also look at energetic component of soil, such as its paramagnetic properties in the mineral solids. As a starting point, however, a brief overview is necessary into the mineral potential of rock dusts for soil regeneration and plant health. There is credence for this since based on natural cycles leached or degraded soils are restored and rejuvenated periodically by nutrient-rich rock debris, glacial milk, volcanic eruptions and seasonal flooding (Swoboda, 2016).

Over a century ago with the emergence of chemical fertilisers, there was a counterview that is little known today, that the remediation for depleted soils could happen via remineralisation. The enlivening of the soil via paramagnetic rock powders originated in the mid-1880s from Julius Hensel, an agricultural chemist and contemporary of Justus von Liebig, the originator of today's chemical agriculture. Hensel (1894) believed that agricultural soils had been left depleted of essential micronutrients after millennia of agriculture. He argued against the use of NPK chemical fertilizers and advocated using pulverized rock powders as an alternative remedy since unlike NPK they contain important trace elements and furthermore avoided the deleterious effects of the former.

Paramagnetic rock dusts, although material in nature still have a 'subtle' component in that their functioning can be partially been explained by having a paramagnetic component. Moving beyond the accepted conventional agricultural science, Burke and Halberg (2005) cites research indicating that early civilisations had created stone structures such as Stonehenge and the Mayan pyramids to harness electromagnetic energies to enhance crop production. These ideas are also explored by Callahan (1995) who devised towers made of paramagnetic rock modelled on old Irish round towers for this purpose. He believed this component to be essential for a healthy agriculture to provide a balance to diamagnetic properties of soil and in private studies outside academia looked at the energetic properties and attempted to channel this via stone structures made of paramagnetic rocks. Although no peer-reviewed field trials were found to test this assertion, Massy (2021) reports the popularity of these 'towers of power' among regenerative farmers, in particular in Australia.

Date of Origination	Likely since dawn of agriculture (erection of stone structures mainly with
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	paramagnetic rocks to increase crop yields)
Founder/source	Hensel, J., (1894), Germany, Europe (application of rock dusts in agriculture as an alternative to NPK)
Geographical Spread	Worldwide, particularly prevalent in South America based on the findings in this literature review
Farmers Practising	Unknown - estimated thousands
Materials Required	Rock powders, primarily from paramagnetic rocks
Synergies with other Practices	Geomancy (Burke and Halberg, 2005)
Reference Site	None found
Reported Benefits (from Peer-Reviewed Literature) – Rocks Dusts Applications only	
Soil	pH value (Li and Dong, 2013), Extractable proportions for different elements (Ramos <i>et al.</i> , 2015), Concentration of soluble Ca ²⁺ , Mg ²⁺ , and K ⁺ (Lopes <i>et al.</i> , 2014).
Plant	Growth parameters (Rodrigues <i>et al.</i> , 2017), Weight (Crusciol <i>et al.</i> , 2019), Yield (Kelland <i>et al.</i> , 2020), Biomass (Rodrigues <i>et al.</i> , 2017), Health (Li and Dong, 2013), Nutrient content (micro and macro) (Ramos <i>et al.</i> , 2016).
Animal	None found in publications in systematic review; however this was not the subject of any of the trials found.
Human	None found in publications in systematic review; however this was not the subject of any of the trials found.
Other	None found in publications in systematic review; however this was not the subject of any of the trials found.

Main Critiques

Effects of rock dusts are long-term and its applications are unwieldy at a large scale. Effects of paramagnetism as theorised by Callahan (1995) has no modern scientific basis.

4.7 Astronomical Planting Calendars

Brief Overview

Agricultural astronomy features in many historical records dating back to ancient times which clearly indicate the entanglement of farming activities with the movements of the sun, moon, stars and constellations across cultures (Lehoux, 2000; Evans, 1998).

For the ancient Greeks, the forerunners of modern Western philosophy, the word ‘kosmos’ means ‘order’ illustrating the industrial worldview as an interconnected universe infused with purpose in juxtaposition with the modern worldview of a vast emptiness populated with a multitude of discrete isolated objects without underlying purpose and intent.

Astronomy was also extensively referred to in the agricultural practices by the ancient Romans described in the writings of Varro, Columella, Pliny and Palladius (Ager, 2000, Evans, 1998; Taverner, 1918). For instance, Taverner (1918) quotes Palladius instructions that "all planting should be done when the moon is increasing (p.68)’ and from Pliny that ‘all kinds of cutting...are accomplished with less damage during the waning moon (p.75)’

Date of Origination	Since the dawn of agriculture over 10,000 years ago
Founder/source	Unknown
Geographical Spread	Worldwide
Farmers Practising	Historically common worldwide including Europe up until a few hundred years ago. Hundreds of thousands estimated currently based on biodynamic farmers (8000+) and indigenous peoples worldwide
Materials Required	None, if visually reliant on moon, sun and stars
Synergies with other Practices	Detailed planting calendars can be purchased, such as the Maria Thun calendar in biodynamic agriculture Biodynamic Preparations, plus all ancient practises
Reference Site	None found

Reported Benefits from Peer-Reviewed Literature

Soil	None found in publications in review; however this was not the subject of any of the publications.
Plant	Growth parameters (Spiess, 1990a), Yield (Spiess, 1990b), Water uptake (Brown and Chow, 1973), Germination % (Zürcher and Schlaepfer, 2014).
Animal	Fertility rate (sheep) (Palacios and Abecia, 2014), Fecundity (sheep) (Palacios and Abecia, 2014), Spontaneous deliveries (cattle) (Yonezawa <i>et al.</i> , 2016).
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	None found in publications in review; however this was not the subject of any of the publications.
Main Critiques	None found.

4.8 Ritual-based practices

Brief Overview

Throughout history rituals played an important function in all human societies and this has particularly been so in agriculture (Eliade, 1958). Possibly the most well-known and widespread ritual in agriculture said to establish a link with the other-than-human world is ‘Agnihotra.’ This ritual has been designated as universally beneficial and has been freely shared worldwide from its origins in India since 1972 by Vasant Paranjpe (1989). Fire rituals or ‘yajna’ have been used in Vedic culture for millennia and sought to deliver many benefits such as bioenergy, psychotherapy, medicine, agriculture, biogenetics and climate engineering (Devi *et al.*, 2004). The Agnihotra and associated fire rituals are part of a farming practice known as ‘homa farming’ is considered to be simplified and accessible for modern times and can be practised by anyone irrespective of caste, religion, gender, age or race (Paranjpe, 1989). The intention of the yajna rituals is to remove toxic conditions of the atmosphere through the agency of fire namely that ‘heal the atmosphere and the healed atmosphere heals you (p.7)’ (Paranjpe, 1989) with the result that the purification of the atmosphere which has a positive effect on all life, enhancing its qualities for plants, animals and humans.

Date of Origination	Since the dawn of agriculture for rituals, the separation of food production from all other social and spiritual dimensions of life is a recent occurrence. 1944 specifically for Agnihotra in its contemporary practice.
Founder/source	Vasant Paranjpe, India, specifically for Agnihotra in its contemporary practice
Geographical Spread	Worldwide in over 71 countries, particularly prevalent in India and South America (Pathak and Berk, 2015)
Farmers Practising	Unknown - estimated thousands
Materials Required	A copper pyramid of a prescribed size Unbroken grains of rice, preferably less polished or whole brown rice Ghee (Clarified Butter) Dried Cow Dung made into pancake-like patties
Synergies with other Practices	Undetermined based on publications found in this review

Reference Site	Ecovillage Bhrugu Aranya http://ecovillagepoland.org/
Reported Benefits (from Peer-Reviewed Literature)	
Soil	P Solubility (Kratz and S., Schnug, 2007).
Plant	Growth parameters (Kumar <i>et al.</i> , 2017), Yield (Kumar <i>et al.</i> , 2017), Nutrient content (micro and macro) (Kumar <i>et al.</i> , 2017), Germination % (Abhang <i>et al.</i> , 2015).
Animal	None found in publications in review; however this was not the subject of any of the publications.
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	Air quality (Abhang <i>et al.</i> , 2015), Water purification (Berk and Sharma, 2015).
Main Critiques	Pertains to energies and forces not recognised as real by conventional modern science.

4.9 Intuitive/meditative practices

4.9.1 Intuition

Brief Overview

The role of intuition as the subtle ‘sixth sense’ as farmers’ *modus operandi* is not a new concept. Working closely with the land throughout the seasons has always been instinctual and ‘normal’ throughout the history of agriculture. It is only in recent times when it was compartmentalised and separated from the spiritual and social dimensions by Western modernity (Peat, 2005). This ability to connect to the wider world is not lost however and can be relearned through training and practice. Steiner (2012; 1924) described the process in a farming context as follows:

‘The peasant...is himself a *meditator*. He does indeed acquire a kind of method — a method of spiritual perception. Only he cannot express it. It suddenly emerges in him. We go through the fields, and all of a sudden the knowledge is there in us. We know it absolutely. Afterwards we put it to the test and find it confirmed. It really is so, and from such things as these we must take our start once more. The merely intellectual life is not sufficient - it can never lead into these depths. We must begin again from such things. After all, the weaving life of Nature is very fine and delicate. We cannot sense it - it eludes our coarse-grained intellectual conceptions. Such is the mistake science has made in recent times. With coarse-grained, wide-meshed intellectual conceptions it tries to apprehend things that are far more finely woven (p.51-52).’

Research done by Nuthall (2012) revealed that most of the successful New Zealand sheep farmers he studied relied on informal systems such as experience and intuition rather than externally developed generic computer programs for optimal grazing management, noting that each farm would need its own system.

Date of Origination	Since the dawn of agriculture
Founder/source	Not applicable
Geographical Spread	Worldwide
Farmers Practising	All indigenous. Modern examples include biodynamic agriculture (8000+ farms) and thousands in Shumei Natural Agriculture (Shumei, ND)
Materials Required	None
Synergies with other Practices	Synergetic with all other indigenous practices
Reference Site	Shumei Natural Agriculture Yatesbury Model Farm

3 Yatesbury

Calne, SN11 8YG

<https://shumei.uk/yatesbury/contact-us/>

Reported Benefits from Peer-Reviewed Literature

Soil	None found in publications in review; however this was not the subject of any of the publications.
Plant	None found in publications in review; however this was not the subject of any of the publications.
Animal	None found in publications in review; however this was not the subject of any of the publications.
Human	Improved decision making (Dane and Pratt, 2009), Khatri and Ng (2000), the former emphasising the increased value of intuition in unstable environments.
Other	None found in publications in review; however this was not the subject of any of the publications.
Main Critiques	Intuition is not recognised by modern mainstream science.

4.9.2 Mind-Matter Approaches

Brief Overview

The intimate connection between mind and matter is something that indigenous cultures have long recognised (Ramsay, 2012a). In recent years, this link has been given scientific credibility by a meta-analysis study carried out by two Princeton researchers Radin and Nelson (2000) reviewing 40 studies carried out from 1959-2000 showing mental intention focused towards a specific number compared to actual results in either a dice or random number generator (RNG). From a total of 515 RNG experiments by 91 researchers, the findings showed a statistically highly significant and repeatable mind-matter interaction effect whereby the intention affected the outcome of the dice or RNG roll. The authors concluded from this study that the overall results could not be attributed to chance, selective reporting or variations in design quality.

To support and systematise this in an agricultural context, field trials on this have been carried out in India by the Brahma Kumari Spiritual University (BKSU) on their system of Sustainable Yogic Agriculture (SYA). The SYA method consists of introducing systematic thought-based meditation at all stages of the crop cycle along with the methods of traditional organic farming meditation practices amongst farmers.

Date of Origination	Since the dawn of agriculture 2009 – Sustainable Yogic Farming (SYA) is a modern construct based on ancient practice
Founder/source	Brahma Kumaris Spiritual University
Geographical Spread	Worldwide, but primarily in India and Europe based on findings in this literature review
Farmers Practising	Unknown – estimated thousands
Materials Required	None
Synergies with other Practices	Undetermined based on publications found in this review
Reference Site	Tapovan Farm Himalaya Marg, Near Brahma Kumaris World Spiritual University, Sector 16, Sector 22, Chandigarh Website not available

Reported Benefits (from Peer-Reviewed Literature)

Soil	None found in publications in review; however this was not the subject of any of the publications.
Plant	Yield (Pandey <i>et al.</i> , 2015), Protein % (Pandey <i>et al.</i> , 2015), Oil % (Pandey <i>et al.</i> , 2015), Weight (Pandey <i>et al.</i> , 2015), Biomass (Pandey <i>et al.</i> , 2015), Growth Parameters (Ducharme, 2007), Germination % (Stephen <i>et al.</i> , 2018), Decreased pest damage (Roney-Dougal and Solfvin, 2003).
Animal	None found in publications in review; however this was not the subject of any of the publications.
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	None found in publications in review; however this was not the subject of any of the publications.
Main Critiques	Mind-matter connection is not recognised by modern mainstream science.

4.10 Geomancy

Brief Overview

Geomancy has been defined by Pennick (1978) as ‘the science of putting human habitats and activities into harmony with the visible and the invisible world around us (p.7).’ The word itself means divination or foresight by the earth; this involves using various tools to access ‘hidden’ knowledge that is not available to the five senses by connecting to the energy of the earth. Geomantic practices have been used in all cultures to some extent since it was considered common knowledge up until recent times that super sensible realms play a role in human affairs.

Although this worldview has diminished in the global ‘North’ and elsewhere now as a result of modernity/coloniality (Mignolo, 2007), geomancy however remains popular as a developed system in Asia. The most well-known geomancy system, Feng Shui, originates from China as a theory and practice for the placement of structures attuned to the harmony of the land and the elements. It has been defined by Skinner (1982) as ‘the art of living in harmony with the land, and deriving the greatest benefit, peace and prosperity from being in the right place at the right time (p.5)’ Rossbach (1983) describes Feng Shui as ‘an eco-art dealing with conservation, ecology, orientation, and spatial arrangement – basically how and where man should place himself or build his shelter in this vast world. It is a means to define one’s position in the universe, and then improve on it. (p.2).’

Feng Shui literally translates as ‘wind and water’ and was introduced to the Western world by Ernst Eitel (1979; 1873) living in China as a missionary in the late 19th century. It was described thus because ‘it is a thing, like wind that you cannot comprehend and like water, which you cannot grasp (p.2).’ Feng Shui and related geomantic applications as landscape healing have little usage in the West but increasingly adopted in a domestic setting.

Date of Origination	Over 3000 years old
Founder/source	Unknown
Geographical Spread	Worldwide, particularly prevalent in China and the Far East
Farmers Practising	Unknown - estimated thousands in South and East Asia based on the findings in this literature review
Materials Required	Depends on school, the ‘Compass’ school requires a Feng Shui compass or ‘Luo Pan’
Synergies with other	Undetermined based on publications found in this review

Practices

Reference Site None found

Reported Benefits (from Non-Peer Reviewed Literature)

Soil None found in publications in review; however this was not the subject of any of the publications.

Plant None found in publications in review; however this was not the subject of any of the publications.

Animal None found in publications in review; however this was not the subject of any of the publications.

Human Health, Prosperity, Good luck (Rossbach, 1983).

Other Harmony in landscape (Eitel (1979; 1873).

Main Critiques Pertains to energies and forces not recognised as real by conventional modern science.

4.11 Instrument-based intuitive practices

4.11.1 Dowsing

Brief Overview

Dowsing is a type of divination practice that could have widespread impact and usage in subtle agroecological practices with potentially unlimited possibilities for application. Willey (1984) defines dowsing as the exercise of a human faculty which permits one to obtain information in a manner beyond the scope of the standard human physical senses of sight, sound, touch.’ Unlike intuition, tools are often used to assist in increasing a person’s sensitivity to receiving answers to questions that go beyond the five senses.

Gardner (2012) proposes that dowsing can be divided into two aspects ‘location’ (finding things) and ‘divination (finding things out). Many theories abound how the dowsing could work and it remains a highly controversial subject. Neuroscientists estimate that the human brain processes an estimated 400 billion pieces of sensory information per second; however the conscious mind filters to only around 2000 of these perceptions (Dispenza, 2007) based on what has been important for survival in the past due to latent inhibition (Radin, 2006). There have been some investigations to test the usefulness of dowsing for scientific research in other areas. In geology, one oft-cited peer-reviewed scientific paper is from Betz (1995a), a German physicist who has carried out extensive experiments over many years on water dowsing. This key review summarises several experiments carried out in Germany and abroad with the rigour and control intended to convince the scientific community. The results of these trials showed favourable indications that dowsing does work, with for example one experiment in Munich involving 40 testers and 3000 experiments showing results outside pure chance with probability at 1: 1,000,000. In another detailed scientific study carried out by Betz (1995b), expert dowsers working on drilling wells in overseas development projects had an overall success rate of 96% from 691 drilling wells in Sri Lanka compared to an expected success rate of 30-50% from conventional techniques.

Date of Origination	Unknown – estimated thousands of years old
Founder/source	Not applicable
Geographical Spread	Worldwide, particularly prevalent in Europe and the United States based on the findings in this review
Farmers Practising	Unknown
Materials Required	Most practitioners prefer to use dowsing rods, pendulums or another instrument, but can be done with reflexology

Synergies with other Practices	Undetermined based on publications found in this review.
Reference Site	None found
Reported Benefits (from Non-Peer Reviewed Literature)	
Soil	None found in publications in review; however this was not the subject of any of the publications.
Plant	None found in publications in review; however this was not the subject of any of the publications.
Animal	None found in publications in review; however this was not the subject of any of the publications.
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	Locating water sources (Betz, 1995a, 1995b)
Main Critiques	Pertains to energies and forces not recognised as real by conventional modern science.

4.11.2 Radionics

Brief Overview

Radionics is a type of divination very similar to dowsing, but is generally done using specific instruments. The Radionic Association (2020) website describe radionics as:

‘a healing technique in which our natural ESP faculties are used both to discover the energetic disturbances underlying illness and to encourage the return of a normal energetic field that supports health...For the purposes of assessment and treatment, radionics sees organs, diseases and remedies as having their own particular frequency or vibration. These factors are expressed in numerical values which are known as “rates” and radionics instruments are provided with calibrated dials on which such “rates” are set for analysis and treatment purposes. These figures have a significance more symbolic than mathematical...Radionics can be used to treat not only people but animals, plants and the soil wherever in the world that need exists, and with no depletion of material resources.’

Radionics originates from medical experiments in the early 1900s by a medical doctor Albert Abrams (1922) who proposed that every disease and every natural phenomenon was a matter of vibrations and healing could occur via the transference of specific rates of resonance received from a healthy sample. A cure via an instrument operated by electricity could subsequently transfer that resonance to the patient without the need for the patient to undergo a physical treatment.

Date of Origination	1949
Founder/source	Albert Abrams
Geographical Spread	Worldwide, but particularly prevalent in Europe and the United States based on the findings in this review
Farmers Practising	Unknown
Materials Required	Radionics Instrument There are many devices that are commercially available ranging from hundreds to thousands of £. Here is one example that was used for the field trial experiment described in Chapter 8: https://quantumagriculture.com/product/quantum-agriculture-radionic-instrument/
Reference Site	None found
Synergies with other	Intuitive/meditative practices, biodynamic preparations (Lovel, 2014)

Practices

Reported Benefits (from Non-Peer Reviewed Literature)

Soil	Soil remediation and determination of potencies (Diver and Kuepper, 1997).
Plant	Foliar feeding (Kuepper, 2003).
Animal	Diagnosing medical treatments (Diver and Kuepper, 1997).
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	Transmitting treatments over a wide area (Diver and Kuepper, 1997).
Main Critiques	The energetic methods are not recognised as valid by modern mainstream science.

4.12 Communication with Nature Intelligences

The role of intuitive and meditative practices can also be taken a step further to establish communication with other realms in Nature. This section highlights some of these avenues identified.

4.12.1 Plant-Human Communication

Brief Overview

In the Western classical Greek and subsequent Christian ontologies, plants have traditionally been placed at a low rung in the natural ‘hierarchy’ above minerals and below animals (Gagliano *et al*, 2017; Hall, 2011). However, Hall (2011) outlines that this ‘zoocentric vision’ has not been universally accepted as true; in Hindu, Jain, Buddhist and indigenous cultures plants have been considered as fully sentient beings with their own attributes of mentality, at times even attributing them a ‘personhood’ greater in capability and worth than humans. Primavesi (1991) attributes the dominant Western mainstream view of a ‘hierarchy’ in nature as an intended method by domination systems stating that:

‘Hierarchy in this sense is not merely a social condition or a classification; it is also a state of consciousness, a sensibility towards phenomena at every level of personal and social experience. It reaches into the core of the psyche by internalising domination and subordination as internal traits of human nature; by separating us from the subjects or objects presented to us on a hierarchical scale. (p.17).’

Vertosick (2002) terms this ‘brain chauvinism’ prevalent within the Western tradition that intelligence and behaviour requires a nervous system. Nevertheless, the idea that plants possess a degree of sentience and ability to actively interact on par with humans has been put forth into the Western public mainstream in a seminal popular book by Tompkins and Bird (1989;1973) describing experiments where plants indicated responses like recognition, pleasure, pain, fear, anticipation and even telepathic connections with humans. Tompkins and Bird (1989; 1973) notes the implications for agriculture could be via an active plant-human collaboration in plant breeding such as the varieties developed by Luther Burbank and Washington Carver in the early 20th century.

Date of Origination	Unknown – thousands of years old
Founder/source	Unknown
Geographical Spread	Worldwide
Farmers Practising	Unknown – estimated to be very few

Materials Required	None
Synergies with other Practices	Intuitive/meditative practices
Reference Site	None found
Reported Benefits (from Non-Peer Reviewed Literature)	
Soil	None found in publications in review; however this was not the subject of any of the publications.
Plant	Determining plant qualities useful for humans (2018). Improved plant breeding (Keller, 1983).
Animal	None found in publications in review; however this was not the subject of any of the publications.
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	None found in publications in review; however this was not the subject of any of the publications.
Main Critiques	Plant-human communication not recognised in modern mainstream science.

4.12.2 Deva Communication

Brief Overview

The recognition and communication with the spiritual entities of other-than-human world is of course not a new idea and was also acknowledged as reality in pre-industrial European cultures and still remains so in indigenous cultures today.

The notion that conscious communication and cooperation with such beings as ‘devas’ and ‘nature spirits’ is possible received some public attention in the 1960s at a remote New Age community at Findhorn in Scotland. The noteworthy and publicly discussed experiment by the Findhorn Community (1975) in establishing an extraordinary abundant and diverse garden featuring 22-pound cabbages and 60-pound broccoli in unfavourable conditions however is unique at the present time. Findhorn was the first community where such conscious communication with Nature intelligences arose in a modern 20th century Western industrial cultural setting which had several centuries earlier broadly dismissed such communication as myth and superstition without any practical aspect.

Date of Origination Since the dawn of agriculture.

1960s – Findhorn Community

Founder/source Not applicable

Findhorn Community, Scotland for a modern example of active deva-human collaboration

Geographical Spread Worldwide

Farmers Practising Unknown – estimated to be very few in the West, but likely greater numbers in the world’s social majority

Materials Required None

Synergies with other Practices Intuitive/meditative practices

Reference Site Perelandra Center for Nature Research

<https://www.perelandra-ltd.com/>

Reported Benefits (from Non-Peer Reviewed Literature)

Soil	None found.
Plant	Yield (Findhorn Community, 1975), Health (Hawken, 1976).
Animal	None found in publications in review; however this was not the subject of any of the publications.
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	None found in publications in review; however this was not the subject of any of the publications.
Main Critiques	Existence of non-material beings is not recognised by modern mainstream science.

4.12.3 Nature Constellations

Brief Overview

Nature Constellations are a relatively recent development arising out of a psychotherapeutic approach called Family or Systemic Constellations deployed by Bert Hellinger in Germany who was trained in various Western therapeutic modalities and also influenced by the indigenous knowledge and understanding of the Zulu people from having spent 16 years among them in South Africa (Franke, 2017). The process involves a trained facilitator (Constellator) solving a specified problem by intuitively letting the client assign and arrange unrelated individuals in specific roles and locations in the room as ‘reps’ (representations) of concerned stakeholders. From this setting wherever they were placed, the ‘reps’ would describe what their bodily sensations, their emotional state and their relationships with the other reps, with the intended outcome to solve a problem. Although there are no published peer-reviewed English language studies into its efficacy growing body of anecdotal and case study data that suggest that participants benefit from the insights resulting from the process (Cohen, 2006).

In using Nature Constellations as a method, these can include other-than-human representatives, such as animals, plants and components of ecosystems. Roussopoulos (2021) describes case study experiences using this method that yielded insights that none of the actors would have known beforehand and yielding positive and surprising results indicating its possible value to agriculture, in that the method allows access accurate information about the other-than-human world and establish communication to solve problems co-creatively.

Date of Origination	1980s (Systemic Constellations) 2000s (Nature Constellations)
Founder/source	Bert Hellinger, Germany, Europe, but it likely has influences from indigenous Zulu ancestor reverence traditions (Cohen, 2006).
Geographical Spread	Worldwide
Farmers Practising	Unknown – estimated very few
Materials Required	None, but other human participants and a facilitator are required.
Synergies with other Practices	Intuitive/meditative practices, ritual-based practices
Reference Site	None found

Soil	Soil remediation (Roussopoulos, 2021) – case studies.
Plant	Health (Roussopoulos, 2021) – case studies.
Animal	Animal welfare (Roussopoulos, 2021) – case studies.
Human	None found in publications in review; however this was not the subject of any of the publications.
Other	None found in publications in review; however this was not the subject of any of the publications.
Main Critiques	The methods are not recognised as valid by modern mainstream science.

Having laid out the groundwork with a categorisation of these practices, the following subsequent chapter provide further exploration of these practices. Firstly, Chapter 7 provides the methods and results of an original field trial conducted by myself. From this experiment follows a critical impact analysis of existing peer reviewed research trials (Chapter 8) before leading on to more qualitative methods in a social studies context, case studies (Chapter 9) and finally a farmers’ survey (Chapter 10). However, as the preliminary step research was carried out to gauge whether the emergent alternative agricultural movements would have any possible interest in adopting these methods and how these movements have been impacted by decolonisation initiatives. This will form the subject of the next chapter.

Chapter 5 : A Review of Current Agricultural Movements as Possible Beneficiaries of Subtle Agroecological Practices

Alternative farming movements have emerged in the agricultural domain over the last 100 years as counter currents to industrial-chemical agriculture and are gradually increasing in their outreach at the present time. The topic of this chapter is to review how alternative they are in their openness to different epistemologies entailed by subtle agroecological practices and their openness to decolonise based on a literature review. Although recognising that this may not present a complete picture without deploying other research methods, this review is justified to lend support to the hypothesis that the broadest interest in subtle agroecological practices will be from these alternative movements rather than modern industrial farmers. In order to assess possible interest for the subject of this study, this section will delve further into each of these alternative agricultural movements and discuss their philosophical underpinnings and how the decolonisation praxis has affected them to date.

These agricultural movements based on time-tested knowledge that have entered mainstream thought in recent decades are biodynamic agriculture (Steiner 2012; 1924), organic agriculture (Balfour, 2006; 1943), agroecology (Altieri, 1987), regenerative agriculture (Toensmeier, 2016) and permaculture (Mollison and Holmgren, 1978). While having different areas of focus, all five alternative movements share unifying ethics and principles that their followers subscribe to (Agroecology, 2016; IFOAM, 2016; Permaculture Association, 2016; Regeneration International, 2017; Biodynamic Association, 2017). All five alternative agricultural movements' principles are relatively more amenable to a more ecological consciousness compared to the modern industrial paradigm. Nevertheless, at the present time biodynamic agriculture is the only movement originating from a different ontology and epistemology and openly advocating subtle practices (Wright, 2021). Of course there are many other smaller alternative agricultural movements, such as Shumei Agriculture, Homa Farming and Sustainable Yogic Agriculture, the latter described as a case study in Chapter 9), but these are of such small size and do not presently have the international outreach and literature to classify them as a 'movement' in this thesis.

All the alternative agricultural movements are more aligned with the 'New Ecological Paradigm' (NEP) as described by Beus and Dunlap (1990) and stand in divergence to modern industrial agriculture which fits into the Dominant Social Paradigm (DSP) as described by Pirages and Ehrlich (1974). According to Beus and Dunlap (1990) the tension between the two competing paradigms can be summarised in the following six dimensions (DSP vs. NEP)

in Table 5.1. Given the present predominance of the DSP paradigm, it is not really accurate to say there is direct opposition between them and most of these alternative movements in their present form coexist as niche systems within the large dominant paradigm.

Table 5.1 - DSP and NEP Paradigms in Agriculture

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Beus and Dunlap (1990)

Despite the contradictions in these two paradigms, just like the false dichotomies discussed in decolonisation in Chapter 2, it would also be simplistic to brand them as simplistic binaries in terms of 'right/wrong' or 'good/evil' but rather that they exist at differing locations on the same spectrum. Very few people embody one paradigm as a totality; most people live in both to some degree. It is perhaps more helpful to view them a polarity of opposites and their interplay is necessary to bring about something new, similar to the ying/yang forces in Chinese philosophy as one of the decolonised practices covered in this study. Thus, seen from this perspective they provide a useful model to describe the forces at work in the early decades of the 21st century. The DSP or 'yang' has been increasingly dominant and out of balance during the last five hundred years with a peak reached in the 20th century. However, there are many indications as outlined in the previous chapters that the power of the DSP is now waning with the NEP or 'yin' now emerging as an increasingly influential force.

Furthermore, a review of all the alternative agricultural systems indicate that they all share a similar ecological knowledge system differentiated by the conventional knowledge system as outlined by Röling and Jiggins (2000) and described in Table 5.2.

Table 5.2 - Farming Systems Alignment with Conventional and Ecological Knowledge Systems

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Röling and Jiggins (2000)

It is not possible to uniformly label all the other five alternative agriculture, however an extensive review of major literature and seminal works indicates that with the exception of biodynamic agriculture, the other four alternative movements, although clearly more in an 'new ecological paradigm' than chemical-industrial agriculture have on the whole predominantly tended to focus on positivist scientific approaches to make their case as part of

their moves towards greater impact within the present dominant system (e.g. Lampkin (1990) for organic farming; Gliessman (2015) for agroecology; Mollison (1988) for permaculture and Toensmeier (2016) for regenerative agriculture).

In essence, positivism prescribes that only “factual” knowledge gained through observation via the senses, including measurement, is valid and trustworthy. This epistemology arose out of 18th century Enlightenment-era Europe but remains the dominant system of knowledge in the natural and applied sciences today where agriculture has been taught in universities worldwide. Figure 5.1 illustrates the epistemological placement where based on this review the actual science and practices publicly advocated within each of these alternative agricultural movements based on the reviewed literature. This is not to imply that the movements themselves (to the extent they are organised) or their supporters may not have an interest in subtle agroecological practices.

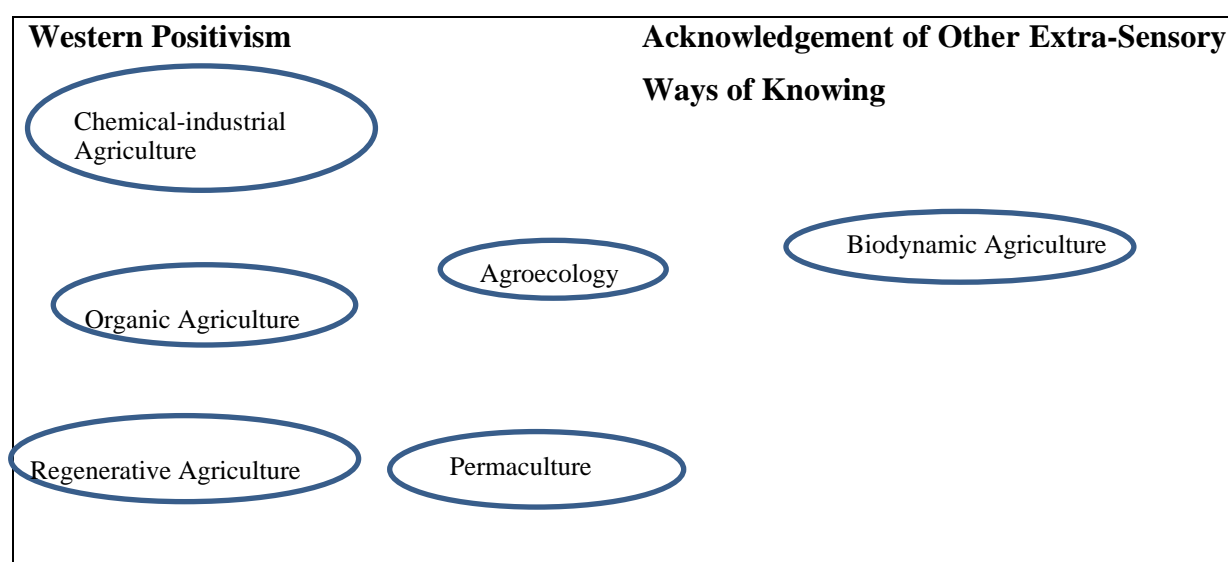


Figure 5.1 - Epistemological Framework of Alternative Farming Movements

It is for the aim of exploring the above assertion that some interest is already present within the agricultural movements for subtler agroecological approaches that the following sections will further review and discuss the literature behind these five movements, the priorities, histories, their philosophies and future outlook, in particular towards alternative epistemologies in a decolonisation context.

5.1 Biodynamic Agriculture

Overview and History

Biodynamic agriculture is perhaps the best known alternative farming system deploying several of the subtle agroecological practices outlined in Chapter 4. This movement originating from the philosophy of Rudolf Steiner, an Austrian esoteric thinker and social reformer has made significant headway since its inception in 1923 and continues to do so although still in the periphery of the organic movement as a whole. The biodynamic certifying body Demeter (2016) has estimated that there are over 300,000 hectares and 8000 farms in over 60 countries farmed according to certified biodynamic principles and this has been steadily increasing. This figure however does not present the complete picture since there are many smallholders who are farming using biodynamic methods but are not registered under Demeter due to the certification costs.

Biodynamic agriculture grew out of Rudolf Steiner's anthroposophy or 'spiritual science' drawn from German mysticism, esoteric Christianity but also incorporates elements from Vedic philosophy such as reincarnation and karma. Steiner recognised that matter and spirit were closely intertwined and that it was not possible to separate the two. To counter the forces of materialism, he formed a worldwide association in his own words 'of people whose will it is to nurture the life of the soul, both in the individual and in human society, on the basis of a true knowledge of the spiritual world.' (Rudolf Steiner House, ND). Steiner spent his final years developing new impulses for the advancement of agriculture in his belief that the insufficient quality of food produced by modern industrial agricultural practices prevented people from gaining an understanding of spiritual dimensions that was possible in previous times. What is called by biodynamic agriculture today grew out of a series of eight lectures delivered by Steiner (2012; 1924) in Koberwitz (in present day Poland), at the request of some farmers who had become concerned about the fertility of their soils and deteriorating seed quality as a result of industrial-chemical methods. Biodynamics is a complex system and consists of many elements such as the concept of the 'farm organism' and has its own cosmology, epistemology and ontology whereby the biodynamic preparations and an astronomical planting calendar are two core practices which will be covered in further detail in subsequent chapters. The role of biodynamic agriculture as a precursor and major influence on the contemporary organic movement has been well-documented (Paull, 2014, Conford, 2001) but despite this very few people in the mainstream today know what is biodynamic agriculture and it remains as a niche within the larger organic movement.

Philosophy

Biodynamics as a philosophy and practice operates within the anthroposophical worldview which is very complex and difficult to grasp in its entirety but has its foundation in the belief

of the spiritual world that can be directly perceived by anyone with the inclination to do so (Steiner, 2011; 1925; Steiner 1989; 1922).

Steiner (2012; 1924) however was clear that his methods went far beyond what is understood by mainstream reductionist science saying that:

‘Real science only arises when you begin to control the working forces. But the living plants and animals — even the parasites in the plants — can never be understood by themselves...Anyone who thought of the magnet-needle alone — anyone who looked in the magnet-needle itself for the causes of its always turning northward — would be talking nonsense. We do not do so; on the contrary, we take the whole Earth and assign to it a magnetic North Pole and a magnetic South. The whole Earth must be included in our explanation...What does science do nowadays? It takes a little plate and lays a preparation on it, carefully separates it off and peers into it, shutting off on every side whatever might be working into it...By and by it has come to this: scientists always have recourse, more or less, to their microscope. We, however, must find our way out again into the macrocosm. Then we shall once more begin to understand Nature - and other things too (p. 119).’

Future Outlook towards Decolonisation

Biodynamic agriculture today is a growing movement that is spreading worldwide according to the figures in its certification organisation Demeter (2016). Nevertheless, biodynamic methods being underpinned by a radically different mode of consciousness to the mainstream agricultural sciences has been ridiculed and dismissed by conventional natural scientists in academia. For example, biodynamic agriculture has been labelled as ‘irrational’ and ‘pseudo-science’ by Kutchera (2016) and ‘occult and dogmatic’ by Kirchmann (1994). Research into its methods nevertheless continues to this day and there are 86 peer-reviewed studies in more mainstream agricultural journals indicating some efficacy (Brock, *et al.* 2019). In more recent years, biodynamic research has broadened its scope to allow room for discussion for other practices outside those specifically described by Rudolf Steiner within its headquarters the Goetheanum including yogic agriculture (Goetheanum, 2018) thus indicating its willingness to form alliances with other spiritual agricultural movements worldwide. Furthermore, the movement has made active public attempts to include a diverse international audience including the Global ‘South’ and addressing colonial issues of exclusion and promote greater diversity within the movement (Carlson, 2020). Biodynamic agriculture, although still a niche sector within the large organic agriculture movement, has kept itself together as an agricultural movement presenting an alternative to the modern industrial paradigm despite overtly presenting its spiritual underpinnings.

5.2 Organic Agriculture

Overview and History

The organic agriculture movement arose as a countermovement to the advent of the industrialisation of agriculture that was already underway in the early 20th century and later became industrial-chemical agriculture following the end of World War 2 in 1945. Its history and the main figures in the movement have been documented in detail by Conford (2001, 2011). Prior to the industrial inputs from chemically derived pesticides and fertilisers, all agriculture worldwide was ‘organic’ and hence there was no need to label it as such. It is not widely known that the earliest figures in the organic movement, such as Lord Northbourne who coined the word ‘organic’, were influenced by the biodynamic movement initiated following the Agriculture Lectures given by Rudolf Steiner (2012; 1924) at Koberwitz, present day Poland. The early collaboration between the organic and biodynamic movements and in particular with Steiner’s former student Ehrenfried Pfeiffer, who would later help establish the US Biodynamic Association, have been documented by Paull (2014) in his biography of Lord Northbourne. Other prominent figures in the organic movement were similarly interested in biodynamic agriculture, such as Eve Balfour, one of the founders of the Soil Association who wrote the following preface of Pfeiffer’s book ‘Soil Renewal and Fertility’ (1947):

‘When science was first applied to agriculture the traditional wisdom of the husbandman, built up through the ages by careful observation of natural phenomena, was condemned by science as superstitious nonsense and discarded. So the farmer died and his wisdom with him, and the agriculturalist took his place. This unfortunate, deprived of his faith in, and knowledge of, ancient wisdom, has to rely on science alone, and science has let him down. It is time that we retraced our steps and tried again. By this I do not mean that we should go back to blind acceptance of the so-called superstition of our ancestors, nor do I mean that we should scrap the scientific knowledge we have gained; far from it, but we should examine again the beliefs of our forebears and study the observations on which they were based, and we should use our new scientific knowledge to interpret those observations and to sift those belief...The truly scientific mind is an open mind. Not accepting blindly, but equally not rejecting blindly. Above all it is a humble mind, recognizing how much more numerous are the things we don't know, than the things we do know, and that even the things we think we know are but half truths.’

It is the unscientific mind—possessed, alas, by too many self-styled scientists!—that instantly dismisses as superstition, magic, or even as non-existent, happenings brought about through the operation of some natural law which we do not yet understand. Those who think they know everything can learn nothing. Those who know they know little will learn much. Scientific "truths" are always being modified as our knowledge increases (p.12).'

It has also been reported by Conford (2011), that Eve Balfour, regarded organic methods as the 'kindergarten' and biodynamic methods as the 'university.'

Philosophy

Nevertheless despite many overlaps in ideals, the organic movement took a different strategic direction from biodynamic agriculture with key differences between some of the main proponents in the years following World War 2. Conford (2001) has described in detail the history of the organic movement that it was initially presented as a whole systems challenge to the industrial consciousness which gradually decided to instead focus on niche food production rather than broader systems change. The organic movement's more recent public stance has been to eschew spirituality and focus only on the physical dimension. Conford (2001) references this concern with esoteric issues drawing away mainstream support for the wider organic movement with the following quote from one of its major proponents. H.J. Massingham describing biodynamic methods as 'an elaborate and pantheistic cultism...a white witchcraft which tends to frighten people away from its eccentricity (p.80)' One of the organic movement's other main proponents, Howard (1943), although like Steiner critical of 'laboratory hermits' also was sceptical of the biodynamic methods. Thus, the movement's core ethos is based on another quote from Eve Balfour (1975) that 'the health of soil, plant, animal and man is one and indivisible' focused exclusively on the material dimension and hence has relied on modern conventional science to try to enhance its profile.

One such early attempt to get mainstream credence was the Haughley Experiment, organised by the Soil Association and running from 1938-1962, compared chemical and organic plots using modern scientific methods. It did not provide conclusive results and was eventually abandoned (Conford, 2011). The following decades from the 1970s saw the organic movement shift closer into the mainstream, in particular by collaborating with supermarkets. The 'modernisers' in the organic movement from the 1970s onwards further distanced themselves from its founding members who had envisaged the organic movement to be not simply about healthy food but rather a broader restructuring of society (Conford, 2001).

Future Outlook towards Decolonisation

Since the 1970s the organic movement is no longer considered fringe and its incorporation into the mainstream has increased its market share over the last few decades but it remains to this day a niche market with only 7.5% of agricultural land certified organic in EU (EU, 2018) and 1.5% certified organic worldwide with 75% of this land area located in the Global 'North' (FIBL, 2021). Organic farming as an industry at large has been criticised by Thottathil (2014) for perpetuating the same colonial patterns where 'organic' food is shipped around the world from poorer producers in the global 'South' who are locked in an export cycle dependent on foreign markets where the main source of consumers are in the wealthier 'North' who can afford to pay the price premiums. Thottathil (2014) reviews the situation of organic farming and criticises its scale and long-term trajectory that it has come to be very much like global industrial agriculture whereby farmers are beginning to adopt more intensive and possibly unsustainable agricultural practices such as monocropping to remain competitive in the marketplace and to minimise economic losses. These farmers are also relying more and more on large agribusiness for investment capital paying lower wages for labourers thus maintaining and perpetuating the status quo of an economic system that exploits people and the other-than-human world.

In summary, the organic movement has been in existence for over a century with little success in shifting the dominant paradigm in industrial-chemical agriculture as it had been initially envisaged to do by its early founders and proponents (Conford, 2001). There have been some successes that in the present day the organic movement is well-known and accepted into the mainstream since its methods are relatively more ecologically benign than industrial-chemical agriculture. This 'co-optation' has been at a cost however. In over the last 50 years up to the present it has primarily been as a niche provider for wealthier and health-conscious consumers instead of seeking to replace the dominant paradigm in agriculture. This has arguably weakened its potential for greater societal and ecological transformation that is necessary at this time. The movement recognises that it needs to move forward into the next phase, with the recently announced 'Organic 3.0' concept by IFOAM (2016) As such, it may be that the next evolution of the organic movement could be increased openness amongst aligned farmers to subtle agroecological practices in addition to its time-tested material practices but this remains to be seen.

5.3 Agroecology

Overview and History

The agroecology movement arose in the 1970s as a countermovement to the Green Revolution exported by the US to the global ‘South’ when its negative effects on the local rural populations and ecosystems became evident. The use of the term ‘agroecology’ began to be used at that time; however agroecological science and practice are as old as the practice of agriculture (Hecht, 1995). Altieri (1995) has defined agroecology as an applied science that deploys ecological concepts and principles for the design and management of sustainable agroecosystems where external inputs are replaced by natural processes like promoting natural soil fertility and biological control. However, agroecology is not just an agricultural method but it has become an interdisciplinary movement with active political, social and ecological dimensions as well; Wezel *et al.* (2009) defines it as a scientific discipline, agricultural practice or political or social movement. Since 1990 agroecology has become a common term in academic domain (Ferguson and Lovell, 2014; Gómez *et al.*, 2012) and is also now a commonly mentioned in UN and NGO reports (e.g. De Schutter, 2010; IAASTD, 2009a) and the recent IPCC report (2019b).

Pimbert (2017) outlines the recent history and contemporary status of agroecology highlighting its recent success in achieving a high public profile in international public policy discourses but with the disadvantage therein that it now means many different things to different people. However, he emphasises that agroecology developed within the paradigm of food sovereignty and has a more transformative intent, theory and practice than merely a different way of food production within the dominant system.

Whereas the organic agriculture movement tends to be concentrated in the global ‘North’ (FIBL, 2021) and practiced by medium-large farms, the agroecological movement has a strong presence in the global ‘South’ and tends to represent smallholders who will often not be certified organic due to prohibitive certification costs. It is estimated by IFAD (2013) that smallholders run 80% of the world’s estimated 500 million small farms (less than 2 hectares). Smallholders still produce most of the food worldwide (up to 80% in ‘developing’ countries) while occupying less than 25% of the world’s farmland (GRAIN, 2014). However, the number of smallholder farms continues to decrease in numbers and size worldwide (GRAIN, 2014) due to the expansion of agribusiness and land grabbing. La Via Campesina, the world’s largest transnational movement of peasants, farm workers, and rural women representing at least 200 million families worldwide is a leading advocate of agroecology on the international scene representing smallholder interests (Rosset and Martinez-Torres, 2013).

Philosophy

Agroecology as a movement values traditional farmer's knowledge as part of its framework (SOCLA, 2015). Despite of this however, any alternative epistemologies and coverage of subtle agroecological practices in its publications remains mostly absent (Gómez *et al.*, 2012). One possible reason for this may be that most of published academic literature in agroecology found in the main scientific databases have been done by authors living in the Global 'North' world studying as 'outsiders' in other parts of the world. Gómez *et al.* (2012) states that this 'syncs with a trend of mainstream environmentalism deeply rooted in colonial logic and modern constructions of nature where the latter is seen as something external to the Western world or confined to uninhabited wild areas (p. 3).'

One of the lead proponents of agroecology (Altieri, 1987) attributes the loss of traditional peasant agronomic knowledge to the three processes of colonialism, capitalism and positivist science:

'Why this agricultural heritage has been relatively unimportant in the formal agronomic sciences reflects biases that some contemporary researchers are trying to overcome. Three historical processes have done much to obscure and denigrate the agronomic knowledge that was developed by local peoples and non-western societies: (1) the destruction of the means of encoding, regulating, and transmitting agricultural practices; (2) the dramatic transformation of many non-western indigenous societies and the production systems on which they were based as a result of demographic collapse, slaving, and colonial and market processes; and (3) the rise of positivist science. As a result, there have been few opportunities for the insights developed in a more holistic agriculture to "filter up" into the formal scientific community. This difficulty is further compounded by unrecognised biases of agronomic researchers related to social factors such as class, ethnicity, culture, and gender (p.2).'

This is not always the case though; Pimbert (2017) notes one of the leading agroecological spokesmen Pierre Rabhi's approach is explicitly grounded in the anthroposophy, the underlying philosophy of the biodynamic movement (Steiner, 2012; 1924) and indigenous cosmovisions, with an emphasis on a life affirming and a central focus on the Earth as a whole rather than limited to the agroecosystem. Furthermore, authors in one of the foundational textbooks of agroecology (Norgaard and Sikor, 1995; Hecht, 1995) express their reservations about the dominant scientific premises of atomism, mechanism, materialism, objectivism and monism. They rather suggest that the alternative premises of holism, contextualism, pluralism and subjectivism are more intuitive and closer to 'common sense' and thus advocate a methodological pluralism. The same theme has been discussed in detail by Santos (2014) who criticises the devaluation and exclusion of knowing different from the

modern Western epistemology, arguing that this is ‘epistemicide’ and that recovering the epistemologies of the ‘South’ is critical since it is not possible to obtain social justice without cognitive justice and that the so-called developing world have much to offer in this regard.

Future Outlook towards Decolonisation

The agroecology movement is now at a crossroads since it has in recent years been facing the challenge of co-optation into the industrial agribusiness system by the global North (Pimbert, 2017; Altieri and Holt-Giménez, 2016). For example, the French agriculture minister stated in 2012 to be a champion of ‘agroecology’ but proposing only minor adjustments such as ‘industrial greening’ like using no-till with herbicides, remaining firmly with the dominant paradigm and attempting to bypass radical agrarian and social reform (Pimbert, 2017). Co-opting of emerging popular ideas and concepts by the modern industrial culture is not specific to agriculture, some pertinent examples being ‘sustainability’ or ‘green’ practices. Grey and Patel (2014) explicitly links the food sovereignty goal of La Via Campesina with decolonisation theory and practice, asserting that food sovereignty extends beyond agricultural practice to cultural, spiritual and environmental dimensions.

At this critical junction in the agroecology movement, it would perhaps be prudent to review the history and lessons from the organic movement, because as noted earlier its incorporation into the mainstream agribusiness system has not led to the radical social change initially envisaged and hoped for by its early founders and pioneers. One suggested possible way to steer away from this course is to explore more deeply the traditional wisdoms and epistemologies and the associated agroecological practices of the diverse cultures that the movement represents and see how these can be applied to agriculture. This openness of the agroecology movement appears to be already there to some degree. Altieri and Nichols (2005) state that ‘agroecology seeks to root sustainable agricultural production in ecological potentials and cultural values, to open a dialogue between scientific knowledge and traditional wisdoms; to empower farmers, peasants and indigenous peoples as social actors to renew their community based productive practices, to enable them to inhabit their cultural territories’ (p. 6).

5.4 Permaculture

Overview and History

The permaculture concept and movement originated in Australia in the 1970s around the same time as the agroecology movement and was initiated by Bill Mollison and David

Holmgren. Permaculture is a contraction of ‘permanent agriculture’, and has been defined by Mollison (1991):

‘A design system for creating sustainable human environments...The aim is to create systems that are ecologically sound and economically viable, which provide for their own needs, do not exploit or pollute, and are therefore sustainable in the long term...Permaculture is based on the observation of natural systems, the wisdom contained in traditional farming systems, and modern scientific and technological knowledge (p.1).’

Permaculture is a movement focusing mainly on designing sustainable human settlements. Since its inception it has spread worldwide via a grass-roots movement with no centralised network and it is estimated that there are now over 3 million practitioners worldwide (Permaculture Association, 2016). It is taught in a 70 hour training programme covering principles and design practices whereupon completion graduates obtain a Permaculture Design Certificate (PDC) and licence to teach it to others using a prescribed curriculum from the Permaculture Designers Manual compiled by Mollison (1988).

Philosophy

As a broad-based movement, permaculture does not have an organised structure. Rather, permaculturists are asked to align themselves with three core ethics condensed from the values of indigenous land-based cultures (Mollison, 1988):

- 1) *Care of the Earth*
- 2) *Care of People*
- 3) *Setting Limits to Population and Consumption*. This is the original version, but it is now more commonly phrased as ‘Return the Surplus’ or ‘Fair Share’ by most practitioners today.

There are many overlaps between the permaculture and agroecology movements in terms of principles and practices, both originating from indigenous land-based practices. However, one core distinction is that permaculture has up to this time been strictly apolitical, preferring to operate outside the centres of power by making personal and local changes in lifestyle.

Ferguson and Lovell (2014) have carried out an analysis comparing the agroecology and permaculture movements using searches in academic publications and web searches. They

found that agroecology as a term featured significantly more in academic publications; however, permaculture is referenced up to 11 times more in internet searches. Ferguson and Lovell (2014) critique the movement's limited profile in the academic space as a result of its terminology conflicting with standard scientific usage, overreaching claims and frequent referrals to scientific literature which is several decades old. Furthermore, the authors note that the marginal academic profile of the permaculture movement is not surprising since most of the permaculture literature is written by non-scientists for a broad audience and has consequently led to some writers to refer to it as 'pseudo-science.'

The standardised PDC curriculum excludes any references to metaphysics with an exclusive focus on the material dimension and contains many mainstream scientific references. Yet both co-originators of permaculture have acknowledged the inspiration they drew from indigenous cultures (Holmgren, 2013; Mollison, 1988). Mollison (1991) justifies the reason for this exclusion of the non-material dimension as follows:

'Permaculture is a subject called design science. The pragmatic approach of this work largely omits reference to those visions or beliefs classified as spiritual or mystical; not because these are not part of the human experience, but because they are arrived at as a result of long contemplation or intense involvement with the mysteries that eternally surround us. We may dream understanding but it is something we cannot demand, define or teach to others; it is for each of us to develop. If we educate on design science we must omit belief (p. 206).'

One of the movement's leading figures, Lawton (ND) states in one lecture that permaculture is 'about science and ethics... and not metaphysics. The unproven sciences will discredit and dilute our system.' The unspoken assumption here from Lawton is that only what he considers as 'scientific' is Western reductive, analytical and mechanistic approaches to knowledge, or 'Science' (with a capital S) with other ways of knowing being 'unscientific'. In juxtaposition, the term 'indigenous science' was coined and current growing in currency is to challenge this uniform Western-centric notion of science since '*scientia*' (knowing) can take many form as acknowledged in a decolonisation context (Santos, 2014, 2018).

Nevertheless, despite the omission of non-Western ways of knowing, the formal PDC curriculum has remained mostly unchanged from its framework in the 1980s (Mollison, 1988). As a broad-based decentralised global movement there are some permaculture teachers who acknowledge subtle agroecological techniques as part of their designs and practices (Gibstone and Bang, 2015; Moore, 2009; Starhawk, 2004). Permaculture's co-originator (Holmgren, 2011) furthermore notes his views about the spiritual dimension:

‘Although Permaculture can be reasonably seen as essentially materialist and scientific, it depends on an ecological perspective. Spiritual beliefs about a higher purpose in nature have been universal and defining features of all cultures before scientific rationalism. We ignore this aspect of sustainable cultures at our peril... The more we understand the world through the lens of system thinking and ecology, the more we see the wisdom in spiritual perspectives and traditions...Permaculture attracts many people raised in a culture of scientific rationalism because its wholism does not depend on a spiritual dimension. For others, Permaculture reinforces their spiritual beliefs, even if these are simply a basic animism that recognises the earth as alive and, in some unknowable way, conscious. For most people on the planet, the spiritual and rational still coexist in some fashion. Can we really imagine a sustainable world without spiritual life in some form (pp 2-3)?’

In addition to the divergences between ‘materialist’ and ‘spiritual’ permaculturists, differences of opinion also exist between permaculturists about the extent to which the movement should be involved in actively in social justice and challenging the dominant industrial system beyond local initiatives such as setting up regenerative systems in their own gardens and farms. Notably, the permaculture movement’s reluctance to scale up and directly influence and challenge the status quo politically stems from the anarchist leanings of its originators and has been regretted by Rob Hopkins, the founder of the Transition movement who had a prior background in permaculture (MacLeod, 2009).

There are also still frequent discussions and ambiguities about the 3rd permaculture ethic ‘Fair Shares’ or ‘Return of Surplus’ and its implication for socialism, with one prominent American permaculturist (Kitsteiner, 2013) advocating for it to be culled altogether in order to ‘break permaculture into the mainstream.’ On the other hand, there are vocal proponents who are advocating for activism working with other institutions towards radical systems change and thus some degree of overlapping with the agroecological movement has been increasing in recent years (Harland, 2019; Integral Permaculture, 2017; Empty Cages Design, 2017; Ferguson and Lovell, 2015).

Future Outlook towards Decolonisation

The permaculture movement has also received internal criticism from some quarters that its leading public spokespeople are predominantly white males living in the Global ‘North’ (Moyle, 2015; Olson-Ramanujan, 2014). Tobias (2017) goes into further detail as to how the permaculture movement can be ‘decolonised’ by offering some suggestions such as checking the permaculture practices advocated by some Western practitioners as a form of appropriating of traditional knowledge from their originators without giving due credit.

Tobias (2017) furthermore argues that another way to help ‘decolonise’ permaculture is to reform the PDC methodology of presentations, lectures and field visits common in Western academia which would not be appropriate to indigenous people and advocates using different ways of learning.

The permaculture movement has increased its visibility in the fifty years since its inception and despite hundreds of thousands of practitioners worldwide it remains primarily a fringe movement in public discourse and primarily limited to home gardening rather than smallholdings or broad scale agriculture. Many disagreements within the permaculture movement about the right approach to take to scale up towards system change is of course to be expected in a decentralised movement like permaculture and this is both its strength and its weakness. A recent editorial by the editor of the UK Permaculture magazine, Harland (2017) as a major spokesperson and influencer stated her belief that a growth in consciousness is the mechanism to start a paradigm shift towards a regenerative future. She asked how this was to be accomplished and paraphrased the response given as follows:

‘We are called to be radical. We can create change by engaging our heads with our hearts and then acting from that place. It is of great importance to nurture our love and connection with the Earth, to treat it as sacred in our daily practice, and devise ways of sharing insights and practical actions as widely as possible (p.1).’

Although subtle agroecological practices are not specifically part of the PDC and the movement remains decentralised, they could easily be incorporated as supplementary elements into the design systems of permaculture practitioners as part of the ‘Earth Care’ and ‘Fair Share’ principles if the practitioners decide to do so.

5.5 Regenerative Agriculture

Overview and History

Regenerative agriculture is the most recent among the emerging sustainable agriculture movements (Merfield, 2019). The Rodale Institute in Pennsylvania, US has been researching and advocating ‘regenerative’ farming practices since the 1980s. These practices aspire to be more ambitious beyond sustainable (Rodale Institute, 1989) and in a short time have received significant attention from producers, retailers, researchers and consumers, in addition to politicians and the mainstream media (Newton, *et al.* 2020). Interest in regenerative agriculture also includes the public, private, and non-profit sectors movements. For instance,

regenerative agriculture was mentioned in a recent 2019 report alongside organic agriculture and agroecology (IPCC, 2019b, p. 389) to build resilient agro-ecosystems. A TED talk by one of its major spokespersons (Savory, 2013) advocating using livestock to regenerate the world's degraded dry lands and sequester vast amounts of carbon back into the soil has received almost 7.4 million views. Furthermore indicating increasing public interest, a recent Netflix documentary 'Kiss the Ground' (2020) featuring several celebrities advocating regenerative agriculture has reached almost 10 million trailer views to date.

Although now an international movement, Merfield (2019) notes that at present regenerative agriculture appear to be primarily originating and operating from North America, with Australia potentially being second in the level of activity and the predominant agricultural system is extensive livestock and lower intensity arable/row-cropping systems. Its focus has been particularly on mixed farming systems having both arable crops and livestock which are often situated in lower rainfall areas such as temperate grasslands, savannahs, and shrub land biomes.

Philosophy

One of the key tenets of that regenerative agriculture is to be not only sustainable in that it maintains the existing soil, but must also further improve its quality via methods that not only nourish but also regenerate the soil. Many of its key practices (integrating livestock and crop farming, high diversity of plant species, holistic grazing, and cover cropping, minimal or no-tillage) are overlapping with the permaculture movement. Being a new movement, there is as of yet no commonly agreed definition of what constitutes 'regenerative agriculture' but its philosophy can be distinguished by key 'processes' and 'outcomes' derived from a review by Newton *et al.* (2020) consisting of 229 academic research papers and 25 practitioner websites. The 'processes' most commonly cited within the research articles were the emphasis on no or low external inputs and the utility of on-farm inputs (26% of publications), the integration of livestock (19%), not using synthetic fertilisers (12%) or pesticides (12%), and reducing or eliminating tillage (12%). Among the practitioner websites, the most commonly mentioned processes were reducing or eliminating tillage (41%), the integration of livestock (41%), and the use of cover crops (31%) Regarding 'outcomes,' the journal articles identified the most commonly mentioned were aspirations to improve soil health (41%), to sequester carbon (17%), and to increase biodiversity (17%) and among the practitioner websites, the most commonly mentioned outcomes were aspirations to improve soil health (86%), to sequester carbon (64%), to increase biodiversity (46%), to improve water resources (46%), and to improve the social and/or economic wellbeing of communities (41%).

One key distinction therefore between organic agriculture and regenerative agriculture is that whereas the former is more focused on ‘processes’ (what to do, and not to do, with clear legal rules against pesticide use for example), the regenerative agriculture movement is comparatively more focused on ‘outcomes’ and there is no specific ban on applying chemical fertilisers or pesticides. Some notable advocates of regenerative farming do use biocides, although purportedly to a lesser degree (Wozniacka, 2019). The relative fluidity of what constitutes regenerative agriculture and lack of clear definition presents a risk that it can be co-opted or greenwashed (Newton *et al.*, 2020) similar to attempts that have been made to the agroecology movement (Pimbert, 2017). Merfield (2019) notes that regenerative agriculture is also a ‘social movement, a value system and a philosophy, with the objectives to dramatically change the industrial / intensive farming paradigm, to repair the damage done to planetary systems by mainstream agriculture, on the farm, at the planetary level and in the social spheres (p.16).’

There is no mention of metaphysics in the literature identified that guides its practices and it relies on the scientific mainstream to support its agenda. However, Merfield (2019) notes that the movement’s relationship with science is complex. On the one hand, many of the concerns driving the value system (soil and planetary health) are based on scientific knowledge, and generally its proponents are keen to use scientific knowledge to further their cause, but there is also considered to be some selective choosing of the science that best supports the movement’s views. In this way, the movement draws parallels to the organic and agroecology movements that also rely on mainstream science when arguing for its validity (e.g. Krebs and Bach, 2018; Lampkin, 2011) but will also challenge scientific conclusions when they are contrary to its goals. However, one of the leaders of the regenerative agriculture movement, André Leu is a former president of IFOAM and spoke at a recent biodynamic agriculture conference (Goetheanum, 2020) about his experiences with biodynamics showing that there are overlaps between the regenerative agriculture, organic agriculture and biodynamic agriculture.

Future Outlook towards Decolonisation

Given that the regenerative agriculture movement is still in its early stages and undergoing rapid growth, its message of hope and empowerment to farmers and modern consumers resonate with many in that it suggests simple solutions to the climate crisis while regenerating landscapes and producing food. However, the fluidity of what presently comprises regenerative agriculture and the fact that its proponents do not always follow organic

regulations and are not required to means that there is a real risk of greenwashing and co-opting into the status quo.

Also, despite its increasing broad appeal and presence into the mainstream, it has also come under critique with charges of perpetuating a colonial logic with its implicit premise that the status quo of 'business as usual' can persist after the climate crisis and land degradation has been resolved. Writing from a decolonisation perspective, Manrique (2020) critiqued that all the protagonists in the 'Kiss the Ground' movie offering solutions were white and presented in a saviour role, bypassing the discussion that the soil degradation had occurred because of colonialism, the land was taken violently and that while working to regenerate the soils themselves, these efforts would be empty until there is a process to decolonise American culture as well as its fields. Similarly, Wozniacka (2021) asserts that regenerative agriculture has a 'race problem' in that the film alienated a number of black, indigenous, and people of colour in that it excludes their voices and completely ignores their ancestors' contributions to the regenerative movement, claiming that the 'present-day regenerative movement is—much like agriculture in general—'inherited, guarded, and perpetuated by white men.' It is envisaged that as decolonisation gains momentum worldwide, such assertions will continue to need to be seriously addressed as the regenerative agriculture movement develops and matures.

5.6 Moving Towards a Radical 'Counterculture'

This overview of the movements' history, philosophy and future outlook with their continuing distancing in various degrees to the modern industrial consciousness indicates that potential exists within all four 'non-spiritual' movements to be receptive to at least some degree towards subtle agroecological practices. The main reasons for this assertion is their ecological focus and that they are all grounded in indigenous agricultural methods albeit only one of them (biodynamics) openly state that their practices are beyond mainstream Western science. This openness is not a given however, considering that all these alternative movements, even agroecology, are led by influential proponents who are predominantly white males living in the 'Global North.' As such their enculturation would likely mean less openness to accept the premises of decolonisation and alternative epistemologies beyond giving at least some degree of acknowledgement to traditional indigenous practices but would still refrain from teaching or promoting any subtle agroecological practices not grounded in material science. Hence it can be said that indigenous practices have not been collectivised yet into these movements.

Nevertheless, considering that each movement has its majority members in a specific and generally non-overlapping segment of the world's population, they each have their unique segment in terms of focus, geography and demographics to contribute towards a radical shift in their own sphere. Broadly speaking, while there is very wide geographic spread and overlaps with members in all the movements organic agriculture represents middle to large farms in the global 'North' and worldwide (FIBL, 2021), agroecology represents smallholders and indigenous people of the global 'South,' (La Via Campesina, 2018), permaculture representing a significant number of the environmentally conscious younger demographic of urban people and beginner smallholders in the global 'North' (Rhodes, 2017; Ferguson, 2014) and regenerative farmers are typically an older demographic of large landholders (Rhodes, 2017) in the global 'North' and 'South' In all these movements, there are still regions that are under-represented, such as Africa, even though their presence in La Via Campesina is growing. Biodynamic agriculture has been the vanguard for subtle agroecological practices outside the West's agricultural mainstream for almost 100 years and it is well structured, organised and expanding internationally. In total, all five movements present a significant population and geographical spread millions of hectares as presented in Table 5.3.

Table 5.3 -Population and Land Base of Alternative Agriculture

Movement	Estimated Population	Land Base (hectares)	Source
Organic Farming	3.1 million	72.3 million*	FIBL, 2021
Agroecology	200,000,000	Relatively large	La Via Campesina, 2021
Permaculture	>200,000	Relatively small	Rhodes, 2017
Regenerative Agriculture	<50,000	Est. hundreds of millions	Rhodes, 2017

Biodynamic Agriculture	8000	251,842**	Paull and Hennig, 2020 Demeter, 2016
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*Organic-certified only, **Demeter-certified only. Actual number will be higher

Indications from this brief historical overview and philosophies are that the leaders in the organic, agroecology and permaculture and regenerative agriculture movements as a whole have shown reluctance to date into expanding boundaries into the subtle agroecological practices but this is not to say that the possible interest is not there among many of its practitioners (Wright, 2021). Perhaps this historical reticence by the proponents to challenge the modernist consciousness no longer fit in with the 21st century zeitgeist. Illustrating this, one particularly poignant recent critique from a decolonisation perspective comes from a collection of indigenous leaders and organisations (Whitewashed Hope, 2020) suggesting they offer a narrow solution to the climate crisis because while they borrow from indigenous practices, they leave out indigenous worldviews. This is because one common characteristic of these stated ethics and principles of the movements except biodynamics are that they all only deal with the material dimension and base their claims to truth that they are ‘scientific’ in the conventional sense.

This review of the prominent voices in the organic, permaculture and agroecology and regenerative agriculture movements’ indicate adherence to a Western materialism in their epistemological frameworks whereby ecological relationships are principally conceived as relationships between material objects. Esbjörn-Hargens and Zimmerman (2009) however state that any ecological view that omits the depths and interconnections among all components of nature, including subjectivity and interiority is only a partial ecology rather than an integral one. Cox (2014a) notes also that the primary mode of description and analysis within contemporary agroecology is dismissive of the interior dimension whenever possible and explicitly denies it to elements of the other-than-human world that are not judged to exhibit any form of subjectivity. Seen from a decolonisation perspective, this is in direct contrast to most indigenous knowledge systems (Aikenhead and Michell, 2011). Cox (2014a, 2014b) argues that a fully ecological consciousness would be one that acknowledges and considers all forms of relationship, including relationships between subjects-as-subjects.

In closing of this lengthy overture over these previous chapters to the research study, its findings suggest that the struggle of this time is about far more than reductively addressing isolated issues such as healthier food, sequestering carbon and reversing global warming or

biodiversity declines which are merely symptoms of a mode of consciousness. Critiquing the dominant perspective on world agriculture, both modern industrial and so-called ‘alternative’ through a decolonisation lens as described sets the context for now delving into the methodology deployed for the subtle agroecological practices to be explored.

Chapter 6 : Methods

6.1 Introduction

This thesis sets out to address the challenge of transforming contemporary alternative farming systems by using the history of consciousness as a starting point and a decolonisation as one means of radical transformation that has now become necessary worldwide. The immense influence that modern industrial agriculture power exerts on the world scene being the favoured model for powerful governments and corporations (Pimbert, 2018; Clunies-Ross and Hildyard, 2010) is perhaps the primary reason why the agroecological transition has been stunted to date.

However, this is not the complete picture. Another contributing factor posited based on the findings in Chapter 5 why there have been limited gains over the last 100 years within all these alternative agricultural movements is that they have been reluctant to explore ideas and practices not accepted outside the dominant epistemology of modern Western science. Any serious exploration of subtle agroecological practices would require a willingness to adopt a 'decolonised' mind-set of epistemic humility which would involve seeing and interacting with the world through a different lens. There are many little researched practices that could potentially be understood with a different mind-set but appear to be ignored and side-lined despite the urgent need to restore and heal farming landscapes worldwide.

In setting the stage for a serious exploration of these practices, the prior contextual chapters addressed how and why farming systems have been colonised. It is posited that it was firstly resulting from an unbalanced mode of consciousness and that decolonisation theory, indigenous knowledge systems, ancient wisdom practices and non-indigenous allies offer helpful alternatives. The theories regarding how a shift in consciousness gave rise to colonial mind-set towards peoples and the other-than-human world and some remedial practices were explored in Chapters through the decolonisation framework. The argument why the present model of industrial agriculture is untenable in the near future was presented in Chapter 3 and why the alternative agricultural movements have the potential to step up and provide a distinct differentiation from modern Western science in their epistemological approach was described in Chapter 5.

Having set this background, this chapter proceeds by describing the methodology of the research. The next steps were firstly to compile a high level topography of some of the major

subtle agroecological practices, secondly investigate their purported effects and thirdly explore their effects and the challenges and barriers to adoption. At the present time, there are significant alternative agricultural movements practiced by millions worldwide that are in nominal opposition to the modern industrial worldview to at least some degree. The literature review in Chapter 5 indicates that all the movements are on the borderline having an ambiguous relationship with modern Western science, yet are all relatively more aligned to a new ecological paradigm worldview (NEP) than modern industrial farming situated in the Dominant Social Paradigm (DSP). Most of the alternative movements openly espouse agricultural practices by pre-modern cultures but generally leave out their underlying ontologies and epistemologies wherein the role of the spiritual dimension is acknowledged. These movements' contemporary proponents have been reticent to take that extra step towards decolonisation by moving beyond the epistemological assumptions of modern mainstream science. Many reasons could be speculated about to account for this and the aim was to gain a better understanding of why there has been relatively little adoption of the researched subtle agroecological practices. It could be hypothesised that one primary reason is that many figures and practitioners within these movements have little or no knowledges about subtle agroecological practices.

6.2 Research Questions

This research aims to futher the decolonisation of agriculture by bridging that gap in knowledge within the movement by shedding a light on these little-acknowledged practices and researching their effects and challenges from within an academic framework with the research methods available.

Specifically, the research aims to explore the following three questions:

- 1) What are the characteristics of subtle agroecological practices?
- 2) What evidence is there of their efficacy?
- 3) What are the barriers to implementing subtle agroecological systems?

It is important here to make a distinction between 'practices' (1) and (2) and 'systems' (3) in an agroecological context. A 'practice' is an actual application of a method; it contains an action, and generally involves at least some level of background knowledge and proficiency. Practices are thus 'tools' or 'components' that can be deployed stand-alone on a farm level; some examples of agroecological practices are agroforestry, companion planting and composting. An agricultural 'system', on the other hand, as defined by the FAO (NDb) 'is an

assemblage of components which are united by some form of interaction and interdependence and which operate within a prescribed boundary to achieve a specified agricultural objective on behalf of the beneficiaries of the system.’ A system therefore has interacting components operating together for a common purpose. Since all the components and activities are linked and because they affect each other it is not sufficient to investigate one component or ‘practice’ by itself without recognising that what it does and what happens to it will affect other parts of the system.

However, being aware that an exclusive focus on ‘practices’ is reductive reasoning, it is theorised that they in themselves are not sufficient to be applied as ‘inputs’ in isolation but rather working a broader context using a systems approach. With this caveat, the literature review covers each of the ‘practices’ separately for ease of illustration and classification purposes only (Chapter 4). Reductive analysis however is also the norm in academic research, and hence a field trial (Chapter 7) and a compilation of a systematic review assessing empirical trials (Chapter 8) were conducted under this framework that would receive further scrutiny. To provide some balance however, the research also looked at two case studies of alternative decolonised farming ‘systems’ (Chapter 9) where the associated practices are embedded in a spirituality and ways of life that stand distinct to the dominant modern consciousness and finally a farmers’ survey (Chapter 10) to learn more about farmers’ views and practices in the field.

Following this identification and typology, a review was undertaken exploring the potential impacts, both positive and negative, of applying these subtle practices on a farm scale, and lastly having identified and assessed the practices in terms of their impact aimed to shed light on the barriers to implementing such practices.

6.3 Positionality of the Researcher

Sium *et al.* (2012, p.1) state that decolonisation requires us to be ‘deeply aware of the need to begin with our own positionalities, with an inward look at our own histories, subjugations, privileges, contradictions, tensions, insecurities, rage, hope, optimism, and aspirations’. The premise taken here is that decolonisation is not necessarily exclusive to only previously colonised people in the most recent phase of colonisation from 1492 – 1945 CE. It is suggested here that taking the further historical review in recognising that going back millennia indicating that most of the world’s peoples (including Europeans) have also historically experienced the effects of colonisation which was briefly discussed in Chapter 3.

Undertaking such a shift in thinking resulting from this awareness will be particularly challenging for those of us having been educated in the Western schooling system whose model is now the global mainstream as a result of previous colonialist policies (e.g. Macauley, 1835; Arowolo, 2010). In undertaking this research I have had to review my own positionality coming from a position of relative social privilege in terms of geography, ethnicity, gender, sexual orientation and class as a white, middle-class Western-educated, heterosexual male. I spent many of my formative years living a privileged expat life in gated villas in Asia and attending elite private schools in the US and abroad, and therefore writing from a position as an ‘insider’ and beneficiary in the present world system.

Although having no direct experience of marginalisation, undertaking this exploratory journey in my research has still had profound and transformative impact on my own life. It has left a feeling of sadness for what has been lost in my own cultural context coupled with the desire to ‘unlearn’ and recover my sense of connection to a land, culture and community. I do not lay claim to any certainty or fixed worldviews, for me these are continuously evolving. While being aware that oppression has many forms and facets that I have not personally experienced or known, I am put in a minority position given my personal circumstances advocating ‘decolonisation’ from within academia. Within this framework the priority is often given towards indigenous voices ‘talking back’ to the establishment and they do not need me to speak on their behalf. However, I claim the right to be a proponent for the decolonisation of agriculture recognising that everyone is ultimately interconnected, and thus recognising the shared humanity of all and that it is impossible to separate the suffering of others from my own.

Evidence from archaeology and anthropology (Gimbutas, 1997) also indicates that my distant ancestors in Europe were colonised thousands of years ago and little remains of that original culture. Archaeological evidence suggests that these old European cultures had similar worldviews as other indigenous cultures still existing today. Thus it is everyone’s birth right to recover that knowledge of their own indigenous heritage and I offer this work in the spirit of an ally to indigenous peoples in their current struggles.

It is acknowledged that there is an apparent contradiction espousing a ‘decolonised’ research framework when all the above research methods deployed in this study are standard scientific research methods that all originate from an empirical framework. As such they may inherently be at a distinct disadvantage in most effectively furthering the exploration of subtle agroecological practices and systems. These are the nevertheless the methods that form the standard repertoire of natural and social sciences research and it is within the academic

context that this research is grounded. It is also the methods that I have been trained in, and therefore considered most appropriate for the time, place and circumstance. In particular for the case studies, particular the case study in India, I was an ‘outsider’ coming in as a white Westerner to learn from them and there were cultural and language barriers. My approach however was guided by decolonisation practice that my intent was clearly stated that it was to learn more about an indigenous farming system as opposed to teaching them about Western-based methods. Smith (2012) highlights that for some cultural groups, my presence could possibly be viewed as ‘appropriation’ that I was taking knowledge without giving anything back. However, this context was different that the Brahma Kumaris is a worldwide spiritual movement that offers all its services worldwide for free with its mission to help individuals transform their perspective of the world from material to spiritual and supporting the cultivation of a deep collective consciousness of peace (Brahma Kumaris, ND) and I had received prior permission from the senior leadership to meet with the farmers. Furthermore, Indian/Vedic civilisation has traditionally been open and generous in sharing their spiritual practices with the rest of the world in terms of spiritual agricultural practices (Paranjpe, 1989) and general spiritual culture and way of life as was for example shown in the teachers coming to the West in the 1960s like Srila Prabhupada who founded the Society for Krishna Consciousness that is now a worldwide movement (ISKCON, 2017).

Taking aside my own background, the conventional method was chosen to achieve the desired impact to reach farmers who could be swayed by these methods and as noted in Chapter 2, the empirical model also has its strengths. There are almost certainly more complimentary methods, possibly learned from indigenous cultures to explore this but these remain at this time beyond my skill and background to undertake in this exploratory study. It needs to be re-emphasised again that the false binary juxtaposition (in this case modern mainstream science vs. indigenous knowledge systems) is also a colonial thought pattern. It is suggested that the scientific framework that agroecological research would likely be furthered by a more all-encompassing outlook (Norgaard and Sikor, 1995). This would mean that the scientific debate into which approaches to explore subtle agroecologies would not be a question of ‘either-or’ but rather ‘both-and.’

Given the multitude of research methods pertaining to each respective research question, it was decided that for simplicity and for more seamless reading this chapter would not cover the entire methodology for all the research methods. Instead every chapter describing the results from the research methods (Chapter 7 – 10) would be prefaced with the methodological approach leading up to their results. Having now outlined the framework and

intended statements of inquiry, the following chapters will begin to address these questions, starting with a typology in the following chapter describing each of the subtle agroecological practices to be explored further.

6.4 Research Approach/Framework

Subtle agroecological practices work in part with holistic processes and unseen realms that are recognised in indigenous cultures but not empirically verifiable by the five senses or measurable by the instruments presently available in Western positivist science. However this does not mean attempts are necessarily futile. Smith (2012) notes that ‘decolonisation is a process which engages with imperialism and colonialism at multiple levels. For researchers, starting with a decolonisation of the mind, one of those levels is concerned with having a more critical understanding of the underlying assumptions, motivations and values which inform research practices (p. 22).’ It is therefore particularly important to constantly keep an open mind and unleash the imagination to think in terms of ‘what if’ rather than ‘what is’ (Hopkins, 2019).

For reasons outlined in the conceptual framework Indigenous Knowledge Systems (IKS) would perhaps be more appropriate in this research context (Ludwig and Poliseli, 2018). However, I do not come from an unbroken indigenous background so does not have direct access to this knowledge, and thus the pathways chosen to explore the efficacy of subtle agroecological practices will be limited to research instruments used in Western academia. As described in Chapter 2, it is not a black-white case of that all indigenous knowledge systems are ‘good’ in contrast to all contemporary Western sciences being inherently ‘bad’, both offers useful contributions to knowledge that will need to be respected and leveraged in the ‘Age of Dialogue’. Hence the justification for this is that while not the exclusive avenue for new knowledge, reductive and qualitative methods within the Western tradition nevertheless may be helpful to shed light on this topic both reporting from secondary data on past experiments and also with the inclusion of the field trial experiment described in Chapter 7.

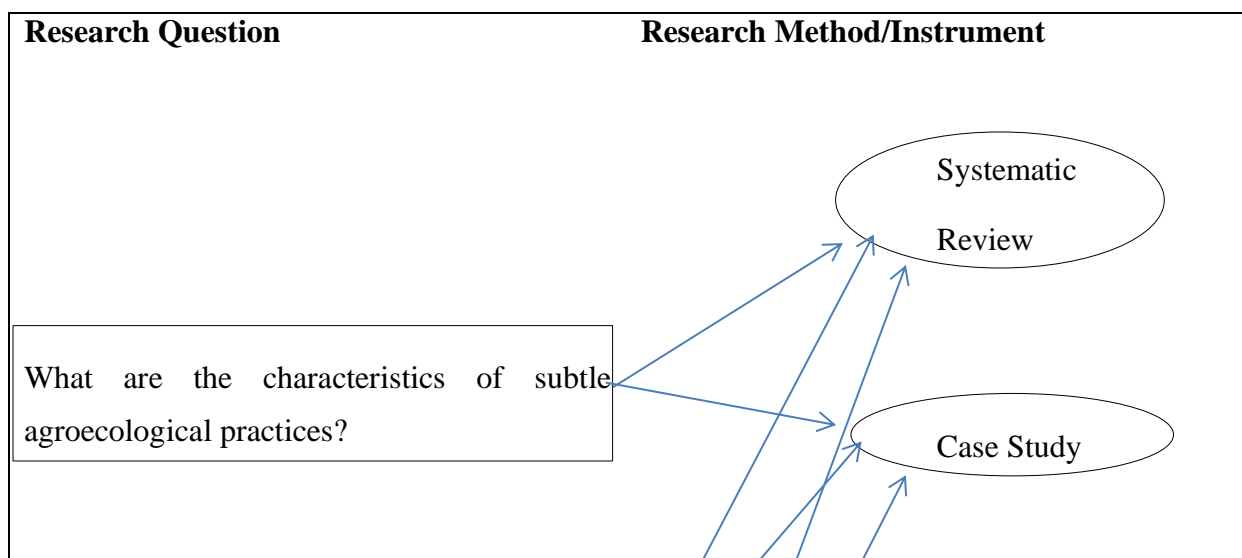
6.5 Research Methods

Given that agriculture deals with complex rather than complicated living systems and people (Poli, 2013) it follows that relational methods deployed in the social sciences are deemed to be also valid and appropriate for emerging agroecological research (Hecht, 1995), in this case surveys and case studies. A multi-faced mix of research methods was therefore deemed

essential, in particular since subtle agroecology is even more complex in that it deals with subtler invisible forces that would be easy to miss using only one research method.

A triangulation approach was deployed in this project to address the research questions from different points of view using a combination of a systematic review, case studies, a farmers' survey and a field trial. Using a variety of methods is often applicable in qualitative research in order to validate and cross-check findings (Hennink *et al.*, 2011; Patton, 1990).

A summary of the research methods to address each question is provided in Figure 6.1 below. The linkage of research questions to research methods/instruments via arrows form a 'web' structure intended to mimic robustness in nature with a similar triangulation to ensure increased robustness.



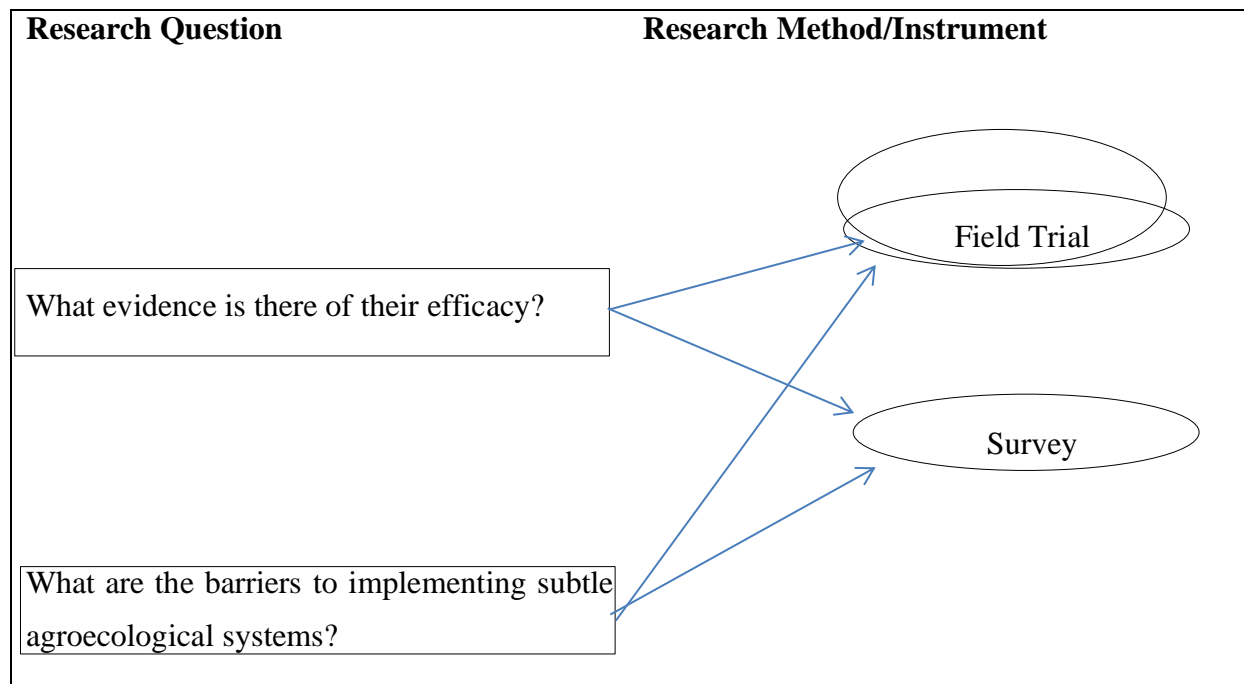


Figure 6.1 -Research Questions and Instruments

Chapter 7 : A Field Experiment using Subtle Practices

7.1 Introduction

Having compiled a typology of various subtle agroecological practices to address the first research question, the next step was to directly explore the purported results of various methods in the second research question ‘what evidence is there of their efficacy?’ The method of comparison in the field trial approach outlined here was specifically to compare against an organic farming approach where none of these practices were applied as the control. This was based on the preposition that subtle practices would perform best in conjunction with organic farming systems and the hypothesis tested was that there would be a statistical significant difference attributed to these practices. A number of different agronomic criteria could have been selected to measure for, but yield was chosen since as the initial focus since this was a relatively simple method and is of particular interest to most farmers. Building on prior results from a wheat trial using one of the subtle practices, human intent, reported in a review by Pandey *et al.* (2015) it was also intended to analyse protein content as a quality criteria but this part of the trial however this did not reach fruition.

With the above context, the objective of this chapter is to report on the attempt to gather first-hand empirical evidence using a field trial to determine if a selected set of subtle practices was able to affect yield.

Treatment Selection and Justification

The four treatments in this field trial were:

- 1) Biodynamic Preparation 500, BD prep 501 and Cow Pat Pit (CPP)
- 2) The above plus conscious positive human intent
- 3) The radionics application of the BD preps
- 4) The BD preps plus astronomical planting calendar

The justification for choosing these treatments were because the literature review found references for field trials on wheat using biodynamic preparations (Reeve *et al.*, 2010), human intent (Stephen *et al.* 2018, Pandey *et al.* 2015), and a trial using rye with astronomical planting calendars (Spiess, 1990a). There were none for the use of a radionics instrument but a machine was found available for testing so this method was included also since this would be the first time such a trial was conducted to my knowledge.

This experiment treatment plots combined the usage of these practices with the three primary biodynamic concoctions, BD 500 (cow manure transformed by 6 month over winter in a cow horn buried 6-12 inches deep), BD 501 (crushed quartz crystal buried over summer in cow horn) and CPP (Cow Pat Pit, cow manure mixed with crushed egg shell and basalt dust, then fermented with biodynamic preparations 502-507 for a three to four months in a pit 12 inches deep lined with brick).

The trials were carried out using two wheat varieties. Wheat (*Triticum aestivum*) was selected because the seeds are readily available, easy to germinate in the UK climate with plants reaching maturity by late summer from an early spring sowing. Spring wheat varieties had been selected specifically chosen over winter wheat varieties since these require less time in the ground but also resulting in lower yield. This means minimising weed competition and thus more typically grown in organic farming systems (Briggs, 2008). Furthermore, prior experiments had already been conducted testing the biodynamic preparations on wheat showing some differences. Hence these preparations were the foundation of the subtle agroecological treatments in this trial. One of these trials (Bavec *et al.*, 2012) indicated some positive differentiation in ecological footprint but lower yields than conventional treatments and another biodynamic treated compost had higher yields than untreated compost (Reeve *et al.*, 2010).

At the outset of my study, a field trial was selected as the obvious quantitative research method to determine the effects on yield. This took the form of experimentation with selected subtle agroecological practices on wheat seed germination and the crop growth cycle. This trial had many precedents from prior researchers (e.g. Podleśny, *et al.*, 2004; Roney-Dougal and Solfin, 2003), including some crop-specific ones testing yield for wheat in biodynamic agriculture (Mayer *et al.* 2015; Bavec *et al.*, 2012). The testing on an annual arable crop allowed the gathering of some primary data within the project time-frame. The inclusion of a rigorously controlled field trial could be considered a benchmark for ‘robustness’ in contemporary agricultural research. Research in the context of systems, both traditional and ecological knowledge systems, considers both holistic and reductionist aspects important (Ludwig and Poliseli, 2018). I was from the outset fully aware of the possible drawbacks of field trials for agroecological systems research, given that their epistemological standpoint is that farming can be understood atomistically, or in small parts (Norgaard and Sikor, 1995). Nevertheless, this is not to dismiss the reductionist method in its entirety and it was theorised that the time invested in such a trial could still yield useful results and also enable a more in-

depth and illustrative understanding of the challenges of using reductionist methods for testing practices not recognised in the modern Western scientific paradigm.

In light of the above a field trial was established at Coventry University in 2018 to delve deeper via direct practice. Despite its limitations, the process was also highly relevant to understand first-hand the challenges of such research which comprises the third research question: ‘What are the barriers to implementing subtle agroecological systems?’

Location and Timeframe

The trials took place at Five Acre Community Farm in Wolston, Warwickshire UK (Latitude 52.367165, Longitude -1.413166) from April 2018 – September 2018. The farm has been managed under certified organic conditions for over 6 years. A basic soil analysis is shown in Table 7.1 for background and reference. However, this analysis was carried out by another researcher working on an unrelated experiment a year after the trial had taken place. It is therefore shown here for illustrative purposes to give a general overview of the soil conditions of the site even though it does not show the circumstances prior to the trial.

Table 7.1 - Soil Analysis at Trial Site, Wolston UK –August 12th 2019

pH	Index			Mg/L Available			SOM %
	P	K	Mg	P	K	Mg	
6.4	1	3	3	13.2	243	120	3.6

For spring wheat, the recommendations as per AHDB (2021) are:

pH - 6.5

P index - 2

K index - 2

Mg index – 2

This indicates a possible P deficiency on the trial plot that may also have been there at the time it was conducted. However, this is speculative and these recommendations were sourced from a reductionist non-agroecological approach, intended towards using synthetic fertilisers rather than organic practices. Agroecological farmers can still obtain good yields with lower measured concentrations of available nutrients because these are quickly made available resulting from microbial activity. The most important nutrient, N, is not usually determined

from soil analysis because it changes so quickly that the results are often futile. Soil Nitrogen Supply Indices are estimated from previous cropping, soil type and winter rainfall - it is often the limiting factor in organic crops in the spring because the soil is not warm enough for soil organisms to produce it as rapidly as it is consumed by the growing plants.

Cultivars

The following cultivars were selected that were both found suitable to grow in the UK.

- 1) An organic traditional variety ('April Bearded')
- 2) An organic modern variety ('Mulika')

The reason behind why both a modern and a traditional variety were used as it is known that there are differential effects of biodynamic preparations among cultivars (Jarienè *et al.*, 2017). It was hypothesised that traditional varieties would be more responsive than modern varieties to the treatments considering the degree that the latter have been bred specifically to rely on artificial inputs.

7.2 Methodology

Trials Layout

The total trial plot was 210 m² (70 m long and 3 m wide). Allowance was made for 4 replications over 40 sub-plots each allocated a coding (A1-10, B1-10, C1-10, and D1-10). Accounting for the edge effect and pathways between the sub-plots, each sub-plot was demarcated as 3.5 m long and 1.2 metres wide (4.2 m²) for the growing area with 10-sub-plots in each over 4 replication areas (A, B, C, D) with a total of 40 sub-plots as shown in Table 7.2.

Table 7.2 - Field Trials Layout with Sub-Plots

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10

The treatments and their respective code allocation are summarised in the following Table 7.3.

Table 7.3 - Treatment Codes and Replications

Code	Treatment	No of Replications in Sub-Plots	Sub-Plot Size (m ²)
MCT	Modern variety control (no treatment)	4	4.2
MPR	Modern variety Preparations only	4	4.2
MRD	Modern variety Preparations + Radionics	4	4.2
MIN	Modern variety Preparations + Intent	4	4.2
MPC	Modern variety Preparations + Planting Calendar	4	4.2
TCT	Traditional variety control (no treatment)	4	4.2
TPR	Traditional variety Preparations only	4	4.2
TIN	Traditional variety Preparations + Intent	4	4.2
TRD	Traditional variety Preparations + Radionics	4	4.2
TPC	Traditional variety Preparations + Planting Calendar	4	4.2
Totals	10	40	168

Considering that the ‘April Bearded’ traditional variety was expected to grow significantly taller than the modern ‘Mulika’ variety, in order to avoid shading and lodging, plots prefixed A and B (north orientation) were allocated to the traditional variety and plots prefixed C and D (south orientation) were allocated to the modern variety. The determination of whether the sub-plots received a specific treatment or were left as controls was based on numbers drawn

up randomly. The randomised format within plots A, B, C, D based on these numbers are outlined in Table 7.4.

Table 7.4 – Plot Layout with Sub-Plot Random Allocations

A1-TCT1	B1-TIN2
A2-TRD2	B2-TRD1
A3-TCT2	B3-TRD3
A4-TCT3	B4-TPC2
A5-TPC4	B5-TCT4
A6-TPC3	B6-TIN4
A7-TPR1	B7-TRD4
A8-TPC1	B8-TIN2
A9-TIN3	B9-TPR2
A10-TPR4	B10-TPR3
C1-MCT1	D1-MRD4
C2-MIN2	D2-MPR2
C3-MCT3	D3-MPC4
C4-MRD2	D4-MIN4
C5-MPC1	D5-MCT2
C6-MCT4	D6-MRD3
C7-MIN3	D7-MPC2
C8-MPR3	D8-MPR4
C9-MRD1	D9-MIN1
C10-MPR1	D10-MPC3

7.2.1 Enhancement Protocol

This section describes the four subtle agroecological treatments carried out in the field trial.

BD500, BD501, CPP: The two main biodynamic field sprays were used as stand-alone on all treatment sub-plots (MPR, TPR, MIN, TIN, MRD, TRD, MPC, TPC) to be compared to the control sub-plots (MCT, TCT) which received no treatment or any other inputs. BD500 was sprayed in the early spring and BD501 was sprayed manually twice in the season at two-leaf stage and when grains were forming in accordance with standard biodynamic practice. Plots allocated with MPR or TPR prefixes in Table 7.4 received no further treatment than the biodynamic preparations.

The preparations were purchased from the UK Biodynamic Association. One ‘unit’ of each preparation was considered sufficient for 0.4 hectares (Biodynamic Association, 2017) and was stirred in 10-15 litres of water for an hour as per Steiner’s specifications ((2009;1923).

BD500, 501, CPP + Intention: Meditation was done by me projecting positive intent on the seeds for 15 minutes 24 hours prior to planting. However, experiments (e.g. Ducharme, 2007; Roney-Dougal and Solfvin, 2003; Roney-Dougal and Solfvin, 2002) have indicated that the experience level of the person meditating can have an increased impact and I could claim no such skill. It was acknowledged from the outset that my inexperience in the method would possibly affect the results. Also, my attempt with this arose from a ‘beginner’s mind’ as outlined in Scharmer’s (2018) Theory U was in line with most farmers initially experimenting with new methods where skill would be gained over time. Plots allocated with MIN or TIN prefixes in Table 7.4 received this treatment.

BD500, 501, CPP + Radionics: Radionics treatment was carried out using an instrument designed by Hugh Lovel (Quantum Agriculture, 2018) who provided me with overview training in its usage. The ‘energetic signature’ for BD 500 and BD501 was imparted to the grain sample prior to planting via cards inserted into the instrument. The specific dial settings as determined by dowsing by an expert present are shown in Table 7.5:

Table 7.5– Radionics Instrument Settings in Field Trial

Well 1	BD500
Well 2	BD501
Well 3	CPP
Well 4	BD508
500 Potency	M4
501 Potency	X34
CPP	C11
Start Time	17:15
Duration	21 minutes
Setting	Green Dial – Slow Pulse

Plots allocated with MRD and TRD prefixes in Table 7.4 received this treatment.

BD500, 501, CPP, Astronomical Planting Calendar: The seeds for this treatment were sown on April 17th 2018 (first day of the experiment) between 0:600 – 16:00 at the sub-plots allocated to codes MPC and TPC; the other planting dates are noted in Table 7.6. The PC timings occurred on ‘Fruit’ days marked as particularly favourable (Thun, 2018). This is the most commonly used calendar in the biodynamic movement with decades of research, albeit not peer-reviewed, already carried out (Kolisko and Kolisko, 1939; Thun, 1979 and 2003). Furthermore, in line with best practices, cultivation weeding and harvesting was only done on a ‘fruit’ day for the treated sub-plots but these would not receive more or less attention than the other sub-plots. Plots allocated with MPC and TPC prefixes in Table 7.4 received this treatment.

7.2.1 Growing Protocol

The following Table 7.6 outlines the management practices undertaken during the 2018 growing season.

Table 7.6 - Growing Protocol Practices and Dates

Year	2018
Crop	Spring Wheat
Varieties	‘Mulika’ (modern) and ‘April Bearded’ (traditional)
Rotovating Date	April 6 th 2018
General Planting Dates	April 17 th 2018 (PC plots) April 18 th 2018 (PR and RD plots) April 19 th 2018 (IN plots) April 20 th 2018 (CT plots)
BD 500 Application Dates	June 6 th 2018
BD 501 Application Dates	July 12 th 2018
CPP Application Dates	July 12 th 2018
Astronomical Planting Dates	Sowing: April 17 th , between 06:00 – 16:00.
Planting Method	Furrow with a manual hoe at 4 cm depth.
Radionics Application Dates	April 11 th 2018

Row spacing	20 cm
Sowing Distance	1 cm apart in rows, no thinning carried out.
Sowing Density	50 grams dry-weight per sub-plot
Irrigation Dates	No irrigation
Weed Control	Manual, handpicking and hoeing
Weed Control Dates	Weekly
Pest Control Measures Undertaken	Mesh – until germination
Harvest Dates	August 1 st 2018

7.2.3 Observation and Harvest Protocol

I monitored the fields on a weekly basis for empirical data looking at plant height, weeds per plot, pests and diseases as indicated by NIAB (2020) protocol for assessing wheat. Pictures were taken on a weekly basis to track growth. In parallel to these standard observations the intention was also to experiment with tapping into other ways of seeing that are more intuitive to gain a more holistic awareness of the crop during the trial. For this purpose, also with a ‘beginner’s mind’ I attempted using Goethean methodology as described by Holdrege (2005) and Hoffman (1998) based on phenomenological observations on specific plants on the subtle plots compared to the control plots. This method of ‘delicate empiricism’ involved aiming to enter into a gradual ‘conversation’ with the plants throughout their growing season based on a structured approach to identify myself with the plants using intuition, imagination and observation. While not specifically part of the research question and methodology for the field trial, it was a thought experiment to learn another way of knowing which is considered a key element to the decolonisation process and Scharmer’s (2018) Theory U upon which this study is grounded.

Hoffman (1998) outlines this process in these sequential stages:

- 1) *Physical/Sensory Information ‘Earth’* – Obtaining in-depth understanding of the phenomena via sensory impressions and observations
- 2) *Time/Exact Sensorial Information ‘Water’* – Observing and recording the ‘flow’ and fluid ‘non-fixed’ nature of the phenomena as it progresses through its life cycle
- 3) *Gesture/Inspiration ‘Air’* – Moving beyond the transitory physical nature of the phenomena into an ‘intensification’ of identification with its non-physical essence
- 4) *Creative Potency/Intuition ‘Fire’* – Moving into the ‘inner way’ of perceiving the phenomena via intuitive perception.

This was carried out by spending some quiet time at the trial plot in the late afternoons for 10-15 minutes on weekly visits. On occasions I attempted to draw pictures of the plants based on the impressions received.

Plants were harvested using a hand sickle on August 1st 2018 when the grain was ripe. The grain and stalks were dried and kept in paper bags in Coventry University’s greenhouse for analysis.

7.2.4 Analysis

Total biomass harvested per sub-plot was recorded using a large measuring scale and then the grain yield per sub-plot was recorded using a small measuring scale. Only the grain yield was used as a variable in the field trial and the stalks were composted.

Differences in grain yields were analysed with a two way ANOVA using the model $\text{yield} \sim \text{treatment} * \text{variety}$, using IBM SPSS Statistical Analysis Software (version 26). First, the grain yields (in grams) for all the plots and then the two varieties (Modern and Traditional) were tested separately for normality.

Box 7.1 summarises the end-to-end process steps of the field trial.

Box 7.1 - SUMMARY OF 2018 FIELD TRIAL PROCESS STEPS

- 1 The entire plot was rotovated with manure applied in advance prior to sowing.
- 2 Plot were divided into 40 separate sub-plots and demarcated and assigned their unique code reference.
- 3 BD500 was applied to the non-control plots (MPR, TPR, MIN, TIN, MRD, TRD, MPC, TPC) before sowing on a Root Day as recommended in the biodynamic literature.
- 4 Seeds from both varieties were divided into 40 separate plastic bags with these samples labelled with a T prefix for traditional and M prefix for modern varieties and assigned a unique numeric code
- 5 A random 8 samples were taken apart to receive daily meditation 15 minutes 24 hours prior to sowing. The intention was made for the efficacy of the biodynamic treatments and healthy growth. This was carried out in the researcher's house from 4 – 5 am.
- 6 A random 8 samples were taken apart 24 hours prior to sowing and imbued with the 500 and 501 energetic signatures via the radionics instrument.
- 7 Seeds were planted in their allocated sub-plots April 17th 2018 starting with the sub-plots (MPC, TPC) allocated to the astronomical planting calendar treatment.
- 8 Sub-plots MPC and TPC were planted on a 'Fruit' day as per Maria Thun's biodynamic calendar on April 17th 2018. The remainder of the treatments planted April 18th-20th 2018.
- 9 Growing protocol was followed.
- 10 Observation and enhancement protocols were followed.
- 11 Harvesting protocol was followed.
- 12 Analysis was carried out by weighing the total dry biomass of each plot, followed by grain output only.

7.3 Results

The results of the trial were negatively impacted due to environmental factors. Although no diseases were found in the crop throughout the growth cycle, there had been some pest damage from pigeons during the early stages of the project shortly after the sowing before the mesh was applied. Subsequently at post-harvest, mice had also eaten some of the samples set aside in bags in the storehouse over winter so this had a direct impact on the final grain yields per treatment. Both these factors were preventable to some degree and the lesson learnt was to take better precautions for these incidents in future trials. Nevertheless, it is because of the above pest factors that the results described in this section cannot be considered reliable as a representation of the actual effects of the treatments.

It was shown that overall the grain yield (in grams) for the 40 sub-plots were within normal distribution at significance level of $P = 0.05$ using Kolmogorov-Smirnov and Shapiro-Wilk tests as per Table 7.7. and illustrated in Figure 7.1.

Table 7.7 - Tests of Normality for Total Plots

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Yield	.124	40	.125	.969	40	.346

a. Lilliefors Significance Correction

This was also confirmed to be the case using the same method looking at the modern and traditional varieties with the results shown in Table 7.8.

Table 7.8 - Tests of Normality for Modern and Traditional Plots

Tests of Normality							
	Variety	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Yield	1	.116	20	.200*	.956	20	.459
	2	.161	20	.183	.952	20	.400

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The final test for normality was carried out between the treatments (1-control, 2-biodynamic preparations, 3-planting calendar, 4-intent and 5-radionics). Here, all treatments were also found to be within normal distribution except for 2-biodynamic treatment according to the

Kolmogorow-Smirnov test as shown in Table 7.9. The treatment which was distinct in significance from the others was the grain yield for 2-biodynamic preparations (in grams/grain per 4.2 m² plot) is illustrated in Figure 7.2 that did not have the normally distributed values.

Table 7.9 – Tests of Normality for Control and Treatment Plots

Tests of Normality							
	Treatment	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Yield	1	.189	8	.200 [*]	.920	8	.430
	2	.383	8	.001	.729	8	.005
	3	.161	8	.200 [*]	.946	8	.672
	4	.131	8	.200 [*]	.982	8	.972
	5	.181	8	.200 [*]	.919	8	.422

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

At significance 0.001 on the Kolmogorow-Smirnov test this fell well below $P = 0.005$ however was at 0.005 on the Shapiro-Wilk test.

Having established normality of the samples, a descriptive analysis of the mean grain yields (in kg/ha) of the 2 varieties and their respective treatments was carried out and the results are illustrated in Table 7.10.

Table 7.10 – Mean Grain Yields (Kg/Ha) for Total Trial Plots

Descriptive Statistics

Dependent Variable: YieldKgHa

Variety	Treatment	Mean	Std. Deviation	N
1.00	1.00	1542.2619	188.32490	4
	2.00	1135.1190	607.84235	4
	3.00	1644.6429	547.79285	4
	4.00	1123.8095	470.45354	4
	5.00	1177.9762	582.87600	4
	Total	1324.7619	502.01432	20
2.00	1.00	2455.3571	384.42060	4
	2.00	1736.9048	114.57470	4
	3.00	1780.3571	411.66097	4
	4.00	1560.1190	526.36238	4
	5.00	1593.4524	254.27839	4
	Total	1825.2381	466.77944	20
Total	1.00	1998.8095	562.80195	8
	2.00	1436.0119	517.14755	8
	3.00	1712.5000	454.41674	8
	4.00	1341.9643	517.67111	8
	5.00	1385.7143	471.84239	8
	Total	1575.0000	541.43426	40

The total mean grain yield recorded in the trial was 1575 kg/ha. The first comparison trial is with the 2018 wheat yields of 7130 kg/ha for conventional systems in the West Midlands, UK (NIAB, 2018) and an average of 2300 kg/ha in a trial of 22 different wheat varieties carried out under organic management in nearby Oxfordshire, UK in 2018 (Amos and Alford, 2018). However, this trial was only with winter wheat varieties which normally have a higher yield than spring wheat used in this trial.

The second comparison trial on wheat grain yield, also winter varieties growing in Switzerland (Titlis and Runal), testing for biodynamic inputs was by Mayer *et al.* (2015) with a grain yield of 3800 kg/ha, compared to 3500 kg/ha for organic inputs and 5600-5800 for conventional treatments, therefore 65% lower for the biodynamic inputs. However, the control plot in this trial which had received no inputs during 30 years of cultivation was 1200 kg/ha, and therefore bears no direct comparison to the situation at the field trial which was under organic management. It is surmised that the significantly lower yield of this trial (1575 kg/ha) compared to the mentioned comparison organic and biodynamic treatments noted in the other reported trials can be explained by the smaller plot sizes at 4.2 m², compared to 100 m², in the trial by Mayer *et al.* (2015) and a significant lower seed rate at 204 seed grains/metre, owing to the scarcity of traditional seeds available compared to the comparison trials at 450-475 grains/metre.

The total mean grain yields per treatment as the sum of both moder and traditional varieties are illustrated in Figure 7.3 below.

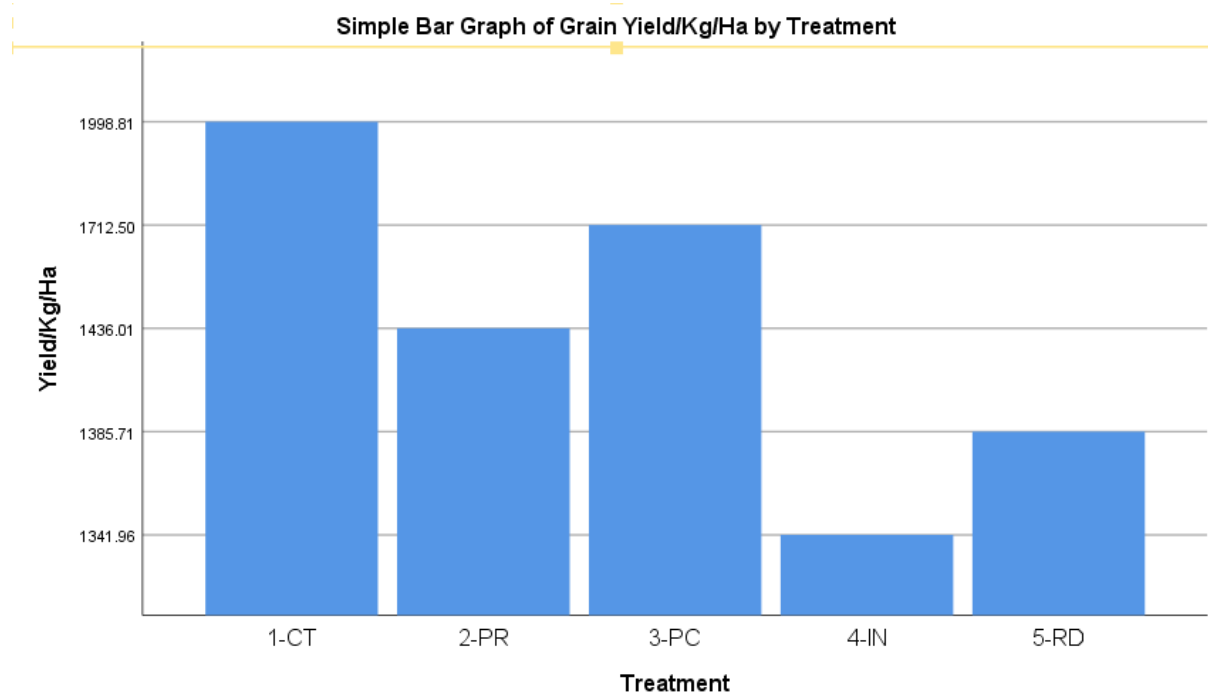


Figure 7.1 – Total Mean Grain Yield in Kg/Ha by Treatment

As indicated above, the highest total mean grain yield was from the control (1-CT) at 1998.81 kg/ha, followed by planting calendar (3-PC) at 1712.50 kg/ha, with the lowest yield was intent (4-IN) at 1341.96.

When looking into separate varieties apart, the illustration of total grain yield in kg/ha per variety is shown in Figure 7.4.

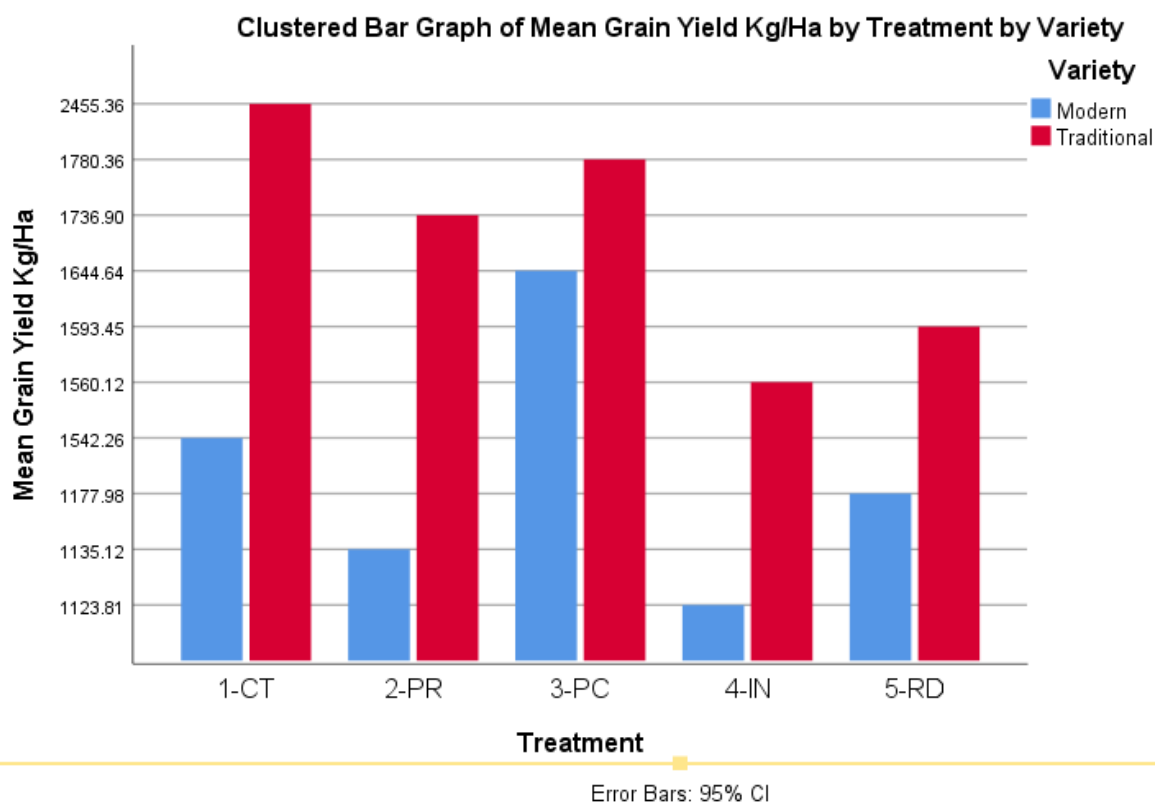


Figure 7.2 - Grain Yield in Kg/Ha by Treatment per Variety

In terms of the modern variety (1-CT), the highest mean grain yield came from the planting calendar treatment (3-PC) at 1644.64 kg/ha with the lowest from intent treatment (4-IN) at 1123.81. Looking at the traditional variety (2) , the highest mean yield was from the control (1-CT) at 2455.36 kg/ha, with the lowest mean yield from intent (4-IN) at 1560.12 kg/ha. Hence, the commonality across the mean yields in kg/ha for the total, modern variety and traditional variety had the intent (4-IN) treatment with the lowest yield. The traditional variety on a whole performed better than the modern variety for all the treatments. This can be partly explained that traditional varieties were bred for organic farming systems whereas modern varieties often rely on artificial inputs

The next step was to establish whether the total yields from the treatments deployed in the trial had any statistical significant differences from the control, irrespective of variety. The results are illustrated in Table 7.11.

Table 7.11 – Effects of Treatments on Total Grain Yields (Kg/Ha)

Treatment

Multiple Comparisons

Dependent Variable: YieldKgHa

Tukey HSD

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	562.7976	220.12342	.105	-75.6941	1201.2893
	3.00	286.3095	220.12342	.693	-352.1822	924.8012
	4.00	656.8452*	220.12342	.041	18.3535	1295.3370
	5.00	613.0952	220.12342	.065	-25.3965	1251.5870
2.00	1.00	-562.7976	220.12342	.105	-1201.2893	75.6941
	3.00	-276.4881	220.12342	.719	-914.9798	362.0036
	4.00	94.0476	220.12342	.993	-544.4441	732.5393
	5.00	50.2976	220.12342	.999	-588.1941	688.7893
3.00	1.00	-286.3095	220.12342	.693	-924.8012	352.1822
	2.00	276.4881	220.12342	.719	-362.0036	914.9798
	4.00	370.5357	220.12342	.459	-267.9560	1009.0274
	5.00	326.7857	220.12342	.580	-311.7060	965.2774
4.00	1.00	-656.8452*	220.12342	.041	-1295.3370	-18.3535
	2.00	-94.0476	220.12342	.993	-732.5393	544.4441
	3.00	-370.5357	220.12342	.459	-1009.0274	267.9560
	5.00	-43.7500	220.12342	1.000	-682.2417	594.7417
5.00	1.00	-613.0952	220.12342	.065	-1251.5870	25.3965
	2.00	-50.2976	220.12342	.999	-688.7893	588.1941
	3.00	-326.7857	220.12342	.580	-965.2774	311.7060
	4.00	43.7500	220.12342	1.000	-594.7417	682.2417

Based on observed means.

The error term is Mean Square(Error) = 193817.271.

*. The mean difference is significant at the .05 level.

As can be seen from the above table using Tukey analysis, the only treatment that had any significant effect compared to the control (1) was the projection of intent (4), at 0.041 and therefore below $P = 0.05$.

A separate analysis was also carried out looking at the yields for each of the varieties, modern and traditional. The results from the modern variety plots are show in Table 7.12 below.

Table 7.12 – Effects of Treatments on Grain Yields for Modern Variety (Kg/Ha)**Treatment****Multiple Comparisons**

Dependent Variable: YieldKgHa

Tukey HSD

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	407.1429	355.82110	.781	-691.6058	1505.8915
	3.00	-102.3810	355.82110	.998	-1201.1296	996.3677
	4.00	418.4524	355.82110	.764	-680.2963	1517.2011
	5.00	364.2857	355.82110	.841	-734.4630	1463.0344
2.00	1.00	-407.1429	355.82110	.781	-1505.8915	691.6058
	3.00	-509.5238	355.82110	.618	-1608.2725	589.2249
	4.00	11.3095	355.82110	1.000	-1087.4392	1110.0582
	5.00	-42.8571	355.82110	1.000	-1141.6058	1055.8915
3.00	1.00	102.3810	355.82110	.998	-996.3677	1201.1296
	2.00	509.5238	355.82110	.618	-589.2249	1608.2725
	4.00	520.8333	355.82110	.599	-577.9154	1619.5820
	5.00	466.6667	355.82110	.689	-632.0820	1565.4154
4.00	1.00	-418.4524	355.82110	.764	-1517.2011	680.2963
	2.00	-11.3095	355.82110	1.000	-1110.0582	1087.4392
	3.00	-520.8333	355.82110	.599	-1619.5820	577.9154
	5.00	-54.1667	355.82110	1.000	-1152.9154	1044.5820
5.00	1.00	-364.2857	355.82110	.841	-1463.0344	734.4630
	2.00	42.8571	355.82110	1.000	-1055.8915	1141.6058
	3.00	-466.6667	355.82110	.689	-1565.4154	632.0820
	4.00	54.1667	355.82110	1.000	-1044.5820	1152.9154

Based on observed means.

The error term is Mean Square(Error) = 253217.309.

None of the treatments when analysed separately for the modern variety had any statistically significant effect compared to the control (1).

The same above analysis was carried to ascertain if there were any statistically significant differences for treatments of the traditional variety separately which can be shown in Table 7.13.

Table 7.13 – Effects of Treatments on Grain Yields for Traditional Variety (Kg/Ha)

Treatment

Multiple Comparisons

Dependent Variable: YieldKgHa

Tukey HSD

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	718.4524	259.24625	.089	-82.0805	1518.9852
	3.00	675.0000	259.24625	.120	-125.5328	1475.5328
	4.00	895.2381*	259.24625	.025	94.7053	1695.7709
	5.00	861.9048*	259.24625	.032	61.3719	1662.4376
2.00	1.00	-718.4524	259.24625	.089	-1518.9852	82.0805
	3.00	-43.4524	259.24625	1.000	-843.9852	757.0805
	4.00	176.7857	259.24625	.957	-623.7471	977.3186
	5.00	143.4524	259.24625	.980	-657.0805	943.9852
3.00	1.00	-675.0000	259.24625	.120	-1475.5328	125.5328
	2.00	43.4524	259.24625	1.000	-757.0805	843.9852
	4.00	220.2381	259.24625	.911	-580.2947	1020.7709
	5.00	186.9048	259.24625	.948	-613.6281	987.4376
4.00	1.00	-895.2381*	259.24625	.025	-1695.7709	-94.7053
	2.00	-176.7857	259.24625	.957	-977.3186	623.7471
	3.00	-220.2381	259.24625	.911	-1020.7709	580.2947
	5.00	-33.3333	259.24625	1.000	-833.8662	767.1995
5.00	1.00	-861.9048*	259.24625	.032	-1662.4376	-61.3719
	2.00	-143.4524	259.24625	.980	-943.9852	657.0805
	3.00	-186.9048	259.24625	.948	-987.4376	613.6281
	4.00	33.3333	259.24625	1.000	-767.1995	833.8662

Based on observed means.

The error term is Mean Square(Error) = 134417.234.

*. The mean difference is significant at the .05 level.

Like with the total plots, there was a statistically significant difference between the intent treatment (4) on the traditional variety, at 0.025 and additionally for the radionics treatment (5) at 0.032.

Outcome and Reflections

It can be deduced from the comparison between varieties that the traditional variety had a greater sensitivity to the effects of the subtle treatments than the modern variety, which confirmed the initial hypothesis. However, it was surprising to see that the net effect of the subtle treatments for both intent (4) and radionics (5) was negative rather than positive compared to the control mean yield which raises some interesting avenues to explore.

Looking at the total at total mean grain yield, the control was 1998.81 kg/ha. In comparison, the total mean grain yield for intent plots (4) was 1341.96 kg/ha. For the traditional variety, the values for grain yield intent (4) was 1123.81 kg/ha and for radionics (5), 1593.45 kg/ha. The low yield aligns with the lower grain yield reported by Mayer *et al.* (2015) from the DOK trials in Switzerland where organic, biodynamic, unfertilised (control) and conventional treatments on winter wheat grain yield was compared over 8 growing seasons (2003-2010). In this trial by Mayer *et al.* (2015) the organic and biodynamic yields were higher than the unfertilised control plot but 64% less than conventional (chemical) treatment. It was noted however that the soil C contents has been decreasing on all treatments except biodynamic treatment with livestock manure added since the DOK experiment began in 1978. In comparison, in the field trial all treatment plots had received very diluted homeopathic amount of manure from the biodynamic treatment which it had no positive effect, but this could be attributed to the short duration of the experiment which only lasted on growing season.

The other comparative wheat yield experiment by Bavec *et al.* (2012) also found significantly reduced yields from organic and biodynamic treatments compared to conventional, but noted that the ecological footprint was higher for the latter farming system. This trial however cannot form a direct comparison to this study since the control (CT) plots set aside for comparison to the subtle treatments had no inputs applied at all.

It may therefore be that perhaps yield was not the optimal parameter when exploring the efficacy of subtle treatments. A prominent practitioner (MacManaway, 2018) using subtle practices has anecdotally indicated from personal field experiences that yields will often increase around 30% from his treatments using intuitive methods communicating with Nature intelligences and positive intent, but he also had decades of experience.

If one puts aside the earlier mentioned caveats, the experiment provided several possibilities for further reflection and exploration. It is first of all noteworthy that there was a statistical significant effect on any of the treatments (even if negative) when none of the practices are recognised as effectual by modern mainstream science. It could also be speculated that because I had no particular skill or experience in these two treatments, intent and radionics both being the most subtle in that they relied on my inner state and intuitive confidence, this could have swayed the treatment in the opposite way intended. It could further be surmised that perhaps my own unconscious bias being educated in a modern Western setting played some role in the outcome. Another conjecture is that the treatment samples were considered more delectable to the pests and therefore had been compromised the most, however this is

pure speculation since any correlation between grain quality is unproven since the trial was solely looking at grain yields and not any quality, such as protein and nutrient content. As such, it was ultimately concluded that the field trial was not able to produce any firm evidence given its short duration, limitations in methodology, and external factors. It also provided indications that yield would not be the optimal factor for assessing the impact of subtle practices.

7.4 Challenges and Barriers Identified in Field Trial

The challenges in conducting a field trial in this study were similar to those for a conventional trial in that the trial was affected by many external factors, such as climate and pests. Furthermore, there were additional challenges when attempting to work with subtle factors. It is possible that because these practices have subtle influences, when practiced on their own their impacts might not be noticeable, but combining them might create a synergy and produce more significant results in the first instance. However, this advantage could speculatively also have the drawback of a creating a possible ‘cocktail effect’ where it would be difficult to isolate the effects of one practice over the other from an experimental perspective. Nevertheless, the combination of the four treatments was the first attempted experiment and therefore distinct from isolated treatments in identified past research trials in the systematic review covered in Chapter 8.

The rationale for spraying all the biodynamic preparations was that given the small size of the field, it would have been impossible to properly isolate the effects of the droplets sprayed in the plots since some of the biodynamic literature (Masson, 2014) indicates that they have a purported non-local energetic effect. This would mean that the conventional plots may also have received the biodynamic treatment notwithstanding that every effort was made to ensure that the droplets were only applied on the treatment fields.

Randomisation vs. Double-Blind

A randomisation and ‘double-blind’ procedure is often included to increase robustness in a field trial. A similar experiment carried out by Roney-Dougal and Solfvín (2003) looking into the effects of meditation on lettuce seeds had a randomisation procedure, thus establishing a precedent for this trial. It was concluded however that a double-blind approach would not have been practical for this experiment for several reasons. Firstly the field trial design meant that double-blind experiments would not have allowed me to sow and cultivate the sub-plots for the astronomical planting calendar treatment and to imbue positive intent to the specific sub-plots during the growing season. This was considered a significant drawback when such

personal and direct attention was required for the specific practices explored. Though I endeavoured for neutrality, there was the possibility of an ‘unconscious’ effect on the treatment and maintenance of the sub-plots, in particular the ones that received a subtle agroecological treatment, given my interest in the subject area, but if so it ultimately had the opposite effect with statistically significant lowery yields for human intent and radionics treatment. However, if subconscious favouring of one method over another has any tangible impact on an experiment, this would also have been the case for all other material non-double-blind trials carried out by other researchers.

Skill Level

Another challenge and barrier in furthering exploration in this area is finding researchers or practitioners with a sufficient level of skill in the practices. It became clear only after the trial that my lack of prior experience with the practices could not ultimately lend a fair assessment to their purported effects when literature found in the study indicated the importance of having a prior competence, such as for example in meditation (Ducharme, 2007; Roney-Dougal and Solfvín, 2002;2003). Furthermore, even putting aside that complexity, the epistemological assumption behind a field experiment is that the researcher functions as an objective observer who is operating outside from the experiment. As described in Chapter 2, this assumption is uncertain in light of findings of quantum mechanics where there is recorded observer effect in the wave-particle duality and quantum entanglement (Murphy, 2021) and also countered by the view in indigenous knowledge traditions that the universe is relationship-based (Aikenhead and Michell (2011).

Outcome of the Experiment Informed by Decolonisation Praxis

The shift away from empirical methods towards an approach centered in decolonisation theory and indigenous knowledge systems in the second year led me to question whether even under such controlled conditions other factors could potentially still affect the experiment. Viewed from an indigenous perspective, the consciousness of the researcher, the soil, seeds and plants are not inert but have their own agency, while also interacting with a multitude of interrelational and spiritual forces (Aikenhead and Michell, 2011; Craven and I’poyi, 2009). All these factors would limit the ‘control’ that a researcher seeks to impose on a trial. Also, indigenous knowledge systems are place-specific so even if the results were reported as statistically significant in a laboratory or a field at Coventry University in the United Kingdom over several years it does not necessarily follow from this worldview that it would work elsewhere. This premise also provides a limitation for physical practices generally acknowledged in modern conventional agricultural science. In adopting the

decolonisation framework I became more appreciative towards the veracity of the ontological view that there was relationship gradually established with the land and seeds I was working with and that the development of such a relationship was not possible to mature over a short duration.

Regarding the ethical and social dimensions inherent in indigenous knowledge systems, Yunkaporta (2020) summarises the approach used by indigenous peoples in their ways of valuing, being, knowing and doing in the world as steps in the following order:

- 1) Respect
- 2) Connect
- 3) Reflect
- 4) Direct

Writing from an indigenous decolonisation perspective, Yunkaporta notes that in ‘Western’ culture, this approach is often followed in inverted order and elaborates further from an indigenous perspective that:

‘The first step of Respect is aligned with values and protocols of introduction, setting rules and boundaries. This is the work of your spirit, your gut.

The second step, Connect, is about establishing strong relationships and routines of exchange that are equal for all involved. Your way of being is your way of relating, because all things only exist in relationship to other things. This is the work of your heart.

The third step, Reflect, is about thinking as part of the group and collectively establishing a shared body of knowledge to inform what you will do. This is the work of the head.

The final step, Direct, is about acting on that shared knowledge in ways that are negotiated by all. This is the work of the hands...Everything in creation is sentient and carries knowledge, therefore everything is deserving of our respect (p 154).’

If the above epistemological approach is applicable to my field trial then my initial position as a detached bystander who had not even attempted to establish a respectful relationship the land or clarified my intention started the experiment at a disadvantage and my assumption that I was in ‘control’ to effect the results could be considered arrogant and flawed from a decolonisation perspective and may even have affected the trial outcome.

Reflections from Goethean Analysis

In addition to indigenous knowledge systems that are acknowledged in the agroecological movement (Anderson *et al.* 2021), there are also other Western-derived ‘intuitive’

methodologies as mentioned in Chapter 2. One of these is the Goethean methodology (e.g. Holdrege, 2005; Hoffman, 1998) that could be possibly further leveraged in subtle agroecological research. I attempted the Goethean methodology as a complete novice during this field trial and found the practice difficult but beneficial.

The main reflection that arose from spending several hours silently observing the characteristics of both the traditional and modern varieties in the field was the drastic difference in the phenotype despite both varieties coming from the same species. It was noted in my last notes before harvest how ‘thick, stocky, plain, short and inflexible’ the modern variety carried itself in its environment compared to the more ‘thin, vibrant, beautiful, powerful, flexible, long and flowing’ characteristics of the traditional variety. In terms of visible and intuited recognition of ‘vitality’ and ‘aliveness’, the traditional variety had a more pronounced felt presence, beauty and longevity than the modern varieties that presented the impression of being less able to thrive in a changing landscape throughout the season. An analogy that came to mind was the difference perceived in a battery-raised chicken breed raised primarily for a specific yield and an older traditional breed that is hardier and more versatile. It became clearer over extended period of time spent in the field in silent observation and ‘beholding’ of the plant how these insights started to crystallise more and it developed into a personal understanding how the other-than-human world could very subtly and gradually communicate back when intention and attention are applied towards simply observing with a ‘beginner’s mind’ rather than analysing.

These insights and descriptors are subjective of course and I claim no expertise in what was a first attempt in this intuitive methodology. Considering that I already knew which variety I was observing would have led to prejudice is entirely possible. Of course both varieties were bred through human intervention to be different for different purposes, with neither being necessarily more ‘natural’. Thus my positionality may have affected my observations, and the reverse could also be true if the experiment was conducted by someone else with a more favourable disposition towards modern varieties. However, the act of even consciously attempting to enter into a conscious bidirectional relationship moving from subject-object thinking to subject-subject thinking was a reflective exercise that could potentially yield new insights overlooked in conventional trials. The importance of intuitive engagement in conventional crop research is supported by Keller (1983) who described Nobel Prize winner Barbara McClintock’s work in sweet corn breeding involved developing a feeling for the whole organism.

Conclusion

Upon the conclusion of the field trial, there were some cautious indications that the subtle agroecological practices could have a statistically significant effect on yields. However, the two practices where a significance was found, for intent and radionics, the effect was negative compared to the controls. It is a possibility that the treatments simply did not work or have a positive effect, but it is not unexpected that a conventional research trial does not show conclusive results in the first year. Another likelihood was that yield was not the optimal parameter to test for. However, I believe the most likely reason for the results gathered was that my skill level in the subtle practices I worked with were not of a sufficient level combined with the short duration and my lack of establishing the necessary relationship with the land I was working on.

My reflections aside from this field experiment was that even when considering the shortcomings of the approach carried out, the findings of statistical significance into more than one practice indicated that some level of efficacy was a possibility even under such conditions and that the empirical approach to learning more about these methods could not be dismissed. This led me to subsequently carry out a detailed review and analysis on what other studies carried out worldwide by more experienced researchers using a similar methodological framework had been carried out on the subtle agroecological practices. This will be the subject of the next chapter where I carried out a systematic review of the available literature on empirical trials.

7.5 Photographs from 2018 Field Trial

Pictures taken during the field trial experiment throughout the growing season up to harvest are shown in Figures 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.12 and 7.13.



Figure 7.3 - Field Trial - April 16th 2018



Figure 7.4 - Field Trial - May 2nd 2018



Figure 7.5 - Field Trial - May 17th 2018



Figure 7.6 - Field Trial - May 31st 2018



Figure 7.7 - Field Trial - June 27th 2018



Figure 7.8 - Field Trial - July 5th 2018



Figure 7.9 - Field Trial - July 17th 2018



Figure 7.10 - Field Trial - August 1st 2018



Figure 7.11 - Wheat samples in Greenhouse

Chapter 8 : How Well do Subtle Practices Perform in Empirical Trials? Findings of a Systematic Review

8.1 Introduction

Building on the findings of a field trial in the previous chapter, this chapter attempts to present and critically assess the available evidence of the efficacy of subtle agroecological practices from data gathered from existing empirical trials.

This phase of the project involved undertaking a systematic review of empirical trials carried out worldwide into subtle agroecological practices and to analyse their results. Proceeding via this approach would require some explaining since after my own first-hand experiences and results raised could be questioned in terms of epistemology, especially in a decolonisation context. As outlined in Chapter 2, it was never suggested that the empirical approach to investigating phenomena was invalid in itself, but nevertheless should be embedded within a broader consideration of other social studies methods, namely the deployment of case studies and a survey that had already been decided upon. The additional evidence from other peer-reviewed empirical trials (along with my own field trial) would serve as a counterbalance and supplement to these findings, in essence using many methods to investigate practices that are difficult to adequately capture in any single research method.

Furthermore, the reality could not be bypassed that at the present time the empirical method remains the gold standard for agricultural research, in both the conventional and alternative agricultural movements. Hence, significant focus and attention was placed on the results from the systematic review with its emphasis on filtering out any papers or trials that did not meet the strict robustness criteria set meant to represent only the cream of the research into the subtle methods for consideration in the project.

The main aim thus of this chapter is to address the second research question about the subtle agroecological practices:

2. What evidence is there of their efficacy?

One possible way to determine their efficacy is through the lens of peer-reviewed empirical research trials carried out worldwide. Although agroecology is gradually moving towards more holistic scientific methods as highlighted in Chapter 2, the evidence from robust scientific trials still carry significant weight and influence among academics and farmers. Working via this approach within the academic mainstream does itself do not pose an obstacle using decolonisation theory as one of many avenues to furthering knowledge.

Therefore, an extensive review was deemed necessary to explore the results of such trials to date.

8.2 Methodology

A systematic review of all peer reviewed references pertaining to subtle agroecological practices was carried out for trials that have been empirically tested worldwide and their robustness analysed. Although some literature reviews have been carried out into some of the specific practices, to date there has been no prior attempt by researchers to consolidate and analyse such a breadth of practices in one comprehensive search. It was therefore considered justified and approved by the Doctoral College (Abell, January 15th, 2021, email communication) that within this research context a systematic review was deemed acceptable as an original part of primary data gathering and analysis to contribute to new knowledge.

Criteria for identifying the efficacy and sustainability of these practices in systematic review were found by looking at common agronomic criteria such as increased yields and crop quality. Furthermore, these practices were also assessed for impact on several elements of the Public Goods Framework such as healthy agricultural landscapes, farmland biodiversity, water quality, soil functionality, climate stability, air quality, resilience to flooding and fire, rural vitality and farm animal health and welfare (Cooper *et al.* 2009). A public good is a term used in economic theory that defines public goods by the following characteristics:

- Non-excludable – if available to one person, others cannot be excluded from the benefits it provides.
- Non-rival – if consumed by one person it does not reduce the amount available to others.

The reason for choosing the public goods framework in the assessment was that in line with a broader holistic analysis with the recognition that a truly regenerative agriculture extends beyond solely productionist dimensions and that its impacts whether positive or negative extend far into the broader social and ecological sphere.

The results in this chapter were compiled from a systematic review to determine the extent to which these practices have already been covered in peer-reviewed scientific and agricultural journals. Its purpose is to ascertain the degree of robust evidence on the efficacy of these practices from the lens of conventional scientific methodology.

9.3 PRISMA Process Flow

The flow of this systematic review was carried out according to the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) in Figure 8.1 (Moher *et al.* 2009). The PRISMA framework was developed for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions going through four phases to ensure the transparent and complete reporting of systematic reviews and meta-analyses (Liberati *et al.* 2009). However, it has also been used in agroecological research carried out systematic reviews on agricultural research trials (Doehring and Sundrum, 2016; Mathie and Clausen, 2015). The PRISMA process flow was followed in its entirety as per the format from Liberati *et al.*, 2009).

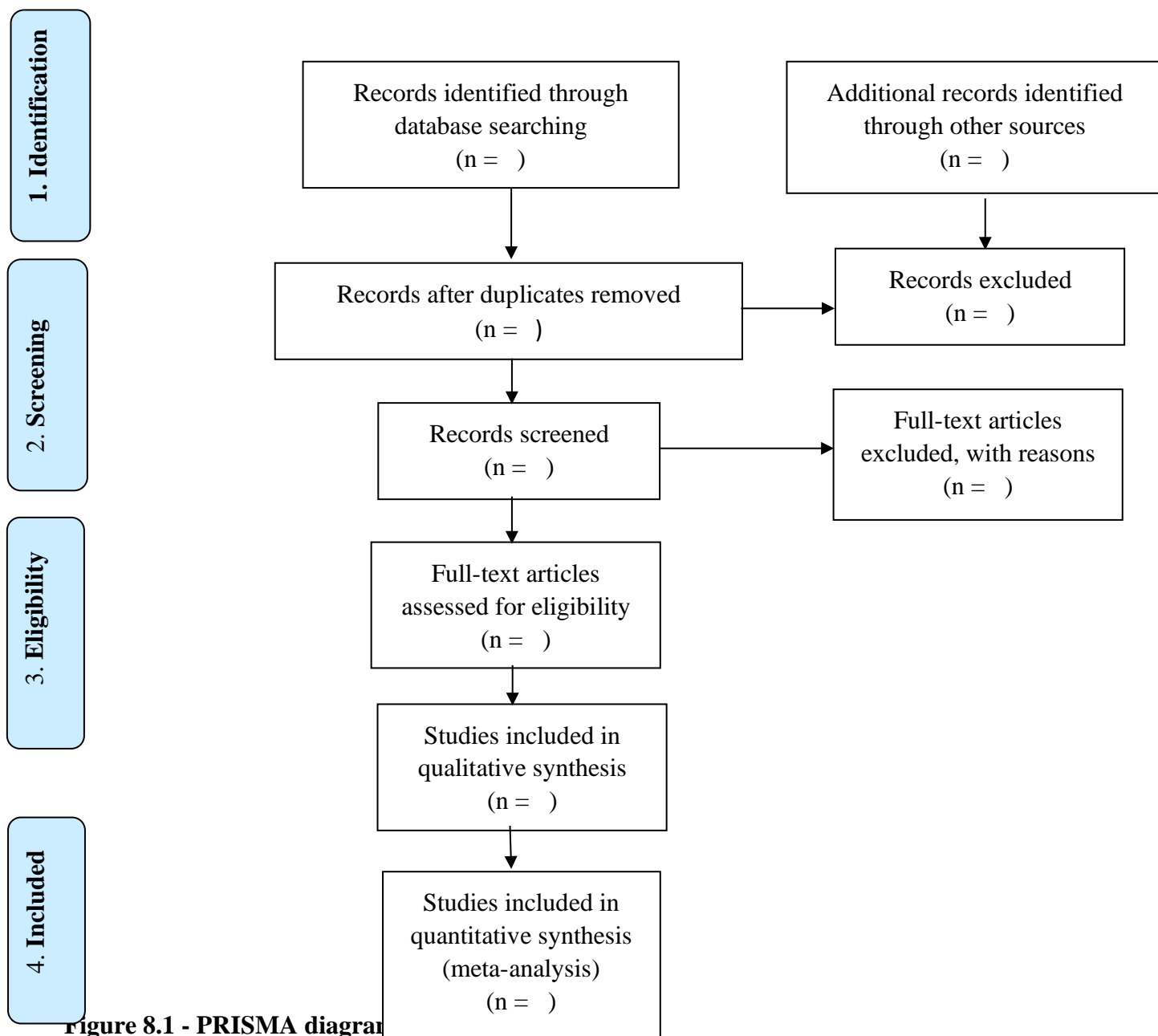


Figure 8.1 - PRISMA diagram

The following step-by-step methodology was followed:

1. Identification

A search was conducted using the following knowledge sources between July 13th 2020 and July 25th 2020:

1. Academic Search Complete
2. Scopus

Searches were carried out based on a combination of at least one word in the title, keywords and abstract in ‘List 1’ and at least 1 word in the title, keywords and abstract in ‘List 2’. List 1 focused on retrieving literature with a specific link to agriculture AND containing one of the following key words: Agroecology, Agroecological, Agriculture, Organic, Permaculture, Farm, Food Production, Crop Production, Livestock, Biodynamic.

List 2, as shown in Table 8.1, was compiled by drawing from my own existing knowledge of and from three other academic researchers working in the same research topic of spiritually-informed practices in agriculture, including one biodynamic researcher and two researching ‘quantum agriculture’, the practices and systems now described as subtle agroecological practices in this thesis.

In Table 8.1 these key words, in the third column, are categorised within the most appropriate practice and sub-practice which are shown in the 1st and 2nd columns. I had done these categorisations as a result of information gleaned from the literature review in Chapter 4.

Table 8.1 - Key Search Words

Practice	Sub-Practice	Key Words
Working with sound/electrical energies	Sound	Music, Singing, Sound
	Electromagnetism	Electromagnet, EMF
		Paramagnet, Rock Dust, Tower of Power
Working with other subtle energies	Paramagnetism	
	Geomancy	Feng Shui, Geomancy, Ley Lines, Earth Energies
		Biodynamics, Concoction *

Practice	Sub-Practice	Key Words
Biodynamic Preparations		
Homeopathic Treatments		Flower essence **, Homeopathy, Homeopathic, Agrohhomeopathy
Astronomical Calendars	Planting	Astrological, Astrology, Cosmic, Lunar, Moon, Planets, Planting calendar, Stars, Thun
Person-based intuitive/meditative practices	Intuition	Intuition, Intuitive, Transpersonal, TPAE, Consciousness
	Intention	Meditation, Mindfulness, Shumei, Chanting, Prayer, Yogic
Ritual-based practices		Homa, Ritual, Yajna, Ceremony, Agnihotra, Blessing, Vedic Divination, Water Witching, Dowsing
Instrument-based intuitive practices	Divination	
	Radionics	Field Broadcaster, Radionics
Communication with Nature Intelligences	Plant-Human Communication	Plant-Human Communication, Telepathy
	Nature Intelligences	Devas, Elementals, Etheric, Nature intelligence, Nature Spirit, Spiritual, Findhorn

*Concoction was a term to look for any other combination of ingredients that were not specific to biodynamic origin but with stated spiritual component. For example, ‘Jeevamrut’ a soil amendment originating from India with various cow by-products was excluded since no references could be found that it had any subtle energies linked with its use.

****Flower Essence** – These include the Bach Flower essences and others were require homeopathic dilution.

Some of the Key Words may be associated with and yield search results from more than practice or sub-practice as indicated in Table 8.2:

Table 8.2 - Key Words across Practices

Key Words	More than 1 Practice	Relevant to More than 2
Planting Calendar, Stars, Astrological, Astrology, Lunar, Moon	1. Biodynamic Preparations, 2. Astronomical Calendars	Planting
Vedic		1) Human Intent 2) Ritual 3) Astronomical Calendars 4) Geomancy 5) Sound

In such cases, upon review the associated practice was assigned to the most appropriate category deemed by the researcher upon a scan of the publication.

Table 8.3 outlines the search words entered into the ‘Academic Search Complete’ and ‘Scopus’ databases.

Table 8.3 - Search Words Strings used in Academic Databases

Practice	String 1	String 2
Sound	“Agroecology” OR “Agroecological” OR “Agriculture” OR “Organic” OR “Permaculture” OR “Farm” OR “Food Production” OR “Crop Production” OR “Livestock” OR “Biodynamic”	“Music” OR “Singing” OR “Sound”

Practice	String 1	String 2
Electromagnetism	“	“EMF” OR “Electromagnet”
Paramagnetism	“	“Paramagnet” OR “Tower of Power” OR “Rock Dust”
Biodynamic Preparations	“	“Concoction” OR “Biodynamic”
Agrohomeopathy	“	“Flower Essence” OR “Homeopathy” OR “Homeopathic” OR “Agrohomeopathy”
Astronomical Planting Calendar	“	“Astrology” OR “Astrological” OR “Cosmic” OR “Moon” OR “Lunar” OR “Planting Calendar” OR “Stars” OR “Thun”
Intuition	“	“Intuition” OR “Consciousness” OR “TPAE” OR “Transpersonal”
Human Intent	“	“Blessing” OR “Chanting” OR “Prayer” OR “Yogic” OR “Meditation” OR “Mindfulness” OR “Shumei”
Ritual	“	“Homa” OR “Ritual” OR “Yajna” OR “Agnihotra” OR “Vedic” OR “Ceremony”
Geomancy	“	“Feng Shui” OR “Geomancy” OR “Earth Energies” OR “Ley Lines”

Practice	String 1	String 2
Divination	“	“Dowsing” OR “Divination” OR “Water Witching”
Radionics	“	“Field Broadcaster” OR “Radionics”
Plant-Human Communication	“	“Plant-Human Communication” OR “Telepathy” OR “Consciousness” OR “Plant Communication”
Nature Intelligences	“	“Devas” OR “Etheric” OR “Nature Intelligence” OR “Nature Spirit” OR “Spiritual” OR “Findhorn”

Screening

Only the two academic knowledge sources ‘Academic Search Complete’ and ‘Scopus’ were used in this systematic review for identifying and presenting the trial results of the subtle agroecological practices to explore research question 2:

‘What evidence is there of their efficacy?’

Earlier investigations from 2016-2019 revealed that there exists an abundance of grey literature (web sites, non-peer reviewed journals, books) discussing the subtle agroecological practices, and that analysis of these would present a more rounded and inclusive overview than what would be available from analysing solely peer-reviewed articles in academia. It is for this reason that descriptors of these practices even when not validated by modern science were not dismissed but instead included in the review in Chapter 4.

In this systematic review covered in this chapter, only peer-reviewed empirical trials and literature reviews published in academic journals were considered eligible for inclusion and analysed in this chapter. There were no restrictions set on the date of publication and this was to include as many resources as possible. It had been established in the literature review that some of these practices have been investigated in agricultural research for over a century, and also to investigate trends in number of publications in a chronological sequence. All duplicates were removed following the initial gathering of publications for review across all the knowledge repositories.

2. Eligibility

A three stage sorting process was carried out to determine eligibility for the review.

Sort 1: Articles retrieved were assessed via a perfunctory scan based on publication title, key words and abstract to determine relevance based on my present knowledge whether they were pertinent to actual subtle agroecological practices.

Sort 2: All articles were categorised into one of these 3 types:

- 1) Empirical Research trial
- 2) Literature Review
- 3) Theoretical/Descriptive

All documents underwent a general review and any that were not relevant (sort 1) or peer-reviewed empirical trials or literature reviews (sort 2) were screened out for further analysis and possible inclusion in the typology in Chapter 4.

Sort 3: Empirical trials and literature reviews were further reviewed in more detail for robustness, however when performing this sort, it was difficult to find one standard criteria or protocol for screening for robustness. Therefore the below protocol was established following consultations with expert opinion with CAWR and an independent review of the requirements for solid academic research gathered in many of the reviewed journal publications:

- 1) Minimum of 3 replications per trial
- 2) Published in a peer-reviewed journal
- 3) Statistical analysis on results carried out at $p = 0.05$ or less
- 4) Clearly described methodology

Abstracts and summarised reporting for conference proceedings were also excluded at this stage. Any complete papers that met all 4 criteria were further classified as ranking 'A', whereas papers that missed one criteria were classified as ranking 'B.', more than one missing criteria classified as ranking 'C'. The remainder were excluded from the review.

All literature reviews were scanned and categorised separately from the trials.

Only publications where the full text was available in English were reviewed.

3. Included

Publications identified for inclusion were categorised under each category and subcategory.

Details were recorded about the country where the trial took place (if more than one, it was marked as ‘international’), trial subject (specific plant, animal, soil, other), the parameters tested for, whether the trial result was positive or negative and a brief summary of important notes in the study. However, in some cases publications that were not available in full format on these databases, or particular references that were subsequently found to be of significant relevance to the study were retrieved from Researchgate. Google or Coventry University library’s document supply team.

4. Parameters for Analysis

Robustness criteria (A, B, C)

Geographical Location

Publication Date

Test Subject

Result (‘Significant’ or ‘Insignificant’)

The sum total of these findings, along with separate sections for each specific subtle agroecological practise, were analysed and discussed. In addition to a summary of the reported results, another key theme in the analysis were the papers’ reported challenges in undertaking this kind of research using empirical trials and suggested ways to improve further research. These were kept for inclusion in the discussion in Chapter 11.

8.3 Results from Systematic Review

In total, the systematic review yielded 31,825 publications that went through a sorting and exclusion process as outlined in Figure 8.2 below. The exclusionary process went through several screening stages:

Screening Stage 1

Name and abstract of publication were reviewed and screened for relevance that the topic was specifically about agricultural applications of these practices and categorised. The results from this screening are highlighted in Table 8.4.

Table 8.4 - Systematic Review Screening Stage 1

Practice	Initial number of papers retrieved	Papers excluded	Papers retained for Sort 2
Application of sound energies	14713	14657	56
Application of Electro- magnetic Energies	2810	2779	31
Astronomical Planting Calendars	1884	1855	29
Biodynamic Preparations	2146	1938	208
Homeopathic Treatments	501	325	176
Communication with Nature Intelligences	3604	3549	55
Instrument-based meditative/intuitive practices	41	10	31
Intuitive/meditative Practices	3836	3771	65
Ritual-based practices	2095	2027	68

Practice	Initial number of papers retrieved	Papers excluded	Papers retained for Sort 2
Application of other subtle energies	195	149	46
Total	31,825	31,060	765

Screening Stage 2

The papers were reviewed and any papers that were not in English, or did not specifically cover empirical trials, such as social studies or theoretical descriptive papers were removed. Literature review summarising prior trials were retained as a separate category at this stage.

The results from this screening are highlighted in Table 8.5 with all the empirical papers identified in this review.

Table 8.5 - Systematic Review Screening Stage 2

Practice	Papers Reviewed	Non- Empirical Papers Excluded	Papers retained for Sort 3
Application of sound energies	47	11	36
Application of Electro- magnetic Energies	40	5	35
Astronomical Planting Calendars	29	14	15

Practice	Papers Reviewed	Non- Empirical Papers Excluded	Papers retained for Sort 3
Bioenergetic Preparations	208	63	145
Homeopathic Treatments	176	58	118
Communication with Nature Intelligences	55	50	5
Instrument-based meditative/intuitive practices	31	24	7
Intuitive/meditative Practices	65	53	12
Ritual-based practices	68	53	15
Application of other subtle energies	46	21	25
Total	765	352	413

Screening Stage 3

In the final stage of the screening, all the remaining papers were read, analysed and assessed based on the robustness criteria specified. Any papers that did not meet the necessary criteria

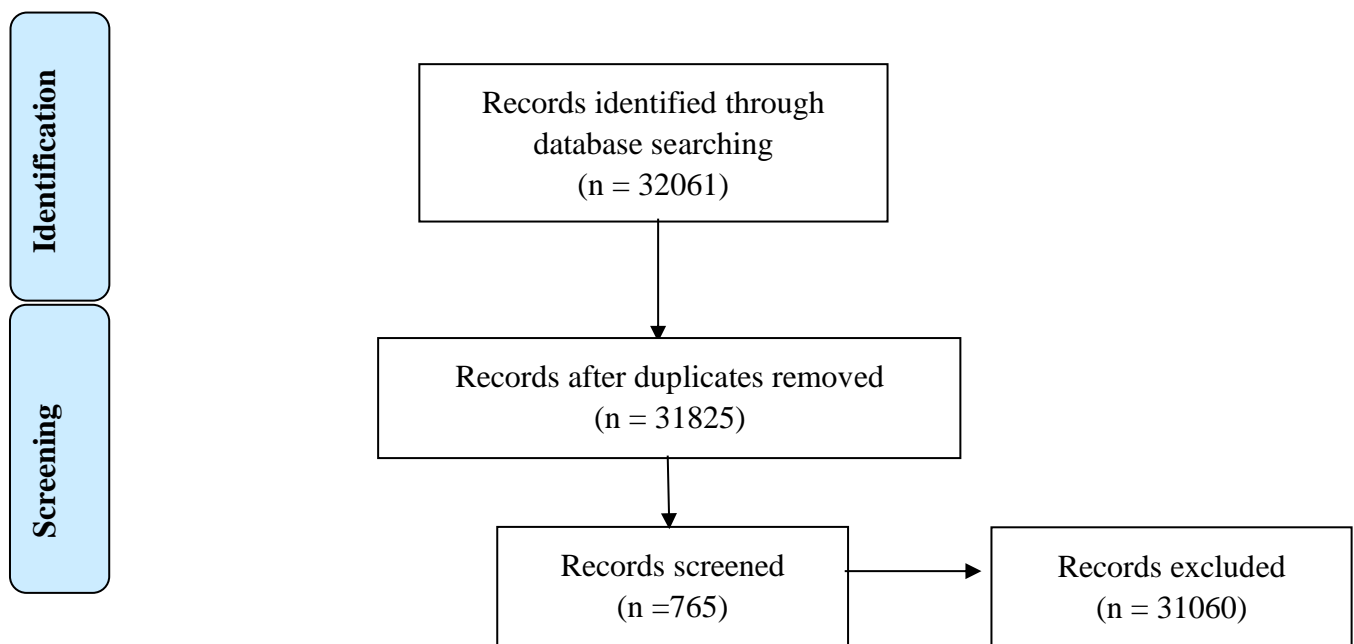
were excluded with the remaining graded in ‘A’, ‘B’ or ‘C’ or ‘L’ for Literature review as a separate category of ‘Qualitative synthesis’ as highlighted in Figure 8.2.

The results from this screening are highlighted in Table 8.6 highlights all the empirical papers identified in this review.

Table 8.6 - Systematic Review Screening Stage 3

Practice	Papers Reviewed	Papers Excluded in Robustness Review	Final Sort of Papers	A	B	C	L
Application of sound energies	36	14	22	9	4	2	7
Application of Electro-magnetic Energies	35	6	29	16	3	2	8
Astronomical Planting Calendars	15	5	10	7	1	0	2
Biodynamic Preparations	145	56	89	70	9	0	10

Practice	Papers Reviewed	Papers Excluded in Robustness Review	Final Sort of Papers	A	B	C	L
Homeopathic Treatments	118	50	68	51	4	0	13
Communication with Nature Intelligences	5	3	2	0	0	0	2
Instrument-based meditative/intuitive practices	7	5	2	0	0	0	2
Intuitive/meditative Practices	12	6	6	4	0	0	2
Ritual-based practices	15	8	7	3	2	0	2
Application of other subtle energies	25	9	16	11	3	0	2
Total	413	162	251	171	26	4	50



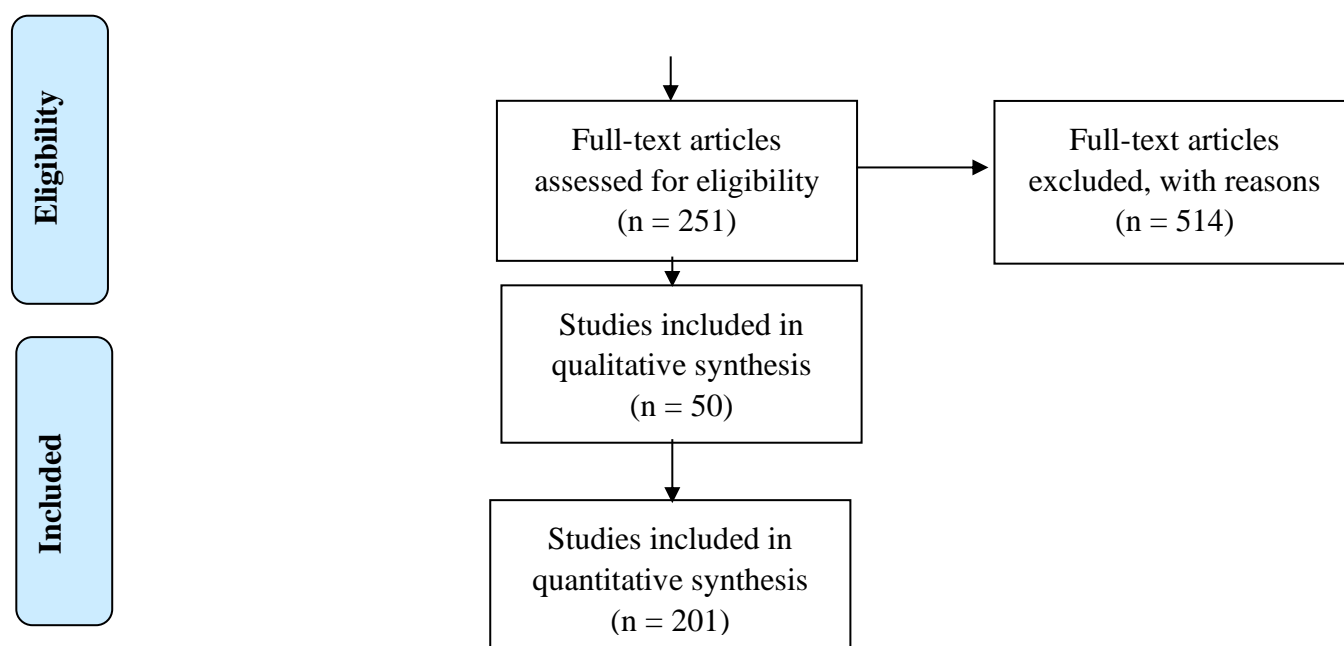


Figure 8.2 - Overall Process and volumes of Systematic Review

In total out of the 361 empirical trials identified, 201 (or 56%) of these trials reviewed met the robustness criteria to be included in this study. The 50 literature reviews were considered as an independent ‘L’ category and were not included among the 201 empirical papers were reviewed.

The breakdown of these journals with the number of papers are summarised in Table 8.7.

Table 8.7 – Alternative Journals and Practices Published

Journal Name	Publications	Practice
Homeopathy	5	Homeopathic Treatments
International Journal of High Dilution Research	2	Homeopathic Treatments
Journal of Alternative & Complementary	2	Homeopathic Treatments

Journal Name	Publications	Practice
Medicine		
Journal of Alternative Medicine Research	2	Homeopathic Treatments (1)
		Person-based intuitive/meditative practices (1)
Alternative Therapies in Health and Medicine	1	Homeopathic Treatments
Revue d'Homeopathie	1	Homeopathic Treatments
Journal of Parapsychology	1	
Total	14	

In terms of geographical location where all the 201 empirical trials took place, 97 were in Europe, 36 were in Asia, 31 were in South America, 22 were in North America, 6 were international (took place in more than country), 7 were in Oceania and 2 were in Africa. Figure 8.3 illustrates the geographical breakdown.

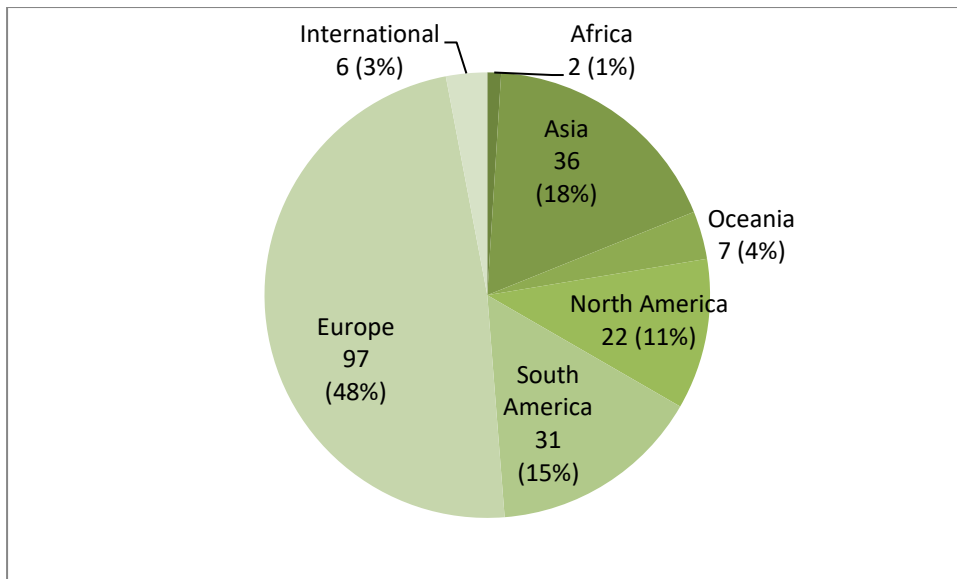


Figure 8.3 - Illustration of Geographical Breakdown of Total Subtle Agroecological Publications

The dates when the research trials were published have been categorised into the following categories (1989 and prior, 1990-1999, 2000-2009, 2010-2015 and 2016-2020) as illustrated in Figure 8.4.

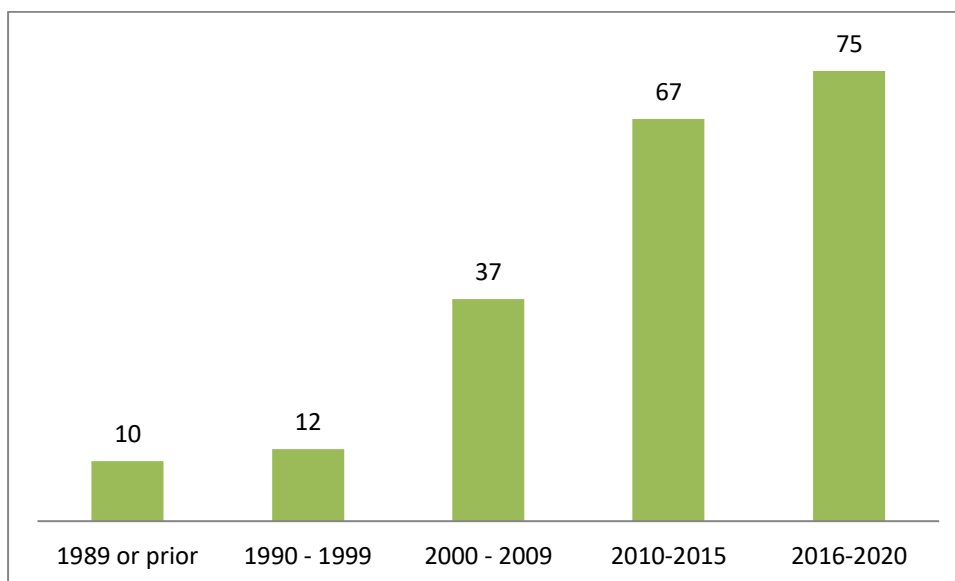


Figure 8.4 - Illustration of Publication Date of Total Subtle Agroecological Publications

Regarding the test subject, out of the 201 empirical trials, 108 were tested on an assortment of plants (47 species, primarily vegetables and arable plants), 48 on animals (poultry, cattle, pigs, sheep, goats), 40 on soil and compost with the remaining 5 on diverse subjects (pests, biodiversity, water, air quality) as indicated in Figure 8.5. The parameters tested for in each paper per practice are shown in Appendices G – N. The most common ones were yield (fresh

and dry weight), crop quality, soil micro biota, nutritional content, plant morphology, growth rate and characteristics and disease resistance.

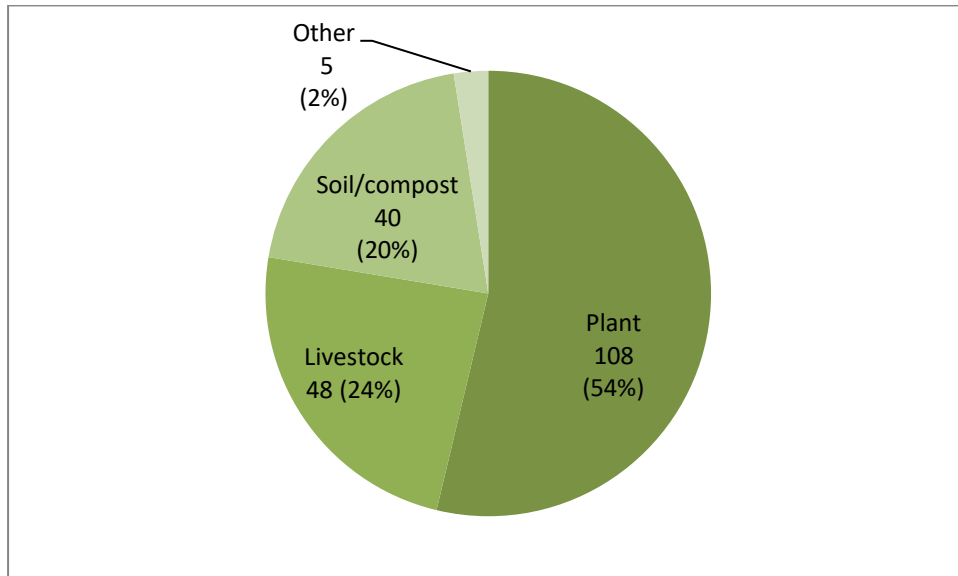


Figure 8.5 - Test Subject Breakdown of Total Subtle Agroecological Trials

In terms of whether the trials had yielded a statistically significant result at $p = 0.05$ or less, or had an insignificant effect above this threshold, out of a 201 total, 152 trials yielded a significant result on at least one of the parameters tested for whereas 49 did not, as illustrated in Figure 8.6.

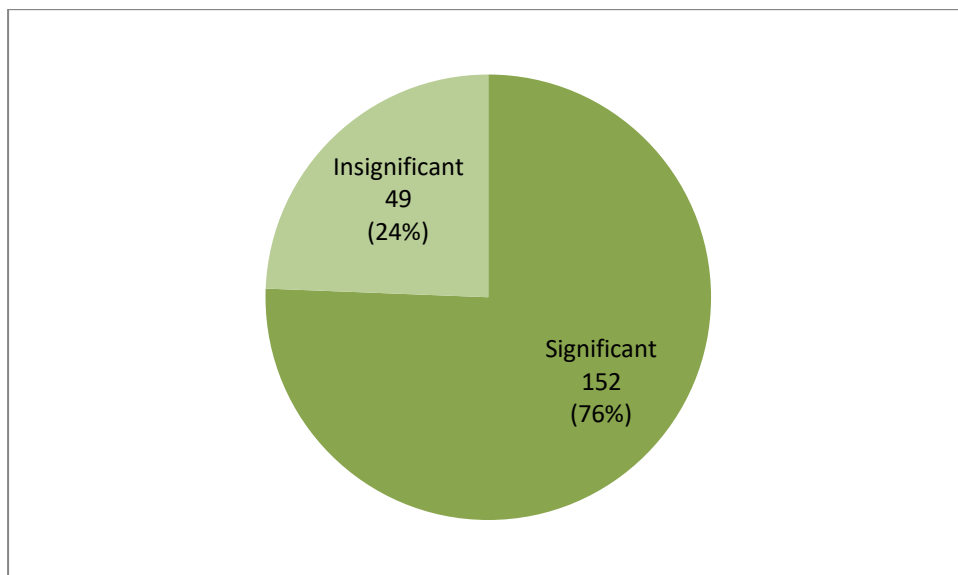


Figure 8.6 - Results of Total Subtle Agroecological Empirical Trials

The general breakdown of the 201 empirical trials into specific subtle agroecological practices yielded 79 on biodynamic preparations, 55 on homeopathic treatments, 15 working with sound, 21 working with electrical energies, 14 working with other subtle energies, 8

astronomical planting calendars, 5 ritual-based practices, 4 person-based intuitive/meditative practices and 0 Instrument-based intuitive practices as illustrated in Figure 8.7.

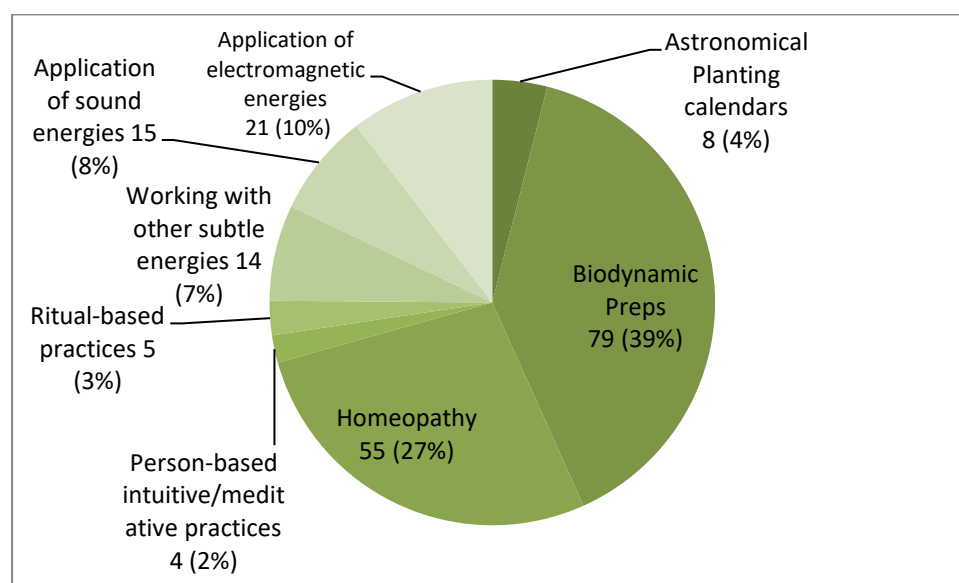


Figure 8.7 - Category Breakdown of Total Subtle Agroecological Practices in Research Trials

Key Systematic Review Findings from Specific Subtle Practices

Key findings of the empirical trials in this review yielded some further elucidation into the results and effects for specific subtle practices.

Biodynamics

Biodynamic preparations featured the highest number of empirical trials. This may be partly because trials have been carried out since 1924 with a well-established research network from the beginning (Paull, 2011). As illustrated in Table 8.6, out of 79 trials, 70 (89%) were classified as ‘A’ in terms of robustness and 9 (11%) classified as ‘B’, which is the second highest after homeopathic treatments the majority of these, 68 (86%) were field trials with only 11 (14%) laboratory trials.

The publications on biodynamics showed a clear skewing in their numbers towards the Global ‘North’ (Europe and former colonies settled by Europeans) which in total accounted for 69 out of 79 papers (88%). Of the remainder of publications for the rest of the world, 7 (9%) of these were carried out in India where the biodynamic movement has made significant headway since it was introduced in the 1990s. India now ranks fifth worldwide in the number

of hectares (9303) under certified biodynamic management (Paul and Hennig, 2020). Out of the 41 biodynamic studies on plants, 14 (34% of the total) were conducted on grapevines. Biodynamic viticulture has a significant niche in the wine sector, accounting for about 1% of hectares worldwide (Soustre-Gacougnolle *et al.*, 2018).

It is also worth noting here that 7 out of 21 (33%) of the biodynamic trials with insignificant results had yields as a parameter. This is balanced by the fact that 9 (15%) out of the 58 statistically significant trials also tested for yields as a parameter. However, in this context it is noteworthy to consider that there is no indication from Steiner's lectures that biodynamic preparations would lead to an increase in yield but rather the purpose was to grow healthier crops and obtain systems balance on farms that were already in poor condition during the early days of industrial farming.

A majority of the trials found in this review indicate that biodynamic preparations had a statistically significant effect on the parameters tested for, which were soil fertility, soil microbiology, soil quality, compost development, plant and animal biodiversity, plant antioxidant activity, nutritional quality, growth parameters, chemical composition, seed germination and milk fatty acid composition. However, not all the trials specifically compare against an organic system as a separate parameter; some only have conventional as a comparator. Hence it cannot always be inferred from these trials whether the results are derived solely from the preparations element in the biodynamic system or whether organic management has also contributed. For example, a study by D'Evoli *et al.* (2010) showed that biodynamic strawberries contained significantly higher amounts of antioxidants than chemically grown strawberries, although no comparison was made to standard organic methods. Also, it is important to consider that there are more differences between organic and biodynamic farming systems than simply the preparations. As mentioned earlier, biodynamic philosophy lays great emphasis on the 'farm organism' which includes different biotypes such as hedges, ponds, meadows, woodland, alongside various species of livestock a required to act as 'organs' for that same farm organism as well as the farmer who plays the role of the conscious agent (Koepf and Schaumann, 1976). In addition to this, there are other factors such as astronomical planting calendars which are a core part of the biodynamic 'systems' approach but were not covered in any of the trials reviewed.

Homeopathy

Homeopathy followed second from biodynamics in terms of robust research papers found and is a comparatively well-established research field among the subtle agroecological practices reviewed. The robustness percentage 'A' (93%) and 'B' (7%) reflects the quality of these

studies, further validated in that 39 (71%) of the trials were published in mainstream agronomy journals, the remainder 16 (29%) in homeopathy and alternative medicine journals.

In terms of geographical distribution, South America, more specifically Brazil where 23 publications had been published. This can be attributed to homeopathy being encouraged at the governmental level in Brazil where it has been legislated for public use in the national health system in organic food production systems and furthermore supported by research in universities (Boff *et al.* 2021, Brasil, 2007). The United States appears totally absent in this research with the only 4 publications found in North America published in Mexico. It is likely that the publications retrieved in English as part of this study's review comprise only an incomplete part of the overall research into this field, as indicated for example by the reference list by Boff *et al.* (2021) with 15 references to homeopathic research in Brazilian Portuguese.

For the test subjects, 23 trials were tested on plants, 18 on cattle, 7 on pigs, 5 on sheep and goats, 1 on poultry and 1 on pests, as illustrated in Figure D.2 in Appendix D. The use of homeopathic remedies on dairy herds is preferred over allopathic remedies on organic farms where antibiotic use is restricted and they provide a gentler and less expensive alternative (Ebert *et al.*, 2017). Of the 31 (56% of total) trials carried out on livestock, results were 21 (68%) statistically significant and 10 (32%), nil/inconclusive, significantly less than the plant trials which had 18 statistically significant (78%) and 5 nil/inconclusive (22%). All the trials with insignificant result for livestock tested for disease resistance and weight gain under a conventional farming system where homeopathic remedies would already be at a disadvantage compared to an agroecological setting, as reported by Boff *et al.* (2021). The trials carried out for plants tested primarily for growth parameters and yield but also a few for disease resistance and showed no clear indicator whether the insignificant results were skewed towards disease resistance or yield. For all trials however, 73% had a statistically significant result as shown in Appendix D, Figure D.2.

16 (29%) of these trials were published in journals specialising in homeopathy and alternative medicine with the remainder 39 (71%) in mainstream agronomy and veterinary journals. The greater proportion of mainstream publications is pertinent since homeopathy as a subtle practice is being researched and seriously discussed despite critiques from the conventional medical standpoint that at the molecular level no actual substance in highly diluted homeopathic medicines can be detected with existing methods (Camerlink *et al.* 2010). This, along with biodynamics where the majority of papers were found, sets a precedent for the

possibility of future research into other more subtle agroecological practices that are obscure to the present day.

The complete list of parameters for homeopathy are described in Appendix H, but in broad terms the two main parameters tested for were plant growth, yields and disease reduction. For example, a study by Swarovsky *et al.* (2014) specifically researched the use of homeopathic remedies for increased disease resistance by investigating the homeopathic treatment ‘Cina’ for root-knot nematode in tomato plants under greenhouse conditions. The results indicated a significant increase in root volume of the treated plants at 13.98% compared to the controls which would make the plants more resistant to nematodes and allow more absorption of water and nutrients. In another illustrative trial looking at essential oil content, Bonato *et al.* (2009) had undertaken a trial in Brazil where it was found that homeopathic remedies with sulphur had increased the essential oil content in mint 75%, 77%, 116% and 51%, respectively, in dynamisations 6, 12, 24 and 30CH when compared to those of control. In addition to being desirable for production, increased oil content also serves as a defensive measure to make the plants more resistant to diseases. What draws both studies together was that the results varied depending on different dynamisations or dilutions of the homeopathic treatment. This was also validated in four of the other statistically significant trials reviewed (Abasolo-Pacheco *et al.*, 2020; Modolon *et al.* 2015; Gama *et al.*, 2015; Modolon *et al.* 2012) as being an important variable to consider.

Sound Energies

All of the 8 sound trials carried out on plants tested primarily for growth parameters, but 2 with protein and flavonoid content also yielded statistically significant results, although it was found that this was dependent upon the growth stages, species and frequency of and exposure time to sound waves. For instance, a laboratory study by Kim *et al.* (2020) found that sound wave treatments of alfalfa (250 Hz), broccoli sprouts (800 Hz) and red young radish sprouts (1 kHz) increased the total flavonoid content by 200%, 35% and 85%, respectively and furthermore significantly improved the antioxidant efficiency of sprouts in comparison with the untreated control. A further variable to consider was that the effect of the sound treatments was not uniform across a species and could also differ across plant cultivars according to a study by Mildažienė *et al.* (2020).

The effects of the 7 sound trials using sound treatment on animals had mixed results, with 2 insignificant (29%) and 5 statistically significant (71%). The 2 animal studies with insignificant results (Li *et al.* 2019 and Cloutier *et al.*, 2000) were conducted on a commercial pig farm, thus drawing a linkage between the homeopathic trials where the overall local

context was unlikely to be conducive for subtle methods. This is noteworthy since all the livestock trials were on experimental or industrial farms where these environments may be less conducive to adding a subtle technique under already stressful conditions.

Electromagnetic Energies

For the trials working with electromagnetic energies, the trend in results was shown with 15 out of the 21 studies (71%) also revealing statistically significant results for the tested parameters which were primarily growth indicators and germination percentage. Breaking down the 6 trials with insignificant results, 3 out of the 4 trials on plants had missing statistical analysis or no details on the number of replications. 10% of the total studies (2 out of 21) had been carried out on animals (chickens). Both animal trials reported insignificant results testing for haemoglobin, blood count, dead embryo percentage and body weight. It is noted here that these were carried out in a laboratory rather than a more 'natural' setting under field or farm conditions.

Rock Dusts

In reviewing the empirical trials using paramagnetic rock dusts as an agricultural supplement, 11 out of the total 14 trials (79%) showed a statistically significant result in the tested parameters which were primarily plant growth parameters, soluble plant nutrients, pH value and yield. The 3 trials with insignificant results had tested for growth parameters, nutrient composition and microbial activity, but 2 out of these trials had methodological drawbacks including no mention of replicates in both or statistical analysis in one. Like homeopathy, this was a practice where most trials came from South America and more specifically Brazil, where 43% of the total publications originate, making it the leader in this research.

Astronomical Planting Calendars

Despite farmers worldwide planting according to the moon, sun and constellations over millennia (Lehoux, 2000; Evans, 1998), this review identified only 8 empirical trials testing these practices. All these trials only investigated lunar influences. 6 out of 8 (75%) trials tested statistically significant on the parameters tested for, out of which 4 were tested on plants germination percentage, yields, growth characteristics and water uptake for plants. 2 of the statistically significant plant trials were conducted by a biodynamic researcher Spiess (1990a and 1990b). In one of these trials on rye (1990a), the largest effects of lunar influences were noted during early growth stages, and especially at emergence. Early influences on the formation of yield were modified by compensatory mechanisms of the plants throughout the growth cycle so that little effect was found on yield but lunar influences

were still apparent in the crude protein content of the rye grain. The authors also draw references to further research on this within the movement including the distributor of the main calendar (Thun, 2003). However, none of these reports were found to be published in peer-reviewed journals so could not be analysed for robustness as part of the systematic review. The 4 trials carried out on livestock had 50% statistically significant results with 2 trials carried out on sheep and cattle for fertility rate and number of deliveries respectively. The remaining 50% with insignificant results had one trial (Palacios and Abecia, 2001) found no statistically significant evidence that lunar cycles affect the number of births in sheep looking at a registries of birth records for 68,127 lambs from 2003–2005 on 60 sheep farms in northwestern Spain. However, this study happened over 3 years which could not be considered a sufficient timeframe to make a definite conclusion disproving what has been considered farmers' knowledge for millennia. A similar study with insignificant results was carried out looking at calving frequency and pre-term calving based on 41,116 records of Japanese black cows from 905 farms (Sasaki *et al.*, 2019), with the same drawbacks of a short duration (4 years) and reliance on external records rather than a controlled experiment.

Ritual-Based Practices

All 5 ritual-based trials identified in this review were related to the Agnihotra ritual. Although rituals related to agriculture are a global phenomenon (Apffel-Marglin, 2012), the systematic review found only literature solely on this practice. This may be because it has a clear methodology for its use, along with attempts to quantify the results in an empirical framework (Berk, 2016). All the trials tested a statistically significant result on parameters as diverse as improvement in plant growth dimensions, air and water quality, yields and P solubility.

Intuitive/meditative Practices

The systematic review found a relatively low number of robust publications (4) on such practices compared to the other practices, despite the efficacy of meditation and mindfulness being accepted in modern culture as a personal practice as well as being encouraged in work environments (Pathath, 2017). The publications all indicated that such practices had a statistically significant effect on plants under the parameters tested for, which was primarily yield, growth, but also oil content and reduction in pest damage. Ducharme (2007) published a doctoral thesis on an experiment in which positive and negative prayers were transmitted towards courgette seeds stored in Petri dishes located in a greenhouse. The prayers were carried out by the researcher with a background as a trained alternative healer. The study found, compared to the control sample, a significant increase and decrease in germination

rates and weights above statistical significance on the seeds receiving the positive and negative treatments, respectively. In a peer-reviewed trial, Roney-Dougal and Solfvin (2002, 2003) performed two double-blind trials on two commercial organic farms in Somerset, UK, in which a trained healer blessed some of the lettuce seeds to test for germination and growth. Another paper by Pandey *et al.* (2015) summarised several university trials carried out in India on Sustainable Yogic Agriculture (to be discussed further in Section 12.2.3) with statistically significant results found for yield and protein content for wheat and groundnuts.

Key Areas of Interest from Empirical Subtle Agroecologies Research to Farmers

As summarised in Chapter 9, Table 9.14, the review papers revealed that specific practices positively impacted different crop, livestock and soil parameters. In the case of wheat production, adding the biodynamic preparations improved compost development and wheat yield. The focus of human intention improved wheat rooting rate, while electromagnetism had a beneficial effect on germination speed and plant height. The impact of sound was shown to be beneficial for numbers of both roots and tillers. In the case of broad bean, emergence, yield, length of stem with pods, number of seeds per plant and pod and seed mass were all enhanced by electromagnetic treatments. Planting by lunar calendars had shown positive effects on growth and yields for rye. The application of biodynamic preparations indicate beneficial impacts on key plant species; improved yield, dry matter content and phenolic compounds and antioxidant activity in potato crops, and improvement in chemical properties of grapes and wine.

The homeopathic treatments were found to be particularly beneficial for the treatment of various livestock ailments including lower SCC for dairy cattle, verminosis and diarrhoea prevention and lower FEC for sheep. Using sound treatments enhanced the hatching duration, hatchability percentage, quality of hocks and navel and weight of poultry.

Biodynamic preparations were also identified to positively benefit key soil parameters, such as organic C content, microbial biomass, soil chemistry, compost temperature, nitrate content and CO₂ respiration.

Systematic Review Findings of Practical Benefits for Farmers

One of the intended outputs of the research was to identify specific practices that could be of particular benefit to farmers. A filtering of some of the major areas of agronomic interest was therefore compiled in Table 8.8 looking at only the most robust classification ‘A’ references where a statistically significant result was indicated.

Table 8.8 - Significant Agricultural Benefits of Subtle Practices Drawn from the Systematic Review papers

Agronomical Subject	Impact	Trial Type	Subtle Practices Identified	Reference
Wheat	Compost Development Yield	Field	Biodynamic Preparations	Bavec <i>et al.</i> , 2012
				Reeve <i>et al.</i> , 2010
	Rooting Rate	Laboratory	Human Intent	Stephen <i>et al.</i> , 2018
	Speed of Germination		Electromagnetism	Payez <i>et al.</i> , 2013
	Plant Height Number of roots Number of tillers		Sound	Weinberger and Measures, 1978
Broad Bean	Emergence Yield	Field	Electromagnetism	Podleśny <i>et al.</i> , 2004
	Plant losses during vegetation %			
	Length of stem with pods			
	Number of seeds per plant			
	Number of seeds per pod			
	Mass of 1000 seeds (g)			
Rye	Growth	Field	Astronomical Planting	Spies, 1990
	Number of plants per m ²		Calendars	

Agronomical Subject	Impact	Trial Type	Subtle Identified	Practices	Reference
	Yield				
	1000-seed weight				
Potato	Yield	Field	Biodynamic Preparations		Verma <i>et al.</i> , 2011
	Dry Matter Content	Field	Biodynamic Preparations		Jariene <i>et al.</i> , 2015
					Vaitkevičienė <i>et al.</i> , 2016
	Phenolic compounds and antioxidant activity	Field	Biodynamic Preparations		Jariene <i>et al.</i> , 2017
Grapevines	Chemical properties of grapes and wine	Field	Biodynamic Preparations		Reeve <i>et al.</i> , 2005 Fritz <i>et al.</i> , 2017 Picone <i>et al.</i> , 2016
Cattle	SCC	Farm	Homeopathic Treatments		Wagenaar <i>et al.</i> , 2011 Klocke <i>et al.</i> , 2010
	Weight gain				Zábranský <i>et al.</i> , 2014
Sheep	FEC (Faecal egg count)	Farm	Homeopathic Treatments		Benvenuti <i>et al.</i> , 2011
	Verminosis prevention	Farm	Homeopathic Treatments		Santos <i>et al.</i> , 2016
	Diarrhoea	Farm	Homeopathic		Fortuoso <i>et al.</i> , 2016

Agronomical Subject	Impact	Trial Type	Subtle Identified	Practices	Reference
	prevention		Treatments		2019
Poultry	Embryonic growth Hatching duration Hatchability % Quality of hocks and navel Weight	Farm	Sound		Donofre <i>et al.</i> , 2020
Soil	Soil organic C content	Field	Biodynamic Preparations		Fließbach <i>et al.</i> , 2006 Scheller and Raupp, 2005
	Microbial biomass	Field	Biodynamic Preparations		Sradnick <i>et al.</i> , 2018 Heinze <i>et al.</i> , 2010 Birkhofer <i>et al.</i> , 2008
	Soil Chemistry	Field	Biodynamic Preparations		Birkhofer <i>et al.</i> , 2008 Zaller and Köpke, 2004 Murata and Goh, 1997
	Compost temperature Nitrate content CO2 respiration	Field	Biodynamic Preparations		Carpenter-Boggs <i>et al.</i> , 2000

Overview of Practices Not Covered in Systematic Review

There were no empirical trials identified on geomantic practices, instrument-based intuitive practices and communication with Nature intelligences in the systematic review. The premises of these practices are outside the paradigm of modern conventional science and as such academic institutions may not sponsor research into this practice. This highlights a possible research gap for further exploration since academic and grey literature indicates that there are presently a significant number of farmers that use radionics instruments (Kuepper, 2021; Massy, 2021; Diver and Kuepper, 1997). A case study approach would likely be the optimal method of research into radionics for researchers to gain further understanding into how farmers use radionics and to assess its effects.

Significant publications were found with literature reviews on plant intelligence but none covered communication with the other-than-human world. There were no empirical trials on communicating with Nature intelligences specifically in an agricultural context. Empirical trials conducted in a conventional frame work are unlikely to be effective since the intent is to establish a relationship with the beings that are purported to have their own agency. The findings from the farmers' survey (to be discussed in Chapter 10) indicate that this is an area many farmers view positively and are already practicing.

8.4 Challenges and Barriers Identified in Systematic Review

Looking at the third research question, the systematic review identified specific challenges for some of the key practices which are highlighted here.

Biodynamics

In addition to the challenges and barriers to conducting empirical research in a reductionist framework as outlined in Chapter 2, there are also further barriers to adoption of biodynamics by farmers, especially those living in the global 'North'. In this context, Goldstein (2000) postulated the following reasons why biodynamic preparations to this day remain a small part of the land under organic cultivation worldwide:

- Most people have likely not heard of biodynamic agriculture or biodynamic preparations.
- Biodynamic agriculture is based on 'spiritual scientific' principles. Spiritual matters are difficult, if not impossible, to quantify.
- The making of the preparations may seem odd or unsanitary to many since they involve animal organs, horns and skulls.

- Small quantities of the preparations applied to crops, soils, or compost would indicate a doubtful result according to contemporary scientific understanding.
- No confirmed chemical or physical theory has been proven to establish why the preparations might work. It has been suggested by some that they act as microbial inoculates; others think they may have hormonal effects or perhaps even radiative effects.

Goldstein (2000) mentions that most of these barriers are cultural rather than practical.

Homeopathic Treatments

The farming system and the empirical research framework if run according to conventional standard would likely mean that, like biodynamics, homeopathic remedies being a holistic method by nature would not lend themselves easily to a reductionist trial. Drawing from Brazilian experiences, Figueiredo *et al.* (2018) postulate that such remedies could work better under agroecological conditions than with livestock since it would be difficult to isolate the livestock health from their broader environmental conditions. Most of the trials (27 out of 31, or 87%) were carried out on non-organic livestock largely kept in industrial-farm conditions. Performing trials with livestock managed in a more holistic manner closer to their natural requirements would likely be necessary to obtain a proper evaluation of homeopathic treatments on farm livestock.

Supporting this, Scofield (1984) also highlights the epistemological challenge of conducting trials of holistic therapies like homeopathy using an atomistic approach. Stoff (1983) states ‘it is a highly questionable scientific practice to dismiss a body of significant empirical evidence (such as homoeopathy) simply because the underlying philosophy, which rationally interprets such results, assumes premises foreign to those currently accepted (p.151).’

One of the primary problems with homeopathic trials is that reproducibility does not always occur. An experiment will yield reproducible results only if all factors that influence the given experimental system are known and controlled. This problem is not particular to homeopathy however. It has recently been reported that the modern Western scientific model partly bases its claim to truth on reproducibility, yet many phenomena cannot be replicated (e.g. Foster and Skufca, 2016; Aarts *et al.*, 2015; Ioannidis, 2005) leading to a ‘replication crisis’ in mainstream science putting into question its presupposed universal effectiveness in understanding the complexities of the living world.

Non reproducibility therefore means that the scientists who performed the experiment did not control all crucial parameters, either because they were not aware of them or because they

were not able to do so for technical or epistemological reasons, as for example those highlighted in the double-slit experiment in quantum mechanics. Thus irreproducibility may be an inherent feature of the part of the world that one investigates (Baumgartner, 2005).

Furthermore, the lack of a homeopathic ‘Materia Medica’ specifically for plants, containing a large number of signs and symptoms in different species, does not allow for the application of the therapeutic similitude principle leading to individualized treatment of diseases and other ailments in plants (Teixeira and Carneiro, 2017).

The consciousness and experience of the practitioner are also important factors to consider in homeopathy. Boff *et al.* (2021) state that the effectiveness of homeopathic therapy in agriculture is reliant on its local contextualisation, which rests on the practitioner’s experience of perceiving the whole sick organism, the relationships between the parts, and the emergent properties occurring at different levels of the system. Furthermore, the same study notes that the agroecological context is also important for homeopathic practices. Before the healing process starts, any obstacles to healing and any practices misaligned with agroecological principles – should be identified and eliminated, so that the homeopathic revitalisation of the system as a whole can be possible.

Application of Sound Energies

Drawing from the results of the systematic review, the first main challenge is that the studies on sounds indicate a wide variance between different frequencies for different plants and animals, exposure of treatment and the environmental conditions where the studies were carried out. The variance of effects can occur even on the cultivar level which means further testing, experimentation and care under field conditions that requires more forethought than the more ‘blunt’ approaches used in industrial farming such as applying pesticides and chemical fertilisers. Significant research on these variances and parameters has already been collated in literature reviews carried out by other researchers from trials on many plant species (e.g. Pietruszewski and Martínez, 2015; Hassanien *et al.* 2014).

Sound treatments may be one of the subtle energies that is conceptually the easiest for farmers to accept, given that these are already recognised by modern science and known to effect living beings, such as the effects of music on well-being. Furthermore, the study found there are already seven literature reviews describing past scientific research on working with these energies. Thus, indications based on Figure C.3 in Appendix C are that research interest is on the rise in this field, indicating significant scope and potential for leveraging these

natural energies sensitively to increase animal and plant health without the use of chemical supplements.

Application of Electromagnetic Energies

Taking the above factors working with sound energies into consideration, the effects of electromagnetic treatments on a field could possibly have unintended interferences and impacts on the wider environment, whether plants, animals and humans. These broader aspects of agriculture were not the subject of the trials; however there are indications that this is a concern. For instance, a study by Shepherd *et al.* (2018) indicated that 50 Hz ELF EMFs emitted from power lines may represent a prominent environmental stressor for honey bees, potentially impacting their cognitive and motor abilities, in turn reducing their ability to pollinate crops. There are also possible ethical implications to consider on the broader health of humans, animals and plants in exposing them electromagnetic treatments at frequency levels that are as yet unproven but potentially harmful (SCENIHR, 2009). Furthermore, the electromagnetic treatments may require industrial infrastructure and lead to situations whereby small farmers could be dependent on supplies from outside their local environment. Moerman (2021) speculates that the wider research and practical application of electromagnetic energies in agriculture has possibly been stymied by the fact that practical people may favour direct or visible (e.g. morphological or symptomatic) observations rather than indirect or invisible (electromagnetic) ones.

From a positive perspective, electromagnetic treatments may be the subtle energies that will be the easiest for farmers to accept given that they are already recognised by modern quantum science (Kieft, 2006) and known to effect living beings to some extent (Moerman, 2021). Furthermore, there are already 8 extensive literature reviews describing past scientific research on working with electromagnetic energies.

Rock Dusts and Paramagnetism

Some of the main challenges of broad scale rock dust application identified are the economics of transportation, grinding and other modification techniques of the rock fertilisers (Van Straaten, 2006). Although the majority of the empirical research trials reviewed indicates some degree of effectiveness on the parameters tested for, studies indicate that, unlike organic by-products, it may be some years before the effects of rock dusts become apparent. This does not lend itself well to short-term agricultural experiments, or make the application of rock dusts attractive to farmers paying a high cost for long-term result. As noted by Swoboda (2016), the conventional economic approach in farming simply takes fertiliser input

and yield output over a short timeframe into account. Rock dust however does not simply aim to raise yield, but to ameliorate and maintain soil conditions over a longer term. These benefits are difficult to quantify in the prevailing economic paradigm. Poor results in some of the trials were attributed to low solubility of nutrients. Effectiveness in nutrient delivery is indispensably linked to the weathering of the rock particles in the soil (Harley and Gilkes, 2000). Additionally it is difficult to determine exact dosages or cause-response relations since rock materials exhibit slow or lagging effects on plants and soil health which are also dependent on pH, temperature and rainfall (Winiwarter and Blum, 2008). Half of the 42 trials were conducted in greenhouses and thus isolated from the surrounding environment. Furthermore, Swoboda (2016) noted that the duration of experiments with rock materials is often too limited to allow definite conclusions, but in the trials cited, basalt and volcanic rocks generally performed better when compared to granite or rocks containing primarily feldspar. The same author noted that the application of rock dust led to significant results when applied to highly weathered soils in tropical environments which have higher precipitation rates, helping silicate dissolution (Harley and Gilkes, 2000), as well as when applied in combination with organic materials and microorganisms. Only 3 trials analysed by Swoboda (2016) showed a negative effect of the treatment but this was attributed to applying very coarse particles (~6mm) and amounts between 40-50 t/ha, widely considered as the application limit and potentially contributing to soil sealing. The negative result of another trial cited was relativised by the fact that slow weathering granite was applied, with that trial lasting only a month. Furthermore, the dissolution of the rock dusts into the soil to become available for plant nutrients is likely influenced by the composition of soil solution and the action of plants. Other factors including climate, temperature, pH, and bulk soil solution composition, changes in rhizosphere pH and redox, and chelation by organic acids also play a role (Swoboda, 2016).

Taking all the above factors into consideration, there are many unknowns concerning how the application of rock dusts might perform within the context of each individual farm. Even though according to the studies there is generally no danger of over-applying the rock dusts if finely ground (Swoboda, 2016), the cost of purchasing and spreading out and incorporating the rock dusts could be a prohibitive factor on a large scale. Also, the mineral composition of the rocks could be a factor in their effectiveness. Some areas may have more suitable sites for rock dusts which could potentially lead to colonial appropriation and mining of mountains considered sacred to some indigenous cultures. Looking at this approach from a decolonisation lens, the dominant modern view that rocks are a 'resource' that can be extracted at will is also a problematic concept. This is not to say that quarrying of rock dusts,

like any harvest from the other-than-human world, cannot happen under the right circumstances and context. Nevertheless, the use of fossil fuels for large-scale mining operations and transport of bulky material on a global scale is also not a long-term sustainable solution in light of the recent IPCC (2021) that greenhouse gas emissions are a direct cause of escalating occurrences of extreme heat waves, droughts and flooding worldwide.

There are hence many caveats in including rock dusts in the toolkit of subtle agroecological practices. At the present time, however, as a by-product of the quarry industry, there is no shortage of material available to apply to agricultural soils worldwide and making use of waste products fits well within the ethos of agroecology. If a small-scale technology was available that could produce rock dust locally and supply this inexpensively to farmers while also taking into consideration the wider landscape and culture, it could prove to be a beneficial component towards regenerating agriculture worldwide.

Geomancy

Since no robust peer-reviewed trials were retrieved on Geomancy from the systematic review, this indicates that it is an area that researchers hesitate to explore at the present time. This could be because it pertains to subtle energies that are not considered existent in the modernist paradigm, although this is of course also the case with the other practices discussed. However it is more likely that as indicated in the typology in Chapter 4, the purported benefits from the practices, such as ‘luck’ or ‘harmony’ are qualitative in nature and thus being immeasurable do not lend them easily to scientific scrutiny. Looking at Feng Shui geomancy in particular, it can be surmised that millennia of application throughout the Far East would appear to indicate some wisdom underlying the practices through the fact that they remain in use to the present day even without empirical validation.

Astronomical Planting Calendars

The main challenge recognised in astronomical planting calendars in the systematic review is the immense number of variables to account for, both cosmic and telluric. Such calendars can employ relatively simple methods, such as planting according to the lunar or solar cycles. Alternatively, they can go into greater complexity, such as the Maria Thun calendar used in biodynamics (Thun, 2018) which looks at a wide area of astronomical influences including the constellations and even specifies the specific plant part that is favourable for cultivation at a specific time of day (Root, Fruit, Leaf, and Flower). Studies have also found that it is not

clear whether specific astronomical elements favour all species equally (Zürcher and Schlaepfer, 2014). It is also possible that those geographic locations can increase or decrease the effects of the astronomical factors, for example distance from the sea which is governed by lunar tides. One biodynamic practitioner, Podolinski (1985) would emphasise the moon's influence rather than that of the constellations in locations near the sea. Most of the studies reviewed tested for parameters related to growth and yield, but astronomical influences may have more qualitative benefits, such as water uptake (Brown and Chow, 1973). Given that most of trials reviewed were field trials, it would have been beneficial to have included more laboratory trials for balance. However, as discussed above a reductionist framework would likely not present a rounded analysis of subtle agroecological practices. Laboratory trials might possibly allow greater scope for isolating astronomical influences, but with the drawback of separating trial subjects from telluric influences. Nevertheless, 75% of the trials did indicate a statistically significant result on the parameters tested and hence lend some validity to millennia of traditional farming' knowledge based on close observation and experience. This indicates that astronomical elements cannot be dismissed simply because their effects on agriculture have not been validated according to modern scientific understanding.

Given the immense number of variables to consider in this context, it would be unrealistic to expect to define universal recommendations applicable for all locations and contexts. Instead, further research would be necessary at a local level to observe and engage with the other-than-human world to understand cosmic influences on specific animals and plants in order to further explore the use of plant calendars as an alternative to relying on industrial products and the modern mechanistic knowledge system.

Ritual-based Practices

In common with other practices described above, the breadth of the effects beyond agriculture purported to arise from ritual-based practices makes it difficult to isolate their benefits in the research domain. The only ritual identified in the systematic literature was Agnihotra, which is a an ancient Vedic fire ritual that has a wide range of purported benefits, not only in the agricultural domain for soils, plants and animals, but also for water and atmosphere purification and even human health. Berk (2016), a lead scientist and researcher in the Homa Farming movement using this practice, suggests a compromise as to the relevance of traditional knowledge practices in contemporary farming systems in stating:

‘We have to avoid two possible forms of dogmatism which are actually widespread when dealing with any form of traditional knowledge:

- 1) "This statement is confirmed by different quotations from the Vedas - and therefore it must be true."
- 2) "These statements from Vedic Knowledge do not make sense in terms of modern science and therefore have to be refuted."

The first kind of dogmatism could lead to an endless discussion about how it can be established that the Vedas have sacred origin and all statements within them must be true. A more fruitful approach might be to treat the statements as hypotheses and then attempt to test them using modern scientific method. The second kind of dogmatism is one of the big stumbling blocks for the integration of science and traditional knowledge: Quite often ideas which cannot easily be integrated in the present body of scientific knowledge are refuted simply because of this reason. However, fundamental progress in science has often been achieved through transcending borders from the present body of knowledge into the realm of the yet unknown or even previously unthinkable (pp 3-4).’ A further challenge highlighted in testing for the effects of the Agnihotra ritual results from the many variables in the ritual (timing, materials, mantra, type of vessel used) that would also make it difficult to determine whether one, some or all of them produced the desired effect. In this respect a trial by Avemaria (2017) indicates that it is necessary for all the components and process steps in the ritual as traditionally given to be used in conjunction for the best effect.

Although the ritual is considered to be universal in nature by its proponents, it has strong correspondences with Indian (Vedic) culture in particular in the Sanskrit language (Paranjpe. 1989). This could be another barrier to adoption if farmers from other cultures and religious affiliations hesitate to consider it appropriate in their local context. This assumption could be challenged though in that at present Agnihotra has crossed many cultural boundaries with practitioners reported in 71 countries (Pathak and Berk, 2015), just as biodynamics as a Western-originated practice is now used worldwide, including in India (Sedlmayr *et al.* 2016).

Intuitive/Meditative Practices

Having knowledge of and skill in meditative practices at a level that would enhance crop growth would be a primary challenge in this area, since all the trials reviewed for this practice indicate that the skill of the meditator is important to ensure success. Nevertheless, the publications indicate that this is a skill that can be learned, although in the beginning stages

its effects may not be apparent and therefore the effort needed to fully acquire mastery may not continue to be made. Furthermore, if the conjecture is true that one person can influence seed germination and plant health positively, then conversely it may also be true that a negative effect could also happen. If so, it is conceivable that a laboratory trial or research environment where there is scepticism or hostility to the practice could also have an indirect effect on the experiment. Even if this is an unconscious factor it would be impossible to eliminate this variable completely. The impact of researcher attitude therefore is an important consideration for laboratory and field trials, although all the studies reviewed in the systematic review indicated statistically significant results with benefits following the practice.

In light of the above, it is conjectured that the optimal way for adoption of this subtle agroecological method would be firstly to identify trainers willing to teach farmers who are open minded about the practice. This is already being done by the Brahma Kumaris in India, as discussed in the case study in Chapter 9. Since this meditation is a no-cost method, farmers can learn the skill and decide for themselves if it yields any practical benefit for their farming. Furthermore, the benefit of meditative practices in agriculture may extend beyond the land to the plants and animals tended by the farmer. It could also possibly change the consciousness and worldview of the farmer and create a ripple effect on the wider community. Supporting this, one of the natural agriculture pioneers, Fukuoka (1978) asserted that ‘the ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings (p. 103).’ Like with the case of Agnihotra, the limited scientific evidence available concerning the efficacy of this technique as of yet need not detract from the importance of person-based intuitive/meditative practices as key component of a subtle agroecology given their purported benefits beyond the agronomic dimension.

Instrument-based Intuitive Practices

Since no publications were found for instrument-based intuitive practices such as radionics, it can be inferred that the primary challenge and barrier in this area is that the suppositions behind it are very far removed from what is considered possible in a modern scientific epistemology and consequently making it a difficult area for funded research in most academic institutions.

Dowsing or divination, although similar in principle to radionics, is far older and has remained in use for centuries. However, being an intuitive method, it would likely fall under the same limitations as radionics and meditation in an empirical research trial that, in that it

would require a degree of skill and its purported effects could be hampered by the unconscious energies in the surroundings.

Communication with Nature Intelligences

No peer-reviewed empirical trials into this area were identified in the systematic review. This indicates that the primary challenge to furthering research into Nature intelligences from an empirical standpoint is that the existence of non-material beings with intelligence and agency are not recognised by modern mainstream science.

Graphical representations displaying the systematic review results per specific topic are available in the following Appendixes:

Appendix A – Breakdown of Trial Robustness per Subtle Agroecological Practices

Appendix B – Breakdown of Geographical Distribution per Subtle Agroecological Practice

Appendix C – Breakdown of Publication Dates per Subtle Agroecological Practice

Appendix D – Breakdown of Test Subject per Subtle Agroecological Practice

Appendix E – Breakdown of Trial Results per Subtle Agroecological Practice

Appendix F – Breakdown of Trial Type per Subtle Agroecological Practice

The final sort of 201 empirical trials assessed in the systematic review can be found in the following Appendixes categorised per practice:

Appendix G – Overview of Empirical Trials – Biodynamic Preparations

Appendix H – Overview of Empirical Trials – Homeopathic Treatments

Appendix I – Overview of Empirical Trials – Sound Energies

Appendix J – Overview of Empirical Trials – Electromagnetic Energies

Appendix K – Overview of Empirical Trials – Rock Dusts and Paramagnetism

Appendix L – Overview of Empirical Trials – Astronomical Planting Calendars

Appendix M – Overview of Empirical Trials – Ritual-based Practices

Appendix N – Overview of Empirical Trials – Biodynamic Preparations

The list of 50 literature reviews identified in this study can be found in Appendix O.

The completion of the systematic review provided the study an ample overview of the academic and scientific

The next two chapters will move away from quantitative research in deploying a social studies approach to learn more about subtle agroecological practices directly from farmers' experience with a Case Studies (Chapter 9) and a Farmers' survey (Chapter 10)

Chapter 9 : Two Case Studies of Subtle Agroecological Practice

9.1 Introduction

The conduct of case studies were considered to be a complimentary suitable method for further in-depth exploratory research into subtle agroecological practices to answer the three research questions:

- 1) What are the characteristics of subtle agroecological practices?
- 2) What evidence is there of their efficacy?
- 3) What are the barriers to implementing subtle agroecological systems?

This was in order to investigate the agroecological practices from within a ‘systems’ perspective in addition to coverage of its practices from the prior analyses. Also, considering that the majority of the research methods in this study were quantitative in nature, the inclusion of case studies was intended to provide a qualitative perspective to the present usage of the subtle practices in a field setting. Including this ‘soft’ data as a complementary addition to the ‘hard’ data of facts and figures provided in other chapters was considered justified. Presenting illustrative examples from a practitioner’s perspective observed first-hand by the researcher with personal interaction would help gather key information on the usage and philosophy behind some of the key practices that would not be possible to gather from a systematic review or a questionnaire. Case studies with the results ‘written on the land itself’ as stated by Howard (1947) were expected to yield rich information directly from voices in the field that would not be possible with the other research methods.

Although there were many subtle agroecological practices that could have been chosen for case study analysis, two factors were decisive in determining the selection of the case studies. The first factor was the availability of prior peer-reviewed literature on the practices that could be reviewed for a comparative analysis so that prior preparation was possible before the visit to have some background to validate their findings against the literature. The second factor was ease of access, namely that the case studies were accessible to the researcher and the practitioners had expressed an interest in participation.

9.2 Methodology

Two case studies consisting of interviews and farm walks were carried out with existing practitioners working with subtle agroecological practices within two respective farming systems, biodynamic agriculture and sustainable yogic agriculture (SYA). The first study took place in India from November 8th to 23rd 2017 and the second in the United Kingdom on May 5th 2021. Since this was field work involving human participants, prior approval was received by Coventry University's ethics committee to carry out this work, with references P61942 for the field work in India and P94834 for the UK. Participants were given an information sheet describing the purposes of the case study and then agreed to sign a consent form. This research approach was taken as 'emic' which centres on the participants' point of view and examines the research setting by describing the participants' ways of communicating, behaving, and interacting (Scarduzio, 2017).

9.3 Case Study 1 – Sustainable Yogic Agriculture

Decolonisation in Field Work

The first case study that was undertaken as part of the research was set in India, in the Global South. This country has been massively affected by the historical effects of colonisation for centuries, in most recent years from Western powers. It has been calculated by the economist Patnaik (2017) that £9,184 billion was lost by India to England over the period 1765–1938, the bulk of it coming from the heavily taxed Indian peasantry. Hickel *et al.* (2021) argues that the massive extraction of wealth in terms of labour and resources from the 'Global South' continues today. According to the authors calculations, from 1960 to 2018 in the 'post-colonial era' and calculates that, 3.378 trillion in India has been extracted, out of \$62 trillion from the total 'Global South' through unequal exchange.

In the agricultural sphere, there has also been a transfer of knowledge with clear benefits to the Western world's agricultural practices but conversely less so for India as the recipient. India has an ancient and venerable agricultural heritage that inspired the worldwide organic movement (Howard, 1947). While working in India, Howard, an agricultural botanist in the colonial service realised that the Indian farmers could teach him more and popularised the 'Indore method' of composting (Howard, 1931). In juxtaposition the transfer of knowledge from the West has been less benign. Shiva (2016b) describes in detail how the effects of hybrid seeds, fertilisers, pesticides and technology based on a modern Western industrial

agricultural model has led to vast ecological degradation and impoverishment, displacement and deaths of thousands of small-holder farmers.

It was in this context that I as a Western researcher wanted to emulate the same spirit as Albert Howard, who as an earlier advocate of ‘decolonising’ research acknowledged and valued the wisdom of indigenous farmers. However, whereas the proponents of the first phase of the organic movements preferred to focus on the materialist dimensions of Indian farming methods such as composting, my interest was in the spiritual dimension which has been overlooked in Western research to date. Considering my own positionality involved being mindful that the merging of mind-matter approaches in agriculture is a controversial idea in the Western rational mind that I have been enculturated in. Nevertheless, considering how Indian spirituality has in recent decades had a great influence and appeal in the West from the 1960s onwards, I believed that the accumulated wisdom of Indian agriculture in applying specific spiritual practices towards agriculture deserved closer scrutiny and that the urgencies of our time necessitated their further exploration.

It was not entirely clear to me though at the outset of the case study in 2017 what I was going to be able to ‘give back’ for the time and knowledge imparted to me by the Brahma Kumaris and SYA farmers. Since then however, I have been involved in my researcher capacity to disseminate knowledge about in presentations about SYA Dornach, Switzerland in September 2018 (Jensen *et al.* 2018), a book chapter in an academic book on subtle agroecologies in 2020 (Jensen, 2020), available in Appendix V and a case study sponsored by the UNDP (Wright and Jensen, 2022). My practical involvement continues to date with the Brahma Kumaris movement continues to date (October 2022) and although not a Brahma Kumari myself, I presented myself as an interested researcher with respect and interest their spirituality and worldview. I have been told that my analytical approach in writing about SYA has been appreciated and valued by their leadership. Therefore, in summary by presenting an open-minded, yet analytical approach to learning directly from the SYA practitioners with full transparency and the intention to reciprocate, the case study approach in India could be considered ‘decolonised’ research.

Overview of Farming System

A preliminary scan of academic journals revealed an emerging farming system promoted by the Brahma Kumari Spiritual University called Sustainable Yogic Agriculture (SYA) where field trials with Indian agricultural universities have been conducted in recent years. Its methods include using meditative practices super-imposed on standard organic agro-ecological practices to improve the wellbeing and livelihoods of farmers. Although a recent

system less than a decade old at the time of study, field trials into the SYA techniques had already been carried out by universities in India and documented in international publications (Ramsay, 2012a, 2012b, and 2012c), although only one peer-reviewed publication was found (Pandey *et al.* 2015). The literature review yielded a background and descriptive overview of the farming system that was helpful to prepare before undertaking the case study.

Background: The Origins of SYA Methods

SYA came into being as a result of observations by traditional Indian farmers practising meditation in their fields to improve crop health. Their methods were brought to the attention of the Brahma Kumaris Rural Development Wing (RDW), which subsequently developed and launched them as an initiative to improve the lives and livelihoods of farmers (Ramsay, 2012a). Ramsay (2012a) defines SYA as ‘a unique form of farming that combines thought-based meditative practices with the methods of organic agriculture’ (p. 118). SYA sets its foundation on standard organic principles that prohibit the use of non-organic fertilisers and biocides. The metaphysical or subtle element of meditation is subsequently added as a core component of all farming practices throughout the year.

The Metaphysical Component: Practice of Raja Yoga Meditation

SYA farmers are firstly trained in the practice of Raja Yoga, a style of open-eyed meditation taught by the Brahma Kumaris that is inspired by ancient Indian practices. The method is described in the SYA manual (RDW, 2009) and summarised as follows:

The first step of Raja Yoga Meditation is to attain the soul-conscious stage. Pure thoughts are the source of pure vibrations, and pure vibrations create a pure atmosphere. After having entered into such a state, if you think positive about any person, animal, or vegetation irrespective of where they are, very far or very close, our vibrations reach them and activate every gene (pp 21-22)

The manual also states that the ideal time to perform this meditation is between 4 and 5 am (part of the time period referred to as ‘Amrit Vela’). Farmers should also transmit positive intentions outside this time period during specific farming activities. These regular meditation sessions can be conducted remotely or in the field, with focused thought practices and affirmations to support each phase of the crop growth cycle, from sowing, irrigation and growth to harvest and soil rehabilitation (Ramsay, 2012c; RDW, 2009). As well as focused meditation on the field crops, Ramsay (2012c) describes the practice of seeds being taken to

local Brahma Kumaris meditation centres where experienced meditators focus thoughts of peace, non-violence, love, strength and resilience on them from between 10 days and 1 month prior to sowing. This is believed to enhance seed germination.

Examples of meditative affirmations for various stages and occurrences over the seasonal farming cycle are provided by Ramsay (2013a) and shown in Table 9.1.

Table 9.1 - Affirmations Used by SYA Farmers at Specific Farming Events

Farming Event	Affirmation
Amrit Vela (4–5 am every morning)	I am the form of peace, filling seeds with peace
Ploughing the land	I am a soul who transforms the world
Application of organic inputs	I bestow fortune on the earth
Irrigating	I am a living river of wisdom
Incidence of disease	I am the form of silent healing power
Incidence of pests	I am the form of supreme purity

Farmers are also encouraged to play music and sing spiritual songs while working in the fields, both for their own motivation and happiness and in the expectation that this will aid crop growth (RDW, 2009 p.44).

Physical SYA Practices

As well as meditation and focused intent, organic farming techniques are applied. These include companion planting and integrated pest management (RDW, 2009).

One cultural practice is the hoisting of red and yellow ‘flag of Shiva’ 5 ft. above the ground at regular intervals across the fields. This serves multiple purposes, some of which are metaphysical: it is a constant reminder to the farmer that he/she is tending God’s land, and that the land is under divine care even when the farmer is not present; and it acts as a reflector of sunlight onto the crops (RDW, 2009, p. 44). From a physical perspective, the red and yellow ‘flag of Shiva’ also acts as a deterrent to grasshoppers, which allegedly lay eggs on the yellow part of the flag and subsequently perish (RDW, 2009, p. 44).

The production of home-made farm inputs is encouraged, and the SYA manual provides instructions on how to prepare 11 specific soil, bacterial inoculation, pest management and fungicide preparations based on traditional practices using cow by-products and other local materials (RDW, 2009, pp 31–24). One such preparation is ‘Jeevamrut’, an organic liquid fertiliser.

Nevertheless, the published literature about SYA, both peer reviewed (Pandey *et al.* 2015) and non-peer reviewed (Ramsay, 2012a, 2012b, and 2012c), as well as the farm visit and group interview in this study all concur that the primary emphasis of SYA is positive human intention carried out by trained farmer-meditators that is transmitted onto the farm. The meditative practice, as well as the use of sound via singing and oxens' bells, and use of light via the flag of Shiva, are superimposed onto a foundation of standard organic practices including the use of traditional preparations and remedies. The use of sound and ritualistic objects (in this case a flag) were also classified earlier as two separate subtle practices, in addition to the intuitive/meditative practices that SYA primarily was allocated to in the typology, thus showing the challenge of separating the practices from each other.

Farmers' Code of Conduct

As well as the metaphysical and physical farming practices, SYA also comprises a specific code of conduct for farmers. This includes adherence to a pure vegetarian diet, the practice of abstinence from carnal desires, the avoidance of drugs and alcohol, goodwill towards others, remembrance of God and the early morning meditations (RDW, 2009, p. 44).

Case Study Protocol

As a result of establishing contact with a prominent Australian researcher in the Brahma Kumaris movement who had authored several publications (Ramsay, 2012a, 2012b, and 2012c), a visit request was sought and approved by the UK leadership of the Brahma Kumari Spiritual University (BKSU). The field research began on a trip to India undertaken in November 2017 when visiting the international IFOAM conference. Accompanied by my Director of Studies, Dr. Julia Wright the visit took place in New Delhi with subsequent travel to the BKSU headquarters in Mount Abu, Rajasthan, India. A two week visit was arranged via the BKSU where I was a guest at Mount Abu and from there it was arranged by the BKSU Rural Wing to meet with Indian farmers practicing SYA.

This case study involved small-scale Indian farmers working with SYA in Rajasthan and Gujarat provinces in India as briefly summarised below. In order to achieve a well-rounded overview of SYA practices and investigate their effects, a triangulated approach was deployed through a literature review, a visit to the SYA demonstration farm and a group interview with local farmers.

Agenda

The questions were prepared before the visit to Mount Abu based on their relevance to obtain a well-rounded understanding of the farming system and the SYA methods deployed to answer the research questions while considering the limited time allotted for the visits. The main contact and liaison while staying at Mount Abu referred to in this study as 'A' was a senior member of the Rural Wing who was present as a guide and translator throughout all the meetings.

The first part of the study involved a farm walk at the BKSU headquarters 'Tapovan' demonstration farm with 'A' and the farm manager 'B' on the late afternoon on November 17th 2017 observing and asking questions lasting two hours was the first part of the case study. The second part of the case study visit involved a meeting held in a workshop format at the BKSU building near Palanpur, Gujarat where semi open-ended questions were addressed to a panel of SYA farmers. I was introduced to the panel by the farm manager 'B' as a foreign researcher interested in the methods. Prior to the visit and interviews, I had carried out background research about the history and practices of SYA from the available literature found in the systematic review.

The panel, which was chosen by the BKSU, consisted of eight male farmers aged between 40-60. The workshop lasted 4 hours and was facilitated via the BKSU Rural Wing who assisted as a translator. The interview was conducted in English and a local translator and guide provided by the BKSU was available as an intermediary to facilitate the exchange.

It is generally the cultural norm in India that men are considered the representatives of their farms outside the home, although women are proportionally a larger percentage of the agricultural workforce and perform most of the daily work in Indian agriculture including sowing, livestock handling (except for ploughing generally) and harvesting but rarely enjoy equal rights or own farm land in their name (Kumar *et al.* 2021). I was not given any choice in the panel selected so there was a possibility of bias in terms of who was selected amongst the hundreds of SYA farmers in the area. My own positionality was that I had been invited by the Brahma Kumaris as a Western 'outsider' that was curious to learn about SYA and entered the process with a 'beginner's mind' considering that this was my first case study interview but I was also joined in the meeting by my Director of Studies who helped facilitate the exchange. I considered from the beginning that the Brahma Kumaris likely intended to put out their 'best' farmers to make a positive impression about their farming system, and that I was not able to verify what was said considering that the farmers spoke Gujarati and Hindi, but the Brahma Kumaris place a great emphasis on good conduct so I had no reason to suspect that the translations I received were not genuine. I was reflecting on my own

positionality that I as a Western researcher had come to India with the purpose to learn about their farming system as part of my ‘decolonisation’ mind-set with a humble and open mind which was in sharp contrast to previous colonial and post-colonial endeavours to impose a modern Western model of chemical agriculture on the rest of the world. Being mindful of the previous colonial history, my intention was to listen and understand what the farmers wanted to convey to me and try my best to suspend any disbelief when ideas were presented to me that were outside my own worldview. I did not consider it appropriate to audio record the transactions so I was reliant on note-taking which was done in short-hand based on the verbal transmissions received from the translators. These were written up shortly after the meeting when the events were still fresh in my mind.

The list of open ended discussion prompts to facilitate the workshop discussion have been presented in Appendix P. Following the workshop, a subsequent visit was organised by BKSU to visit one of the nearby SYA farms and walk around the fields where pictures were taken.

9.3.1 The Effects of the SYA Practices

The results of this case study yielded a descriptive overview of SYA as one emerging subtle agroecological system to address the first research question to learn more about its practices directly. Furthermore, information was gathered from practitioners regarding their hands-on experiences using subtle agroecological methods in a field setting that contributes to addressing the second research question of what evidence is there of their efficacy, in addition to further information regarding challenges and barriers relevant to the third research question.

Farm Walk Findings – Tapovan

During the farm walk, the respondents at Tapovan farm, the 5 acre Brahma Kumaris demonstration farm at their headquarters noted that it had been managed according to SYA methods over the last 3 years. The fields were rectangular and estimated to be less than one acre in size with medium sized trees around the perimeter (Figure 9.1).



Figure 9.1 - Tapovan farm, Rajasthan, India, November 17th 2017 – Field layout

Crops were visually inspected to be closely spaced and planted in rows with primarily bare soil in between the rows. Local varieties of trees were planted, some with flowers to encourage wildlife. The respondents explained that the aim of teaching Raja Yoga meditation is to cultivate in farmers a feeling of connection to God, Self, the Motherland and cows – the holy animal of India, and that this inner transformation of the farmer will transform the farm through right thinking and action.

Vegetables and fruits were grown for local consumption by the Brahma Kumaris and not sold in the market. The crops were grown as part of a rotation and one field (Figure 9.2) had green manure that was going to be ploughed under with potatoes to be grown subsequently.



Figure 9.2 - Tapovan farm, Rajasthan, India, November 17th 2017 - Green manure

The vegetables inspected at the time of visit included cabbage, papaya, corn, gourds, squash and broccoli (Figures 9.3, 9.4).



Figure 9.3 - Tapovan farm, Rajasthan, India, November 17th 2017 – Crops with marigolds intercropping



Figure 9.4 - Tapovan farm, November 17th 2017 – Field with Flag of Shiva in the background

Each field provided four crops per year. There were minimal weeds spotted and all crops inspected appeared to be in good health. Marigold (calendula) flowers were planted amongst the rows as part of companion planting (Figures 9.3 and 9.4). The early morning meditation takes place near the ‘flag of Shiva’ (Figures 9.3 and 9.4) which is hoisted in the field, and they asserted that the visible results of the meditation typically manifest in around 2–3 months.

A case was reported where parrots were causing partial damage to fruits, and the farmer meditated and established a communication with the parrots, inviting them to eat some whole fruits and to leave others intact. This was reportedly successful. SYA is premised on the notion that the farm is not only for human beings but animals and all other living things should also be accepted and have their rightful place.

The Brahma Kumaris believe that cows are integral to agriculture and have a total of 25 cows on the farm. However, these cows are not fed from the demonstration plot and are part of a larger farm entity not yet converted to SYA. Only the indigenous cows with a hump are considered appropriate for SYA. No work with oxen was carried out however, and a tractor was used on the farm as it was under pressure to produce food for the thousands of visitors to the Mt. Abu Headquarters.

When asked about whether any other subtle practices such as planting by the astronomical planting calendar were used, the farm manager explained that meditation rather than external influences was considered the primary force for ensuring crop health.

One respondent noted that many farmers did not believe it possible to farm without agrochemicals and were afraid to try alternative methods as they expected lower yields. At this demonstration farm, the rationale was to explain that the higher quality produce led to higher market prices, and this combined with lower production costs (owing to the savings on agrochemical purchases) made SYA farming more profitable than non-organic farming. To help farmers adopt SYA, the RDW is facilitating a system of farmer-to-farmer networks, where farmers experiencing difficulties are put into contact via telephone with more experienced farmers.

Farmers Group Interview Findings – Palanpur, Gujarat

The field study visit also comprised a group interview based on a pre-prepared, semi-structured questionnaire that was conducted with eight local farmers practising SYA.

In the event of pest damage, farmers in the group interview explained that a farmer will enter a state of meditation with the aim of achieving pure soul consciousness. This feeling of soul purity is then vibrated onto the crop as being full of health and divine light and therefore capable of resisting the pests.

The SYA farmers in the group interview reported following the astrological calendar as part of their cultural tradition. However, the SYA farmers felt that performing the meditation and sending love to distressed plants supported the use of traditional remedies, which, according to them, were generally effective.

Farmers in the group interview concurred that it was vital to have a healthy soil with a good carbon content and microbial population, and this was attained through composted cow manure, cover crops and 'Jeevamrut' that serves as an inoculate of beneficial microbes. Farmers explained that the use of tractors should be avoided as these compact the soil and that bullocks should be used instead, which are gentler to 'Mother Earth'. The Brahma Kumaris generally believe that cows are integral to agriculture. The ringing of oxen's bells was also felt to have a beneficial environmental effect.

Farmers in the group interview identified improvements in the health and quality of their land and soil after abandoning the use of agrochemicals, including increased microbial load and activity and increased beneficial insect populations. There were also fewer incidences of wild animals and pests causing crop damage. Livestock was reported to be more peaceful following the meditation practice. Customers were said to be willing to pay more for their SYA produce which they perceived to be of better quality.

The farm environment was reported to be more pleasant, joyful and refreshing, and that these changes had also been noted by visitors. Their villages had become cleaner, more peaceful and unified politically, especially during elections. Farmers admitted that their families were happier because the heads of the household (themselves) were more peaceful. Farmers noted fewer problems associated with addictions to smoking, alcohol, opium and other substances, since they had to abandon these practices. Fewer doctor's visits were reported, and one farmer claimed to have cured his paralysis problems after adopting SYA and eating more high-quality plant food. Farmers reported improved inner strength and higher self-esteem.

Most farmers planned to expand the SYA techniques to a larger area of their holdings. However, sufficient labour was a limitation, and the farmers were concerned that any labourers could affect the health of the crops if they were drinking and smoking. Some farmers in the group interview felt that the SYA farming was harder work since organic inputs were not always easily available whereas agrochemicals were. For example, the cow urine required as an ingredient for the traditional preparations should come from indigenous breeds, but in Gujarat, 90% of the cows are cross-bred. Hence, farmers felt they had to be seriously committed to the practices. The SYA farmers reported that 3 years was the transition period required to restore biodiversity to the land and soil.

In terms of spontaneous farmer-to-farmer dissemination, almost all SYA farmers in the group interview explained that their neighbours were sceptical when they initially adopted SYA but after some time would notice improvements in the quality of their produce of farm, which made them more curious to engage in SYA.

9.3.2 Challenges and Barriers Identified for Sustainable Yogic Farming (SYA)

The farm manager 'B' in this study stated that one of the main challenges in India is that many farmers do not believe that it is possible to farm without chemicals and are thus wary to try alternative methods due to expected lower yields. This point of view is countered by the Brahma Kumaris Rural Wing, which showcases the SYA method via the demonstration farm and explains to farmers that quantity should not be the sole focus of output but that quality is more important. Furthermore, in order to assist farmers who adopt SYA, the Brahma Kumari Rural Wing is facilitating a system of farmer-to-farmer networks where farmers experiencing difficulties can be put into contact with more experienced farmers.

From this case study, two main challenges were identified with researching into SYA. Firstly, in focusing on yield and productivity comparisons, the available research maintains the standard reductionist methodological approach, while attempting to assess complex holistic systems that comprise both the physical and metaphysical. The wider benefits reported by SYA have been captured subjectively through the valuable anecdotal stories and literature of the SYA farmers. These qualitative methods provide an indication of the differences between SYA, organic and chemical practices that may encourage further research. Ramsay (2013b) recommends more targeted research into the topics of water absorption and retention: the challenges of conversion from non-organic to SYA; the potential for SYA outside of the Brahma Kumaris community and India; differing farm scales and replicability with other forms of meditation.

Challenges in Researching SYA

There are two primary challenges with conducting empirical research trials on the SYA methods. Firstly, in focusing on yield and productivity comparisons, the available research summarised by Pandey *et al.* (2015) maintains the standard reductionist methodological approach while attempting to assess complex holistic systems that comprise both the physical and metaphysical. Nevertheless, the wider benefits of SYA are captured subjectively through the valuable anecdotal stories from the SYA farmers (Ramsay, 2013b) and this provides sufficient indication of differences between SYA, organic and conventional practices to encourage further research. Ramsay (2013b) advises more targeted research on the topics of water absorption and retention, challenges of conversion from non-organic to SYA, the potential for SYA outside of the Brahma Kumaris community and India, differing farm scales and replicability with other forms of meditation.

The second challenge relates to differentiating between organic and SYA farming. It is possible that the reported economic benefits which appeared to be a result of the cost savings through both the non-purchase of agrochemicals and the selling of premium produce could have resulted from the organic practices rather than the spiritual practices of SYA farming. Similarly, the environmental benefits could also be due to switching from chemical to organic farming without the meditative practices having any impact. In addition, organic farming also requires a degree of conscious intention to switch from the mainstream approach which is easier and less labour intensive. Hence, there could be intentional interference in organic as well as SYA farming. Nevertheless, committing to both the additional farm practices and the lifestyle changes of vegetarianism and abstinence (necessary to achieve a higher proficiency in Raja Yoga meditation) in this system could be perceived as additional stringent requirements for the uptake of SYA farming, arguably involving an even stronger intention.

9.4 Case Study 2 – Biodynamic Agriculture

Overview of Farming System

Biodynamics is one of the oldest and most established contemporary Western farming systems which unlike the others covered in Chapter 5 have an explicit spiritual orientation. Its origin lies in Rudolf Steiner's anthroposophical movement with its philosophy that matter and spirit are closely intertwined and inseparable and its preparations draw on esoteric knowledge not validated by modern science. There already exist a number of popular books into its methods as well as many academic publications describing field trials research, some spanning several decades (see Chapter 4, Section 4.2). Furthermore, there are 90 Demeter-certified biodynamic farms in the United Kingdom (Demeter, 2016) where I live which presented an opportunity to explore its methods using a case-study approach.

One of these farms as a subject of this study is Tablehurst, originally a part of Emerson College since 1967 and a community-supported biodynamic farm for the last 25 years. Based in East Sussex, UK. The 45-hectare farm incorporates beef cattle, a small dairy herd, sheep, pigs, poultry, arable crops, a large vegetable garden and some woodland. The farm and garden together employ a team of around ten people with most of the produce sold directly via a farm shop. The farm philosophy is committed to biodynamics and community engagements, both locally and teaching people about farming and food running a programme

of community events, engaging with volunteers, a care home for adults with learning disabilities in addition to an education programme for children on the farm.

Protocol

A visit was agreed through direct contact with one of Tablehurst Farm's resident biodynamic experts, 'Y' who is responsible for making many of the biodynamic preparations that are sold via the UK Biodynamic Association. The purpose of the case study was to gain a first-hand opportunity to gain first-hand data from an experienced practitioner about the effects of the biodynamic farming system and the challenges towards its broader adoption via the participant observation method while having a walk around the farm.

Agenda

The interview was conducted in English in a one-to-one setting in an outbuilding on the farm where the preparations were made and then followed by a farm walk. The visit lasted 6 hours. Pictures were taken and notes were transcribed by hand during the interview. The interview was not recorded at 'Y's request due to some sensitive developments with a previous organisation she had worked with in India.

The question list for the case study is noted in Table 9.2.

Table 9.2 - Open ended Questionnaire for Biodynamic Expert

Context to Research Questions	Number	Question
What are the characteristics of decolonised agroecological practices?	1	Please tell me about yourself and your journey into the work you do?
	2	Why did you decide to work with biodynamics?
	3	How did you learn about biodynamics?
	4	How long have you been working with biodynamics?
	5	Please tell me about Tablehurst Farm and your role here?

Context to Research Questions	Number	Question
What evidence is there of their efficacy?	6	Please explain/show me what you do here on the farm?
	7	How often and at what times do you apply the preparations?
	8	What are the differences buying the BDA preparations compared to making them on the farm?
	9	Would the preparations have an effect on a non-organic farm?
	10	Does 'belief' in the efficacy of the preparations have any impact on their efficacy?
	11	Do you think it's necessary to apply all the preparations for them to work?
	12	Have you made any innovations to the preparations or follow the standard procedure for making them?
	13	Do you use other preps than BD500 – 507? Hugo Erbe's 3 kings etc.?
	14	Do you follow Maria Thun's calendar?
	15	How can a farmer cultivate a relationship to the farm individuality/spirit of place?
	16	Do you 'communicate' intuitively with the farm and the land? Please describe
	17	Please tell me more about your experiences in India? Have you been involved with Agnihotra movement or SYA, other?
	18	What are the benefits you have seen on Tablehurst and other farms from using the preparations?
	19	Do you work with any other subtle methods? If yes, Please describe your views or personal experiences with. If no, please explain why not.

Context to Research Questions	Number	Question
What are the barriers to implementing subtle agroecological systems?	20	Do you think the preparations in their current form are appropriate in other cultural contexts, such as India?
	21	What are the challenges you have found working with the biodynamic preparations? In UK? India, elsewhere?
	22	What do you think would help spread biodynamic agriculture to more farmers and gardeners?
	23	Have you encountered hostility towards your work?
	24	What do your neighbours and other in your community think about biodynamics?
	25	Do you try to convince sceptics, if so how?
	26	Do you think working with several different practices at the same time hinder or help the farming system?
	27	What factors do you think would encourage other farmers to adopt biodynamics, e.g. peer-reviewed scientific publications, more public awareness, training/consultancy available etc.
	28	Please tell me about your views/experiences with vegan biodynamics?
	29	What do you think is the future prospects for biodynamic agriculture in the next 5-10 years?

The visit to Tablehurst Farm took place on May 5th 2021 from 14:00 – 18:30 on a rainy and cold afternoon. The biodynamic expert ‘Y’ interviewed is a resident on the farm. The first part of the interview took place in a room where many of the biodynamic preparations and the associated equipment for their use are stored, such as stirring sticks of various kinds of

wood, backpack sprayers and cow horns (Figure 9.5). There was a variety of boxes filled with herbs and flowers, including freshly picked dandelions (Figure 9.6) which are a core ingredient for one of the compost preparations (BD506).



Figure 9.5 - Cow Horns for BD500 and 501



Figure 9.6 – Dandelions for BD506

The second part of the interview took place at another shed located at a hill nearby with a panoramic view of the farm and its surroundings. This hill had a flow form shape (Figure 9.7) intended to ‘enliven’ the water pumped from below the hill and then passing through shapes creating spirals. The hill also had large wooden barrels where the two field preparations (BD 500 and 501) were stirred (Figure 9.8).



Figure 9.7 – Biodynamic Flow form



Figure 9.8 - Biodynamic Stirring Barrels

Before discovering biodynamics, ‘Y’, was an alternative health practitioner and naturopath and thus had a prior background in energetic medicine. After attending a course in 2004 at Emerson College she started to become interested to move beyond personal healing into broader healing via the biodynamic preparations. She is now deeply involved with biodynamics at Tablehurst Farm and responsible for growing the flowers and herbs used in the biodynamic preparations. She plays a pivotal role in making them for the UK Biodynamic Association. Prior to Covid-19, ‘Y’ divided up her time between the UK (March – October) and India the remainder of the year also working with biodynamics there.

9.4.1 The Effects of the Biodynamic Preparations

Working with the Preparations

When asked about whether there were additional benefits to make the preparations on-farm or purchase them, ‘Y’ explained that in her experience many of the preparations made by farmers themselves were not up to the mark and that therefore it was better for beginners to initially purchase them to see their effects. It was encouraged however for farmers to develop a ‘relationship’ with the preparations with their on-going use and then gradually build up to making them with inputs from their own farm organism. The importance of ‘experiencing’ while working with the preparations was highlighted as very important rather than by just

follow a ‘recipe thinking’ noting that when engaging with the preparations ‘if experienced as a truth, then the mind is less likely to argue.’

Upon witnessing the decomposing pig skulls (Fig 9.9) used as a component for the oak bark preparation (BD 505), and asked if she had prior experience with vegetarian alternatives as sheath materials, ‘Y’ stated that as a vegetarian it was her first impulse when starting the work to look for alternatives. She realised however that it was important not to put her own personal agenda ahead of what the preparations were meant to deliver. From her experiences she learned that the preparations made according to instructions given by Rudolf Steiner were able to do work that nature could not do without human intervention by creatively combining elements from the different Kingdoms of Nature (mineral, plant and animal). She provided an example of this by filling a cow horn with silica in BD 501, and stated this is why the usage of animal parts are a key part of the biodynamic preparations. ‘Y’ also noted as an aside that her assistant in India who works closely with her on the preparations is a devout Hindu who sees each preparation as overseen by its own ‘god’ and has developed an intense relationship with the essence of the preparations. It was noted that when there is an intention by some to change the preparations, it is important to ask ‘what is the purpose of the preparations?’



Figure 9.9 - Animal Skulls for BD505

Effects of the Preparations

When discussing the effects of the preparations, ‘Y’ recounted one of her experiences in India where rain was brought to a drought-stricken region by the efforts of a group of farmers stirring BD500. This involved first setting the intention to bring rain when by imagining rain clouds descending into the vortexes when stirring the preparations into a vortex, which was reportedly successful. This event also led ‘Y’ to wonder what else the preparations can accomplish. Steiner indicated that the purpose of the preparations were to ‘enliven’ the Earth and improve the nutritional ‘forces’ in food, and that yield was not indicated to be the critical purpose. In essence, ‘Y’ said that working with biodynamics required intent, focus as well as the inputs from the preparations. Unlike the natural ecological processes described in alternative farming systems in ‘working with Nature’ the biodynamic preparations were unique in that they delivered something that Nature could not do without conscious human intervention. Citing one example with BD 501 (horn silica preparation), ‘Y’ noted that the silica connects the physical plant to its non-physical archetype and this is what makes example biodynamic carrots taste more ‘carroty.’

When asked whether the preparations were effective as an input whether one believes in their effects or not, ‘Y’ affirmed that she believed so and there would even be some degree of effectiveness if applied by a conventional farmer. She re-iterated Steiner’s recommendation at the end of his lectures how urgent it was that the preparations be spread across the entire Earth.

In terms of other benefits of the biodynamic preparations, ‘Y’ said that there were many and showed a short video where each farmer in India had reported something unique about the benefits they had noticed, such as bigger fruits, better taste, shinier leaves and more. One of the main benefits she has also experienced and noticed in others is improved personal well-being and a sense of connectedness from working deeply with the biodynamic preparations.

Experimenting with the Preparations

It was re-emphasised by ‘Y’ the possible drawbacks of changing just one component in the preparations due to their holistic design towards natural healing since it could have wider implications since everything is related to something else. For example, it was noted that chamomile and mayweed look very similar on the surface but have very different properties. When discussing a recent conference of experimentations with the preparations using ingredients in a local geographic context (such as using bison animal sheaths in North America rather than cattle), ‘Y’ said that a pre-requisite for doing such experiments would involve having a very deep prior relationship with the original preparations. ‘Y’ said that to date her experiments have shown that there has been no suitable replacement found for the

cow horns in the field preparations (BD 500 and 501) but there was a greater likelihood that vegetarian replacements could be found for the compost preparations (BD 502 – 507).

When asked whether it was essential to use all the preparations in conjunction, ‘Y’ said that some positive effects would still occur but ideally all the preparations would need to be applied together since they all deliver their own unique benefit.

Decolonisation and Biodynamics

‘Y’ expressed some reservations about decolonisation as a suitable framework for biodynamic agriculture. From her perspective as a practitioner the biodynamic preparations are intended to bring in ‘future’ forces into evolution that humanity needs to help moving forward and noted that it is not possible to return back to a different and older mode of consciousness. Given the world’s ongoing evolution, Y’ asserted that the ‘forces’ the preparations bring forth will not ‘take things back’ but make it possible to ‘move forward in a healthy way.’

Experiences in India and Subsequent Experiments

‘Y’ then recounted her experiences working in India with the local biodynamic associations and discussed the current political challenges where there has been increasing resistance to using animal parts, in particular with the BJP coming to power. With BD 500 (horn manure preparation), as a starting point, ‘Y’ had then been asked to carry out research into looking at alternatives for the cow horns and had set up experiments using clay, glass and steel cones, bamboo and bark from various trees sacred in Indian culture. These experiments had revealed that not only the component of the sheaths but also the shape was important too in enlivening the preparations and showed pictures of the substances, microbial analysis and chromatography, ‘Y’ had also tried experiments to infuse a sense of ‘cowness’ into the non-animal organs by spraying them with cow urine and milk. The experiments revealed a very different eco-system in the containers that were not animal horns.

The components from the various containers were then used as inputs in a laboratory trial with pot marigolds (*calendula*) to ascertain their different effects on plants. The experiments were carried out double-blind to ensure ‘Y’ or others could not project their intentions on the trial setup. The experiment had 11 replications in pots per treatment which were photographed and each treatment showed distinct differences. The seeds from the 1st year plants were then sown for a 2nd year trial and the same effects persisted. It was noticed that the containers that had been infused with cow products generally had better results. Regarding analysis there had also been carried out double-blind ‘energetic sensing’ from

experienced intuitive healers who had drawn out their findings regarding the shape of the cones from viewing the plants, in addition to chromatography. At the time of the study, the same trial was moving into its 3rd year. Overall, the results so far had shown that the stainless steel container had the poorest result. ‘Y’ also noted that some of the samples from the stainless steel containers had a ‘metallic’ smell which was unexplained since it was a double-blind experiment, and the experiments had also shown so far that the shape in which the cow manure was stored in had a big effect on what kind of ‘forces’ were generated into the substance.

Adjusting the Preparations

When discussing her previous work in India, ‘Y’ noted that the biodynamic movement had established a presence in India but had recently encountered difficulties around the supply of animal parts. The research conducted by ‘Y’ indicated that it was not easy to substitute the cow horns specified by Rudolf Steiner. She had carried out experiments using other sheaths that were not of animal origin, highlighting the many unknowns when attempting to adjust preparations that are put together in a way that goes beyond logical analysis. A paper by Zanardo *et al.* (2020) indicates that there is a ‘rational’ interactional association between the keratin of the horn and the beneficial bacterial and fungal communities existing in the manure. There is also wide overall agreement as indicated by case studies of long time biodynamic practitioners worldwide (Sedlmayr *et al.*, 2016), including one from India, of the importance of using cow horns for the BD500 and BD501 field preparations, or a local equivalent animal such as bison in the US. In the discussion, ‘Y’ emphasised the importance of not putting one’s “personal agenda” into the work that the biodynamic preparations were designed to deliver and to keep a sense of humility when dealing with these subtle forces. This reflection on humility, which is also noted by Scharmer (2018) as a precondition for advancement to a higher level is arguably relevant for research into any subtle agroecological practice, many of which are at variance with modern approaches to farming.

Biodynamics and Other Subtle Practices

‘Y’ stated that whenever possible she works with the preparations according to the Maria Thun astronomical planting calendar. In her experiences, she found that the lunar phases play a much stronger role with plants than the specific days considered best for planting root, fruit, flower and leaf crops. ‘Y’ had not worked with Agnihotra (a Vedic fire ritual) and noted that for this to work it is necessary to perform it consistently which has not been possible because

of her travels. ‘Y’ also noted that the environmental effects of Agnihotra are different from those of the biodynamic preparations and thus each has their own role.

‘Y’ stated that farming is at the frontline of ‘spiritualising matter’ and this is where the preparations come into their fruition by combining mineral, plant, animal and astral forces together. Citing Steiner that biodynamics brings ‘non-substance’ into ‘substance’ whereby its unique components allow ‘forces’ to appear before physicality when put together by creative human will. While on a farm-walk, ‘Y’ showed how the preparations are being made on the farm, including a nettle patch for BD 504 (Figure 9.10), and a pit where the CPP (Cow Pat Pit) preparation was being made (Figure 9.11).



Figure 9.10 - Nettle Plot for BD504



Figure 9.11 - Cow Pat Pit

9.4.2 Challenges and Barriers Identified for Biodynamic Agriculture

The biggest challenge for biodynamic agriculture in the UK according to ‘Y’ has been the procurement of animal sheaths for the preparations because of concerns over BSE. Further afield, ‘Y’ noted from her work in India that her biggest challenges in spreading biodynamics have been political, with the use of animal parts in the preparations having been put on the agenda, along with government’s preference for ‘Big Ag’ (agriculture). Rather than encouraging farmers to see their farm as a whole and unique individuality which exists on its own size and scale into the landscape, the government has been focusing on the ‘feeding the world’ logic of industrial agriculture. ‘Y’ also cited her efforts to encourage biodynamic farmers and growers to ‘engage’ with the preparations on a deep level rather than treat them superficially as a recipe.

One of the tenets of biodynamics is that natural forces alone cannot do the work required for planetary healing and it is working with biodynamic preparations that facilitate this. Therefore, ‘Y’ noted that one of the challenges of biodynamics is to ‘look behind what we see’ and one of the problems at the present time is that people have become ‘disconnected’

and need to recover an ability to see beyond the physical that is crucial if humanity is to survive.

Another challenge in this context is that the effects of the biodynamic preparations can take time to manifest. ‘Y’ further expressed the view that biodynamic preparations bring ‘future’ forces into evolution that will assist humanity in moving forward while disagreeing with the suggestion that it might be possible to return ‘back’ to a different age. She stressed that, unlike chemical farming, biodynamic preparations do not ‘impose’ anything on the landscape. She saw it as a process of making the preparations and then letting Nature do the work from there. ‘Y’ recounted that similar to homeopathy, there is no harm in applying the preparations and the worst that can happen is that they will not work.

‘Y’ considered another challenge as being able to create circumstances that allow farmers to develop a relationship with the work they are doing. In working with the biodynamic preparations, it was emphasised that it was important to stay true to the core Steiner’s guidance for the preparations and understand the intent behind them while also being open to experimentation. In her view, real science was about embracing curiosity and also be prepared to be proven wrong. In the end, she saw working with biodynamics as coming down to human development and keeping a spirit of humility that about the extent of our knowledge as humans.

When asked about her view on the future of biodynamics despite the above mentioned challenges, in particular in the next 5-10 years, ‘Y’ said that she believed the future was bright for biodynamics and found daily encouragement in the work she was doing working with the biodynamic preparations, which felt very important to her.

9.5 Similarities and Differences between the Two Case Studies

The case studies in this chapter provided some important first-hand-insights from field practitioners how they view and use some selected subtle agroecological practices within a broader system. They involved a small number of practitioners engaging with some of the agroecological practices explored in this study.

The case studies from a SYA farm and a biodynamic farm situated in two very different continents and cultures yielded interesting insights into the second research question ‘what evidence is there of their efficacy?’ for the some of the practices in this study. In comparing the two systems conceptually, there were important differences in core epistemological approaches. The SYA representatives ‘A’ and ‘B’ interviewed indicated scepticism over

biodynamic agriculture in that SYA does not approve the use of cow horns as a treatment since it is ‘non-living’ whereas according to them positive intent and meditation will only work with ‘living’ forces. When asked about the biodynamic view on farming methods based on positive human intent, such as SYA, ‘Y’ noted a reservation that sometimes as human beings our knowledge is limited and we cannot really know what the best intention should be. ‘Y’ highlighted a possible divergence with traditional Vedic philosophy upon which SYA is based, that biodynamics conversely takes the stance that it is important to work in the physical realm. According to ‘Y’, biodynamics is based on the philosophy that the spiritual and physical realms need to be interconnected. SYA’s emphasis on the spiritual dimension is also grounded in the practical organic practices. Taking a different approach, biodynamics works in the physical dimension with emphasis on the preparations that, while of physical origin are intended to help bring in the spiritual element to the farming system. This illustrates that even within the ‘spiritual’ agricultural systems there are a myriad of approaches and areas of focus, as with the alternative agricultural movements covered in Chapter 5.

When looking for common elements in both farming systems, the following were identified:

- 1) The human being is considered an important active participant in the life of the farm by bringing in the ‘conscious’ element that helps bring about positive change.
- 2) There is an accepted reality of a spiritual world that can have a direct impact on the physical world.
- 3) There is a placement of a very high value on cows for the benefits they bring for soil health.
- 4) The yield is an important factor but greater emphasis on the quality of the produce of crops as compared to chemical farming methods.
- 5) Importance of subtlety and ‘inner work’ to gain a broader holistic context for their methods.

Y’s views on biodynamic agriculture highlighted the importance of skilled and dedicated practitioners who have properly ‘tuned in’ to the energies and materials they are working with and have developed of a deep and grounded understanding working with the subtle elements. This is similar to SYA where farmers are given prior training in meditation and the ongoing guidance they receive from the RDW towards mastery and a more in-depth understanding with an incremental expansion to the methods on their holdings as they progress. This is in stark contrast to the conventional industrial model of applying agricultural chemicals, often without a full understanding of their effects. In juxtaposition, the subtle

practices take time and forethought, but their benefits can be manifold. The experience with biodynamics in India shows that cross-fertilisation of subtle practices across diverse cultures are certainly possible but there can also be socio-political challenges with this approach , as illustrated with the hesitancy among figures in the Indian government to using cow horns when making the preparations.

Both case studies were conducted with people who were committed and experienced users in their respective domains and thus not considered to be representative of farmers in general. In closing of this study there, a farmers' survey was conducted to gather a broad range of views and these will be discussed in the next chapter.

Chapter 10 : Farmers' Survey

10.1 Introduction

In order to gather further data about the efficacy of subtle agroecological practices (research question #2) and the barriers and challenges (research question #3) for farmers, a wider target group was sought than was possible in the case study approach covered in the previous chapter. It was for this reason the final phase of this exploratory research involved a survey conducted to gather the views from a larger sample of farmers, whether sympathetic or not, to the explored practices. In terms of decolonisation practice, a survey approach was at a disadvantage for several reasons. First, the language of the survey was English, this being the lingua franca worldwide, respondents would most likely only be native speakers or at a high level of fluency which would exclude large parts of the world, in particular South America, Africa and Asia where the majority of the world's farmers live (Lowder *et al.*, 2014). Second, on the assumption that many of the respondents would come from a Western background would likely mean that the topic of 'decolonisation' being a sensitive topic. This would apply in particular to farmers living on land, in particular in the United States, Canada and Australia that had been taken from indigenous peoples in relatively recent history. Previous experiences from following farmers' groups on Facebook indicates that there exists significant divisiveness about 'social justice' and how it relates to regenerative agriculture and I did not intend to get involved in that discussion since this was not one of the core research questions. The topic of the decolonisation of agriculture was therefore not linked to an exploration of the practices in the survey, however respondents were asked about their ethnicity and where they learned the practices, with 'tradition' listed as one of the choices. The results from this survey are the subject of this chapter.

10.2 Methodology

In order to reach a broader audience of farmers worldwide, albeit with the caveats earlier mentioned, a farmers' survey was developed to gather a broad range of data on farmer's views on subtle agroecological practices, such as their views, experiences, reported effects and barriers and challenges to adoption and application. The survey was created during the last quarter of 2020 using the JISC Online Surveys tool and then personalised with the

Coventry University logo. Ethics approval was obtained from the university before the study (P114571). The full survey is presented in Appendix Q.

The questions were designed to address all three research questions to ascertain farmers' attitudes towards subtle - referred to as 'non-material' practices for easier comprehension and was structured to be open-ended and relatively few in number so that the survey could be completed in 10-15 minutes. A prototype of the survey was pilot tested with two senior researchers at CAWR with several iterations.

Target Group

The survey was launched via Facebook and sent out to an international audience of farmers via groups related to industrialised farming, regenerative farming, biodynamics, organic farming, agroecology and permaculture with a brief description of the purpose of the survey and a URL where to complete it. Facebook was chosen as the platform to gather the data due to its position as market leader in social media; with 2.8 billion active users, this target group comprises 57% of the world's estimated 4.9 billion internet users (Statista, 2020).

The intent was to reach a broad audience of farmers across all groups and for this purpose Facebook groups were targeted that were mainly international (with one exception for a UK farming group - due to the difficulty in finding international conventional farmer groups with a sizeable population). The sample was intended to be comprehensive and inclusive to reach as many farmers around the world of all different persuasions. Deploying a survey tool for this type of research determining farmers' attitudes into subtle methods is in line with a methodology carried out previously by other agricultural researchers. For instance, Nuthall and Old (2018) sent out a broad posting of questionnaires to find out farmers' views on farmers' intuition (Nuthall and Old, 2018) irrespective of farming system (conventional or organic). In order to avoid confirmation bias via selective sampling, the decision was made to not post primarily to groups that were likely to be more sympathetic to subtle agroecological practices. Nevertheless, for greater inclusion only one group was specifically concerned with biodynamics. This was chosen in recognition that this is a sizeable alternative agricultural movement in its own right (Chapter 5). It was expected beforehand that the biodynamic farmers would be generally sympathetic to many of the practices and would also be able to provide helpful information about the challenges and barriers using their methods. Based on the target groups' total membership numbers only 2.1% of the sample were members of the biodynamic group, 1.9% were members of an agroecology group, 53.3% were members of regenerative farming groups and 42.4% were non-specific, so possibly the majority in this grouping were managing conventional systems to some degree. It was possible via the survey

software to select respondents based on farming system to stratify the results and see specific trends among farming systems on their views and opinions.

The decision which Facebook groups to include was based on the number of group members, with the highest number of group members, (1000+) for maximum outreach and that the group description had an international profile.

The questionnaire was posted on seven weekends from November 26th 2020 up to January 29th 2021 to the following groups listed in Table 10.1.

Table 10.1 - Facebook Groups for Farmers' Survey

Facebook Group Name	Members (as of 30th June 2020)
Regenerative Agriculture	30,400
Farmscale Permaculture™	990
Permaculture and Sustainable Agriculture	10,400
Biodynamic Community	5700
AGRICULTURE GLOBAL EXPERTS	7600
Soil4Climate	20,300
Korean Natural Farming	23,900
The Natural Farming of Fukuoka Masonobu	7100
Amig@s de La Via Campesina	5200
Syntropic Agriculture Community	6600
XR Farmers	1400
Agriculture and Farming UK	1800
Regenerative Agriculture Group	16,700
Carbon Farming and Regenerative Food	7800
Small scale farming as a Business	103,000
Syntropic Network	2600
Silvopasture	5800
Regenerative Agriculture to Reverse Global Warming	3800

Facebook Group Name	Members (as of 30 th June 2020)
ReFarming and Regenerative Agrarians	3600
Total	264,690*

*This is not the sum total of respondents, and would be less since farmers could possibly be a member of multiple groups but it does allow for a sufficiently large sample.

Memon *et al.* (2020) indicates that a minimum sample size of 50 would be necessary for exploratory social research but with between 50 and 100 being optimal, while noting however that a very high number of samples does not necessary led to more precise results. Roscoe (1975) suggested that a sample size greater than 30 and less than 500 is suitable for most behavioural studies. It was expected from the outset that a sample size of a minimum of 50 was achievable given the Facebook group numbers.

Quantitative Analysis

Statistics in % were gathered from all quantitative questions based on following preferences:

- Nationality
- Age Group
- Ethnicity
- Gender
- Spiritual Beliefs
- Farming system
- Farm Size
- Views on subtle practices
- Subtle practices actually performed on the farm
- Length of time practicing (in years)
- Learning source of practices
- Benefits from using the subtle practices
- Reasons for not using specific subtle practices
- Problems or challenges encountering using the subtle practices
- Awareness of specific subtle practices used in the local community
- List of practices most likely to adopt
- Suggestions for further adoption in the local community

Qualitative Analysis

Review and analysis for key insights, trends and notable quotations were also carried out for open-ended free text questions in the survey looking for the following data points:

- List of other subtle practices not included in survey
- Further details about views on specific subtle practices
- Innovations or discoveries when using subtle practices
- Reason for lack of interest in using subtle practices
- Reasons for lack of interest in local community using subtle practices
- General comments and feedback about survey

10.3 Results from Survey Responses

A total of 52 farmers responded to the survey request sent out via the various Facebook groups related to agriculture and farming from November 26th 2020 up to January 29th 2021 when the survey was closed. The demographics of the survey respondents can be seen in Appendix R and summarised in this section.

Demographic Summary and Analysis of Survey Respondents

The respondents' sample (n=52) was broadly representative of farmers in the Western world. In terms of demographics, the age groups of the farmers surveyed were heavily skewed towards an older demographic. 76% were over 40 years of age and 53% were between 45 and 59. This was to be expected since the average age of farmers in Western countries tends to be high. For instance, in the US, where 60% of the respondents came from, the average age of a farmer is 57.5 years and steadily rising (USDA, 2019a). A small proportion (12%) of the respondents was over 70 and therefore possibly no longer actively farming. The relatively low representation of the below 40 demographic could be attributed to the financial challenges of getting capital to own a farm and acquire land and also that Facebook, the method used for compiling the survey, is now primarily for relatively 'older' users with only 29% of users between 18-24 (Statista, 2021).

In terms of nationality breakdown, 96% of the responses came from the Global 'North.' Only 4% came from the Global 'South', namely India and Jamaica, both countries having English as a main language. Therefore, although the selection of Facebook groups was intended to minimise selection bias by including an international audience, the sample had a degree of bias given the English language barrier. This is highly significant since it is in this

geographical area that attitudes towards these practices are likely to be most sceptical based on education and worldview, as previously discussed in Chapters 2 and 3. The complete geographical distribution of respondents is noted in Figure R.1 and Figure R.2 in Appendix R shows the complete age distribution of the respondents.

The gender breakdown of the survey respondents (59% male and 41% female) was also in line with the typical representation in Western countries where most farmers tend to be male. In the US for example, 64% of farmers are male and 36% are female (USDA, 2019b).

However, the spiritual inclinations of the respondents differed from the Western norms. Respondents in the survey indicated that most (76%) professed some spiritual belief. A significant proportion (37%) indicated that they did not belong to a specific religious affiliation. In the US and Europe, the second largest religious group after Christians consists of ‘Nones’ or people who identify with no religious group, comprising a diverse conglomeration of atheists, agnostics and other spiritualisms forming 25% on the population (Pew Research Center, 2015). When added together from the survey respondents, there was a greater proportion of ‘Nones’ (57%) than the norm in Western countries. Responses given as ‘Other’ were ‘Taoist sort of’, ‘Shamanism’, ‘Agnostic’ and ‘Druid.’

The locations of the respondents were primarily from Western countries, with 59% from the United States, 14% Australia, 12% from the United Kingdom and 6% from Canada. The remaining 5% were from other European countries and only 4% (2 out of 52 respondents) from Jamaica and India.

A total of stated ethnicities of the respondents were primarily white Caucasian (79%) which also corresponds with the fact that most farmers and landowners in the West and its former colonies in the United States, Canada and Australia still tend to be white. In the US, 95% of farmers are white Caucasian (USDA, 2019b) which is disproportionately high compared to ethnic breakdown of the broader population where 57.8% identified as white Caucasian (US Census, 2020). The 7% marked as ‘Other’ also provided descriptions (Swedish, Scottish and Appalachian American), which were also likely Caucasian. Hence in summary, given the geographical area of the respondents, the age and ethnicity in the samples was not unexpected as the attempt to create a more geographically and ethnically diverse sample to provide a more representative perspective was not successful. It does however point to a possibility that the interest in subtle agroecological practices is not an anathema to Caucasian male farmers enculturated to scientific materialism as I expected which does reveal my own preconceptions and biases. Conversely, this cannot be taken to mean that the interest in these practices are primarily from the Caucasian ethnic group but more like hypothesised that this group’s

disproportionate sample size in the survey can be attributed to the medium of data gathering rather than inclination. The disproportionate percentage in terms of ethnicity gathered from this survey indicates that the choice of Facebook and having the survey solely in English excluded farmers not belonging to the Caucasian ethnic group, and even outside Anglo-Saxon countries even though English is the world's lingua franca.

In terms of the farming system, respondents were given more than one option they could identify with, and the majority of respondents affiliated themselves with one or more of the main five alternative agricultural movements. Therefore the data required some filtering into 3 broader categories (certified organic/biodynamics, uncertified organic/biodynamic and conventional/non-chemical). Only 8% were certified organic/biodynamic compared with 39% who were uncertified, with the remainder 53% as 'Other' which includes non-chemical/agroecological/conventional/permaculture categories without having also indicated 'Certified' or 'Uncertified'. These four 'Other' categories are not legally defined terms and therefore indicates that these respondents did not fully practice the organic principles of avoiding chemical fertilisers or pesticides in their entirety. The 39% uncertified figure indicates that there are a large number of farmers who are aligned with the principles of these two movements but not formally licensed possibly due to prohibitive costs or they are not using different marketing channels. Although the survey invited farmers of all approaches to participate, only a small sample of farmers (9%) who filled out the survey defined their system as solely 'conventional.' However, a larger proportion (12%) of farmers referred to their systems as 'non-chemical' (but not certified, uncertified or conventional), and 15% noting either only 'Permaculture' or 'Agroecological' without no other categories. If the categories are totalled for certified organic/biodynamic, uncertified organic/permaculture, permaculture, and agroecology, then the total number of 'alternative' farmers in the survey population is 62% compared to 38% likely to be conventional to a greater degree.

Despite the small size of the sample, when looking at willingness to participate this would suggest a positive correlation between an alternative farming approach and interest in subtle agroecological practices as was hypothesised at the outset of the study and when comparing farmers' paradigms (Beus and Dunlap, 1990) in Chapter 5.

In terms of farm size, 42% of the farms were over 20 hectares in size and over a third (34%) were less than 5 hectares effectively making them smallholdings based on the size of a contemporary farms in the Western world today. In the US for example, where more than half of the respondents lived, the average farm size is 444 acres (179.68) hectares (USDA, 2021) and in Australia where 14% of the respondents lived, the average farm is 4331 hectares

(Australian Bureau of Statistics, 2017). In the UK where 12% of the respondents lived, the average farm size is smaller with 87 hectares (Defra, 2021). Since 58% of the respondents were from farms less than 20 hectares this indicates greater interest in subtle agroecological practices coincides with smaller operations, which are also themselves more aligned with agroecological and permaculture principles. Of the 11% of the total respondents from conventional farms, 5 out of 7 farmers (71%) had holdings over 20 hectares. Most respondents 81% had a livestock component on their farms. 17% were solely working in horticulture and interestingly, there were very few (2%) respondents managing solely arable systems.

Respondents Views on Subtle Agroecological Practices

Respondents' views on specific subtle agroecological practices are displaying the following results given in Table 10.2. The breakdown the respondents' views per practice can be seen in graphical format with percentages in Appendix S.

Table 10.2 – Respondents Views on Subtle Agroecological Practices

Subtle Practice		Convinced	Inclined towards Believing	Neutral (Don't Know/No Opinion)	Sceptical	Don't Believe	Total
Application of	Sound/Electrical Energies	9	12	13	5	13	52
Working with	Other Subtle Energies	9	12	14	3	14	52
Biodynamic	Preparations	16	8	13	5	10	52

Subtle Practice	Convinced	Inclined towards Believing	Neutral (Don't Know/No Opinion)	Sceptical	Don't Believe	Total
Homeopathic Treatments	17	12	6	8	9	52
Astronomical Planting Calendars	20	10	6	6	10	52
Person-based intuitive and meditative practices	17	9	9	4	13	52
Instrument-based intuitive practices	9	11	12	5	15	52
Ritual-based practices	9	7	13	7	16	52
Communication with Nature intelligences	18	13	5	3	13	52
Total	124	94	91	46	113	4

Farmers' Views – A Summary

The following bar graph sums up and ranks these practices they are either ‘inclined towards believing’ or ‘convinced about’ in terms of the combined percentages of farmer responses as ranked and presented in Figure 10.1. It shows that the practises viewed the most positively as the top 3 practices are (1) communication with Nature intelligences, followed by (2) astronomical planting calendars and (3) homeopathic treatments.

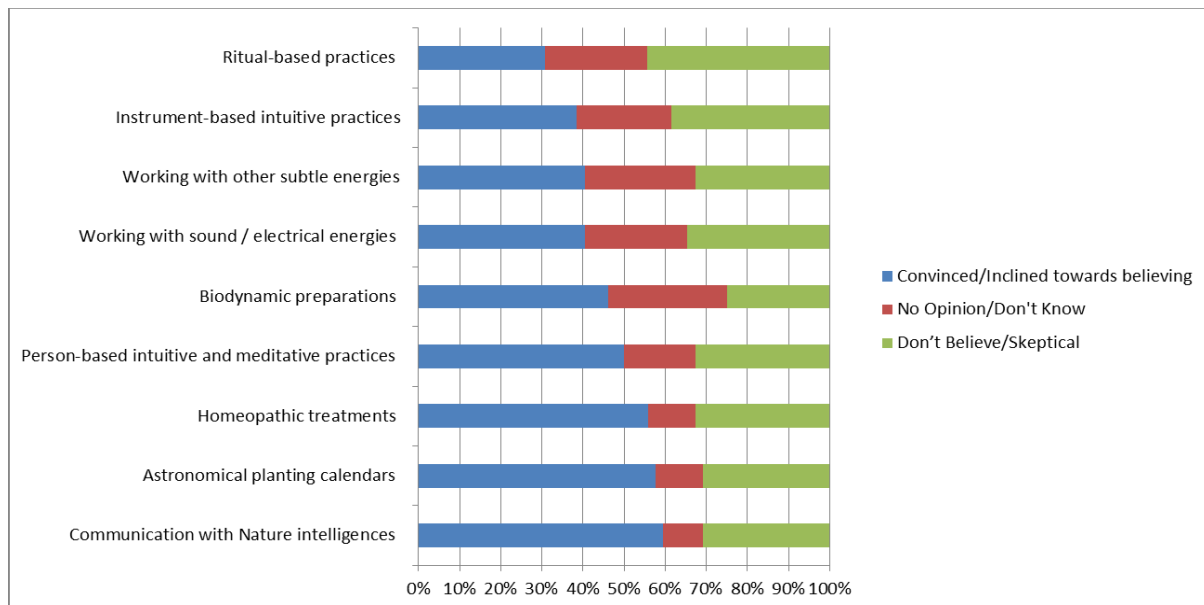


Figure 10.1 – Summary Comparative Breakdown of All Respondents Views on Subtle Agroecological Practices

In testing the hypothesis from Chapter 5 that the expected openness towards these practices would be higher among alternative farmers, the 8 respondents (16% of the total) who had recorded their farming system was ‘non-chemical’ or ‘conventional’ (without any other reference to certified/uncertified organic or biodynamic, agroecology and permaculture as secondary classifications) had the responses analysed separately, with the results shown in Figure 10.2.

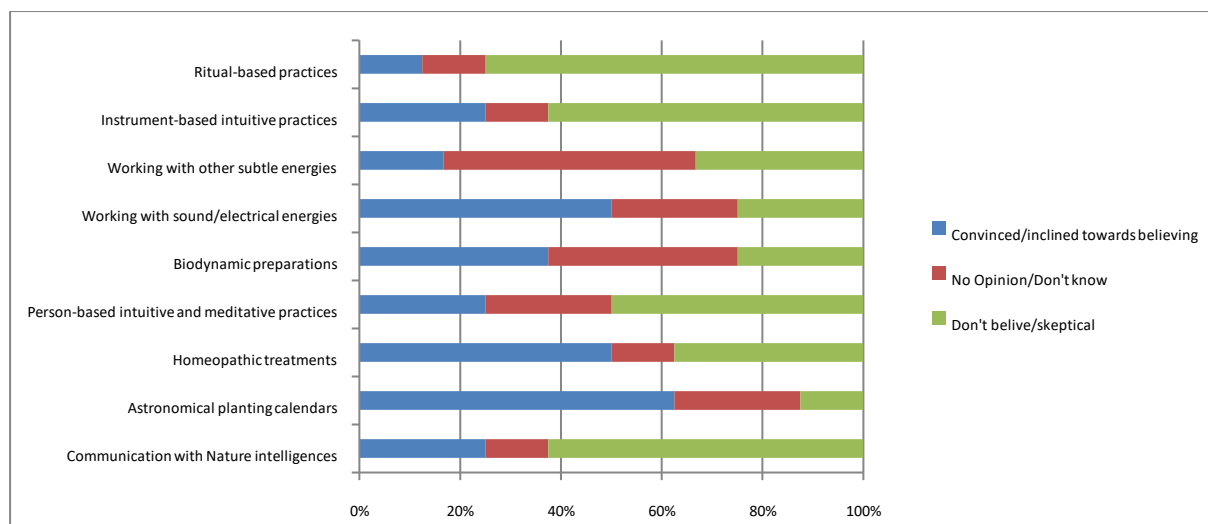


Figure 10.2 – Summary Comparative Breakdown of ‘Non-Alternative’ Respondents Views on Subtle Agroecological Practices

The views of the ‘non-alternative’ generally scored lower for all the subtle practices except for homeopathic and astronomical planting calendars at 50% and 62.5% convinced/inclined to believing, compared to 57.6% and 55.7% respectively for the alternative farmers. Also, the ‘non-alternative’ farmers had a more favourable response to working with sound/electrical energies with 50% convinced/inclined to believe compared to 40.3% for the alternative farmers. It is likely that because these are energies identified by modern science, they are likely to be viewed more favourably as the least ‘subtle’ of the energies in the survey whereas alternative farmers were more open towards less conventional methods.

The respondents were also analysed whether their gender had any impact on their views towards subtle agroecological practices. For female respondents (41% of total), 55% were convinced/inclined to believe towards most of the practices, 10% were neutral and 35% were mostly sceptical/unconvinced, and thus generally had more favourable views than the male respondents (59% of total), with 38% convinced/inclined to believe, 24% neutral and 38% sceptical/unconvinced. In most cases, regardless of gender, most respondents who had a tendency towards each of the 3 standpoints tended to have that same view towards all the practices. Looking at religious affiliation, for the respondents who identified themselves as atheists (17% of respondents), only 11% were convinced/inclined to believe towards most of the practices, 11% were neutral and 78% were sceptical/unconvinced. This indicates that having a spiritual or religious belief system of any type will likely impact farmers’ openness towards adopting subtle agroecological practices. For the practices with the most overall favourable views (communication with nature intelligences at 59%), only 22% of atheists were convinced/inclined to believe, 11% sceptical and 67% did not believe.

The respondents' comments towards their views on these practices also yielded some pertinent information. These have been selectively presented in Table 10.3 expressing positive/neutral and negative/sceptical views that are broadly representative. Out of 33 comments, 25 were positive/neutral (76%) and 8 (24%) were negative/sceptical. The spiritual affiliation or lack of have and gender been put in parantheses in the comments.

Table 10.3 –Respondents Comments on their Views of Subtle Agroecological Practices

Descriptor	Positive/Neutral	Negative/Sceptical
General Outlook	<p>'I believe there is more that we don't know about the natural world than what we do' (Christian, female)</p> <p>'Intention moves energy' (Spiritual not religious, female)</p> <p>'I suppose I am a sceptical spiritual scientist, seeking evidence and trying to understand, but leaning towards conviction that the spirit is real and has a real impact, independent of 'belief.' (Prefer not to Say, male)</p>	<p>'Including mystic and even anti scientific practices is not only not useful, it is harmful in developing sustainable models of regenerative agriculture because it lessens the chances of broad adoption.' (Prefer not to Say, female)</p> <p>'My decision process is mostly science based, so however much I would like to believe a concept (such as those listed above) I need some evidence, experience, and peer review.' (Buddhist, male)</p> <p>'None of these practices have any scientific evidence to support their use. If they did, they would be mainstream, and the explanations for them would (by definition) be non-supernatural. It is also essentially a tautology in my philosophy of knowledge that "supernatural"</p>

Descriptor	Positive/Neutral	Negative/Sceptical
		<p>phenomena are non-existent.’</p> <p>‘If non-material practices help focus attention and discipline to practices that are actually effective, then they may be doing some good. Otherwise they are wasteful and counter-productive. In this age when anti-scientific agendas - notably climate denial - are at the core of the destruction of ecosystems and regeneration, how in the world can we justify embracing equally anti-scientific, anti-rational and anti-humanist mythologies such as homeopathy, biodynamics and the like. It is the ultimate in hypocrisy.’ (Spiritual but not religious, male)</p>
Astronomical Planting Calendar	<p>‘Planting by moon has awesome results. Yields increase by over 2 fold. And produce is far superior in quality; apart from just planting by moon a blended practice of regenerative and conventional which we use has tremendous potential in crop productivity. I have been working with these since almost 10 years now.’</p>	<p>‘Non material practices may bring attention and discipline to material practices but otherwise have no evidentiary basis’ (Spiritual but not religious, male)</p>

Descriptor	Positive/Neutral	Negative/Sceptical
	(Hindu, male)	
	<p>‘When pruning I try and follow the moon cycle but I prefer to follow more pragmatic natural indications like rainy season and dry season cycles which are very effective. I do absolutely believe in the power of energy in the natural world and also in our lives but I think that nature responds in a much more powerful way to less subtle techniques than those mentioned. Especially when working with degraded landscapes and perennial plants such subtle techniques I have not seen have much of an effect’ (Spiritual but not religious, male)</p>	

Summary of Respondents’ Views on the Practices

It is very possible that farmers who took the time to fill out the survey would have some degree of interest or alignment with these practices. Nevertheless, the responses received were roughly an even split of views with a slight slant towards the positive indicate a fair degree of interest, underlining the necessity of conducting this type of research. Summarising the results broadly on respondents’ views across all the practices, there is almost an even split in thirds between the respective views (positive/neutral/negative), but a slight slant towards positive. The full breakdown in percentages per practice is included in Appendix S. This was remarkable given the demographics and geography of the respondent population. It indicates that there are a significant proportion of farmers in the Global ‘North’ who are either already,

or at least to some degree positively inclined to the practices, as well as neutrals that might take a more positive view if presented with supporting evidence of their efficacy.

Nature Intelligences as the Most Favourably Viewed Practice

A key finding of this section of the survey was the degree of positivity in respondents' views and reported practice pertaining to communicating with Nature intelligences. This was expected to be one of the most controversial practices. However, 59% of respondents reported being either convinced or inclined towards believing in such communication (the highest of all the subtle agroecological practices), with only 31% who did not believe or were sceptical and 10% who did not have a view. The dominant Western worldview is founded on the ontological assumption that only humans are possessed with an advanced degree of consciousness and that two-way Nature communication is not possible (Gagliano, 2018). Confusion as to what was meant was unlikely since the survey instruction was explicit to avoid vagueness, specifically listing descriptors such as interspecies communication, nature spirits and devas. All lie beyond the mainstream ecological worldview in which ecological relationships are principally conceived as relationships between material objects lacking a subjective, interior mode of existence (Esbjörn-Hargens and Zimmerman, 2009). It is thus noteworthy to find that communication with Nature intelligences gained top ranking among all of the subtle agroecological practices surveyed, notwithstanding that, as noted earlier, the sample of respondents was small. This could open up exciting avenues for future research with farmers already involved in this practice. As identified in the systematic review (Chapter 8), there has to date been no empirical research carried out in an academic setting establishing such means of communication. Nevertheless, the literature review revealed a PhD dissertation published on this topic by Kealey (2019) whereby the author justifies the validity of establishing such communication based on the agential realism framework by Barad (2007).

In her thesis, Kealey (2019) notes that:

‘Regarding the ecological crises we are facing, it is not unreasonable to claim that we need a radically new approach, which could include asking the plants themselves for assistance. However, this option would arise only if we believed that plants have some kind of knowledge or intelligence worth sharing, plus the agency to be able to partner with us in a co-creative way. Additionally, we would need to be able to engage in two-way communication of some sort. Communication in itself is not sufficient for collaboration, because collaboration additionally requires the sharing of agency and the creation of common goals, but it seems to be a necessary component...A core assumption of modernism is that humans

are privileged in having attributes such as knowledge, intelligence, agency, intentionality, and subjectivity, which eliminates non-humans such as plants from being considered as collaborative allies. It is interesting to note, however, that the modernist attitude toward plants has been shifting, as evidenced by the large and growing body of research providing scientific and philosophical evidence and arguments for including plants among the sentient beings (pp 142-143).’

Perhaps in light of the impending ecological crises, interested researchers can tap further into this area that, based on the findings of this survey, many farmers already seem to implicitly recognise.

Views on other Subtle Practices

Astronomical planting calendars followed closely in second place with 58% of respondents reported being either convinced or inclined to believe, 31% sceptical or disbelieving and 11% neutral or with no opinion. However, very little robust and peer-reviewed empirical research has been conducted in this area to date, with only 8 trials found in the systematic review (Chapter 8).

Homeopathy was third on the list with treatments such as agrohomeopathy and use of flower essences listed as examples. A significant majority of respondents (55%) were either convinced or inclined towards believing in homeopathic treatments compared to 33% who did not believe or were sceptical, with a comparatively smaller proportion (12%) who were neutral or had no opinion, which is a closely similar breakdown to astronomical planting calendars. Considering the relative popularity of homeopathy, in particular in Europe where 29% have reported using homeopathy (EU, 1997), it could explain why a majority of farmers would respond more positively to a method they had already heard about. The highest proportion of robust empirical trial papers (41%) identified in the systematic review coming from Brazil can be attributed to the fact that Brazil has supportive laws encouraging homeopathy.

The other subtle practices showed similar trends. For biodynamics, sound/electromagnetic and other subtle energies practices 40-46% respondents reported being convinced or positively inclined, 29%-35% disbelieving or sceptical and 25-27% neutral or of no opinion. For biodynamics it is noteworthy that close to 50% of respondents were positive to at least a degree towards this farming system with its unconventional spiritual worldview and practices outside the material dimension, which was even more than sound/electrical energies, albeit by a small margin.

When asked about views on intuitive and meditative practices in a farming context, half (50%) of respondents indicated they were convinced or inclined towards believing, 33% were sceptical or did not believe and 17% had no opinion.

Ritual-Based and Instrument-Based Intuitive Practices as Least Favourable

Respondents' views on instrument-based intuitive practices, such as radionics and dowsing were slightly less positive than for practices that did not involve such equipment. Only 38% of respondents were either convinced or inclined to believe against 39% who did not believe or were sceptical and 23% who had no opinion or did not know.

The respondents' views on ritual-based practices in a farming context were reported to be the least favourable than all the other practices asked about, with only 30% convinced or inclined towards believing, 45% who did not believe or were sceptical and 25% who were neutral or did not know.

Summary of Respondent' Views

In summary, the total respondents' views indicated that a third or more were positive to a degree towards the subtle agroecological practices. There was also a considerable proportion of 'neutrals/no opinion' (11.5% - 27% across all practices) who felt they could possibly be convinced if presented with evidence.

Farmers' Own Experiences using Subtle Agroecological Practices

In terms of respondents who actually worked with the subtle agroecological practices, 46% mentioned using communication with Nature intelligences, closely followed by person-based intuitive and meditative practices (42%) and farming according to astronomical planting calendars (38%). The proportion of farmers who did not use any non-material practices on their farm was only 28%, which was a minority within this sample. The remaining 72% however reported a number of benefits that they attributed to these practices, primarily improved ecosystem and personal health and wellbeing, crop health and higher yields when presented with multiple options to choose from.

Comparing the results from the systematic review in Chapter 8 indicate a discrepancy between the attention being given to subtle agroecological practices in the research domain and what (at least some) farmers are actually doing on their farms. This is especially noteworthy considering that the combined papers for the top three practices (8 for

astronomical calendars, 4 for person-based intuitive meditative practices and 0 for communication with Nature intelligences) comprise only 6% of the 201 total robust papers analysed in the systematic review. For future research, it is recommended that researchers explore these practices in more depth with farmers via a case study approach, to understand more about these methods from the practitioner's perspective.

The overall breakdown of respondents' current practicing these subtle methods is indicated in Table 10.4 and Figure 10.3. The practices respondents noted as 'Other' had no relevance to non-material practices (micro-organisms, forest-bathing, bio-farming and holistic management). The three non-material practices with the lowest percentage of practitioners were working with sound/electrical treatments (6%), ritual-based practices (12%) and instrument-based intuitive practices (14%).

Table 10.4 – Numbers of Respondents Using Subtle Practices

Practice	Respondents Practicing	Percentage of Total
Communication with Nature intelligences	23	46%
Person-based intuitive and meditative practices	21	42%
Astronomical Planting Calendars	19	38%
Homeopathic Treatments	15	30%
Not Working with any Practices	14	28%
Biodynamic Preparations	11	22%
Working with Other Subtle Energies	8	16%
Instrument-based intuitive practices	7	14%
Ritual-based practices	6	12%

Other	4	8%
Application of Sound/Electrical Energies	3	6%

The breakdown in terms of percentages of the total respondents surveyed is shown in Figure 10.3.

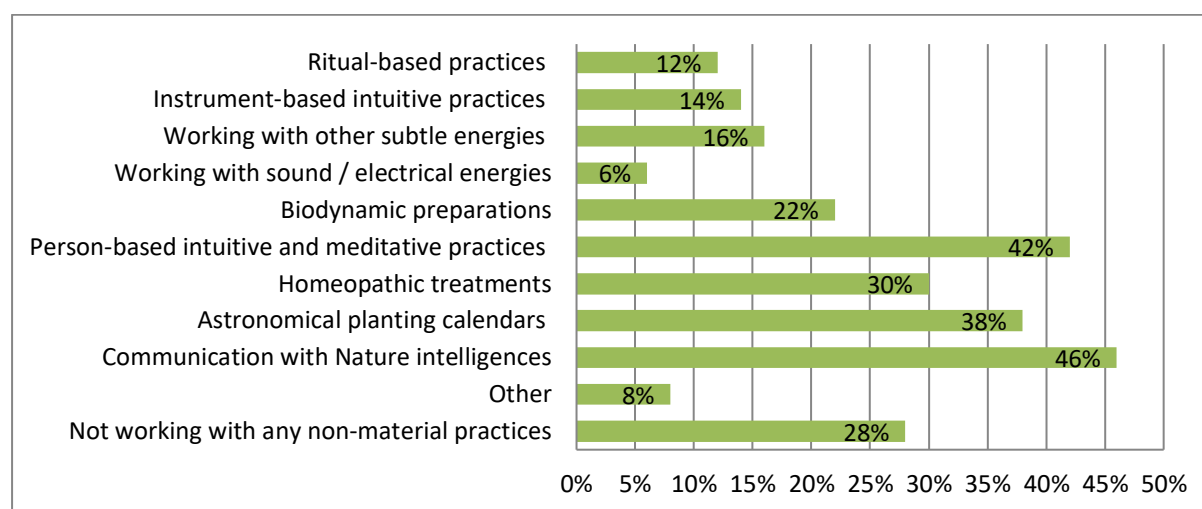


Figure 10.3 - Comparative Breakdown of Subtle Agroecological Practices currently practiced by Respondents

The responses from the 36 out of 52 respondents who reported working with the practices, the number of years experiences in the subtle practices are described in Figure 10.4.

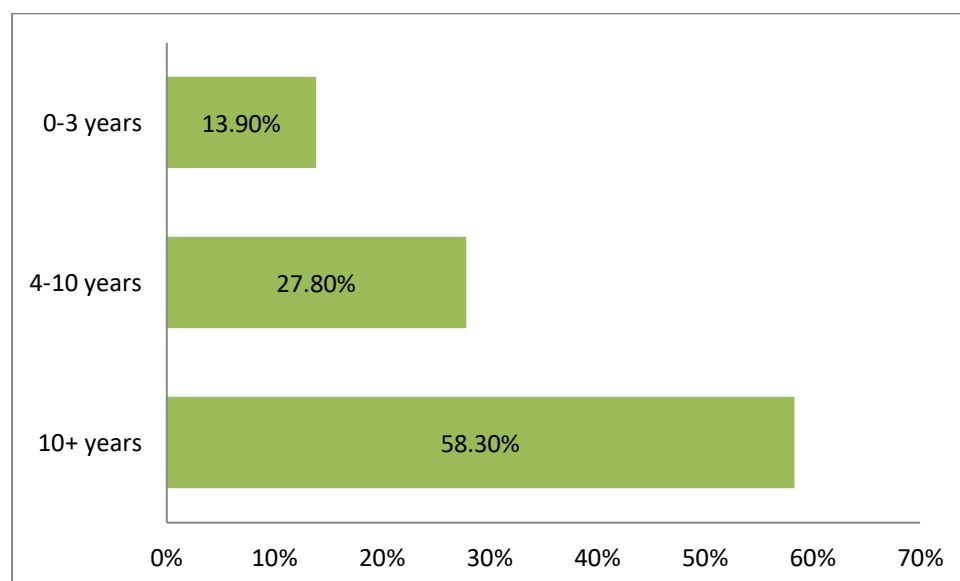


Figure 10.4 - Length of Time Respondents Worked with Subtle Agroecological Practices

The full breakdown of sources of learning given by respondents is indicated in Figure 10.5. Respondents had the option to select multiple sources.

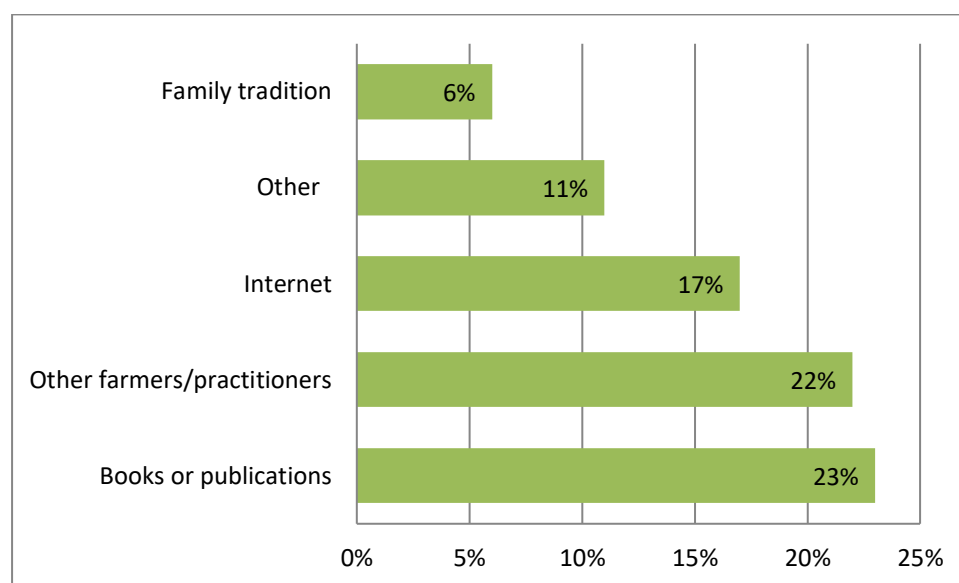


Figure 10.5 - Source of Learning of Respondents Working with Subtle Agroecological Practices

Benefits Reported by Respondents Using the Subtle Practices

Farmers surveyed reported a diverse range of benefits from using the subtle agroecological practices. Notably, the top three benefits described were ecosystem health (80%) closely followed by personal health (77%) and improved personal wellbeing (71%). These top 3 however are rarely discussed in the literature and research from the alternative agricultural movements, which place greater emphasis on the same criteria as conventional agronomical research (Wright, 2021). The focus on yields in the organic compared to ‘conventional’ agriculture debate has long been problematic in letting the ‘conventional’ side determine the primary agenda for discussion, leaving aside other factors such as environmental effects and crop quality. The unsustainable and ethical shortcomings in the productionist paradigm in agriculture have been the subject of effective criticism by Thompson (2005). Based on the respondent’s views, this survey points to evidence that the adoption of subtle agroecological practices may not necessarily directly lead to increased yields as the primary benefit, but can enhance ecosystem health at the macro-level and also benefit farmer health and well-being at the micro-level. This is especially pertinent given that many farmers around the world suffer from stress, depression and suicide (e.g. Liang *et al.*, 2021). It is noted however that one prominent practitioner (MacManaway, 2018) using subtle practices has anecdotally indicated

from personal field experiences that yields will often increase around 30% from his treatments using intuitive methods communicating with Nature intelligences.

The respondents were generally experienced users in view of the number of years spent working with the non-material practices, with 86% having over 4 years' experience and 58.3% over 10 years' experience. It could be conjectured that they would not have continued to use these practices for so long if they did not produce any positive effects on their farms.

Figure 10.6 describes the full list of benefits reported by the respondents. Respondents had the option to select multiple benefits.

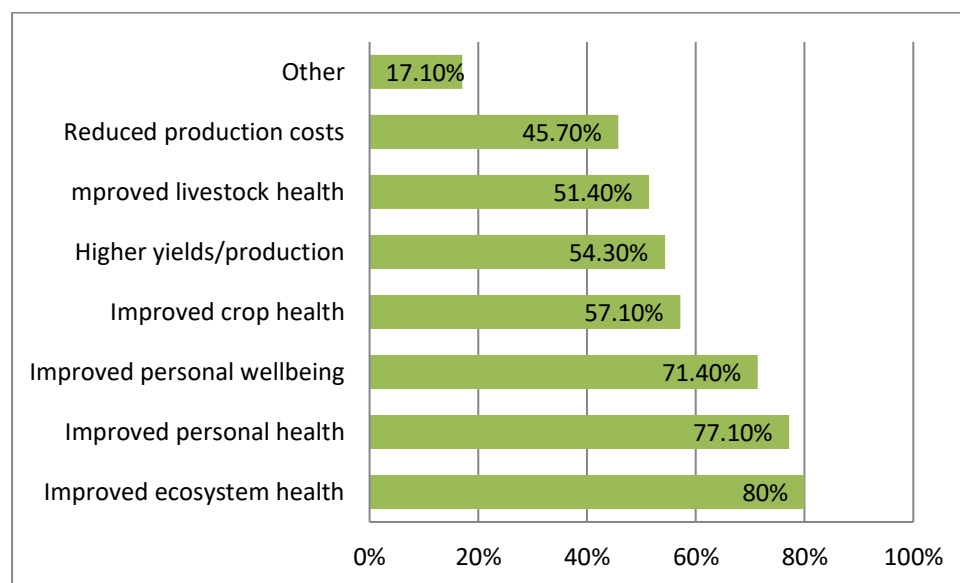


Figure 10.6 - Benefits Reported by Respondents using Subtle Agroecological Practices

Reasons for Not Working with Sound/Electrical Energies

Respondents were also asked about what were the top 3 reasons they did not use each specific practice in the survey. This was in order to better understand the challenges and barriers to subtle agroecological practices for the third research question.

The full list of reasons provided for not working with sound/electrical energies is illustrated in Table 10.5. The breakdown of each response per practice can be seen in graphical format with percentages in Appendix T.

Table 10.5 – Respondents Reasons cited for not working with Subtle Practices

Subtle Practice	Unconvinced they work	Lack of knowledge or information	No published scientific evidence of their efficacy	Too demanding or consuming time	Other	Lack of training /support available	Concern over reputation with buyers/peers	Too expensive	Lack of farmer support network	No support from agricultural extension network	Conflict with religious beliefs
Working with sound/electrical energies	16	23	11	8	6	2	1	2	0	1	0
Working with Other Subtle Energies	20	16	10	4	4	2	1	0	0	0	0
Biodynamic Preparations	18	13	7	5	3	5	0	3	0	1	0

Subtle Practice	Unconvinced they work	Lack of knowledge or information	No scientific evidence of their efficacy	published or their	Too demanding or consuming time	Other	Lack of training /support available	Concern over reputation with buyers/peers	Too expensive	Lack of farmer support network	No support from agricultural extension network	Conflict with religious beliefs
Homeopathic Treatments	18	11	6		2	2	0	0	2	0	0	0
Astronomical Planting Calendars	13	8	6		1	3	1	1	0	1	0	0
Person-based intuitive and Meditative Methods	11	6	6		2	2	0	3	0	1	0	0
Instrument-based intuitive practices	18	14	8		3	1	2	0	1	1	0	0
Ritual-based practices	16	13	9		3	3	1	1	0	1	0	0
Communication with Nature Intelligences	12	7	4		1	5	0	2	0	1	0	1
Total	142	111	67		29	29	13	9	8	5	2	1

Respondents who had indicated that they were using the subtle practices were asked to indicate any challenges and barriers encountered. The results are shown in Table 10.6. The breakdown of each response per practice can be seen in graphical format with percentages in Appendix U.

Table 10.6 - Respondents Challenges and Barriers from Working with the Subtle Practices

Subtle Practice		No problems or challenges faced	Results are not consistent	No/little information or instructions	Very time-consuming	Difficult to learn	Materials difficult to find	Other	No/limited support network	Reputation with buyers
Working with sound/electrical energies		10	2	2	0	0	0	0	1	0
Working with Other Subtle Energies		8	4	6	0	0	0	1	0	0
Biodynamic Preparations		10	4	3	5	2	1	0	0	0
Homeopathic Treatments		7	6	3	1	1	2	0	0	0
Astronomical Planting Calendars		9	4	1	2	4	1	2	0	0

Subtle Practice	No problems or challenges faced	Results are not consistent	No/little information or instructions	Very time-consuming	Difficult to learn	Materials difficult to find	Other	No/limited support network	Reputation with buyers
Person-based intuitive and Meditative Methods	10	2	2	1	1	0	1	0	0
Instrument-based intuitive practices	7	3	3	1	0	0	0	0	0
Ritual-based practices	8	2	2	0	0	0	0	1	0
Communication with Nature Intelligences	8	3	3	1	2	1	1	1	0
Total	77	30	25	11	10	5	5	3	0

In total almost half practitioners (48%) encountered no problems working with the practices, the most two common reason cited by 18% of respondents was that the results were inconsistent and 15% reported that they could find little/no information and instructions about them.

To further address the third research question regarding challenges and barriers, respondents were asked to elaborate on why they were not interested to learn about these practices, respondents provided numerous reasons with the most illustrative ones captured in Table 10.7.

Table 10.7 –Respondents Reasons for not adopting Subtle Agroecological Practices

Descriptor	Comments
Lack of Interest	‘Not interested’ (Christian, male)
	‘Waste of time’ (Spiritual but not religious, male)
Conflict with own Belief System	‘Don't believe any of these things could possibly change an outcome.’ (Atheist, female)
	‘I’m a farmer. I don’t have time for piffle.’ (Prefer not to Say, female)
	‘Show me scientific studies that prove significant efficacy and we can talk. Otherwise I will use my own observation skills, intuition and science.’ (Blank)
Practical Reason	‘These sound impractical on large scale production.’ (Christian, male)
Evaluation from own Knowledge/Experience	‘I am pretty much already using most of them and if I am not, it’s

Descriptor	Comments
	because I have already looked onto them and don't see enough evidence for efficacy to be worth my time.' (Spiritual but not religious, female)
	'I have researched all of these extensively already and am pretty well versed in them. With that said, I'm always happy to visit another farm and see what is going on with them!' (Druid, female)
Social Reasons	'They are generally seen as wacky (Atheist, male)

In closing the survey, respondents were asked to indicate which factors they thought would encourage further adoption in their community up to a maximum of 3, in ranking from 1 to 3, with 1 being the most likely and given the option to leave blank if they did not think anything would help. The results and summaries are noted in Table 10.8 and comments received are captured in Table 10.9.

Table 10.8 - Respondents Indicators of Factors Encouraging Further Adoption of Subtle Agroecological Practices

Factor	Ranking 1	Ranking 2	Ranking 3	Total
Evidence through farmer-to-farmer networks	8	18	4	30
Published scientific evidence of their	16	4	3	23

efficacy				
More public awareness/acceptance of the practice	9	2	4	15
Agricultural extension networks recommending the practice	2	4	7	13
Other farmer advocates in an organised network	3	1	6	10
Training and consulting available	1	2	7	10
Publications in the farming press	2	5	2	9
Government support	3	2	3	8

Table 10.9 – Sceptical Respondents Comments on Subtle Agroecologies

‘In general I am finding farmers and agriculture business having a hard enough time adopting scientifically based solutions, let alone quasi scientific solutions. I would just be happy if farmers and customers follow what is provable, or even experimental. I almost feel these other esoteric paths are a distraction from our more serious problems.’

‘In my area the "crazy" factor is overwhelming to overcome for most farmers; my family have university degrees in agricultural science and they won't consider anything they didn't learn about in school (40 years ago!). ‘

‘I don't care if anyone adopts non-material practices, as I think they are humbug. ‘

‘I don't think farmers should be encouraged to use practices that would waste their time and energy. They would be better off spending them time learning how to actually improve their

practices with regards to building soil fertility without chemicals. ‘

‘Too often practitioners of such become fanatical zealots and tell others what they should do, rather than showing results and let others decide for themselves. If something appears to work it must be their radionics or dowsing, and if something goes wrong, it must be the previous nasty chemicals or like. There seems to me to be little scientific rigor or analysis of their use of such ideas. Does it become a self-fulfilling prophecy? Also many using alternate methods are not prepared to share the financial returns on their farms to help justify their claims. If it works for them that is fine, but do not expect others to follow without sound evidence. ‘

10.4 Challenges and Barriers Identified in Farmers’ Survey

The farmers’ survey intended to capture views and practices from a diverse range of practitioners in the field regardless of farming type, even if the end sample of respondents were predominantly affiliated with the main alternative farming systems identified in Chapter 5. The survey results when analysed across all the practices indicated that roughly a quarter were undecided about subtle practices with the remaining almost split in the middle between convinced/inclined to believe and sceptical/unconvinced. Although the sample size of respondents was small (n=52), it is still above the optimal minimum range for surveys (Memon *et al.*, 2020) indicating that there exists a sizeable proportion of farmers who are already interested in exploring subtle agroecological practices further.

In terms of factors cited by respondents as necessary convince sceptical farmers, the most frequently mentioned in the responses received (30) was the availability of evidence through farmer-to-farmer networks, which also shows the important value farmers place on learning from each other. The establishment of these networks is common within many of the movements already, including among biodynamic farmers and SYA farmers as illustrated by the case studies in Chapter 9, but a broader outreach might well be of further benefit. The overall summary indicates that there are already many interested farmers, even in the Global ‘North’, where one might expect that the most scepticism and hostility would be encountered towards the practices.

The second highest factor identified in the responses (23) concerned the importance of published scientific research demonstrating the efficacy of the methods. This underscores the esteem and importance that empirical research holds in the farming community (at least in the

Western countries where most respondents came from) and justifies further research endeavours within this sphere to explore the practices further.

The third highest ranked factor (15) pointed to more public awareness/acceptance of the practices. This shows that farming practices are closely embedded in the social and cultural milieu within which they take place making the unconventional nature of subtle practices a significant challenge to broader adoption at present.

The most common reason cited by respondents for not using subtle agroecological practices themselves was that they were unconvinced that they work. The percentage of farmers falling into this category varied from 36.4% to 60% across the practices with homeopathic treatments in the highest range and working with sound/electrical energies in the lowest range. This is not surprising given that farmers' worldviews and beliefs are a primary factor in the practices that they carry out on their farms.

For those farmers who were working with the practices, almost half the practitioners (48%) reported they had no problems working with them but the most two common reason cited as challenges by 18% of respondents was that the results were inconsistent and 15% reported that they could find little/no information and instructions about them.

With one exception (working with sound/electrical energies, where lack of knowledge/information was cited as the top reason) the second most commonly cited reason noted by respondents for non-adoption of subtle agroecological practices was a lack of knowledge and information, ranging from 52.3% to 24% of respondents, depending on the specific practice. For most of the practices (with the exception of homeopathy at 60% and instrument-based intuitive practices at 52.6%), 50% or less of respondents described themselves as unconvinced, meaning conversely that more than half of all respondents had some degree of openness towards adoption.

The survey reveals a clear knowledge gap amongst farmers of subtle agroecological practices (at least within the geographical area of the respondents) indicating a possible niche to be filled by interested researchers and practitioners disseminating knowledge of these practices to farming communities. The third most cited reason for not adopting these practices was the perception that there was no published scientific evidence of their efficacy, ranging from 15.4% to 25% of respondents depending on the specific practice. It is important to note here that this was the respondents' perception and does not correspond to the actual position as indicated by the literature identified from the systematic review in Chapter 8. This identified that there are already robust scientific studies into most of these practices, with the exception

of instrument-based intuitive practices, geomancy and communication with Nature intelligences. It can be inferred that many farmers are unaware of these studies which is unsurprising if their findings are not filtered through to agronomical advisors or published in the farming press. Hence there is a possible niche for future work to increase the reach of these publications outside academia to farming extension services, the popular press and other information sources used by farmers. On the assumption that they are successful the publication of the results of trials using the subtle agroecological practices within a robust conventional scientific framework might incline some (and perhaps a significant proportion) of farmers towards using these practices.

Admittedly subtle agroecological practices are underpinned by an epistemological framework not accepted as valid in most academic institutions. It can therefore be expected that furthering this research within that domain will be met with resistance and disagreement from academia. It can also be expected that a sizeable proportion of farmers will resist practices that are new to them and do not conform to their worldview. Of course it will not be possible to find common ground with everyone the survey results however reveal that there is research interest and potential for further exploration among farmers that would justify further research into subtle agroecological practices.

Chapter 11 : Discussion

Based on the total results of the data collected for this research, a clearer picture had emerged of the nature of subtle agroecologies. This exploration did not proceed in a linear progression by any means. Embarking on academic research into a little-explored field presented several pathways for exploration, somewhat akin to a labyrinth where I became lost, retraced my steps and identified a path forward several times. A typology of subtle agroecological methods was compiled, followed by a field trial experiment testing some of these methods directly. This was supplemented by a systematic review of existing peer-reviewed trials pertaining to the subject area, followed by a more in-depth analysis of two case studies of two farming systems deploying some of these subtle agroecological practices. The final step involved conducting a global farmers' survey to capture broader global feedback from farmers about these practices. On reflection it would have been valuable to have carried out the farmers' survey as a starting point instead to set the agenda for the remainder of the study.

During the five year journey, following Scharmer's (2018) Theory U process everything was put into question; many preconceived ideas and frameworks were discarded, some reformed and moderated and new even more radical possibilities were explored as the project gradually developed into its final form. This chapter highlights some of the key findings and discusses the main insights and outcomes that emerged pertaining to the research questions and to the theoretical framework.

11.1 Staking out and Naming a New Research Area

The first and foremost outcome of the research was identifying an appropriate conceptual underpinning to justify and defend the topic of investigation. This required careful deliberation since the controversial nature of the subject necessitated its grounding on a strong foundation to withstand scrutiny and criticism. This was further complicated by the fact that the area of exploration consisted of a diverse conglomeration of practices, at the first perfunctory review only united by an ontological and epistemological underpinning very distinct from the modern worldview familiar to me and others from the Western academic tradition. Thus, gaining a deeper understanding of the ontologies behind these practices involved my undergoing a significant process of 'unlearning' while still operating within the standards and norms of bona fide academic PhD research.

At the start of the research process, I was using the working title of quantum agriculture which drew from the work of Lovel (2014). However, I could find no academic papers on

this subject applying quantum principles to agriculture. Khalili (2003) has written a book linking quantum principles to biology but a literature review at the start of the research indicates that this is as far as quantum mechanics as a formal science has been able to expand into the other sciences to date. Most scientists in the academic establishment concur on the validity of quantum principles but see a logical conflict between quantum and classical physics where the latter is considered to be the macroscopic limit of the former (Polonyi, 2021). This finding, coupled with the challenges I encountered undertaking the field trial (see Chapter 7) led me to subsequently explore decolonisation as a social studies approach. This previously minor aspect of the conceptual framework came to take centre stage as the foundational conceptual paradigm underpinning the research. As discussed in Chapter 2, its appeal, unlike quantum mechanics, was that it had both philosophical and activist elements with an increasingly vocal praxis to challenge entrenched modern notions of reality and which has made existing inroads into modern academia to bring about broader change. Since to date most agroecological research focuses on the tangible material dimension, the term ‘subtle agroecologies’, coined by Wright (2021) was decided upon in the end as most fitting for this conceptual framework and research area.

11.2 Placement of Subtle Agroecologies within the Context of Decolonisation

In an endeavour to be relevant to all farmers, including those from European and ‘settler’ backgrounds in North and South America, Australia and Africa, this study deployed the decolonisation framework in its broadest and most inclusive sense. As with the earlier term ‘quantum agriculture’ using the term decolonisation in this sense was problematic because its scope was extended beyond its normal usage. Although controversial, especially coming from my own positionality as writing from a privileged standpoint in the modern world system, it was my endeavour to weave the different practices together into a common tapestry in arguing for a multiplicity of worldviews and many ‘yeses’ that is integral to decolonisation praxis that stands against a monocultural worldview espoused by modern industrial civilisation.

The validity of this approach of using decolonisation as the definitive conceptual framework was held as an open question throughout the exploration. It was also recognised that the subtle practices covered were not meant to be solely those that could be recognised as ‘indigenous’ (as described in Chapter 2) but also encompass some originating within recent Western cultures with a global reach and applicability that could extend to interested farmers worldwide.

The research also evolved my understanding that the decolonisation movement in its current 21st century phase transcends gender, class and ethnicity and must be inclusive in order to achieve its goals, including engaging constructively with the current ‘beneficiaries’ of the status quo. It led me to learn about my own ancestry linking back to long vanished indigenous European peoples that possibly had undergone a brutal and traumatic process of colonisation, preceding the modern age of global colonisation by centuries and possibly millennia. The archaeological and anthropological evidence by Gimbutas (1997) and Eisler (1987) described in Chapter 2 offers some indicators to suggest this. With this in mind, I decided to proceed with exploring subtle agroecologies via this lens with the proposition that decolonisation, of the ‘mind’ (Ngugi, 1986) in particular, was of the utmost necessity at this time for virtually everyone and likely most of all those of us with a European ancestry as a result of earlier assimilation into ‘dominator’ cultures. Perhaps ‘mind’ would not be the optimal description due its cerebral connotation, but rather ‘heart’ or ‘heart-mind’ describing the inner decolonisation process would be more accurate; Scharmer (2010) states that transformation requires not only an open mind, but also an open heart and an open will. Having gained a better understanding of past events and their spill over into the present, this led to the question of how to move ‘forward’ upwards in the U model (see Chapter 2, Figure 2.2) with exploring unconventional methods in agriculture.

11.3 Compilation of a Typology into a new Research Discipline

The typology outlined in Chapter 4 from an extensive review of the literature had in the beginning not been conducted with the specific lens of decolonisation. It was however possible to establish this link in the sense that the practices identified had all been marginalised or outright dismissed as a direct consequence of the dominance of a monolithic worldview. From this view it could be seen that the modern dominant worldview with its components of materialism, economies of scale and the intentional marginalisation of other cultures and ways of knowing would seek to exclude any agricultural practices that could either present an alternative to modern industrial civilisation, or that could not be effectively monetised by this system. Although some practices, such as radionics and homeopathy had an origin in modern Western culture, these have also been marginalised since they did not fit in with the materialist paradigm and threatened conventional medicine that now claim universality. The origination of subtle agroecologies as an area of research did not begin with me but it has had its starting points in the formation of a research programme at Coventry University (CAWR, 2017) of which I was an early participant. Building and expanding on the

work of Kieft (2017) who had made some classifications of diverse practices, the output of this study has been the further development of a solid typology that attempts to classify and distinguish the different subtle agroecological practices with possible overlaps (Chapter 4, Figure 4.1). Similar to a representation of alternative organic farming systems in a diagram format (e.g. Furtak and Galazka, 2019), the emergence of subtle agroecology as a research discipline and agricultural practice warranted the compilation of a similar road map outline the key processes and focus areas. With this map, which is the first iteration on this topic within academia linking together a diverse range of eleven practices, interested farmers and researchers will have a navigable snapshot and framework to seek to delve further into specific ‘petals’ on the flower. This model aims to link together the various practices into a single framework wherein many of them already consist of extensive literature reviews from robust studies (e.g. Brock *et al.* (2009) for biodynamics and Teixeira and Carneiro (2017) for homeopathic treatments).

It is expected and encouraged from this initial effort in producing a framework that the number of petals and sub-petals are be reviewed or expanded upon as the field further develops and matures since the model is flexible to accommodate a potentially unlimited number of subtle agroecological practices. Whether some of these practices are really ‘subtle’ or not will also be open to debate. I have chosen here to focus on the energetic ‘wave’ component of the practices regardless of whether the underlying energies that form part of the practices are presently recognised by mainstream science or not. Rock dusts for example, have an obvious material component but also has an energetic component with many of the dusts containing paramagnetic properties which are measurable by modern scientific instruments. Similarly, the biodynamic preparations will have a physical component that is also measurable by modern instruments but also have a purported energetic component which is not. Radionics, at the further end of the subtle spectrum does not require any physical component and relies on energetic intervention. All the identified practices are therefore ‘subtle’ at least to some degree and further differentiated in that the energetic component behind their purported effects operate outside the understanding of modern mainstream science. Notwithstanding being open to controversy in including some practices such as communication with Nature Intelligences and ritual-based practices in an academic setting, my intention was to present all the practices on an equal basis without prior judgment and allow the available evidence for each practice to be presented on its own merits.

11.4 Academic and Multi-faceted Investigation into Coverage of Subtle Agroecological Practices and their Effects

11.4.1 Field Trial

Having established the framework of the practices to explore, the field trial was the preliminary starting point in my research to undertake a field trial in a conventional framework into selected subtle practices. This was based on an initial literature review but preceding the systematic review and therefore at this point my understanding of the optimal way to conduct such a trial had not yet crystallised and many lessons were learnt from it that would be of benefit for further such trials. The key notable lessons of the trial was the importance of having some solid prior practical experience in the practices experimented with and to be less ambitious with the number of practices experimented with simultaneously. Although the field trial experiment did show statistically significant effects from two of the subtle practices (intent and radionics), there were several factors described why these results cannot be considered reliable (lack of experience in the practices, small plot sizes, only one year of data, and compromised samples due to external factors). Nevertheless, the experiment offered valuable insights into the myriad of challenges of running such an experiment which is of greater complexity working with energies that are not directly measurable and are as easy to manipulate as those in conventional trials conducted in a similar manner.

Also, the first year field trial, described in Chapter 7, was prepared and conducted in 2018 when the focus was still on a natural sciences methodology. As the research progressed and the first year field trial got underway, it became apparent that undertaking a thorough exploration of subtle agroecologies in a field trial format had been an overly optimistic approach, of under-estimated complexity from both a material and metaphysical perspective.

At first glance, the results indicate that the practices simply did produce any positive outcome on grain yield. It is important to note however that it is not uncommon to obtain negative results in the first year of a field trial with the corroboration of these results continuing through into a second year and possibly beyond. Nevertheless, given the time and attention the continuation of the trial would have entailed at the cost of sacrificing other potential avenues to explore it was decided to instead look into a broader set of research methods. Although the paucity of data gathered from the trial was mostly not statistically significant, the experiment crystallised some insights.

A key lesson learnt was that future research into subtle agroecological practices would need to address critiques from a conventional perspective. Harvest sub-plot sizes at 4.2 m² (totalling 16.8 m² per treatment) are likely to be considered too small for an arable field trial when the traditional guidelines are 100 m² per treatment, ideally over at least two sub-plots (Fielding and Riley, 1997). There are precedents for this with same number of replications in

other field trials on subtle practices tested on wheat (Mayer *et al.*, 2015; Payez *et al.*, 2013; Bavec *et al.* 2012; Reeve *et al.*, 2010). Furthermore, a trial lasting one growing season is inadequate for a longer term experiment on crop yield differences. Standard wheat trials are conducted over a minimum of two growing seasons (NIAB, 2020). In terms of subtle practices, a long-time practitioner, Lovel (personal communication, 2018) highlighted that for radionics treatment, effects in terms of plant health and vigour only start to show from the second generation onwards. For this reason, it was initially envisaged to carry out the experiment over two growing seasons until the change in the methodology moved towards social studies orientated research, as described above.

Natural factors also had their effects on the experiment. Some of the plots suffered pest damage from pigeons in the early part of the growing season. This occurred primarily on the south-orientation side of the plot, closest to the hedge where the modern variety was planted. Similarly, field mice found their way into the storage facility where the sample bags were housed and ate some of the grain. This highlights the challenge that in a field trial, the trial site cannot be separated from the surrounding area, greatly increasing the risk of such events and limiting the researcher's control of the experiment. Additionally conducting the experiment over only one year meant that it was not possible to control for weather patterns. 2018 happened to be the fourth sunniest UK summer since 1929 with June and July having primarily dry weather with summer rainfall at 73% of UK average (Met Office, 2018). Therefore, conducting the experiment over several years would have achieved robustness up to the same standards set out for assessing other trials in the systematic review in Chapter 8.

It was also speculated whether each of these practices could potentially overlap with others- a particular likelihood in a small-scale trial. On a broader scale, such overlap had already been demonstrated from past trials such as the effects of biodynamic treatment based on chronological and astronomical factors (Kolisko and Kolisko, 1939; Thun, 1979 and 2003).

In hindsight, the challenges of space, time, pests, and weather identified above could have been managed better in pot trials in a laboratory. However, this consideration must be balanced against the likelihood that the direct applicability of the results from a laboratory would perhaps have been of more limited value to farmers than a study on a field scale. As illustrated in Figure F.1 in Appendix F, 85% of all biodynamic trials were field trials, upon which the trials I conducted were based. There were also some precedents for using field trials with meditation on crops (e.g. Roney-Dougal and Solfvin, 2002, 2003; Pandey *et al.*, 2015).

It is also speculated that my level of knowledge in the practices may well have played a decisive role in the outcome of the trial. If I had possessed particular expertise or found an experienced practitioner, the results would possibly have been different, in particular for the radionics and human intent treatments. This was supported for the human intent trials identified in Chapter 8 (e.g. Ducharme (2007), Roney-Dougal and Solfvín (2002, 2003), and was also identified in the grey literature for radionics. The short duration of the field trial was also possibly a contributing factor for the biodynamic treatments where other trials such as the DOK trial testing for wheat yields from 2003-2010 (Mayer *et al.* 2015). Nevertheless, despite these shortcomings from the field trial, its intention was not to negate the empirical approach as a valid method for exploring these practices, in particular by more experienced researchers which was covered in the systematic review.

As the trial progressed, it also became apparent that grounded prior practical experience in the methods tested would have been of great benefit. Thus, investing time and resources in the first year of the trial identified that attempting to directly explore the potential of subtle agroecological practices under an empirical field trial was not an optimal primary avenue for continued research in this study.

11.4.2 Systematic Review

The systematic review subsequently carried out in the study revealed that there had already been an extensive amount of empirical research carried out into most of the subtle agroecological practices identified in the typology, with 201 robust papers and 50 literature reviews of good quality that were gathered and sifted from the total search results of 31,825 papers. The availability of this quantity of papers provided a detailed overview of the results of studies already carried out into these practices.

The results show that there already exists a considerable amount of robust peer-reviewed empirical trials and literature reviews into many of the reviewed practices and that these only represented two continents with the global total likely significantly higher. This high proportion of publications in Europe (48%) and North America (11%) could be attributed to the selection criteria limiting the publication language to English. Out of the publications in Asia, 24 (66%) were carried out in India where English is a primary academic language, the remainder were from countries where English is less commonly used. The geographical breakdown is therefore reflective of a post-colonial world where English remains the lingua franca worldwide and is noteworthy to consider in a decolonisation context. Given the diversity of languages, it is likely that ideas might be mistranslated into English, as is often found even in the case of other European languages. This is also a critical factor to consider

in decolonisation research: an indigenous researcher, Smith (2012), highlights how Western education prevents indigenous scholars from writing or speaking from a ‘real’ authentic indigenous position, while on the other hand those who do speak from a more ‘traditional’ indigenous viewpoint are criticised because their world views are not intelligible to non-speakers or those educated in modern perspectives. It does point to the ‘mono-logic’ in empirical research as supported by Ribeiro (2014):

‘But English is the lingua franca of globalisation because it is the language of Empire, of the only empire that subsists on the contemporary world scene. And the logic of empire, that of an all-encompassing centre governed by the goal of total assimilation, is essentially monolingual and monologic. Under such a unifying perspective, for which difference is not to be acknowledged or simply does not exist, translation is, in fact, irrelevant (p.2).’

Although conducted under this ‘mono-logic’ the systematic review that the empirical trials generally followed the same standard approach that was necessary in facilitating in analysis and reporting of results worldwide, albeit only in English.

Geographical Spread of Publications

The broad review of subtle agroecological practices also showed a picture of geographical concentrations of research into specific practices, as shown in Appendix B. For instance, looking at sound energies, it was identified that the relative majority of trials, 9 out of 15 (60%) into the application of sound energies were conducted in Asia. Considering the fact that 70% of biodynamic research has taken place in Europe is likely to be attributable to its origin and history, and that 41% of the homeopathic research coming from Brazil is facilitated by government support, there is no equivalent explanation in the literature as to why exploration into sound energies is so prevalent in Asia, and in particular India where 6 out of the 9 (66%) trials were published.

Publication Dates, Robustness and Journal Rankings

There is a clear upward trend in the number of publications relating to subtle agroecological practices over time. As shown in Chapter 8, Figure 8.4 only 10 papers were found from 1989 or prior, 12 from 1990-1999, 37 from 2000-2009, 67 from 2010-2015 rising further to 75 from 2016-2020. The literature reviewed revealed no evidence explaining the reason for this upwards trend.

An analysis of the journals showed that only a relatively small number (14 out of 201, or 7%) of these papers were published in journals specifically dedicated to subtle alternative practices, as surmised from the name of the journal, and almost all of the latter were about

homeopathy. A large number of papers were found in peer-reviewed mainstream publications where a high number (85%) met the highest ranking ‘A’ under the robustness criteria specified for inclusion in this study as outlined in Chapter 8, Section 8.2. In order to gauge the prestige of the journals found, the Scimago Journal Rank (SJR, 2020) was used as a reference point. SJR was chosen instead of the more traditional Journal Impact Factor (IF) since it draws publications from a larger database, covers more countries and non-English journals, does not count self-citations and has a more structured weighting system based on journal prestige and that it does count self-citations (Falagas *et al.* 2008). The SJR measure calculates the average number of weighted citations received in a year by articles published in a journal during the previous 3 year. The weighting is determined by the more prestigious journals and calculated by an algorithm. A SJR ranking of 1 is considered average. Table 11.1 shows the breakdown of the SJR rankings for the 132 journals where the publications were found.

Table 11.1 - SJR 2020 Rankings of Reviewed Journals

SJR 2020 Rank	Number of Publications
0	6
>0, <1	79
>1	22
Not Listed	25
Total	132

The '0' ranking is explained in that some journals were no longer in publication or has not had any publications in 2020. The 'Not Listed' indicates that the journal or paper is not in the Scopus database. The average SJR 2020 ranking for all the 132 reviewed journals is 0.8265 and therefore somewhat below average in the subject field. However, a journal ranking may not necessarily be a determinant of the quality of the publications therein. Authors may decide to publish papers in specialised journals with fewer citations to gain a wider reader impact rather than prestige.

Breakdown of Results

As an outcome of this filtering, the results of the systematic review yielded generally statistically significant evidence on the parameters tested; with a total of 201 eligible papers, 152 or 76% had a statistically significant result for some aspect of the farming system. The statistically significant results met the $p = 0.05$ significance level on at least one of the parameters tested for as specified in Appendices G to N covering each practice separately.

Breakdown of Statistically Significant Results

For the specific practices and resulting breakdown from these papers, the statistically significant results were 73% for the biodynamic treatments (79 papers), 73% for homeopathy (55 papers), 87% for sound (15 papers), 71% for electromagnetism (21 papers), 79% for paramagnetism (14 papers), 75% for astronomical planting calendars (8 papers), ritual-based practices 100% (5 papers), and intuitive/meditative practices 100% (4 papers). Most papers had tested for more than one parameter with a total of 321 parameters for the statistically significant results, but the five most commonly mentioned in descending order were weight

(35), yield (25), plant height (16), germination percentage (11) and number of leaves (10). In summary, a 76% total success rate across all the subtle agroecological practices reviewed showed that over three quarters of trials indicated that there is some efficacy that cannot be accounted for by statistical randomness even when considering publication bias.

Breakdown of Insignificant Results

The insignificant results in 49 papers (24%) were found to be due to a variety of factors. Of these papers, 19 (39%) related to trials with livestock and the majority of these were managed in industrial farming systems. The 19 (39%) trials on plants had 11 insignificant results (58%) with yields as a testing parameter, indicating that yield is not the primary statistically significant result for treatments deployed. The remaining 11 papers (22%) contained trials on a diverse range of soil properties with 10 biodynamic treatments and 1 related to the application of rock dusts. The proportion of 'A' rankings for trials with insignificant results totalled 40 out of 49 (81%).

Summary

The systematic review while it provided new insight into the effectiveness of many of the practices was not comprehensive or representative of all research carried out globally since the study was limited to publications in English. On several occasions papers of possible interest with abstracts in German, Russian, Portuguese and Spanish were not included in the review because the detailed methodology in the full paper could not be determined. Nevertheless, based on the English publications, papers on agrohomoepathy were more prevalent in South America (Brazil) and on biodynamic preparations in Europe.

The upward trend of the number of peer-reviewed publications across all the practices over 83 years has broadened the visibility of subtle practices in academic research. This is demonstrated in particular for biodynamics and agrohomoepathy with 79 and 55 papers respectively out of the 201 reviewed, comprising a total 66% of the research papers found. There were no empirical research trials found for specific practices, such as radionics, geomancy and communication with Nature intelligences. Given this absence, the systematic review gave an original and insightful albeit incomplete view of research into subtle practices in total that indicate a majority of the trials had a statistically significant result when conducted under a high degree of robustness.

11.4.3 Case Study

The case studies yielded more complementary insights into the qualitative effects of the practices that were not considered in any of the empirical trials.

Sustainable Yogic Agriculture

The increased sense of wellbeing as a result of working with the subtle practices was a key theme gathered directly from the SYA farmers. Even if for nothing else, the subtle agroecological practices practised result in these perceived benefits for farmers and their communities.

The first case study was conducted early in the project (2017) when academic publications had been identified in the literature review describing Sustainable Yogic Agriculture (SYA), a system developed by the Brahma Kumaris in India. A visit to the movement's headquarters in Mt. Abu, Rajasthan was the first field research into this topic by a Western academic institution. The time spent with the Indian farmers was limited to a couple of days and the interviews were organised and mediated by the Brahma Kumaris. However, it was clear from my interaction that the farmers who had adopted SYA were practical farmers who depended on agriculture for their livelihood and had taken an initially cautious approach to this 'new' farming approach. The interview data indicated that it would take several years for the impacts of the SYA method to become evident.

It was clear from the interviews that the Indian farmers were sincere in their espousal of SYA and although increased output was anecdotally reported without specific figures being given, there were other important intangible factors, which were the wellbeing of the farmers themselves, and their families and communities. Notwithstanding the case study arrangements being of short duration and the limitations of data gathered via translators, the first-hand accounts and attitudes from the farmers interviewed also added supporting evidence that super-imposing a spiritual dimension onto standard organic practices had clear and tangible benefits, not only for crop growth but for farmers' and their communities wellbeing. As a meditation-focused farming system, SYA has synergies with the alternative agricultural movements, sharing common goals towards healthy food and community wellbeing. In addition, such movements claim to be holistic, but to date, as highlighted in Chapter 5 many of them have avoided or underemphasised the mind-matter dimension that is brought to the fore with SYA.

Furthermore, the numerous spiritual, physiological, psychological and emotional benefits provided by meditation have been confirmed in many studies as summarised by Erickson (2016), and the practice of meditation itself has moved into the global mainstream culture for

personal well-being (Pathath, 2017). SYA expands upon this and applies meditative practices to crop growth and farm resilience (Ramsay, 2012a). Similar approaches that contain a metaphysical dimension in agriculture have already been advocated by Wright *et al.* (2017), Kieft (2006) and van Eijk (1998).

The study ended with the reflection that further exploration into this relatively simple and no-cost subtle farming practice would be beneficial to identify whether the benefits of adopting SYA would be replicable with other styles of meditations than the Raja Yoga method taught by the Brahma Kumaris and whether this system could be of broader interest outside India. Notwithstanding the short time frame of the study and the lack of first-hand empirical verification, this study provided rich data for the initial exploration of SYA as a farming system. While neutrality cannot be claimed – the small sample of farmers interviewed for this study had been selected by the Brahma Kumaris who were present during the group interview and who managed the demonstration farm visited – I encountered what appeared to be a clear moral and spiritual integrity within the SYA movement. In line with the research methods, the indications are that this is another subtle practice that is moving into greater prominence. Illustrating this, SYA has achieved relatively high publicity and adoption at national level with one Indian government minister advocating ‘yogic farming’ (BBC, 2015) and some international level attention, with at least one wheat farmer in Italy practicing the method (Kebio EU, 2016) in a very short (12 year) time period. Interest could also spread further afield with the increased recognition and adoption of meditation practices originating from India. A recent article has been published in a Western mainstream farming publication on yogic farming (Jagani, 2021). This highlights in particular the psycho-social benefits of the meditation practice, including in some cases healthier living, which are incurred first by the farmer and then go on to positively impact the entire farming family and community. This increased peace of mind – and fewer suicides ⁴ (Prasad, 2019) cannot be overestimated in the context of the plight of small farmers in India and other regions of the world.

Biodynamic Agriculture

A multitude of other effects were reported from the biodynamic preparations from anecdotal experiences in India where rain was brought to a drought-stricken region by the efforts of a

⁴ One Indian farmer commits suicide approximately every 42 minutes (Ref)

group of farmers stirring BD500. Steiner's stated purpose of the preparations were to 'enliven' the Earth and enhance the nutritional 'forces' in food, but yield was not indicated to be the critical purpose. It was also mentioned in a short biodynamic video shown during the case study visit where each farmer in India had reported something unique about the benefits they had noticed, such as bigger fruits, better taste, shinier leaves and more. One of the main benefits 'Y' has also experienced and noticed in others is improved personal well-being and a sense of connectedness from working deeply with the biodynamic preparations.

Summary

Both farming systems in the case studies centered on live farm cases of subtle agroecological practices that appeared to 'work' well for both practitioners in their own unique regional and cultural contexts. It is possible of course that further case studies on additional farms in each farming system would have provided a richer and more balanced description of each system. They would also have provided further data, alongside the inclusion of case studies on the other subtle agroecological practices identified in this study and it is recommended that this is considered for future exploration.

Another important factor in subtle agroecological research identified through the case studies is the importance for subtle agroecological practices to be firmly grounded in the spirituality and worldviews of their practitioners for their maximum benefit. They are not a 'quick fix' and may not have immediate effects but the indications are that if practiced consistently, they could lead to not only changes on their farms but for the farmers' themselves.

11.4.4. Farmers' Survey

The farmers' survey also included a question asking farmers what benefits they had observed from using the subtle practices on their farms where multiple selections were possible. Here the findings from the case studies were also corroborated in that the top three benefits highlighted by the respondents were improved personal wellbeing, health and harmony in the ecosystem. Interestingly, the effects reported in order of highest percentage were improved ecosystem health (80%), improved personal health (77%), improved personal wellbeing (74%), improved crop health (57%), higher yields/production (54%), improved livestock health (51%), reduced production costs (46%) and other (17%). From this research method therefore, additional reported benefits were identified where the top 3 reported were not studied in any of the empirical trials because these are qualitative in nature. Nevertheless, these are clearly of major importance. The healing of ecosystems worldwide extended beyond the agronomic domain has become of paramount urgency and for this reason the

United Nations has declared 2021-2030 to be the decade of ecosystem restoration (UNEP, ND). The importance of deploying practices that affect the health and overall wellbeing of farmers has also increasingly become recognised to be of vital importance; it is estimated that 20% of suicides reported worldwide occur from ingestion of in rural agricultural communities in low-middle income countries (WHO, 2021). The positive effects of some of the subtle practices (such as SYA reported in the case study) corroborates this finding since the Indian farmers in the panel reported improved wellbeing for themselves and their village communities,

This farmer survey approach which was anonymous led to one insight that qualitative research shed light upon. This was that communication with Nature Intelligences was one of the practices that the highest number of survey respondents (59%) viewed favourable to at least some degree even though there were no robust scientific studies recognising their existence. Hence, the conglomeration of the four methods led to a multi-dimensional perspective of the possible effects of the subtle practises.

Summary and Key Highlights of the Effects

My own exploration into these practices have instilled in me a sense of epistemic humility that I now consider to be absolutely essential for any researcher who wishes to delve further into the subtle practices an emerging area of study. This is not the same as blind belief, but rather looking at practices with an open ‘beginner’s mind’, balancing a willingness to learn with maintaining a critical stance. As summarised by the French scientist Andre Voisin (1959) in the context of the biological sciences (Figure 11.1), what we know is infinitely small relatively to what we do not know, and for progress it is necessary to focus more on the black circle than the dot.

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Figure 11.1 – Philosophy to Progress in Biological Science
(Voisin,1959)

If this is the case in biological science, then it is doubtlessly more so in the subtler realms that have still scarcely been explored in modern academic setting to date.

11.5 Deeper Understanding of the Challenges and Suggested Remedies

The adoption of any novel system that is at odds with the status quo will inevitably face some common challenges and barriers. This has certainly been the case in relation to subtle practices and agriculture and a review was carried out to determine which lessons, if any, could be drawn from recent history in the alternative farming movements in their nascent stages up to the present day. Having gathered this understanding from the literature review, the aim was to expand on it to identify possibly unique challenges specifically for subtle agroecological practices. This information was gathered initially from the field trial conducted, then researched as part of the systematic review analysis, then delved into further as a data output from the farmers' survey and lastly examined through the findings from the case studies.

Field Trial

The challenges in conducting a field trial in this study were similar to those for a conventional trial in that the trial was affected by many external factors, such as climate and pests. Furthermore, there were additional challenges when attempting to work with subtle factors. It is possible that because these practices have subtle influences, when practiced on their own their impacts might not be noticeable, but combining them might create a synergy and produce more significant results in the first instance. However, this advantage could speculatively also have the drawback of a creating a possible 'cocktail effect' where it would be difficult to isolate the effects of one practice over the other from an experimental perspective. Nevertheless, the combination of the four treatments was the first attempted experiment a distinct from isolated treatments in identified past research trials in the systematic review covered in Chapter 8.

The experiment provided some insights into the difficulties of setting up a field trial using empirical standards while also working with subtle forces and energies. The number of practices experimented with and the realisation that each required a significant level of skill were also critical factors that are suggested to be considered to mitigate challenges in future trials.

Systematic Review

The systematic review yielded valuable insights about the challenges of each practice where papers were found and these have been included in Chapter 7. The combined overview indicated that there are unique challenges to many of the practices besides the most obvious one that was mentioned by biodynamic agriculture and homeopathy in particular that the

work involved energetic processes that are not validated by mainstream science. Another key theme that arose from the challenges identified in the systematic review was that importance of testing the practices in a holistic setting which is particularly challenging in a controlled experiment that will attempt to isolate the treatments from other factors. Even despite of this challenge, the overall results of the review showed statistical significant results however.

Case Study

Encountering public disbelief and resistance was a key element that both participants encountered which is to be expected when engaging in agricultural practices that go against what is considered normal. In the case of India, there was a cultural resistance from some parties in the Indian government that objected to the use of cow horns. This was not the case for SYA as an indigenous Indian farming system that had received acknowledgement from senior government figures, but the practicing farmers indicated that people in their local communities were not convinced. The social and cultural element is therefore an important factor to consider by ‘early adopters’ of these practices. Another challenge found in both case studies was that results are not always apparent in the short term and it is important to be patient and develop a sufficient level of skill in the practices.

Farmer’s Survey

For those farmers who were working with the practices, almost half the practitioners (48%) reported they had no problems working with them but the most two common reason cited as challenges by 18% of respondents was that the results were inconsistent and 15% reported that they could find little/no information and instructions about them.

The key challenge gathered indirectly was from the reported reasons noted by respondents who were not using subtle agroecological practices themselves. The main reason cited was they were unconvinced that they work. The range of farmers who specified this ranged from 36.4% to 60% across the practices with homeopathic treatments in the highest range and working with sound/electrical energies in the lowest range. This is not surprising given that farmers’ worldviews and beliefs are a primary factor in the practices that they carry out on their farms. The second most commonly cited reason by respondents for why they were not using subtle agroecological practices was a lack of knowledge and information, ranging from 52.3% to 24% of respondents, depending on the specific practice.

In summary, the main challenges identified for working the subtle practices from a research perspective (field trial and systematic review) was the attainment of proficiency in them and that their practices should be applied holistically in a broader farm context and a long duration to see their effects. There were also notable social and cultural barriers as highlighted from

the qualitative instruments (case studies and farmer survey) that a significant proportion of farmers simply did not believe that they work and therefore did not attempt them. For those that did, another key challenge identified was that the results were not consistent, which could possibly be linked back to the research challenges identified from the practices were not adequately learned or they were practiced in isolation from other farming practices as highlighted in the systematic review, in particular from homeopathy where it was identified that most trials that did not work were on non-organic subjects, and that even in mainstream trials, many phenomena cannot be replicated (e.g. Foster and Skufca, 2016). One other interesting finding as a challenge as the third most cited challenge for those already practicing was the lack of information and instructions. This opens up an opportunity for broader knowledge dissemination to farmers who may be interested to learn more, and for those already practicing. The publication of documentation accessible for farmers based on the findings of the systematic review could help towards this knowledge transfer to farmers already practicing and also potentially sway the opinions of the segments of farmers who are neutral or sceptical towards using subtle practices on their farms .

Chapter 12 : Conclusion

Global agriculture is in a precarious state and in urgent need of transformation to a more holistic and regenerative model. As described in Chapter 1 this research set out to explore radical solutions that extend beyond the materialist framework currently dominating agriculture, be it conventional industrial agriculture or that of the more alternative agricultural movements. This exploration was not an attempt to denigrate or dismiss the value of modern ‘Western’ thinking, or the empirical sciences and established organic practices advocated in that tradition by the main alternative agricultural movements. With a framing of ‘both-and’ rather than ‘either-or’ the aim was to build upon them with subtle practices. In this sense, there is no binary opposition, but instead material and subtle practices can serve each other and are essentially two sides of the same coin. As outlined in Chapter 2, Scharmer’s (2010) Theory U process offered a valuable process in coming to understand the current state and the previous historical events in agriculture and colonisation, delve deeper into the unknown and emerge with ideas of what a regenerative and decolonised agricultural model could look like, using subtle practices as supplementary enhancements to the organic material practices. Such a truly regenerative global agriculture is still in emergence but critically important and opportune at this time when the industrial model is increasingly challenged.

In the present time the ‘Age of Monologue’ as the dominant modern materialist perspective still lingers as a global phenomenon, but is gradually weakening. In this space between stories in human history where the present world system no longer able to sustain itself and moving into hospice care and the new one still in its early birth pangs, the necessary shift into an emerging ‘Age of Dialogue’ opens up space and new possibilities for alternative ontologies and epistemologies, some of them pre-colonial indigenous ones to make their presence felt once more. Decolonisation theory was examined as a means to understand the world today and to critique perspectives rooted in the ‘old story’ of materialism and dominance over the other-than-human world. Theory U was the methodology used to go deep, reflect and emerge with new ideas and explorations. A brief history was presented of a mode of consciousness with an unbalanced ego that led to human development, both positive and negative, exported worldwide through the last modern phase of Western colonisation but has now culminated in near ecological collapse along with massive social injustices. Scharmer’s (2010)’s theory of change looking at the emergent agricultural model supports the view that is missing from the present ‘sustainable model’ (3.0) is an invisible dimension (4.0)

goes beyond food production by establishing farms as places of economic, ecological, social, and spiritual-cultural renewal and healing centres for the living ecosystems and offers a process how this future model can be co-created. This is in many ways not a ‘new’ idea and the principles behind an enlightened agriculture are already recognised by indigenous cultures and ancient wisdom traditions, both Eastern and Western which is why a truly regenerative agriculture is inextricably linked to decolonisation.

Chapter 3 identified modern industrial agriculture as a prominent example of how the current agricultural model is not viable and in need of radical reform. Using decolonisation praxis as the conceptual framework this research intended to shed further light on this ‘hidden dimension’ of agriculture and set out to explore subtle agroecologies by (1) identifying the core practices, (2) determining their efficacy using a variety of methods and (3) seeking to understand more about the challenges and barriers to their uptake. Firstly, to address the first question, the identification and description of subtle practices was presented in a typology (Chapter 4) and an examination and literature of the five main alternative agricultural movements (Chapter 5) to gauge their receptivity to these subjects in the context of decolonisation. These emergent alternative models, namely organic agriculture, agroecology, permaculture and regenerative agriculture challenge the failing industrial model but I argue that their focus has possibly hampered by their exclusive focus on the material dimension which is a lingering thought pattern of colonialism.

A broad methodological approach outlined in Chapter 6 set out to explore these questions. their efficacy and challenges and barriers to their uptake were examined through a field trial (Chapter 7), a systematic review (Chapter 8), two case studies (Chapter 9) and a farmers’ survey (Chapter 10) as the chosen research methods, The key findings and some reflections from these methods in addressing the research questions were presented in Chapter 11.

It is hoped that the conclusions of this pioneering study can serve as a springboard to facilitate further exploration into the potential of subtle agroecological practices to assist in the radical transformation urgently required of world agriculture at this time. This concluding chapter summarises these findings and their contributions to academic knowledge, society and farmers, while suggesting recommendations for future research into developing domains within alternative agriculture.

12.1 Contributions to Academic Knowledge

The following contributions to academic knowledge were achieved from this research.

1. Typology of Subtle Agroecological Practices

Although a total of 50 comprehensive quality peer-reviewed literature reviews had already been carried out on all of the practices separately to some degree (Appendix O), the output of this work as described in Chapter 4 was the first attempt to explore all practices as an entirety under the umbrella term of subtle agroecologies as an academic output. The resulting typology depicted in the subtle agroecologies ‘flower’ (Chapter 4, Figure 4.1) presented in this study has created a model that can be built upon and expanded upon by interested researchers. As with any conceptual model, ‘the map is not the territory’ but the studied subtle agroecological practices now have a framework that can be supported by the robust empirical studies identified from this study.

2. Comprehensive Systematic Review of existing Empirical Trials into Subtle Agroecological Practices

This study is to date the first attempt to compile and critically analyse a comprehensive list of robust peer-reviewed academic papers describing empirical trials carried out on a broad range of subtle agroecological practices worldwide. The review with the results outlined in Chapter 8 found 201 robust papers that met strict evaluation criteria which showed that a majority of these trials (76%) had a statistically significant result on the diverse parameters tested for. A compilation of the data gathered from this review (Appendices A – N) highlights the specifics of these trials providing further reference for academic researchers interested to pursue them further. The presentation and methodological approach of filtering out all but the most robust papers offers a valuable store of knowledge and a counter-argument to sceptics who might argue that there is no empirical basis to the effects of subtle agroecological practices.

3. Farmers’ Views and Applications of Subtle Agroecologies from Survey

Another novel contribution to academic knowledge was the insights gained from the farmers’ survey carried out asking farmers’ directly about their views, applications and reasons for not using the subtle agroecological practices. The output of this survey (Chapter 10) revealed that there is a broad segment of farmers from the sample who have positive views of the practices with present usage, a slightly lower number who were not convinced or sceptical and roughly a quarter who had no opinion or were neutral. In terms of practices, only 28% of the farmers surveyed indicated that they did not use any of the mentioned subtle agroecological practices which indicates an already broad amount of existing adoption. This is particularly noteworthy considering that the survey demographics consisting of predominantly Caucasian male farmers assumed to be least receptive given acculturation into the modern Western

worldview. The survey also indicated the topmost benefits farmers perceived from using these practices, which were ecosystem health, personal health and improved personal wellbeing, all dimensions not commonly areas of emphasis in agricultural research. Hence, the supplementation of these practices can add essential elements for a truly holistic and regenerative agriculture.

4. Increased Awareness of the Complexities and Challenges of Research into Subtle Agroecologies

Through the identified research methods, this study uncovered a number of significant challenges and barriers to conduct further research into subtle agroecological practices.

The field trial, systematic review and case studies all highlighted that the application of subtle agroecological practices tends not to show immediate results but often requires patience, skill and attuning to the local context before their efficacy becomes apparent. Specific challenges to subtle agroecologies were identified for several of the practices, such as working with energies not being recognised as real by modern contemporary science, inconsistent results and lack of information and support not being easily available. The information gathered from the systematic review and the field trial in this study indicated that consistency requires a holistic setting and patience to see results over a longer time duration than one growing or several growing seasons. The lack of information and support available for interested farmers requires increased knowledge dissemination which is a key contribution that this study aims to help remedy.

5. Further Awareness of an Emerging Farming System from India

The case study on Sustainable Yogic Agriculture (SYA) conducted in India during late 2017 shed further light on a recent agricultural system developed by the Brahma Kumaris Spiritual University that super-imposes meditative practices on existing organic and agroecological practices. At the time of study, only one peer-reviewed paper existed describing the results of the SYA methods (Pandey *et al.*, 2015) and this study was the first time that an independent researcher from a Western university was granted access to local farmers and able to conduct a case study while learning more about their methods. To date, the academic presentation of this research has taken the form of a presentation I delivered at a research conference held in Dornach, Switzerland in September 2018 (Jensen *et al.* 2018). A book chapter in an academic book on subtle agroecologies in 2020 (Jensen, 2020), available in Appendix V and a case study presentation sponsored by the UNDP (Wright and Jensen, 2022), and a video presentation at the UN Biodiversity Conference (COP17) projected for December 2022.

6. Linking Decolonisation Praxis to Agroecological Practices

This study presented a new and thought-provoking angle in drawing a connection between the conceptual framework of decolonisation praxis and the exploration of subtle agroecological practices supported by Theory U as a model for change. As covered in Chapter 5, decolonisation is already a subject of academic discourse but extends beyond its influence into popular land-based networks such as La Via Campesina (Grey and Patel, 2015). Since decolonisation has its firm grounding in agroecology (the largest popular movement of the alternative movements), its praxis has the potential to radically shape discourse in the other movements in the years to come as indicated by critiques targeted at permaculture and regenerative agriculture (Whitewashed Hope, 2020) biodynamics (Carlson, 2020) and organic farming (Thottathil, 2014).

From my experiences working with Theory U, this academic exploration into decolonisation as a framework however went beyond most decolonisation literature which has been primarily focused on the impact of the last phase of colonisation carried out worldwide by Western powers. I have taken this further by suggesting that colonisation and its associated traumas stretch even further back. In the research described in Chapter 2 I suggest that the analysis of colonisation is incomplete without looking further back with evidence of Europe having borne one of its earliest historical and most effective onslaughts that started approximately 6000 years ago. While recognising that every race, gender and class has had its own unique experience and degree of suffering from the mind-set that created the modern world, and that some of these have been far greater than others, I have attempted to show a shared history of trauma, and have suggested that its resolution has be through unity and reconciliation rather than division for the co-creation of a better future.

12.2 Contribution to Society

The output of this study was intended to extend beyond academia and be of practical value to alternative farmers worldwide by disseminating knowledge about subtle academic practices from an academic perspective. The intention of the research was to deliver a serious and balanced assessment without hyperbole, generalisations and unsubstantiated claims commonly found in the grey literature. The key areas where farmers can benefit from this research are:

- 1) The identification and consolidation of 201 existing robust empirical trials and review of these based on the impacts of subtle agroecological practices on specific crops and

livestock that they may be interested in applying on their farms. These have been summarised in Table 8.8. A public presentation of the systematic review findings were presented to an audience of over 100 at the Oxford Real Farming Conference in 2022 (Wright *et al.* 2022).

- 2) The main barriers to the adoption of subtle agroecological practices among farmers have been identified along with recommendations to ameliorate these. The farmers' survey indicated that the two primary reasons are lack of knowledge or information and the perception that there is no published scientific evidence of their efficacy. Academic research therefore has been found to be a highly significant factor that could help shift this perception if translated into popular parlance.

The compiled findings from the systematic review and farmers' survey reveal that there already exists a significant repository of robust peer-reviewed empirical trials with valuable information for further study. However, the visibility of these findings remains poor and many farmers are not aware of these practices. This work is now intended to be made more accessible to farmers' worldwide via ongoing efforts in presenting at conferences, facilitating further dissemination online via websites and the establishment of farmer-to-farmer networks on local and international levels. It is hoped that this research offers its own modest contribution in furthering the placement of subtle agroecological practices on the agenda for attention, interest and serious discussion in the alternative agricultural movements for whom this work was intended to benefit. Hence, in order to bring about Scharmer's (2018) '4.0' vision for agriculture the change elements that need to occur are bringing more awareness of these practices to farmers. Researchers have a significant role to play here in translating or transmitting these practices that may be otherwise unknown or regarded as 'esoteric' through giving greater visibility and exploring them through research to validate them. This draws parallels to the journey of the organic movement (covered in Chapter 5) that was initially regarded as fringe only a few decades ago and has now entered the mainstream. Finally, the research can help create community because although the practices are different they share some level in the challenges faced. Awareness by practitioners of specific practices of the broader umbrella field of subtle agroecologies (Figure 4.1) in which they are located may help establish constructive connections across these fields enabling them to work together to overcome these shared challenges.

12.3 Recommendations for Future Research

Arising from what was learnt from this research, the following actions are recommended:

- 1) The result of the field trial presented in Chapter 7 indicated that subtle agroecological practices required the prior acquisition of skill and having a ‘long-term’ mind-set since results do not often show over a single growing season. Therefore, specific trials are recommended to be established into selected methods by experienced practitioners that lend themselves better to empirical research, such as meditative approaches based on existing trials carried out to date that span at least two growing seasons. There is much that can be learnt from the existing empirical trials summarised in Chapter 8 and which are presented in Appendix G – N separately for each of the studied practices.
- 2) Further longer-term case study work and qualitative studies to be carried out on SYA and biodynamic agriculture as well as the other 9 subtle agroecological farming practices. In light of this study’s findings, it is recommended that a particularly emphasis is to be placed on learning more about the ‘qualitative’ benefits such as farmers’ well-being, cultural and social cohesion in their communities and the broader environmental benefits that these practices are indicated to improve upon and also vitally important to a healthy agriculture in specific and a healthy culture in general.
- 3) The academic research provided herein from the grey literature in Chapter 4 and the systematic review in Chapter 8 into how these practices work has yielded foundation material for broader knowledge dissemination to farmers with the planned future publication of a subtle agroecologies ‘technical’ manual. This will be a ‘how to’ guide gathered from extensive research into the practices with the support of empirical data gathered in this study. The lessons learnt from the field trial covered in Chapter 7 can also be passed on to future academic research.
- 4) Additional surveys to learn more about farmers’ views and practices towards subtle agroecological practices to gain further in-depth understanding from a broader profile of farmers’ attitudes worldwide. The demographic profile from this study (Chapter 10) indicated that Facebook would not be the optimal medium to gather views from a representative international group and therefore different avenues would need to be considered as well as translation of the survey in different languages.
- 5) The expansion and improvement of the umbrella framework presented of the diverse range of subtle practices presented in Chapter 4, Figure 4.1. This will open up new possibilities into the repertoire of subtle practices available to interested farmers to

supplement the existing material organic techniques which are non-contaminating to humans and the environment.

- 6) The funding of further case study research to learn more about the key broader societal and environmental benefits to farmers and their communities provided by these practices, such as increased ecosystem and personal health and wellbeing being topmost. As shown in the case studies presented in Chapter 9 of this study, the inner life and perception of the farmers what these practices within their agricultural systems offer to the world beyond food growing is critical but devalued aspect of current farming research that warrants further consideration.

In summary, as noted at the beginning of the study by Santos (2014), the problems originating from the cultural and political confines of Western modernity have no modern solutions and it is necessary at this critical juncture in human history to step outside and think beyond the conventional patterns. This project presents consolidated evidence from a variety of sources that there is ‘substance’ to the effects of these subtle agroecological practices and their potential can be effectively super-imposed on the existing well-established material agroecological practices. As such, the subtle agroecologies offer an under-explored component to be considered for a truly holistic and comprehensive decolonisation of agriculture starting with the heart-mind and then our farming landscapes. This requires having the courage, persistence and will to think and act unconventionally. It means to challenge and not rely solely on the dominant ‘left-brain’ hemisphere materialist worldview that while appreciating its positive contributions, its unbalancing has held most of the modern human world and Nature in bondage for far too long. This study concludes that subtle agroecological practices presenting a more rounded worldview offer exciting and transformative possibilities for future research and exploration to help establish a truly holistic alternative towards a regenerative world agriculture.

References

Aarts, A.A. et al., (2015). *Open Science Collaboration (2015) Estimating the reproducibility of psychological science.* Science, volume 349 (6251). Available at:

<https://curve.coventry.ac.uk/open/file/2cb6ae15-530f-49eb-9b32-87ea1ee9493c/1/Psychological%20science.pdf>

[Accessed March 28th, 2017]

Abasolo-Pacheco, F., Ojeda-Silvera, C.M., Cervantes-Molina, J.E., Moran-Villacreses, E., Vera-Aviles, D., Ganchozo-Mendoza, E., Mazón-Suástegui, J.M. (2020). *Effect of homeopathic medicines during the initial stage and vegetative development of cucumber plants (Cucumis sativus L.).* Terra Latinoamericana 38(1), pp. 165-180

Abell, J. (2021). *Email to Julia Wright.* January 15th 2021.

Abhang, P., Manasi, P., and Pramod, M. (2015). *Beneficial effects of Agnihotra on environment and agriculture.* International Journal of Agricultural Science and Research (IJASR), Vol. 5, Issue 2, Apr 2015, pp 111-120. Available at:

https://www.homatherapie.de/press/homa_press_trans.pdf

[Accessed June 11th, 2020]

Abrams, A. (1922). *New Concepts in Diagnosis and Treatment.* Physico-Clinical Company, San Fransisco. Available at:

<https://archive.org/details/newconceptsindia00abra>

[Accessed May 11th, 2020]

Abram, D. (1996). *The Spell of the Sensuous.* Pantheon, New York

Acharya, M. and Kendra, K.Y. (2013). *Food Micro-nutrients & Organic (Natural) Farming.* International Journal of Agriculture and Food Science Technology. ISSN 2249-3050, Volume 4, Number 4 (2013), pp. 379-384. Available at:

http://www.ripublication.com/ijafst_spl/ijafstv4n4spl_16.pdf

[Accessed January 4th, 2018]

Adams, W.M. and Mulligan, M. (2003). *Decolonizing Nature – Strategies for Conservation in a Post-colonial Era.* Earthscan Publications Ltd, London

Ager, B.K. (2010). *Roman Agricultural Magic*. A dissertation submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy (Classical Studies) in The University of Michigan. Available at:

https://deepblue.lib.umich.edu/bitstream/handle/2027.42/75896/bager_1.pdf

[Accessed May 4th, 2020]

Agroecology (2016). *Principles of Agroecology and Sustainability*. Available at:

http://www.agroecology.org/Principles_List.html

[Accessed November 29th, 2016]

AHDB (2021). *Nutrient Management Guide (RB209)*. Available at:

https://projectblue.blob.core.windows.net/media/Default/Imported%20Publication%20Docs/RB209%202021/RB209_Section4_2021_210208_WEB.pdf

[Accessed December 12th, 2021]

Aikenhead, G. and Michell, H. (2011). *Bridging Cultures: Indigenous and Scientific Ways of Knowing Nature*. Pearson Canada Ltd. Don Mills.

Albert, D. (1992). *Quantum mechanics and experience*. Harvard University Press, Cambridge

Albrecht, H. and Schütte, A. (1999). *Homeopathy versus antibiotics in metaphylaxis of infectious diseases: A clinical study in pig fattening and its significance to consumers*. *Alternative Therapies in Health and Medicine* 5(5), pp. 64-68

Al-Khalili, J. (2003). *Quantum Biology*. Phoenix Illustrated, London

Altieri, M.A. (1987). *Agroecology: The Science of Sustainable Agriculture*. 2nd edition. IT Publications, London

Altieri, M.A. (1995). *Agroecology: the science of sustainable agriculture*. Westview Press, Boulder.

Altieri, M.A. and Nicholls, C.A. (2005). *Agroecology and the Search for a Truly Sustainable Agriculture*. 1ST edition, University of California, Berkeley. Available at:

<http://www.agroeco.org/doc/agroecology-engl-PNUMA.pdf>

[Accessed June 11th, 2020]

Altieri, M. and Holt-Giménez, E. (2016). *Can agroecology survive without being cooped by the Global North?* Available at:

https://www.researchgate.net/publication/309385013_Can_agroecology_survive_without_being_cooped_in_the_Global_North

[Accessed April 2nd, 2017]

Amos, D. and Alford, J. (2018). *Field Lab: Organic Wheat Varieties Final Report: 2018/2019.* Innovative Farmers. Available at:

<https://www.innovativefarmers.org/media/3073/if-final-report-organic-wheat-varieties-year2-v3.pdf>

[Accessed October 20th, 2022]

Anderson. C.R., Bruil, J., Chappell, M.J., Kiss, C.,Pimbert, M.P. (2021). *Agroecology Now! Transformations Towards More Just and Sustainable Food System.* Palgrave Macmillan, London

Apffel-Marglin, F. (2012). *Subversive Spiritualities: How Rituals Enact the World.* Oxford Ritual Studies Series. Oxford University Press, New York

Arowolo, D. (2010). *The Effects of Western Civilisation and Culture on Africa.* Afro Asian Journal of Social Sciences Volume 1, No. 1 Quarter IV. Available at:

<http://www.onlineresearchjournals.com/aajoss/art/53.pdf>

[Accessed June 15th, 2020]

Arsenault, C. (2016). *Only 60 Years of Farming Left If Soil Degradation Continues.* The Scientific American. Available at:

<https://www.scientificamerican.com/article/only-60-years-of-farming-left-if-soil-degradation-continues/>

[Accessed November 29th, 2016]

Australian Bureau of Statistics (2017). *Agricultural Commodities, Australia, 2015-16.* Available at:

<https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7121.0Main+Features12015-16#:~:text=Sheep%20flock%3A%202%2C857%20head.%20Average%20farm%20size%3A%204%2C331ha,megalitres%20of%20water.%204%20megalitres%20less%20than%202014%E2%80%939315.>

[Accessed April 28th, 2021]

Avemaria, P. (2017). *Agnihotra - Ancient Purification Technology with Environmental and Agricultural Perspective*. BSc Thesis Forest and Nature Conservation: Design Study, November 2017. Wageningen University. Available at:

<https://www.agnihotra-online.com/images/articles/studien/Bachelor-Thesis-BBN-Philipp-Avemaria.pdf>

[Accessed June 11th, 2020]

Baars, T., Wohlers, J., Rohrer, C., Lorkowski, S., Jahreis, G. (2019). *Patterns of biodynamic milk fatty acid composition explained by a climate-geographical approach*. *Animals* 9(3), 111

Balfour, E. (2006; 1943). *The Living Soil*. Soil Association

Bailey, L. H. (1995a). *The Holy Earth*. Charles Scribner's Sons, New York

Bailey, L. H. (1995b). *The Outlook to Nature*. Norwood Press, Norwood

Barad, K. (2007). *Meeting the Universe Halfway*. Duke University Press, London

Bar-On, Y.M., Phillips, R., Milo, R. (2018). *The biomass distribution on Earth*. *Proceedings of the National Academy of Sciences Jun 2018, 115 (25)*. Available at:

<https://www.pnas.org/content/115/25/6506>

[Accessed May 26th, 2021]

Barton, G.A. (2014). *Informal Empire and One World Culture*. Palgrave MacMillan, Basingstoke.

Battiste, M. and Henderson, J.Y. (2000). *Protecting Indigenous Knowledge and Heritage*, Purich Publishing, Saskatoon

Baumgartner, S.M., Shah, D. Heusser, P., Thurneysen, A. (2000). *Homoeopathic dilutions: is there a potential for application in organic plant production?* IFOAM 2000 – The World Grows Organic, T. Alföldi, W. Lockeretz, and U. Niggli, (Eds). Proceedings 13th IFOAM Scientific Conference. Zürich: vdf Hochschulverlag, 2000, pp 97-100. Available at:

https://www.researchgate.net/publication/228513906_Homoeopathic_dilutions_is_there_a_potential_for_application_in_organic_plant_production

[Accessed July 4th, 2017]

Baumgartner, S. (2005). *Reproductions and Reproducibility in Homeopathy: Dogma or Tool?* The Journal of Alternative and Complementary Medicine. Volume 11, Number 5, pp. 771–772

Bavec, M., Narodoslawsky, M., Bavec, F., Turinek, M. (2012). *Ecological impact of wheat and spelt production under industrial and alternative farming systems.* Renewable Agriculture and Food Systems 27 (03), September 2012. Available at:

https://www.researchgate.net/publication/259424575_Ecological_impact_of_wheat_and_spelt_production_under_industrial_and_alternative_farming_systems

[Accessed March 12th, 2018]

BBC (2015). *India minister backs 'yogic' farming to 'empower seeds'.* Available at: <https://www.bbc.com/news/world-asia-india-34254964>

[Accessed September 5th, 2020].

BBC (2021). *COP26: Thousands march for Glasgow's biggest protest.* Available at:

<https://www.bbc.co.uk/news/uk-scotland-59185007>

[Accessed December 11th, 2021].

Bellah, R.N. and Joas, H. (2012). *The Axial Age and its Consequences.* Harvard University Press, Cambridge

Bellwood, P. (2005). *First Farmers: The Origins of Agricultural Societies.* Blackwell Publishing, Malden

Benvenuti, M.N., Pisseri, F., Goracci, J., Giuliotti, L., Macchioni, F., Verità, P., Guidi, G. (2011). *Use of homeopathy in parasite control in a flock of Zerasca sheep.* EAAP Scientific Series 129(1), pp. 296-300

Berk, U., and Sharma, S. (2015). *Effect of Agnihotra energy field on water purification.* Indian Journal of Traditional Knowledge, Vol 1, No 1, January 2015. Available at:

https://www.researchgate.net/publication/301214313_Effect_of_Agnihotra_energy_field_on_water_purification

[Accessed June 11th, 2020]

Berk, U. (2016). *Suggested Experiments with Agnihotra and Homa Therapy: What has been done and what can be done.* German Association of Homa Therapy. Available at:

<http://www.agnihotra.org/core/wp-content/uploads/2016/01/Manual-Suggested-Experiments-Jan.-2016.pdf>

[Accessed June 11th, 2020]

Berry, T. (1988). *The Dream of the Earth*. Sierra Club Books, San Francisco

Berry, T. (1999). *The Great Work*. Three Rivers Press, New York.

Berry, W. (1981). *The Gift of Good Land*. North Point Press, New York.

Berry, W. (2015). *The Unsettling of America*. Counterpoint Press, Berkeley.

Betz, H.D. (1995a). *Unconventional Water Detection: Field Test of the Dowsing Technique in Dry Zones: Part II* Journal of Scientific Exploration, Vol. 9, No. 2, pp 159-189. Available at:

<http://dowsing.co.za/images/PDF/Dr%20Betz%20part%202.pdf>

[Accessed June 8th, 2017]

Betz, H.D. (1995b). *Unconventional Water Detection: Field Test of the Dowsing Technique in Dry Zones: Part I*. Journal of Scientific Exploration, Vol. 9, No. I, pp. 1-43, 1995. Available at:

https://www.scientificexploration.org/docs/9/jse_09_1_betz.pdf

[Accessed June 8th, 2017]

Beus, C.E. and Dunlap, R.E. (1990). *Conventional versus alternative agriculture: The paradigmatic roots of the debate*. Rural Sociology, 55(4), pp 590-616.

Available at:

<http://www.soc.iastate.edu/class/325/beus.pdf>

[Accessed December 1st, 2016]

Bilalis, D J.; Katsenios, N.; Efthimiadou, A.; Karkanis, A. (2012). *Pulsed electromagnetic field: an organic compatible method to promote plant growth and yield in two corn types*. Electromagnetic Biology & Medicine, Vol. 31 Issue 4, pp 333-343.

Birkhofer, K., Bezemer, T.M., Bloem, J., Bonkowski, M., Christensen, S., Dubois, D., Ekelund, F., Fließbach, A., Gunst, L., Hedlund, K., Mäder, P., Mikola, J., Robin, C., Setälä, H., Tatin-Froux, F., Van der Putten, W.H., Scheu, S. (2008). *Long-term organic farming fosters below and aboveground biota: Implications for soil quality, biological control and productivity*. Soil Biology and Biochemistry 40 (9), pp 2297-2308

Bohm, D. (1980). *Wholeness and the implicate order*. Routledge Classics, London. Available at:

<http://gci.org.uk/Documents/DavidBohm-WholenessAndTheImplicateOrder.pdf>

[Accessed March 29th, 2017]

Boff, P., Verdi, R., and Faedo, L. (2021). *Homeopathy Applied to Agriculture: Theoretical and Practical Considerations with Examples from Brazil* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Bonato, C.M., de Proença, G.T., Reis, B. (2009). *Homeopathic drugs Arsenicum Album and Sulphur affect the growth and essential oil content in mint (Mentha Arvensis L.)*. Acta Scientiarum. Agronomy. Maringá, v. 31, n. 1, pp 101-105. Available at:

https://www.researchgate.net/profile/Bruno_Reis/publication/26594342_Homeopathic_omeopathic_drugs_Arsenicum_album_and_Sulphur_affect_the_growth_and_essential_oil_content_in_mint_Mentha_arvensis_L_Os_medicamentos_homeopaticos_Sulphur_e_Arsenicum_album_afetam_o_crescimen/links/09e41503e6e1aa35f9000000.pdf?origin=publication_list

[Accessed July 5th, 2017]

Borras, S. (2009). *La Via Campesina and its Global Campaign for Agrarian Reform*. Journal of Agrarian Change, Vol. 8 Nos. 2 and 3, April and July 2008, pp. 258–289. Available at:

https://www.researchgate.net/publication/229924439_La_Via_Campesina_and_Its_Global_Campaign_for_Agrarian_Reform?ev=srch_pub

[Accessed April 14th, 2017]

Botica, A. (2013). *Weather, Agriculture and Religion in the Ancient Near East and in the Old Testament*. Perichoresis, Volume 11, Issue 1 (2013), pp 95-122. Available at:

<https://www.degruyter.com/downloadpdf/j/perc.2013.11.issue-1/perc-2013-0005/perc-2013-0005.pdf>

[Accessed April 1st, 2017]

Bradley, K. and Herrera, F. (2016). *Decolonizing Food Justice: Naming, Resisting and Researching Colonizing Forces in the Movement*. Antipode, 48(1), pp.97-114.

Brahma Kumaris (ND). *Introduction*. Available at:

<https://www.brahmakumaris.org/about-us/introduction>

[Accessed August 20th, 2022]

Briggs, S. (2008). *Organic Cereal and Pulse Production*, The Crowood Press Ltd, Marlborough

Brock, C., Geier, U., Greiner, R., Olbrich-Meyer, M., Fritz, J. (2019). *Research in biodynamic food and farming – a review*. Open Agriculture. 4, pp 743-757

Brooke, J.H. (1995). *Science and Religion: Some Historical Perspectives*. Cambridge University Press, Cambridge.

Brown, F.A., and Chow, C.S. (1973). *Lunar-Correlated Variations in Water Uptake by Bean Seeds*. *Biological Bulletin*, vol.145, no. 2, 1973, pp 265–278. Available at:

www.jstor.org/stable/1540039

[Accessed May 5th, 2020]

Burger, J.R. and Fristoe, T.S. (2018). *Hunter-gatherer populations inform modern ecology*. *Proceedings from the Natural Academy of Sciences (PNAS)* February 6, 2018 115 (6), pp 1137-1139. Available at:

<https://www.pnas.org/content/115/6/1137>

[Accessed June 5th, 2021]

Burke, J. and Halberg, K. (2005). *Seed of Knowledge, Stone of Plenty: Understanding the Lost Technology of the Ancient Megalith-Builders*. Council Oak Books, San Francisco. Available at:

<http://kajhalberg.dk/en/books/seed-of-knowledge-stone-of-plenty/>

[Accessed September 8th, 2021]

Carson, R. (2000; 1962). *Silent Spring*. Penguin Classics; New Ed edition, London

Callahan, P.S. (1995). *Paramagnetism: Rediscovering Nature's Secret Force of Growth*. Acres USA, Austin

Callicott, J.B. (1999). *The Metaphysical Transition in Farming in The Newtonian-Mechanical to the Eltonian-Ecological in Beyond the Land Ethic: More Essays in Environmental Philosophy*. State University of New York Press, Albany

Callicott, B.J. (2010). *The Conceptual Foundations of the Land Ethic* in Hanks, C. (Editor), *Technology and Values: Essential Readings*. Wiley-Blackwell, Hoboken.

Camerlink, I., Ellinger, L., Bakker, E.J., Lantinga, E.A. (2010). *Homeopathy as replacement to antibiotics in the case of Escherichia coli diarrhoea in neonatal piglets.* Homeopathy 99, pp 57–62

Capra, F. (1988). *The Turning Point: Science, Society, and the Rising Culture.* Non Basic Stock Line

Capra, F. (1996). *The Web of Life.* Anchor Books, New York

Carlson, T.M. (2020). *Awakening the Heart in Agriculture.* Biodynamics Journal, Spring/Summer 2020. Available at:

https://www.sektion-landwirtschaft.org/fileadmin/SLW/Events/2020/LWT/Awakening-Heart-In-Agriculture_TMC.pdf

[Accessed March 10th, 2021]

Carpenter-Boggs, L., Reganold, J.P., Kennedy, A.C. (2000). *Effects of Biodynamic Preparations on Compost Development.* Biological Agriculture and Horticulture 17(4), pp 313-328

CAWR (2017). *Subtle Agroecologies: Farming with the Hidden Side of Nature.* Centre for Agroecology, Water and Resilience (CAWR), Coventry University. Available at:

<https://www.coventry.ac.uk/research/research-directories/current-projects/2021/subtle-agroecologies/>

[Accessed March 10th, 2021]

Chalker-Scott, L. (2013). *The science behind biodynamic preparations: A literature review.* HortTechnology 23(6), pp. 814-819. Available at:

https://www.researchgate.net/publication/286356710_The_Science_Behind_Biodynamic_Preparations_A_Literature_Review

[Accessed March 16th, 2021]

Chand, N.; Sirohi, A. S.; Tyagi, S.; Sharma, A.; Kumar, Suresh; Raja, T. V. (2018). *Comparative efficacy of homeopathic and allopathic treatments against Foot and Mouth disease in cattle.* Indian Journal of Animal Research. Jun2018, Vol. 52 Issue 6, pp 898-902

CHRGJ (2012). *Every Thirty Minutes: Farmer Suicides, Human Rights and the Agrarian Crisis in India.* Center for Human Rights and Global Justice, New York: NYU School of Law, 2011). Available at:

<http://chrgj.org/wp-content/uploads/2012/10/Farmer-Suicides.pdf>

[Accessed July 13th, 2016]

Clare, J. (1831). *The Mores*. Available at:

https://www.best-poems.net/john_clare/the_mores.html

[Accessed January 15th, 2018]

Cloutier, S., Weary, D. M., Fraser, D. (2000). *Can Ambient Sound Reduce Stress in Piglets during Weaning and Restraint?* Journal of Applied Animal Welfare Science. 2000, Vol. 3 Issue 2, pp 107-116.

Clunies-Ross, T., Hildyard, N. (2010). *The Politics of Industrial Agriculture*. Routledge, London.

Cohen, J.E. (1995). *Population Growth and the Earth's Human Carrying Capacity*. Science, New Series, Volume 269, Issue 5222 (July 21, 1995), pp 341-346. Available at:

http://www.econ.yale.edu/~nordhaus/homepage/documents/CohenScience_carrying_cap.pdf

[Accessed April 14th, 2017]

Cohen, D.B. (2006). *Family Constellations: An Innovative Systemic Phenomenological Group Process from Germany*. The Family Journal, Vol 14, Issue 3, pp 226-233. Available at:

https://www.researchgate.net/publication/247763470_Family_Constellations_An_Innovative_Systemic_Phenomenological_Group_Process_From_Germany

[Accessed September 10th, 2021]

Conford, P. (2001). *The Origins of the Organic Movement*. Floris Books, Edinburgh

Conford, P. (2011). *The Development of the Organic Network: Linking People and Themes, 1945-95*. Floris Books, Edinburgh

Cooper, T., Hart, K. Baldock, D. (2009). *Provision of Public Goods through Agriculture in the European Union*. Institute for European Environmental Policy, 30-CE-0233091/00-28. Available at:

https://www.researchgate.net/profile/David-Baldock/publication/265407011_Provision_of_Public_Goods_through_Agriculture_in_the_European_Union/links/54bcd0cf24e50e9409c33/Provision-of-Public-Goods-through-Agriculture-in-the-European-Union.pdf

[Accessed February 23rd, 2021]

Cotgrove, S. (1982). *Catastrophe or Cornucopia: The Environment, Politics and the Future*, Wiley-Blackwell, Hoboken

Cox, T. (2014a). *Transpersonal Agroecology: The Metaphysics of Alternative Agricultural Theory*. The Journal of Transpersonal Psychology, 2014, Vol. 46, No. 1. Available at:

<https://www.atpweb.org/jtparchive/trps-46-14-01-035.pdf>

[Accessed March 28th, 2020]

Cox, T. (2014b). *Integral Agriculture: Taking seriously the mindset of the farmer, the interiority of the beings on the farm, and a metaphysics that connects them*. PhD thesis, Iowa State University, Ames, Iowa. Available at:

<https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=5098&context=etd>

[Accessed March 28th, 2020]

Craven, J. and I'poyi, O. (2009). *Indigenous Epistemology and Scientific Method*. Presented at the 16th Congress of the IUAES, Kunming, China July 26-31. Available at:

<http://sttpml.org/Indigenous-epistemology-and-scientific-method/>

[Accessed August 10th, 2020]

Crusciol, C. A. C.; Moretti, L. G.; Bossolani, J. W.; Moreira, A.; Micheri, P. H., Rossi, R. (2019). *Can Dunite Promote Physiological Changes, Magnesium Nutrition and Increased Corn Grain Yield?* Communications in Soil Science & Plant Analysis, Vol. 50 Issue 18, pp 2343-2353

Dandaro, F., Aparecida, P. Bonfim, G., Pereira, F. Yoshikawa, A.M. Alves, L. F. Matsinhe, D. Aida, M. (2019). *Ultradilutions of Natrum muriaticum in the agronomic performance of cherry tomatoes submitted to saline stress*. Revista de Ciencias Agroveterinarias. 2019, Vol. 18 Issue 4, pp 412-420

Dane, E. and Pratt, M.G. (2009). *Conceptualizing and Measuring Intuition: A Review of Recent Trends in* Hodgkinson, G.P. and Ford, J. K (Eds). *International Review of Industrial and Organizational Psychology 2009 Volume 24*. John Wiley and Son Ltd, Chichester

Dasgupta, P. (2021). *The Economics of Biodiversity: The Dasgupta Review*. HM Treasury, London. Available at:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The Economics of Biodiversity The Dasgupta Review Full Report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf)

[Accessed May 25th, 2021]

Dawkins, R. (2006). *The God Delusion*. Houghton Mifflin Company, New York.

Decolonial Futures (ND). *Four Denials and the Layers of Denial*. Available at:

<https://decolonialfuturesnet.files.wordpress.com/2020/05/four-denials-four-layers-1.pdf>

[Accessed June 21st, 2021]

Defra (2021). *Defra Statistics: Agricultural Facts - England Regional Profiles*. Department for Environmental, Food and Rural Affairs. March 2021. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972103/regionalstatistics_overview_23mar21.pdf

[Accessed September 26th, 2021]

De Jonge, F.H.; Boleij, H.; Baars, A.M.; Dudink, S., Spruijt, B.M. (2008). Music during play-time: Using context conditioning as a tool to improve welfare in piglets. *Applied Animal Behaviour Science*, Vol. 115 Issue 3/4, pp 138-148.

De Luca, P. A., and Vallejo-Marin, M. (2013). *What's the 'buzz' about? The ecology and evolutionary significance of buzz-pollination*. *Current Opinion in Plant Biology*. 16, pp 429–435. Available at:

http://plant-evolution.org/Papers%20PDF/DeLuca%20and%20Vallejo-Marin_2013_Buzz-pollination%20review.pdf

[Accessed March 11^h, 2021]

Deni, D., Caminiti, A., Lai, O., Alfieri, L., Casati, D., Sciarri, M., Scaramozzino, P., Brocherel, G. (2015). *Effect of a homeopathic complex on reproductive performance in a commercial pig farm*. *Homeopathy* (2015) 104, pp 9-14. Available at:

https://www.researchgate.net/profile/Paola_Scaramozzino/publication/267159366_Effect_of_a_homeopathic_complex_on_reproductive_performance_in_a_commercial_pig_farm/links/515864c0cf2b5d6a0e9fe0f.pdf?inViewer=0&pdfJsDownload=0&origin=publication_detail

[Accessed July 5th, 2017]

De Paula Coelho, C., Soto, F.R.M., Vuaden, E.R., Melville, P.A., Oliveira, F.C.S., Benites, N.R. (2015). *Evaluation of preventive homeopathic treatment against Colibacillosis*

in swine production. International Journal of High Dilution Research. 2009, Vol. 8 Issue 29, p183-190

De Schutter, O. (2010). *Report submitted by the Special Rapporteur on the right to food*, UN Human Rights Council Sixteenth session, Agenda item 3: Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development. Available at:

http://www.srfood.org/images/stories/pdf/officialreports/20110308_a-hrc-16-49_agroecology_en.pdf

[Accessed July 15th, 2016]

D'Evoli, L., Tarozzi, A., Hrelia, P., Lucarini, M., Cocchiola, M., Gabrielli, P., Franco, F., Morroni, F., Cantelli-Forti, G., Lombardi-Bocci, G. (2010). *Influence of Cultivation System on Bioactive Molecules Synthesis in Strawberries: Spin-off on Antioxidant and Antiproliferative Activity*. Journal of Food Science—Vol. 75, Nr. 1

Demeter (2016). *Demeter production found the world all over*. Available at:

<http://www.demeter.net/statistics>

[Accessed April 10th, 2017]

Devi, H. J., Swamy, N. V. C., and Nagendra, H. R. (2004). *Effect of Agnihotra on the germination of rice seeds*. Indian Journal of Traditional Knowledge, Vol 3(3), July 2004, pp 231-239. Available at:

[http://nopr.niscair.res.in/bitstream/123456789/9356/1/IJTK%203\(3\)%20231-239.pdf](http://nopr.niscair.res.in/bitstream/123456789/9356/1/IJTK%203(3)%20231-239.pdf)

[Accessed June 11th, 2020]

DiAngelo, R. (2018). *White Fragility - Why It's So Hard for White People to Talk About Racism*. Beacon Press, Boston

Dispenza, J. (2007). *Evolve your Brain; the Science of Changing your Mind*. Health Communication, Inc., Deerfield Beach.

Diver, S and Kuepper, G. (1997). *Radionics in Agriculture*. Kelly Research Report, Vol 10, No 2. Available at:

<http://www.kellyresearchtech.com/articles/kuepper-radionics-in-agriculture.pdf>

[Accessed May 11th, 2020]

Doehring, C. and Sundrum, A. (2016). *Efficacy of homeopathy in livestock according to peer-reviewed publications from 1981 to 2014.* Veterinary Record 179 (24), pp 1-13. Available at:

https://www.researchgate.net/publication/311588821_Efficacy_of_homeopathy_in_livestock_according_to_peer-reviewed_publications_from_1981_to_2014

[Accessed March 18th, 2021]

Donofre, A. C.; da Silva, I. J. O.; Ferreira, I. E.P. (2020). *Sound exposure and its beneficial effects on embryonic growth and hatching of broiler chicks.* British Poultry Science. Feb2020, Vol. 61 Issue 1, pp 79-85

Ducharme, L.J. (2007). *The Effects of Intentional Thought in Close Proximity or at a Distance: Demonstrating the Relation between Mind and Matter on Seed Germination.* Dissertation submitted to the Faculty of Holos University Graduate Seminary in partial fulfillment of the requirements for the degree of Doctor of Theology. Available at:

[https://www.holosuniversity.org/content/uploads/files/dissertations/DuCharme_L_PDF%20\(1\).pdf](https://www.holosuniversity.org/content/uploads/files/dissertations/DuCharme_L_PDF%20(1).pdf)

[Accessed April 15th, 2017]

Duplessis, R.S. (2019). *Transitions to Capitalism in Early Modern Europe.* 2nd edition. Cambridge University Press.

Dworkin, A. (1989). *Letters from a War Zone.* Penguin Books, London

Ebert, F., Staufenbiel, R., Simons, J., Pieper, L. (2017). *Randomized, blinded, controlled clinical trial shows no benefit of homeopathic mastitis treatment in dairy cows.* Journal of Dairy Science 100, pp 4857–4867

Eisenstein, C. (2013). *The More Beautiful World Our Hearts Know is Possible.* North Atlantic Books, Berkeley

Eisenstein, C. (2018). *Climate – A New Story.* North Atlantic Books, Berkeley

Eisler, R. (1987). *The Chalice and the Blade.* Harper Collins, San Francisco

Eitel, E. (1979; 1873). *Feng Shui: The Science of Sacred Landscape in China.* 7th edition, Synergetic Press, Bonsall

Eliade, M. (1958). *Patterns in Comparative Religion.* Sheed and Ward, London

Empson, M. (2018). *Kill All the Gentlemen: Class Struggle and Change in the English Countryside*. Bookmark Publications, London

Empty Cages Design (2017). *Liberation Permaculture Archive*. Available at:

<http://www.emptycagesdesign.org/category/radical-community-organising/liberation-permaculture-radical-community-organising/>

[Accessed April 4th, 2017]

Erickson, D.L. (2016). *Integrating body, mind and spirit: An essay reviewing the physiological, psychological, and spiritual benefits of meditation*. *Journal of Transpersonal Research* 8(2): 147–159.

Esbjörn-Hargens, S. and Zimmerman, M. (2009). *Integral Ecology: Uniting Multiple Perspectives on the Natural World*. Integral Books, Boston

Etamad, B. (2007). *Towards a Demographic Approach of the Colonial Expansion of Europe*. *Annales de démographie historique* Volume 113, Issue 1, 2007, pp 13-32

EU (1997). *Homeopathic medicinal products*. Commission report to the European Parliament and the Council on the application of Directives 92/73 and 92/74. Available at:

https://www.hri-research.org/wp-content/uploads/2014/11/Commission_Report_Dir_92-73_and_92-74_Homeo_July_1997.pdf

[Accessed July 4th, 2017]

EU (2007). *Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91*. Available at:

<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32007R0834>

[Accessed June 29th, 2017]

EU (2013). *Organic versus conventional farming, which performs better financially? An overview of organic field crop and milk production in selected Member States*. *Farm Economics Brief* No 4, November 2013. Available at:

http://ec.europa.eu/agriculture/rica/pdf/FEB4_Organic_farming_final_web.pdf

[Accessed July 13th, 2016]

EU (2018). *The EU's organic food market: facts and rules (infographic)*. Available at:

<https://www.europarl.europa.eu/news/en/headlines/society/20180404STO00909/the-eu-s-organic-food-market-facts-and-rules-infographic>

[Accessed March 9th, 2021]

Eurostat (2015). *Farm Economy Focus*. Available at:

http://ec.europa.eu/agriculture/rica/database/factsheets_en.cfm

[Accessed July 12th, 2016]

Evans, J. (1998). *The History and Practice of Ancient Astronomy*. Oxford University Press, New York

Extinction Rebellion (2021). *About Us*. Available at:

<https://extinctionrebellion.uk/the-truth/about-us/>

[Accessed December 11th, 2021]

Fairlie, S. (2009). *A Short History on Enclosure in Britain*. The Land, Issue 7, Summer 2009. Available at:

<http://www.thelandmagazine.org.uk/articles/short-history-enclosure-britain>

[Accessed January 15th, 2018]

Falagas, M.E., Kouranos, V.D., Arencibia-Jorge, R., Karageorgopoulos, D.E. (2008). *Comparison of SCImago journal rank indicator with journal impact factor*. The FASEB Journal · May 2008. Available at:

[https://www.researchgate.net/publication/5444851_Comparison_of_SCImago_journal_rank_i
ndicator_with_journal_impact_factor](https://www.researchgate.net/publication/5444851_Comparison_of_SCImago_journal_rank_indicator_with_journal_impact_factor)

[Accessed January 8th, 2022]

FAO (NDa). *Pastoralist Knowledge Hub*. Available at:

<https://www.fao.org/3/i6410e/i6410e.pdf>

[Accessed August 20th, 2022]

FAO (NDb). *Agricultural and Farm Systems – Concepts and Definitions*. Available at:

<https://www.fao.org/3/w7365e/w7365e04.htm>

[Accessed December 7th, 2021]

FAO (2009). *How to Food the World in 2050*. Food and Agriculture Organization: Rome, Italy, 2009. Available at:

http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf

[Accessed May 25th, 2017]

FAO (2016). *Key facts on food loss and waste you should know!* Food and Agriculture Organization of the United Nations. Available at:

<http://www.fao.org/save-food/resources/keyfindings/en/>

[Accessed December 1st, 2016]

Fandon, F. (1967). *The Wretched of the Earth*. Penguin Books, London

Ferguson, R.S. (2014). *Toward 21st Century Permaculture: Critical Questions and Early Answers*. Permaculture Activist, No. 93. “Science in Permaculture,” August 2014. Available at:

<http://liberationecology.org/critical-questions-early-answers/>

[Accessed June 10th, 2021]

Ferguson, R.S. and Lovell, S.T. (2014). *Permaculture for agroecology: design, movement, practice, and worldview*. A review. Agron. Sustain. Dev. (2014) 34:251–274. Available at:

<http://link.springer.com/article/10.1007/s13593-013-0181-6>

[Accessed February 13th, 2017]

Ferguson, R.S. and Lovell, S.T. (2015). *Grassroots engagement with transition to sustainability: diversity and modes of participation in the international permaculture movement*. Ecology and Society 20(4):39. Available at:

https://www.researchgate.net/publication/287204861_Grassroots_engagement_with_transition_to_sustainability_Diversity_and_modes_of_participation_in_the_international_permaculture_movement

[Accessed April 4th, 2017]

Ferrando, T., Claeys, P., Diesner, D., Vivero-Pol, J.L., Woods, D. (2021). *Commons and Commoning for a Just Agroecological Transition: The importance of de-colonising and de-commodifying our food systems* in Resourcing an Agroecological Urbanism, Routledge, 1st edition, London

FIBL (2021). *The World of Organic Agriculture – Statistics and Emerging Trends 2021*. Research Institute of Organic Agriculture (FiBL). Available at:

<https://www.fibl.org/fileadmin/documents/shop/1150-organic-world-2021.pdf>

[Accessed March 10th, 2021]

Fielding, W.J. and Riley, J. (1997). *How big should on-farm trials be and how many plots should be measured?* PLA Notes (1997), Issue 29, pp.19–22, IIED London. Available at:

<https://pubs.iied.org/sites/default/files/pdfs/migrate/G01697.pdf>

[Accessed February 26th, 2021].

Figueiredo, A., Fantatto, R.R., Agnolon, I.C., Lopes, L.G., de Oliveira, P.R., Matias, M.L.C., Alves, T.C., Júnior, W.B., de Souza Chagas, A.C. (2018). *In vivo study of a homeopathic medicine against Rhipicephalus (Boophilus) microplus in dairy cow.* Brazilian Journal of Pharmacognosy 28(2), pp. 207-213

Findhorn Community (1975). *The Findhorn Garden.* Turnstone Books/Wildwood House Ltd, London

Fischer, G., Shah, M., van Velthuizen, H., Nachtergaele, F.O. (2001). *Global Agroecological Assessment for Agriculture in the 21st Century.* International Institute for Applied Systems Analysis (IIASA) and Food and Agriculture Organisation (FAO). Available at:

<http://pure.iiasa.ac.at/6413/1/XO-01-001.pdf>

[Accessed August 17th, 2017].

Fisher, M. (2009). *Capitalist Realism: Is there no Alternative?* Zer0 Books, John Hunt Publishing, Old Alresford

Forbes, J.D. (2009). *Columbus and other Cannibals.* Seven Stories Press. New York, NY

Fließbach, A., Oberholzer, H-R., Gunst, L. and Mader, P. (2006). *Soil organic matter and biological soil quality indicators after 21 years of organic and conventional farming.* Agriculture, Ecosystems and Environment 118, pp 273–284

Fortuoso, B.F., Gebert, R.R., Griss, L.G., Glombovisky, P., Cazarotto, C.J., Rampazzo, L., Stefani, L.M. Ferreira, E.B., da Silva, A.S. (2019). *Reduction of stool bacterial counts and prevention of diarrhea using an oral homeopathic product in newborn lambs.* Microbial Pathogenesis 127, pp 347-351

Foster, K.R. and Skufca, J. (2016). *Many scientific results can't be replicated, leading to serious questions about what's true and false in the world of research.* IEE Pulse, March/April 2016. Available at:

<http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=7432073>

[Accessed March 27th, 2017]

Fox, W. (1995). *Towards a Transpersonal Ecology: Developing New Foundations for Environmentalism*. SUNYP, Albany

Franke, U. (2017). *The river never looks back: Historical and practical foundations of Bert Hellinger's family constellations*. Carl-Auer-Systeme Verlag, Heidelberg

Frankl, V. (1969). *Reductionism and Nihilism in Beyond Reductionism* by Arthur Koestler, A. and Smythies, J. R. (Editors), Hutchinson, London

Freire, P. (1968). *Pedagogy of the Oppressed*. Penguin Classics, London

Fridays for a Future (2021). *What We Do*. Available at:

<https://fridaysforfuture.org/what-we-do/>

[Accessed December 11th, 2021]

Fritz, J., Athmann, M., Meissner, G., Kauer, R., Köpke, U. (2017). *Quality characterisation via image forming methods differentiates grape juice produced from integrated, organic or biodynamic vineyards in the first year after conversion*. Biological Agriculture and Horticulture 33(3), pp 195-213

Fukuoka, M. (1978). *The One-Straw Revolution*. New York Review Books, New York.

Fukuoka, M. (1993). *The Natural Way of Farming*. Bookventure, Madras

Furtak, K. and Galazka, A. (2019). *Effect of Organic Farming on Soil Microbial Parameters*. Polish Journal of Soil Science, Vol LII/2.

Gagliano, M., Mancuso S., and Robert D. (2012). *Towards understanding plant bioacoustics*. Trends Plant Sci 17: pp 323– 325

Gagliano, M., Ryan, J.C. and Viera, P. (2017). *The Language of Plants – Science, Philosophy, Literature*. University of Minnesota Press, Minneapolis

Gagliano, M. (2018). *Thus Spoke the Plant*. North Atlantic Books, Berkeley.

Gama, E., Silva, F. Santos, I; Malheiro, R., Soares, A.; Pereira, J. Armond, C. (2015). *Homeopathic drugs to control red rot disease in sisal plants*. Agronomy for Sustainable Development. Springer Science & Business Media B.V. Apr 2015, Vol. 35 Issue 2, pp 649-656

Garcia, C., Alvarez, C.E., Carracedo, A., Iglesias, E. (1989). *Soil fertility and mineral nutrition of a biodynamic avocado plantation in Tenerife*. Biological Agriculture and Horticulture 6(1), pp. 1-10.

Gardner, G. (2012). *Dowsing Magic*. Penwith Press, Cornwall.

Gebser, J. (1984). *The Ever-Present Origin*. Ohio University Press, Athens

Gibstone, C. and Bang, M. (2015). *Permaculture: A Spiritual Approach*. Findhorn Press, Forres.

Gimbutas, M. (1997). *The Kurgan Culture and the Indo-Europeanization of Europe:*

Selected Articles From 1952 to 1993. Journal of Indo-European Studies

Monograph Series No. 18) M.R. Dexter & K. Jones-Bley, (Eds), Institute for the

Study of Man, 1997

Available at:

<https://b-ok.cc/book/3429728/b2b8aa>

[Accessed March 24th, 2020]

Gliessman,, S.R. (2015). *Agroecology: The Ecology of Sustainable Food Systems*. 3rd edition. CRC Press, Boca Raton.

Goetheanum (2018). *Evolving Agriculture and Food - Opening up Biodynamic Research, Conference Contributions*. Wahl, V., Hach, A., Sommer,S., Derkzen P., Brock, C., Fritz, J. Spengler-Neff, A., Hurter,U., JFlorin, J-M. (Eds). September 5th to 8th 2018 / Dornach, Switzerland. Available at:

https://www.sektion-landwirtschaft.org/fileadmin/SLW/Arbeitsfelder/forschung/Bd_research_2018_conference_contributions.pdf

[Accessed March 10th, 2021]

Goetheanum (2020). André Leu - *Lecture: "Rudolf Steiner – 100 years ahead of the science of his time*. Videos Agriculture Conference 2020. Available at:

<https://www.sektion-landwirtschaft.org/en/lwt/2020/einzelansicht/videos-agriculture-conference-2020>

[Accessed March 10th, 2021]

Goldstein, W. (2000). *Experimental Proof for the Effects of Biodynamic Preparations*. Biodynamics, September/October 2000. Available at:

https://www.biodynamics.com/sites/default/files/scan/Goldstein%2C%20W. 2000 Experimental%20Proof%20for%20the%20Effects%20of%20Biodynamic%20Preparations_Biodynamics_231.pdf

[Accessed March 16th, 2021]

Gómez, L.F., Ríos-Osori, L., Eschenhagen, M.L. (2012). *Agroecology Publications and the Coloniality of Knowledge*. Agronomy for Sustainable Development. Official journal of the Institut National de la Recherche Agronomique (INRA), April 2012. Available at:

https://www.researchgate.net/publication/257805453_Agroecology_publications_and_coloniality_of_knowledge?ev=srch_pub

[Accessed April 2nd, 2017]

GRAIN (2014). *Report: Hungry for Land*. May 2014. Available at:

<https://www.grain.org/article/entries/4929-hungry-for-land-small-farmers-feed-the-world-with-less-than-a-quarter-of-all-farmland>

[Accessed January 12th, 2018]

Grey, S. and Patel, R. (2015). *Food sovereignty as decolonization: some contributions from Indigenous movements to food system and development politics*. Agriculture and Human Values, Vol 32, pp 431–444

Griffin, S. (1978). *Woman and Nature*. The Women's Press Ltd, London

Grigg, D. (1987). *Chapter 4: The Industrial Revolution and Land Transformation in Land Transformation in Agriculture* by Wolman, M.G. and Fournier, F.G.A., John Wiley and Sons Ltd

Griswold, E. (2012). *How 'Silent Spring' Ignited the Environmental Movement*. New York Times, September 21, 2012. Available at:

<https://www.nytimes.com/2012/09/23/magazine/how-silent-spring-ignited-the-environmental-movement.html>

[Accessed April 24th, 2020]

Gvaryahu, G., Cunningham D.L. and Van Tienhoven, A. (1989). *Filial imprinting, environmental enrichment, and music application effects on behavior and performance of meat strain chicks*. Poultry Science 68: pp 211-217

Haberman, D.L. (2006). *River of Love in an Age of Pollution*. University of California Press. Berkeley.

Hahnemann, S. (2016; 1842). *Organon of Medicine*. 6th edition, Jain Publishers, New Delhi

Hall, M. (2011). *Plants as Persons - A Philosophical Botany*. SUNY Press, Albany

Hardoon, D., Ayele, S., Fuentes-Nieva, R. (2016). *An Economy for the 1%*. 210 Oxfam Briefing Paper – Summary, Available at:

https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp210-economy-one-percent-tax-havens-180116-summ-en_0.pdf

[Accessed April 14th 2017]

Harland, M. (2017). *Editorial*. Permaculture Magazine. No. 91, Spring 2017.

Harland, M. (2019). *Pollinating Protest: Being Active, Being Activist*. Permaculture Magazine. Available at:

<https://www.permaculture.co.uk/articles/pollinating-protest-being-active-being-activist>

[Accessed April 20th 2020]

Harley, A.D., Gilkes, R.J. (2000). *Factors influencing the release of plant nutrient elements from silicate rock powders: a geochemical overview*. Nutrient Cycling in Agroecosystems Vol 56, pp 11–36. Available at:

https://www.researchgate.net/publication/227101054_Factors_influencing_the_release_of_plant_nutrient_elements_from_silicate_rock_powders_A_geochemical_overview

[Accessed March 23rd 2021]

Hassanien, R.H.E., H. Tian-Zhen, Yu-Feng, L., Bao-Ming, L. (2014). *Advances in Effects of Sound Waves on Plants*. Journal of Integrative Agriculture 2014, 13(2), pp 335-348. Available at:

http://scholar.cu.edu.eg/sites/default/files/redagreen/files/advances_in_effects_of_sound_waves_on_plants.pdf

[Accessed April 23rd 2020]

Haverkort, B. and Reijntjes, C. (2006). *Moving Worldviews: Reshaping sciences, policies and practices for endogenous sustainable development*. Compas, Leusden

Haverkort, B. (2021). *From the Mainstreaming of Western Science to the Co-Evolution of Different Sciences – Addressing Cognitive Injustice* in Wright, J. (Ed) *Subtle Agroecologies: Farming With the Hidden Half of Nature*. CRC Press, London

Hawken, P. (1976). *The Magic of Findhorn*. The Quality and Scientific Book Clubs, joint edition, London.

Hawken, P. (2007). *Blessed Unrest*. Penguin Books, London

Hecht, S.B (1995). *The Evolution of Agroecological Thought* in Altieri, M., *Agroecology*, 2nd edition, Intermediate Technology Publications, London

Heinze, S., Raupp, J., Joergensen, R.G. (2010). *Effects of fertilizer and spatial heterogeneity in soil pH on microbial biomass indices in a long-term field trial of organic agriculture*. Plant and Soil 328(1), pp. 203-215

Heisenberg, W. (1958). *The Physicists's Conception of Nature*. Hutchinson Scientific and Technical, London

Heisenberg, W., Born, M., Schrödinger. E., Auger, P. (1962). *On Modern Physics*. Collier Books, New York

Hennink, M., Hutter, I., Bailey, A. (2011). *Qualitative Research Methods*. Sage Publications Ltd, London

Hensel, J. (1894). *Bread from Stones: A New and Rational System of Land Fertilisation and Physical Regeneration*. Available at:

https://www.academia.edu/6782223/BREAD_FROM_STONES_A_New_and_Rational_System_of_Land_Fertilization_and_Physical_Regeneration

[Accessed May 9th 2020]

Hickel. J., Sullivan, D., Zoomkawala, H. (2021). *Plunder in the Post-Colonial Era: Quantifying Drain from the Global South Through Unequal Exchange, 1960–2018*. New Political Economy, 2021, Vol. 26, No. 6, pp 1030–1047. Available at:

<https://www.tandfonline.com/doi/pdf/10.1080/13563467.2021.1899153?needAccess=true>

[Accessed September 1st 2022]

Hickel, J. (2020). *Less is More – How Degrowth will Save the World*. William Heinemann, London.

Hickel, J. (2017). *The Divide*. William Heinemann, London

- Hoerder, D. (2002).** *Cultures in Contact*. Duke University Press Books, Durham.
- Holdrege, C. (2005).** *Doing Goethean Science*. Janus Head, 8(1), 27-52. Trivium Publications, Amherst. Available at:
<http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=0917DB917A7E20B5247E4A9C800DA00E?doi=10.1.1.694.4497&rep=rep1&type=pdf>
 [Accessed February 13th, 2017]
- Holmgren, D. (2011).** *Permaculture – Principles and Pathways beyond Sustainability*. Permanent Publications, East Meon.
- Holmgren, D. (2013).** *Essence of Permaculture*. Available at:
https://holmgren.com.au/downloads/Essence_of_Pc_EN.pdf
 [Accessed April 3rd, 2017]
- Hopkins, R. (2019).** *From What Is to What If*. Chelsea Green Publishing, London
- Howard, A. (1931).** *The Waste Products of Agriculture Their Utilisation as Humus*. Oxford University Press, London.
- Howard, A. (1943).** *An Agricultural Testament*. Oxford University Press, London
- Howard, A. (1947).** *The Soil and Health: Farming and Gardening for Health or Disease*. Faber and Faber, London
- Hull, G.S. (1898).** *Electrohorticulture*. The Knickerbocker Press, New York
- Huntington, S. (1996).** *The Clash of Civilizations and the Remaking of World Order*. Simon and Schuster, New York
- Hyams, E. (1952).** *Soil and Civilization*, 1st edition, Thames and Hudson, London
- IAASTD (2009a).** *Agriculture at a Crossroads*. International Assessment of Agricultural Knowledge, Science and Technology for Development. Available at:
[http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Global%20Report%20\(English\).pdf](http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Global%20Report%20(English).pdf)
 [Accessed November 29th, 2016]
- IAASTD (2009b).** *Agriculture at a Crossroads. International Assessment of Agricultural Knowledge, Science and Technology for Development. Summary for Decision Makers of the Global Report*. Available at:

[http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Global%20Summary%20for%20Decision%20Makers%20\(English\).pdf](http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Global%20Summary%20for%20Decision%20Makers%20(English).pdf)

[Accessed November 29th, 2016]

IARC (2015). *IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides*. Internal Agency for Research on Cancer (IARC). World Health Organization. Available at:

<http://www.iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf>

[Accessed March 22nd, 2017]

Icaza, R. and Vázquez, R. (2018). *Diversity or Decolonisation? Researching Diversity at the University of Amsterdam in Decolonising the University* Bhambra, G.K, Gebrial D., Nişancioğlu, K. (Eds). Pluto Press, London

IFAD (2013). *Smallholders, Food Security and the Environment*. International Fund for Agricultural Development (IFAD). Available at:

<http://www.ifad.org/documents/10180/666cac24-14b6-43c2-876d-9c2d1f01d5dd>

[Accessed August 17th, 2017]

IFOAM (2016). *Principles of Organic Agriculture*. Available at:

<http://www.ifoam.bio/en/organic-landmarks/principles-organic-agriculture>

[Accessed November 29th, 2016]

Ignatiev, N. (1995). *How the Irish became White*. Routledge, London

Integral Permaculture (2017). *Welcome to the Integral Permaculture Designers' Manual*. Available at:

<http://en.permaculturescience.org/>

[Accessed April 4th, 2017]

Ioannidis, J.P.A. (2005). *Why most published research findings are false*. PLoS Med. 2005 Aug; 2(8): e124, Aug. 2005. Available at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1182327/>

[Accessed March 28th, 2017]

IPCC (2019a). *Global Warming of 1.5 °C. The Intergovernmental Panel on Climate Change*. Available at:

<https://www.ipcc.ch/sr15/>

[Accessed November 2nd, 2021]

IPCC (2019b). *Land degradation in Climate Change and Land: an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, (Eds) Shukla, P. R. Skea, J., Buendia, E.C., Masson-Delmotte, V. , Pörtner, H.-O. , Roberts, D. , Zhai, P., Slade, R., Connors, S., van Diemen, R. , Ferrat, M. , Haughey, E. , Luz, S. , Neogi, S. , Pathak, M. , J. Petzold, J., Pereira, J.P., Vyas, P., Huntley, E., Kissick, K., Belkacemi, M. and Malley, J. 345–436. Available at:

<https://www.ipcc.ch/site/assets/uploads/sites/4/2021/02/210202-IPCCJ7230-SRCCL-Complete-BOOK-HRES.pdf>

[Accessed March 9th, 2021]

IPCC (2021). *Climate Change 2021 – The Physical Science Basis – Summary for Policy Makers*. Available at:

https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

[Accessed September 15th, 2021]

ISKCON (2017). *Srila Prabhupada's visionary propagation of India's spiritual culture: The Power of One Spiritual Indian*. The Spiritual Scientist. Available at:

<https://www.thespiritualscientist.com/2012/04/srila-prabhupadas-visionary-propagation-of-indias-spiritual-culture-the-power-of-one-spiritual-indian/>

[Accessed August 20th, 2022]

Jackson, W. (1980). *New Roots for Agriculture*. New Edition. University of Nebraska Press, Lincoln.

Jackson, W. (1994). *Becoming Native to this Place*. Counterpoint, Berkeley.

Jagani, A. (2021). *Can Yogic Farming Help Boost Crop Yield?* Modern Farmer. Available at:

<https://modernfarmer.com/2021/10/yogic-farming/>

[Accessed October 20th, 2021]

Jakopic, J., Slatnar, A., Mikulic-Petkovsek, M., Veberic, R., Stampar, F., Bavec, F., Bavec, M. (2013). *Effect of different production systems on chemical profiles of dwarf*

French bean (Phaseolus vulgaris L. cv. Top Crop) pods. Journal of Agricultural and Food Chemistry 61(10), pp. 2392-2399

Jariénė, E., Vaitkevičienė, N., Danilčenko, H., Tajner-Czopek, A., Rytel, A., Kucharska, A., Sokół-Łętowska, A., Gertchen, M., Jeznach, M. (2017). *Effect of biodynamic preparations on the phenolic antioxidants in potatoes with coloured-flesh*. Biological Agriculture and Horticulture 33(3), pp. 172-182.

Jensen, J.B. (2016). *An Investigation into the Suitability of Paulownia as an Agroforestry Species for UK & North West European Farming Systems*. Submitted to the Department of Agriculture & Business Management, SRUC, in partial fulfilment of the requirements for the degree of Master of Science. Available at:

https://www.researchgate.net/profile/Janus-Bojesen-Jensen/publication/311558333_An_investigation_into_the_suitability_of_Paulownia_as_an_agroforestry_species_for_UK_NW_European_farming_systems/links/584c465008aed95c24fc55d6/An-investigation-into-the-suitability-of-Paulownia-as-an-agroforestry-species-for-UK-NW-European-farming-systems.pdf

[Accessed July 12th, 2022].

Jensen, J.B. (2018). *Sustainable Yogic Agriculture and Reflections on its Relation to Biodynamic Agriculture* in in Wahl, V., Hach, A., Sommer, S., Derkzen, P., Brock, C., Fritz, J., Spengler-Neff, A., Huerter, U., Florin, J-M. (Eds) *Evolving Agriculture and Food – Opening up Biodynamic Research*. Available at:

https://www.sektion-landwirtschaft.org/fileadmin/SLW/Arbeitsfelder/forschung/Bd_research_2018_conference_contributions.pdf

[Accessed January 18th, 2022].

Jensen, J.B. (2021). *An Investigation of Sustainable Yogic Farming as a Mind-Matter Farming Approach* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Kaviraj, V.D. (2006). *Homeopathy for Farm and Garden*. Mark Moodie Publications, Newnham-on-Severn

Kebio EU (2016). *Spirituality and organic farming*. Available at: <https://www.kebio.eu/en/news/yoga-and-agriculture.html>

[Accessed August 10th, 2020].

Kelland, M.E., Wade, P.W., Lewis, A.L., Taylor, L.L., Sarkar, B., Andrews, M.G., Lomas, M.R., Cotton, T.E.A., Kemp, S.J., James, R.H., Pearce, C.R., Hartley, S.E., Hodson, M.E., Leake, J.R., Banwart, S.A., Beerling, D.J. (2020). *Increased yield and CO₂ sequestration potential with the C₄ cereal Sorghum bicolor cultivated in basaltic rock dust-amended agricultural soil.* Global Change Biology, Volume 26, Issue 6, pp 3658-3676

Keller, E.F. (1983) *A Feeling for the Organism: The Life and Work of Barbara McClintock.* Freeman and Co., New York

Khanna, K.K. and Chandra, S. (1976). Control of tomato fruit rot caused by Fusarium Roseum with homoeopathic drugs. Indian Phytopathology 29, pp 269-272

Khanna, K.K. and Chandra, S. (1978). A homoeopathic drug controls mango fruit rot caused by Pestalotia mangiferae Henn. Experientia 34, pp 1167-1168.

Khatri, N., Ng, H.A. (2000). *The role of intuition in strategic decision making.* Human Relations, Volume 53(1) pp 57–86, SAGE Publications, London. Available at:

<https://pdfs.semanticscholar.org/767e/884fd64a50e74a91baf5447d1837dc254ae7.pdf>

[Accessed May 6th, 2020]

Kieft, H. (2017). *About Quantum Inspired Agriculture.* Available at:

<https://gaiacampus.com/about/>

[Accessed September 25th, 2022]

Kieft, H. (2006). *Quantum agriculture: bridging frontline physics and intuitive knowledge of nature?* in Haverkort, E. and Reijntjes, C. (Eds). *Moving Worldviews: Reshaping sciences, policies and practices for endogenous sustainable development.*

Kieft, H. (ND). *Gaia Campus.* Available at:

<https://gaiacampus.com/page/2/>

[Accessed September 6th, 2021]

Kim, J.Y., Kang, Y.E., Lee, S.I., Muthusamy, M., Jeong, M.-J. (2020). *Sound waves affect the total flavonoid contents in Medicago sativa, Brassica oleracea and Raphanus sativus sprouts.* Journal of the Science of Food and Agriculture 100(1), pp. 431-440

Kirchmann, H. (1994). *Biological dynamic farming: an occult form of alternative agriculture?* Journal of Agricultural and Environmental Ethics 7 (2), pp 173-187

Kirkhorn, S., Schenker, M.B. (2001). *Human Health Effects of Agriculture: Physical Diseases and Illnesses*. Available at:

http://nasdonline.org/static_content/documents/1827/d001772.pdf

[Accessed March 22nd, 2017]

Kiss the Ground (2020). Available at:

<https://kisstheground.com/>

[Accessed March 9th, 2021]

Kitsteiner, J. (2013). *The Third Ethic... it's time to identify the mutation*. Temperate Climate Permaculture. Available at:

<http://tcpermaculture.com/site/2013/05/15/the-third-ethic-its-time-to-identify-the-mutation/>

Klocek, D. (2013). *Sacred Agriculture: The Alchemy of Biodynamics*. Lindisfarne Books, Great Barrington

Klocke, P., Ivmeyer, S., Butler, G., Maeschli, A., Heil, F. (2010). *A randomized controlled trial to compare the use of homeopathy and internal Teat Sealers for the prevention of mastitis in organically farmed dairy cows during the dry period and 100 days post-calving*. Homeopathy 99(2), pp. 90-98

Koepf, H., Pettersson, B., & Schaumann, W. (1976). *Bio-dynamic Agriculture: Practical Applications of the Bio-dynamic Method*. Anthroposophic Press, Hudson.

Kolisko, E. and Kolisko, L. (1939). *Agriculture of Tomorrow*. Kolisko Archive, Stroud. Available at:

<http://soilandhealth.org/copyrighted-book/agriculture-of-tomorrow-2/>

[Accessed April 10th, 2017]

Kothari, A., Salleh, A., Escobar, A., Demaria, F., Acosta, A. (2019). *Pluriverse: A Post-Development Dictionary*. Tulika Books, New Delhi.

Kratz, S., Schnug, E. (2007). *Homa Farming - A vedic fire for agriculture: Influence of Agnihotra ash on water solubility of soil P*. Landbauforschung Volkenrode 57(3), pp 207-211

Krauss, M., Berner, A., Perrochet, F, Frei, R., Niggli, U., Mäder, P. (2020). *Enhanced soil quality with reduced tillage and solid manures in organic farming – a synthesis of 15 years*. Scientific Reports 10(1),4403

Krebs, J. and Bach, S. (2018). *Permaculture—Scientific Evidence of Principles for the Agroecological Design of Farming Systems*. Sustainability 2018, 10, 3218. Available at:

https://res.mdpi.com/d_attachment/sustainability/sustainability-10-03218/article_deploy/sustainability-10-03218.pdf

[Accessed March 9th, 2021]

Kuepper, G. (2021). *Psychotronics and a Biodynamic Garden*. Floris Books, Edinburgh.

Kuepper, G. (2003). *Foliar Fertilization*. Appropriate Technology Transfer for Rural Areas (ATTRA). Available at:

<https://attra.ncat.org/attra-pub/download.php?id=286>

[Accessed May 11th, 2020]

Kumar, R. Kumar, A., Chakraborty, S.; Basarkar, P. W. (2017). *Effect of Homa organic farming on growth, yield and quality parameters of Okra*. Journal of Applied & Natural Science. Dec2017, Vol. 9 Issue 4, pp 2205-2210

Kumar, A., Meena, S., Kumar, S. (2021). *An analysis of women's participation in the agrarian India*. International Journal of Applied Research 2021; 7(6): 225-231. Available at:

<https://www.allresearchjournal.com/archives/2021/vol7issue6/PartD/7-6-46-388.pdf>

[Accessed August 30th, 2022]

Kunnas, J. (2017). *Storytelling: From the early Anthropocene to the good or the bad Anthropocene*. Sage Publications, 2017. Vol. 4, No 2, pp 136-150

Kutchera, U. (2016). *Ernst Haeckel's biodynamics 1866 and the occult basis of organic farming*. Plant Signalling and Behavior. 2016, Vol. 11, No. 7, e1199315 (3 pages). Available at:

https://www.researchgate.net/publication/304187892_Ernst_Haeckel%27s_biodynamics_1866_and_the_occult_basis_of_organic_farming

[Accessed April 10th, 2017]

Lampkin, N. (1990). *Organic Farming*. 2nd edition, Farming Press Books, Ipswich

Lampkin, N. (2011). *Organic farming myths and reality*. World Agriculture, 1, pp 36-45. Available at:

<http://www.world-agriculture.net/article/organic-farming-myths-and-reality>

[Accessed March 9th, 2021]

La Via Campesina (2018). *Member Organisations of La Via Campesina (Updated 2018)*. Available at:

<https://viacampesina.org/en/member-organisations-of-la-via-campesina-updated-2018/>

[Accessed June 10th, 2021]

La Via Campesina (2021). *The International Peasants' Voice*. Available at:

Lawton, G. (ND). *What do I have to do to Teach a PDC Permaculture Design Course*. Available at:

https://www.youtube.com/watch?v=7r5hYa_rEp0&list=PLdBcHwkiOT4pi9L_XkJRAN1SZYrAOKt0

[Accessed April 3rd, 2017]

Leeming, D.A. (2010). *Creation Myths of the World: An Encyclopedia*. 2nd edition, ABC Clio, Santa Barbara. Available at:

https://maghon.weebly.com/uploads/2/0/0/3/20035969/small_creation-myths-of-the-world.pdf

[Accessed April 24th, 2018]

Lehoux, D. R. (2000). *Paraepigmata, Astrology, Weather, and Calendars in the Ancient World being an examination of the interplay between the Heaven and the Earth in the Classical and Near-Eastern Cultures of Antiquity, with particular reference to the Regulation of Agricultural Practice, and the Signs and Causes of Storms, Tempests, &c.* A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy Institute for the History and Philosophy of Science and Technology University of Toronto. Available at:

<https://tspace.library.utoronto.ca/handle/1807/15178>

[Accessed May 5th, 2020]

Le Net, A. (2017). *IPC India 2017 - Themes, Talks & Workshops*, Permaculture Magazine. PM93. Available at:

<https://www.permaculture.co.uk/articles/ipc-india-2017-themes-talks-workshops>

[Accessed January 11th, 2018]

Leopold, A. (1949). *A Sand County Almanac*. Oxford University Press, Oxford.

- Levchenko, I., Xu, S., Mazouffre, S., Keidar, M., Bazaka, K. (2021).** *Mars Colonization: Beyond Getting There* in Mars Beech, M., Seckbach, J. and Gordon R. (Eds). *Terraforming* Scrivener Publishing, Beverly
- Li, J. N. Zhao, P. Zhao, X. Zhang, Y. J. Bi, J. H. Li, H. G. Liu, C. Wang, J. Bao (2019).** *Behavioural responses of piglets to different types of music.* *Animal* 13(10), pp. 2319-2326
- Li, J.-G., Dong, Y.-H. (2013).** *Effect of a rock dust amendment on disease severity of tomato bacterial wilt.* *International Journal of General and Molecular Microbiology* 103(1):11-22
- Liang. Y., Wang, K., Janssen B., Casteel C., Nonnenmann, M. and Rohlman, D.S. (2021).** *Examination of Symptoms of Depression among Cooperative Dairy Farmers.*
- Liberati, A., Altman, D.G., Tetzlaff, J., Mulrow C., Gøtzsche, P.C., Ioannidis J.P.A, Clarke, M., Devereaux, P.J., Kleijnen, J., Moher, D. (2009).** *The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration.* *Journal of Clinical Epidemiology* 62 (2009) pp 1-34.
- Liebig, J. (1989; 1873).** *Es ist ja die Spitze meines Lebens. Naturgesetze im Landbau.* *International Journal of Environmental Research and Public Health.* April 2021; 18(7) 3657
- Lipton, B. (2005).** *The Biology of Belief.* Hay House Inc, Carlsbad
- Logsdon, G. (1994).** *At Nature's Pace.* Pantheon Books, New York.
- Lopes, O.M.M., Carrilho, E.N.V.M., Lopes-Assad, M.L.R.C. (2014).** *Effect of rock powder and vinasse on two types of soils.* *Revista Brasileira de Ciência do Solo* 38(5), pp 1547-1557
- Lovel, H. (2014).** *Quantum Agriculture: Biodynamics and Beyond: Growing Plentiful, Vital Food.* Rudolf Steiner Press.
- Lovel, H. (2018).** *Personal Communication,* March 23rd 2018.
- Lowder, S.K., Skoet, J. and Singh, S. (2014).** *What do we really know about the number and distribution of farms and family farms worldwide?* Background paper for The State of Food and Agriculture 2014. ESA Working Paper No. 14-02. Rome, FAO. Available at: <https://www.fao.org/3/i3729e/i3729e.pdf>
- [Accessed September 3rd, 2022]

Ludwig, D. and Poliseli, L. (2018). *Relating traditional and academic ecological knowledge: mechanistic and holistic epistemologies across cultures.* Biology & Philosophy 33:43

Macauley, T.B. (1835). *Minutes on Education.* Minute by the Honourable T. B. Macaulay, dated the 2nd February 1835. Available at:

<http://home.iitk.ac.in/~hcverma/Article/Macaulay-Minutes.pdf>

[Accessed June 15th, 2020]

MacLeod, D. (2009). *Rob Hopkins, Permaculture and Transition.* Available at:

<http://transitionwhatcom.ning.com/profiles/blogs/rob-hopkins-permaculture-and>

[Accessed April 2nd, 2017]

MacKenzie, I. (2020). *Dear White Men – From an Indigenous Woman (Pulxaneeks (Haisla Nation)).* [Podcast] The Mythic Masculine. Available at:

<https://www.themythicmasculine.com/episodes/pulxaneeks>

[Accessed March 10th, 2021]

Macy, J. and Brown, M. (2014). *Coming Back to Life.* New Society Publishers, Gabriola Island

MacManaway, P. (2018). *The Most Important Conversation in Agriculture – Dialogue with the Spirit of Place.* Lecture held at Centre for Agroecology, Water and Resilience on October 24th 2018. Available at:

<https://www.coventry.ac.uk/research/research-directories/current-projects/2018/quantum-thinking-for-agroecology/>

[Accessed November 26th 2021]

Magdoff, F. and Van Es, H. (2009). *Building Soils for Better Crops*, 3rd edition, SARE Outreach Publications, Waldorf

Manrique, A. (2020). *Kiss the Ground- the white people will save us.* Available at:

<https://medium.com/@anthonymanrique6/kiss-the-ground-the-white-people-will-save-us-f1b07b9e8070>

[Accessed March 9th 2021]

Marshall, P. (1992). *Nature's Web: Rethinking Our Place on Earth.* Cassell, London

Martini, A., Polidori, R., Lorenzini, G., Lotti, C., Whittaker, A. (2012). *Efficiency and costs of homeopathy and phytotherapy in an organic dairy farm.* New Medit 11(4 SPECIAL), pp. 42-45

Masson, P. (2014). *A Biodynamic Manual.* 2nd edition, Floris Books, Edinburgh

Massy, C. (2021). *Rediscovering Ancient Pathways for Regenerative Agriculture* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Mathie, R.T. and Clausen, J. (2015). *Veterinary homeopathy: Systematic review of medical conditions studied by randomised trials controlled by other than placebo.* BMC Veterinary Research Vol, 11, 236

Mayer, J., Gunst, L., Mäder, P., Samson, M-F., Carcea, M., Narducci, V., Thomsen, I.K., Dubois, D. (2013). *Productivity, quality and sustainability of winter wheat under long-term conventional and organic management in Switzerland.* European Journal of Agronomy 65, pp. 27-39

McGilchrist, I. (2009). *The Master and His Emissary.* Yale University Press, New Haven

Means, R. (2011). *Revolution and American Indians: Marxism is as Alien to My Culture as Capitalism.* Available at:

<https://www.filmsforaction.org/news/revolution-and-american-indians-marxism-is-as-alien-to-my-culture-as-capitalism/>

[Accessed December 11th 2021]

Merchant, C. (1980). *The Death of Nature.* Harper and Row, San Fransisco

Merfield, C. N. (2019). *An analysis and overview of regenerative agriculture (Report No. 2-2019).* Lincoln, New Zealand: The BHU Future Farming Centre. Available at: <https://www.bhu.org.nz/future-farmingcentre/ffc/information/misc/an-analysis-and-overview-of-regenerative-agriculture-2019-ffc-merfield.pdf>

[Accessed March 5th 2021]

Met Office (2018). *Summer 2018.* Available at:

<https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2018/summer-2018---met-office.pdf>

[Accessed February 26th 2021]

McGinnis, M.V. (1999). *Bioregionalism.* Routledge, London

Mignolo, W.D. (2007). *Delinking: The Rhetoric of Modernity, the Logic of Coloniality and the grammar of de-coloniality*. Cultural Studies, 21 (2): 449-514.

Mignolo, W.D. and Walsh, C.E. (2018). *On Decoloniality*. Duke University Press, Durham.

Mildažienė, V., Paužaitė, G. Naučienė, Z., Žūkienė, R. Malakauskienė, A. Norkevičienė, E., Šlepetienė, A., Stukonis, V., Olšauskaitė, V., Padarauskas, A., Filatova, I.,

Modolon, T.A., Boff, P., Boff, M.I.C., Miquelluti, D.J. (2012). *Homeopathic and high dilution preparations for pest management to tomato crop under organic production system*. Horticultura Brasileira 30(1), pp. 51-57

Modolon, T.A., Boff, P., Boff, M.I.C., Miquelluti, D.J. (2015). *Mycelium growth of early tomato blight pathogen, Alternaria solani, subjected to high dilution preparations*. Mycelium growth of early tomato blight pathogen, Alternaria solani, subjected to high dilution preparations. Biological Agriculture and Horticulture 31(1), pp. 28-34

Moerman, E. (2021). *Electromagnetic Parameters Related to Plants and their Biomes* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Moher, D, Liberati, A., Tetzlaff J., Altman D.G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. The PRISMA Group. PLoS Med 6(7). Available at:

<http://www.prisma-statement.org/documents/PRISMA%202009%20flow%20diagram.pdf>

[Accessed June 12th, 2020]

Mollison, B. and Holmgren, D. (1978). *Permaculture One: A Perennial Agriculture for Human Settlements*. Tagari Publications

Mollison, B. (1988). *Permaculture: A Designer's Manual*. Tagari Publications, Sister's Creek.

Mollison, B. (1991). *Introduction to Permaculture*. Tagari Publications, Sister's Creek.

Moore, A. (2009). *Sensitive Permaculture*. Python Press, Castlemaine

Monbiot, G. (2014). *Feral: Rewilding the Land, the Sea and Human Life*. The University of Chicago Press. Chicago

Montgomery, D. (2007). *Dirt: The Erosion of Civilizations*, 1st edition, University of California Press, Berkeley

Moyles, T. (2015). *Permaculture or Spermaculture? Confronting patriarchy in permaculture and alternative food movements.* Briarpatch Magazine May/June 2015 issue Available at:

<https://briarpatchmagazine.com/articles/view/permaculture-or-spermaculture>

[Accessed April 4th, 2017]

Murata, T., Goh, K.M (1997). *Effects of cropping systems on soil organic matter in a pair of conventional and biodynamic mixed cropping farms in Canterbury, New Zealand.* Biology and Fertility of Soils 25(4), pp 372-381

Murphy, M.P.A. (2021). *Quantum Social Theory for Critical International Relations Theorists.* Palgrave Macmillan, London

Nelson, M.K. (2008). *Original Instructions – Indigenous Teachings for a Sustainable Future.* Bear & Company, Rochester

Newton, P., Civita N, Frankel-Goldwater L, Bartel K and Johns C (2020). *What Is Regenerative Agriculture? A Review of Scholar and Practitioner Definitions Based on Processes and Outcomes.* Frontiers in Sustainable Food Systems. October 2020, Volume 4, Article 577723. Available at:

<https://www.frontiersin.org/articles/10.3389/fsufs.2020.577723/full>

[Accessed March 9th, 2021]

Ngugi, W.T. (1986). *Decolonising the Mind.* Available at:

https://archive.org/stream/DecolonisingTheMind/Decolonising_the_Mind_djvu.txt

[Accessed March 25th, 2020]

NIAB (2018). *Wheat yields 2018.* Available at:

<https://www.niab.com/news-views/blogs/wheat-yields-2018>

[Accessed October 20th, 2022]

NIAB (2020). *United Kingdom National List Technical Protocol for Official Examination of Distinctness, Uniformity and Stability (DUS) Wheat Triticum aestivum L.* May 2020. National Institute Of Agricultural Botany. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888280/dus-protocol-wheat.pdf

[Accessed July 7th, 2020]

Norgaard, R.B. and Sikor, T.O. (1995). *The Methodology and Practice of Agroecology* in Altieri, M., *Agroecology*, 2nd edition, Intermediate Technology Publications, , London

Nuthall, P.L. (2012). *The intuitive world of farmers – the case of grazing management systems and experts.* *Agricultural Systems*, Volume 107, March 2012, pp 65-73. Available at:

<https://www.sciencedirect.com/science/article/abs/pii/S0308521X11001776>

[Accessed May 6th, 2020]

Nuthall, P.L. and Old, K.M. (2018). *Intuition, the farmers' primary decision process. A review and analysis.* *Journal of Rural Studies*, 58, pp 28-38. Available at:

https://www.researchgate.net/publication/322865391_Intuition_the_farmers'_primary_decision_process_A_review_and_analysis

[Accessed May 6th, 2020]

OECD (2015). *Agriculture and Climate Change.* Organization for Economic Cooperation and Development. OECD Publishing. Available at:

<http://www.oecd.org/tad/sustainable-agriculture/agriculture-climate-change-september-2015.pdf>

[Accessed March 27th, 2017]

Olaniyi, Y.K. and Ogunlela, A. O. (2017). *Effects of magnetized water on the vegetative growth and yield of tomato.* *Agricultural Engineering International: CIGR Journal*, Vol. 19 Issue 1, pp 1-8

Olson-Ramanujan, K. (2014). *A “Pattern Language” for Women in Permaculture.* *Permaculture News*. Available at:

<https://www.permaculturenews.org/2014/02/18/pattern-language-women-permaculture/>

[Accessed April 20th, 2020]

ORFC (2021). *Full Programme.* Available at:

[Programme - Oxford Real Farming Conference \(orfc.org.uk\)](https://orfc.org.uk/)

[Accessed February 16th, 2021]

Osterhammel, J. (2005) *Colonialism: A Theoretical Overview*, Princeton, 4, 15; Arneil

Palacios, C. and Abecia, J.A. (2014). *Does lunar cycle affect lamb production after artificial insemination in sheep?* *Biological Rhythm Research* 45(6), pp 869-873

Polonyi, J. (2021). *Macroscopic Limit of Quantum Systems*. Universe 2021, 7, 315.
Available at:

https://www.researchgate.net/publication/354279613_Macroscopic_Limit_of_Quantum_Systems

[Accessed December 18th, 2021]

Popescu, S. (2014). *Nonlocality beyond quantum mechanics*. *Nature Physics* 10, pp 264–270.
Available at:

<https://www.nature.com/articles/nphys2916>

[Accessed July 1st, 2020]

Pandey, S.T., Verma, O., Kewalanand, Pandey, D.S., Gill, S., Patel, J.C., Patel, G.N., Patel, D.M., Patel, B.T., Patel, B.B., Patel, D.S., Patel, I.S., Patel, R.N., Singh, N.K., and Thakur, D.M. (2015) *Yogic farming through Brahma Kumaris Raja yoga meditation: An ancient technique for enhancing crop performance*. *Asian Agri-History* 19(2), pp 105–122.

Paranjpe, V.V. (1989). *Homa Therapy: Our Last Chance*. Fivefold Path Publications, Dhule

Pathak, R. K., and Berk, U. (2015). *Homa Therapy: An Effective Tool in Mitigating Soil, Water and Environmental Crises*. *Climate Dynamics in Horticultural Science, Volume Two: Impact, Adaptation, and Mitigation*. Apple Academic Press, New York

Patton, M.Q. (1990). *Qualitative research and evaluation methods*. 2nd edition. Sage Publications, California.

Pathath, A.W. (2017). *Meditation: Techniques and benefits*. *International Journal of Current Research in Medical Sciences* 3(6), pp 162–168.

Patnaik, U. (2017). *Revisiting the 'Drain,' or Transfers from India to Britain* in Chakrabarti, S., and Patnaik, U. (eds.) *Agrarian and Other Histories: Essays for Binay Bhushan Chaudhuri*, Tulika Books, New Delhi

Paull, J. (2011). *The Secrets of Koberwitz: The Diffusion of Rudolf Steiner's Agriculture Course and the Founding of Biodynamic Agriculture*. *Journal of Social Research & Policy*, Volume 2, Issue 1, July 2011

Available at:

<http://orgprints.org/19518/1/Paull2011SecretsJSRP.pdf>

[Accessed April 10th 2017]

Paull, J. (2014). *Lord Northbourne, the man who invented organic farming, a biography.* Journal of Organic Systems, 9(1), 2014, pp 31-53. Available at:

<http://www.organic-systems.org/journal/91/9104.pdf>

[Accessed February 12th 2017]

Paull, J. and Hennig, B. (2020). *A World Map of Biodynamic Agriculture.* Agricultural and Biological Sciences Journal Vol. 6, No. 2., pp 114-119. Available at:

<https://orgprints.org/id/eprint/38129/1/PaullHennig2020.BDworld.ABSJ.pdf>

[Accessed March 30th 2021]

Payez, A., Ghanati, F., Behmanesh, M., Abdolmaleki, P., Hajnorouzi, A., Rajabbeigi, E. (2013). *Increase of seed germination, growth and membrane integrity of wheat seedlings by exposure to static and a 10-KHz electromagnetic field.* Electromagnetic Biology and Medicine 32(4), pp 417-429

Peat, F.D. (2005). *Blackfoot Physics.* Red Wheel/Weiser, Boston

Pennick, N. (1978). *The Ancient Science of Geomancy.* Thames and Hudson, London

Permaculture Association (2016). *What is the Next Big Step?* Available at:

<https://international.permaculture.org.uk/home>

[Accessed November 29th, 2016]

Pew Research Center (2015). *What is each country's second-largest religious group?* Available at:

<https://www.pewresearch.org/fact-tank/2015/06/22/what-is-each-countrys-second-largest-religious-group/>

[Accessed April 27th, 2021]

Pfeiffer, E. (1947). *Soil Fertility, Renewal and Preservation.* Faber and Faber, London

Pfiffner, L. and Mäder, P. (1997). *Effects of Biodynamic, Organic and Conventional Production Systems on Earthworm Populations.* Biological Agriculture and Horticulture 15(1-4), pp. 2-10

Pfiffner, L. and Niggli, U. (1996). *Effects of Bio-dynamic, Organic and Conventional Farming on Ground Beetles (Col. Carabidae) and Other Epigaeic Arthropods in Winter Wheat.* Biological Agriculture and Horticulture 12(4), pp. 353-364

Picone, G., Trimigno, A., Tessarin, P., Donnini, S., Rombolà, A.D., Capozzi, F. (2016). *¹H NMR foodomics reveals that the biodynamic and the organic cultivation managements produce different grape berries (Vitis vinifera L. cv. Sangiovese).* Food Chemistry 213, pp 187-195

Pietruszewski, S. and Martínez, E. (2015). Magnetic field as a method of improving the quality of sowing material: a review. International Agrophysics, Vol 29, pp 377-389. Available at:

https://www.researchgate.net/publication/280038587_Magnetic_field_as_a_method_of_improving_the_quality_of_sowing_material_A_review

[Accessed March 15th, 2021]

Pimbert, M.P. (2017). *Agroecology as an Alternative Vision to Conventional Development and Climate-smart Agriculture.* Development. 58(2–3), pp 286–298

Pimbert, M.P. (2018). *Global Status of Agroecology - A Perspective on Current Practices, Potential and Challenges.* Economic & Political Weekly EPW, October 13, 2018 vol LIII, No 41

Pinker, S. (2018). *Enlightenment Now – The Case for Science, Reason and Humanism.* Viking, New York

Pirages, D.C. & Ehrlich, P.R. (1974). *Ark II: Social response to environmental imperatives.* The Viking Press, New York

Plumwood, V. (2003). *Indigenous Peoples and Biodiversity in Decolonizing Nature.* Adams, M.A. and Mulligan, M., (Eds). Earthscan Publications Ltd, London

Podleśny, J., Pietruszewski, S., and Podleśna, A. (2004). *Efficiency of the magnetic treatment of broad bean seeds cultivated under experimental plot conditions.* International Agrophysics 18(1), pp. 65-71.

Podolinski, A. (1985). *Biodynamic agriculture introductory lectures.* Vol. 1. Gavemer Foundation, Sydney

Poli, R. (2013). *A Note on the Difference Between Complicated and Complex Social Systems.* Cadmus – Promoting Leadership in Thought that Leads to Action. Volume 2, Issue 1, October 2013. Available at:

<http://www.cadmusjournal.org/files/pdfreprints/vol2issue1/reprint-cj-v2-i1-complex-vs-complicated-systems-rpoli.pdf>

[Accessed August 19th, 2017]

Pollan, M. (2001). *The Omnivore's Dilemma*. Bloomsbury Publishing, London.

Prasad, N.R. (2019) *A review on the farmer suicides in India: An unsolved problem*. Journal of Economic Policy and Research 14(1), pp 56–67.

Pretty, J.N., Bharucha, Z.P. (2014). *Sustainable intensification in agricultural systems*. Article in Annals of Botany, October 2014. Available at:

https://www.researchgate.net/publication/267643337_Sustainable_intensification_in_agricultural_systems

[Accessed August 13th, 2017]

Prévost, V., Duhamel, M., Ferrandiz, P. (2021). *Practical Uses of the Epigenetic Regulation of Protein Synthesis in the Agricultural Field* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Primavesi, A. (1991). *From Apocalypse to Genesis – Ecology, Feminism and Christianity*. Fortress Press, Minneapolis. Available at:

<https://archive.org/details/fromapocalypseto0000prim/page/n3/mode/2up>

[Accessed June 1st, 2020]

Pulido, E., Boff, P., Duarte, T., Boff, M.I. (2017). *High dilution preparations for organic production system of broccoli*. Agronomia Colombiana 35(1), pp. 53-58

Quantum Agriculture (ND). *About*. Available at:

<https://quantumagriculture.com/about/>

[Accessed December 18th, 2021]

Quantum Agriculture (2018). *Field Broadcasters*. Available at:

<http://quantumagriculture.com/articles/field-broadcasters>

[Accessed March 14th, 2018]

Quijano, A. (2007). [*Coloniality and modernity/rationality*](#). *Cultural Studies*, 21 (2-3), pp 168-178. Available at:

https://pybarra.weebly.com/uploads/6/8/7/0/687099/_quijano_coloniality_and_modernity_rationality.pdf

[Accessed April 10th, 2021]

Radin, D. and Nelson, R. (2000). *Meta-analysis of mind-matter interaction experiments: 1959 to 2000*. Boundary Institute, Los Altos, California. Princeton Engineering Anomalies Research, Princeton University. Available at:

https://www.researchgate.net/publication/241676080_Meta-analysis_of_mind-matter_interaction_experiments_1959_to_2000

[Accessed April 17th, 2017]

Radin, D. (2006). *Entangled Minds: Extrasensory Experiences in a Quantum Reality*. Paraview Pocket Books (publisher*)

Radionic Association (2020). *Who And What Can Be Treated*. Available at:

<https://www.radionic.co.uk/who-what-can-be-treated/>

[Accessed May 11th, 2020]

Ramos, C.G., Querol, X., Oliveira, M., Silva, L. (2015). *A preliminary evaluation of volcanic rock powder for application in agriculture as soil a remineralizer*. Volumes 512–513, pp 371-380

Ramos, C.G., Querol, X., Dalmora, A.C., Pires, K.C.J., Schneider, I.A.H., Oliveira, L.F.S., Kautzmann, R.M. (2016). *Evaluation of the potential of volcanic rock waste from southern Brazil as a natural soil fertilizer*. Journal of Cleaner Production, Volume 142, Part 4, pp 2700-2706

Ramsay, T. (2012a). *Awakening Biodiversity Consciousness*. Statement for the Conference of the Parties to the Convention on Biological Diversity. Eleventh Meeting, Andhra Pradesh, Hyderabad, India. October 8-19 2012. Available at:

https://www.researchgate.net/publication/239672387_Awakening_Biodiversity_Consciousness

[Accessed February 17th, 2017]

Ramsay, T. (2012b). *Systems Approach to Agriculture*. LEISA India. December 2012 Volume 14 no. 4. Available at:

https://www.researchgate.net/profile/Tamasin_Ramsay/publication/239672409_Systems_Approach_to_Agriculture/links/00b4951d87d3a531fa000000.pdf?inViewer=true&disableCoverPage=true&origin=publication_detail

[Accessed April 16th, 2017]

Ramsay, T. (2012c). *Yogic Agriculture reaping rewards in India*. Rioplus Business Magazine. Produced for: Rio+20, United Nations Conference on Sustainable Development, Rio de Janeiro, June 2012. Available at:

http://www.academia.edu/1786497/Yogic_Agriculture_Reaping_Rewards_in_India

[Accessed April 16th, 2017]

Ramsay, T. (2013a) *Sustainable yogic farming: Changing the lives and livelihoods of farmers*. October 8th 2013. Available at:

http://yogickheti.org/researchPapers/SYA_Living_in_Harmony_2013.pdf

[Accessed October 13th 2020]

Ramsay, T. (2013b). *Sustainable yogic farming: Internal report. Tour of Maharashtra and Goa 2013*. Brahma Kumaris at the United Nations, New York. Available online: https://www.researchgate.net/publication/265172643_Informal_Report_-_SYA_Tour_India_September_2013 (accessed August 10th 2020).

Rasmussen, R.H. (2021). *Is Nordic Animism Indigenous?* Available at:

<https://www.youtube.com/watch?v=ivI9BxJyptg>

[Accessed October 6th, 2021]

RDW (2009). *Perpetual yogic agriculture*. Rural Development Wing. Rajyoga Education and Research Foundation and Prajapita Brahma Kumaris Ishwariya Vishwa Vidyalaya. Shantivan, Mount Abu: Omshanti Press. Available at <http://yogickheti.org/pdf/Book%20English.pdf>

[Accessed August 10th, 2020]

Reeve, J.R., Carpenter-Boggs, L., Reganold, J.P., York, A.L., McGourty, G., McCloskey, L.P. (2005). *Soil and winegrape quality in biodynamically and organically managed vineyards*. American Journal of Enology and Viticulture 56(4), pp 367-376

Reeve, J.R., Carpenter-Boggs, L., Reganold, J.P., York, A.L., Brinton, W.F. (2010). *Influence of biodynamic preparations on compost development and resultant compost extracts on wheat seedling growth*. Bioresource Technology 101(14), pp. 5658-5666

Regeneration International (2017). *What is Regenerative Agriculture?* Available at:

[Regen-Ag Definition 2.23.17.pdf \(regenerationinternational.org\)](http://regen-ag-definition.2.23.17.pdf)

[Accessed February 16th, 2021]

Rhodes, C.J. (2017). *The Imperative for Regenerative Agriculture*. Science Progress, 100 (1), pp 80–129. Available at:

<https://journals.sagepub.com/doi/pdf/10.3184/003685017X14876775256165>

[Accessed June 10th, 2021]

Ribeiro, A. S. (2004). *The reason of borders or a border reason? Translation as a metaphor for our time*. Eurozine, January 8th, 2004. Available at:

<https://www.eurozine.com/the-reason-of-borders-or-a-border-reason/>

[Accessed January 7th, 2022]

Richardson, W.J. (2018). *Eurocentrism as a Structural Problem of Undone Science?* in *Decolonising the University*. Bhambra, G.K, Gebrial D., Nişancıoğlu, K. (Eds). Pluto Press, London

Ritchie, H. (2018). *Urbanization*. OurWorldInData.org. Available at:

<https://ourworldindata.org/urbanization>

[Accessed July 1st, 2020]

Rodale Institute (1989). *Beyond sustainable*. Available at:

<https://rodaleinstitute.org/why-organic/organic-basics/regenerative-organic-agriculture/>

[Accessed March 9th, 2021]

Rodrigues, A.S.D.L., Mesak, C., Silva, M.L.G., Silva, G.S., Leandro, W.M., Malafaia, G. (2017). *Organic waste vermicomposting through the addition of rock dust inoculated with domestic sewage wastewater*. Journal of Environmental Management, Vol. 196, pp 651-658

Rodríguez, S.R., Delgado, E.O., Pupo, J.J.S., Fonseca, A.A., Enríquez, M.A.U., Basulto, L.E.A. (2021). *Effect of Low-Power Laser Biotechnology Treatment on Shooting and Initial Growth of White Mulberry and Sugarcane under Flood Stress* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Röling, N. G., & Jiggins, J. J. (2000). *The Ecological Knowledge System*. In *Technical and Social Systems Approaches for Sustainable Rural Development*, pp 242-246. *Second Symposium of the Association of Farming Systems Research and Extension, Grenada, 1996* / Doppler, W. and Calantrava, J.- Magraf Verlag, Weikersheim

Roney-Dougal, S.M. & Solfvin, J. (2002). *Field Study of enhancement effect on lettuce seeds - their germination rate, growth and health.* Journal of the Society of Psychical Research, 66, pp 129-143. Available at:

<http://www.psi-researchcentre.co.uk/documents/2002%20lettuce%20paper.doc>

[Accessed April 16th, 2017]

Roney-Dougal, S.M. & Solfvin, J. (2003). *Field study of an enhancement effect on lettuce seeds - Replication study.* Journal of Parapsychology, 67(2), 279-298. Available at:

https://www.researchgate.net/publication/286887524_Field_study_of_an_enhancement_effect_on_lettuce_seeds_A_replication_study

[Accessed April 16th, 2017]

Rosling, H. (2018). *Factfulness.* Hodder & Stoughton, London

Rossbach, S. (1983). *Feng Shui – The Chinese Art of Placement.* E.P. Dutton, New York

Rosset, P. and Martinez-Torres, M.E. (2013). *Food Sovereignty: A Critical Dialogue.* Conference Paper #4. International Conference, Yale University, September 13-14th 2013. Available at:

https://www.schoolsforchiapas.org/wp-content/uploads/2014/06/4_Rosset_Torres_2013.pdf

[Accessed November 13th, 2022]

Rotchés-Ribalta, R., Sans, F.X., Mayer, J., Mäder, P. (2020). *Long-term farming systems and last crop sown shape the species and functional composition of the arable weed seed bank.* Applied Vegetation Science 23(3), pp. 428-440.

Rousseau, J-J. (1779; 1762). *Emile or On Education.* Basic Books, New York

Roussopoulos, M. (2021). *The Systemic Constellations Method Applied to Agriculture* in Wright, J. (Ed) *Subtle Agroecologies: Farming with the Hidden Half of Nature*, CRC Press.

Rudolf Steiner House (ND). *About Us.* Available at:

<https://www.rsh.anth.org.uk/about-us/>

[Accessed June 7th, 2021]

Said, E. (1978). *Orientalism.* Penguin Books, London

Santos, B.S. (2014). *Epistemologies of the South.* Routledge, London

Santos, B.S. (2018). *The End of the Cognitive Empire.* Duke University Press, London

Santos, S.K., Sandini, I.E., Novakowiski, J.H., Falbo, M.K. (2016). *Homeopathy as an alternative to control of verminosis ewes.* Asian Journal of Animal and Veterinary Advances 11(4), pp 235-241

Sarivaara, E., Maatta, K. and Uusiautti, S. (2013). *Who is Indigenous? Definitions of Indigeneity.* European Scientific Journal, December 2013 special edition vol.1, pp 369-378

Sasaki, Y., Kitai, N., Uematsu, M., Kitahara, G., Osawa, T. (2019). *Daily calving frequency and preterm calving is not associated with lunar cycle but preterm calving is associated with weather conditions in Japanese Black cows.* PLoS ONE 14 (7)

Savory, A. (2013). *How to fight desertification and reverse climate change.* Available at:

https://www.ted.com/talks/allan_savory_how_to_fight_desertification_and_reverse_climate_change

[Accessed March 9th, 2021]

Scarduzio, J.A. (2017). *Emic Approach to Qualitative Research* in Matthes, J., Davies, C S., Potter, R.F. (Eds) . Wiley-Blackwell, Hoboken

SCENIHR (2009). *Health Effects of Exposure to EMF. Scientific Committee on Emerging and Newly Identified Health Risks. Scientific Committee on Emerging and Newly Identified Health Risks.* Available at:

https://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_022.pdf

[Accessed September 15th, 2021]

Scharmer, O. (2010). *Seven Sacred Teachings.* Available at:

<http://www.blog.ottoscharmer.com/?p=211>

[Accessed July 1st, 2021]

Scharmer, O. (2009). *Theory U.* Berrett-Koehler Publishers, New York.

Scharmer, O. and Kaufer, K. (2013). *Leading from the Emerging Future.* Berrett Koehler Publishers, Inc., San Francisco

Scharmer, O. (2018). *The Essentials of Theory U.* Berrett Koehler Publishers, Inc., San Francisco

Scheller, E., Raupp, J. (2005). *Amino acid and soil organic matter content of topsoil in a long term trial with farmyard manure and mineral fertilizers.* Biological Agriculture and Horticulture 22(4), pp 379-397

Scofield, A.M. (1984). *Homeopathy and its potential role in agriculture - a critical review.* Biological Agriculture and Horticulture. Vol 2, pp 1-50. Available at:

<https://eap.mcgill.ca/MagRack/BAH/BAH%204.htm>

[Accessed March 17th, 2021]

Sedlmayr, A., van Leewen, A., Schönfelder,, J., Kolar, M., Ingold, R., Hurter, U. (2016). *The biodynamic preparations in context: Individual approaches to preparation work - Case studies of worldwide practice.* Section for Agriculture, Goetheanum, Dornach. Available at:

http://www.sektion-landwirtschaft.org/fileadmin/landwirtschaft/Pr%C3%A4parate/The_biodynamic_preparations_in_context_web.pdf

[Accessed April 10th, 2017]

Sharaf-Eldin, M. A. (2016). *The Effects of Electromagnetic Treatments on the Growth and Palmitic Acid Content of Cynara cardunculus.* JAPS: Journal of Animal & Plant Sciences. Aug2016, Vol. 26 Issue 4, pp 1081-1086

Shaw, M. (2018). *Small Gods.* Available at:

<https://drmartinshaw.com/essays/>

[Accessed June 28th, 2021]

Sheldrake, R. (2012). *The Science Delusion.* Hodder and Stoughton, London

Shepherd, S., Lima, M.A.P, Oliveira, E. E., Sharkh, S. M., Jackson, C. W., Newland, P. L. (2018). *Extremely Low Frequency Electromagnetic Fields impair the Cognitive and Motor Abilities of Honey Bees.* Nature, Scientific Reports

Shipman, J., Wilson, J. D., and Higgins, C. A. (2012). *Waves and Sound in An Introduction to Physical Science,* Cengage Learning, (Boston, pp 134–142)

Shiva, V. (2016a). *Who Really Feeds the World? The Failures of Agribusiness and the Promise of Agroecology.* North Atlantic Books, Berkeley.

Shiva, V. (2016b). *The Violence of the Green Revolution.* University Press of Kentucky, Lexington.

Shumei (ND). *Gardening in Keeping with Natural Agriculture*. Available at:

<https://shumei.uk/yatesbury/wp-content/pdf/NA%20gardening%20guide.pdf>

[Accessed September 10th, 2021]

Sium, A., Desai, C., Ritskes, E. (2012). *Towards the 'tangible unknown': Decolonization and the Indigenous future*. Decolonization: Indigeneity, Education & Society, Vol. 1, No. 1, 2012, pp. 1-13. Available at:

https://qmplus.qmul.ac.uk/pluginfile.php/2909957/mod_resource/content/1/Sium%20et%20al%20Towards%20the%20E2%80%98tangible%20unknown%E2%80%99-%20Decolonization%20and%20the%20Indigenous%20future.pdf

[Accessed October 11th, 2021]

SJR (2020). *Scimago Journal Rankings*. Available at:

<https://www.scimagojr.com/journalrank.php>

[Accessed January 8th, 2022]

Skinner, S. (1982). *The Living Earth Manual of Feng Shui*. Arkana Penguin Books, London

Smith, L.T. (2012). *Decolonizing Methodologies*. 2nd edition, Zed Books, London

Smith, A. (2016). *Heteropatriarchy and the Three Pillars of White Supremacy: Rethinking Women of Color Organizing in Color of Violence: An INCITE Anthology*. Duke University Press Books, Durham

Available at:

<https://cpt.org/sites/default/files/2019-04/Undoing%20Oppressions%20-%20Three%20Pillars%20-%20Smith.pdf>

Smitsman, A. and Currivan J. (2021). *Healing our Relationship with Gaia through a New Thrivability Paradigm* in Wright, J. (Ed) *Subtle Agroecologies: Farming With the Hidden Half of Nature*. CRC Press, London

SOCLA (2015). *Agroecology: Key Concepts, Principles and Practices*. Sociedad Científica Latinoamericana de Agroecología (SOCLA). Third World Network, Penang. Available at:

<http://agroeco.org/wp-content/uploads/2015/11/Agroecology-training-manual-TWN-SOCLA.pdf>

[Accessed April 2nd, 2017]

Soustre-Gacougnolle, I., Lollier, M., Schmitt, C., Perrin, M., Buvens, E., Lallemand, J-F., Mermet, M., Heneaux, M., Thibault-Carpentier, C., Dembelé, D., Steyer, D., Clayeux, C., Moneyron and A., Masson, J.E. (2018). *Responses to climatic and pathogen threats differ in biodynamic and conventional vines.* Scientific Reports 8(1),16857

Spiess, H. (1990a). *Chronobiological investigations of crops grown under biodynamic management. I. experiments with seeding dates to ascertain the effects of lunar rhythms on the growth of winter rye (secale cereale, cv. nomaro).* Biological Agriculture and Horticulture 7(2), pp 165-178

Spiess, H. (1990b). *Chronobiological Investigations of Crops Grown under Biodynamic Management. II. Experiments with Seeding Dates to Ascertain the Effects of Lunar Rhythms on the Growth of Little Radish (Raphanus sativus, cv. Parat).* Biological Agriculture and Horticulture. Vol. 7, pp 179-189

Sradnick, A., Oltmanns, M., Raupp, J., Joergensen, R.G. (2018). *Microbial biomass and activity down the soil profile after long-term addition of farmyard manure to a sandy soil.* Organic Agriculture 8(1), pp 29-38

Starhawk (2004). *The Earth Path.* Harper Collins, New York.

Statista (2020). *Facebook Keeps on Growing.* Available at:

<https://www.statista.com/chart/10047/facebook-monthly-active-users/>

[Accessed April 27th, 2021]

Statista (2021). *Distribution of Facebook users worldwide as of January 2021, by age and gender.* Available at:

<https://www.statista.com/statistics/376128/facebook-global-user-age-distribution/>

[Accessed April 27th, 2021]

Steele, R.D. (1976). *Theory, Risk Assessment and Internal War: A Framework for the Observation of Revolutionary Potential.* Available at:

http://www.oss.net/dynamaster/file_archive/061108/9e6cb71588e90a03054f968bf6fe359d/MA%201976%20On%20Revolution.pdf

[Accessed April 14th, 2017]

Steiner, R. (2011;1925). *Occult Science.* Rudolf Steiner House, Forest Row

Steiner, R. (1989; 1922). *Theosophy.* Rudolf Steiner Press, London

Steiner, R. (2012; 1924). *Agriculture Course: The Birth of the Biodynamic Method (Classic Translation)*. Revised edition, Rudolf Steiner Press, Forest Row

Steiner, R. (1995, 1918). *Intuitive Thinking as a Spiritual Path; A Philosophy of Freedom*. Centennial Edition, Anthroposophic Press, Hudson,

Steiner, R. (2012, 1918). *Knowledge of the Higher Worlds and How it is Achieved*. Rudolf Steiner Press, Forest Row, UK

Steiner, R. (2004, 1914). *Human and Cosmic Thought*. Available at:

https://wn.rsarchive.org/Lectures/GA151/English/RSP1961/HuCoTh_index.html

[Accessed June 23rd, 2021]

Steiner, R. (2009, 1923). *The Evolution of Consciousness*. Available at:

https://wn.rsarchive.org/Lectures/GA227/English/RSP1966/EvoCon_index.html

[Accessed July 7th, 2021]

Stephen, S., Moreno, M., Mazon, S., Scherer-Pongratz, W., Endler, P. C. (2018). *Wheat germination and intentional influence in Brennan Healing Science®: A contribution to fundamental research*. Journal of Alternative Medicine Research. 2018, Vol. 10 Issue 3, pp 217-222

Stoff, J.A. (1983). *Homoeopathy--a clinical science*. British Homoeopathic Journal Vol 71, pp 148- 151. Available at:

<https://www.homeopathy360.com/2017/10/27/homeopathy-a-clinical-science-stoff-jesse-a-bhj-72-31983/>

[Accessed March 18th, 2021]

Storl, W. (2013). *Culture and Horticulture*. North Atlantic Books, Berkeley.

Swarovsky, R.A., Stangarlin, J.R., Kunh, O.J., Estevez, R.L., Mioranza, T.M., Muller, M.A. (2014). *Influence of High Dilutions of Cina for the Control of Meloidogyne incognita in Tomato Plants*. American Journal of Plant Sciences, 2014, 5, pp 3695-3701. Available at:

https://www.researchgate.net/profile/Jose_Stangarlin/publication/276498863_Influence_of_High_Dilutions_of_Cina_for_the_Control_of_Meloidogyne_incognita_in_Tomato_Plants/links/55f7feb308aeba1d9f010657.pdf?inViewer=true&pdfJsDownload=true&disableCoverPage=true&origin=publication_detail

[Accessed July 5th, 2017]

Swidler, L. (2002) *A Vision for the Third Millenium: The Age of Global Dialogue*. Journal for the Study of Religions and Ideologies 1(1): 6-18. Available at:

<http://jsri.ro/ojs/index.php/jsri/article/viewFile/6/7>

[Accessed June 19th, 2021]

Swoboda, P. (2016). *Rock dust as agricultural soil amendment : a review*. Masters Thesis Available at:

https://www.researchgate.net/publication/321543473_Rock_dust_as_agricultural_soil_amendment_a_review

[Accessed June 19th, 2020]

Tarnas, R. (1991). *The Passion of the Western Mind*. Pimlico, London

Taylor, S. (2005). *The Fall*. John Hunt Publishing, Ropley.

Taverner, E. (1918). *The Roman Farmer and the Moon*. Transactions and Proceedings of the American Philological Association, Vol. 49 (1918), pp 67-82. Available at:

https://www.jstor.org/stable/282995?seq=1#metadata_info_tab_contents

[Accessed May 4th, 2020]

Thayer, R.L. (2003). *Lifepace – Bioregional Thought and Practice*. University of California Press, Berkeley.

Thompson, P.B. (2005). *The Spirit of the Soil*. Routledge, London

Thoreau, H.D. (2006; 1854). *Walden*. Yale University Press, New Haven

Thottathil, S.A. (2014). *India's Organic Farming Revolution – What it Means for Our Global Food System*. University of Iowa Press, Iowa City

Teixeira, M.Z. and Carneiro, S.M.T.P.G. (2017). *Effects of homeopathic high dilutions on plants: literature review*. Revista de Homeopatia. Vol. 80 Issue 3/4, Pp 104-120. Available at:

https://www.researchgate.net/publication/320267648_Effects_of_homeopathic_high_dilutions_on_plants_literature_review_Special_Dossier_Scientific_Evidence_for_Homeopathy_-_Revista_de_Homeopatia_Sao_Paulo_Homeopathic_Medical_AssociationAPH_-_Online_Edit

[Accessed March 18th, 2021]

Thun, M. (1979). *Work on the Land and the Constellations* The Lanthorn Press, East Grinstead. Available at:

<http://soilandhealth.org/copyrighted-book/work-on-the-land-and-the-constellations/>

[Accessed April 10th, 2017]

Thun, M. (2003). *Results from the Biodynamic Sowing and Planting Calendar*. Floris Books, Edinburgh. Available at:

<http://soilandhealth.org/copyrighted-book/results-from-the-biodynamic-sowing-and-planting-calendar/>

Thun, M. (2018). *The Maria Thun Biodynamic Planting Calendar*. Floris Books, Edinburgh.

Tippetts, J. (2014). *The Science of Biodynamic Viticulture*. Gastronomica , Vol. 12, No. 1 (Spring 2012), pp. 91-99

Tobias, R. (2017). *How to Decolonize the Permaculture Movement*. The Huffington Post. Available at:

<http://www.huffingtonpost.com/tobias-roberts/how-to-decolonize-the-permaculture-movement/index.html>

[Accessed April 3rd 2017]

Toensmeier, E. (2016). *The Carbon Farming Solution*. Chelsea Green Publishing, White River Junction.

Toledo, M.V., Stangarlin, J.R., Bonato, C.M. (2011). *Homeopathy for the control of plant pathogens*. Homeopathy for the Control of Plant Pathogens. Mendez-Vilas, A., Ed., Science against Microbial Pathogens: Communicating Current Research and Technological Advances, Fomatex, Badajoz, 2: pp 1063-1067. Available at:

https://www.researchgate.net/publication/268064121_Homeopathy_for_the_control_of_plant_pathogens

[Accessed June 29th 2017]

Tompkins, P. and Bird, C. (1989; 1973). *The Secret Life of Plants*. HarperCollins, New York

Tompkins, P. and Bird, C. (1998). *Secrets of the Soil: New Solutions for Restoring Our Planet*. Earthpulse Press, Anchorage

Tuck, E. and Yang, K.W. (2012). *Decolonization is not a Metaphor*. Decolonization: Indigeneity, Education & Society Vol.1, No.1, pp 1-40. Available at:

https://www.researchgate.net/publication/277992187_Decolonization_Is_Not_a_Metaphor

Turinek, M., Bavec, M., Repič, M., Kranjc, M.A., Möllers, C., Tres, A., Bavec, F. (2017). *Effects of intensive and alternative production systems on the technological and quality parameters of rapeseed seed (Brassica napus L. 'Siska')*. Journal of the Science of Food and Agriculture 97(8), pp. 2647-2656

UNCCD (2017). *Global Land Outlook*. UNCCD Publications, first edition. Available at:

https://knowledge.unccd.int/sites/default/files/2018-06/GLO%20English_Full_Report_rev1.pdf

[Accessed June 15th 2020]

UNCTAD (2013). *Wake Up Before It is Too Late: Make Agriculture Truly Sustainable Now for Food Security in a Changing Climate*. United Nations Conference on Trade and Development. Trade and Environment Review 2013. Available at:

http://unctad.org/en/PublicationsLibrary/ditcted2012d3_en.pdf

[Accessed July 15th, 2016]

UN (2015). *World Population Prospects 2015*. Available at:

http://esa.un.org/unpd/wpp/Publications/Files/WPP2015_DataBooklet.pdf

[Accessed March 27th, 2017]

UN (ND). *Indigenous Peoples. Indigenous Voices – Fact Sheet*. Available at:

https://www.un.org/esa/socdev/unpfii/documents/5session_factsheet1.pdf

[Accessed June 30th, 2021]

UNEP (ND). *Preventing, Halting and Reversing the Degradation of Ecosystems Worldwide*. Available at:

<https://www.decadeonrestoration.org/>

[Accessed September 27th, 2022]

UNISECO (2019). *Deliverable Report D2.2: Typology of AEFS and Practices in the EU and the Selection of Case Studies*. Available at:

<https://uniseco-project.eu/assets/content/resources/02-deliverables/UNISECO%20D2.2%20rev.pdf>

[Accessed December 26th 2021]

US Census (2020). *Racial and Ethnic Diversity in the United States: 2010 Census and 2020 Census*. Available at:

<https://www.census.gov/library/visualizations/interactive/racial-and-ethnic-diversity-in-the-united-states-2010-and-2020-census.html>

[Accessed December 13th, 2021]

USDA (2019a). *2017 Census of Agriculture Data now Available*. Available at:

<https://www.usda.gov/media/press-releases/2019/04/11/2017-census-agriculture-data-now-available>

[Accessed April 27th, 2021]

USDA (2019b). *2017 Census of Agriculture Highlights: Farm Producers*. Available at:

https://www.nass.usda.gov/Publications/Highlights/2019/2017Census_Farm_Producers.pdf

[Accessed April 27th, 2021]

USDA (2021). *Farming and Farm Income*. Available at:

<https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income/>

[Accessed April 28th, 2021]

Vallianatos, E.G. (2001). *All of Africa's gods are weeping*. *Race & Class*. 2001, Vol. 43(1): pp 45-57. Available at:

<http://courses.arch.vt.edu/courses/wdunaway/gia5524/Vallia2001.pdf>

[Accessed April 1st, 2017]

Vallianatos, E.G. (2012). *The democratic and sacred nature of agriculture*.

Environment, Development and Sustainability, Volume 14, Issue 3, pp 335–346.

Van Eijk, T. (1998). *Farming systems research and spirituality: An analysis of the foundations of professionalism in developing sustainable farming systems*. Ph.D. Thesis, Wageningen: Wageningen Agricultural University.

Van Straaten, P. (2006). *Farming with rocks and minerals: challenges and opportunities*. *Annals of the Brazilian Academy of Sciences*. 78(4), pp 731-747. Available at:

https://rockdustlocal.com/uploads/3/4/3/4/34349856/farming_with_rocks_and_minerals.pdf

[Accessed September 15th, 2021]

Vaitkevičienė, N., Jariene, E., Danilcenko, H., Sawicka, B. (2016). *Effect of biodynamic preparations on the content of some mineral elements and starch in tubers of three coloured potato cultivars.* Journal of Elementology 21(3), pp 927-935

Verma, S.K., Asati, B.S., Tamrakar, S.K., Nanda, H.C., Gupta, C.R. (2011). *Effect of organic components on growth, yield and economic returns in potato.* Potato Journal 38(1), pp. 51-55.

Vertosick, F.T. (2002). *The genius withi: Discovering the intelligence of every living thing.* Harcourt Inc., New York

Voisin, A. (1959). *Soil, Grass and Cancer.* Crossby Lockwood and Son, Ltd, London

Wagenaar, J.-P., Klocke, P., Butler, G., Smolders, G., Nielsen, J.H., Canevar, A., Leifert, C. (2011). *Effect of production system, alternative treatments and calf rearing system on udder health in organic dairy cows.* NJAS - Wageningen Journal of Life Sciences 58(3-4), pp. 157-162

Wallerstein, I. (2011). *Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century.* University of California Press, Berkeley

[Accessed January 25th 2022]

Waziyatawin and Bird M.Y. (2012). *For Indigenous Minds Only: A Decolonization Handbook.* SAR Press, Santa Fe

Weinberger, P. and Measures. M. (1978). *Effects of the intensity of audible sound on the growth and development of rideau winter wheat.* Canadian Journal of Botany, 57, pp 1036–1039

Welch, C. (2002). *Appropriating the Didjeridu and the Sweat Lodge: New Age Baddies and Indigenous Victims?* Journal of Contemporary Religion 17(1), pp 21-38. Available at:

https://www.researchgate.net/publication/248981962_Appropriating_the_Didjeridu_and_the_Sweat_Lodge_New_Age_Baddies_and_Indigenous_Victims

[Accessed December 14th 2021]

Wezel, A., Bellon, S., Doré, T., Francis, C., Vallod, D., David, C. (2009). *Agroecology as a science, a movement and a practice. A review.* Agronomy for Sustainable Development. Available at:

<https://www.socla.co/wp-content/uploads/2014/wezel-agroecology.pdf>

[Accessed April 1st 2017]

WFP (2019). *Hunger Statistics*. World Food Programme. Available at:
https://docs.wfp.org/api/documents/WFP-0000108355/download/?_ga=2.71842899.1570071030.1585333151-1225503075.1585333151

[Accessed March 27th 2020]

Whitehead, A.N. (1925). *Science and the Modern World*. Cambridge University Press, London. Available at:
<https://archive.org/details/b29978531>

Whitehead, A.N. (1978; 1929). *Process and Reality*. The Free Press, New York. Available at:

Whitewashed Hope (2020). *A Message from 10+ Indigenous Leaders and Organisations*. (2020). Open source document. Available at:

bit.ly/IndigenousWorldViews

[Accessed October 21st, 2021]

Whitt, L. (2014). *Science, Colonialism and Indigenous Peoples*. Cambridge University Press, New Work.

WHO (2021). *Suicide*. Available at:

<https://www.who.int/news-room/fact-sheets/detail/suicide>

[Accessed September 27th, 2022]

WHO (2016). *Fact Sheet: Obesity and Overweight*. World Health Organization. Available at:
<http://www.who.int/mediacentre/factsheets/fs311/en/>

[Accessed July 9th 2016]

Wilber, K. (1983). *Up from Eden – A Transpersonal View of Human Evolution*. Shambhala Publications, Boulder

Willey, R. (1984). *Modern Dowsing: The Dowser's Handbook*. Treasure Chest Publications; Fifth Printing edition (*city)

Williams, E. (1944). *Capitalism and Slavery*. University of North Carolina Press, Chapel Hill.

Winiwarter, V. and Blum, W.E.H. (2008), *From marl to rock powder. On the history of soil fertility management by rock materials.* Journal of Plant Nutrition and Soil Science, Vol. 171 No. 3, pp 316–324. Available at:

https://www.researchgate.net/publication/260492333_From_Marl_to_Rock_Powder_On_the_History_of_Soil_Fertility_Management_by_Rock_Materials

[Accessed March 23rd, 2021]

WMO (2020). *WMO Statement on the State of the Global Climate in 2019.* World Meteorological Organization. Available at:

https://library.wmo.int/index.php?lvl=notice_display&id=21700#.XnI43Hd2uUk

[Accessed March 18th 2020]

World Stat Info (2016). *Land use in the world.* Available at:

[http://en.worldstat.info/World/List_of_countries_by_Agricultural_land_\(percentage_of_total_area\)](http://en.worldstat.info/World/List_of_countries_by_Agricultural_land_(percentage_of_total_area))

[Accessed July 14th 2016]

Wozniacka, G. (2019). *With Regenerative Agriculture Booming, the Question of Pesticide Use Looms Large.* Available at:

<https://civileats.com/2019/09/05/with-regenerative-agriculture-booming-the-question-of-pesticide-use-looms-large/>

[Accessed June 9th 2021]

Wozniacka, G. (2021). *Does Regenerative Agriculture have a Race Problem?* Available at:

<https://civileats.com/2021/01/05/does-regenerative-agriculture-have-a-race-problem/>

[Accessed June 9th 2021]

Wright, J., Kief, H., von Diest, S. (2017). *Quantum-based Agriculture: The Final Frontier.* Scientific Track “Innovative Research for Organic Agriculture 3.0” 19th Organic World Congress, New Delhi, India, November 9-11, 2017 Organized by ISO FAR, NCOF and TIPI

Wright J. (2021). *Re-enchanting Agriculture – Farming with the Hidden Half of Nature* in Wright, J. (Ed) *Subtle Agroecologies: Farming With the Hidden Half of Nature.* CRC Press, London

Wright, J., Roussopoulos, M., Jensen, J.B. (2022). *Re-Enchanting Agriculture – The Evidence and Practice for Communicating with Nature*. Oxford Real Farming Conference Event Schedule 2022. Available at:

<https://www.youtube.com/watch?v=ZdtwBH3m4hQ>

[Accessed October 17th, 2022]

<https://theses.lib.vt.edu/theses/available/etd-10172003-101905/unrestricted/>

[Accessed June 4th, 2017]

Wright, J. and Jensen, J.B. (2022). *Sustainable Yogic Agriculture and the Cultivation of Farmers' Wellbeing, Chapter in Conscious Food Systems Alliance – Collection of Case Studies*. UNDP. Available at:

<https://www.undp.org/facs/publications/cultivating-inner-capacities-regenerative-food-systems#>

[Accessed October 17th, 2022]

Yadav, A., Singh, Y., Shukla, G., Shukla, P.K., Kumar, M., Singh, D.N., Kumar, A. (2018). *Effect of exposure of sound signals in semen collection area on quantity and quality of semen in Harijana bulls*. Indian Journal of Animal Research, 52 (3), pp 438-443

Yonezawa, T., Uchida, M., Tomioka, M., Matsuki, N. (2016). *Lunar Cycle Influences Spontaneous Delivery in Cows*. PLoS ONE, Vol. 11 Issue 8, pp 1-8

Yunkaporta, T. (2020). *Sand Talk*. Text Publishing, Melbourne

Zábranský, L., Šoch, M., Pániková, M., Novák, P., Broucek, J., Švejsová, K., Šimková, A., Čermák, B. (2014). *Possibilities of using unconventional methods and dietary supplements to affect weight gains of calves*. Journal of Central European Agriculture 15(4), pp. 157-168

Zaller, J.G. (2007). *Seed germination of the weed Rumex obtusifolius after on-farm conventional, biodynamic and vermicomposting of cattle manure*. Annals of Applied Biology, Vol. 151 Issue 2, pp 245-249.

Zaller, J.G., Köpke, U. (2004). *Effects of traditional and biodynamic farmyard manure amendment on yields, soil chemical, biochemical and biological properties in a long-term field experiment*. Biology and Fertility of Soils 40(4), pp 222-229

Zanardo, M.; Giannattasio, M.; Sablok, G.; Pindo, M.; Porta, N.L.; Lorenzetti, M.; Noro, C.; Stevanato, P.; Concheri, G.; Squartini, A. (2020). *Metabarcoding Analysis of the Bacterial and Fungal Communities during the Maturation of Preparation 500, Used in*

Biodynamic Agriculture, Suggests a Rational Link between Horn and Manure. Preprints 2020. Available at:

<https://www.preprints.org/manuscript/202008.0727/v1>

[Accessed January 11th, 2022]

Zürcher, E. and Schlaepfer, R. (2014). *Lunar Rhythmicities in the Biology of Trees, Especially in the Germination of European Spruce (Picea abies Karst.): A New Statistical Analysis of Previously Published Data*. Journal of Plant Studies; Vol. 3, No. 1. Available at:

<https://pdfs.semanticscholar.org/406f/25d337175b5c510d1ad36f85cabe4223ed24.pdf>

[Accessed May 5th, 2020]

Appendix A – Breakdown of Trial Robustness per Subtle Agroecological Practices

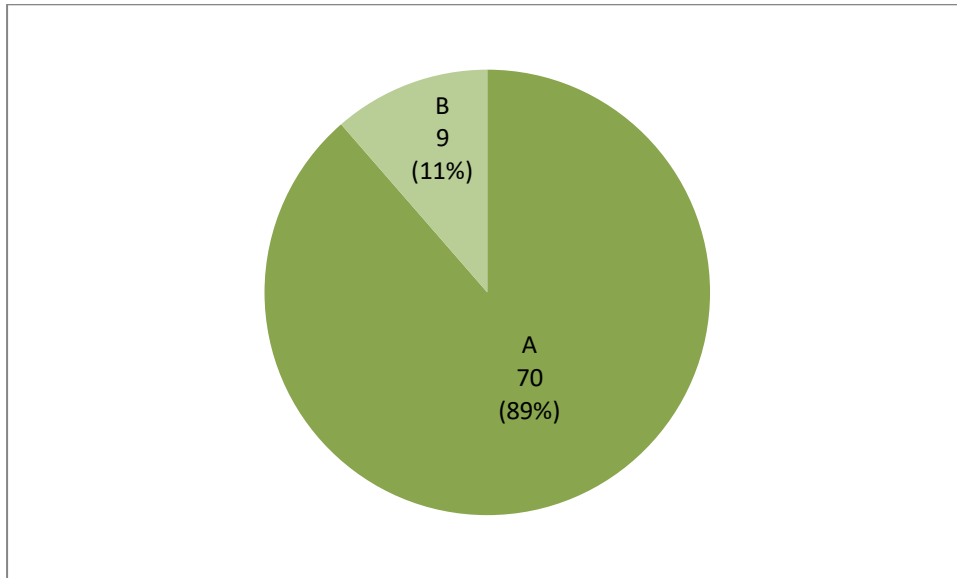


Figure A.1- Illustration of Robustness of Publications about Biodynamic Treatment Trials

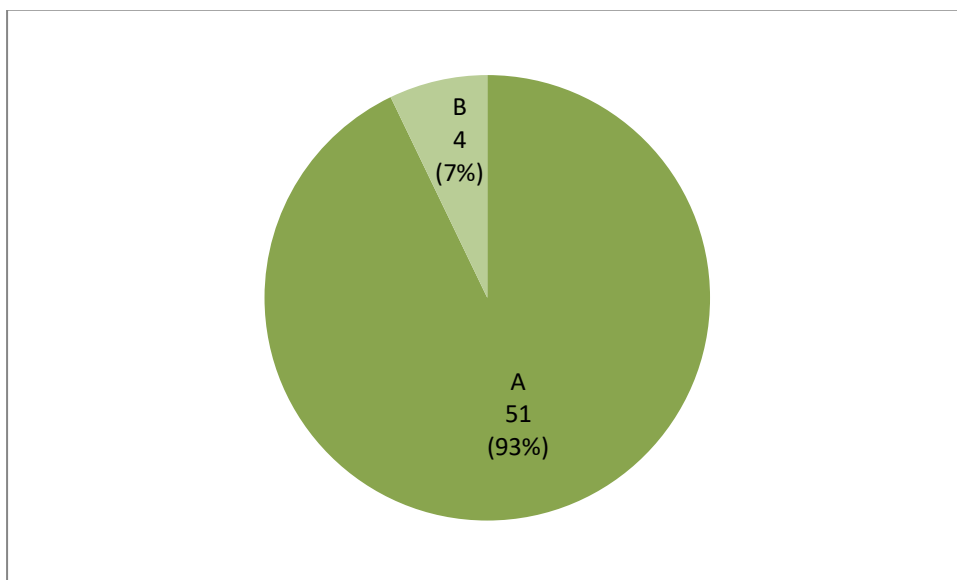


Figure A.2- Illustration of Robustness of Publications about Homeopathic Treatment Trials

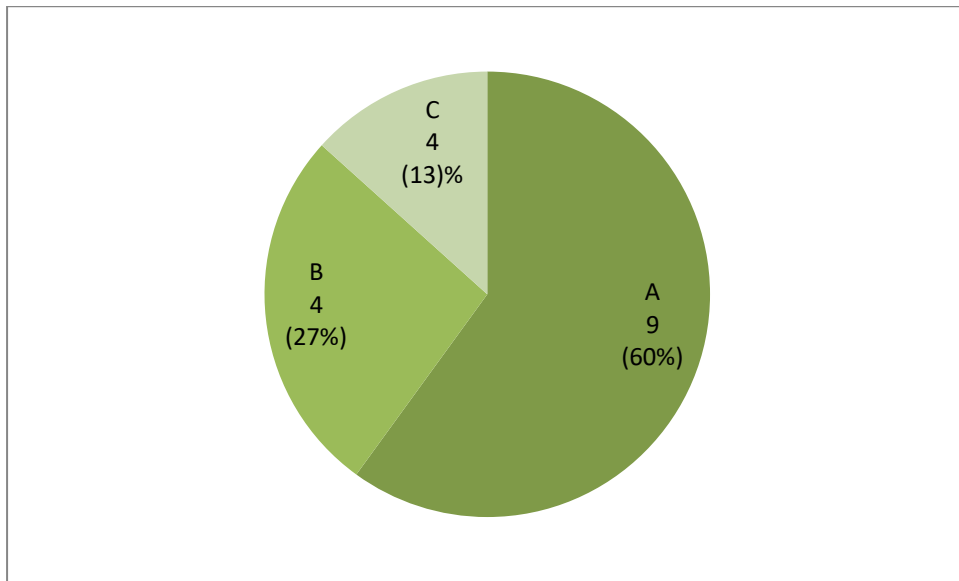


Figure A.3- Illustration of Robustness of Publications about Sound Energies Treatment Trials

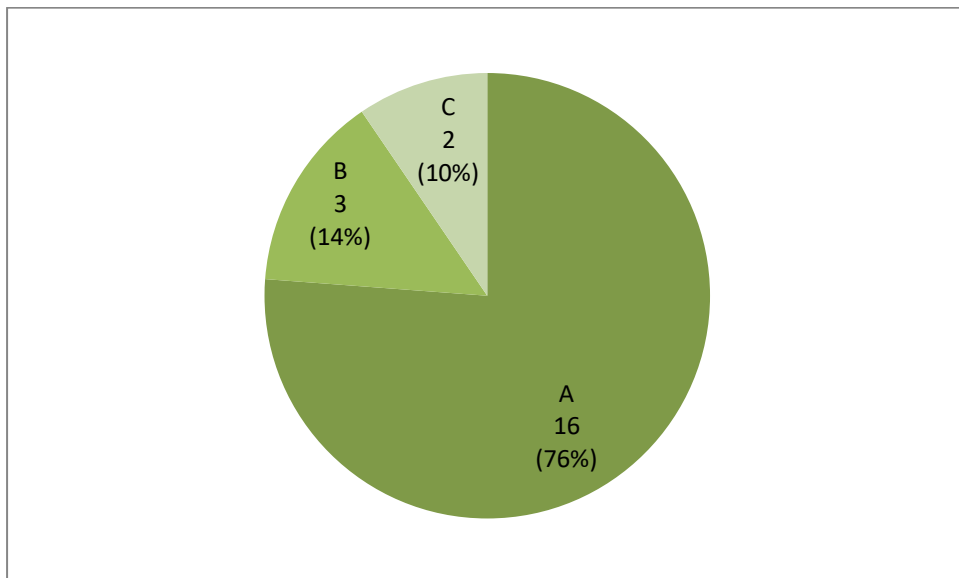


Figure A.4 - Illustration of Robustness of Publications about Electromagnetic Energies Treatment Trials

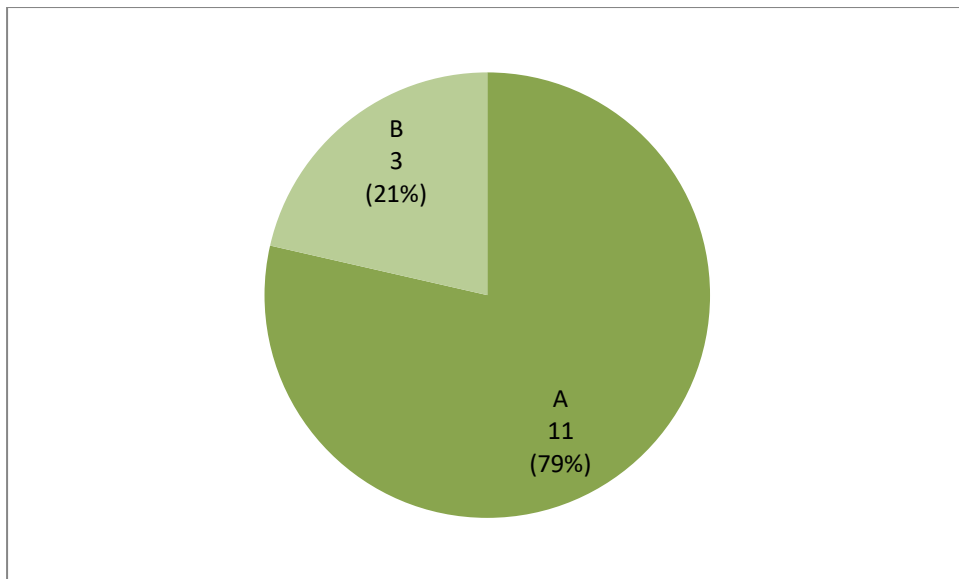


Figure A.5 - Illustration of Robustness of Publications about Rock Dusts and Paramagnetism Treatment Trials

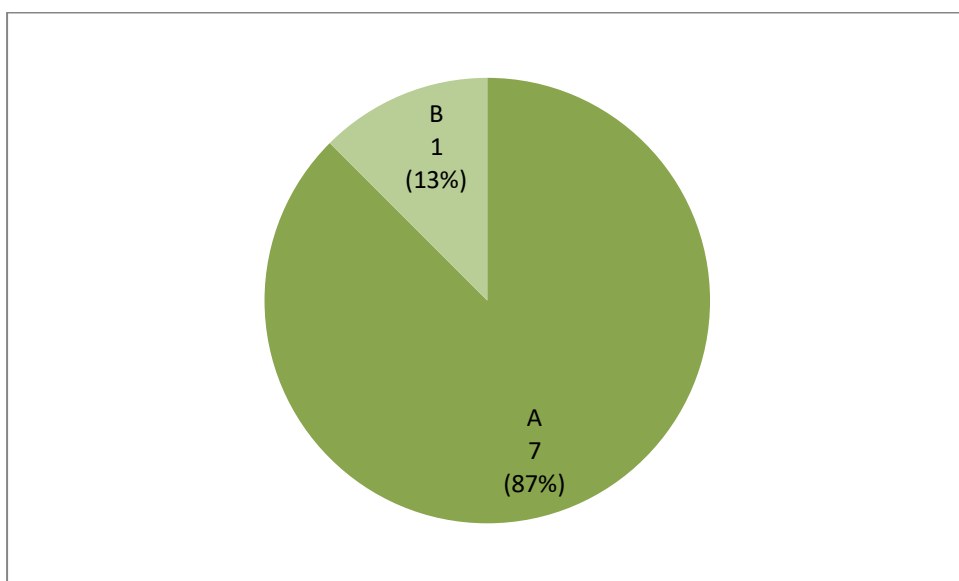


Figure A.6 - Illustration of Robustness of Publications about Astronomical Planting Calendar Treatment Trials

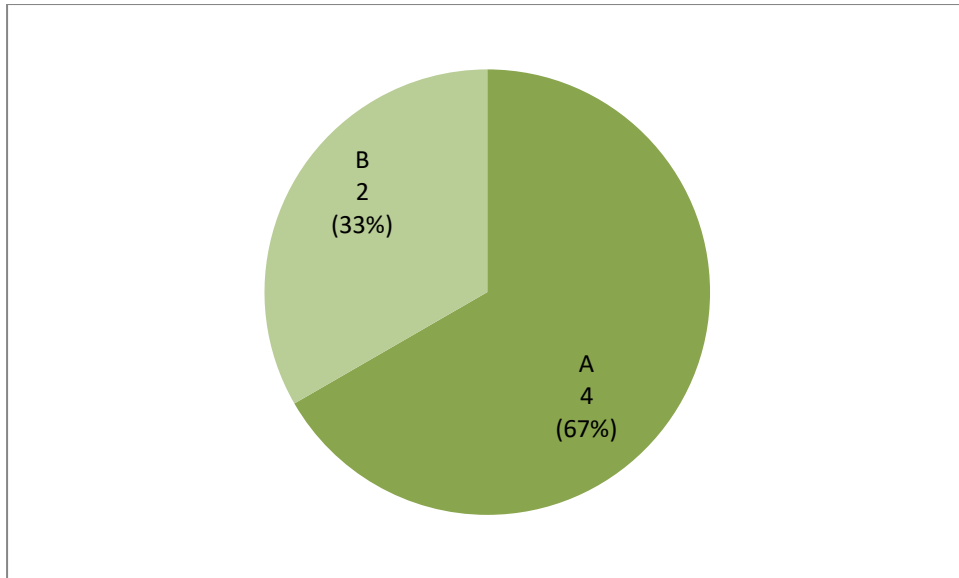


Figure A.7- Illustration of Robustness of Publications about Ritual-based Treatment Trials

Appendix B – Breakdown of Geographical Distribution per Subtle Agroecological Practice

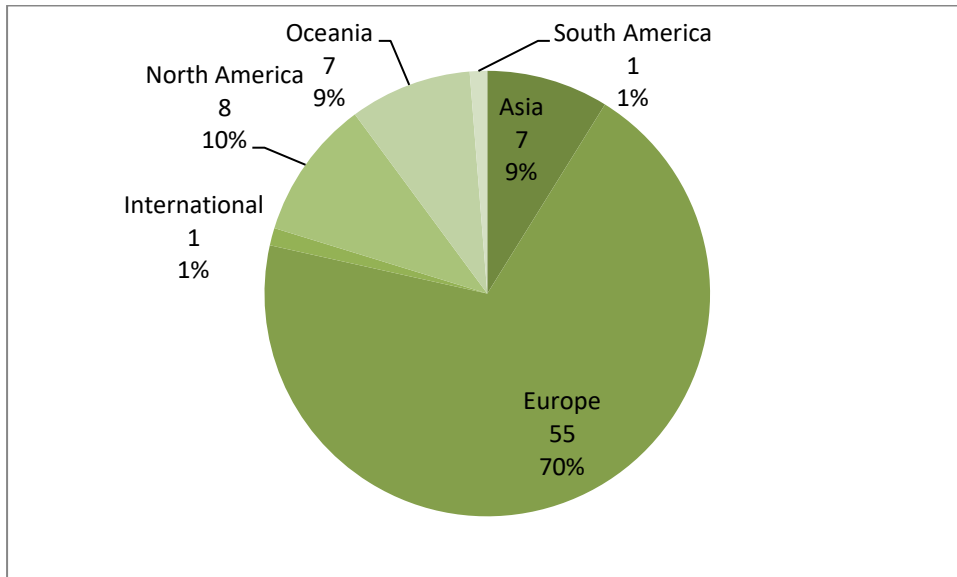


Figure B.1 - Illustration of Geographical Breakdown of Biodynamic Treatment Trials

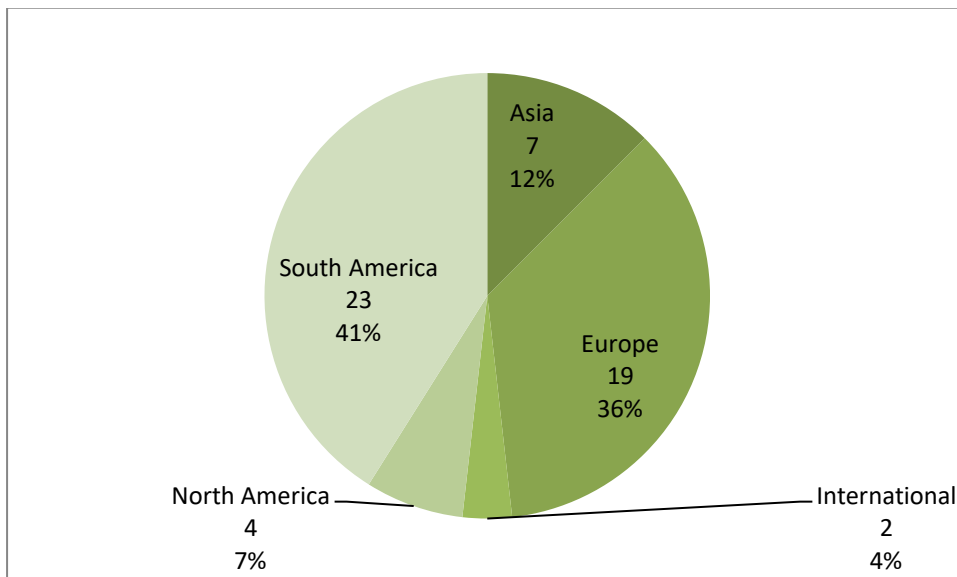


Figure B.2 Illustration of Geographical Breakdown of Homeopathic Treatment Trials

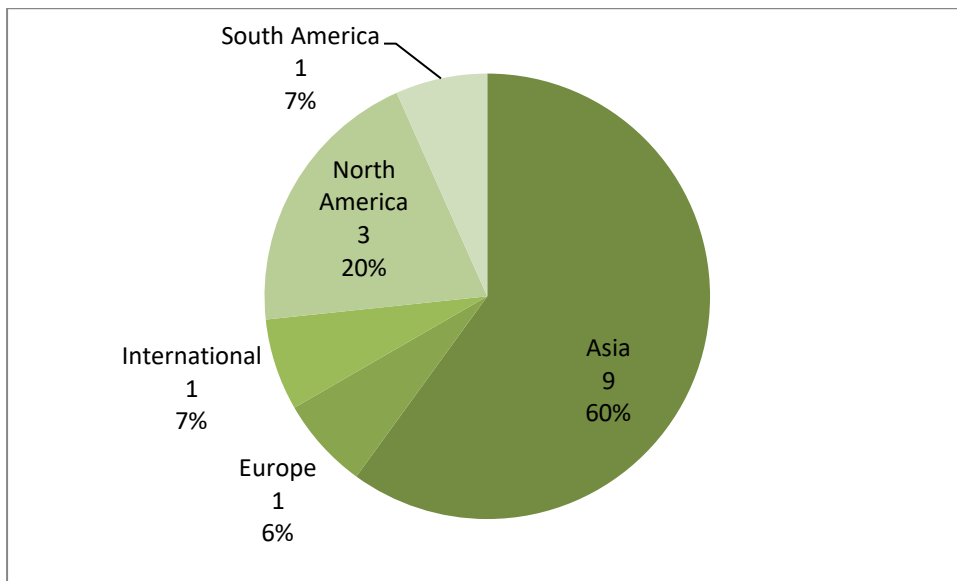


Figure B.3 - Illustration of Geographical Breakdown of Sound Energies Treatment

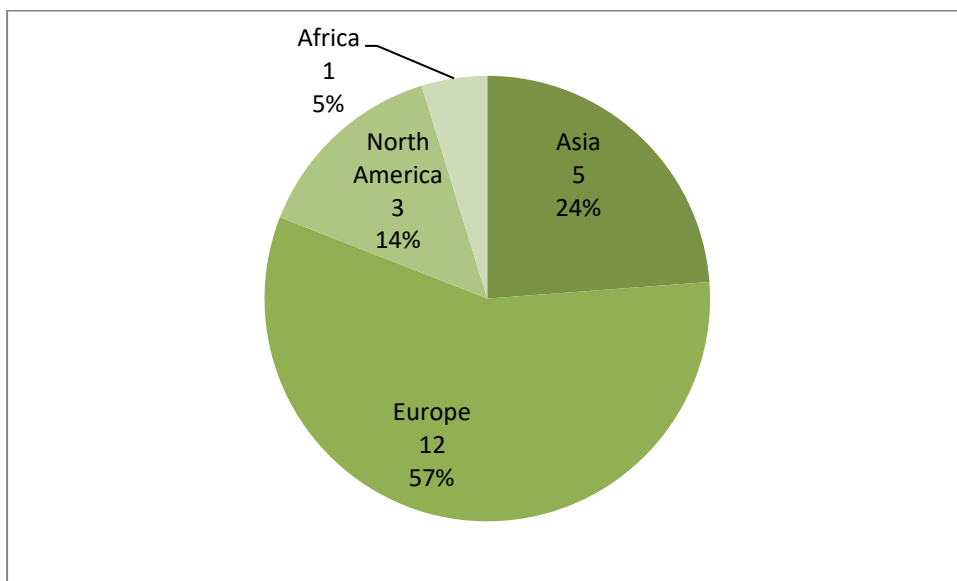


Figure B.4 - Illustration of Geographical Breakdown of Electromagnetic Energies Treatment

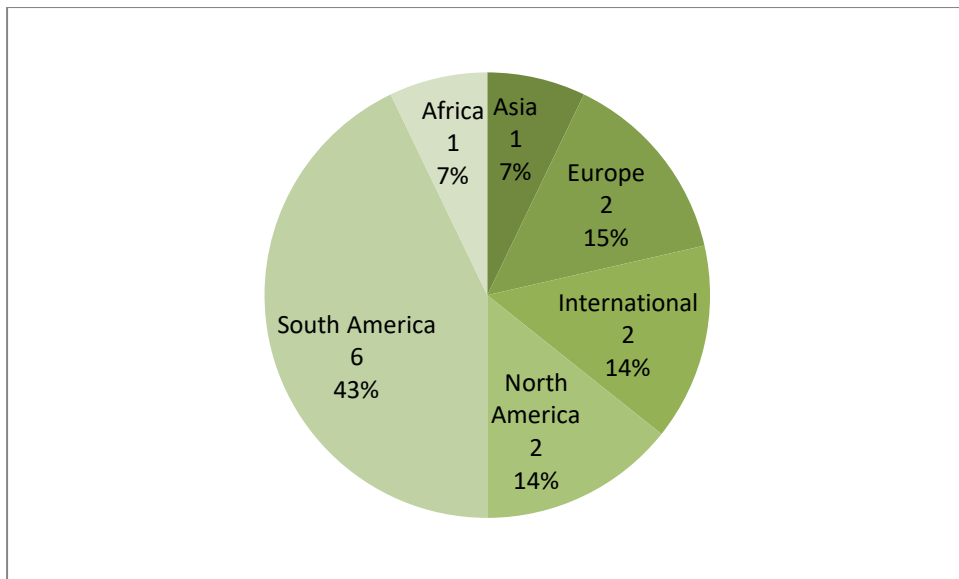


Figure B.5 - Illustration of Geographical Breakdown of Rock Dusts and Paramagnetism Treatment

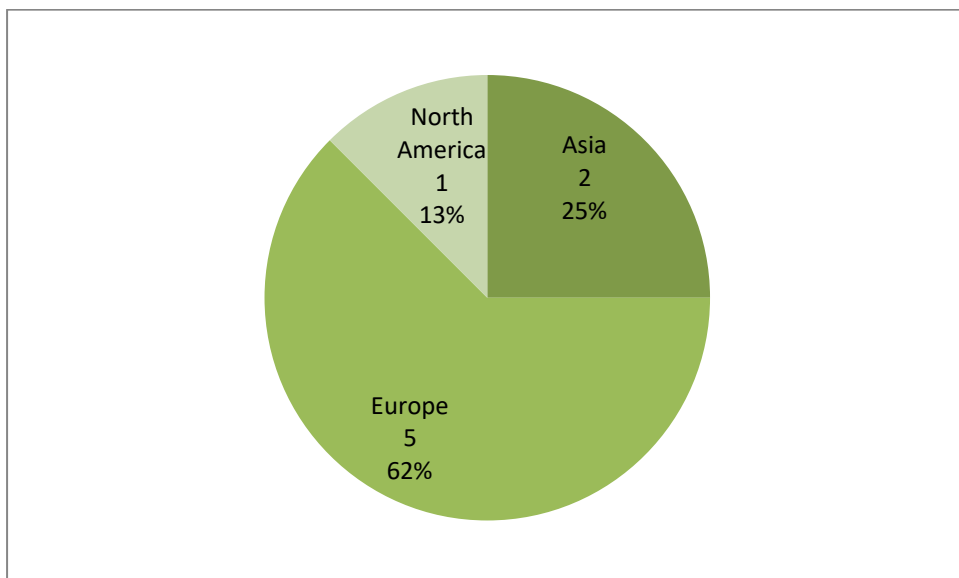


Figure B.6 - Illustration of Geographical Breakdown of Astronomical Planting Calendar Treatment

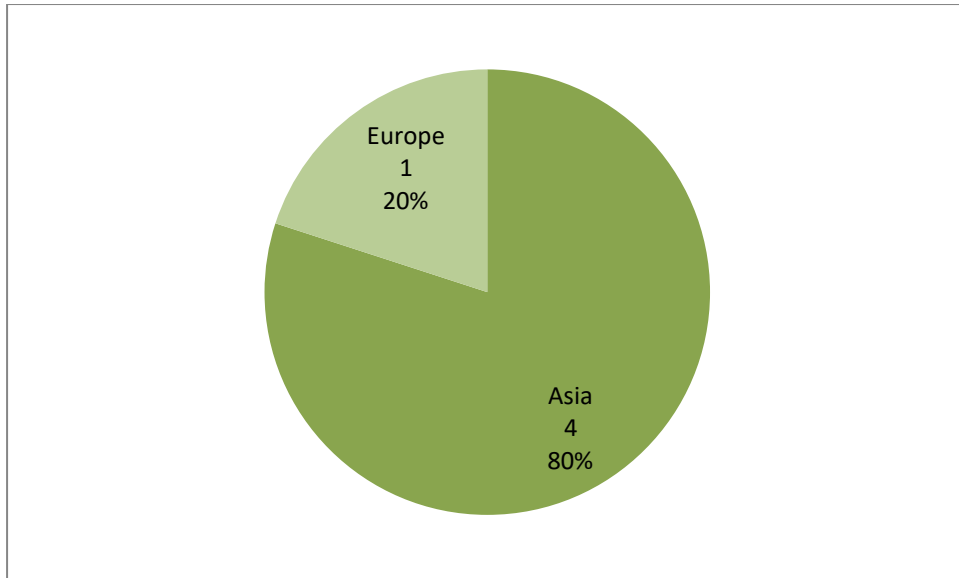


Figure B.7 - Illustration of Geographical Breakdown of Ritual-based Treatments

Appendix C – Breakdown of Publication Dates per Subtle Agroecological Practice

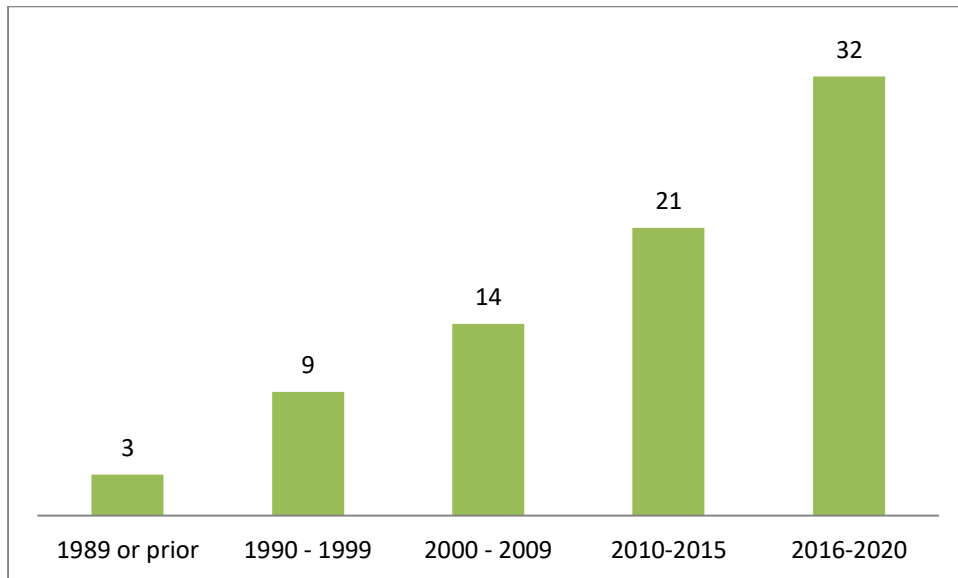


Figure C.1 - Illustration of Publication Date of Biodynamic Treatment Trials

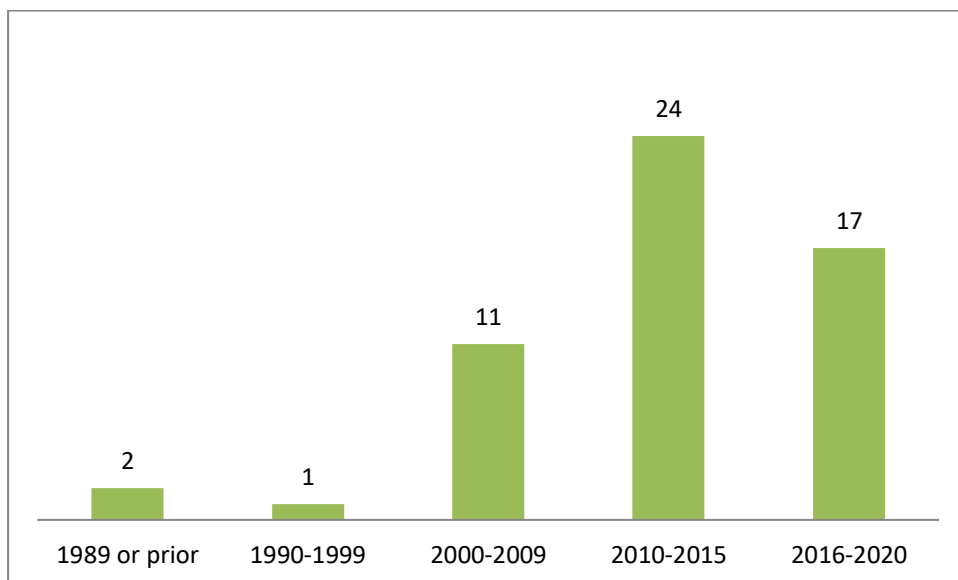


Figure C.2 - Illustration of Publication Date of Homeopathic Treatment Trials

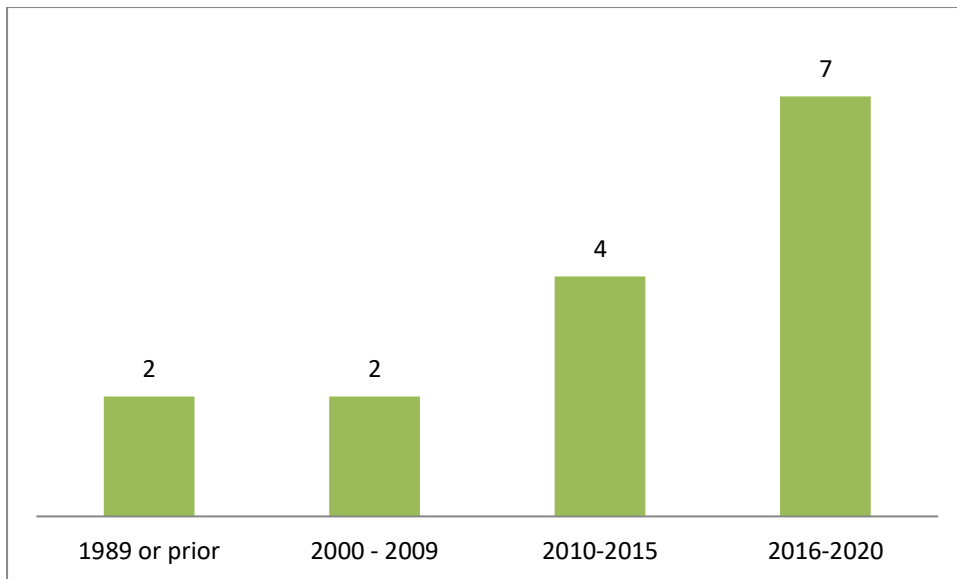


Figure C.3 - Illustration of Publication Date of Sound/Electrical Energies Treatment Trials

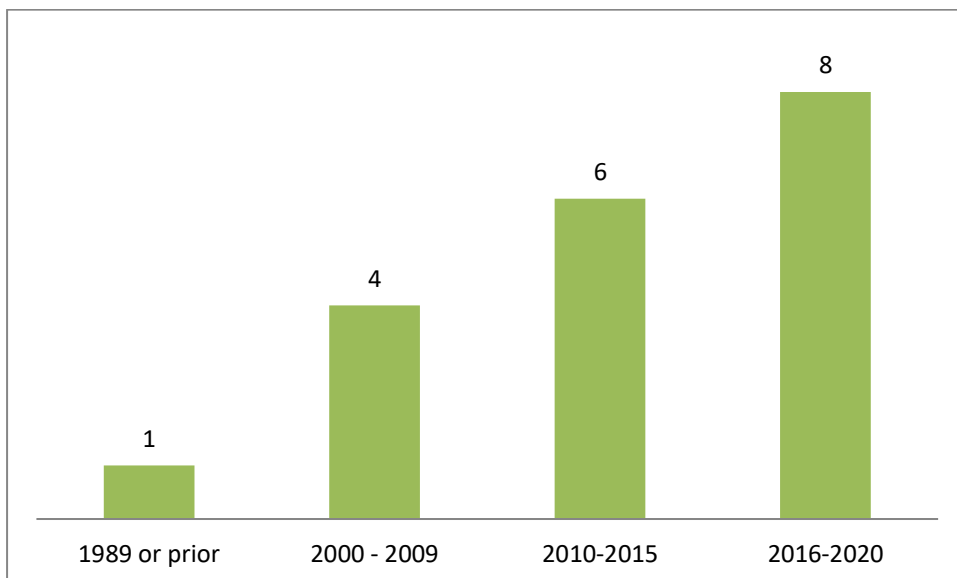


Figure C.4 - Illustration of Publication Date of Electromagnetic Energies Treatment Trials

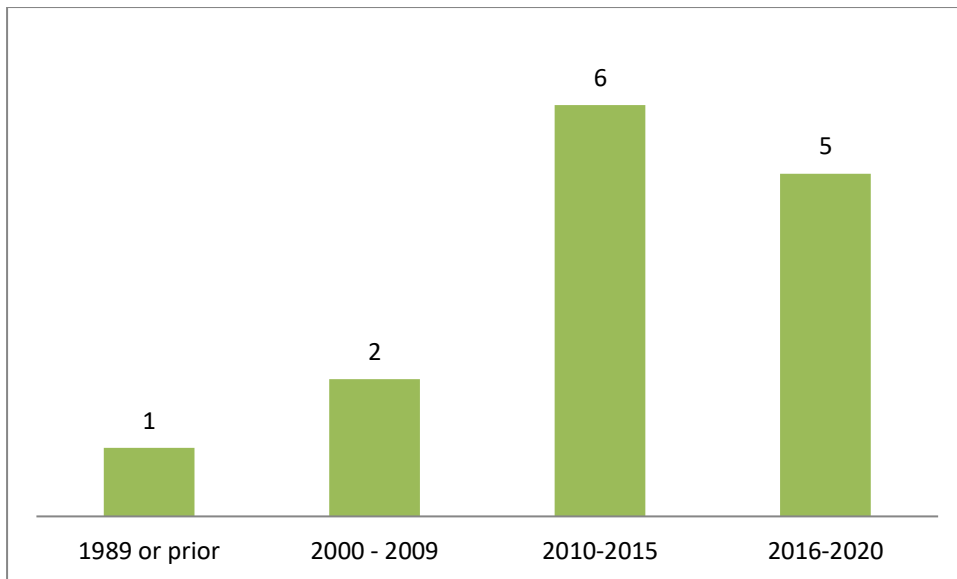


Figure C.5 - Illustration of Publication Date of Rock Dusts and Paramagnetism Treatment Trials

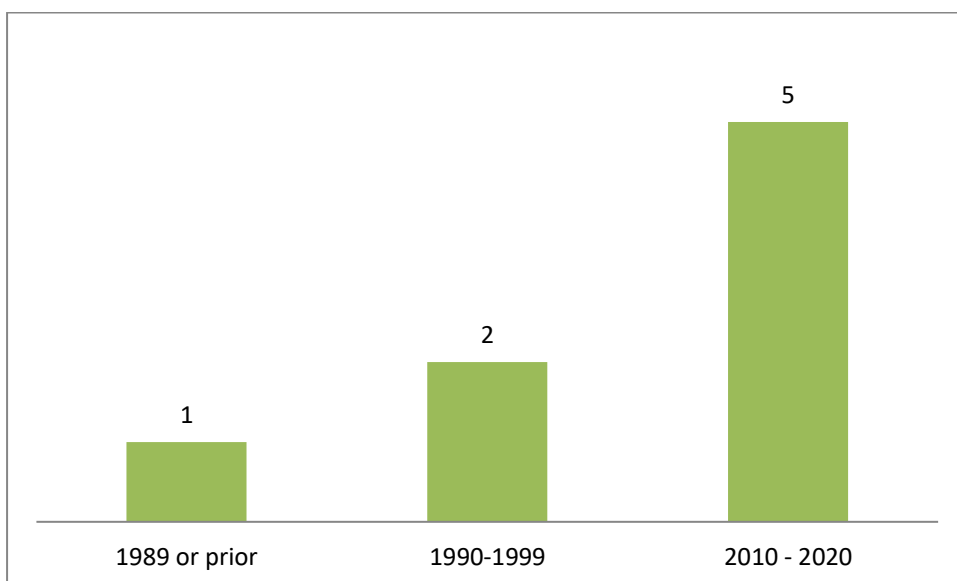


Figure C.6 - Illustration of Publication Date of Astronomical Planting Calendar Treatment Trials

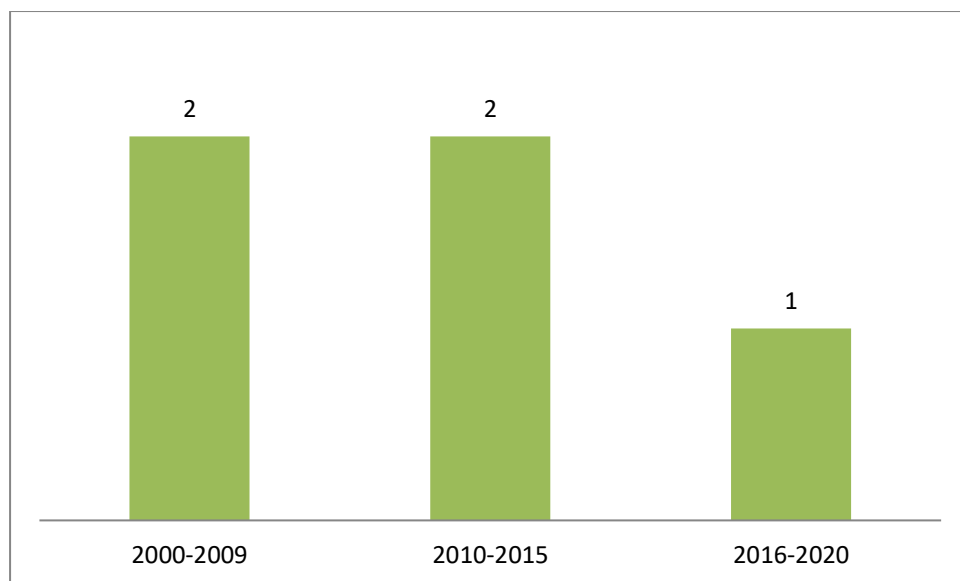


Figure C.7 - Illustration of Publication Date of Ritual-based Treatment Trials

Appendix D – Breakdown of Test Subject per Subtle Agroecological Practice

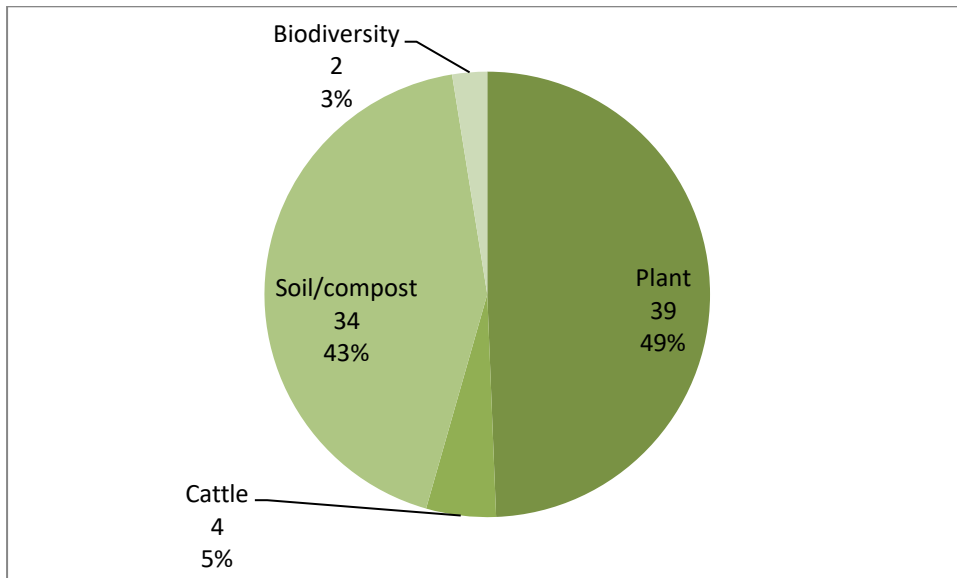


Figure D.1 - Test Subject Breakdown of Biodynamic Treatment Trials

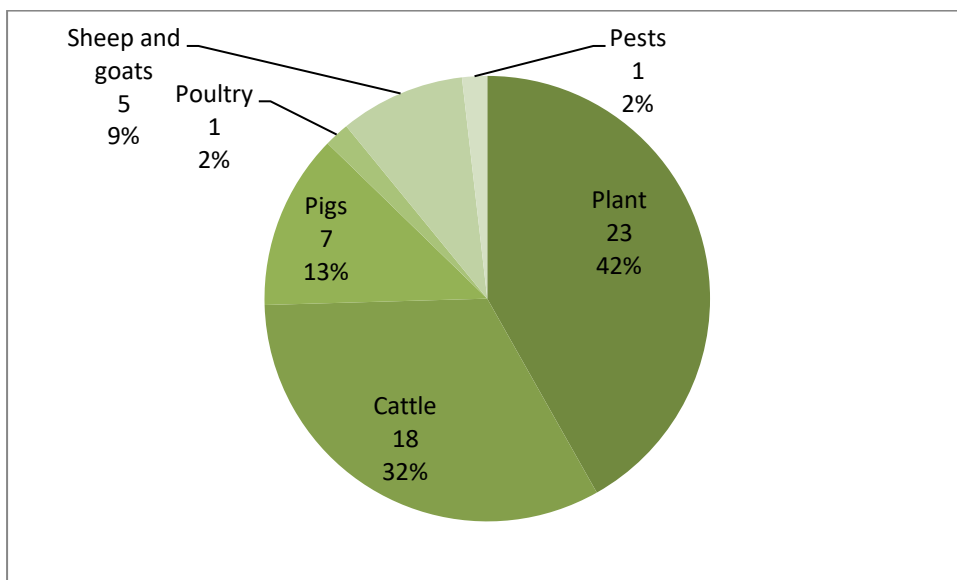


Figure D.2 - Test Subject Breakdown of Homeopathic Treatment Trials

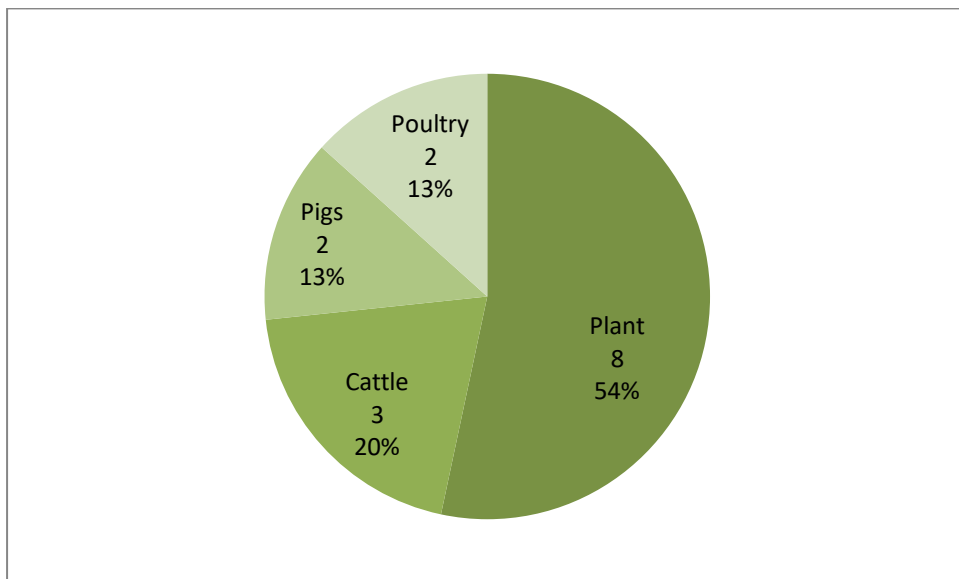


Figure D.3 - Test Subject Breakdown of Sound Energies Treatment Trials

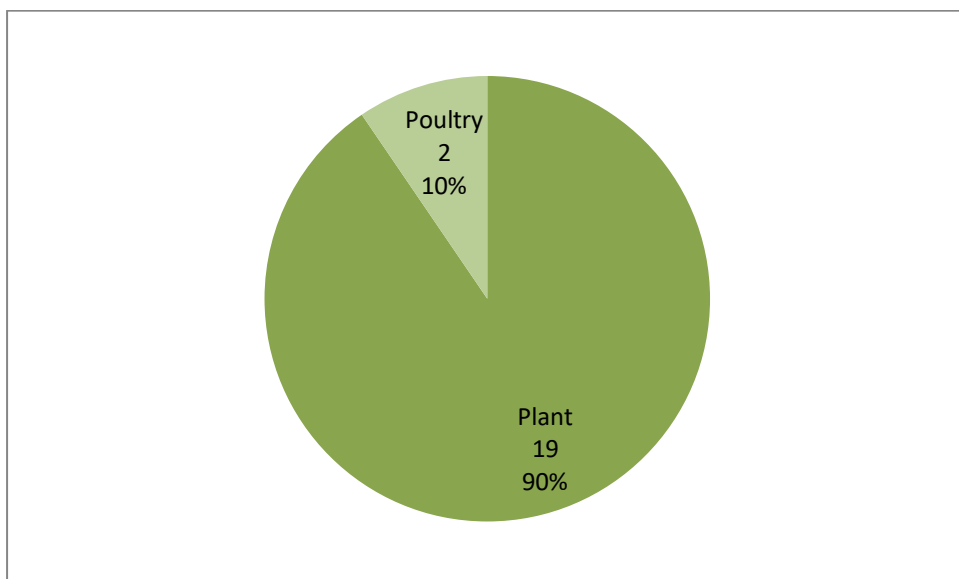


Figure D.4 - Test Subject Breakdown of Electromagnetic Energies Treatment Trials

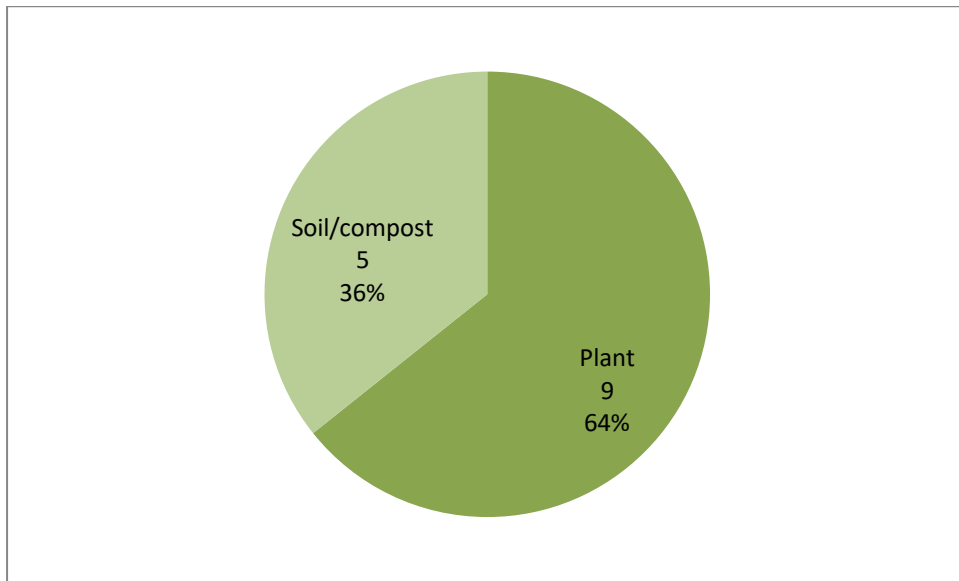


Figure D.5 - Test Subject Breakdown of Rock Dusts and Paramagnetism Treatment Trials

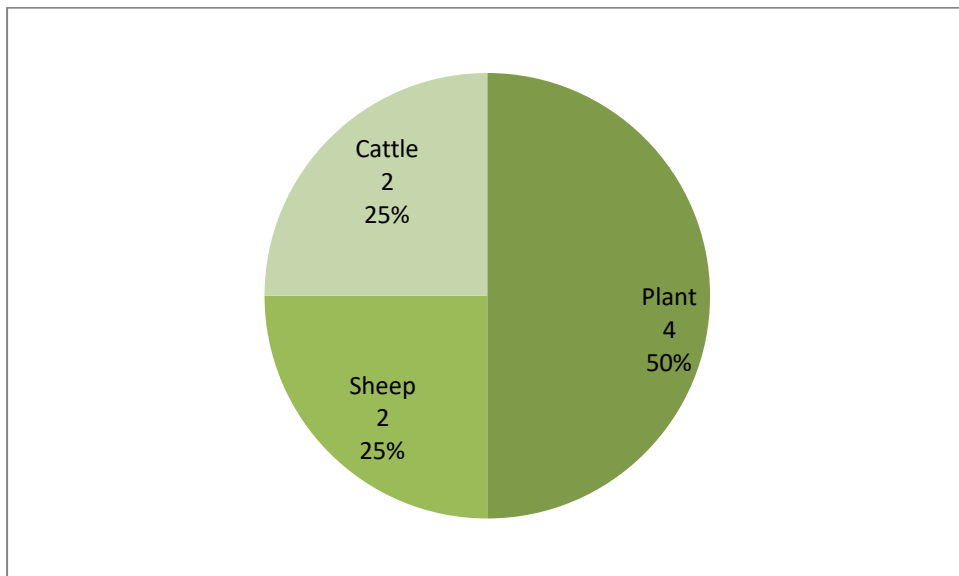


Figure D.6 - Test Subject Breakdown of Astronomical Planting Calendar Treatment Trials

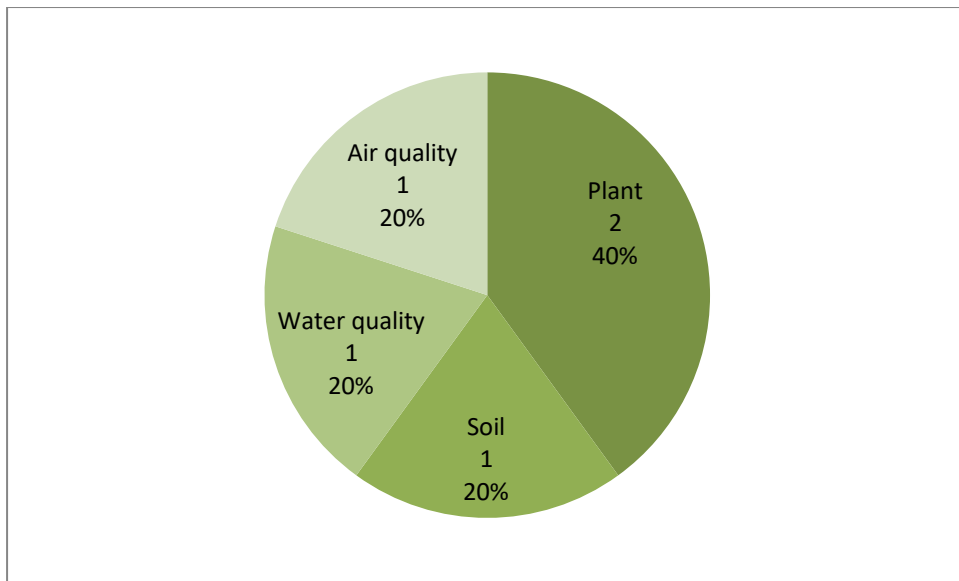


Figure D.7 - Test Subject Breakdown of Ritual-based Trials

Appendix E – Breakdown of Trial Results per Subtle Agroecological Practice

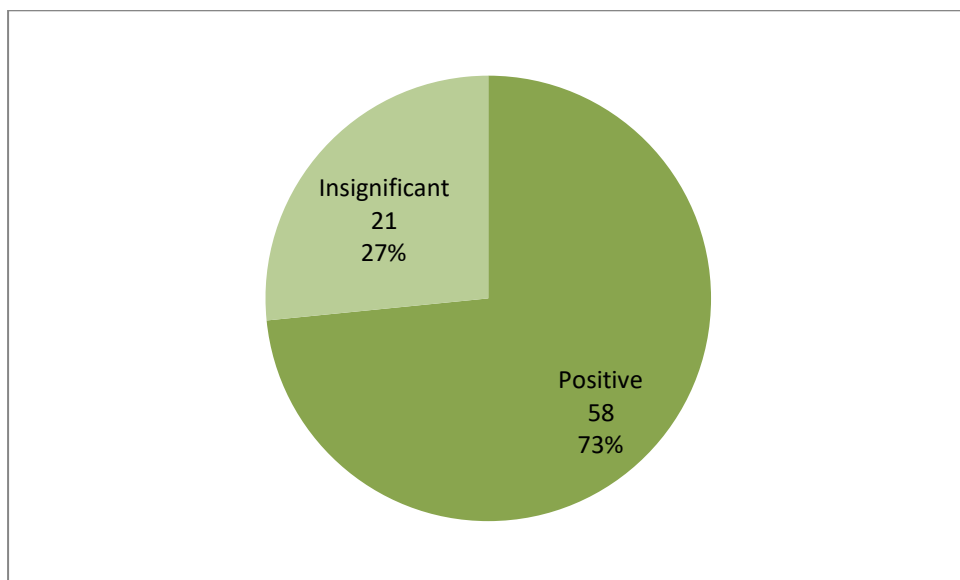


Figure E.1 - Results of Biodynamic Treatment Trials

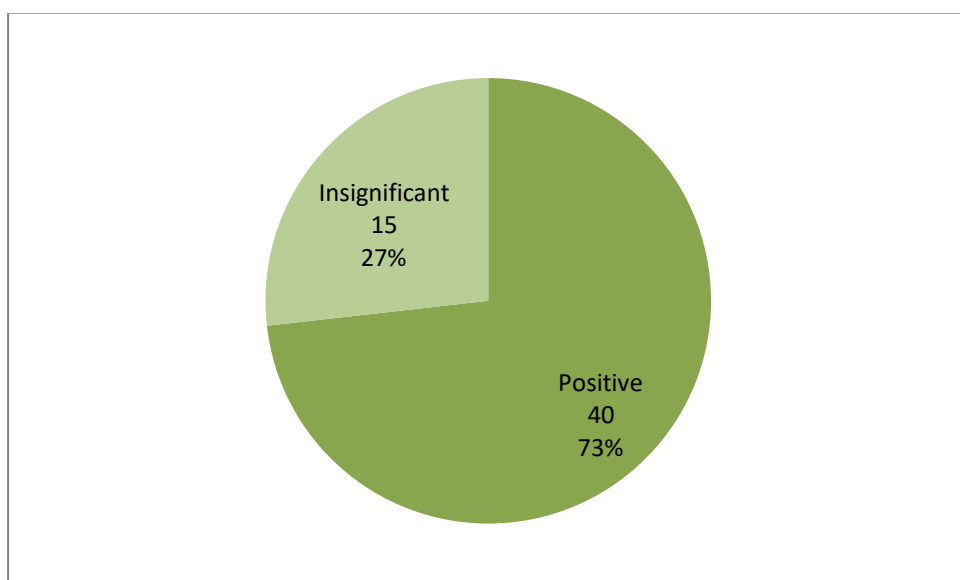


Figure E.2- Results of Homeopathic Treatment Trials

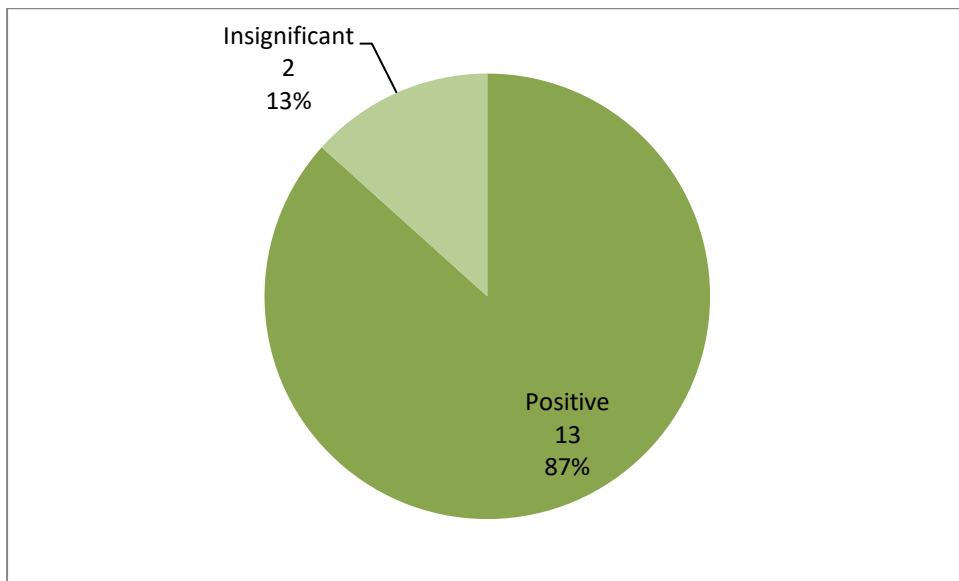


Figure E.3 - Results of Sound Energies Trials

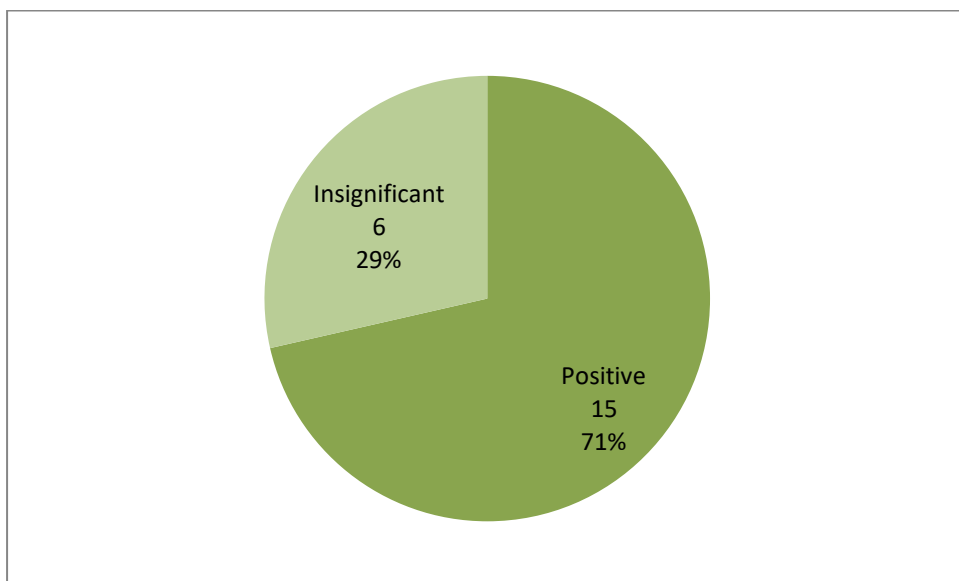


Figure E.4 - Results of Electromagnetic Energies Trials

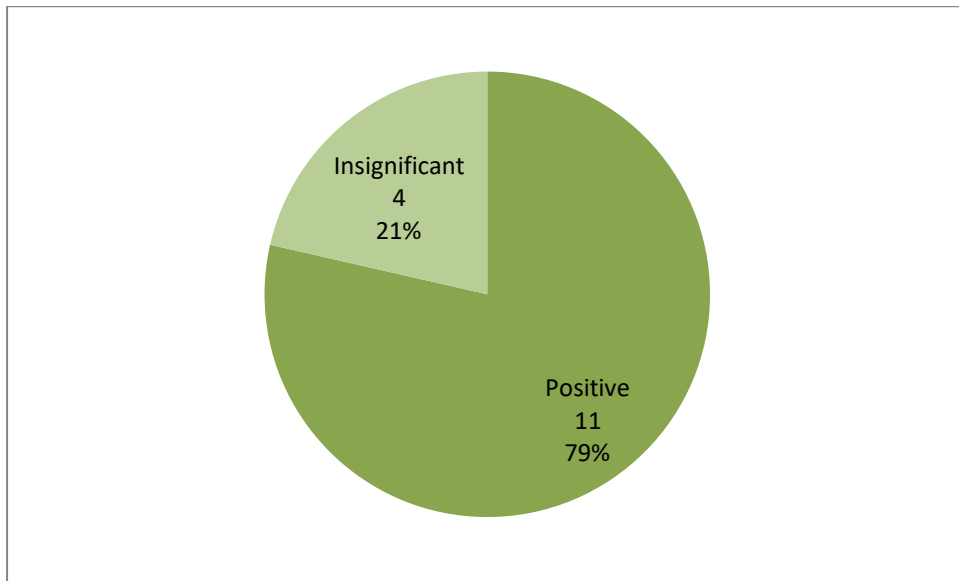


Figure E.5 - Results of Rock Dusts and Paramagnetism Treatment Trials

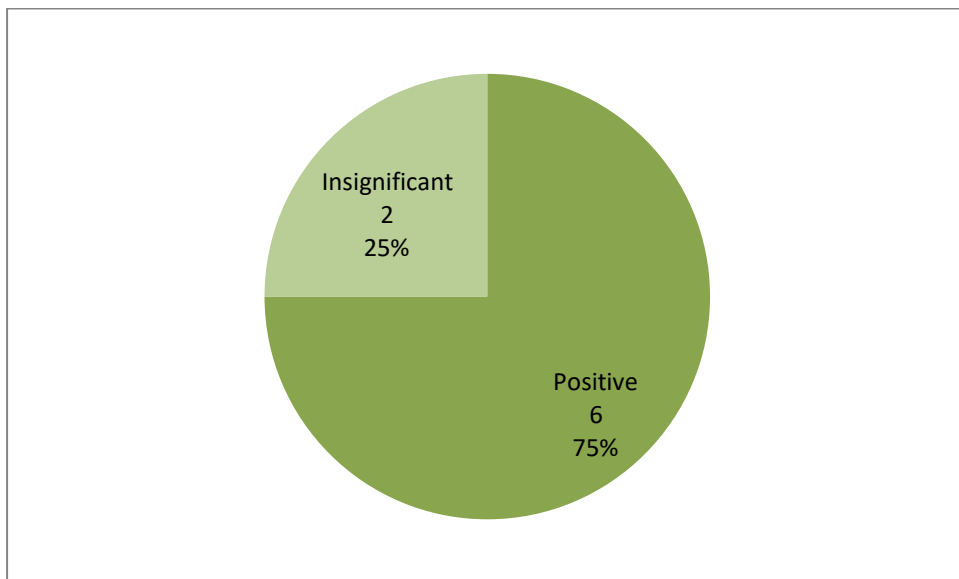


Figure E.6 - Results of Astronomical Planting Calendar Treatment Trials

Appendix F – Breakdown of Trial Type per Subtle Agroecological Practice

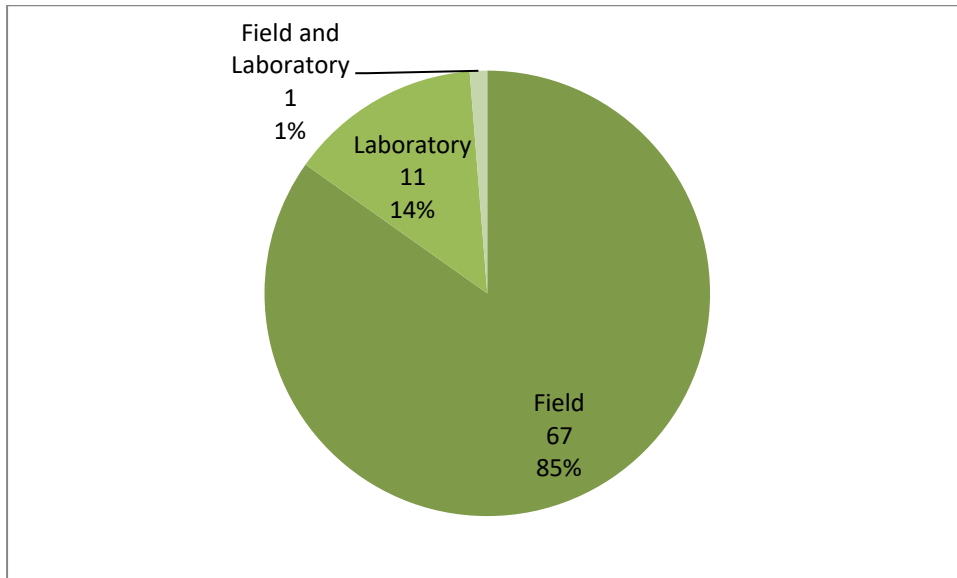


Figure F.1 - Illustration of Trial Type for Biodynamic Treatment Trials

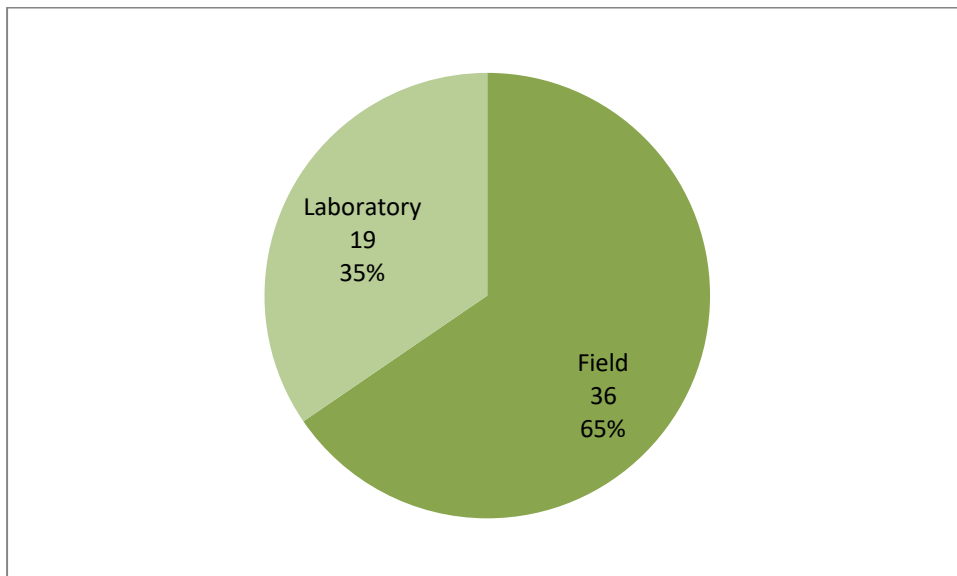


Figure F.2 - Illustration of Trial Type for Homeopathic Treatment Trials

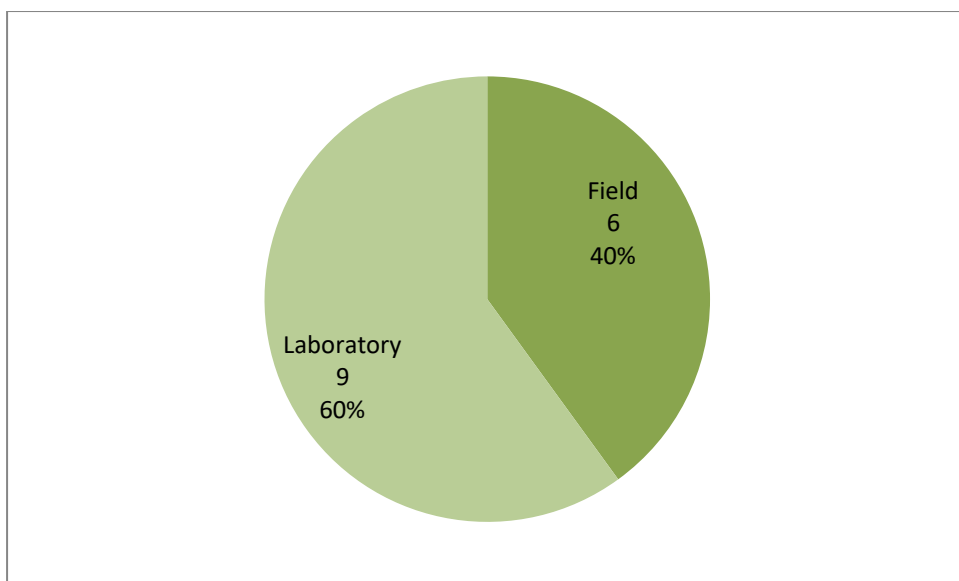


Figure F.3 - Illustration of Trial Type for Sound Treatment Trials

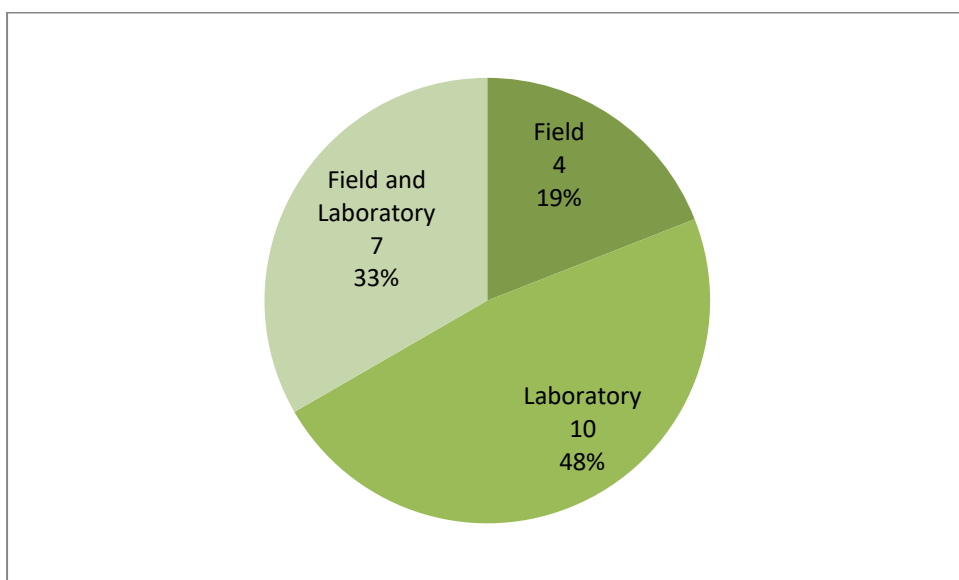


Figure F.4 - Illustration of Trial Type for Application of Electromagnetic Energies Trials

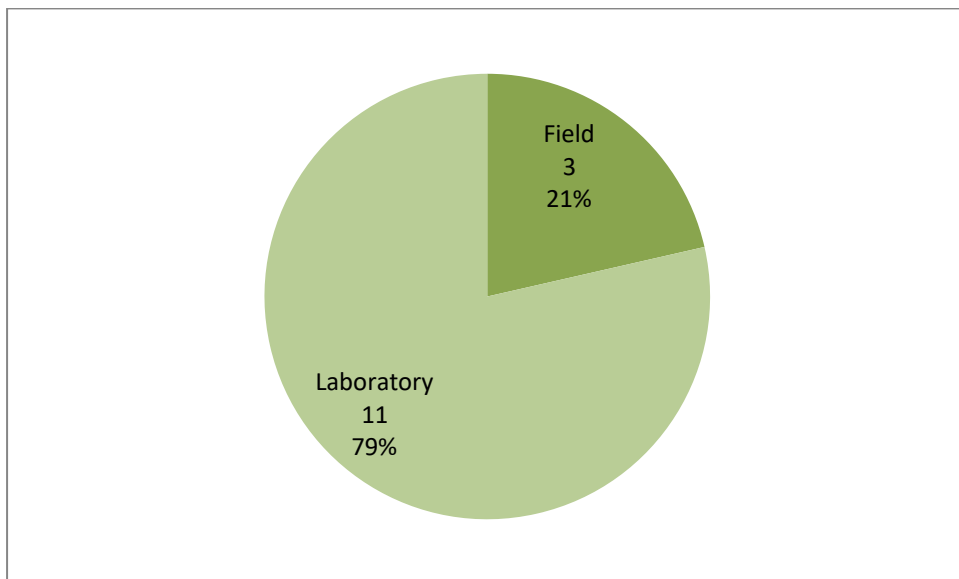


Figure F.5 - Illustration of Trial Type for Rock Dusts and Paramagnetism Trials

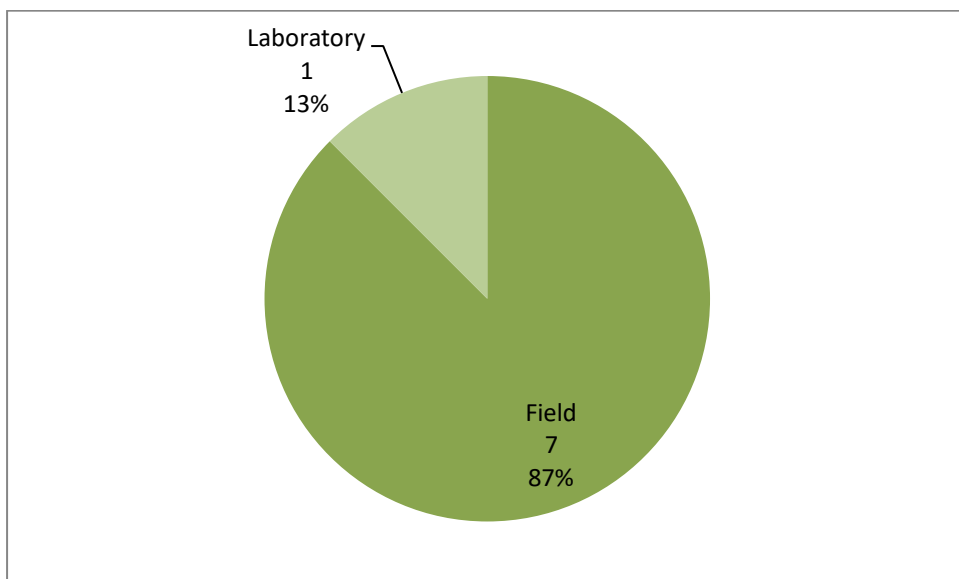


Figure F.6 - Illustration of Trial Type for Astronomical Planting Calendars Trials

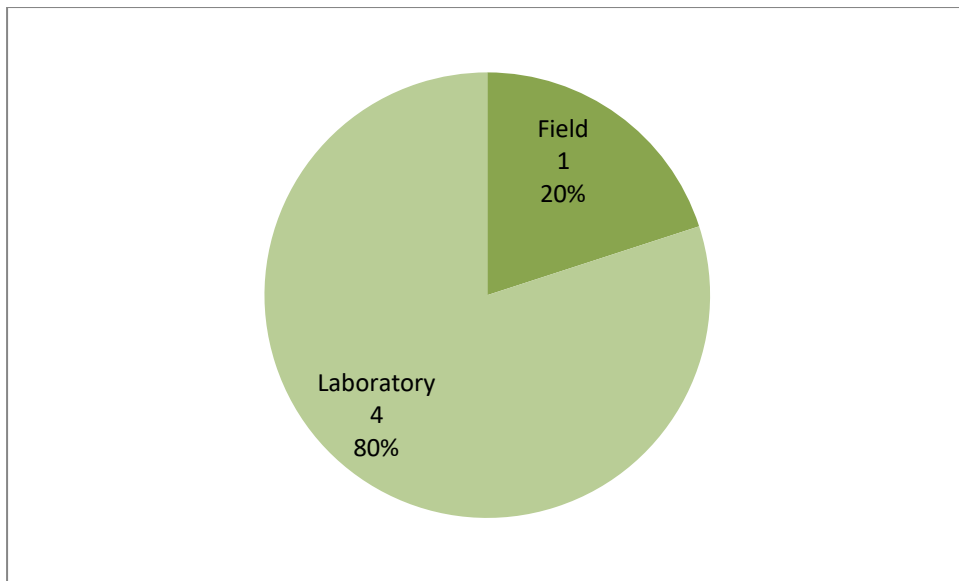


Figure F.7 - Illustration of Trial Type for Ritual-based Trials

Appendix G – Overview of Empirical Trials – Biodynamic Preparations

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Nutritional value of crops as influenced by organic and inorganic fertilizer treatments - Results of 12 years' experiments with vegetables (1960-1972)	Vegetables	Field	Germany	1974	Schupan, W.	QuaI. Plant - P1. Fds. hum. Nutr. XXIII, 4: 333-358, 1974,	Yields	Significant	A
Soil fertility and mineral nutrition of a biodynamic avocado plantation in Tenerife	Soil	Field	Spain	1989	García, C., Alvarez, C.E., Carracedo, A., Iglesias, E.	Biological Agriculture and Horticulture 6(1), pp. 1-10	Soil fertility	Significant	A
Soil phosphorus dynamics in cropping systems managed according to conventional and biological agricultural methods	Soil	Field	Switzerland	1993	Oberson, A., Fardeau, J.C., Besson, J.M., Sticher, H.	Biology and Fertility of Soils 16(2), pp. 111-117	Soil pH Humus % Available P Crop yields Soil microbial biomass	Statistically significant	A
Effects of Bio-dynamic, Organic and Conventional Farming on Ground Beetles (Col. Carabidae) and Other Epigaeic Arthropods in Winter Wheat	Biodiversity	Field	Switzerland	1996	Pfiffner, L., Niggli, U.	Biological Agriculture and Horticulture 12(4), pp. 353-364	Number of carabids and other arthropods	Significant	A
Microbiological processes in soil organic phosphorus transformations in conventional and biological cropping systems	Soil	Laboratory	Switzerland	1996	Oberson, A., Besson, J.M., Maire, N., Sticher, H.	Biology and Fertility of Soils 21(3), pp. 138-148	Microbial P values (k/ha) Mineralisation of Organic C Level of phosphatase activity	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effects of Biodynamic, Organic and Conventional Production Systems on Earthworm Populations	Biodiversity	Field	Switzerland	1997	Pfiffner, L., Mäder, P.	Biological Agriculture and Horticulture 15(1-4), pp. 2-10	Earthworm density Earthworm species	Significant	A
Effects of cropping systems on soil organic matter in a pair of conventional and biodynamic mixed cropping farms in Canterbury, New Zealand	Soil	Field	New Zealand	1997	Murata, T., Goh, K.M.	Biology and Fertility of Soils 25(4), pp. 372-381	Total C Total N Microbial biomass C Microbial biomass N Stable Soil Organic Matter	Significant	A
Effects of phosphorus and nitrogen on growth of pasture plants and VAM fungi in SE Australian soils with contrasting fertiliser histories (conventional and biodynamic)	Soil	Laboratory	Australia	1999	Ryan, M., Ash, J.	Agriculture, Ecosystems and Environment 73(1), pp. 51-62	Growth of pasture plants VAM fungi	Insignificant	A
Biodynamic preparations: Short-term effects on crops, soils, and weed populations	Soil	Field	United States	2000	Carpenter-Boggs, L., Reganold, J.P., Kennedy, A.C.	American Journal of Alternative Agriculture 15(3), pp. 110-118	Leafy biomass yield Grain yield Nutrients per grain	Significant	A
Phosphorus controls the level of colonisation by arbuscular mycorrhizal fungi in conventional and biodynamic irrigated dairy pastures	Soil	Field	Australia	2000	Ryan, M.H., Small, D.R., Ash, J.E.	Australian Journal of Experimental Agriculture 40(5), pp. 663-670	Soil and pasture nutrient concentrations	Significant	A
Effects of Biodynamic Preparations on Compost Development	Soil	Field	United States	2000	Carpenter-Boggs, L., Reganold, J.P., Kennedy, A.C.	Biological Agriculture and Horticulture 17(4), pp. 313-328	Compost development	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Organic and biodynamic management: Effects on soil biology	Soil	Field	United States	2000	Carpenter-Boggs, L., Kennedy, A.C., Reganold, J.P.	Soil Science Society of America Journal 64(5), pp. 1651-1659	Compost temperature Nitrate content CO2 respiration Microbial communities	Significant	A
Application of compost elaborated with sugar-cane (<i>Saccharum officinarum</i> L.) crop residues	Sugarcane	Field	Brazil	2003	Dário, F.R., Veiga De Vincenzo, M.C., Cardelli, R., Miklós, A.A.W., Levi-Minzi, R., Kaemmerer, M.	Fresenius Environmental Bulletin 12(11), pp. 1379-1383	Field evaluation results Compost analysis Chemical soil properties Biological soil properties	Significant	A
Effects of traditional and biodynamic farmyard manure amendment on yields, soil chemical, biochemical and biological properties in a long-term field experiment	Soil	Field	Germany	2004	Zaller, J.G., Köpke, U.	Biology and Fertility of Soils 40(4), pp. 222-229	Yield Soil chemical properties Biochemical properties Biological properties	Significant	A
Soil and winegrape quality in biodynamically and organically managed vineyards	Grapevine	Field	United States	2005	Reeve, J.R., Carpenter-Boggs, L., Reganold, J.P., York, A.L., McGourty, G., McCloskey, L.P.	American Journal of Enology and Viticulture 56(4), pp. 367-376	Soil quality Wine grape quality	Significant	A
Amino acid and soil organic matter content of topsoil in a long term trial with farmyard manure and mineral fertilizers	Soil	Laboratory	Germany	2005	Scheller, E., Raupp, J.	Biological Agriculture and Horticulture 22(4), pp. 379-397	Amino Acid Soil Organic Matter Content	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Soil organic matter and biological soil quality indicators after 21 years of organic and conventional farming	Soil	Field	Switzerland	2006	Fließbach, A., Oberholzer, H-R., Gunst, L. and Mader, P.	Agriculture, Ecosystems and Environment 118, pp 273–284	Soil organic carbon Microbial biomass Soil acidity Soil microbial activities	Significant	A
Seed germination of the weed <i>Rumex obtusifolius</i> after on-farm conventional, biodynamic and vermicomposting of cattle manure.	Weeds	Field	Austria	2007	Zaller, J.G.	Annals of Applied Biology. , Vol. 151 Issue 2, p245-249.	Seed germination	Significant	A
Comparing irrigated biodynamic and conventionally managed dairy farms. 1. Soil and pasture properties	Soil	Field	Australia	2007	Burkitt, L.L., Small, D.R., McDonald, J.W., Wales, W.J., Jenkin, M.L.	Australian Journal of Experimental Agriculture 47(5), pp. 479-488	Soil fertility (on pasture)	Insignificant	A
Comparing irrigated biodynamic and conventionally managed dairy farms. 2. Milk production and composition and animal health	Vegetables	Field	Australia	2007	Burkitt, L.L., Wales, W.J., McDonald, J.W., Small, D.R., Jenkin, M.L.	Australian Journal of Experimental Agriculture 47(5), pp. 489-494	Milk yield Milk fat yield Milk protein yield Number of chemical treatments per yield Intestinal worm count SCC	Insignificant	A
Crop yield and soil fertility response to reduced tillage under organic management	Soil	Field	Switzerland	2008	Berner, A., Hildermann, I., Fließbach, A., Pfiffner, L., Niggli, U., Mäder, P.	Soil and Tillage Research 101(1-2), pp. 89-96	Crop yield Soil fertility	Insignificant	A
Long-term organic farming fosters below and aboveground biota: Implications for soil quality, biological control and productivity	Soil	Field	Switzerland	2008	Bonkowski, M., Christensen, S. Dubois, D., Ekelund, F., Fließbach, A., Gunst, L.,	Soil Biology and Biochemistry 40(9), pp. 2297-2308	Soil chemistry Microbial biomass	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
					Hedlund, K., Mäder, P., Mikola, J. Robin, C., Setälä, H., Tatin-Froux, F. van der Putten, W.H., , S.				
The impact of farming practice on soil microorganisms and arbuscular mycorrhizal fungi: Crop type versus long-term mineral and organic fertilization	Soil	Field	Germany	2010	Ngosong, C., Jarosch, M., Raupp, J., Neumann, E., Ruess, L.	Applied Soil Ecology 46(1), pp. 134-142	Soil microorganismsArbuscular mycorrhizal fungi	Insignificant	A
Long-term effects of organic farming on fungal and bacterial residues in relation to microbial energy metabolism	Soil	Field	Switzerland	2010	Joergensen, R.G., Mäder, P., Fließbach, A.	Biology and Fertility of Soils 46(3), pp. 303-307	Microbial properties Correlation coefficients between adenylates, ergosterol, fungal C, bacterial C, and galactosamine Correlation coefficients between adenylate energy charge (AEC), and the ratios ergosterol/microbial biomass C, ergosterol/ATP, and fungal C/bacterial C	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Influence of biodynamic preparations on compost development and resultant compost extracts on wheat seedling growth	Wheat	Field	United States	2010	Reeve, J.R., Carpenter-Boggs, L., Reganold, J.P., York, A.L., Brinton, W.F.	Bioresource Technology 101(14), pp. 5658-5666	Compost development	Significant	A
Effects of fertilizer and spatial heterogeneity in soil pH on microbial biomass indices in a long-term field trial of organic agriculture	Soil	Field	Germany	2010	Heinze, S., Raupp, J., Joergensen, R.G.	Plant and Soil 328(1), pp. 203-215	Soil chemical properties Microbial biomass and activity	Significant	A
Influence of industrial and alternative farming systems on contents of sugars, organic acids, total phenolic content, and the antioxidant activity of red beet (<i>Beta vulgaris</i> L. ssp. <i>vulgaris</i> Rote Kugel)	Beetroot	Field	Slovenia	2011	Bavec, M., Turinek, M., Grobelnik-Mlakar, S., Slatnar, A., Bavec, F.	Journal of Agricultural and Food Chemistry 58(22), pp. 11825-11831	Sugars content Organic acids content Total Phenolic Content Antioxidant activity	Significant	A
Soil organic matter pools and crop yields as affected by the rate of farmyard manure and use of biodynamic preparations in a sandy soil	Soil	Field	Germany	2011	Heitkamp, F., Raupp, J., Ludwig, B.	Organic Agriculture 1(2), pp. 111-124	Yield Soil organic matter	Insignificant	A
Effect of organic components on growth, yield and economic returns in potato	Potato	Field	India	2011	Verma, S.K., Asati, B.S., Tamrakar, S.K., Nanda, H.C., Gupta, C.R.	Potato Journal 38(1), pp. 51-55	Growth Yield	Significant	A
Impact of farming practices on soil diatoms and testate amoebae: A pilot study in the DOK-trial at Therwil, Switzerland	Soil	Field	Switzerland	2012	Heger, T.J., Straub, F., Mitchell, E.A.D.	European Journal of Soil Biology 49, pp. 31-36	Testate amoeba	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Conventional, organic and biodynamic farming: Differences in polyphenol content and antioxidant activity of Batavia lettuce	Lettuce	Field	Germany	2012	Heimler, D., Vignolini, P., Arfaioi, P., Isolani, L., Romani, A.	Journal of the Science of Food and Agriculture 92(3), pp. 551-556	Yield Polyphenol content Antioxidant	Insignificant	A
Soil microbial dynamics in organic (biodynamic) and integrated apple orchards	Apple	Field	Italy	2012	Bougnom, B.P., Greber, B., Franke-Whittle, I.H., Casera, C., Insam, H.	Organic Agriculture 2(1), pp. 1-11	Soil microbial qualities	Significant	A
Impact of reduced tillage on soil organic carbon and nutrient budgets under organic farming	Soil	Field	Switzerland	2012	Gadermaier, F., Berner, A., Fließbac, A., Friedel, J.K., Mäder, P.	Renewable Agriculture and Food Systems 27(1), pp. 68-80	Soil organic carbon Nutrient Budgets	Insignificant	A
Ecological impact of wheat and spelt production under industrial and alternative farming systems	Wheat and spelt	Field	Slovenia	2012	Bavec, M., Narodoslawsky, M., Bavec, F., Turinek, M.	Renewable Agriculture and Food Systems 27(3), pp. 242-250	Yields	Significant	A
Effect of different production systems on chemical profiles of dwarf French bean (<i>Phaseolus vulgaris</i> L. cv. Top Crop) pods	French bean	Field	Slovenia	2013	Jakopic, J., Slatnar, A., Mikulic-Petkovsek, M., Veberic, R., Stampar, F., Bavec, F., Bavec, M.	Journal of Agricultural and Food Chemistry 61(10), pp. 2392-2399	Chemical analysis	Significant	A
Response of on farm produced organic inputs on soil, plant nutrient status, yield and quality of guava (<i>Psidium guajava</i>) cv Allahabad Safeda	Guava	Field	India	2014	Ram, R.A., Singha, A., Bharguvanshi, S.R.	Indian Journal of Agricultural Sciences 84(8), pp. 962-967	Soil nutrients Plant nutrients	Significant	A
Productivity, quality and sustainability of winter wheat under long-term conventional and organic management in Switzerland	Wheat	Field	Switzerland	2015	Mayer, J., Gunst, L., Mader, P., Samson, M-F., Carcea, M., Valentina, N.,	European Journal of Agronomy 65, pp. 27-39	Crop yields Baking quality parameters Nitrogen use efficiency	Insignificant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
					Thomsen, I.K., Dubois, D.				
Characterization of Conventional, Biodynamic, and Organic Purple Grape Juices by Chemical Markers, Antioxidant Capacity, and Instrumental Taste Profile	Grapevine	Laboratory	International	2015	Granato, D., Margraf, T., Brotzakis, I., Capuano, E., van Ruth, S.M.	Journal of Food Science 80(1), pp. C55-C65	Chemical Markers Antioxidant Capacity Instrumental Taste Profile	Insignificant	A
Impact of biodynamic preparations and panchgavya in organically managed cropping systems comprising legumes on soil biological health	Soil	Field	India	2015	Rana, M., Raverkar, K.P., Pareek, N., Chandra, R., Singh, D.K.	Legume Research 38(2), pp. 219-228	Microbial population Microbial biomass carbon: Dehydrogenase Phosphatase Arylsulfatase Potentially mineralizable nitrogen:	Significant	A
Influence of biodynamic preparations on the quality indices and antioxidant compounds content in the tubers of coloured potatoes (<i>Solanum tuberosum</i> L.)	Potato	Field	Lithuania	2015	Jariene, E., Vaitkevičienė, N., Danilčenko, H., Gajewski, M., Chupakhina, G., Fedurayev, P., Ingold, R.	Notulae Botanicae Horti Agrobotanici Cluj-Napoca 43(2), pp. 392-397	Dry matter content Crude fibre content Antioxidant Compounds Content	Significant	A
Growth, yield and fruit quality of grapevines under organic and biodynamic management	Grapevine	Field	Germany	2015	Döring, J., Frisch, M., Tittmann, S., Stoll, M., Kauer, R.	PLoS ONE 10(10)	Growth Yield Fruit quality	Insignificant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Are Epiphytic Microbial Communities in the Carposphere of Ripening Grape Clusters (<i>Vitis vinifera</i> L.) Different between Conventional, Organic, and Biodynamic Grapes?	Grapevine	Laboratory	Germany	2016	Kecskeméti, E.; Berkelmann-Löhnertz, B.; Reineke, A.	. PLoS ONE. 8/8/2016, Vol. 11 Issue 8, p1-23. 23p.	Microbial communities and populations	Significant	A
Effects of biodynamic production on growth and essential oil content in Basil	Basil	Field	Croatia	2016	Dudaš, S., Poljuha, D., Šola, I., , Šegula, S., Varga, S., Sladonja, B.	Acta Botanica Croatica 75(2), pp. 260-265	Plant height Percentage of leaf Mass Essential oil content	Significant	A
Prevalence and activity of entomopathogenic nematodes and their antagonists in soils that are subject to different agricultural practices	Soil	Field	Germany	2016	Jaffuel, G., Mäder, P., Blanco-Perez, R., Chiriboga, X., Fließbac, A. Turlings, T.C.J., Campos-Herrera, R.	Agriculture, Ecosystems and Environment 230, pp. 329-340	Prevalence and activity of entomopathogenic nematodes	Insignificant	A
¹ H NMR foodomics reveals that the biodynamic and the organic cultivation managements produce different grape berries (<i>Vitis vinifera</i> L. cv. Sangiovese)	Grapevine	Field	Italy	2016	Picone, G., Trimigno, A., Tessarin, P., Donnini, S., Rombolà, A.D., Capozzi, F.	Food Chemistry 213, pp. 187-195	Grape berry composition	Significant	A
Evaluation of the oenological suitability of grapes grown using biodynamic agriculture: The case of a bad vintage	Grapevine	Field	Italy	2016	Guzzon, R., Gugole, S., Zanzotti, R., Malacarne, M., von Wallbrunn, C., Mescalchin, E.	Journal of Applied Microbiology 120(2), pp. 355-365	Microbiological and chemical properties of grapes and wine	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of biodynamic preparations on the content of some mineral elements and starch in tubers of three coloured potato cultivars	Potato	Field	Lithuania	2016	Vaitkevičienė, N., Jariene, E., Danilcenko, H., Sawicka, B.	Journal of Elementology 21(3), pp. 927-935	Amounts of dry matter Starch Mineral elements (potassium, magnesium, phosphorus and nitrogen)	Significant	A
An Experimental Test of a Biodynamic Method of Weed Suppression: The Biodynamic Seed Peppers	Turnip	Field	United States	2016	Kirchoff, B.K.	Organic Farming 2016 Volume 2 Issue 1 Pages 17-20	Weed suppression using BD peppers	Insignificant	A
The impact of biological agents on properties of heavy-textured soil and productivity of organically grown crops	Soil	Laboratory and Field	Poland	2017	Łachacz, A., Tyburski, J., Romanekas, K.	Agronomy Research 15(1), pp. 225-238	soil organic matter Soil pH Content of available forms of P, K and Mg	Insignificant	A
Effect of biodynamic soil amendments on microbial communities in comparison with inorganic fertilization	Soil	Field	Germany	2017	Faust, S., Heinze, S., Ngosong, C., Sradnic, A., Oltmanns, M., Raupp, J., Geisseler, D., Joergensen, R.G.	Applied Soil Ecology 114, pp. 82-89	Soil microbiota	Insignificant	A
Effect of biodynamic preparations on the phenolic antioxidants in potatoes with coloured-flesh	Potato	Field	Lithuania	2017	Jarienė, E., Vaitkevičienė, N., Danilčenko, H., Tajner-Czopek, A., Rytel, A., Kucharska, A., Sokół-Łętowska, A., Gertchen, M., Jeznach, M.	Biological Agriculture and Horticulture 33(3), pp. 172-182	phenolic compounds and antioxidant activity	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Quality characterisation via image forming methods differentiates grape juice produced from integrated, organic or biodynamic vineyards in the first year after conversion	Grapevine	Field	Germany	2017	Fritz, J., Athmann, M., Meissner, G., Kauer, R., Köpke, U.	Biological Agriculture and Horticulture 33(3), pp. 195-213	Plant morphology Chemical composition of grapes and wine	Significant	A
Soil microbiota respond to green manure in organic vineyards	Grapevine	Field	Italy	2017	Longa, C.M.O., Nicola, L., Antonielli, L., Mescalchin, E., Turco, E., Pertot, I.	Journal of Applied Microbiology 123(6), pp. 1547-1560	Soil microbiota	Insignificant	A
Effects of intensive and alternative production systems on the technological and quality parameters of rapeseed seed (<i>Brassica napus</i> L. 'Siska')	Rapeseed	Field	Slovenia	2017	Turinek, M., Bavec, M., Repič, M., Kranjc, M.A., Möllers, C., Tres, A., Bavec, F.	Journal of the Science of Food and Agriculture 97(8), pp. 2647-2656	Quality and nutritional parameters	Significant	A
Nutritional quality of soybean and wheat under organic, biodynamic and conventional agriculture in semi-arid tropical conditions of Central India	Soybean and wheat	Field	India	2018	Aher, S.B., Lakaria, B.L., Singh, A.B., Kaleshana, S., Yashona, D.S.	Indian Journal of Agricultural Biochemistry 31(2), pp. 128-136	Nutritional quality	Insignificant	A
Microbial biomass and activity down the soil profile after long-term addition of farmyard manure to a sandy soil	Soil	Field	Germany	2018	Sradnick, A., Oltmanns, M., Raupp, J., Joergensen, R.G.	Organic Agriculture 8(1), pp. 29-38	Microbial biomass and activity	Significant	A
Responses to climatic and pathogen threats differ in biodynamic and conventional vines	Grapevine	Field	France	2018	Soustre-Gacougnolle, I., Lollier, M., Schmitt, C., Perrin, M., Buvens, E., Lallemand, J.-F., Mermet,	Scientific Reports 8(1), 16857	Pathogen response	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
					M.,Heneaux, M.,Thibault-Carpentier,C., Dembelé,D.,Steyer, D., Clayeyx, C.,, Moneyron, A., Masson, J.E.				
Patterns of biodynamic milk fatty acid composition explained by a climate-geographical approach	Cattle	Laboratory	International	2019	Baars, T., Wohlers, J., Rohrer, C., Lorkowski, S., Jahreis, G.	Animals 9(3),111	Milk fatty acid (FA) composition	Significant	A
Effects of biodynamic preparations on concentration of phenolic compounds in the leaves of two white mulberry cultivars	Mulberry	Field	Lithuania	2019	Jarienė, E., Levickienė, D., Danilčenko, H., Vaitkevičienė, N., Kulaitienė,J., Jakštas, V., Ivanauskas, L., Gajewski,M.	Biological Agriculture and Horticulture 35(2), pp. 132-142	Concentrations of flavonoids Concentrations of phenolic compounds	Significant	A
Effect of organic sources of nutrients on performance of soybean (Glycine max)	Soybean	Field	India	2019	Aher, S.B., Lakaria, B.L.A.L., Singh , A.B., Kaleshananda, S. Ramana, S.,Ramesh,K.,T hakur,J.K.,, Raj put,P.S., Yashona, D.S.	Indian Journal of Agricultural Sciences 89(11), pp. 1787-1791	Pods/Plant Seeds/Pod 100Seed wt Seed Yield Straw Yield Total Biomass Nutrient uptake Effect of organic sources of nutrients on soil enzyme activity	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Soil aggregation and aggregate associated carbon in a vertisol under conventional, organic and biodynamic agriculture in semi-arid tropics of central India	Soil	Field	India	2019	Aher, S.B., Lakaria, B.L., Singh, A.B., Kaleshanda, S.	Journal of the Indian Society of Soil Science 67(2), pp. 183-191	Soil Ph EC Organic C Soybean yield Wheat yield Soil bulk density Distribution of soil aggregates	Insignificant	A
Conversion to organic and biodynamic viticultural practices: Impact on soil, grapevine development and grape quality	Grapevine	Field	Germany	2019	Meissner, G., Athmann, M., Fritz, J., Kauer, R., Stoll, M., Schultz, H.R.	Oeno One 53(4), pp. 639-659	Mean concentration of soil mineral nitrogen Earthworm abundance Fresh weight biomass Shoot length (cm) Pruning weight (t/ha) No. of leaf layers Proportion of inner leaves (%) Leaf chlorophyll content (mg/g fresh weight) Gaps in the canopy (%) Exposed grapes (%) Grape cluster compactness (cluster flexibility index) Grape yield	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of biodynamic preparations on the soil biological and agrochemical properties and coloured potato tubers quality	Potato	Field	Lithuania	2019	Vaitkevičiene, N., Jariene, E., Ingold, R., Peschke, J.	Open Agriculture 4(1), pp. 17-23	Available phosphorus Available potassium Nitrogen (sum of nitrate and nitrite nitrogen) Ammonia nitrogen Mineral nitrogen	Significant	A
Biodynamic preparations, greater root growth and health, stress resistance, and soil organic matter increases are linked	Soil	Field	United States	2019	Goldstein, W.A., Koepf, H.H., Koopmans, C.J.	Open Agriculture 4(1), pp. 187-202	Fertilization rate Shoot weight Root weight Tillers/plant Adventitious roots/plant Total root length	Significant	A
Biodynamic preparations on static pile composting from prickly pear cactus and moringa crop wastes	Compost	Field	Mexico	2019	Rodas-Gaitán, H.A., Palma-García, J.M., Olivares-Sáenz, E., Gutiérrez-Castorena, E.V., Vázquez-Alvarado, R.	Open Agriculture 4(1), pp. 247-257	Mean temperature of static piles Moisture of static piles pH and Electrical conductivity (EC) of static piles	Significant	A
Long-term farming systems and last crop sown shape the species and functional composition of the arable weed seed bank	Soil	Field	Switzerland	2020	Rotchés-Ribalta, R., Sans, F.X., Mayer, J., Mäder, P.	Applied Vegetation Science 23(3), pp. 428-440	Seed bank	Significant	A
Growth responses of garden cress (<i>Lepidium sativum</i> L.) to biodynamic cow manure preparation in a bioassay	Garden cress	Laboratory	Germany	2020	Morau, A., Piepho, H.-P., Fritz, J.	Biological Agriculture and Horticulture 36(1), pp. 16-34	Growth rate	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Vineyard management system affects soil microbiological properties	Soil	Field	Germany	2020	Di Giacinto, S., Friedel, M., Poll, C., Döring, J., Kunz, R., Kauer, R.	Oeno One 54(1), pp. 131-143	Soil microbiology	Significant	A
Enhanced soil quality with reduced tillage and solid manures in organic farming – a synthesis of 15 years	Soil	Field	Switzerland	2020	Krauss, M., Berner, A., Perrochet, F., Frei, R., Niggli, U., Mäder, P.	Scientific Reports 10(1),4403	Soil quality	Significant	A
Characterization of bioactive compounds in colored potato (solanum tuberosum l.) cultivars grown with conventional, organic, and biodynamic methods	Potato	Field	Lithuania	2020	Vaitkeviciene, N., Kulaitiene, J., Jariene, E., Levickienė, D., Danillchenko, H., Šrednicka-Tober, D., Rembiałkowska, E., Hallmann, E.	Sustainability (Switzerland) 12(7),2701	Contents of phenolics Content of flavonoids Content of anthocyanins	Significant	A
Comparison of chemical composition and taste of biodynamically and conventionally grown vegetables	Vegetables	laboratory	Denmark	1980	Hansen, H.	Qualitas Plantarum Plant Foods for Human Nutrition 30(3-4), pp. 203-211	Chemical composition Taste	Insignificant	B
Soil quality and financial performance of biodynamic and conventional farms in New Zealand	Soil	Field	New Zealand	1993	Reganold, J.P., Palmer, A.S., Lockhart, J.C., Macgregor, A.N.	Science 260(5106), pp. 344-349	Soil quality Financial performance	Significant	B
Biological Farming for Sustainable Agricultural Production	Soil	Field	Australia	1995	Penfold, C.M., Miyan, M.S., Reeves, T.G., Grierson, I.T.	Australian Journal of Experimental Agriculture 35(7), pp. 849-856	Organic C Extractable P Mycorrhizae Microbial biomass Microbial activity Earthworms Product quality Gross margin/hectare	Significant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
The species composition and frequency of spiders (Araneae) in fields of winter wheat grown under different conditions in Germany	Wheat	Field	Germany	1998	Basedow, Th.	Journal of Applied Entomology 122(9-10), pp. 585-590	Diversity of spider communities	Significant	B
Influence of Cultivation System on Bioactive Molecules Synthesis in Strawberries: Spin-off on Antioxidant and Antiproliferative Activity	Strawberry	Laboratory	Italy	2010	D'Evoli, L., Tarozzi, A., Hrelia, P., Lucarini, M., Cocchiola, M., Gabrielli, P., Franco, F., Morroni, F., Cantelli-Forti, G., Lombardi-Bocci, G.	Journal of Food Science—Vol. 75, Nr. 1	Bioactive molecules Antioxidant activity	Significant	B
Chemical and sensory characterisation of Sangiovese red wines: Comparison between biodynamic and organic management	Grapevine	Field	Italy	2015	Parpinello, G.P., Rombolà, A.D., Simoni, M., Versari, A.	Food Chemistry 167, pp. 1-8	Chemical and sensory attributes	Significant	B
Parthenolide in Danish biodynamic and organic milk: A new source of exposure to an allergenic sesquiterpene lactone	Cattle	Laboratory	Denmark	2018	Paulsen, E., El-Houri, R.B., Andersen, K.E., Christensen, L.P.	Contact Dermatitis 79(4), pp. 208-212	Parthenolide (allergen)	Insignificant	B
Differentiation between milk from low-input biodynamic, intermediate-input organic and high-input conventional farming systems using fluorescence excitation spectroscopy (FES) and fatty acids	Cattle	Laboratory	Germany	2019	Wohlers, J., Stolz, P.	Biological Agriculture and Horticulture 35(3), pp. 172-186	Fat-, protein- and urea concentration Somatic-cell count Fatty acid levels (FA)	Insignificant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Influence of organic nutrients with spraying of foliar organics on yield parameters of sindil kodi (tinospora cordifolia)	Tinospora cordifolia	Field	India	2020	Sivasankar, S., Manivannan, K., Sureshkumar, R., Sendhilnathan, R., Rajkumar, M.	Plant Archives 20, pp. 1560-1562	Yield	Significant	B

Appendix H – Overview of Empirical Trials – Homeopathic Treatments

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Control of tomato fruit rot caused by Fusarium Roseum with homoeopathic drugs.	Plant	Laboratory	India	1976	Khanna, K.K. and Chandra, S.	Indian Phytopathology 29, 269-272.	Tomato fruit rot	Significant	A
A homoeopathic drug controls mango fruit rot caused by Pestalotia mangiferae Henn. Experientia 34, 1167-1168.	Plant	Laboratory	India	1978	Khanna, K.K. and Chandra, S.	Experientia 34, 1167-1168	Mango fruit rot	Significant	A
Homeopathy versus antibiotics in metaphylaxis of infectious diseases: A clinical study in pig fattening and its significance to consumers	Pigs	Farm	Germany	1999	Albrecht, H., Schütte, A.	Alternative Therapies in Health and Medicine 5(5), pp. 64-68	Incidence of diseases	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
No effect of a homeopathic preparation on neonatal calf diarrhoea in a randomised double-blind, placebo-controlled clinical trial	Cattle	Farm	Sweden	2003	De Verdier, K., Öhagen, P., Alenius, S.	Acta Veterinaria Scandinavica 44(1-2), pp. 97-101	Diarrhoea duration	Insignificant	A
Comparison of Homeopathy, Placebo and Antibiotic Treatment of Clinical Mastitis in Dairy Cows—Methodological Issues and Results from a Randomized-clinical Trial.	Cattle	Farm	Norway	2004	Hektoen, L.; Larsen, S.; Ødegaard, S. A.; Løken, T.	Journal of Veterinary Medicine Series A. Dec2004, Vol. 51 Issue 9/10, p439-446.	Efficacy of treatment	Insignificant	A
Comparative efficacy of homeopathic and allopathic systems of medicine in the management of clinical mastitis of Indian dairy cows	Cattle	Farm	India	2005	Varshney, J.P., Naresh, R.	Homeopathy 94(2), pp. 81-85	Quarter cure rate % Recovery time (days) Cost of treatment	Significant	A
Controlled clinical trial of the effect of a homeopathic nosode on the somatic cell counts in the milk of clinically normal dairy cows.	Cattle	Farm	United Kingdom	2005	Holmes, M. A.; Cockcroft, P. D.; Booth, C. E.; Heat, M. F. Veterinary Record:	Journal of the British Veterinary Association. 4/30/2005, Vol. 156 Issue 18, p565-567.	SCC	Insignificant	A
Duckweed (Lemna gibba L.) as a Test Organism for Homeopathic Potencies.	Duckweed	Laboratory	International	2007	Scherr, Claudia; Simon, Meinhard; Spranger, Jrg; Baumgartner, Stephan.	Journal of Alternative & Complementary Medicine. Nov2007, Vol. 13 Issue 9, p931-937.	Fron areaFron number	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Control of downy mildew on grapes in organic viticulture.	Grapevine	Field	Italy	2008	La Torre, A., Talocci, S., Spera, G., Valori, R.	Communications in agricultural and applied biological sciences 73(2), pp. 169-178	Leaves infected (%) Bunches infected (%) Yield	Insignificant	A
Anthelmintic efficacy of neem (<i>Azadirachta indica</i> A. Juss) and the homeopathic product Fator Vermes® in Morada Nova sheep	Sheep	Farm	Brazil	2008	Chagas, A.C.S.; Vieira, L.S.; Freitas, A.R.; Araújo, M.R.A.; Araújo-Filho, J.A.; Araguão, W.R.; Navarro, A.M.C.	Veterinary Parasitology . Jan2008, Vol. 151 Issue 1, p68-73	eggs per gram (EPG) of feces.	Insignificant	A
Homeopathic drugs Arsenicum Album and Sulphur affect the growth and essential oil content in mint (<i>Mentha Arvensis</i> L.).	Mint	Laboratory	Brazil	2009	Bonato, C.M., de Proença, G.T., Reis, B.	Acta Scientiarum. Agronomy. Maringá, v. 31, n. 1, pp 101-105	Plant height Root system's dry mass Shoot's dry mass Essential oil content	Significant	A
Homeopathic remedies in a semi-intensive alternative system of broiler production.	Poultry	Farm	Brazil	2009	Amalcaburio, R.; Filho, L.C. Pinheiro, M.; Honorato, L. A.; Menezes, N.A.	International Journal of High Dilution Research. 2009, Vol. 8 Issue 26, p33-39. 7p. 2 Charts.	Weight	Insignificant	A
Efficiency and costs of the health management in an organic dairy farm	Cattle	Farm	Italy	2009	Lorenzini, G., Martini, A., Sabatini, L., Gallai, S., Squilloni, S., Tambini, P., Casini, M., Polidori, R.	Italian Journal of Animal Science 8(SUPPL. 2), pp. 622-624	Type of medical treatments used by results of treatment Duration of medical treatments and calculated costs by type of medical treatments.	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Efficacy of homeopathic remedies as prophylaxis of bovine endometritis.	Cattle	Farm	Germany	2009	Arlt, S.; Padberg, W.; Drillich, M.; Heuwieser, W.	Journal of Dairy Science. Oct2009, Vol. 92 Issue 10, p4945-4953.	Classification of endometritis	Insignificant	A
Homeopathy as replacement to antibiotics in the case of Escherichia coli diarrhoea in neonatal piglets	Pigs	Farm	Netherlands	2010	Camerlink, I., Ellinger, L., Bakker, E.J., Lantinga, E.A.	Homeopathy 99(1), pp. 57-62	Diarrhoea occurrence (%)Diarrhoea incidence (%)	Significant	A
A randomized controlled trial to compare the use of homeopathy and internal Teat Sealers for the prevention of mastitis in organically farmed dairy cows during the dry period and 100 days post-calving	Cattle	Farm	Switzerland	2010	Klocke, P., Ivemeyer, S., Butler, G., Maeschli, A., Heil, F.	Homeopathy 99(2), pp. 90-98	Minor pathogens Major pathogens Environment associated pathogens SCC count	Significant	A
Reproductive performance of sows inseminated with diluted semen treated with homeopathic medicine.	Pigs	Farm	Brazil	2010	Soto, R.M.F.; Vuaden, E.R.; Coelho, C. de P.; Bonamin, L.V.; de Azevedo, S.S.; Benites, N.R.; Visintin, J.A.; de Barros, F.R.E.; Goissis, M.D.; Assumpção, M.E.O.A; Marques, M.G.	International Journal of High Dilution Research. 2010, Vol. 9 Issue 30, p51-57. 7p. 2 Charts.	Number of parturitions Parturition percentage (%) Numbers of return to estrus Return to estrus percentage (%) Mean number of newborn piglets Median number of newborn piglets	Significant	A
Effect of biotherapeutic of Alternaria solani on the early blight of tomato-plant and the in vitro development of the fungus.	Tomato	Laboratory	Brazil	2010	De Toledo Piza Gomes Carneiro; S.M.,Davidson Bueno Romano; E.,Pignoni, E.,Teixeira, M.Z.,da Costa Vasconcelos, M.E., Gomes, J.C.	International Journal of High Dilution Research. 2010, Vol. 9 Issue 33, p147-155.	germination of spores of A. solani	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
						9p.			
Antimicrobial resistance in production animals. Can homeopathy offer solutions? – Homeopathy as replacement to antibiotics in the case of neonatal diarrhoea in piglets [Antibiorésistance chez les animaux d'élevage. L'homéopathie peut-elle proposer des solutions ? – L'homéopathie en remplacement des antibiotiques pour les diarrhées néonatales des porcelets]	Pigs	Farm	Netherlands	2010	Ellinger, L.	Revue d'Homeopathie 10(4), pp. 166-170	No. of piglets with diarrhoea (%) Day of occurrence and duration of diarrhoea for newly affected piglets	Significant	A
Homeopathic preparations to control the rosy apple aphid (<i>Dysaphis plantaginea</i> Pass.)	Apple	Laboratory	Switzerland	2010	Wyss, E., Tamm, L., Siebenwirth, J., Baumgartner, S.	The Scientific World Journal 10, pp. 38-48	Percentage of damaged leaves, Number of juvenile offspring, Fresh weight of apple seedlings	Insignificant	A
COMPARATIVE EFFICACY OF ALLOPATHIC, HERBAL, HOMEOPATHIC AND EFFECTIVE MICRO-ORGANISMS FOR THE CONTROL OF HAEMOCHOSIS IN SHEEP & GOATS.	Sheep and Goats	Farm	Pakistan	2011	Qamar, Muhammad Fiaz; Maqbool, Azhar; Ahmad, Nisar.	Scientific Papers: Series D, Animal Science - The International Session of Scientific Communications of the Faculty of Animal	Mortality, Morbidity, Egg count, Larvae count	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
						Science. Oct2011, Vol. 54, p187-196. 10p.			
Use of homeopathy in parasite control in a flock of Zerasca sheep	Sheep	Farm	Italy	2011	Benvenuti, M.N., Pisseri, F., Goracci, J., Giuliotti, L., Macchioni. F., Verità, P., Guidi, G.	EAAP Scientific Series 129(1), pp. 296-300	FEC (Faecal egg count)	Significant	A
Development of a Test System for Homeopathic Preparations Using Impaired Duckweed (Lemna gibba L.).	Duckweed	Laboratory	Switzerland	2011	Jäger, T.; Scherr, C.; Simon, M.; Heusser, P.; Baumgartner, S.	Journal of Alternative & Complementary Medicine. Apr2011, Vol. 17 Issue 4, p315-323. 9p.	Growth rate Colour classification	Significant	A
Effect of production system, alternative treatments and calf rearing system on udder health in organic dairy cows	Cattle	Farm	International	2011	Wagenaar, J.-P., Klocke, P., Butler, G., Smolders, G., Nielsen, J.H., Canever, A., Leifert, C.	NJAS - Wageningen Journal of Life Sciences 58(3-4), pp. 157-162	SCC	Significant	A
High dilution of Staphysagria and fruit fly biotherapeutic preparations to manage South American fruit fly, Anastrepha fraterculus, in organic peach orchards	Peach	Field	Brazil	2012	Rupp, L.C.D., Boff, M.I.C., Boff, P., De Gonçalves, P.A.S., Botton, M.	Biological Agriculture and Horticulture 28(1), pp. 41-48	Number of fruit flies trapped	Insignificant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Homeopathic and high dilution preparations for pest management to tomato crop under organic production system [Manejo fitossanitário do tomateiro com uso de preparados homeopáticos e altas diluições sob sistema orgânico de produção]	Tomato	Field	Brazil	2012	Modolon, T.A., Boff, P., Boff, M.I.C., Miquelluti, D.J.	Horticultura Brasileira 30(1), pp. 51-57	Large borers Small borers Septoria leaf spot Fruit production Bunches of flowers	Significant	A
Efficiency and costs of homeopathy and phytotherapy in an organic dairy farm	Cattle	Farm	Italy	2012	Martini, A., Polidori, R., Lorenzini, G., Lotti, C., Whittaker, A.	New Medit 11(4 SPECIAL), pp. 42-45	Results obtained for medical treatments by type of disease	Significant	A
Influence of High Dilutions of Cina for the Control of Meloidogyne incognita in Tomato Plants.	Tomato	Laboratory	Brazil	2014	Swarowsky, R.A., Stangarlin, J.R., Kunh, O.J., Estevez, R.L., Mioranza, T.M., Muller, M.A.	American Journal of Plant Sciences, 2014, 5, pp 3695-3701.	number of root galls eggs and second-stage juveniles present in the roots of tomato and soil Stem diameter Root volume Plant height Fresh weight Dry weight Number of roots	Significant	A
Possibilities of using unconventional methods and dietary supplements to affect weight gains of calves	Cattle	Farm	Slovakia	2014	Zábranský, L., Šoch, M., Pániková, M., Novák, P., Broucek, J., Švejdová, K., Šimková, A., Čermák, B.	Journal of Central European Agriculture 15(4), pp. 157-168	Weight gain	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Influence of Alternative Methods in Treatment and Precaution of Cow Mastitis.	Cattle	Farm	Czech Republic	2014	Šoch, M.; Zábanský, L.; Janoušková, A.; Šimková, A.; Švejdvová, K.; Čermák, B.; Smutný, L.; Smutná, Š.; Šastná, J.; Maršálek, M.	Scientific Papers: Animal Science & Biotechnologies / Lucrari Stiintifice: Zootehnie si Biotehnologii. 2014, Vol. 47 Issue 2, p342-346. 5p.	Repeated mastitis Number of medical days	Insignificant	A
Homeopathic drugs to control red rot disease in sisal plants.	Agave	Laboratory	Brazil	2015	Gama, E.; Silva, F.; Santos, I.; Malheiro, R.; Soares, A.; Pereira, J.; Armond, C.	Agronomy for Sustainable Development (Springer Science & Business Media B.V.). Apr2015, Vol. 35 Issue 2, p649-656	Mycelia growth and sporulation Conidium germination	Significant	A
Mycelium growth of early tomato blight pathogen, <i>Alternaria solani</i> , subjected to high dilution preparations	Tomato	Laboratory	Brazil	2015	Modolon, T.A., Boff, P., Boff, M.I.C., Miquelluti, D.J.	Biological Agriculture and Horticulture 31(1), pp. 28-34	Mycelium growth	Significant	A
Effect of Matricaria Chamomilla CH12 Weaning Stress in Pigs.	Pigs	Farm	Brazil	2015	Reis, L., Pardo, P., Oba, E., Kronka, S.d.M., Rodrigues, G., Bezerra, R.C.	Colloquium Agrariae. jul-dez2015, Vol. 11 Issue 2, p6-11	Serum cortisol concentrations days after weaning	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of a homeopathic complex on reproductive performance in a commercial pig farm	Pigs	Farm	Italy	2015	Deni, D., Caminiti, A., Lai, O., Alfieri, L., Casati, D., Sciarri, M., Scaramozzino, P., Brocherel, G.	Homeopathy 104(1), pp. 9-14	Repeat services per farrowing Newborns per farrowing Stillbirths per farrowing	Significant	A
Evaluation of preventive homeopathic treatment against Colibacillosis in swine production.	Pigs	Farm	Brazil	2009	Coelho, C.d.P., Soto, F.R.M., Vuaden, E.R., Melville, P.A., Oliveira, F.C.S., Benites, N.R.	International Journal of High Dilution Research. 2009, Vol. 8 Issue 29, p183-190	Number of sick animals/total number of animals Weight gain average	Significant	A
Homeopathy as an alternative to control of verminosis ewes	Sheep	Farm	Brazil	2016	Santos, S.K., Sandini, I.E., Novakowski, J.H., Falbo, M.K.	Asian Journal of Animal and Veterinary Advances 11(4), pp. 235-241	f hematocrit (Hct) hemoglobin (Hgb) Total Protein (TP) albumin (Alb) Globulin (Glob) Aspartate aminotransferase (AST)	Significant	A
Ultra high diluted arsenic reduces spore germination of <i>Alternaria brassicicola</i> and dark leaf spot in cauliflower	Cauliflower	Laboratory	Brazil	2016	Trebbi, G., Nipoti, P., Bregola, V., Brizzi, M., Dinelli, G., Betti, L.	Horticultura Brasileira 34(3), pp. 318-325	Spore germination Infection level	Significant	A
High dilution preparations for organic production system of broccoli	Broccoli	Field	Brazil	2017	Pulido, E., Boff, P., Duarte, T., Boff, M.I.	Agronomia Colombiana 35(1), pp. 53-58	Shoot dry mass Root dry mass Plant height Root length Stem diameter	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Randomized, blinded, controlled clinical trial shows no benefit of homeopathic mastitis treatment in dairy cows	Cattle	Farm	Germany	2017	Ebert, F., Staufienbiel, R., Simons, J., Pieper, L.	Journal of Dairy Science 100(6), pp. 4857-4867	Antibiotic treatmentNon-antibiotic allopathic treatment Allopathic treatment (antibiotic or non-antibiotic)Mastitis cure within 7 dMastitis cure within 14 d	Insignificant	A
Trichoderma spp. Isolates with potential of phosphate solubilization and growth promotion in cherry tomato	Tomato	Laboratory	Brazil	2017	França, D.V.C., Kupper, K.C., Magri, M.M.R., Gomes, T.M., Rossi, F.	Pesquisa Agropecuaria Tropical 47(4), pp. 360-368	Leaf number Leaf area Leaf dry mass Shoot dry mass Mycelial growth speed index Sporulation Germination %	Insignificant	A
In vivo study of a homeopathic medicine against Rhipicephalus (Boophilus) microplus in dairy cow	Cattle	Farm	Brazil	2018	Figueiredo, A., Fantatto, R.R., Agnoloni, I.C., Lopes, L.G., de Oliveira, P.R., Mathias, M.I.C., Alves, T.C., Barioni Júnior, W., Chagas, A.C.D.S.	Brazilian Journal of Pharmacology 28(2), pp. 207-213	Means of body weight of the animals Means of packed cell volume obtained from hemograms of the animals Mean number of ticks counted on the cows' bodies	Insignificant	A
Comparative efficacy of homeopathic and allopathic treatments against Foot and Mouth disease in cattle.	Cattle	Farm	India	2018	Chand, N.; Sirohi, A. S.; Tyagi, S.; Sharma, A.; Kumar, Suresh; Raja, T. V.	Indian Journal of Animal Research. Jun 2018, Vol. 52 Issue 6, pp 898-902	Appetite Oral lesion Rumen motility Foot lesion	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Homeopathic treatment as an alternative prophylactic to minimize bacterial infection and prevent neonatal diarrhoea in calves	Cattle	Farm	Brazil	2018	Fortuoso, B.F., Volpato, A., Rampazzo, L., Glombowsky, P., Griss, L.G., Galli, G.M., Stefani, L.M. Baldissera, M.D., Ferreira, E.B., Machado, G., da Silva, A.S.	Microbial Pathogenesis 114, pp. 95-98	Diarrhea	Significant	A
Comparative effectiveness of individualised homeopathy and antibiotics in the treatment of bovine clinical mastitis: Randomised controlled trial	Cattle	Farm	Germany	2018	Keller, D., Sundrum, A.	Veterinary Record 182(14), pp. 407	SSC Count	Insignificant	A
Effect of Homeopathic Medicines and a Nosode on Larvae of <i>Cochliomyia hominivorax</i> (Diptera: Calliphoridae)	Pest	Laboratory	Brazil	2019	De Barros, G.P., Seugling, J., Bricarello, P.A.	Homeopathy 108(3), pp. 177-182	height, diameter of the lap number of leaves number of flowers per cluster number of fruits fresh fruit mass productivity of tomato plants.	Significant	A
Reduction of stool bacterial counts and prevention of diarrhea using an oral homeopathic product in newborn lambs	Sheep	Farm	Brazil	2019	Fortuoso, B.F., Gebert, R.R., Griss, L.G., Glombovisky, P., Cazarotto, C.J., Rampazzo, L., Stefani, L.M. Ferreira, E.B., da Silva, A.S.	Microbial Pathogenesis 127, pp. 347-351	weight gain, mortality bacterial counts (<i>Escherichia coli</i> and total coliforms) in feces hematological analysis (leukocytes, hematocrit, hemoglobin and erythrocytes) biochemical analyses (glucose, triglycerides, cholesterol,	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
							albumin, globulin, urea and total protein)		
Ultradilutions of Natrum muriaticum in the agronomic performance of cherry tomatoes submitted to saline stress.	Tomato	Laboratory	Brazil	2019	Faitanini Dandaro, Priscila Aparecida; Giardini Bonfim, Filipe Pereira; Yoshikawa, Aline Mako; Alves, Lucas Ferenzini; Diogo Matsinhe, Marisa Aida.	Revista de Ciencias Agroveterinarias. 2019, Vol. 18 Issue 4, p412-420	Height (cm), Lap diameter (mm) Number of leaves (Number of flowers per cluster	Significant	A
Response of common bean (Phaseolus vulgaris L.) Quivican variety to the application of homeopathic medicines	French bean	Laboratory	Mexico	2020	García-Bernal, M., Ojeda-Silvera, C.M., Batista-Sánchez, D., Abasolo-Pacheco, F., Mazón-Suástegui, J.M.	Terra Latinoamericana 38(1), pp. 137-147	photosynthetic rate length of stem and root fresh root biomass fresh and dry stem and leaf biomass leaf area stem diameter number of leaves	Significant	A
Effect of homeopathic medicines during the initial stage and vegetative development of cucumber plants (Cucumis sativus L.)	Cucumber	Laboratory	Mexico	2020	Abasolo-Pacheco, F., Ojeda-Silvera, C.M., García-Galligos, V., Melgar-Valdes, C., Nuñez-Cerezo, K., Mazón-Suástegui, J.M.	Terra Latinoamericana 38(1), pp. 165-180	Germination Emergence Vegetative development	Significant	A
Agronomic behavior of the turnip (Brassica napus L.) during the application of homeopathic medicines	Turnip	Laboratory	Mexico	2020	Abasolo-Pacheco, F., Ojeda-Silvera, C.M., Cervantes-Molina, J.E., Moran-Villacreses, E., Vera-Aviles, D., Ganchozo-Mendoza, E., Mazón-Suástegui, J.M.	Terra Latinoamericana 38(1), pp. 183-198	percentage of germination and emergence length of stem and radicle, fresh weight of the aerial part and radicle dry weight of the aerial part and radicle	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
							plant height stem diameter, number of leaves weight leaf area productive yield		
Effect of homeopathic medicines in tomato plants (Solanum lycopersicum L.)	Tomato	Laboratory	Mexico	2020	Abasolo-Pacheco, F., Bonilla-Montalván, B., Bermeo-Toledo, C., Ferrer-Sánchez, Y., Ramírez-Castillo, A.J., Mesa-Zavala, E., Llerena-Ramos, L., Mazón-Suástegui, J.M.	Terra Latinoamericana 38(1), pp. 219-233	Germination rate Emergence rate Percentagemorphometric variables (plant height, radicle length, dry and wet weight) Variables in stem diameter and wet and dry leaf weight, number of branches, leaves, and buds in the vegetative development stage	Significant	A
A Study on Homeopathic Treatment of Teat Fibrosis in Bovines.	Cattle	Farm	India	2010	Shah, K. A.; Andrabi, Syed Anjum; Sumbul, Syed.	VetScan. 2010, Vol. 5 Issue 1, p56-57. 2p. 1 Chart.	No of animals treated No of animals recovered	Significant	B
Pathogenetic trial of boric acid in bean and tomato plants	Bean and tomato	Laboratory	Brazil	2011	Carneiro, S.M.T.P.G., Romano, E.D.B., Garbim, T.H.S., de Oliveira, B.G., Teixeira, M.Z.	International Journal of High Dilution Research 10(34), pp. 37-45	Leaf symptom	Insignificant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Isotherapic for the control of the cattle tick	Cattle	Farm	Brazil	2014	Novo, S.M.F.	International Journal of High Dilution Research 13(48), pp. 165-171	Tick mortality rate	Significant	B
High dilution of a photosynthesis inhibitor increases chlorophyll, growth, and yield of potato in a field.	Potato	Field	India	2019	Banerjee, Siddharthasankar; Mondal, Priya; Sukul, Nirmal Chandra; Sohel, Amir; Sengupta, Asmita; Sukul, Anirban.	Journal of Alternative Medicine Research. 2019, Vol. 11 Issue 2, p177-184. 8p.	Total yield of potato in each plot Free water in fresh potato No. of Potatoes/plant 1. Large sized (300 g) 2. Small sized (30 g)	Significant	B

Appendix I – Overview of Empirical Trials – Sound Energies

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effects of the intensity of audible sound on the growth and development of rideau winter wheat.	Wheat	Laboratory	Canada	1978	Weinberger P. and Measures M.	Canadian Journal of Botany, 57, pp 1036–1039	Plant Height Number of roots Number of tillers Emergent shoots Dry weight (roots) Dry weight (shoots)	Significant	A
Filial imprinting, environmental enrichment, and music application effects on behavior and performance of meat strain chicks	Poultry	Laboratory	United States	1989	Gvaryahu G, Cunningham DL and Van Tienhoven, A.	Poultry Science 68:211-217	Body weight Feed conversion Approach response Fear behaviour	Significant	A
Can Ambient Sound Reduce Stress in Piglets During Weaning and Restraint?	Pigs	Farm	International	2000	Cloutier, S.; Weary, D. M.; Fraser, D.	Journal of Applied Animal Welfare Science. 2000, Vol. 3 Issue 2, p107-116.	Calls per piglet per minute	Insignificant	A
Music during play-time: Using context conditioning as a tool to improve welfare in piglets	Pigs	Farm	Netherlands	2008	de Jonge, F. H.; Boleij, H.; Baars, A.M.; Dudink, S.; Spruijt, B. M.	Applied Animal Behaviour Science. Dec2008, Vol. 115 Issue 3/4, p138-148.	Percentage of piglets per time sample showing aggressive behaviour on week 1 after weaning during 4 consecutive hours	Significant	A
Study of audible sound effect on algae growth	Algae	Laboratory	United States	2013	Cai, W., Wang, N., Dunford, N.T., Zhu, S., He, H.	American Society of Agricultural and Biological Engineers Annual International Meeting 2013, ASABE 2013 4, pp. 3284-3292	Biomass concentration Growth rate	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of exposure of sound signals in semen collection area on quantity and quality of semen in Haryana bulls	Cattle	Farm	India	2018	Yadav, A.,Singh, Y.,Shukla, G.,Shukla, P.K.,Kumar, M., Singh, D.N., Kumar, A.	Indian J. Anim. Res., 52 (3) 2018 : 438-443	Volume pH Mass motility % Progression motility % Sperm concentration	Significant	A
Behavioural responses of piglets to different types of music	Pigs	Farm	China	2019	Li, J. N. Zhao, P. Zhao, X. Zhang, Y. J. Bi, J. H. Li, H. G. Liu, C. Wang, J. Bao	Animal 13(10), pp. 2319-2326	Walking Lying Standing Residence time Exploring Feeding Playing Tail wagging	Insignificant	A
Sound exposure and its beneficial effects on embryonic growth and hatching of broiler chicks.	Poultry	Farm	Brazil	2020	Donofre, A. C.; da Silva, I. J. O.; Ferreira, I. E.P.	British Poultry Science. Feb2020, Vol. 61 Issue 1, p79-85.	Embryonic growth Hatching duration higher hatchability Quality of hocks and navel Weight	Significant	A
Sound waves affect the total flavonoid contents in Medicago sativa, Brassica oleracea and Raphanus sativus sprouts	Cabbage and other vegetables	Laboratory	South Korea	2020	Kim, J.Y., Kang, Y.E., Lee, S.I., Muthusamy, M., Jeong, M.-J.	Journal of the Science of Food and Agriculture 100(1), pp. 431-440	Total flavonoid content	Significant	A
Effect of Different Types of Music on Rosa Chinensis Plants.	Rose	Laboratory	India	2014	Chivukula, V. and Ramaswami, S.	International Journal of Environmental Science and Development, Vol. 5, No. 5, October 2014, pp 430-434.	Maximum elongation of shoot Maximum number of flowers Highest diameter of flowers	Significant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
The Effect of Music on Physico-Chemical Parameters of Selected Plants.	Plant	Laboratory	India	2015	Sharma, D., Gupta, U., J. Fernandes, A., Mankad, A., & A. Solanki, H.	International Journal of Plant, Animal and Environmental Sciences, pp 282 - 287.	Plant height Number of leaves Number of flowers Concentration of total sugars Concentration of reduced sugar Concentration of Phenol Concentration of protein Concentration of starch Concentration of Chlorophyll	Significant	B
Effect of sound exposure in the ambient environment of Haryana bulls on their plasma concentration of testosterone and cortisol hormones	Cattle	Farm	India	2018	Yadav, A., Singh, Y., Shukla, G., Shukla. P.K. Siroji, R.,Kumar. M., Swain, D.K.	Indian Journal of Animal Research 52(7), pp. 964-967	CortisolTestosterone	Significant	B
Plant acoustic frequency technology control system to increase vegetative growth in red-lettuce.	Lettuce	Laboratory	Indonesia	2020	Hendrawan, Yusuf; Putra, Adamsyah Harika; Sumarlan, Sumardi Hadi; Djoyowasito, Gunomo.	Telkomnika. Aug2020, Vol. 18 Issue 4, p2042-2052.	Number of leaves (strands) Plant height (cm) Leaf area (cm ²) Plant wet weight (g) Plant dry weight (g) Red mean leaves Width stomata opening	Significant	B
Effect of sound on plant growth.	Several Plant Species	Laboratory	India	2013	Singh, A., Jalan, A. and Chatterjee, J.	Asian Journal of Plant Science and Research, 2013, 3(4):28-30.	Plant height Number of leaves	Significant	C

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of Sound on the Growth of Plant: Plants Pick Up the Vibrations.	Several Plant Species	Laboratory	India	2016	Patel, A., Shankar, S. and Narkhede, S.	Asian Journal of Plant Science and Research, 2016, 6(1), p. 6-9.	Shoot length	Significant	C

Appendix J – Overview of Empirical Trials – Electromagnetic Energies

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Efficiency of the magnetic treatment of broad bean seeds cultivated under experimental plot conditions	Broad bean	Field	Poland	2004	Podleśny, J., Pietruszewski, S., Podleśna, A.	International Agrophysics 18(1), pp. 65-71	Emergence Yield Plant losses during vegetation % Length of stem with pods Number of seeds per plant Number of seeds per pod Mass of 1000 seeds (g)	Significant	A
Pulsed electromagnetic fields effect in oregano rooting and vegetative propagation: A potential new organic method.	Oregano	Laboratory and Field	Greece	2012	Bilalis, Dimitrios; Katsenios, Nikolaos; Efthimiadou, Aspasia; Efthimiadis, Panagiotis; Karkanis, Anestis	. Acta Agriculturae Scandinavica: Section B, Soil & Plant Science. 2012, Vol. 62 Issue 1, p94-99.	Fresh weight Dry weight Root length	Significant	A
Pulsed electromagnetic field: an organic compatible method to promote plant growth and yield in two corn types.	Sweetcorn	Laboratory and Field	Greece	2012	Bilalis, Dimitrios J.; Katsenios, Nikolaos; Efthimiadou, Aspasia; Karkanis, Anestis.	Electromagnetic Biology & Medicine, Vol. 31 Issue 4, pp 333-343.	Germination percentage Vigor Chlorophyll content Leaf area Fresh weight Dry weight Yield	Significant	A
Investigation of pulsed electromagnetic field as a novel organic pre-sowing method on germination and initial growth stages of cotton.	Cotton	Laboratory and Field	Greece	2012	Bilalis, Dimitrios J.; Katsenios, Nikolaos; Efthimiadou, Aspasia; Karkanis, Anestis;	Electromagnetic Biology & Medicine. Jun2012, Vol. 31 Issue 2, p143-150.	Germination % Field emergence % Stem length Fresh weight Dry weight Leaf area Root surface	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
					Efthimiadis, Panagiotis.				
Increase of seed germination, growth and membrane integrity of wheat seedlings by exposure to static and a 10-KHz electromagnetic field	Wheat	Laboratory	Iran	2013	Payez, A., Ghanati, F., Behmanesh, M., Abdolmaleki, P., Hajnorouzi, A., Rajabbeigi, E.	Electromagnetic Biology and Medicine 32(4), pp. 417-429	Speed of germination Germination % Root length Shoot length Root fresh weight Root dry weight Shoot fresh weight Shoot dry weight	Significant	A
Improvement of the seed germination, growth and yield of onion plants by extremely low frequency non-uniform magnetic fields.	Onion	Laboratory and Field	Cuba	2014	De Souza, A.; García, D.; Sueiro, L.; Gilart, F.	Scientia Horticulturae. Sep2014, Vol. 176, p63-69. 7p.	Germination % Root length Leaf area	Significant	A
Effect of pre-sowing electromagnetic field treatment on growth and oleic acid content of cardoon (Cynara cardunculus L.)	Cardoon	Field	Saudi Arabia	2015	Sharafeldin, M.A., Tubek, B., Szumny, A.	Journal of Chemical and Pharmaceutical Research, 2015, 7(8):917-922	Plant height Number of leaves /plant Number of offshoots /plant Longest leaf length Oleic acid %	Significant	A
The Effects of Electromagnetic Treatments on the Growth and Palmitic Acid Content of Cynara cardunculus.	Cardoon	Field	Saudi Arabia	2016	Sharaf-Eldin, M. A.	JAPS: Journal of Animal & Plant Sciences. Aug2016, Vol. 26 Issue 4, pp 1081-1086	Palmitic acid content Growth characteristics	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effects of magnetized water on the vegetative growth and yield of tomato.	Tomato	Laboratory	Nigeria	2017	Olaniyi, Y. K. and Ogunlela, A. O.	Agricultural Engineering International: CIGR Journal. Jun2017, Vol. 19 Issue 1, pp 1-8	Shoot dry mass Root dry mass Plant height Root length Stem diameter	Significant	A
Pulsed electromagnetic field - a cultivation practice used to increase soybean seed germination and yield.	Soybean	Field	Serbia	2017	ĐUKIĆ, Vojin; MILADINOV, Zlatica; DOZET, Gordana; CVIJANOVIĆ, Marija; TATIĆ, Mladen; MILADINOVIĆ, Jigor; BALEŠEVIĆ-TUBIĆ, Svetlana. Zemdirbyste-	Agriculture. 2017, Vol. 104 Issue 4, p345-352.	Seed germination % Seed yield (kg)	Significant	A
Effect of an 1800 MHz electromagnetic field emitted during embryogenesis on the blood picture of one-day-old domestic hen chicks (Gallus gallus domesticus).	Poultry	Laboratory	Poland	2018	Pawlak, Krzysztof; Bojarski, Bartosz; Nieckarz, Zenon; Lis, Marcin; Wojnar, Tomasz.	Acta Veterinaria Brno. 2018, Vol. 87 Issue 1, p65-71.	red blood cell count haemoglobin concentration haematocrit mean corpuscular volume mean corpuscular haemoglobin mean corpuscular haemoglobin concentration white blood cell count leukocyte differential count	Insignificant	A
Effect of a 1800 MHz electromagnetic field emitted during embryogenesis on chick development and hatchability.	Poultry	Laboratory	Poland	2018	Pawlak, K.; Nieckarz, Z.; Sechman, A.; Wojtysiak, D.; Bojarski, B.; Tombarkiewicz, B.	Anatomia, Histologia, Embryologia: Journal of Veterinary Medicine Series C. Jun2018, Vol. 47 Issue 3, p222-	Dead embryos % Body weight	Insignificant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
						230.			
Electromagnetic field pretreatment of <i>Sinapis alba</i> seeds improved cadmium phytoextraction.	Mustard	Laboratory	Poland	2018	Bulak, Piotr; Lata, Lesia; Plak, Andrzej; Wiącek, Dariusz; Strobel, Wacław; Walkiewicz, Anna; Pietruszewski, Stanisław; Bieganski, Andrzej.	International Journal of Phytoremediation. 2018, Vol. 20 Issue 4, p338-342.	Ca content in the shoot Fresh weight Dry weight	Insignificant	A
Pre-sowing seed treatment with cold plasma and electromagnetic field increases secondary metabolite content in purple coneflower	Purple coneflower	Laboratory	Lithuania	2018	Mildaziene, Vida; Pauzaite, Giedre; Naucienė, Zita; Malakauskiene, Asta; Zukiene, Rasa; Januskaitiene, Irena; Jakstas, Valdas; Ivanauskas, Liudas; Filatova, Irina; Lyushkevich, Veronika.	Plasma Processes & Polymers. Feb2018, Vol. 15 Issue 2, p1-1.	Final germination percentage	Significant	A
Changes in Norway spruce germination and growth induced by pre-sowing seed treatment with cold plasma and electromagnetic field: Short-term versus long-term effects.	Norway spruce	Laboratory and Field	Lithuania	2018	Pauzaite, Giedre; Malakauskiene, Asta; Nauciene, Zita; Zukiene, Rasa; Filatova, Irina;	Plasma Processes & Polymers. Feb2018, Vol. 15 Issue 2, p1-1.	Total amount of germinated seeds (%)Height	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
					Lyushkevich, Veronika; Azarko, Igor; Mildaziene, Vida.				
Effect of seed treatment with cold plasma and electromagnetic field on red clover germination, growth and content of major isoflavones.	Red clover	Laboratory	Lithuania	2020	Mildažienė, Vida; Paužaitė, Giedrė; Naučienė, Zita; Žūkienė, Rasa; Malakauskienė, Asta; Norkevičienė, Eglė; Šlepetienė, Alvyra; Stukonis, Vaclovas; Olšauskaitė, Vilma; Padarauskas, Audrius; Filatova, Irina; Lyuskevich, Veronika.	Journal of Physics: D Applied Physics. 6/24/2020, Vol. 53 Issue 26, pp 1-10	Germination % Length Weight	Significant	A
ELECTROMAGNETIC EFFECTS ON SOYBEANS	Soybean	Laboratory	United States	2007	Parsi, N.	A Thesis Presented To the Faculty of the Graduate School University Of Missouri – Columbia, In Partial Fulfillment of the Requirements for the Degree Master of Science	Germination % Fatty acid analysis	Insignificant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
THE EFFECTS OF ELECTROMAGNETIC FIELDS ON PLANT GERMINATION AND GROWTH.	Cardoon	Laboratory and Field	Romania	2009	Cotovitchi, Raluca; Bercu, Rodica; Axini, Monica.	Annals of the Romanian Society for Cell Biology. 2009, Vol. 14 Issue 2, p279-283.	Plant height Number of leaves Number of offshoots per plant Fifth leaf width and length Longest leaf length Palmitic acid content	Significant	B
The effects of electroculture on shoot proliferation of garlic (Allium sativum L.)	Garlic	Laboratory	Philippines	2009	Manguiam, V.L.R., Margate, A.N.M., Hilahan, R.D.G., Lucin, H.G.L., Pamintuan, K.R.S. and Adornado, A.P.	International Conference on Informatics, Technology and Engineering, 703 012009	Shoot height Shoot height daily progress	Insignificant	B
The Effect of Electric Currents on Certain Crop Plants. Research Bulletin No 210.	Several Plant Species	Laboratory and Field	United States	1937	Dorchester, C. S.	Agricultural Experimental Station, Iowa State College of Agriculture and Mechanic Arts.	Weight Number of micro-organisms in soil Yields	Insignificant	C
Impact of RF electromagnetic field on cucumber and tomato plants	Cucumber and tomato	Laboratory	Oman	2016	Al-Kathiri, F. , Al-Raisi, K. , Al-Hinai, K. , Al-Droushi, M. , Khan, M., Nadir, Z.	7th IEEE Annual Information Technology, Electronics and Mobile Communication Conference, IEEE IEMCON 2016 7746234	Plant height Number of leaves Fresh weight pH	Significant	C
Efficiency of the magnetic treatment of broad bean seeds cultivated under experimental plot conditions	Broad bean	Field	Poland	2004	Podleśny, J., Pietruszewski, S., Podleśna, A.	International Agrophysics 18(1), pp. 65-71	Emergence Yield Plant losses during vegetation % Length of stem with pods Number of seeds per plant	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
							Number of seeds per pod Mass of 1000 seeds (g)		
Pulsed electromagnetic fields effect in oregano rooting and vegetative propagation: A potential new organic method.	Oregano	Laboratory and Field	Greece	2012	Bilalis, D.J.; Katsenios, N.; Efthimiadou, A.; Efthimiadis, P.; Karkanis, A.	Acta Agriculturae Scandinavica: Section B, Soil & Plant Science. 2012, Vol. 62 Issue 1, p94-99.	Fresh weight Dry weight Root length	Significant	A
Pulsed electromagnetic field: an organic compatible method to promote plant growth and yield in two corn types.	Sweetcorn	Laboratory and Field	Greece	2012	Bilalis, D.J.; Katsenios, N.; Efthimiadou, A.; Karkanis, A.	Electromagnetic Biology & Medicine, Vol. 31 Issue 4, pp 333-343.	Germination percentage Vigor Chlorophyll content Leaf area Fresh weight Dry weight Yield	Significant	A
Investigation of pulsed electromagnetic field as a novel organic pre-sowing method on germination and initial growth stages of cotton.	Cotton	Laboratory and Field	Greece	2012	Bilalis, D.J.; Katsenios, N.; Efthimiadou, A.; Karkanis, A.; Efthimiadis, P.	Electromagnetic Biology & Medicine. Jun2012, Vol. 31 Issue 2, p143-150.	Germination % Field emergence % Stem length Fresh weight Dry weight Leaf area Root surface	Significant	A

Appendix K – Overview of Empirical Trials – Rock Dusts and Paramagnetism

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Yield and nutrition of tomato using different nutrient sources	Tomato	Field	Brazil	2011	Zuba, S.N., Nogueira, W.C.L., Fernandes, L.A., Sampaio, R.A., da Costa, C.A.	Horticultura Brasileira	Marketable yield Weight/fruit (g) Fruits/plant Diameter (mm) pH Brix	Significant	A
Effect of a rock dust amendment on disease severity of tomato bacterial wilt	Tomato	Laboratory	China	2013	Li, J.-G., Dong, Y.-H.	International Journal of General and Molecular Microbiology, 103(1):11-22	Plant growth Plant health Soil pH Soil Ca content	Significant	A
Addition of a volcanic rockdust to soils has no observable effects on plant yield and nutrient status or on soil microbial activity	Wheat	Field	Sweden	2013	Ramezani, A., Dahlin, A.S., Campbell, C.D., Hillier, S., Mannerstedt-Fogelfors, B. and Öborn, I.	Plant and Soil, Vol. 367 No. 1-2, pp. 419–436. Rusch, H.P. (2004), Bodenfruchtbarkeit: Eine Studie des biologischen Denkens ; mit 29	Plant growth Nutrient composition Microbial activity	Insignificant	A
Influence of rock dust-based soil re-mineralisation on root-knot disease of organic watermelon plants	Watermelon	Field	Nigeria	2014	Atungwu, J.J., Oladeji, O.A., Aiyelaagbe, I., Olabiyi, T.I.	Archives of Phytopathology and Plant Protection	Effects of rock dust on vine length (cm) Effects of rock dust on 50% days to flowering, gall formation, dry matter and M. incognita	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of rock powder and vinasse on two types of soils	Soil	Laboratory	Brazil	2014	Lopes, O.M.M., Carrilho, E.N.V.M., Lopes-Assad, M.L.R.C.	R. Bras. Ci. Solo, 38:1547-1557, 2014	Concentration of soluble Ca ²⁺ , Mg ²⁺ , and K ⁺	Significant	A
A preliminary evaluation of volcanic rock powder for application in agriculture as soil a remineralizer	Soil	Laboratory	International	2015	Ramos, C.G., Querol, X., Oliveira, M., Silva, L.	Volumes 512–513, 15 April 2015, pp 371-380	pH values Extractable proportions for different elements	Significant	A
Evaluation of the potential of volcanic rock waste from southern Brazil as a natural soil fertilizer	Soil	Laboratory	Brazil	2016	Ramos, C.G., Querol, X., Dalmora, A.C., Pires, K.C.J., Schneider, I.A.H., Oliveira, L.F.S., Kautzmann, R.M.	Journal of Cleaner Production, Volume 142, Part 4, pp 2700-2706	Chemical composition of macronutrients and micronutrients of volcanic rock waste	Significant	A
Organic waste vermicomposting through the addition of rock dust inoculated with domestic sewage wastewater	Mexican Petunia	Laboratory	Brazil	2017	Rodrigues, A.S.D.L., Mesak, C., Silva, M.L.G., Silva, G.S., Leandro, W.M., Malafaia, G.	Journal of Environmental Management	Total dry biomass Plant height Shoot dry biomass Root dry biomass Stem diameter	Significant	A
Organic waste vermicomposting through the addition of rock dust inoculated with domestic sewage wastewater.	Mexican Petunia	Laboratory	Brazil	2017	Rodrigues, A.S.L; Mesak, C.; Silva, M.L.G.; Silva, G.S.; Leandro, W.M.; Malafaia, G.	Journal of Environmental Management, Vol. 196, pp 651-658	Total dry biomass Plant height Shoot dry biomass Root dry biomass Stem diameter Growth rate Number of worms Root length Seedling height Seedling dry weight Leaf area per plant	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
							Leaf number per plant Mean bulb weight Diameter of bulbs Number of tunics per bulb Bulb yield per area Dry bulb weight		
Can Dunite Promote Physiological Changes, Magnesium Nutrition and Increased Corn Grain Yield?	Sweetcorn	Laboratory	Brazil	2019	Crusciol, C. A. C.; Moretti, L. G.; Bossolani, J. W.; Moreira, A.; Micheri, P. H.; Rossi, R.	Communications in Soil Science & Plant Analysis, Vol. 50 Issue 18, pp 2343-2353	Mg contents in corn leaves Si contents in corn leaves Shoot dry matter Number of grains per ear Weight of 100 grains Grain yield	Significant	A
Increased yield and CO2 sequestration potential with the C4 cereal Sorghum bicolor cultivated in basaltic rock dust-amended agricultural soil	Sorghum	Laboratory	United States	2020	Kelland, M.E., Wade, P.W., Lewis, A.L., Taylor, L.L., Sarkar, B., Andrews, M.G., Lomas, M.R., Cotton, T.E.A., Kemp, S.J., James, R.H., Pearce, C.R., Hartley, S.E., Hodson, M.E., Leake, J.R., Banwart, S.A., Beerling, D.J.	Global Change Biology, Volume 26, Issue 6, pp 3658-3676	Yield	Significant	A
Organic extracts for the treatment of rock powder fertilizers in biological agriculture	Soil	Laboratory	Germany	1983	Von Fragstein, P., Vogtmann, H.	Biological Agriculture and Horticulture, 1(3), pp. 169-180	Effect of the extract concentration on the mineral content of an amino acid concentrate treated with basalt or lava	Significant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
							rock powders		
Effects of basaltic mineral fines on composting	Soil	Laboratory	United States	2004	Sikora, L.J.	Waste Management	Temperature	Insignificant	B
Assessing the addition of mineral processing waste to green waste-derived compost: An agronomic, environmental and economic appraisal	Tomato, Wheat, Ryegrass	Laboratory	International	2009	Jones, D.L., Chesworth, S., Khalid, M., Iqbal, Z.	Bioresource Technology	Tomato height Tomato stem diameter Tomato stem biomass Tomato leaf biomass Wheat height Wheat dry weight Grass height Grass blade width Grass dry weight Grass fresh weight	Insignificant	B

Appendix L – Overview of Empirical Trials – Astronomical Planting Calendars

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Lunar-Related Variations in Water Uptake by Bean Seeds.	Bean	Laboratory	United States	1973	Brown, F.A., and Chow, C.S.	Biological Bulletin, vol.145, no. 2, 1973, pp 265–278.	Bean water uptake	Significant	A
Chronobiological investigations of crops grown under biodynamic management. I. experiments with seeding dates to ascertain the effects of lunar rhythms on the growth of winter rye (secale cereale, cv. nomaro)	Rye	Field	Germany	1990	Spiess, H.	Biological Agriculture and Horticulture 7(2), pp. 165-178	Growth Number of plants per m ² Yield 1000-seed weight	Significant	A
Chronobiological Investigations of Crops Grown under Biodynamic Management. II. Experiments with Seeding Dates to Ascertain the Effects of Lunar Rhythms on the Growth of Little Radish (Raphanus sativus, cv. Parat)	Radish	Field	Germany	1990	Spiess, H.	Biological Agriculture and Horticulture. Vol. 7, pp. 179-189	Root yield Total yield	Significant	A
Lunar cycle and the frequency of births in sheep.	Sheep	Field	Spain	2011	Palacios, C.; Abecia, J.A.	Biological Rhythm Research. Aug2011, Vol. 42 Issue 4, p283-286.	Births	Insignificant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Does lunar cycle affect lamb production after artificial insemination in sheep?	Sheep	Field	Spain	2014	Palacios, C., Abecia, J.A.	Biological Rhythm Research 45(6), pp. 869-873	Fertility rate Fecundity	Significant	A
Lunar Cycle Influences Spontaneous Delivery in Cows.	Cattle	Field	Japan	2016	Yonezawa, Tomohiro; Uchida, Mona; Tomioka, Michiko; Matsuki, Naoaki.	PLoS ONE. 8/31/2016, Vol. 11 Issue 8, p1-8.	Number of deliveries	Significant	A
Daily calving frequency and preterm calving is not associated with lunar cycle but preterm calving is associated with weather conditions in Japanese Black cows	Cattle	Field	Japan	2019	Sasaki, Y., Kitai, N., Uematsu, M., Kitahara, G., Osawa, T.	PLoS ONE 14(7)	Calving frequency Preterm calving	Insignificant	A
Lunar Rhythmicities in the Biology of Trees, Especially in the Germination of European Spruce (Picea abies Karst.): A New Statistical Analysis of Previously Published Data.	Spruce	Field	Switzerland	2014	Zürcher, E. and Schlaepfer, R.	Journal of Plant Studies; Vol. 3, No. 1.	Germination rate %	Significant	B

Appendix M – Overview of Empirical Trials – Ritual-Based Practices

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Effect of Agnihotra on the germination of rice seeds.	Rice	Laboratory	India	2004	Devi, H. J., Swamy, N. V. C., and Nagendra, H. R.	Indian Journal of Traditional Knowledge, Vol 3(3), July 2004, pp 231-239.	Root length Shoot length Fresh weight Dry weight	Significant	A
Homa Farming - A vedic fire for agriculture: Influence of Agnihotra ash on water solubility of soil P	Soil	Laboratory	Germany	2007	Kratz, S., Schnug, E.	Landbauforschung Volkenrode 57(3), pp. 207-211	P Solubility	Significant	A
Effect of Homa organic farming on growth, yield and quality parameters of Okra.	Okra	Field	India	2017	Kumar, R.; Kumar, A.; Chakraborty, S.; Basarkar, P. W.	Journal of Applied & Natural Science. Dec2017, Vol. 9 Issue 4, p2205-2210.	plant height Number of branches per plant Number of leaves Leaf area 100-fruit weight Fruit yield Nitrogen Phosphorus Potassium Micronutrients	Significant	A
Effect of Agnihotra energy field on water purification.	Water	Laboratory	India	2015	Berk, U., and Sharma, S.	Indian Journal of Traditional Knowledge, Vol 1, No 1, January 2015.	Dissolved Oxygen % pH % Chemical Oxygen Demand % Hardness Coliform/100 ml	Significant	B

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Beneficial effects of Agnihotra on environment and agriculture.	Air quality	Laboratory	India	2015	Abhang, P., Manasi, P., and Pramod, M.	International Journal of Agricultural Science and Research (IJASR), Vol. 5, Issue 2, Apr 2015, pp 111-120.	Number of seeds germinated Shoot length Root length SOx level Nox level Microbial count	Significant	B

Appendix N – Overview of Empirical Trials – Person-Based Meditative/Intuitive Practices

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
FIELD STUDY OF AN ENHANCEMENT EFFECT ON LETTUCE SEEDS: A REPLICATION STUDY.	Lettuce	Field	United Kingdom	2003	Roney-dougal, S. M.; Solfvin, J.	Journal of Parapsychology. Fall2003, Vol. 67 Issue 2, p279-297.	Gross weight Net weight Slug damage Fungal damage	Significant	A
The Effects of Intentional Thought in Close Proximity or at a Distance: Demonstrating the Relation between Mind and Matter on Seed Germination.	Plant	Laboratory	United States	2007	Ducharme, L.J.	Dissertation submitted to the Faculty of Holos University Graduate Seminary in partial fulfillment of the requirements for the degree of Doctor of Theology.	Weight Seed stem length	Significant	A
Yogic farming through Brahma Kumaris Raja Yoga meditation: An ancient technique for enhancing crop performance	Plant	Field and Laboratory	India	2015	Pandey, S.T., Verma, O., Kewalanand Pandey, D.S., Gill, S., Patel, J.C., Patel, D.M., Patel, B.T., Patel, B.B., Patel, I.S., Patel, N.K., Singh, N.K., Thakur, D.M.	Asian Agri-History 19(2), pp. 105-122	Yield Protein % Oil % 1000-grain weight Biomass Earhead length	Significant	A

Title	Test Subject	Type	Country where trial took place	Year	Author	Reference	Parameters tested	Result	Classification
Wheat germination and intentional influence in Brennan Healing Science®: A contribution to fundamental research.	Wheat	Laboratory	Austria	2018	Saundra, S.; Moreno, M.; Mazon, S.; Scherer-Pongratz, W.; Endler, P. C.	Journal of Alternative Medicine Research. 2018, Vol. 10 Issue 3, pp 217-222	Germination rate % Rooting rate %	Significant	A

Appendix O – Literature Reviews on Subtle Agroecological Practices

Practice	Title	Year	Author	Reference
Astronomical Planting Calendars	Evidence for lunar-sidereal rhythms in crop yield: A review	2001	Kollerstrom, N., Staudenmaier, G.	Biological Agriculture and Horticulture 19(3), pp. 247-259
Astronomical Planting Calendars	Lunisolar tidal force and the growth of plant roots, and some other of its effects on plant movements.	2012	Barlow, P.W. and Fisahn, J.	Annals of Botany 110, pp 301–318.
Biodynamic Preparations	Soil quality and profitability of biodynamic and conventional farming systems: A review	1995	Reganold, J.P.	American Journal of Alternative Agriculture 10(1), pp. 36-45
Biodynamic Preparations	Biodynamic Preparations Cause Opposite Yield Effects Depending Upon Yield Levels	1996	Raupp, J., König, U.J.	Biological Agriculture and Horticulture 13(2), pp. 175-188
Biodynamic Preparations	Biodynamic agriculture research progress and priorities	2009	Turinek, M., Grobelnik-Mlakar, S., Bavec, M., Bavec, F.	Renewable Agriculture and Food Systems 24(2), pp. 146-154

Practice	Title	Year	Author	Reference
Biodynamic Preparations	Biodynamic soil fertility management (Book Chapter)	2012	Turinek, M., Bavec, M., Bavec, F.	Advances in Citrus Nutrition pp. 195-203
Biodynamic Preparations	The science behind biodynamic preparations: A literature review	2013	Chalker-Scott, L.	HortTechnology 23(6), pp. 814-819
Biodynamic Preparations	Is biodynamic farming the sustainable agriculture of the future?	2015	Wood, B.	DISSERTATION LEVEL 3 – BSC ENVIRONMENTAL STEWARDSHIP, University of Glasgow
Biodynamic Preparations	Plant polyphenol content, soil fertilization and agricultural management: a review	2017	Heimler, D., Romani, A., Ieri, F.	European Food Research and Technology 243(7), pp. 1107-1115
Biodynamic Preparations	Organic and biodynamic wines quality and characteristics: A review	2019	Cravero, M.C.	Food Chemistry 295, pp. 334-340

Practice	Title	Year	Author	Reference
Biodynamic Preparations	Organic and biodynamic viticulture affect biodiversity and properties of vine and wine: A systematic quantitative review	2019	Döring, J., Collins, C., Frisch, M., Kauer, R.	American Journal of Enology and Viticulture 70(3), pp. 221-242
Biodynamic Preparations	Research in biodynamic food and farming- A review	2019	Brock, C., Geier, U., Greiner, R., Olbrich-Majer, M., Fritz, J.	Open Agriculture 4(1), pp. 743-757
Divination	Unconventional Water Detection: Field Test of the Dowsing Technique in Dry Zones: Part II	1995	Betz, H.D.	Part II Journal of Scientific Exploration, Vol. 9, No. 2, pp 159-189.
Electromagnetism	Effects of various electrical fields on seed germination.	1968	Wheaton, F.W.	Retrospective Theses and Dissertations. Iowa State University, Ph.D.
Electromagnetism	Magnetoreception in plants	2005	Galland, P., Pazur, A.	J Plant Res (2005) 118:371–389

Practice	Title	Year	Author	Reference
Electromagnetism	Magnetic field effects on plant growth, development, and evolution	2014	Maffei, ME	Magnetic field effects on plant growth, development, and evolution. <i>Frontiers in Plant Science</i> . 5:1–15.
Electromagnetism	Magnetic field as a method of improving the quality of sowing material- a review	2015	Pietruszewski S, Mart inez E.	Magnetic field as a method of improving the quality of sowing material: a review. <i>Int Agrophys</i> . 29:377–389.
Electromagnetism	Impact of Electric and Magnetic Field Exposure on Young Plants-A Review.	2016	Barman, P. and Bhattacharya, R.	<i>International Journal of Current Research and Academic Review</i> , Volume 4 Number 2 (February-2016) pp 182-192.
Electromagnetism	Potential Utilization of Electro-Culture Technology for Promoting Plant Growth	2016	Kochar, K.S., Kaur, I.	<i>Research Inspiration</i> , Vol. 1, Issue-II, March 2016
Electromagnetism	The Effects of Magnetic Fields on Plants Growth: A Comprehensive Review	2019	Nyakane, N.E., Markus. E. D. and Sedibe, M. M.	<i>International Journal of Food Engineering</i> Vol. 5, No. 1, March 2019

Practice	Title	Year	Author	Reference
Electromagnetism	Application of Electrolyzed Water in Agriculture	2019	Forghani F.	Ding T., Oh D.H., Liu D. (Eds) Electrolyzed Water in Food: Fundamentals and Applications. Springer, Singapore
Homeopathic Treatments	Homoeopathy and its Potential Role in Agriculture- A Critical Review	1984	Scofield, A. M.	Biological Agriculture and Horticulture, 1984, Vol. 2
Homeopathic Treatments	Homoeopathic dilutions: is there a potential for application in organic plant production?	2000	Baumgartner, S.M., Shah, D. Heusser, P., Thurneysen, A.	IFOAM 2000 – The World Grows Organic, T. Alföldi, W. Lockeretz, and U. Niggli, (Eds). Proceedings 13th IFOAM Scientific Conference. Zürich: vdf Hochschulverlag, 2000, pp 97-100
Homeopathic Treatments	Managing helminths of ruminants in organic farming	2002	Cabaret, J., Bouilhol, M., Mage, C.	Managing helminths of ruminants in organic farming
Homeopathic Treatments	Immunology and Homeopathy. 3. Experimental Studies on Animal Models	2006	Bellavite, P., Ortolani, R., Conforti, A.	Evidence-based Complementary and Alternative Medicine. 2006;3(2), pp 171–186

Practice	Title	Year	Author	Reference
Homeopathic Treatments	Models with Plants, Microorganisms and Viruses for Basic Research in Homeopathy	2008	Lucietta Betti, L., Trebbi, G., Nani, D., Majewsky, V., Scherr, C., Jäger, T. and Baumgartner, S.	Presented part at the XVIth Symposium of GIRI, Monaco, 2002 and part at the XVIIth Symposium of GIRI, Graz, 2003
Homeopathic Treatments	Use of homeopathic preparations in phytopathological models and in field trials: a critical review	2009	Betti, L., Trebbi, G., Majewsky, V., Scherr, C., Shah-Rossi, D., Jäger, T., Baumgartner, S.	Homeopathy 98(4), pp. 244-266
Homeopathic Treatments	Homeopathy for the control of plant pathogens.	2011	Toledo, M.V., Stangarlin, J.R., Bonato, C.M.	Homeopathy for the Control of Plant Pathogens. Mendez-Vilas, A., Ed., Science against Microbial Pathogens: Communicating Current Research and Technological Advances, Fomatex, Badajoz, 2: pp 1063-1067.
Homeopathic Treatments	Homeopathy in parasitic diseases.	2014	Aleixo, D.L.; Bonamin, L.V.; Ferraz, F.N.; da Veiga, F.K.; de Araújo, S.M.	International Journal of High Dilution Resarch. Mar2014, Vol. 13 Issue 46, p13-27. 15p.
Homeopathic Treatments	Efficacy of homeopathy in livestock according to peer-reviewed publications from 1981 to 2014	2016	Doehring, C., Sundrum, A.	Veterinary Record 179(24), pp. 1-13

Practice	Title	Year	Author	Reference
Homeopathic Treatments	Effects of homeopathic high dilutions on plants: literature review.	2017	Teixeira, Marcus Zulian; Carneiro, Solange M. T. P. G.	Revista de Homeopatia. 2017, Vol. 80 Issue 3/4, p104-120. 17p.
Homeopathic Treatments	Invited review: A systematic review and qualitative analysis of treatments other than conventional antimicrobials for clinical mastitis in dairy cows.	2017	Francoz, D.; Wellemans, V.; Dupré, J. P.; Roy, J. P.; Labelle, F.; Lacasse, P.; Dufour, S.	Journal of Dairy Science. Oct2017, Vol. 100 Issue 10, p7751-7770.
Homeopathic Treatments	The Potential of Agro-homeopathy Applied to Medicinal Plants —A Review	2019	Pereira, M.M.A., Martins, A. D. Morais, L. C., Dória I., J., Cavalcanti, V. P. Rodrigues, F. A. , Pasqual, M. and Luz, J. M. Q.	Journal of Agricultural Science; Vol. 11, No. 4; 2019
Homeopathic Treatments	Veterinary homeopathy: Systematic review of medical conditions studied by randomised trials controlled by other than placebo.	2019	Mathie, R T.; Clausen, J.	BMC Veterinary Research. 10/7/2015, Vol. 11 Issue 1, p1-16
Human Intent	Meta-analysis of mind-matter interaction experiments: 1959 to 2000.	2000	Radin, D. and Nelson, R.	Boundary Institute, Los Altos, California. Princeton Engineering Anomalies Research, Princeton University.

Practice	Title	Year	Author	Reference
Intuition	Conceptualizing and Measuring Intuition: A Review of Recent Trends	2009	Dane, E. and Pratt, M.G.	in Hodgkinson, G.P. and Ford, J. K (Eds). International Review of Industrial and Organizational Psychology 2009 Volume 24. John Wiley and Son Ltd, Chichester
Nature Intelligences	Frontiers of Plant-Human Collaboration.	2019	Kealey, L.	A dissertation submitted in partial satisfaction of the requirements for the degree of DOCTOR OF PHILOSOPHY in Philosophy.
Paramagnetism	Factors influencing the release of plant nutrient elements from silicate rock powders: A geochemical overview	2000	Harley, A.D., Gilkes, R.J.	Nutrient Cycling in Agroecosystems
Paramagnetism	Rock dust as agricultural soil amendment : a review. Masters Thesis	2016	Swoboda, P.	Researchgate
Plant-Human Communication	The foundations of plant intelligence.	2017	Trewavas, A.	Interface Focus 7: 20160098.

Practice	Title	Year	Author	Reference
Radionics	Radionics: Its Origin, History and Applications.	2006	Cox, M.J.	Culminating Project submitted to the Faculty of Atlantic University in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Transpersonal Studies, Atlantic University, Virginia Beach, Virginia September 2006.
Ritual	Agnihotra - Ancient Purification Technology with Environmental and Agricultural Perspective.	2017	Avemaria, P.	BSc Thesis Forest and Nature Conservation: Design Study, November 2017. Wageningen University.
Ritual	Impact of Agnihotra on Environment and Plants Impact of Homa Organic Farming in mitigating Soil, Water, and other Environmental Crises	2020	Berk, U.	International Journal of Plant and Environment · January 2020
Sound	Towards understanding plant bioacoustics	2012	Gagliano M., Mancuso S and Robert D,	Trends Plant Sci 17: 323– 325 (2012).
Sound	Advances in Effects of Sound Waves on Plants.	2014	Hassanien, R.H.E., H. Tian-Zhen, Yu-Feng, L., Bao-Ming, L.	Journal of Integrative Agriculture 2014, 13(2), pp 335-348.

Practice	Title	Year	Author	Reference
Sound	Effect of Music on Plants – An Overview	2015	Chowdhury, A.R. and Gupta, A.	International Journal of Integrative Sciences, Innovation and Technology (IJIIT), 4(6), pp 30 – 34.
Sound	Music Effects on Swine Welfare: a Sumarry.	2018	Zhang, Z.; Zhang, S.; Zhang, H.; Li, Y.; Gu, K.; Xue, Z.	Agricultural Biotechnology (2164-4993). Feb2018, Vol. 7 Issue 1, p79-81. 3p.
Sound	Beyond Chemical Triggers: Evidence for Sound-Evoked Physiological Reactions in Plants	2018	Jung, J., Kim, S.K., Kim J.Y., Jeong, M.J., Ryu, C.M.	Front Plant Sci. 2018;9:25.
Sound	International Journal of Agriculture and Plant Science Online Role of music on seed germination: A mini review	2019	Chandrakala, Y, Trivedi, L.	International Journal of Agriculture and Plant Science, Volume 1; Issue 2; April 2019
Sound	Water purification using ultrasound waves: application and challenges	2020	Fetyan, N.A.H., Salem Attia, T.M.	Arab Journal of Basic and Applied Sciences: Vol. 27, No. 1, pp. 194-207

Appendix P – SYA Farmer's Questions

Open ended Questionnaire for SYA Farmers

Context to Research Questions	Question	Question
What are the characteristics of subtle agroecological practices?	1	What is your current farming system? (Size of farm, crops /livestock cultivated, inputs used (non-organic and organic) number of people working on the land full and part time, how much of the produce is for your family/friends and how much if any do you sell? Do you or any of your family have any other form of income?)
	2	Why did you decide to adopt SYA?
	3	Who gave you advice or support with these practices?
	4	Does your family help with the SYA, who and how?
	5	Do your neighbours do it? How many of them?
	6	Do you compare practices or results with other farmers?
	7	What do your neighbours who are not practicing SYA think?
	8	Is there anything that you would like to improve on your farm?
	9	Do you practice any other 'alternative' techniques, such as biodynamic?
	10	Are you in contact with any research organisation? If yes how...
	11	Let's go into the SYA practices in more detail – can you explain what you do - can we see it – farm walk etc.... do you think you need to believe in this for it to be successful?
What evidence is	12	What have you found the benefits to be – in terms of amount produced, quality of products, quality of soil, anything else?

Context to Research Questions	Question	Question
there of their efficacy?		
What are the barriers to implementing subtle agroecological systems?	13	What do government officials (ministry) think, and researchers? Others?

Appendix Q – Farmers’ Survey Questionnaire



Farmer's Survey - Non-Material Agroecological Practices

Participant Information Sheet

Dear Participant,

My name is Janus Bojesen Jensen and I am a PhD research student at the Centre for Agroecology, Water and Resilience at Coventry University in UK. I would greatly appreciate your participation in my research project on ‘non-material’ agroecological practices by completing a short survey as per the information provided below.

1. Information and Purpose about the project

The aim of this research is to review and explore the potential of ‘non-material’ agroecological practices as part of the transition towards regenerative farming systems worldwide. These practices explored are derived from either historical wisdom, indigenous knowledge or contemporary research.

Examples of such practises from historical wisdom/indigenous knowledge are planting according to the lunar calendar or using paramagnetic rocks to aid seed germination. Examples from contemporary research include meditative practices and the biodynamic preparations.

This survey is part of this research and is being sent out to organic, regenerative, biodynamic and conventional farmers. It includes high level categorisations of non-material agroecological practices in order to find out whether farmers are already using these practices and to record their experiences if so. If farmers are not using such practises, the survey seeks to understand any barriers and challenges to their uptake.

2. Why have I been chosen?

All farmers are invited to share their views and/or experiences with non-material agroecological practices.

3. Do I have to take part?

No. Participation is entirely voluntary. If you do decide to withdraw after commencing participation please contact me via email and provide me with your email address.

4. What do I have to do?

Please fill out the informed consent form on the next page and then complete the survey to the best of your knowledge and include as much information as possible.

5. What are the risks associated with this project?

None – You will not be obliged to indicate your name so any information you enter will be anonymous.

6. What are the benefits of taking part?

You will help further understanding of attitudes to biodynamics and other non-material agroecological practices in alternative agriculture in academia.

If you would like to receive a copy of my research results when it is finished (expected September 2021), please indicate so in the final page of this survey.

7. Withdrawal options

You can withdraw after submitting the questionnaire by contacting me via the contact details given below before January 31st 2021.

8. What if things go wrong? Who to complain to

Please contact my supervisor Dr. Julia Wright via the following email:

j.wright@coventry.ac.uk

9. What will happen with the results of the study?

The data received will be analysed into a comprehensive overview of farmers' views, practice and challenges/barriers to adoption and remedial actions. The results will be written up and presented as part of my PhD dissertation. These may also be presented at academic conferences and / or written up for publication in peer reviewed academic journals.

10. Who has reviewed this study?

This study has been through the Coventry University Peer Review process and been approved.

11. Further information/Key contact details

Please contact me (Janus Bojesen Jensen) at: Email:

bojesenj@uni.coventry.ac.uk

Phone: +44 (0) 7748109530

Informed Consent Form

1. I confirm that I have read and understood the participant information sheet on the previous page. ☐ *Required*

☐ Yes

☒ No

2. By handing this questionnaire back to you, completed, I am giving my consent for you to use my questionnaire answers in this research study. ☐
Required

☐ Yes

☒ No

3. I understand that I have the right to withdraw my questionnaire by December 31st 2020 by contacting the researcher using the details on the participant information sheet and quoting the participants email address supplied on this page. ☐ *Required*

☐ Yes

☒ No

4. Email Address *Optional*

Ethics Statement

Data Protection and Confidentiality

Your data will be processed in accordance with the General Data Protection Regulation 2016 (GDPR) and the Data Protection Act 2018. All information collected about you will be kept strictly confidential. Your data will be referred to by a unique participant number rather than by name. Your data will only be viewed by the researcher/research team. All electronic data will be stored on a password-protected computer file on the researcher's OneDrive University account. All paper records will be stored in a locked filing cabinet in the researcher's office, at the Centre for Agroecology Water and Resilience, based in Ryton Organic Gardens, Ryton-on-Dunsmore, Coventry, UK. Your consent information will be kept separately from your responses in order to minimize risk in the event of a data breach. The lead researcher will take responsibility for data destruction and all collected data will be destroyed on or before December 31st, 2030.

Data Protection Rights

Coventry University is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance with the General Data Protection Regulation and the Data Protection Act 2018. You also have other rights including rights of correction, erasure, objection, and data portability. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - enquiry.ipu@coventry.ac.uk

5. I confirm that I have understood the purpose of the study (as explained by the researcher in the written information provided on the previous page). ☐ *Required*

☐ Yes

☐ No

6. I understand that my participation is voluntary. ☐ *Required*

☐ Yes

☐ No

Participant and Farm Details

Please, remember that it is very important that **you need to press the "FINISH" button at the end of the survey**. By doing so, you will then see 100% in the progress bar and our final message. If you don't do that all the information will be lost.

7. Please indicate where you came across this survey

- ☐ Facebook
- ☐ UK Biodynamic Association Agriculture
- ☐ Section - Goetheanum Other
- ☐

If you selected Other, please specify:

8. Nationality *Optional*

9. Age Group *Optional*

10. How would you best describe your ethnicity? *Optional*

If you selected Other, please specify:

11. Gender *Optional*

If you selected Other, please specify:

12. Please describe your spiritual beliefs (if any) *Optional*

- ☐ Atheist
- ☐ Buddhist
- ☐ Christian
- ☐ Hindu Jewish
- ☐ Muslim
- ☐ Spiritual but not Religious
- ☐ Prefer not to Say
- ☐ Other

If you selected Other, please specify:

13. Farming System

- ☐ Arable
- ☐ Horticulture
- ☐ Livestock
- ☐ Mixed
- ☐ Other

If you selected Other, please specify:

14. Is your farm

- ☐ Certified organic
- ☐ Certified biodynamic
- ☐ Uncertified organic or biodynamic
- ☐ Permaculture
- ☐ Agroecological
- ☐ Non-chemical farming
- ☐ Conventional

Are you certified in any other regenerative agricultural scheme?

- ☐ Yes
- ☐ No

If you selected Yes, please specify:

15. Farm Size (Hectares) - If you measure in Acres, please divide your farm size by 2.471 to calculate Hectares ☐ *Required*

☐ Less than 1

☐ 1-2

☐ 2-5

☐ 5-10

☐ 10-20

☐ Over 20

Views and Practices

16. Please describe your views on the following practices ☐ *Required*

Please don't select more than 1 answer(s) per row. Please select at least 9 answer(s).

	Don't Believe	Sceptical	Neutral (Don't know / No opinion)	Inclined towards Believing	Convinced
Working with sound / electrical energies (e.g. music, electro- agriculture)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working with other subtle energies (e.g. Feng Shui, paramagnetism)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Homeopathic treatments (e.g. agrohomoepathy, flower essences)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Astronomical planting calendars (e.g. Maria Thun, planting by the moon)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person-based intuitive and meditative practices (e.g. yogic farming, intuition)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instrument-based intuitive practices (e.g. radionics, dowsing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ritual-based practices (e.g. agnihotra, fertility rites)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Please provide further details here about your views

18. Please tick which of these non-material practices you currently perform on your farm (if applicable). *Optional*

☐ Working with sound / electrical energies (e.g. music, electro-agriculture)
 ☐ Working with other subtle energies (e.g. Feng Shui, paramagnetism)
 ☐ Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings)
 ☐ Homeopathic treatments (e.g. agrohomoepathy, flower essences)
 ☐ Astronomical planting calendars (e.g. Maria Thun, planting by the moon)
 ☐ Person-based intuitive and meditative practices (e.g. prayer, intent, yogic farming)
 ☐ Instrument-based intuitive practices (e.g. radionics, dowsing)
 ☐ Ritual-based practices (e.g. agnihotra)
 ☐ Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)
 ☐ Not working with any non-material practices on my farm

☐ Other

If you selected Other, please specify:

How long have you been working with these practices?

☐ 0-3 years

☐ 4-10 years

☐ 10+ years

Where did you learn about these practices?

☐ Other farmers/practitioners

☐ Internet

☐ Books or Publications Family

☐ tradition

☐ Other

If you selected Other, please specify:

What are the main benefits you have experienced from using these practices?

☐ Improved personal health personal

☐ wellbeing Improved livestock

☐ health Improved ecosystem health

☐ Reduced production costs Higher

☐ yields/production Improved crop

☐ health

☐ Other

☐

If you selected Other, please specify:

Please describe your practices and results in further detail

Have you made any innovations or discoveries while using these practices such as around the ingredients, timings, or methods for application? If Yes please describe.

19. In respect of practices you are not using, please state the reason(s) - 3 maximum.

	Unconvinced they work	Concern over reputation with peers/buyers	Lack of knowledge/information	Lack of training/support available	Lack of farmer support network	No published scientific evidence of their efficacy	No support from agricultural extension networks	Too expensive	Too demanding/tim consuming
Working with sound / electrical energies (e.g. music, electro-agriculture)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working with other subtle energies (e.g. Feng Shui, paramagnetism)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Homeopathic treatments (e.g. agrohomyopathy, flower essences)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Astronomical planting calendars (e.g. Maria Thun, planting by the moon)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person-based intuitive and meditative practices (e.g. yogic farming, intuition)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instrument-based intuitive practices (e.g. radionics, dowsing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ritual-based practices (e.g. agnihotra, fertility rites)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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20. Please indicate if there are any of these non-material practices in the previous question you would like to learn more about.

☐ Yes
 ☐ No

Please select up to a maximum of 3 (in ranking from 1 to 3, with 1 being the most interested to learn about)

Please don't select more than 1 answer(s) per row. Please select between 1 and 3 answers.

Please don't select more than 1 answer(s) in any single column.

	Working with sound / electrical energies (e.g. music, electro-agriculture)	Working with other subtle energies (e.g. Feng Shui, paramagnetism)	Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings)	Homeopathic treatments (e.g. agrohomeopathy, flower essences)	Astronomical planting calendars (e.g. Maria Thun, planting by the moon)	Person-based intuitive and meditative practices (e.g. yogic farming, intuition)	Instrument-based intuitive practices (e.g. radionics, dowsing)	Ritual-based practices (e.g. agnihotra, fertility rites)	Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please explain why not.

Challenges and Barriers to Adoption

21. IF you are using any of these practices, please describe any problems or challenges you have faced performing these practices - please indicate the most relevant up to a maximum of 3.

	No problems/challenges faced	No/limited support network	No/little information or instructions	Difficult to learn	Materials difficult to find	Very time-consuming	Results are not consistent	Reputation with peers/buyers	Other	If you select
Working with sound / electrical energies (e.g. music, electro-agriculture)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Working with other subtle energies (e.g. Feng Shui, paramagnetism)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Homeopathic treatments (e.g. agrohomeopathy, flower essences)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Astronomical planting calendars (e.g. Maria Thun, planting by the moon)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Person-based intuitive and meditative practices (e.g. yogic farming, intuition)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Instrument-based intuitive practices (e.g. radionics, dowsing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ritual-based practices (e.g. agnihotra, fertility rites)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

22. Are you aware of any non-material practices used in your farming community?

☐ Yes

☐ No

If so, please tick all non-material practices used in your farming community

- ☐ Working with sound / electrical energies (e.g. music, electro-agriculture) Working with other subtle energies (e.g. Feng Shui, paramagnetism) Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings) Homeopathic treatments (e.g. agrohomedopathy, flower essences) Astronomical planting calendars (e.g. Maria Thun, planting by the moon) Person-based intuitive and meditative practices (e.g. yogic farming, intuition) Instrument-based intuitive practices (e.g. radionics, dowsing)
- ☐ Ritual-based practices (e.g. agnihotra, fertility rites)
- ☐ Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)

23. If you are not aware of any non-material practices used in your farming community, do you think anyone may be interested in adopting such practices?

☐ Yes

☐ No

Please tick up to a maximum 3 non-material practices you think they would be most likely to adopt?

Please select no more than 3 answer(s).

- ☐ Working with sound / electrical energies (e.g. music, electro-agriculture) Working with other subtle energies (e.g. Feng Shui, paramagnetism) Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings) Homeopathic treatments (e.g. agrohomedopathy, flower essences) Astronomical planting calendars (e.g. Maria Thun, planting by the moon) Person-based intuitive and meditative practices (e.g. yogic farming, intuition) Instrument-based intuitive practices (e.g. radionics, dowsing)
- ☐ Ritual-based practices (e.g. agnihotra, fertility rites)
- ☐ Communication with Nature intelligences (e.g. interspecies communication, nature spirits/devas)

Please explain why not.

24. Please indicate which you think would encourage further adoption in your community up to a maximum of 3 (in ranking from 1 to 3, with 1 being the most likely). If you think nothing would help, please leave blank.

Please don't select more than 1 answer(s) per row. Please

select between 1 and 3 answers.

Please don't select more than 1 answer(s) in any single column.

	More public awareness/acceptance of the practice	Government support	Published scientific evidence of their efficacy	Evidence through farmer-to-farmer networks	Publications in the farming press	Training and consulting available	Other farmer advocates in an organised network	Agricultural extension networks recommending the practice
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25. If you have any further comments to add to this survey, please describe below.

26. Finally, if you are interested in supporting this research further, please indicate the ways in which you would like to be involved (more than 1 can be selected).

☐ Participate as a research case study (involves a visit to your farm – 1-2 days total)
☐ Undertake a more in-depth, 45 minute virtual interview
☐ Receive a copy of my published research paper when the study is complete
☐ None of the above, thank you

Appendix R – Demographics of Farmers’ Survey Respondents

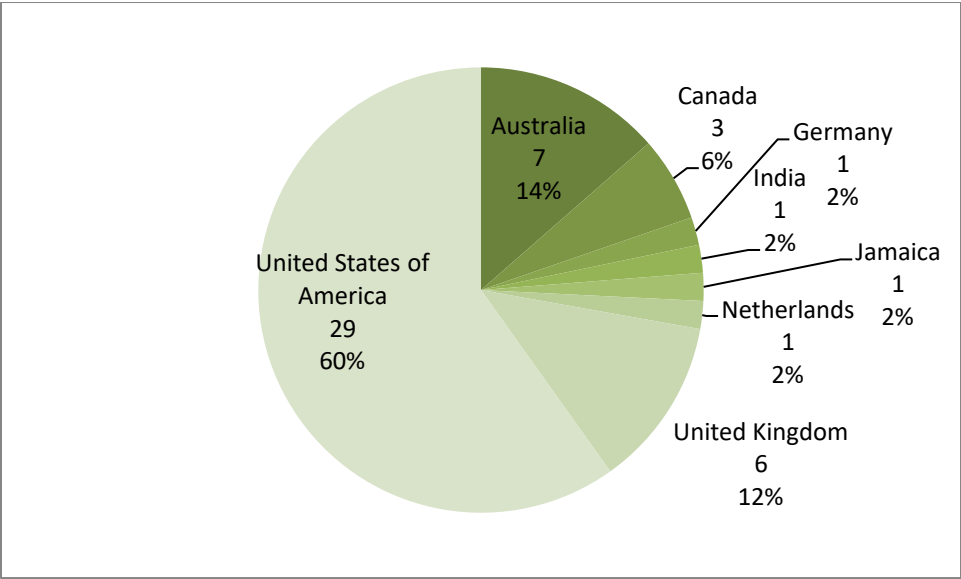


Figure R.1 - Nationality Breakdown of Survey Participants

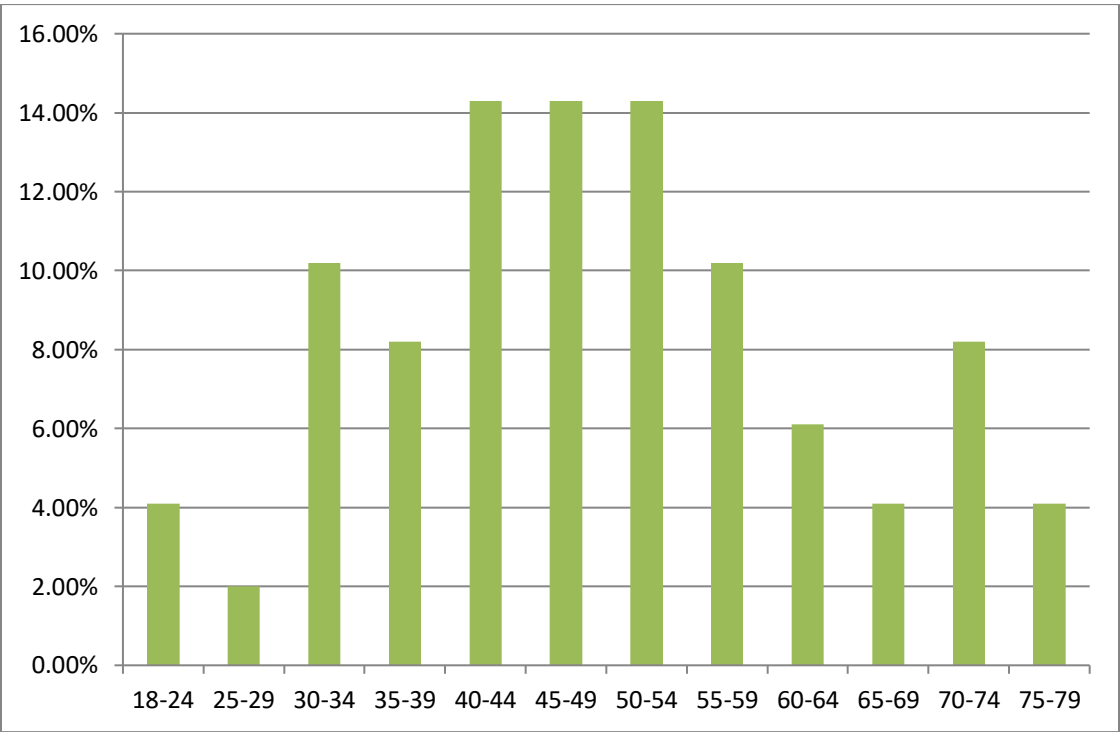


Figure R.2 - Age Group Breakdown of Survey Participants

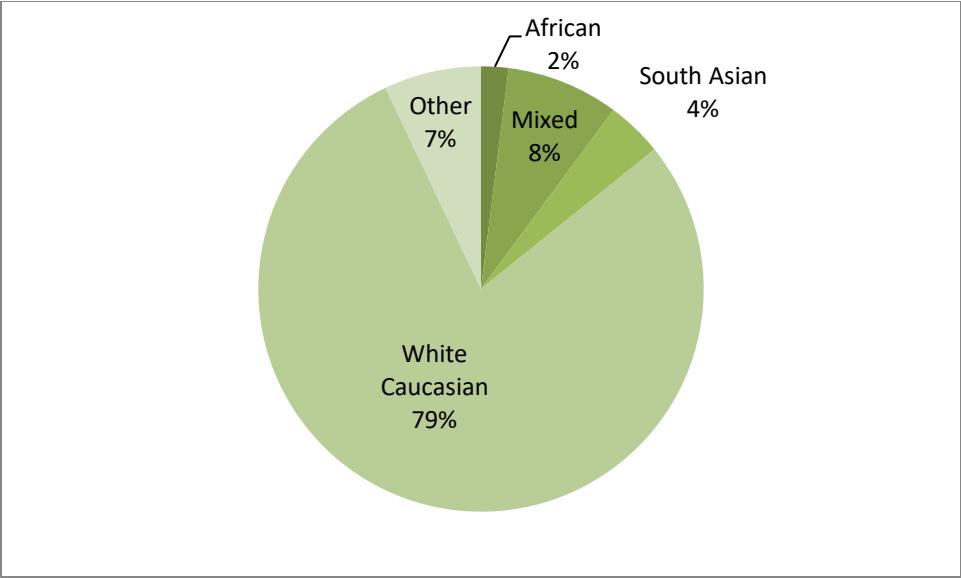


Figure R.3 - Ethnicity Breakdown of Survey Participants

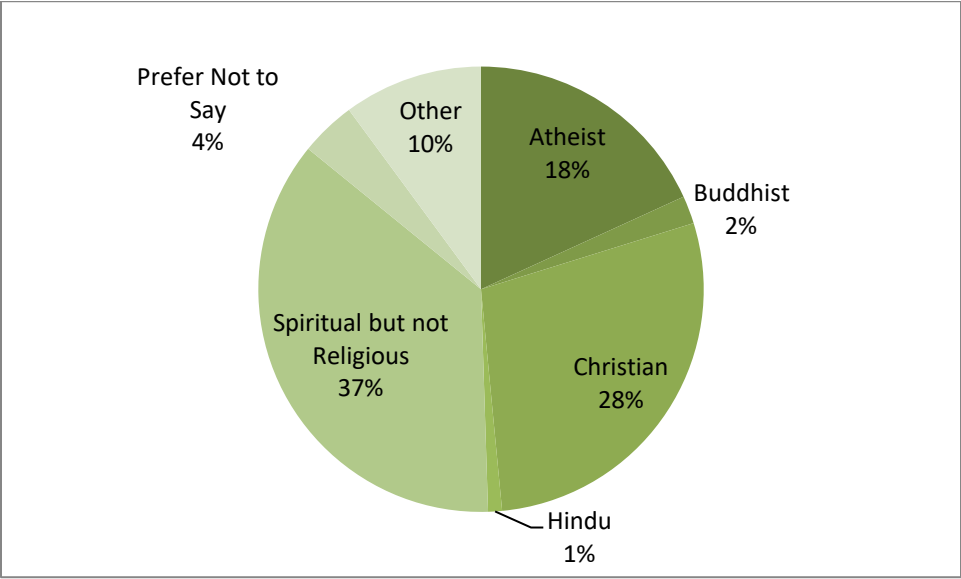


Figure R.4 - Spiritual Beliefs Breakdown of Survey Participants

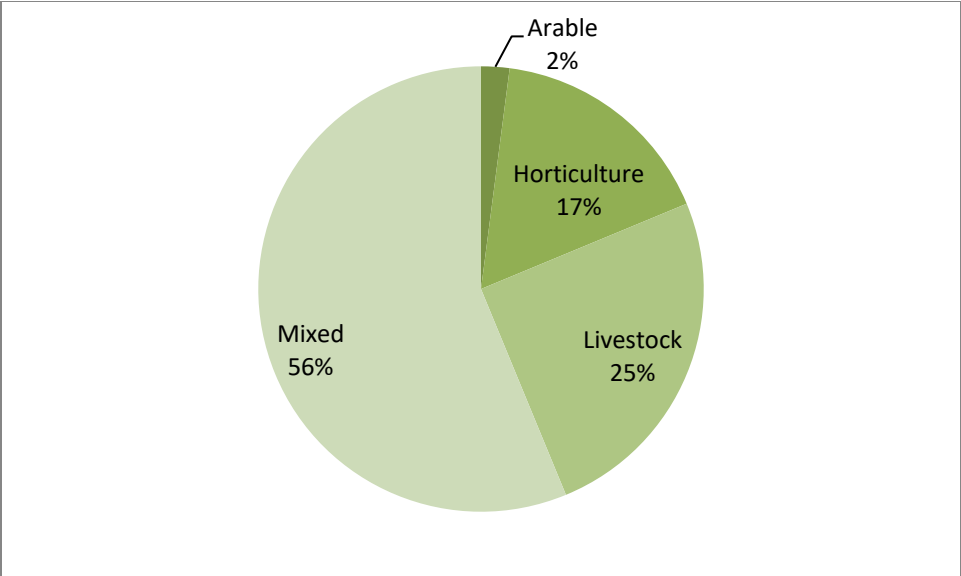


Figure R.5 - Farming System of Survey Participants

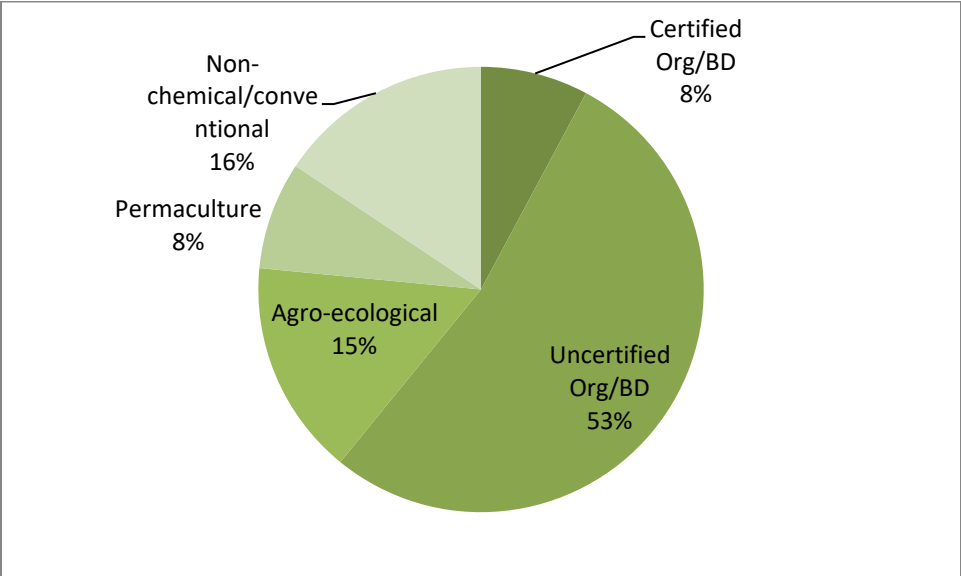


Figure R.6 - Farming System Breakdown of Survey Participants

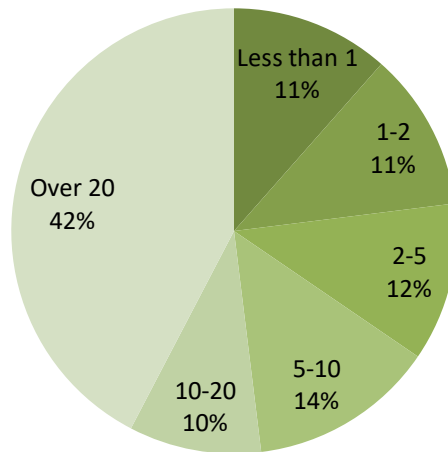


Figure R.7 - Farm Size of Respondents (Hectares) of Survey Participants

Appendix S – Breakdown per Practice for All Respondents’ Views about Subtle Practices

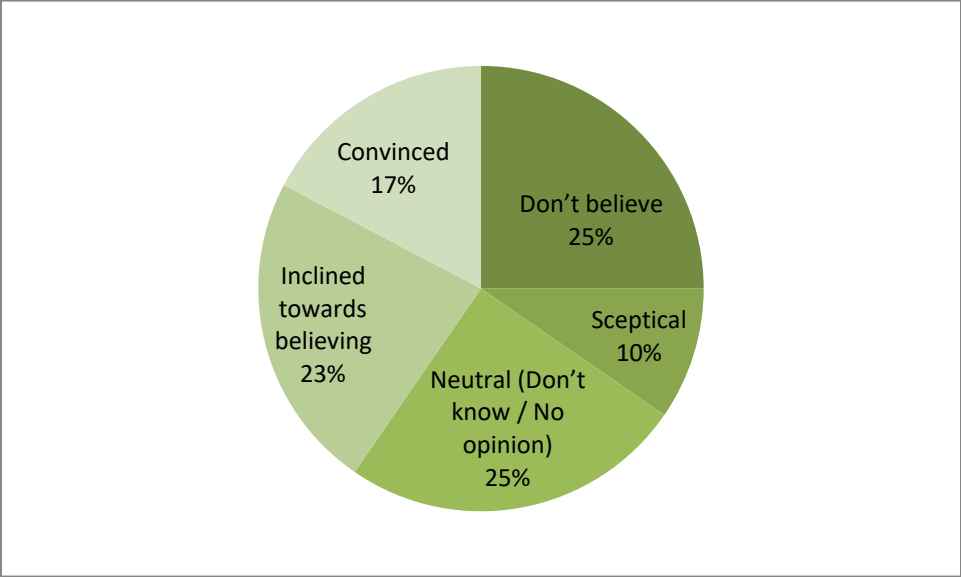


Figure S.1 - Views of Respondents on Working with sound / electrical energies

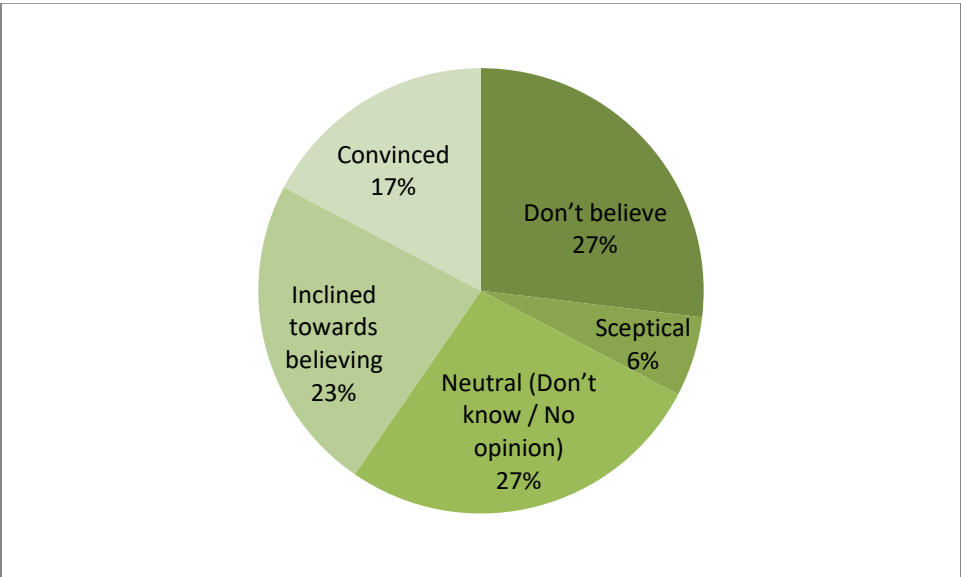


Figure S.2 - Views of Respondents on Working with other subtle energies

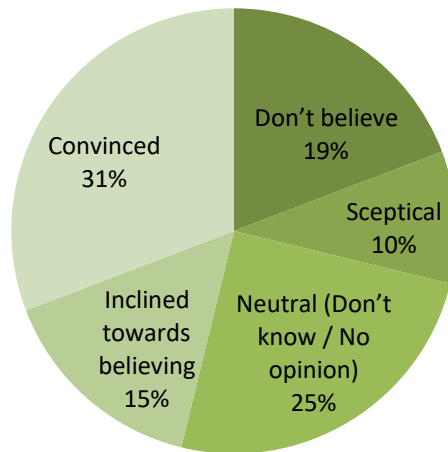


Figure S.3 - Views of Respondents on Biodynamic preparations

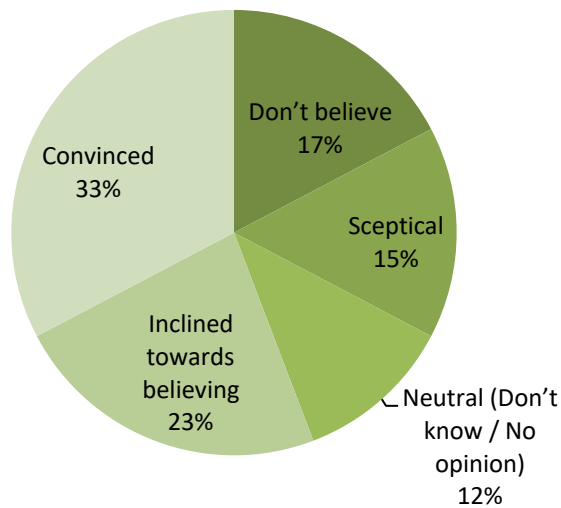


Figure S.4 - Views of Respondents on Homeopathic treatments

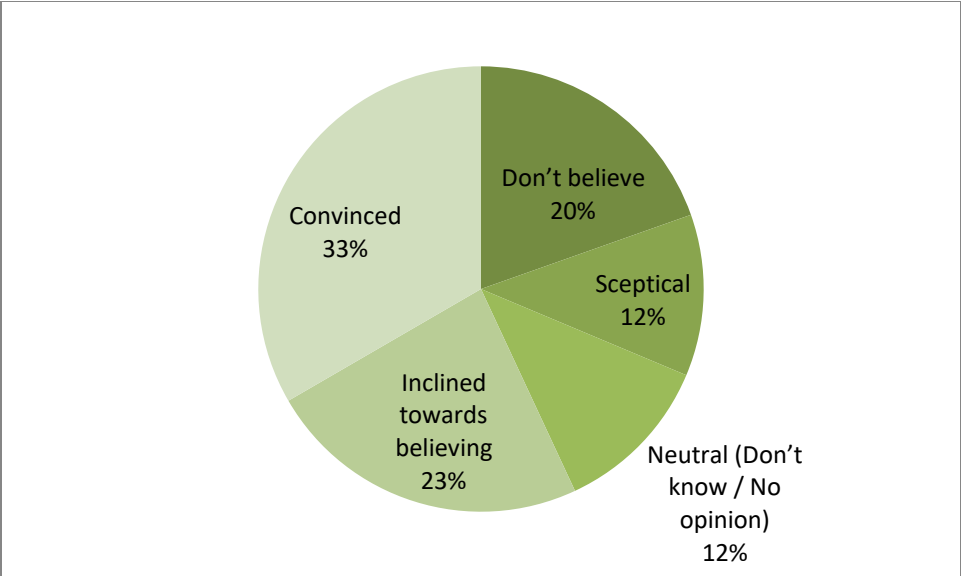


Figure S.5 - Views of Respondents on Astronomical planting calendars

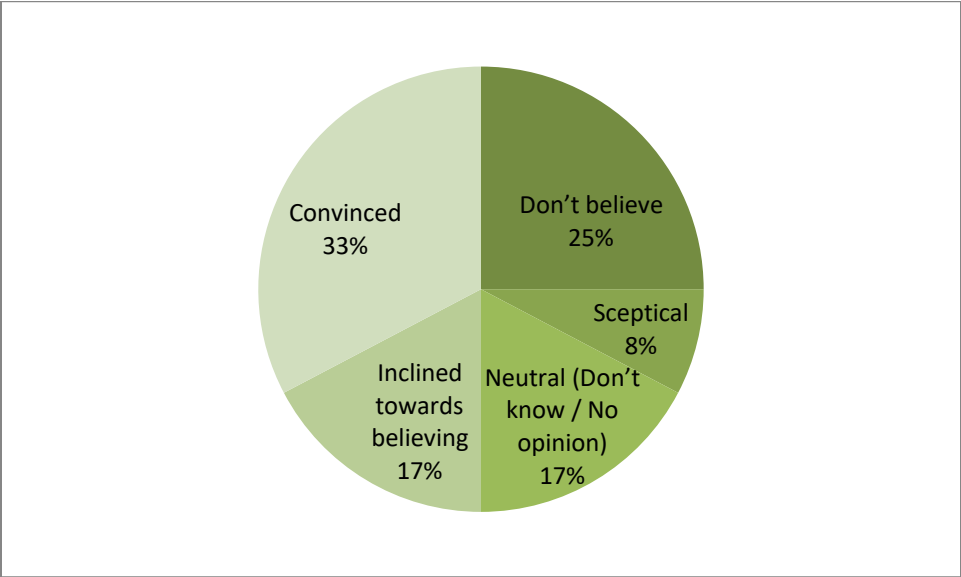


Figure S.6 - Views of Respondents on intuitive and meditative practices

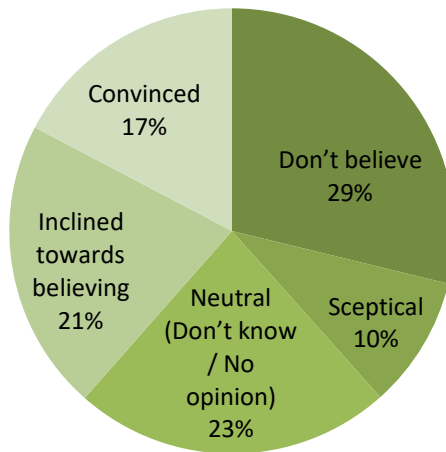


Figure S.7 – Views of Respondents on Instrument-based intuitive and meditative practices)

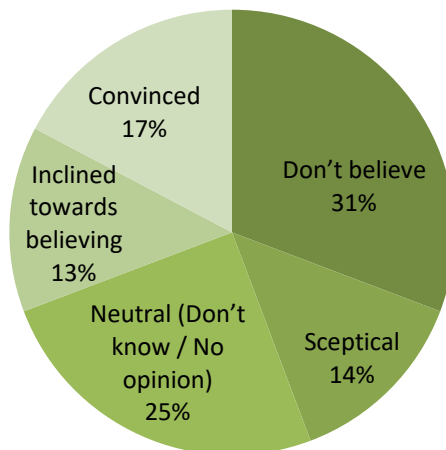


Figure S.8 - Views of Respondents on Participants Ritual-based practices

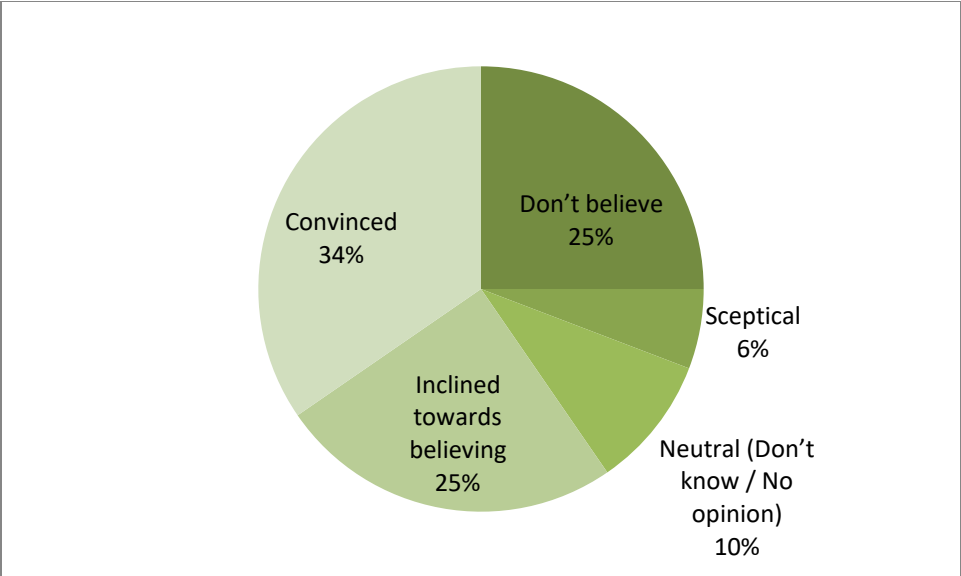


Figure S.9 – Views of Respondents on Communication with Nature Intelligences

Appendix T – Breakdown per Practice for Respondents’ Reasons for Not Working with Subtle Practices

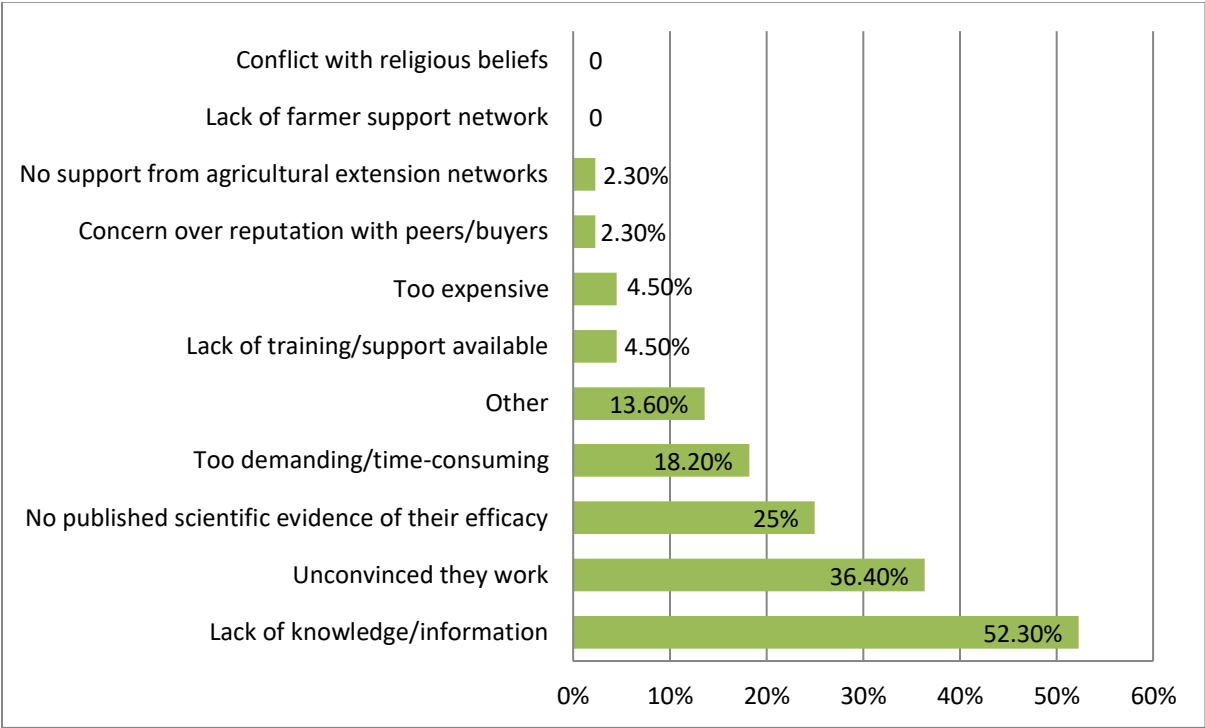


Figure T.1 - Reasons provided by Respondents for not working with sound / electrical energies

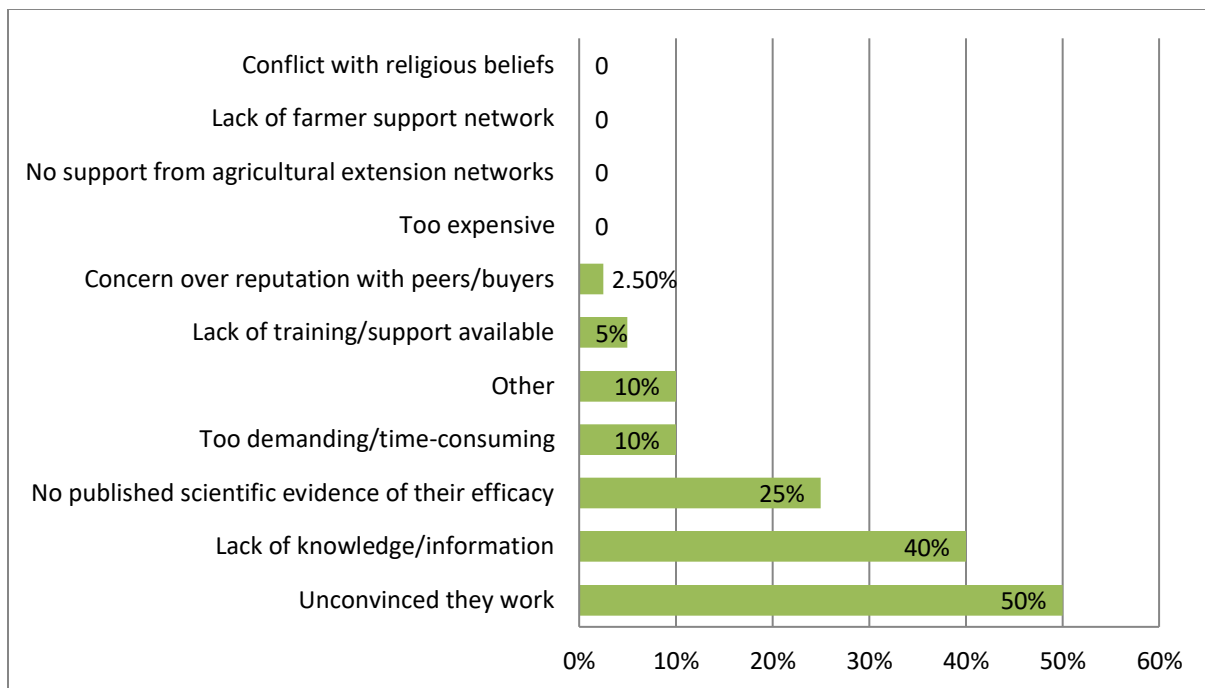


Figure T.2 – Reasons provided by Respondents for not working with other subtle energies

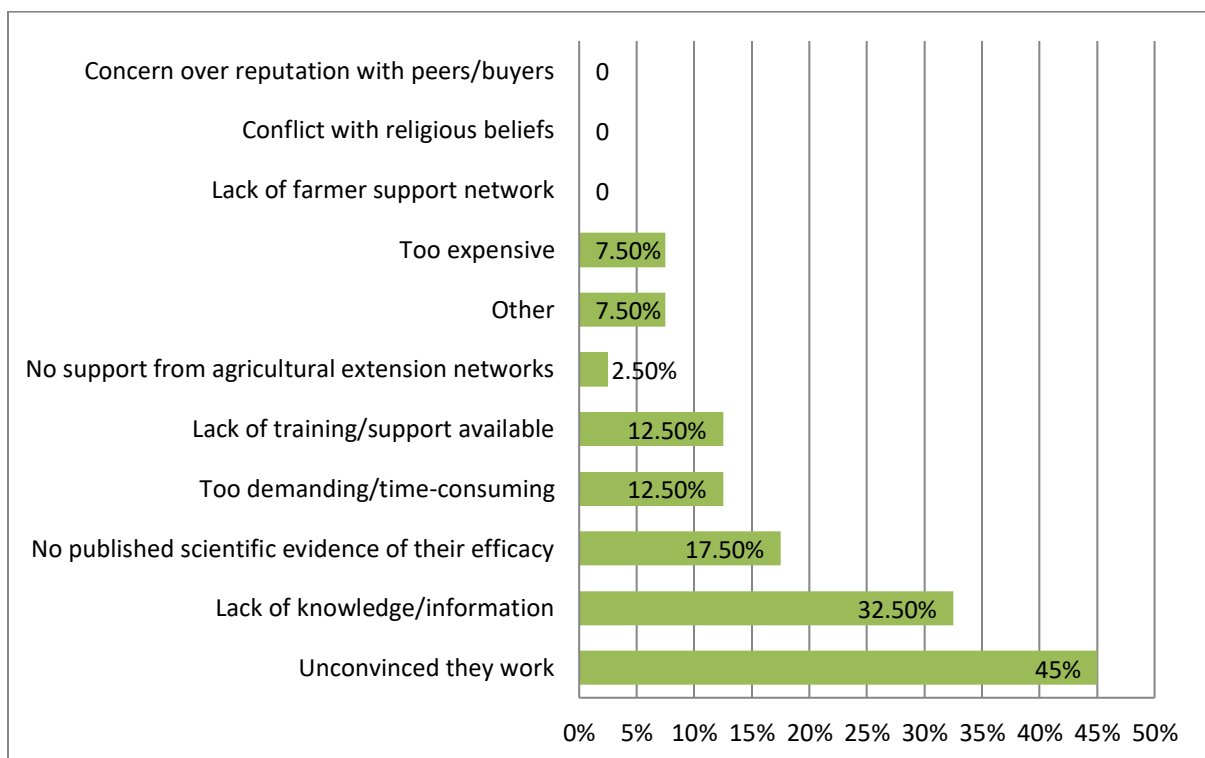


Figure T.3 – Reasons provided by Respondents for not working with Biodynamic preparations (e.g. BD500, 501, 502-507, Three Kings)

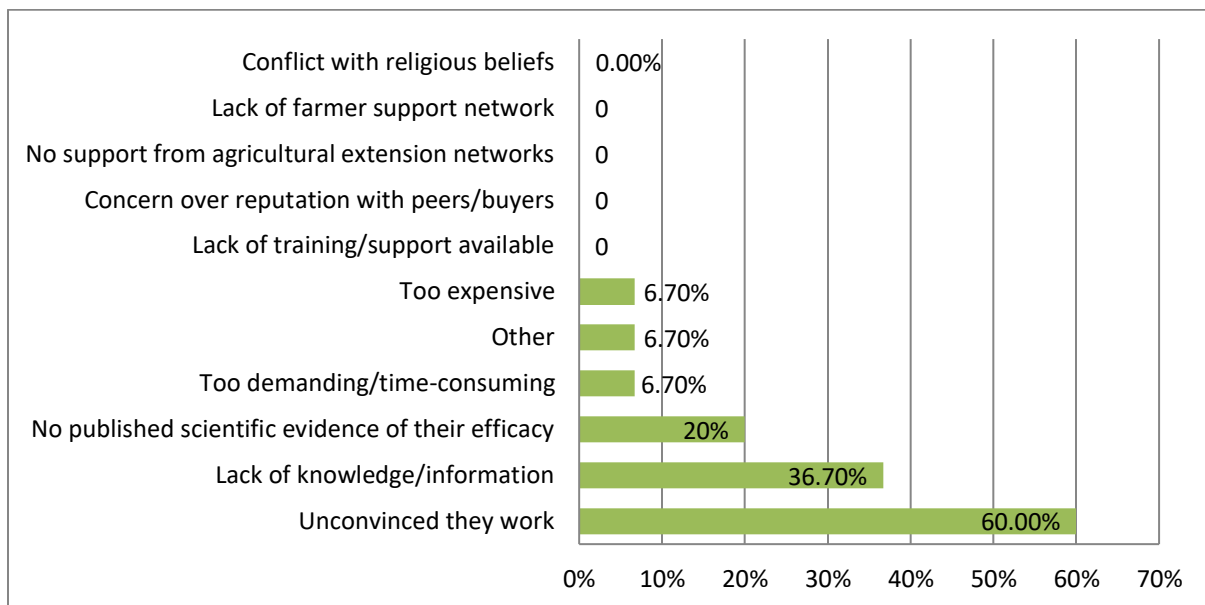


Figure T.4 – Reasons provided by Respondents for not working with Homeopathic treatments

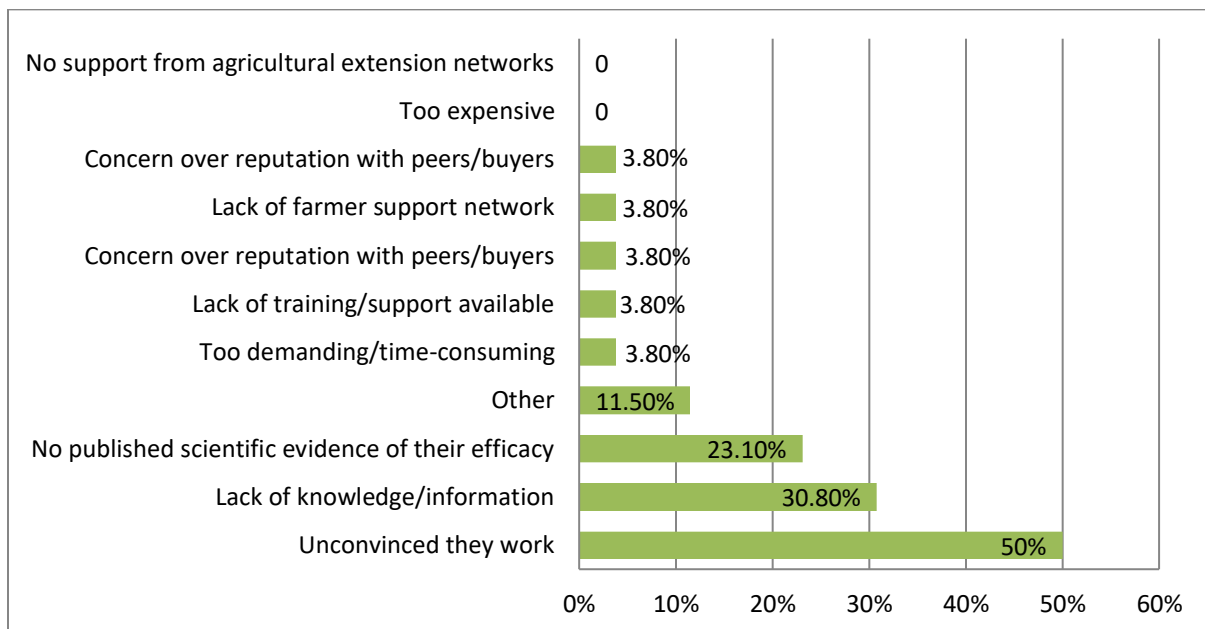


Figure T.5 - Reasons provided by Respondents for not working with Astronomical planting calendars

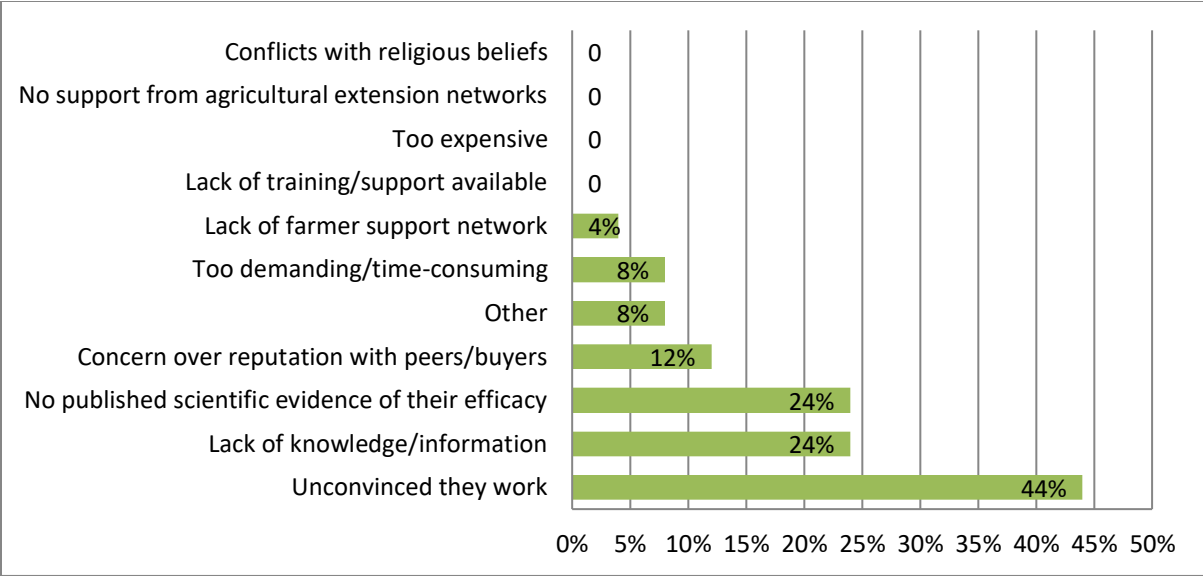


Figure T.6 – Reasons provided by Respondents for not working with person-based intuitive and meditative practices

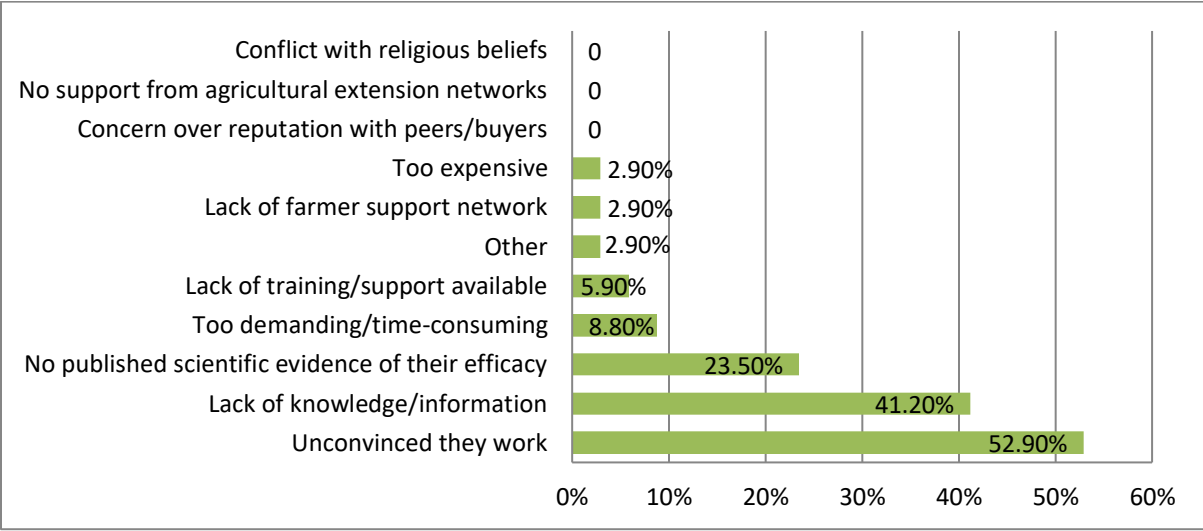


Figure T.7 – Reasons provided by Respondents for not working with Instrument-based intuitive practices

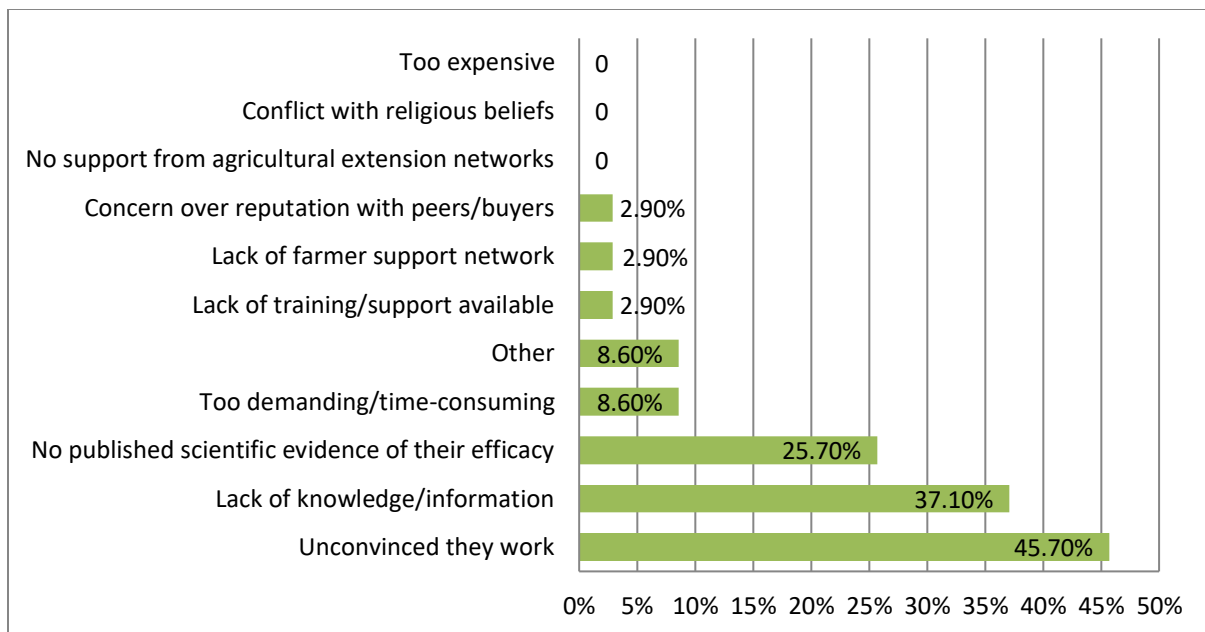


Figure T.8 – Reason provided by Respondents for not working with Ritual-based practices

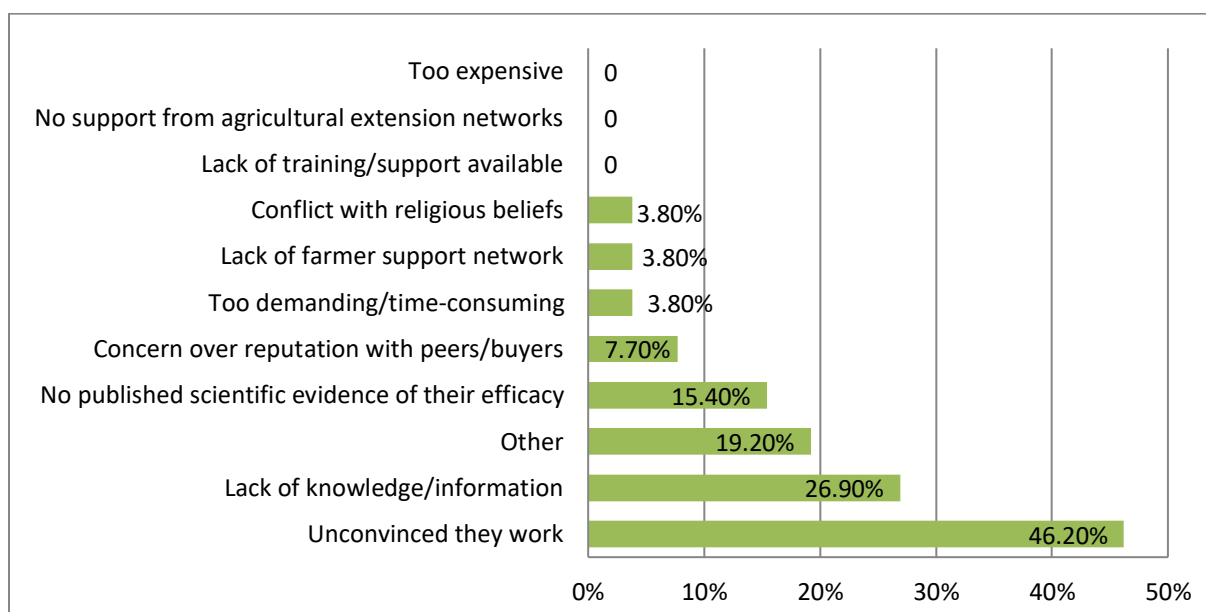


Figure T.9 - Reasons provided by Respondents for not communicating with Nature intelligences

Appendix U – Breakdown per Practice for Respondents’ Challenges and Barriers Working with Subtle Practices

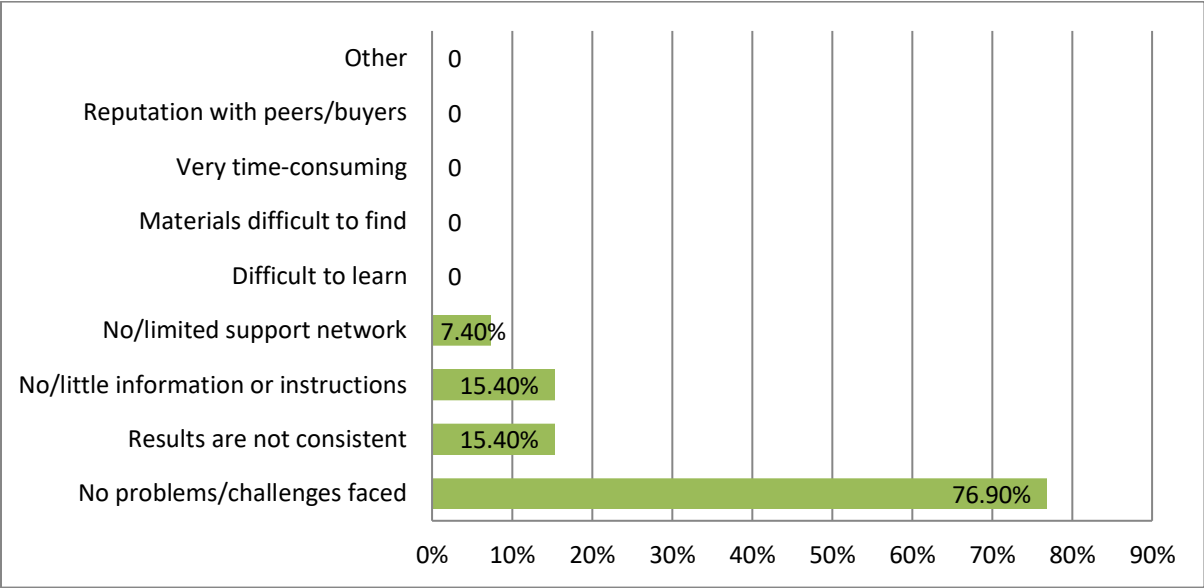


Figure U.1 - Comparative Breakdown of Respondents Challenges Working with sound / electrical energies

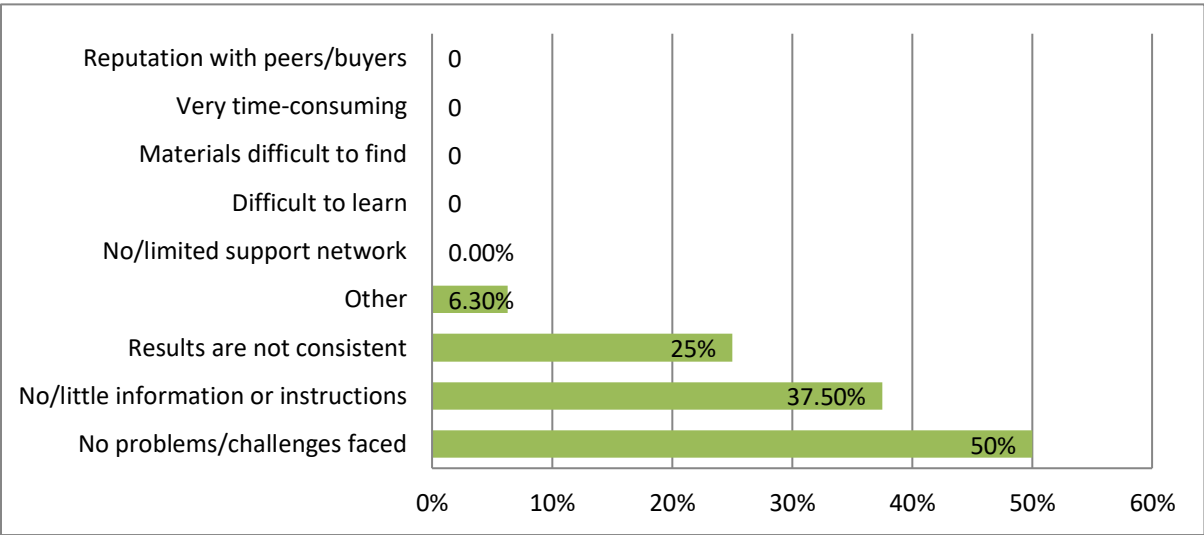


Figure U.2 - Comparative Breakdown of Respondents Challenges Working with other subtle energies

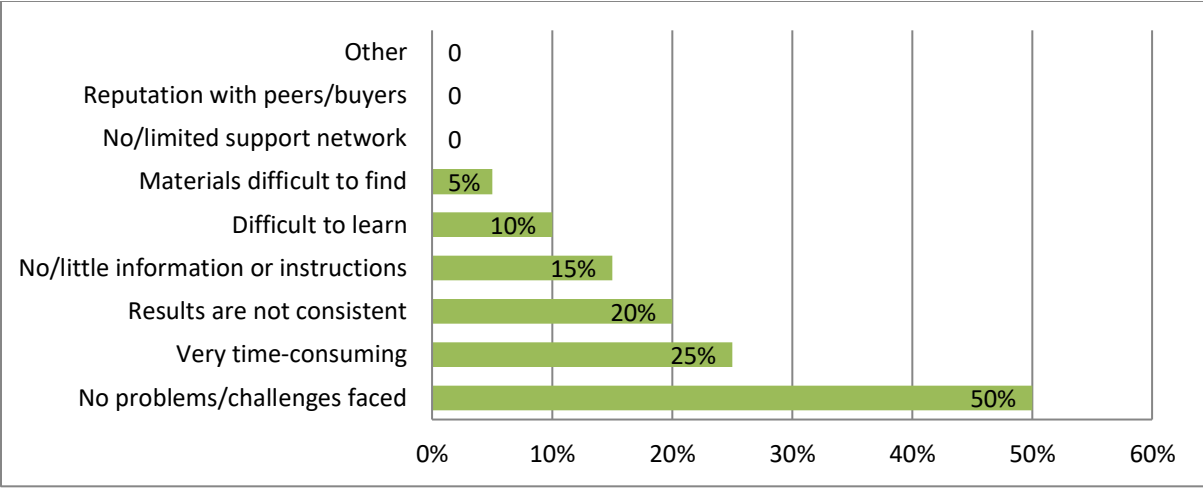


Figure U.3 - Comparative Breakdown of Respondents Challenges Working with Biodynamic preparations

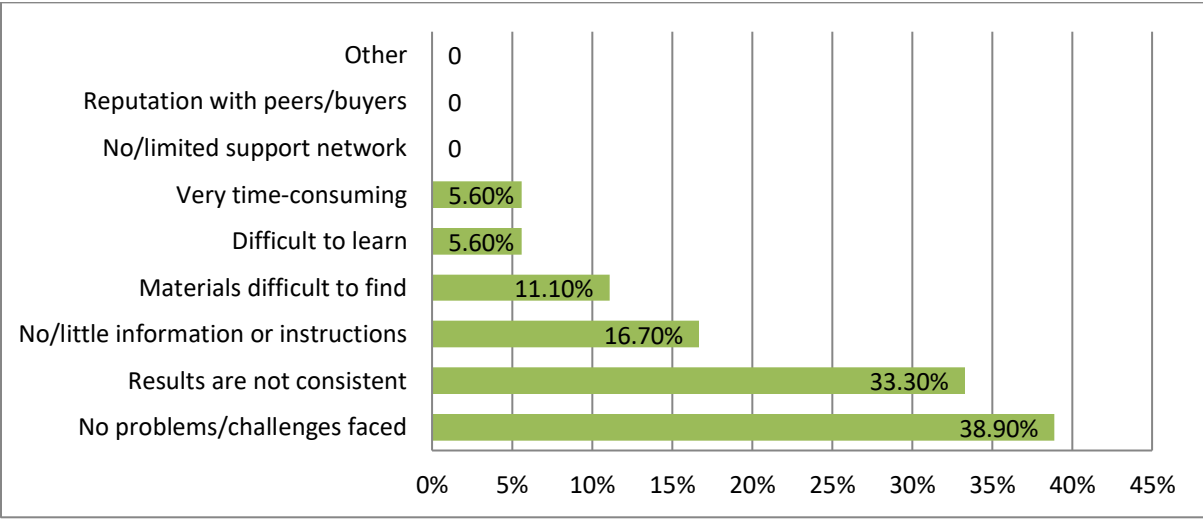


Figure U.4 - Comparative Breakdown of Respondents Challenges Working with Homeopathic treatments

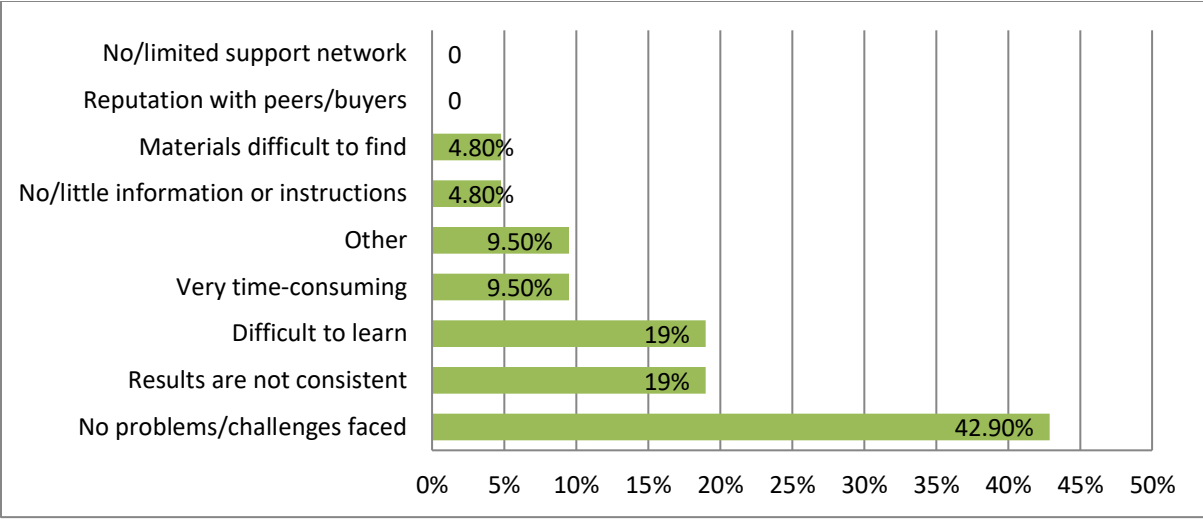


Figure U.5 - Comparative Breakdown of Respondents Challenges Working with Astronomical planting calendars

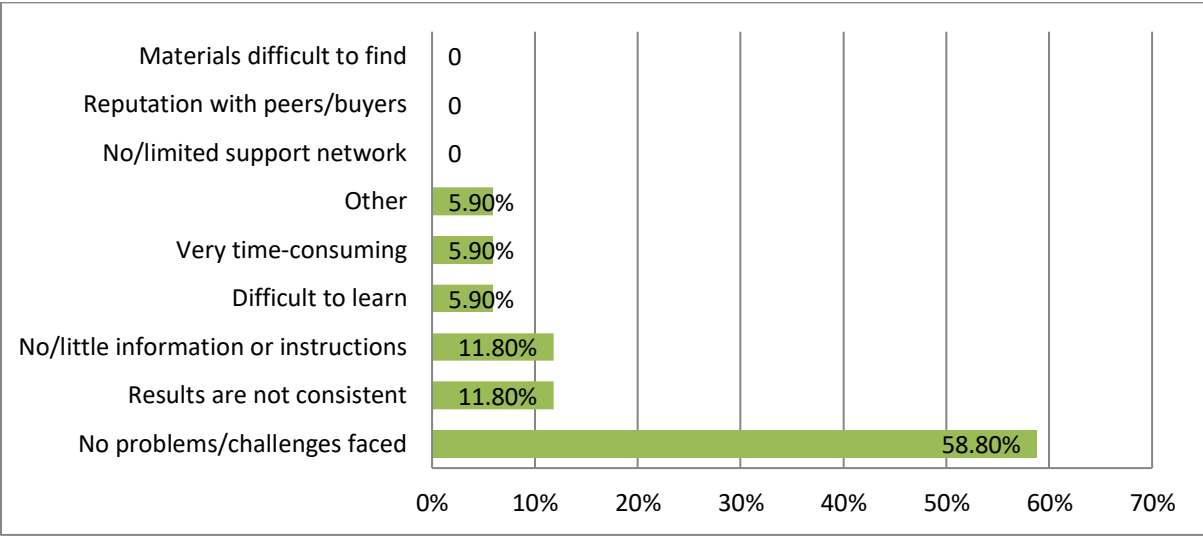


Figure U.6 – Comparative Breakdown of Respondents Challenges Working with Person-based intuitive and meditative practices

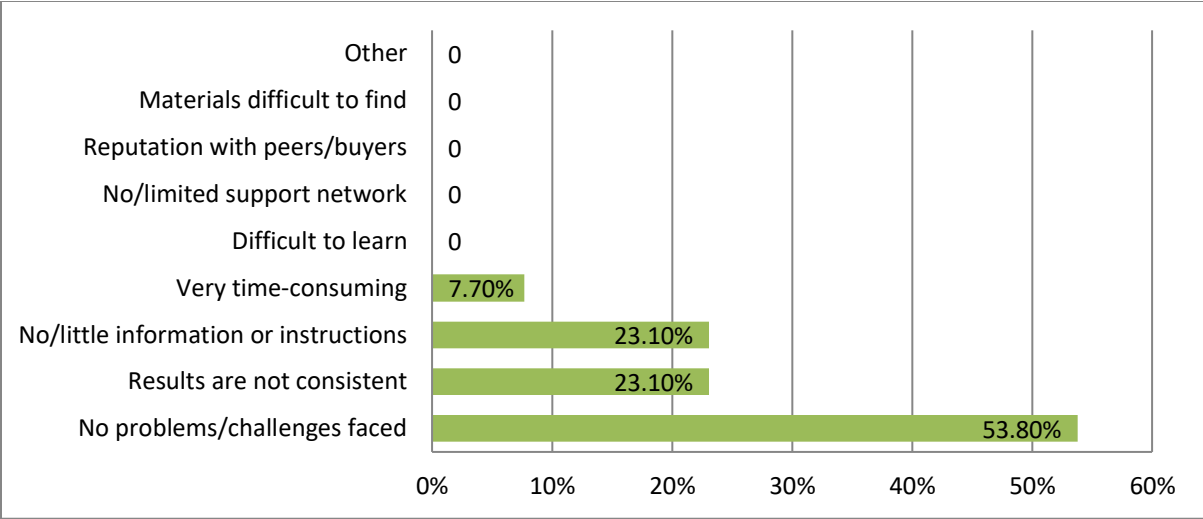


Figure U.7 – Comparative Breakdown of Respondents Challenges Working with Instrument-based intuitive practices

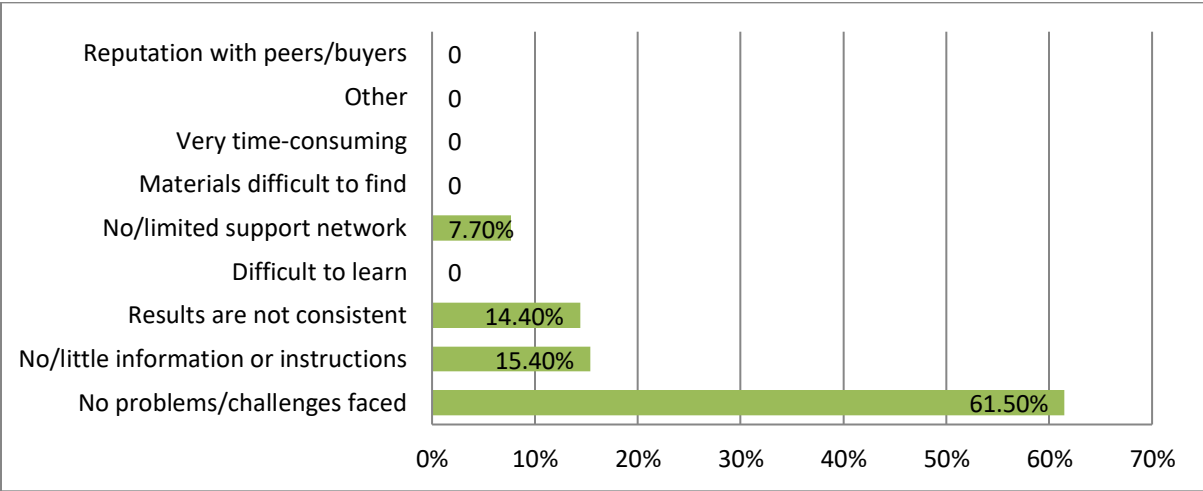


Figure U.8 – Comparative Breakdown of Respondents Challenges Working with Ritual-based practices

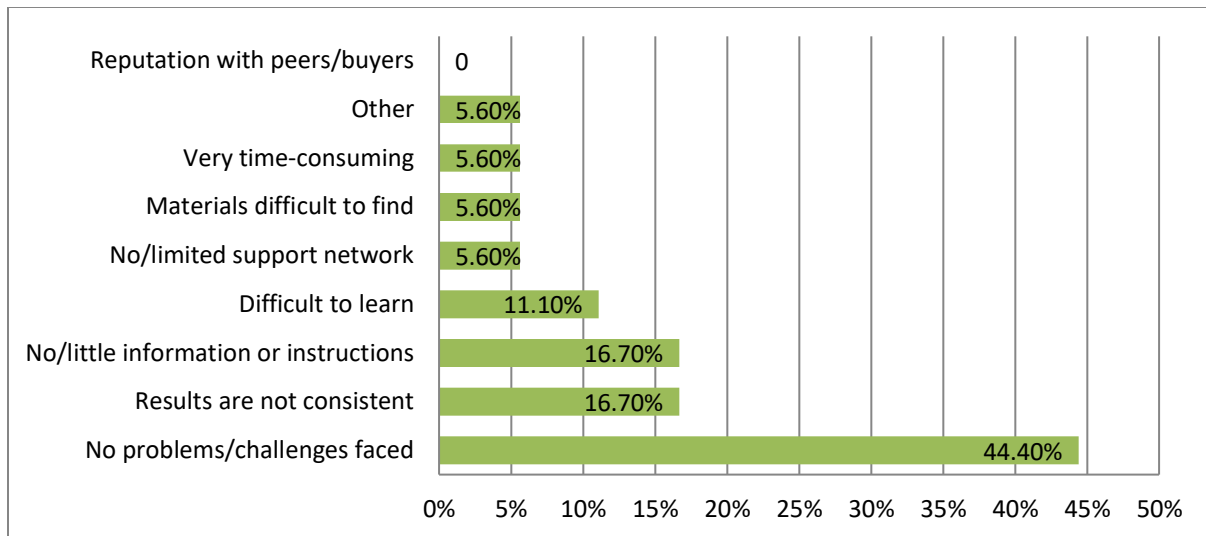


Figure U.9 – Comparative Breakdown of Respondents Challenges for Communicating with Nature Intelligences

Appendix V – Book Chapter on Sustainable Yogic Farming

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