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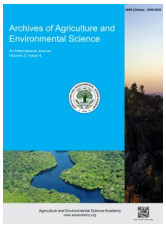

REVIEW ARTICLE

A review on history of organic farming in the current changing context in Nepal

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ABSTRACT

Worldwide, with the increase in awareness of health and environmental concerns, demand for organic agricultural products is increasing, however, its adoption in Nepal at the field level is minimal (0.30% of the total agricultural land area). Exploring the history of organic agriculture could answer, "why its growth, despite the increasing demand, is minimal?" The history of organic agriculture for commerce in Nepal is little known. This study thus explores the scope and history of commercial organic agriculture in Nepal. The paper identifies a few historical landmarks of organic agriculture; and while doing so, it describes the world history of organic agriculture. The study observed that a 'pure' form of organic agriculture in Nepal started in 1987, when an American research scholar established a commercial farm. Since then, it advanced until 1992, and then 'merged' with permaculture. The organic agriculture movement rejuvenated again in 2002 into the 10th five years plan. Much of the national policy documents on organic agriculture favored 'income' and perceived organic products as luxurious goods. As a result, much of the innovation in organic agriculture, government priorities, and people's perception inclined towards earning dollars rather than environmental conservation and sustainability of the farming system. The movement of organic agriculture in Nepal deviated from its philosophical grounds and the government's priority increased on earnings, resulting in some myths in the Nepalese society on organic agriculture. All these factors caused minimal growth of organic agriculture, despite its great scope at national and international levels.

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INTRODUCTION

In the recent past, most of the Nepalese farmers sustained themselves by farming. They used to farm a variety of crops within a limited area of land for their own consumption and sale in nearby markets in case of surplus. The farm economy was small and sustainable in terms of efficient resource utilization, enhanced social integration and human dignity. However, the use of chemical fertilizers and pesticides after the 1970s to nurture so-called high yielding crops exploded–resulting in an array of environmental and ecological disturbances (Altieri and Nicholls, 2001; Wilson and Tisdell, 2001; Atreya *et al.*, 2011; Pingali, 2012; Garcia-Yi *et al.*, 2014; Altieri, 2018). After publication of the Brundtland Report in 1987, sustainable agriculture is being popularized to overcome such disturbances (Velten *et al.*, 2015) including achieving global food security (Sustainable Agriculture, 2018). Organic agriculture is being advocated as one of the sustainable agricultural systems that not only help minimize externalities of the high input-based agriculture but also increases human nutrition by providing diversified crops including fruits, vegetables and livestock (Lampkin, 2003). Diversification of crops also reduces pests, insecticide applications, and increases yields (Gurr *et al.*, 2016). Scientific studies proved that organically grown foods have more nutrient density

than those grown conventionally (Mie *et al.*, 2017).

The emergence of organic agriculture tracked back to the early 20th century, when an Austrian philosopher Rudolf Steiner delivered a series of lecture in 1924, and later published the series as "Spirituals Foundations for Renewal of Agriculture" coining the term 'biodynamic agriculture' (Heckman, 2006; Paull, 2011a, 2011b). Then, several key scholars, independently in the USA, Germany, and United Kingdom involved in the movement of organic agriculture. At present, the four principles of the International Federation of Organic Agriculture Movement (IFOAM) guided organic agriculture: 'the principle of health', 'the principle of ecology', 'the principle of fairness' and 'the principle of care' (Gonciarov *et al.*, 2014; IFOAM, 2020). The IFOAM General Assembly organized in June 2008 in Italy defined organic agriculture as "a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved." Organic farming emphasizes environmental protection, livestock production, and animal welfare (Niggli, 2015). It avoids the use of synthetic fertilizers, pesticides, and herbicides (Morgera *et al.*, 2012). The production of genetically modified organisms (GMOs) and their use in animal feeds are also prohibited in the organic farming. It is characterized by the application of regulated standards (production rules), compulsory control schemes and a specific labeling scheme (Gomiero *et al.*, 2011) compared to other agricultural production methods. The organic farming is environment friendly, sustainable and profitable, which comes up with healthier foods with no or fewer pesticide residues than produced from conventional agriculture (Sandhu *et al.*, 2010; Reganold and Wachter, 2016). Recent meta-analysis findings showed that overall organic agriculture yield gaps are 25% (based on 316 comparisons, Seufert *et al.*, 2012) and 20% (based on 362 comparisons, De Ponti *et al.*, 2012) lower than conventional, however, the use of green manures and upgraded fertilization can lessen the gap between these two (Knapp and van der Heijden, 2018; Kumar *et al.*, 2018).

More recently, organic agriculture is rapidly growing in all parts of the world (Nandwani and Nwosisi, 2016; Reganold and Wachter, 2016), including Nepal (Aryal *et al.*, 2009; Bhatta *et al.*, 2009; Pokhrel and Pant, 2009; Burlakoti *et al.*, 2012) because of people's increased willingness to consume the organic products even at a premium price. Over the past decade, the demand of organic products has been increasing in Nepal, mostly in major cities, with increased public awareness on health (Aoki, 2014), however; field level adoption of organic farming practices is so far limited (Bhatta *et al.*, 2009; Pokhrel and Pant, 2009). The organic certified land area was a mere 11,851 ha (0.30% of the total agricultural land area) in 2018 (Willer *et al.*, 2020). The historical development of organic agriculture in Nepal is, in fact, 'hidden', and there are a few studies on the history itself, and very few are available in the international peer-reviewed journals. Exploring the history may answer, "why the growth of organic agriculture in Nepal, despite its increasing demand, is minimal?" Therefore, we started the present study to explore the scope and history of commercial organic agriculture in Nepal. The paper identifies historical landmarks associated with organic agriculture development in Nepal. While doing so, it also briefly describes the world history of organic agriculture.

METHODOLGY

The study adopted an in-desk review of literature, key informant interviews, and field observation of a few organic farms. The study also captures the first-hand experience of Asia Network for Sustainable Agriculture and Bioresources (ANSAB) in developing and promoting ecosystem-based commercial agriculture (ECA), a method of organic farming. The study reviewed national -level policies, standards and guidelines, grey documents, published literature, and other reports; and selected only organic agriculture-related documents for review. Authors visited a few government offices, non-governmental organizations (NGOs), and local libraries to collect documents. We interviewed a few government officials at the Department of Agriculture. Similarly, we consulted a few local NGOs working in permaculture and organic agriculture. Further, we visited a few organic farms and interviewed the farm owners.

SCOPE OF ORGANIC AGRICULTUR IN NEPAL

Nepal still practices traditional agriculture

Nepalese farmers have been practicing traditional agriculture over centuries, which has ignored the use of chemical fertilizers and pesticides and emphasized the use of locally available inputs in crop production through integrating crops, livestock and forests (Panth and Gautam, 1990). This agricultural practice is organic by default and still carried out in rural Nepal exhibiting the closed nutrient cycling within the farm. The cattle shed-house in most of the family farms in the hills and mountains contains a pair of bullocks, few cows or buffalos, a few pairs of goats and chicken, and others (Pokhrel and Pant, 2009). The family farms receive the organic manure generated from the cattle shed-house. Farmers also incorporate field residues into soil, or fed to livestock. Crop yield in such farming depends on internal resources, organic matters recycling, inbuilt biological pest control mechanisms and local weather patterns. High percentage of agricultural land in Nepal is by default free from chemical fertilizers and pesticides (Pokhrel and Pant, 2009). We believe that this is a favorable condition and has a potential for future conversion of the 'uncontaminated' agricultural land for organic farming in Nepal. Beside such a favorable environment, increased global and national demand for organic products, coupled with its role in the conservation of biodiversity in agro-ecosystems (Bengtsson *et al.*, 2005) illustrate a significant scope and importance of organic agriculture in Nepal.

The high input-based agriculture is unsustainable

Crop yields in the traditional agriculture are modest but stable. Traditional agriculture practices involve diversifying crops, rotating with legumes, fully family managed, and linking the agriculture systems with ecology secured crop production. However, when modern agriculture progressed at around 1960s after the innovation of 'green revolution', particularly in Asia, the ecological farming linkage was broken because yields and farm profit solely drove contemporary agricultural innovation (Lichtfouse *et al.*, 2009). As a result, there was a remarkable return (yield increase) but an array of negative ecological and social problems emerged (Dhanagare, 1988; Shiva, 1992; Pimentel, 1996; Evenson and Gollin, 2003; Pingali, 2012; Hazell, 2014). The modern agriculture has, in fact, revolutionized food production in parts of the world. It is actually a kind of significant change that promoted high inputs use, such as synthetic fertilizers, chemical pesticides, farm mechanization, irrigation water use, and so on for the production of high yielding varieties. In 1970, an American biologist, Norman E. Borlaug received the Nobel Peace Prize for having set in motion a worldwide agricultural development–particularly the increase in yield of the 'miracle wheat', which doubled or even tripled the yield than the contemporary crop yield (Shiferaw *et al.*, 2013). Now several terminologies are being synonymously used for such types of agriculture: "green revolution agriculture", "industrial agriculture", "conventional agriculture", "commercial agriculture", "high input-based agriculture", "intensified agriculture" and so on. Many scholars believed that the benefits of these technological changes in terms of increased yield far outweigh their negative impact on human health and the environment. However, the famous book of Rachel Carson's "Silent Spring" highlighted and made people aware of the negative effects of the industrial agriculture. In fact, the book "touched off the debate on the use of chemical pesticides, the responsibility of science, and the limitations of the technological progress" (Lear, 2002). Using chemical fertilizers and chemical pesticides in crop production has two major effects. The first is the immediate income gain by increased crop yield (Liu *et al.*, 2015) and the second is the negative ecological disturbance and human health degradation over the long run, which far outweighs the first effect (Antle and Pingali, 1994; Pimentel, 1996; Krebs *et al.*, 1999; Tilman *et al.*, 2001; Atreya, 2008; Pingali, 2012). Evidence shows that prevailing agricultural policies have led to this environmental crisis by favoring large farm size, specialized production, crop monocultures and mechanization (MoAD, 2014; Norgrove and Hauser, 2015; Devkota *et al.*, 2020). As a result, assemblages of farm components are broken; nutrient and energy cycles are more open; pest outbreaks often occur; plants become more susceptible to pests; insects develop resistant to pesticides; often small farm-holders are marginalized or pushed out of agriculture (Dhanagare, 1988; Altieri and Nicholls, 2001; Altieri, 2004, 2018); and finally, the high chemical input-based agriculture becomes unsustainable (Shiva, 1992; Wilson, 2000; FAO, 2017). At present, many scholars argue that to manage the said disturbances, we should take the associated external costs into consideration while accounting this investment into benefit-cost analysis (Antle and Pingali, 1994; Wilson, 2000; Maumbe and Swinton, 2003; Pimentel, 2005; Atreya *et al.*, 2012). Taking an example of pesticide use in Nepal, Atreya and his colleagues have shown how the poor farmers are marginalized by the high input-based agriculture. These farmers are 'forced' to bear the costs of health and environmental degradation and marginalized because of declining health productivity, increasing the economic burden of pollution, and changing social behaviors (Atreya, 2008; Atreya *et al.*, 2011, 2013). Henceforth, we recommend accounting of the health and environmental costs of pollution caused by the high input-based agriculture in designing national farm policy and plans. The high input-based agriculture crossed the limits of the earth production potential, it is unsustainable and could not feed the growing population in a long-term (Shiva, 1992; Struik and Kuyper, 2017); therefore, a new paradigm in agricultural revolution emerged, that strongly considers the relationships among agriculture, natural resources, and economic yield; that has been popularizing as the "sustainable agriculture". Although organic agriculture is not a paradigm for sustainable agriculture, the combination of organic and conventional practices could hand out toward sustainable food production system (Meemken and Qaim, 2018).

The UN and some organizations have called for a fundamental change in agriculture

Now we are in the era of sustainable agriculture - a new paradigm. The world views sustainable agriculture as the production system that secures food self-sufficiency by conserving/enhancing the natural resource base and ensuring social equity and economic viability (Thompson, 2007; Velten *et al.*, 2015; FAO, 2017). Until the era of high input-based agriculture, each scientist was working with its own defined field, not interested or willing to see how things are interacted. These scientists were working independently. For example, agronomist, edaphologist, crop protectionist, ecologist, and economist had focused their research on a single indicator of agriculture—crop yield per unit area. However, heavy use of chemical fertilizers and pesticides was one example where exogenous effects forced some scientists to look beyond the boundaries of their own mono-disciplinary to understand what they were seeing and experiencing in the yield, soil ecology, crop ecology, and society. These people faced trying to find novel ways of thinking and new methodological approaches to gain a better understanding of the world they saw. Finally, a new paradigm of sustainable agriculture emerged. The sustainable agriculture paradigm that adopts the interdisciplinary approach of study solves several issues of mono-disciplinary. It not only accounts positive (yield) but also considers the negative effects of high input-based agriculture in the long and short run and the multiple interacting factors in the environment, including people, soil, crops, surface and ground water, and micro- and macro-flora and fauna - making a complete agro-ecosystem

approach (Tilman *et al.*, 2002; Altieri, 2004, 2018). The United Nations' "Wake up before it is too late" (UNCTAD, 2013) and iPES-Food's "From uniformity to diversity" (IPES-Food, 2016) called for a paradigm shift away from input-intensive industrial agriculture towards the more sustainable, highly regenerative and productive "ecological intensification" and "diversified agroecological systems", respectively for growing our foods.

Practical approaches and methods are being developed

Figure 1 helps to perceive changing knowledge of understanding in the agriculture system. Its interpretation with time depends on the analytical framework of the scientific communities. The different scientific methods (A_1, A_2, ...A_n) can achieve a paradigm (A). The high input-based industrial agriculture replaced the initial traditional agriculture, which again has been replacing to some extent by the sustainable agriculture, resulting in a stepwise development of the agriculture science. The methods set "C" are the best, based on the current context and 'mind', but are not the absolute truth regarding agriculture because the 'future mind' could interpret facts based on a different framework. But the more we move towards achieving sustainable agriculture, the development of world agricultural knowledge becomes more interconnected, complex and multi-and trans-disciplinarity.

Here we want to clarify 'method' within a paradigm. A method is an established scientific knowledge that helps to achieve the goal of the paradigm. For example, the use of chemical pesticides, chemical fertilizers, high yielding varieties, farm mechanization and irrigation water are the methods applied for achieving the goal of high input-based industrial agriculture. Similarly, scientific communities and local communities have discovered such methods for sustainable agriculture too. These are, for example, organic farming, agro-forestry, integrated pest management farming, permaculture, conservation agriculture and so on. A method could be a model, or a hypothesis, or a system, or an alternative, but it should aim to achieve a particular paradigm's goal. For the development of knowledge base of organic agriculture, importance of farmers and producers, and actors along the food chain are vital. Both scientific community and local farmers' community are equally important in the scientific development process of organic agriculture. Particularly in Nepal, development or introduction of methods like integrated pest management (IPM), integrated crop management (ICM), integrated plant nutrient management system (IPNS), organic farming, permaculture, agroforestry, and sustainable rice intensification have to some extent, tried to minimize their respective problems by addressing both social and ecological approaches. We intend these concepts are successful to identify the optimum level of fertilizer and pesticide usage regarding human society.

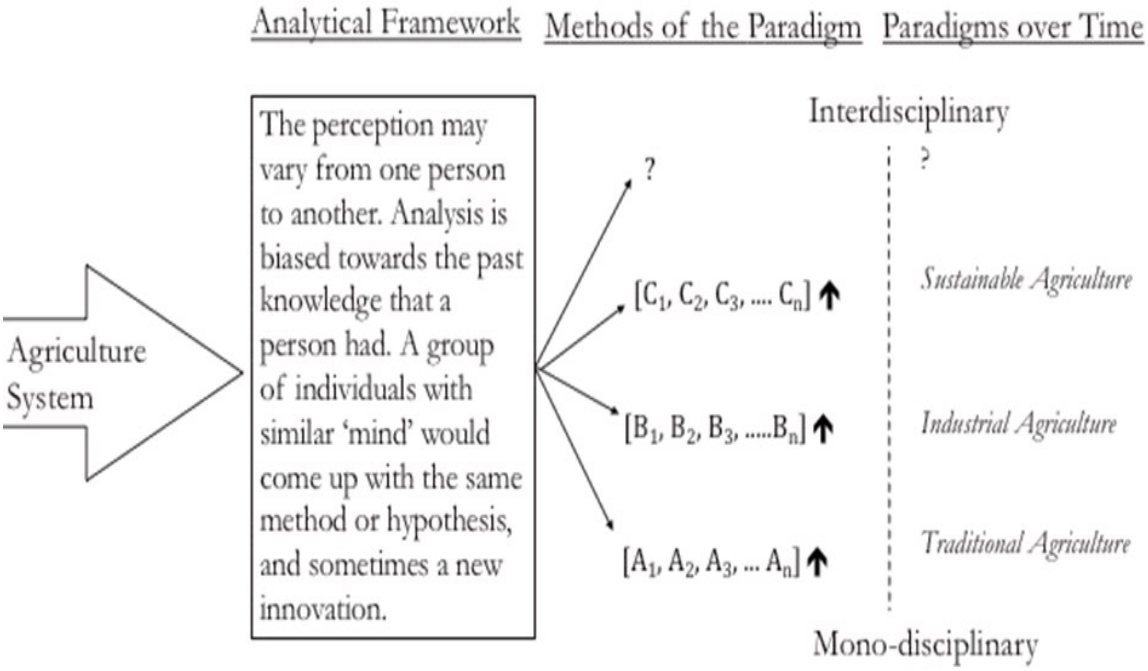

Figure 1. *Interpretations of agriculture system depend on the analytical framework of an individual (Atreya, 2015a).*

At present, many scientists and practitioners understand that neither the ancient agriculture nor the traditional agriculture could feed the growing population; and the present conventional agriculture heavily depends on chemicals, resulting many ecological disturbances and health hazards, which the human civilization cannot afford if unchanged. Many believe that it is the right time for action, for change before irreversible damage happened. This leads to the emergence of 'sustainable agriculture' paradigm. However, the term 'sustainable' itself is not free from controversy because of its vagueness, unclearness, and measurability (Petersen and Snapp, 2015). The practical issue of sustainability paradigm is that it does not show the way to achieve its goal, for example, what techniques it can deploy to get the 'end product' of sustainability. This has resulted to an innovation of 'the best' agricultural production systems. A good deal of agriculture production systems developed, with comparatively well-defined characteristics, boundaries, and innovations (Figure 2). Neither one accepted unequivocally as 'the best'—instead, each one defined what 'the best' means. These methods differ especially in the way they see (i) the effects of environment on agriculture, (ii) the effects of agriculture on environment and (iii) the ways they link natural elements to agriculture and vice versa (Therond *et al.*, 2017). It results from competition between 'input technologies' and 'process technologies.' Many of these innovative agricultural systems are context-specific, ecosystem-specific, and accordingly we noticed remarkable changes in the technological and institutional development.

Recently, a few development organizations in Nepal, acknowledging organic agriculture and visualizing the Nepalese landscape agro-ecology, came up with a changed 'hybrid' method to support 'sustainable agriculture'. A Kathmandu based civil society organization - Asia Network for Sustainable Agriculture and Bioresources (ANSAB) has pioneered "Ecosystem-based commercial agriculture (ECA)" in Nepal with the aim to transform the traditional forestry and agriculture into climate smart, attractive and socially prestigious business. The ECA system, as envisioned by the organization, increases the production and productivity sustainably; improves the resilience of agro-ecosystems and people to climate change; reduces/removes greenhouse gases; and attract youths and make it socially prestigious generating better remuneration. It has established a few experimentations and demonstration farms—the first is in the Central mid-hill region (Kavre district), the second is in the Western Terai region (Nawalparasi district), the third is in the Far-western mid-hill region (Bajura district), and the fourth is in Central mountain region (Dolakha district). Although its effects on social, environmental and economic benefits are yet to measure, Atreya (2015) noted that ECA emerged on four basic foundational principles: (i) landscape ecology, (ii) agro-ecology, (iii) social cohesion, and (iv) agribusiness entrepreneurship - for the structural transformation on economic growth considering environment sustainability, social justice and equity, and economic efficiency. The ECA accepts the philosophy of organic agriculture (prohibits use of chemical pesticides, synthetic fertilizers, antibiotics, GMOs, and so on) and also considers human needs of increased production with enhancing environmental resource-base of agro-landscape and building prosperous communities through enhanced social cohesion and agro-enterprises. A group of scholars working in the ANSAB (and authors of this paper) believe that there is a need of modification to existing agricultural system to harness comparative advantages of the country looking into its diverse social, economic and ecological situations, and maintaining the 'pure' form of organic agriculture. We are thus promoting the ECA as being context-specific, ecosystem-specific, and fulfilling local demands of sufficient nutritious food and better livelihood by making it attractive to youth through commercialization of high value crops and dignified business.

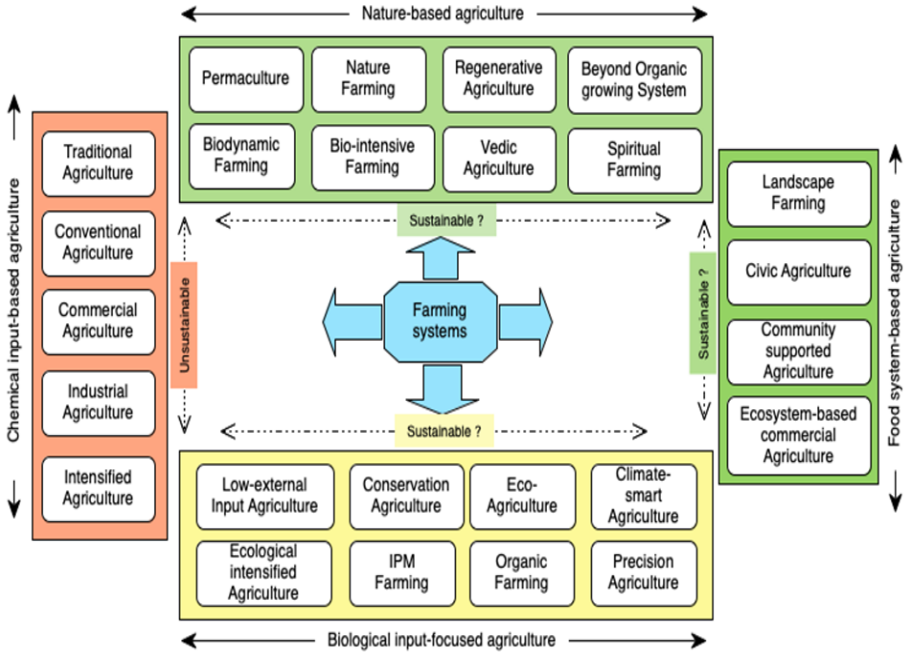

Figure 2. *Characteristics and boundaries of the various farming systems.*

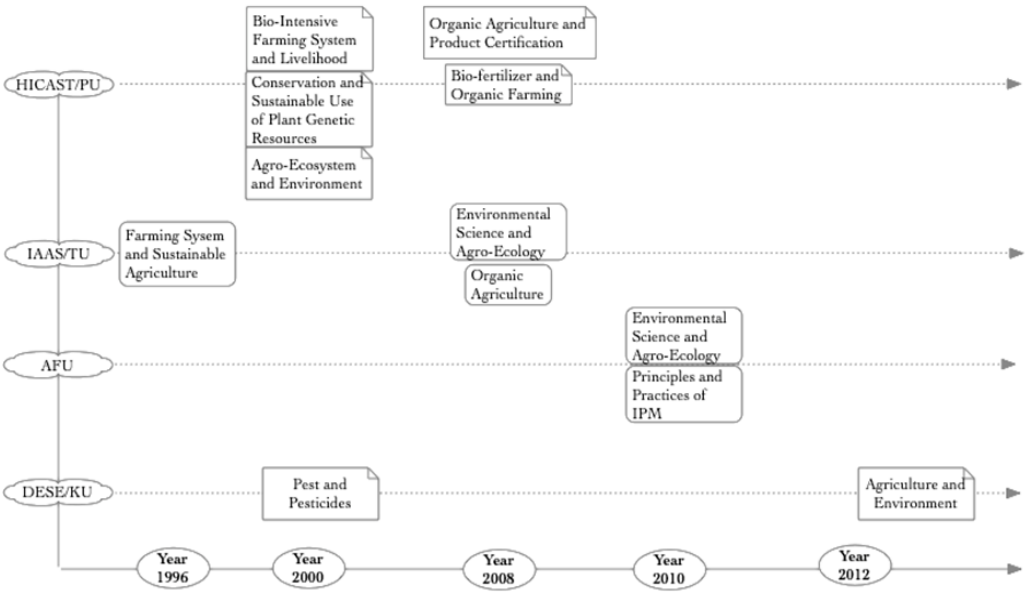

Figure 3. *Endorsement of organic agriculture related courses at Bachelor Level by the Nepalese Universities (Atreya, 2015b). [Note: HICAST/PU = Himalayan College of Science and Technology, Purbanchal University; IAAS/TU =Institute of Agriculture and Animal Science, Tribhuvan University; AFU = Rampur Campus, Agriculture and Forest University; and DESE/KU= Department of Environmental Science and Engineering, Kathmandu University].*

Organic agriculture – global acceptance

Of the many alternative approaches under sustainable agriculture, people around the world accepted organic agriculture in terms of area coverage, technological and institutional development, and environmental conservation. At present, on a global scale, 71.5 million hectares of agricultural land (1.5% of total agricultural land) over the 186 countries are certified as 'organic' with 2.8 million producers and about US $114 billion market size (Willer *et al.*, 2020). In reality, there must be much more area under organic agriculture, as there are farms and practices, especially in developing countries, which are organic by default or follow organic practices but not formally certified. The global market of produces from organic agriculture is increasing, because of its philosophical, environmental and food safety concerns (Schösler *et al.*, 2013). It is a kind of ecological farming, where the field is a laboratory for ecological innovations, and the producers/farmers constantly try, fail, learn and retry for the innovation with long-suffering associated risks and costs (Tittonell, 2014). Maria (2010) strongly pointed out that the "chemical paradigm is about controlling nature; the organic paradigm is about respecting nature".

WORLD HISTORY OF ORGANIC AGRICULTURE

Today's organic farming, although uses a few similar methods as of traditional agriculture, in fact, is not the reversion of past practices, but is 'an intensification of farming by biological and ecological means in contrast to chemical intensification by mineral fertilizers and chemical pesticides (Vogt, 2007). This clarifies that organic agriculture started much more recently (see Table 1). It is hard to specify exactly when it begun; however, the series of lecture on agriculture by Rudolf Steiner in Koberwitz, Germany (now Kobierzyce, Poland) in 1924, and his publication "Spiritual Foundations for the Renewal of Agriculture" founded 'biodynamic agriculture' (Paull, 2011a) (Table 1). Steiner's lectures not only made aware of the danger of chemical fertilizers (just appearing in his time), but also offered guidelines for organic farming practices, stressing the ideas of the farm as a self-sustaining organism, that thrives through crop diversity, the crop-livestock integration, and creating 'closed' nutrient cycling (Vogt, 2007). Later in 1938, Ehrenfried Pfeiffer, a student of Steiner, unequivocally popularized the biodynamic agriculture in the book "Bio-Dynamic Farming and Gardening" which brought the practices, philosophy, and nomenclature of the 'alternative' agriculture to a worldwide audience (Paull, 2006).

A few American and British agricultural scientists also began for alternatives to industrial farming in their countries when they observed contrasting practices on parts of Asia. In USA, Franklin Hiram King's publication in 1911 "Farmers for Forty Centuries" acknowledged the practices that had been applying to enhance soil fertility and soil conservation in China, Korea and Japan. In the UK, Sir Albert Howard, a mycologist (often referred as the father of modern organic agriculture) published several books and many articles at different time intervals, including a few remarkable publications, such as "The Waste Products of Agriculture" in 1931, "An Agricultural Testament" in 1940 and "The Soil and Health: A study of Organic Agriculture" in 1947 (Heckman, 2006). In his publications, he argued that healthy soils are the foundation for healthy plants and animals. During the same period, Sir Robert McCarrison observed the relationship between agriculture and human health in India and inspired GT Wrench to write the book "The Wheel of Health" in 1938, after his return to England in 1935 (Wachter and Reganold, 2014).

Table 1. World history of organic agriculture [including Nepal].

Year	Country	Historical land marks
1911	USA	Franklints King's "Farmers for Fourties Centuries" acknowledged the Asian soil management practices, and recommended other agriculturists.
1924	Germany	Rudolf Steiner lecture series, later published as "Spiritual Foundations for the Renewal of Agriculture" coined 'biodynamic agriculture'.
1927	Germany	"The Natural Farming" and "Back-to-back Land Association" movement.
1931	Germany/ UK	Germany: Eward Konemann "Biological Soil Culture and Manure Economy", Vol 1 UK: Sir Albert Howard "The Waste Product of Agriculture"; often refereed as "Father of modern organic agriculture".
1932	Germany	Eward Konemann "Biological Soil Culture and Manure Economy", Vol 2.
1937	Germany	Eward Konemann "Biological Soil Culture and Manure Economy", Vol 3.
1938	Germany/ UK	Germany: Ehrenfried Pfeiffer "Biodynamic Farming and Gardening" UK: Sir Robert McCarrison inspired GT Wrench "The Wheel of Health".
1940	USA/UK	USA: Rodale Organic Gardening and Experimental Farm (Rodale Institute today), 2nd longest experimental farm on organic vs. conventional; UK: [a] Sir Albert Howard "An Agricultural Testament", [b] Lord Walter Northbourne "Look to the Land" - first spell out 'organic farming'.
1942	USA	Jerome Rodale's "Organic Farming and Gardening".
1943	UK	[a] Lady Eva Balfour, founder and the first president of Soil Association in Britain, "The Living Soil" and started [b] "Haughley Experiment"- the first longest experimental farm on organic vs. non-organic.
1945	USA	Jerome Rodale "Pay Dirt".
1947	UK	Sir Albert Howard "The Soil and Health: A study of Organic Agriculture".
1962	USA	Rachel Carson "Silent Spring" brought an environmental social movement. She is often referred as 'mother of environmental movement'.
1970	France	Claude Aubert "L'Agriculture Biologique" - a popular book helped to form Frenche association Nature et Progres.
1972	France	Formed International Federation of Organic Agriculture Movement (IFOAM).
1973	Germany	Formed Research Institute of Organic Agriculture (LiBL).
1978	Germany	LiBL started DOK trial - the longest experimental trail among biodynamic (B), organic (O), and conventional (K).
1984	USA	First spell out 'organic agriculture' in the policy document.
1987	Nepal	Mrs Judith Chase (founder of AAA) initiated the first commercial organic farm.
1989	USA	The National Research Council report entitled "Alternative Agriculture".
1990	USA	[a]Endorsed "Organic Food Production Act" that established USDA National Organic Program; [b] Nicolas Lampkin "Organic Farming", a very popular publication.
1991	Nepal	4th International Permaculture Conference, Kathmandu 10-15 Feb. organized by INSAN/Badri Dahal with support from Chris Evans (JPP - co founder).
2005	Nepal	National Workshop on Organic Agriculture and Food Security (13-15 Dec).
2006	Nepal	The first National Workshop on Organic Farming (12-14 June).
2007	Nepal	[a] Declare Jumla as the first Organic District; [b] Held 1st National Organic Fair.
2008	Nepal	An International Workshop on "Organic Agriculture: Challenges and Opportunities"
2011	Nepal	[a] National policy dialogue workshop on organic agriculture (21 March) & [b] National Consultation Workshop in Kathmandu (13 June).
2012	Nepal	National conference on organic agriculture in Kathmandu (4-6 April).
2014	Nepal	National workshop (9 May) on ecosystem-based commercial agriculture (ECA).
2018	Nepal	Karnali Province Policy - delineate the whole provincial area into gradual transformation into fully organic.
2019	Nepal	[a] Formation of high-level task force on organic agriculture promotion at federal level; [b] 12th National Organic Agriculture Fair.
2020	Nepal	Initiation of founding "Organic Farming Promotional Centre" under Ministry of Agriculture and Livestock Development.

Inspired by the work of King, Howard, and McCarrision, Lady Eve Balfour established the first long-term comparison of organic and non-organic production experiment farm (the Haughley Experiment), and published a book entitled "The Living Soil" in 1943 that highlighted the importance of soil biota on nutrient availability. It was Lord Northbourne who coined the term 'organic farming' from the concept of 'farm as organism' (Paull, 2006, 2011c) and because of this, he has the best claim to being the "father" of organic agriculture. In his book "Look to the Land," published in 1940, he exceptionally versioned a clash of worldviews between "organic versus chemical farming" and warned that it may last for generations (Paull, 2014). This book provided a practical and philosophical underpinning for organic farming, slightly changed the view of Steiner and Pfeiffer to see further and brought the concept of 'organic' to a worldwide audience by presenting the 'biodynamic agriculture' as one way of practicing organics (Paull, 2011b).

In the US, Jerome Irving Rodale brought much of the work done in Europe and founded Rodale Inc. in 1930. He was the first person in the United States favoring sustainable agriculture and organic farming. As a result, he established Rodale Organic Gardening and Experimental Farm (the 2nd longest experimental farm between organic and conventional) in 1940 (Wachter and Reganold, 2014); started publishing a magazine entitled "Organic Farming and Gardening" starting in 1942 (until today known as Organic Gardening but re-launched as Rodale's Organic Life in spring 2015); and published a book "Pay Dirt: Farming and Gardening with Compost" in 1945 (Heckman, 2006; Paull, 2006). There was significant social movement towards organic and against the use of chemical pesticides during the 1960s, after publication of Rachel Carson's book "Silent Spring"–ultimately leading to the ban on DDT in the US in 1972 (Frey, 1995). The works on organic farming in Germany and Britain made influence in France in the early 1970s. In 1970, Claude Aubert wrote a popular book entitled "L'Agriculture Biologique" that helped to the formation of the French association called—Nature et Progres–which led to the foundation of International Federation of Organic Agriculture Movement (IFOAM) in 1972 (Wachter and Reganold, 2014). The IFOAM is now an important global network promoting organic farming practices around the world and setting basic global certification standards for organic agriculture. In 1973, the Research Institute of Organic Agriculture (FiBL—German initials), the largest research institution on organic agriculture, was founded. FiBL started BOK trial in 1978, which is the longest experimental trial among biodynamic (B), organic (O) and conventional (K) agriculture. During 1970s, despite significant work by IFOAM, FiBL, and Rodale Institution; people still perceived organic agriculture as a radical movement. Until 1980s, the USDA had no attention of organic farming in its policy documents. However, in 1989, the National Research Council report entitled "Alternative Agriculture" (NRC, 1989) acknowledged the importance of alternative farming systems such as organic farms. The organic movement in the US was further strengthened after the publication of the popular book "Organic Farming" by Nicolas Lampkin; and the endorsement of Organic Food Production Act 1990, that established USDA National Organic Program (Wachter and Reganold, 2014).

ORGANIC AGRICULTURE MOVEMENT IN NEPAL

The organic agriculture movement in Nepal was first observed when it was at the infancy stage in the US policy documents. The US National Research Council accepted the philosophy of organic agriculture in 1989 and put forward it as "Alternative Agriculture". During the 1980s, an American research scholar Miss Judith Chase came to Nepal. With her interest to escape life in the city, she moved to Gamcha village, Dadhikot, Bhaktapur district in 1987 and started a small 'organic garden' at first, but immediately envisioned a commercial organic farm. In the same year, she founded Appropriate Agricultural Alternatives (AAA), an NGO devoted to the promotion, research, advocacy and marketing of the organic agriculture in Nepal (Table 1). She is the pioneer of organic farming for commerce in Nepal; local farmers occasionally referred to her "mother of Nepal's organic farming" (Bisht, 2011). The first author interviewed her while conducting this study. She cautiously said that "probably I had introduced the commercial organic agriculture in Nepalese society for the very first time, however, Nepalese farmers have been practicing organic agriculture since ancient time."

The movement of organic agriculture in Nepal would be incomplete if it does not account the history of permaculture. The permaculture history in Nepal dates back to 1986, when Institute for Sustainable Agriculture Nepal (INSAN) started permaculture design courses in collaboration with the Agricultural Project Services (APROSC—now defunct) and Winrock International - and that Mr. Bill Mollison, an Australian scientist, referred as the 'father of permaculture', facilitated the training (Malla, 1996). Although, there is hardly a distinct philosophical difference between permaculture and organic farming; however, Nepalese people perceive permaculture as "natural farming without chemicals" and organic as "farming with no use of chemicals." Permaculture accounts for 'system approach' and encompasses much more than just organic, whereas organic grew more on research, institutional development, and market share. In Nepal, permaculture is a kind of 'family-driven natural farming', whereas organic farming is a kind of 'market-driven commercial farming'. Despite many similarities, the fundamental difference between these two in Nepal is that "permaculture is cent percent organic and is a subsistence in its motives; whereas organic farming may not be cent percent permaculture-based but has a business motive".

We regard INSAN as one of the pioneer organizations that worked under the philosophy of permaculture and ecological agriculture since its establishment; however, this organization did not use the term 'organic farming'. AAA was providing training courses on 'organic farming and sustainable agriculture' at the time when others providing trainings on 'permaculture' (Malla, 1996). During early 1990s, a few non-governmental

organizations such as Nepal Community Support Program (NECOS – est. 1989), The Lotus Land Agriculture Farm (est. 1991), Jajarkot Permaculture Program (JPP – est. 1991), Community Welfare and Development Society (CWDS – est. 1992), Hasera Agriculture Research and Training Center (est. 1992), and Ecological Service Center (est. 1994) have promoted organic agriculture in Nepal. Nepal Permaculture Group (NPG) established in 1992, has organized NGOs and individuals working independently on sustainable agriculture, organic agriculture, and permaculture. Establishment of the NPG is a milestone in the organic agriculture movement in the country. NPG is a member of 'IFOAM—Organics International'. NPG acts as an umbrella organization, disseminate the philosophy and principles of permaculture - and has 17 organizational members and over 800 trained-individual members - advocating for policy formulation, research and trainings, and partnerships with government and international organizations. NPG has so far organized four national workshops on the organic agriculture (in the year 2005, 2006, 2011, and 2012) and one international workshop in 2008 (Table 1). The member organizations of NPG are also regularly organizing different trainings on permaculture design course, sustainable agriculture, and organic agriculture.

In the late 1990s, ANSAB supported and promoted sustainable agriculture and bio-resources with more focus on wild and herbal products. It promoted an organic certification program to promote international marketing of such products. It supported 29 forest user groups with 3,602 households, and 23,259 hectares of forests in Dolakha and Humla for certification against the International Federation of Organic Manufacturers (IFOM) organic certification standards. Starting from the early 2010s, ANSAB has been promoting organic agriculture and farming practices in Nepal, while considering environment sustainability, social justice and equity, and economic efficiency. ANSAB started ECA in 2012 that captures to reverse the trend of low return at least at the producers' level by bringing remunerative crops, climate smart inputs, technologies and practices, inclusive value chain, value addition and marketing. In partnership with Ashapuri Organics, which later developed as the lead firm for promoting ECA value chain, and the farms of which established as the experimentation and demonstration center for ECA, ANSAB promoted organic system development in the country. Agriculture farms in Kavrepalanchok and Nawalpur districts are certified organic, with some organic certified products from the farm exported to the international markets. While there are some wild herbs and non-timber forest products (NTFPs) with international market demand being organic certified in Nepal, certification of the Ashapuri Organics was exclusive in the agriculture sector. ANSAB also promoted organic farming practices at community level in Bajura, Dolakha, Nawalparasi, Kavrepalanchok and Sindhupalchok districts. During the late 2010s, ANSAB closely worked with the Jiri municipality (in Dolakha) for sustainable natural and organic products-based enterprises and local economic development. It was after the new political change with devolution of power to local government bodies, and with the aim to demonstrate the environmentally sustainable, economically viable and socially beneficial local economic development model, that is replicable in other areas for larger societal benefits. Jiri municipality has envisioned "clean Jiri, green Jiri and organic Jiri", and ANSAB has been working closely with the municipality for the promoting organic agriculture practice along with the with the market system development for the organic products. In Jiri, ANSAB has started development of the internal control system (ICS) for group certification along with the training to over 1,000 local farmers on organic production and ICS.

Organic agriculture movement in Nepal was 'hidden' into the permaculture philosophy until 2002. During mid 1990s, there was a significant growth of NGOs and individuals working under the permaculture philosophy, however there were only a few organizations unequivocally working in organic agriculture. National level agricultural policy documents also did not support organic agriculture during the initial period. For example, the Agricultural Perspective Plan 1995 (APP) favored heavy use of chemical fertilizers and chemical pesticides. The 9th Five-Year Plan (1997-2001) emphasized balanced application of chemical fertilizer and organic manures for the optimal crop yield. Both Plans were aware of the negative effects of chemicals and promoted IPM and integrated plant nutrient management system (IPNMS). One significant positive impact of the organic movement was that the curriculum board of the Tribhuvan University (TU) endorsed a Bachelor of Science (Agriculture) course "Farming System and Sustainable Agriculture" under Institute of Agriculture and Animal Sciences (IAAS) in 1996 (Atreya, 2015b). Later, other universities in Nepal also approved different sustainable agriculture related courses at Bachelor Degree levels (Figure 3).

The 10th Five-Year Plan (2002-2007) of Nepal is another milestone that used the term 'organic farming' to reduce chemical pesticide use; but the Plan was more focused on agriculture commercialization and diversification with heavy use of chemical inputs, therefore, impact of organic agriculture movement at policy level was minimal but significant (first spell out in the policy document). In 2002, the National Fertilizer Policy came into effect, which favored balanced use of organic and inorganic fertilizers. The National Coffee Policy 2003 envisioned organic coffee possibility in Nepal, therefore it proposed development of organic coffee with a national logo; but the intuition of the policy was to generate income rather than environmental care and fairness. The most commendable policy that still influencing organic agriculture is the National Agricultural Policy 2004. This policy encouraged organic farming and provided support for the certification and accreditation for export. Most of the policy documents supporting organic agriculture promotion in the country have accounted mostly for 'income', 'export' and 'business', and considered organic products as 'luxurious goods' to domestic demand.

It took nearly 19 years to arrange a national level workshop on organic agriculture since its 'birth' in Nepal. The NPG organized a workshop in Kathmandu during 13-15 December 2005. The Government of Nepal (GoN) also organized the 'first' national

level workshop on organic farming during 12-13 June 2006. Over 125 experts took part the workshop and included presentation of 21 papers within six thematic areas - (i) concept, status and opportunity of organic farming (ii) production techniques, (iii) soil fertility management (iv) pest management (v) inspection, certification and standardization; and (vi) policies and strategies; of the organic agriculture in Nepal. The Director General of the Department of Agriculture chaired the workshop and the Secretary of the Ministry of Agricultural Development inaugurated the workshop. The workshop is another landmark in the history of organic agriculture in Nepal, because (i) the GoN was the organizer with participation of a significant number of individuals from diverse sectors, (ii) it not only defined the concept of 'organic agriculture' and 'organic product' in a simple word for Nepalese, but also established the role of different stakeholders in the promotion of organic agriculture, and (iii) included many of the recommendations of the workshop envisioned for promoting organic agriculture in Nepal, in the National Standards of Organic Agriculture Production and Processing 2007 (Revised 2008), which is the basic standard of organic agriculture in Nepal as of today. This standard not only provides basic guidelines for the organic agriculture production but also establishes a few organizational structures, the most important are: National Coordination Committee for Organic Agriculture Production and Processing Systems (NCCOAPPS), and National Organic Agriculture Accreditation Body (NOAAB).

In 2007, District Development Committee of Jumla district in Karnali province declared the district as "organic" which was another commendable initiative of Nepal government. Similarly, regular organization of National Organic Fair to promote local organic products is encouraging. The Organic Fair started in 2007 and functional annually until now. In 2019, the 12th Organic Fair was held on Lalitpur (Feb 28- Mar 3). The government has endorsed a few working guidelines on organic agriculture to encourage organic farming. Likewise, there is official working procedure endorsed in 2009 to provide an incentive for the establishment of organic fertilizer production industry, and recently (in 2019) endorsed an organic fertilizer subsidy program operating procedure - both promote the use of organic fertilizers however the consumption of organic fertilizers at farmer's level is low because of the lack of quality assurance, bulkiness and difficulty in transportation (Amgai *et al.*, 2018). Some recent other initiative taken by (i) the provincial government (Karnali) is the delineation of the areas for gradual transformation into a fully organic province and (ii) federal government is the formation of a high-level taskforce on organic agriculture promotion – these are giving some hope for the development of organic agriculture in Nepal.

MYTHS ON ORGANIC AGRICULTURE

The deviation of organic agriculture from its philosophical grounds, and the government's priority of organic agriculture as a business have resulted in several myths on organic agriculture in Nepal, and that may have caused a minimal growth of organic agriculture despite its increasing scope and relevance in the face of climate change vulnerability. Since the 10th Five-Year Plan, a few institutions, a group of farmers, and a few innovative individuals have shown affection on organic agriculture, however, its adoption is below than expected. For many individuals and government body in Nepal, organic agriculture is synonymous to 'crop production with no application of chemical fertilizers and pesticides' and they perceive organic products only for export. There are some myths of organic agriculture (see Table 2), which has resulted to the minimal attraction of the general people to the sector. Until recently, only well-off people and people returning from abroad started organic farming for earnings. The myths are untrue because the organic agriculture goes beyond 'income'. It is a way of agriculture life, a social tribute to the animal and plant with care and fairness and believes in the production's sustainability for present and future generation through improving/maintaining soil health and thus more resilient to the global climate change.

Table 2. Myths on organic agriculture.

Myth #1	Organic farmers use no inputs
Myth #2	Organic crop yields are always less than conventional
Myth #3	Organic farms are mostly small vegetable growers, not real farmers
Myth #4	Products from organic farms must receive a premium to be profitable
Myth #5	You must certify the whole farm, not just one field
Myth #6	Organic farming is only for the counter-culture folks, not real farmers
Myth #7	Organic agriculture is for earning $*
Myth #8	Organic products are only for export to boost our economy*
Myth #9	Organic products are luxurious goods, general people could not afford*
Myth #10	Farmers by default are practicing *organic* in many rural villages*

* these myths are typical for Nepalese society

Conclusion

We found a great scope of organic agriculture in Nepal as the country has plenty of 'uncontaminated' agricultural land and increasing public awareness on the importance of organic agriculture; the UN has already called for searching alternative options for unsustainable high input-based industrial agriculture; and increased global acceptance of organic agriculture in terms of coverage, institutional development and technological advancement. The 'pure' organic agriculture in Nepal started in 1987, when an American research scholar established a commercial farm. Since then organic agriculture movement progressed independently until the establishment of Nepal Permaculture Group (NPG), after which it was 'merged' with permaculture until the 10th Plan. A decade long 'hidden' period (1992 to 2002) of the organic agriculture movement was because of the less favored contemporary government policies. After 2002, government rejuvenated it into policy documents because of a significant demand for organic products at national and international markets and the continuous lobbying by the associated non-governmental institutions, individual members, and related farmers. Honestly, we observed - the world organic movement 'to change the world farming system' by taking care of nature, the society and the economy - a significant deviation from its philosophical grounds - it accounted only the 'income' sector of the organic agriculture in Nepal. Therefore, much of the policy documents of Nepal that are supporting promotion of organic agriculture have accounted for 'incomes', 'export', and 'business', and considered organic products as 'luxurious goods' for domestic demand. As a result, much of the structural and institutional innovation in organic agriculture, government priorities, and people perception are more towards earning dollars rather than its intuition of environmental conservation and sustainability of the farming system. The deviation of organic agriculture from its philosophical grounds, and the governments priority of organic agriculture as a business have resulted several myths about organic agriculture in the Nepalese society, and thus the growth of organic agriculture, despite its huge scope, is minimal in Nepal. However, an introduction of the ecosystem-based commercial agriculture (ECA), although yet at the experimental stage, could be one option for the future agriculture of Nepal, because it accepts the principles of organic agriculture and also considers human needs of increased production by enhancing agro-landscape sustainability, and builds prosperous communities through enhanced social structure like agro-enterprises. ECA practice enhances the capability of the farmers to grow organic crops to meet their food and nutrition needs and access to the local market for selling the excess. Its effects on crop yields, and on other social, environmental and economic benefits need further research.

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