PREDICTING SPECIES INVASION: GLOBAL CHANGE AND THE NON-NATIVE TREES OF SOUTHERN AFRICA

BY

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DECLARATION

I declare that this thesis hereby submitted to the University of Johannesburg has not been previously submitted by me at this or any other institution and that it is my work in design and execution and everybody who contributed has been duly acknowledged.

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BEZENG SIMEON BEZENG (MAY 2015)

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FORWARD

In this study I present findings on the interactions between climate change data, biological traits, and phylogeny in an attempt to provide a thorough understanding of invasion success of trees and shrubs in southern Africa. This thesis is divided into four chapters consisting of two main research topics.

In chapter One, I present the motivation and objectives of this study. I then review the state of biodiversity in the southern African region; explaining the possible factors driving biodiversity loss and the impact of these factors on the rich native flora in this region. I conclude this section by stating the objectives of the study.

In Chapter Two, I use DNA sequence data for aproximately 1400 native and non-native trees and shrubs species to test Darwin's Naturalization Hypothesis at a regional scale, which posits that non-native species introduced to a new environment are more likely to establish and become invasive if there are no close relatives in the recipient environment (Daehler, 2001). Second, I evaluate how biological traits alone, and in combination with plant evolutionary history can help explain invasion success of plant species. These results have been published in Journal of Ecology (doi: 10.1111/1365-2745.12410) and have been presented at local and international conferences including the 10th University of Johannesburg Botany Postgraduate Symposium (2014), the 18th Evolutionary Biology Meeting in Marseilles, France (2014), the 41st annual conference of South African Association of Botanists (SAAB) in Venda, South Africa (2015) and the 6th International Barcode of Life Conference in Guelph, Canada (2015). Finally, this paper was chosen as the editor choice for the 103 issue of journal of ecology.

In Chapter Three, I use non-native and invading species occurrence data in South Africa together with climate data, to examine the potential effect of climate change on their current and future potential distribution. Using these data, I then test how patterns of species distribution change over time by comparing recent versus historical introduction events. Findings from this chapter have been presented at the XXth Association for the Taxonomic Study of the Flora of Tropical Africa (AETFAT) international conference in Stellenbosch, South Africa (2014), the 9th and 11th University of Johannesburg Botany Postgraduate Symposium, South Africa (2013) and (2015) respectively and the 42nd joint SAAB and southern African Society of Systematic Biologists (SASSB) annual conference in Bloemfontein, South Africa (2016).

In Chapter Four, I present the general conclusion of this thesis and recommendations for future research.

I conclude by citing all the references use in writing up this thesis.

Abstract:

The rapid rise in human population has generated a great demand for ecosystem goods and services that native species are often unable to meet. This increasing need has led to the introduction of many non-native species. In particular, non-native trees and shrubs have been disproportionately introduced beyond their native ranges to supply numerous services. Some of these species are now naturalized, and others have become invasive, causing significant negative ecological and economic impacts. Controlling the spread and reducing the establishment of invasive species requires a better understanding of the attributes that make some species more likely to invade than others. Such information would better inform pre-emptive management decisions.

In this study, I explored the interaction between two putative drivers of global change, climate change and species invasion, in southern Africa; a major hotspot of native plant species diversity but also a region highly threatened by alien invasive species. Combining a suite of plant biological traits together with the most comprehensive regional phylogeny available for native and non-native trees and shrubs species, I explored the biological and evolutionary determinants of species invasion and further investigate how some non-native plant species are likely to respond to changes in climatic conditions currently and in the future.

Results reveal that invasive trees and shrubs tend to be less closely related to native species in comparison to their non-invasive counterparts.

Surprisingly, no significant difference in life history traits was found between non-native invasive and non-native non-invasive species. However, results show that non-native species (invasive and non-invasive combined) differ in their flowering phenology, sexual system and primary dispersal mode compared to native species. However, results from species distribution models suggest that over half of the non-native and invading trees and shrubs in South Africa will experience a contraction in their climatically suitable habitats in the future.

The finding that invasive trees and shrubs in this region are less closely related to the native trees and shrubs communities might indicate evidence for competitive release or a support for the vacant niche theory. These observations may contribute towards resolving “Darwin’s Naturalization Conundrum”. The finding that biological traits are not a significant predictor of invasion success does not match to results observed in other systems. This perhaps highlights the context or scale dependent nature of the invasion process. The finding that many non-native species ranges might contract under projected climate change scenarios suggests that climate change may act as a “natural” control to species invasion within the region. These findings are discussed in line with the on-going fight against species invasion in this region.

Key Words: Dispersal, pollination, phenology, sexual system, phylogenetic independent contrasts, Phylannova, maxent, species distribution modelling, conservation, trees and shrubs, invasion hotspots.

CHAPTER ONE

GENERAL INTRODUCTION AND OBJECTIVES

1.1 Global Biodiversity and Threats

Biodiversity as defined by the Convention on Biological Diversity (CBD) is 'the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes which constitute them' (CBD, 2001). One recent prediction estimates global biodiversity to be approximately 8.7 million species, including 2.2 million marine species (Mora et al., 2011). Of this diversity, only ~ 1.2 million species are described (UNEP-WCMC, 2000; Roskov et al., 2013) with a vast majority of biodiversity (86% terrestrial and 91% marine species) remaining unknown (Mora et al., 2011). This incredible species diversity provides humanity with a wide variety of ecosystem goods and services, including regulation of atmospheric greenhouse gases (e.g. CO_2) through carbon sequestration, provision of food and fresh water, protection from natural disasters (e.g. biological barriers), seed dispersal, waste decomposition, pollination of crops, recreation, provision of timber for furniture, etc.

Despite the benefits biodiversity provides to humankind, the future of biodiversity is a matter of increasing concern. Species face multiple threats, most of which are related directly or indirectly to human activities (Wilcove et al., 1998; Mack et al., 2000; Sala et al., 2000; Balmford et al., 2001; Loarie et al., 2008; Pyšek et al., 2010; Willis et al., 2008, 2010). Two key drivers of biodiversity loss are changing climatic conditions and invasive alien species (Sala et al., 2000; Willis et al., 2008, 2010). In response to climate change, for example, some species shift their natural ranges to track suitable climatic conditions whilst others adjust their phenology locally to adapt to the new climate regime; species that fail to shift their ranges or their phenology risk population declines (Willis et al., 2008). Exotic species introduced into new habitats threaten native species as they may out-compete local species in resource use (Turpie & Heydenrych, 2000; DeFalco et al., 2003). Recently, it has been suggested that the competitive ability of exotic species could be favoured by climate change (Willis et al., 2010). Additional threats to biodiversity include rapid human population growth, deforestation, pollution, and over exploitation (see section 1.2 for further details).

1.1.2 Biodiversity in southern Africa

Africa is home to a large portion of the world's biodiversity, and contains nine of the world's 34 biodiversity hotspots (areas of particularly high species richness and endemism) and between 40,000 to 60,000 plant species (UNEP, 2008). Five of these nine biodiversity hotpots (Cape Floristic Kingdom, Coastal forests of Eastern Africa, Eastern Afromontane, Maputaland-Pondoland-Albany, and the Succulent Karoo) are under serious threat as a result of human activities (Mittermeier et al., 2000).

Southern Africa in particular is known for its incredible plant biodiversity and harbours five of the nine African biodiversity hotspots: the Cape Floristic Region (CFR; South Africa), Maputaland-Pondoland-Albany (South Africa, Swaziland and southern Mozambique), eastern Afromontane (Zimbabwe), the coastal forests of eastern Africa bordering the Maputuland-Pondoland-Albany (Mozambique) and the Succulent Karoo (South Africa and Namibia) (figure 1.1; Myers et al., 2000). The CFR is the only floral kingdom to be found within the borders of a single country, and it is also a center of biodiversity and endemism for mammals, reptiles, and amphibian species (Cowling et al., 2003). It is the smallest floral kingdom occupying an area of about 90, 000 km^2, yet it contains approximately 3% of the world's plant species, of which nearly 70% are endemic to the CFR (Goldblatt & Manning, 2002; Broennimann et al., 2006). The Maputaland-Pondoland-Albany extends across the east coast of southern Africa, from southern Mozambique through KwaZulu-Natal and the eastern Cape provinces of South Africa. It is the second-richest floristic kingdom in Africa after the CFR, and covers an area of about 275, 000 km^2. This hotspot is well known for its high tree endemism. The eastern Afromontane hotspot stretches across similar biogeographic mountains of eastern Africa, Saudi Arabia and Yemen in the north, to Zimbabwe and Mozambique in the south. It is particularly well-known for its high endemism in fish species. The Succulent Karoo is the richest arid region in the world to be declared a biodiversity hotspot, and it contains close to 6,400 plant species, of which over 40% are endemic to the Karoo system. It covers an estimated area of about 116, 000 km^2, stretching from South Africa's Little Karoo into Namibia.

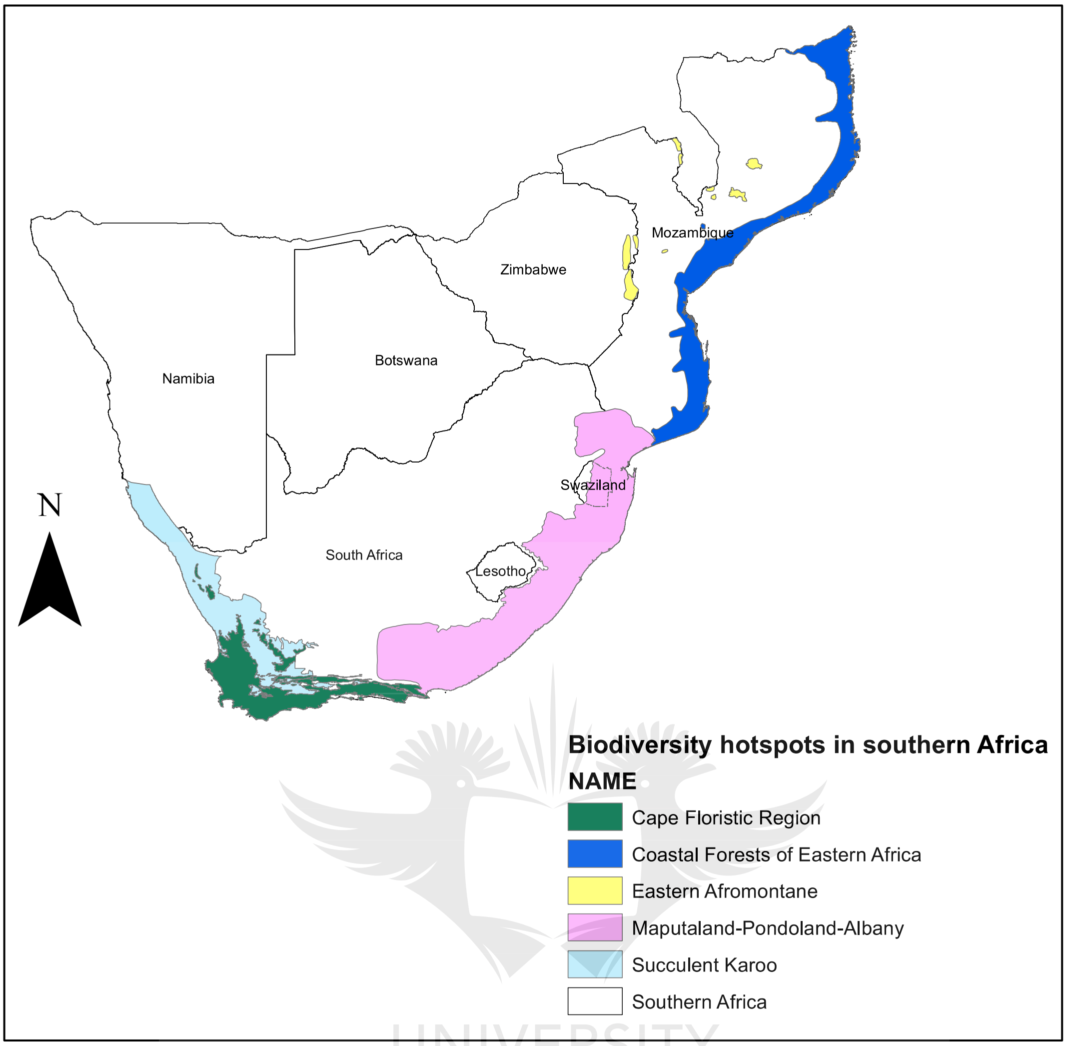

Figure 1.1: Biodiversity hotspots in southern Africa (modified from Conservation International, 2011).

South Africa alone is ranked as the third most biologically diverse country in the world, containing about 10% of global plants, birds, and fish species (Wynberg, 2002). Of the 18,000 native vascular plant species over 80% are endemic to the country (Cowling & Hilton-Taylor, 1997). The major threats to the country's biodiversity are growing human populations, fast rate of urban development and land conversion, which has favoured the successful establishment of invasive alien species (Cowling et al., 2003; Turpie, 2003).

1.2 Factors Driving Biodiversity Loss

Anthropogenic activities are primary drivers of biodiversity loss (CBD, 2001). The most important anthropogenic drivers include habitat loss, climate change, pollution, unsustainable harvesting of natural resources, and invasive alien species (figure 1.2; Wilcove et al., 1998; Sala et al., 2000). The effects of these drivers on biodiversity differ between ecosystems and often the impacts are exacerbated when they interact (Mack et al., 2000). For example, the interaction between introduced species and climate may have facilitated establishment of non-native species out of their native ranges, resulting in loss of native diversity in the invaded ranges (Willis et al., 2010).

During the 2002 Earth Summit held in Johannesburg, South Africa, world leaders agreed to achieve a significant reduction in the rate of biodiversity loss. But these targets have not been met (Global biodiversity outlook 3, 2010). A renewed commitment towards significant reduction of biodiversity loss is paramount if we are to continue reaping the benefits biodiversity provides. Such commitment would benefit from a deeper understanding of species responses to threats (e.g. climate change and invasive species), allowing us to design well-informed conservation plans. The present study aims to elucidate how exotic plant species may respond to climate change, and identify the biological and evolutionary factors that predispose some species to become invasive. The work will help reveal the impact of future threats to biodiversity in southern African.

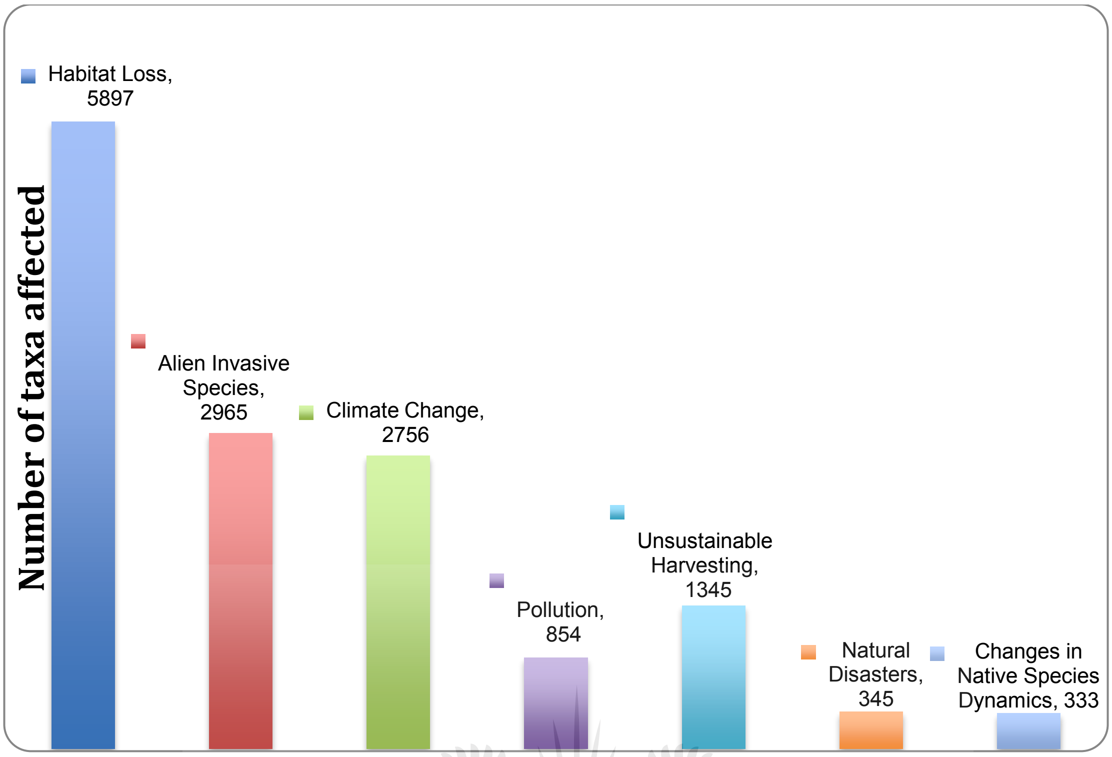

Figure 1.2: Graph showing the main factors that cause biodiversity loss (modified from Mack et al., 2000).

1.2.1 Species Responses to Climate Change

Recent reports of the intergovernmental panel on climate change (IPCC) indicate that global mean temperatures may increase by 4°C by the end of this century due to anthropogenic activities (IPCC, 2001, 2007). In a meta-analysis of 143 studies, Root and colleagues (2003) showed that rises in global temperatures have already resulted in possible species extinction. In addition, many other species are shifting their geographic ranges to track suitable climatic habitats, disaggregating local species composition and community structures (McLaughlin et al., 2002; Parmesan & Yohe, 2003; Pounds et al., 2006). Species are also adjusting their phenologies, often in complex ways (Rafferty & Ives, 2010; Wolkovich et al., 2013). For example, some species exhibit earlier first flowering (Abu-Asab et al., 2001; Wolkovich et al., 2013) whilst others have delayed flowering (Fitter & Fitter, 2002).

In the South African fynbos biome previous work has suggested that this biome will witness a loss of between 51% to 65% of its area in the future as a result of climate change (Midgley et al., 2002). To persist in the face of climate change, plants must either move in order to track areas where climatic conditions are suitable, or adapt to new climatic conditions, for example through shifts in phenology (Lenoir et al., 2008; Loarie et al., 2009; Willis et al., 2008; Friedman-Rudovsky, 2012; Wolkovich et al., 2013). The focus in this thesis is on distribution shifts.

Of the many different methods used to model plant-climate change interactions, species distribution modelling (SDM) has been most widely employed (Guisan & Zimmermann, 2000; Guisan & Thuiller, 2005; Hughes et al., 2012; see also review by Elith & Leathwick, 2009). SDMs attempt to predict the distribution of species based on species known occurrences and environmental variables. SDMs have a wide application in many fields, including wildlife management, invasion biology, ecology, and conservation biology (Guisan & Zimmermann, 2000; Araújo & Pearson, 2005; Thuiller et al., 2005; Hughes et al., 2012). Within a conservation framework, SDMs have helped conservation managers in delimiting the geographical distribution of species for monitoring purposes and for conservation planning in absence of comprehensive range data. In addition, SDMs have aided the selection of target areas for collecting plant species. The application of SDMs to explore how entire floras might behave in the face of climate change provides new insights. One recent study investigated the future of California's endemic flora (~2,400 taxa), and showed that the majority of these taxa will experience >80% reductions in range size within the century (Loarie et al., 2008). This study was also able to identify potential refugia, where some climatically threatened species may persist. These refugia should be prioritized in conservation planning and potentially species dispersal to them could be facilitated. In southern Africa, the utility of SDMs in conservation planning has also been demonstrated (Midgley et al., 2002; Bomhard et al., 2005; Richardson et al., 2010; Trethowan et al., 2010; Kaplan et al., 2012; Cabral et al., 2013). Results from these studies show that many species (both native and exotic) will witness a range contraction in their climatically suitable habitats, and some might experience a complete loss of suitable habitat. However, these studies have been taxonomically limited, often focused on a single plant family, genus or species, making it difficult to generalize.

1.2.2 Plant Biological Invasion

Invasive species are defined as species that are able to form self-sustaining populations when introduced into a new environment outside their native distribution range (Lockwood et al., 2007). Invasive species are of great concern worldwide as a result of a rapid rise in globalization through the development of more efficient transport modes. Globalization has facilitated the transportation of plant materials into new environments, increasing propagule pressure of non-natives, and recent trends suggest that this trajectory of plant introduction is expected to increase (Hulme, 2009; Hulme et al., 2009; Pyšek & Hulme, 2011). In southern Africa especially, several plant species were introduced to meet the growing demand for timber production, charcoal, tannin, mine props, sand dune stabilization, ornament, windbreaks, etc. (Poynton, 2009). However, not all introduced species go on to become invasive. Understanding why some exotic species become invasive while others fail to invade out of their native ranges will be vital if we are to limit the introduction and spread of invasive species.

1.2.2.1 Brief History of Plant Introduction into South Africa

The introduction of non-native trees in southern Africa is well documented for South Africa where the history of species introduction dates back over three and a half centuries (Poynton, 2009). To date, over 750 tree species of an estimated 8,000 species (comprising shrubs, succulents and herbs) have been introduced, of which over 171 are presently regarded as serious invaders (van Wilgen et al., 2001). It is possible that many more species will become invasive in the future given the rapid changes to the environment. Fast growing tree species have been prioritized for introduction due to the benefits they provide to people (i.e. windbreak, soil stabilization, timber, etc.) and as a result of the slow rate of tree production within the naturally predominant vegetation types in the region (i.e. savanna). With increases in human population coupled with the high demand for tree products (i.e. timber production, aesthetic reasons, windbreaks and to reduce the severe climatic conditions in order to aid early European settlement), there was increasing pressure for the introduction of fast-growing tree species (Bennett, 2010; Showers, 2010). However, their naturalization and subsequent invasiveness has been a major ecological concern.

1.2.2.2 Impact of Invasive Species

Huge economic and ecological impacts have been associated with invasive species (Vitousek et al., 1997; Wilcove et al., 1998; van Wilgen et al., 2001; Pimentel et al., 2005). Invasive species are also considered to be one of the most important threats to global biodiversity after habitat loss (Wilcove et al., 1998; Mack et al., 2000; Winter et al., 2009; Pyšek et al., 2010; Suetsugu et al., 2012). They can affect biodiversity change by causing species loss, which in turn disrupts ecosystem functioning and the services they provide (Blackburn et al., 2004; Sax & Gaines, 2008). However, while several species of birds have been lost as a consequence of invasive species, there exists little evidence of direct invasion-related loss of plant species. Nonetheless, impacts of invasives on plant communities have been shown (Sax et al., 2002; Sax & Gaines, 2008; Brown & Gurevitch, 2004; see also Gurevitch & Padilla, 2004 for further references). Although it is difficult to quantify biodiversity loss in terms of monetary values, various studies have attempted to estimate costs through loss of ecosystem services (e.g. reduction in crop production, fisheries, animal farming, water resources) and also the cost incurred for the control/eradication of these species (US Congress, 1993; Pimentel et al., 2000; van Wilgen et al., 2001; Pimentel et al., 2005). For example in the United States alone annual losses due to invasive species are estimated at over $137 billion per year (Pimentel et al., 2000). In South Africa, several studies have estimated harmful effects of invasive species on ecosystems and the services they provide (Versfeld et al., 1998; van Wilgen et al., 2001). These studies indicate that the South African government spends approximately 620 million US$ yearly on the control of invasive species (De Lange & Van Wilgen, 2010).

1.2.2.3 Factors that Explain Plant Invasion Success

Identifying the factors that drive the invasion success of alien species out of their native ranges is challenging. Here I consider some key biological or ecological traits, environment, and evolutionary history.

1.2.2.3.1 Plant Functional Traits

Various biological and ecological traits have been associated with the invasion success of alien species; however, identifying key traits is not simple (Pyšek & Richardson, 2007; Hayes & Barry, 2008). Traits linked to habit, seed mass, leaf mass per area, flowering time, pollination vectors, and reproduction biology have been used to explain the invasion success of many alien species (Gleason & Cronquist, 1991; Daws et al., 2007; Reich et al., 2007; Wolkovich et al., 2013). Results from such studies have, however, been equivocal, and in most cases only apply to closely related species (Rejmánek & Richardson, 1996; Cadotte et al., 2006; Pyšek & Richardson, 2007). There has been much recent interest on the interactions between plants and plant mutualists (i.e. their pollinators and dispersers) because changes in climatic conditions might impact phenologies of both, resulting in potential temporal mismatches (Hegland et al., 2009). Nevertheless, there still exists a knowledge gap on how mutualistic interactions and plant phenological shifts affect establishment and invasion.

1.2.2.3.2 Habitat Characteristics

Habitats that are susceptible to invasion often possess particular characteristics. Several studies have attempted to distinguish these characteristics to understand why some communities are more prone to invasion than others (Elton, 1958; Naeem et al., 2000; Keane & Crawley, 2002; Levine et al., 2003; Thuiller et al., 2006). Habitat disturbance, the absence of natural enemies, and the native species composition are all thought to be important components for predicting invasion success. Disturbed habitats are thought to be particularly prone to invasion (Levine et al., 2003; van Ruijven et al., 2003), perhaps because disturbance might weaken the competitive ability of native species, or because it opens new niches for invaders. The enemy release hypothesis (ERH) suggests that when a species is introduced into a new region it may be able to spread rapidly since it is liberated from its co-evolved natural enemies (Keane & Crawley, 2002). However, evidence supporting the ERH is mixed (see meta-analysis by Liu & Stiling, 2006), and host switching between closely related groups has been documented (Keane & Crawley, 2002). The species composition of a habitat might also determine invasion success, for example, if native species are weak competitors. In addition, habitats that contain close relatives to potential invaders may be at higher risk, as they are also likely to represent environments to which invaders are well adapted (see Section 1.2.2.3.3 below).

1.2.2.3.3 Phylogeny

Although, phylogenies reconstructed using DNA barcoding sequence data have been increasingly used in ecological studies, relying on information from such short sequences may not always reflect the true evolutionary processes of a species (i.e. due to limited phylogenetic information contained therein). Notwithstanding, increased resolution can be achieved using a combined multilocus DNA barcoding approach especially if sequences are from separately evolving regions of the genome. Thus, combined barcoding data have increasingly been used in phylogenetic comparative studies owing to increased nucleotide sampling (see Joly et al., 2013 for a review of some ecological applications). The use of a phylogenetic approach towards understanding correlates of invasion success has received much attention lately as a result of the increasing availability of molecular sequencing data, including DNA barcode data (Strauss et al., 2006; Schaefer et al., 2011; Bezeng et al., 2013; 2015). Darwin hypothesized that non-native plant species that are more phylogenetically distant to native species would stand a greater chance of establishing, and hence of becoming invasive in their newly introduced ranges since competition would weaker compared to that with more closely related species (Darwin's naturalization hypothesis; Darwin, 1859). However, at the same time Darwin also recognized that invasive species that are closely related to native species might stand a better chance of becoming naturalized/invasive since they are more likely to share the same suite of ecological traits and niche. This paradox has been termed Darwin's naturalization conundrum (Diez et al., 2008). Researchers have examined these two contrasting hypotheses and even with the same dataset, they have sometimes come to different conclusions (Daehler, 2001; Diez et al., 2008; Thuiller et al., 2010; Schaefer et al., 2011; Bezeng et al., 2013). These different results have been linked with scale dependency and methodological differences (Procheş et al., 2008; Thuiller et al., 2010; Bezeng et al., 2013).

1.2.2.3.4 Climate Change as a Driver of Species Invasion

Recent studies on the interaction between climate change and biological invasion have shown that new climatic conditions are likely to favour species invasion since many native species fail to adjust to new climate regimes (Simberloff, 2000, Thuiller et al., 2007; Willis et al., 2010). For example, invasive species have been shown to adjust their flowering time tracking new climate, whilst native species fail to do so (Wolkovich et al., 2013). However, to date, most studies have been restricted to temperate floras (Willis et al., 2010; Wolkovich et al., 2013), and the few studies within southern Africa have been taxonomically limited focusing mainly on the genera *Acacia* Mill.*, Pinus* L. or the Proteaceae Juss. family (Richardson & Pyšek, 2006; Richardson et al., 2011; Moodley et al., 2013).

In this study, I combine climate change data, biological traits, and phylogeny in an attempt to provide a robust understanding of invasion success of trees and shrubs in southern Africa.

1.3 Objectives of this Study

Firstly, I will test Darwin's Naturalization Hypothesis at a regional scale. Darwin's naturalization hypothesis posits that non-native species are more likely to establish and become invasive in a new range if there are no close relatives in the recipient environment (Daehler, 2001).

Secondly, I will evaluate how biological traits alone, and in combination with plant evolutionary history can help explain the invasion success of plant species at a regional scale. To do this, I will add non-native and invasive trees and shrubs species to the native regional phylogeny currently available for southern African trees and shrubs (Maurin et al., 2014).

Thirdly, I will examine the potential effect of climate change on the future distribution of non-native trees in South Africa. Here, I will use available non-native trees and shrubs occurrence data to model the potential current and future distribution under a high carbon emission scenario to show areas that will be vulnerable to non-native species spread in the future. With these data, I will show areas that may be particularly vulnerable to the expansion of non-native trees and shrubs and also areas where threats by these species will recede in the future.

CHAPTER TWO

REVISITING DARWIN'S NATURALIZATION CONUNDRUM: EXPLAINING INVASION SUCCESS OF NON-NATIVE TREES AND SHRUBS IN SOUTHERN AFRICA

Summary

Invasive species are detrimental ecologically and economically. Their negative impacts in Africa are extensive, and call for a renewed commitment to better understand the correlates of invasion success.

In this study, I explored several putative drivers of species invasion among woody non-native trees and shrubs in southern Africa, a region of high floristic diversity. I tested for differences in functional traits between plant categories using a combination of phylogenetic independent contrasts and a simulation-based phylogenetic ANOVA.

Results reveal that non-native species generally have longer flowering duration compared to native species, are generally hermaphroditic and their dispersal is mostly abiotically mediated. Furthermore, non-native trees and shrubs that have become invasive are less closely related to native trees and shrubs than their non-invasive non-native counterparts. Non-natives that are more closely related to the native species pool may be more likely to possess traits suited to the new environment in which they find

themselves, and thus have greater chance of establishment. However, successful invaders are less closely related to the native pool, indicating evidence for competitive release or support for the vacant niche theory.

In summary, non-native trees and shrubs in southern Africa are characterized by a suite of traits, including long flowering times, a hermaphroditic sexual system, and abiotic dispersal, that may represent important adaptations promoting establishment. In addition, these differences in the evolutionary distances separating the native species pool from invasive and non-invasive species might help resolve Darwin's Naturalization Conundrum.

Key-words: Darwin's Naturalization Hypothesis, dispersal, phenology, pollination syndrome, sexual system.

2.1 Introduction

Biological materials have been moved around the globe throughout human history. In southern Africa non-native trees and shrubs have been introduced over the past three centuries to meet the growing demands for charcoal, timber production, ornaments, sand dune stabilization, etc. (Poynton, 2009; Bennett, 2010). However, many of these introduced species have naturalized and become invasive, posing severe economic and ecological challenges (van Wilgen et al., 2001; Pimentel et al., 2005; Thuiller, 2007; Hulme, 2009). It is essential, therefore, to gain a better understanding of the factors that promote invasion success so that we can recognize future invaders before they become problematic and help develop pre-emptive management plans.

The search for common factors that predispose some introduced species to successfully naturalize and become invasive has been a major goal in invasion biology (Nentwig, 2007; see also a recent review by Richardson & Pyšek, 2012). This search has followed two general paths. First, species traits (Rejmánek, 1995; Thuiller et al., 2006; Pyšek & Richardson, 2007; Pyšek et al., 2014) or habitat characteristics (Levine et al., 2004; Marvier et al., 2004; Alston & Richardson, 2006) have been evaluated, and various biological traits have been suggested to enhance the competitiveness of non-native species over native species (Kolar & Lodge, 2001; Pyšek & Richardson, 2007; Violle et al., 2007; Ordonez & Olff, 2013). However, the identification of predictive traits is challenging because it requires a great wealth of information on a species' biology that is often unavailable (Kolar & Lodge, 2001). Further, traits that are strong predictors of invasion success for some taxa in one environment might not necessarily be good predictors for other clades or elsewhere (Kolar & Lodge, 2001; Cadotte et al., 2006; Pyšek & Richardson, 2007; Wolkovich et al., 2013). The recent rapid increase in, and availability of, molecular DNA data has motivated an alternative approach based on phylogenetic information.

Analysing species co-existence in the eastern US, Darwin observed that introduced species are more likely to become naturalized and successful invaders in recipient environments where (phylogenetically) close relatives are absent. This hypothesis is often referred to as Darwin's Naturalization Hypothesis (DNH) (Daehler, 2001; see also Rejmánek, 1999). Phylogenetic approaches allow direct tests of DNH by comparing the phylogenetic distances separating native and invading species (Strauss et al., 2006). However, once again, empirical evidence has been mixed: whilst some studies have provided support for DNH (Rejmánek, 1996; Ricciardi & Atkinson, 2004; Strauss et al., 2006; Schaefer et al., 2011), others have not (Duncan & Williams, 2002; Lambdon & Hulme, 2006; Ricciardi & Mottiar, 2006; Diez et al., 2009; Bezeng et al., 2013). One explanation for this discrepancy, which was also recognized by Darwin, is that closely related species may also share traits that pre-adapt them to a particular environment, and thus non-native species more closely related to the native species pool would have an inherent advantage (Duncan & Williams, 2002). These opposing predictions have been termed Darwin's Naturalization Conundrum (Diez et al., 2008).

In this study, using a dataset of putative key traits linked to invasion success in combination with a comprehensive phylogenetic tree of native and non-native trees and shrubs of southern Africa, I evaluated the ecological and evolutionary determinants of invasion success in the region.

2.2 Materials and Methods

2.2.1 Study Area

The study area includes seven of southern African countries namely; Botswana, Mozambique, Namibia and Zimbabwe located south of the Zambezi River plus South Africa, Lesotho and Swaziland with a total land area of approximately 4,000,000 km^2 (see figure 1.1 in chapter one). This region is a center of high plant endemism but many species are also highly threatened by various factors, including the introduction of alien plant species since the arrival of the first Europeans settlers (Cowling et al., 2003; Henderson, 2006).

2.2.2 Species Checklist and Plant Biological Traits

I compiled a matrix of native and non-native woody trees and shrubs for the region, encompassing 1,400 taxa (1,191 natives and 209 non-natives), representing 581 genera and 130 families (appendix 2.1). I followed O'Brien's (1993) as a guide to defining woody taxa for this study as: perennial plants with an above ground stem and secondary branches (with the exception of geoxylic suffrutex *sensu* White, 1976); however, species with a maximum height >0.5 m, were included in my list and thus the taxa considered in this study encompass more species than O'Brien's definition of trees (maximum height >2.5 m). Therefore, all taxa included in this study were collectively referred to as woody trees and shrubs. In a very few instances, species that have been described as herbaceous were included within this taxonomic sampling when they have sometimes also been considered as shrubs (e.g. *Tithonia spp., Hypericum perforatum* L.; Jama et al., 2000).

A checklist of non-native species was obtained from Henderson (2007), which forms the foundation for the Southern African Plant Invaders Atlas (SAPIA) database, and supplemented with additional data from Coates Palgrave (2005). For native species, I used the species list from Maurin et al. (2014).

The categorization of non-native species as invasive and non-invasive is non-trivial, and published lists are frequently contradictory. Here, I follow the classification of Henderson (2007) (see Appendices 1-4 in Henderson 2007), which matches to the criteria for invasive species specified by Richardson et al. (2000a) and Pyšek et al. (2004). However, I combined Henderson's (2007) naturalized and casual alien plants to form a single non-native non-invasive species category. The classification of non-natives into invasives and non-invasives was verified by consultating with experts from the South African Biodiversity Institute and Center for Invasion Biology (CIB) at Stellenbosch University. Nonetheless, I acknowledge that there are a number of alternative data sources available (e.g. Wyk & Wyk, 2013), and this classification may be subject to revision in the future. All species names were cross-checked for synonyms using The Plant List (www.plantlist.org) and the family names using the Angiosperm Phylogeny Group (APG III, 2009) to match the classification followed by Maurin et al. (2014).

Although there is no consensus list of functional traits related to invasion success globally, numerous traits have been linked with species invasion locally and regionally (e.g. see Rejmánek, 1995; Lake & Leishman, 2004;

Thuiller et al., 2006; Pyšek & Richardson, 2007; Schaefer et al., 2011; Flores-Moreno et al., 2013; Wolkovich et al., 2013). Here, I focused on six traits that are commonly referred to in the invasion literature: maximum plant height, seed mass, sexual system, flowering time (first and last flowering months and duration of flowering period), primary dispersal mode, and primary pollination syndrome (appendix 2.2). For sexual system I combined species that were monoecious under the broad group 'hermaphrodite. Again, I additionally performed a sensitivity analysis by excluding monoecious species from the analysis. Finally, for both dispersal mode and pollination modes I distinguished plants that use abiotic versus biotic dispersal agents.

2.2.3 Phylogeny Reconstruction

To complement the readily available native woody trees and shrubs phylogeny, non-native species sequences were either generated from the laboratory or downloaded from GenBank/EBI. These native DNA sequences are the results of over six years data collection efforts for native species within the southern African region. I additionally generated DNA sequences for 26 out of the 232 non-native species recorded in the region at the African Centre for DNA Barcoding. The remaining 206 non-native sequences were downloaded directly from GenBank/EBI (using same vouchers for *rbcLa* and *matK* regions). Voucher specimen and GenBank accession numbers are listed in appendix 2.1. For sequences generated from the laboratory, total DNA was extracted from leaf materials using the 10X cetyltrimethylammonium bromide (CTAB) method as described by Doyle & Doyle (1987). Then, polymerase chain reactions and cycle sequencing for the two plant DNA barcoding loci (i.e. *rbcLa* and *matK*) (CBOL Plant Working Group, 2009) was performed using a standard protocol (Hajibabaei et al., 2005; Ivanova et al., 2008).

Complementary DNA strands were assembled and edited using Sequencher v.4.8 (Gene Codes, Ann Arbor, Michigan, USA). The *rbcLa* sequences were aligned manually in PAUP version 4.0b.10 (Swofford, 2002) whereas the *matK* alignment was performed using MEGA software (Tamura et al., 2011). The combined data set comprised 552 and 1,397 base pairs for *rbcLa* and *matK* respectively.

I then used this combined data set to reconstruct the regional phylogeny of the species pool. Firstly, due to the large number of sequences used in my study together with the many constraints, using the BEAST randomly generated starting tree did not achieve convergence. Therefore, I generated a pre-defined starting tree to satisfy all the constraints and prior used. To do this, I used the APG III backbone tree generated using the Phylomatic software (Webb & Donoghue, 2005) and estimated branch lengths using maximum likelihood (ML) on the combined data in RAxML-HPC2 v.7.2.6 (Stamatakis et al., 2008) employing a GTR+G model. The support of the resulting tree was assessed using 100 bootstrap replicates. The RAxML starting tree was adjusted so that all branch lengths satisfied all fossil prior constraints using the PATHd8 v.1.0 software (Britton et al., 2007). In doing so, I used 20 out of the 35 fossil calibration points from Bell et al. (2010) (table 2.1) as minimum age constrains, with an additional calibration point for the root node of the Eudicots, which was set at 124 million years.

Table 2.1: Calibration points and minimum age constraints used in BEAST analysis. (Ma= million years), (MRCA = most recent common ancestor), (SD= standard deviation).

Fossil (Clade)	Minimum Age (Ma)	MRCA	Reference(s)	Mean (SD)
Unnamed (Hamamelidaceae)	84	*Daphniphyllum* and *Itea*	Magalón-Puebla et al., 1996 Magallón et al., 2001	1.5 (0.5)
Unnamed (Laurales)	108.8	*Idiosperma* and *Sassafras*	Crane et al., 1994	2.1 (0.5)
Pandanus sp. (Pandanales)	65	*Stemona* and *Barbacenia*	Muller 1981	1.8 (0.5)
Spirematospermum chandlerae (Zingiberales)	83.5	*Musa* and *Zingiber*	Friis, 1988	1.8 (0.5)
Unnamed (Caryophyllales)	83.5	*Rhabdodendron* and *Spinacia*	Collinson et al., 1993	1.5 (0.5)
Unnamed (Santalales)	51.9	*Schoepfia* and *Santalum*	Collinson et al., 1993	1.5 (0.5)
Unnamed (Ericales)	91.2	*Impatiens* and *Arbutus*	Nixon & Crepet, 1993	1.5 (0.5)
Fraxinus wilcoxiana (Lamiales)	44.3	*Olea* and *Pedicularis*	Call & Dilcher, 1992	1.5 (0.5)

Unnamed (Vitaceae)	57.9	*Leea* and *Vitis*	Collinson et al., 1993	1.5 (0.5)
Esqueiria futabensis (Myrtales)	88.2	*Epilobium* and *Qualea*	Takahashi et al., 1999	1.5 (0.5)
Unnamed (Sapindales)	65	*Citrus* and *Bursera*	Knobloch & Mai, 1986	1.5 (0.5)
Unnamed (Fabales)	59.9	*Pisum* and *Polygala*	Herendeen & Crane, 1992	1.5 (0.5)
Ailanthus sp. (Simaroubaceae/Rutaceae, Meliaceae)	50	*Ailanthus* and *Swietenia*	Corbett & Manchester, 2004	1.5 (0.5)
Burseraceae/Anacardiaceae	50	*Bursera* and *Schinus*	Collinson & Cleal, 2001	1.5 (0.5)
Parbombacaceoxylon sp. (Malvales s.l.)	65.5	*Thymea* and *Bombax*	Wheeler et al., 1987, 1994	1.5 (0.5)
Perisyncolporites sp. (Malpighiales)	48	*Idesia* and *Populus*	Boucher et al., 2003	1.5 (0.5)
Unnamed (Cornales)	86	*Cornus* and *Nyssa*	Crane et al., 1990	1.5 (0.5)
Platanocarpus brookensis (Proteales)	98	*Platanus* and *Nelumbo*	Crane et al., 1993	1.5 (0.5)
Unnamed (Buxaceae)	98	*Didymeles* and *Buxus*	Drinnan et al., 1991	1.5 (0.5)
Unnamed (Bignoniaceae)	35	*Catalpa* and *Campsis*	Manchester, 1999	1.5 (0.5)
Eudicots	124		Anderson et al., 2003	

Branch lengths were then calibrated in millions of years using a Bayesian MCMC approach implemented in BEAST v.1.7.5 software (Drummond & Rambaut, 2007) on the CIPRES cluster (Miller et al., 2009). In the BEAST analysis, I assumed an uncorrelated lognormal (UCLN) model for rate variation among branches and the GTR + I + Γ model of sequence evolution for each partition based on the Akaike information criterion evaluated using Modeltest v.2.3 (Nylander, 2004). Six independent MCMC chain lengths were run for 1,000,000,000 generations logging every 1,000 times. The six independent BEAST runs were combined to generate a consensus tree using LogCombiner v.1.7.5 (Drummond & Rambaut, 2007). The resulting output tree was down sampled at 1 in 20,000 discarding the first 1,000 trees as burn-in. A total of 2,718 trees were obtained from which a consensus tree was generated.

Finally, the phylogeny was rooted using representatives of *Acrogymnospermae* (*Callitris* Vent., *Cupressus* L., *Cycas* L., *Encephalartos* Lehm., *Juniperus* L., *Pinus* L., *Podocarpus* Persoon., *Stangeria* T. Moore., *Widdringtonia* Endl., and *Zamia* L.) (Cantino et al., 2007; Soltis et al., 2011).

2.2.4 Statistical Analysis

All statistical analyses were performed in R (R Development Core Team, 2013). First, I tested Darwin's Naturalization Hypothesisn (DNH) by comparing the phylogenetic nearest neighbor distance (PNND) between each non-native species (invasive and non-invasive) and its nearest native neighbour on the phylogeny. If non-native species that are less related to native species are more successful invaders in southern Africa (as predicted by DNH), the average phylogenetic distance between invasives and natives ($PNND_{invasive-native}$) is expected to be greater than the average phylogenetic distance between non-invasives and natives ($PNND_{non-invasive-native}$). I further evaluated the significance of the phylogenetic distances separating native and invasive by comparing observed patterns to a null model in which non-native status was shuffled randomly 1,000 times along the tips of the phylogeny. Additionally, I conducted a sensitivity analysis to test whether invading species are themselves phylogenetically closely related given that invasive species are often recruited from limited number of clades, which may potentially share traits that make them more successful. Here, I calculated the the mean pairwise distances among a invasive plant species, and compared the observed results with a random draw from the combined native and non-native species set.

Second, I tested for differences in plant functional traits between non-native and native categories using a combination of phylogenetic independent contrasts (PICs; Felsenstein, 1985) and a simulation-based phylogenetic ANOVA (Garland et al., 1993). I compared timing of first flowering month, last flowering month and duration of flowering period, using the phylogenetic ANOVA and post-hoc comparisons of means using the function phylANOVA in the R package Phytools (Revell, 2012). I evaluated sensitivity of these results to assumptions regarding the start of the growing season by exploring alternative start dates. Initially, I arbitrarily assumed a January start to the growing season, with months coded 1 (January) through 12 (December). In testing this, I shifted the start of the growing season to September (as most native species start flowering in September), with months coded 1 (September) through 12 (August).

I used the 'brunch' algorithm (Purvis & Rambaut, 1995) as implemented in the R library caper (Orme et al*.,* 2012), to explore the relationship between invasiveness and both maximum plant height and seed mass. The brunch algorithm conducts independent contrasts for models that include binary categorical variables (in this case invasiveness: invasive vs. non-invasive) where each clade can be unequivocally assigned to one state or the other. Nested contrasts deeper in the phylogeny are not included.

Finally, I calculated PICs (native - non-native) for each categorical variable: sexual system, pollination syndrome and dispersal mode, where each variable was scored as either 1 or 0. I then tested for significant relationships between non-native status and each biological predictor in turn, using a t-test to evaluate whether the mean of the contrasts differed significantly from zero.

It is worth noting the desprepancy in sample size of species in the trait dataset and that included in the regional phylogeny. This mismatch was a result of the difficulties in obtaining detailed trait data for some species (see also section 2.1 for further explanations). Species with no exact match in the phylogeny and trait data files were dropped from these analyses.

2.3 Results

The phylogeny of the regional pool is presented in figure 2.1.

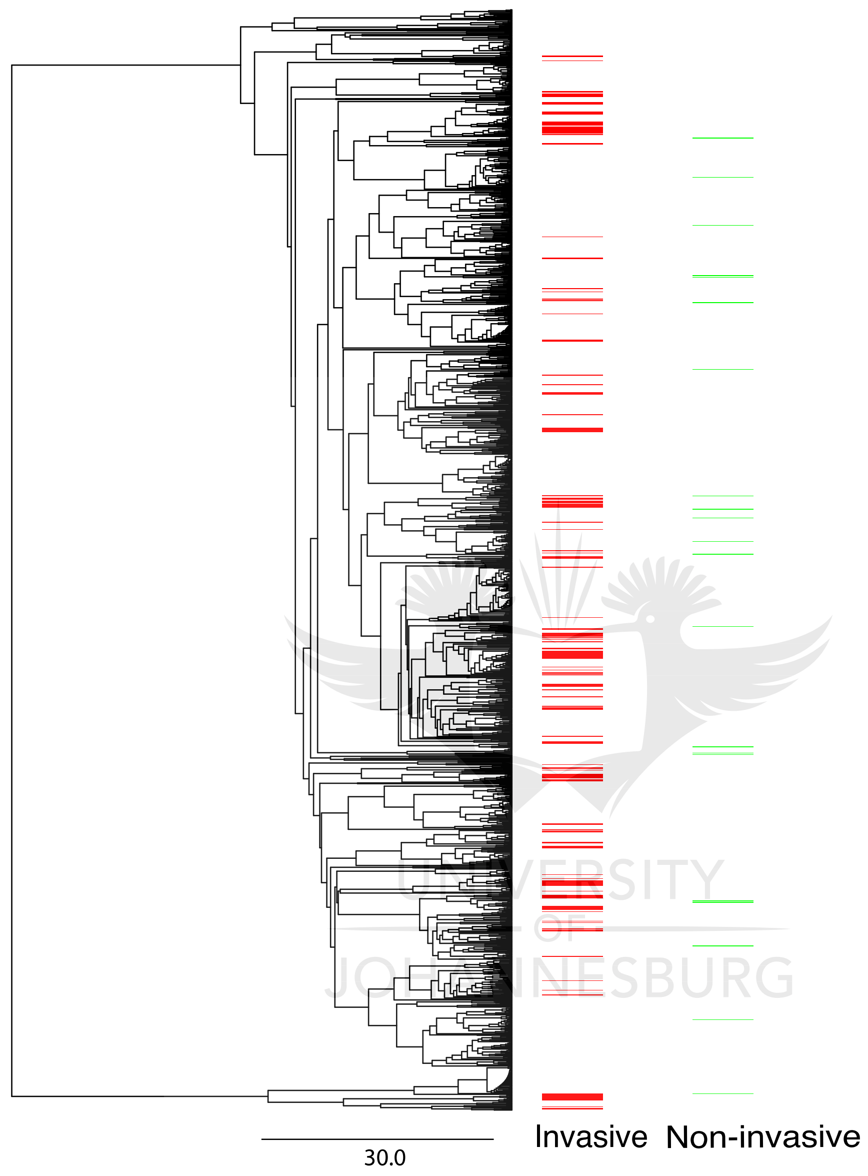

Figure 2.1: Regional phylogeny of 1,400 southern African native and non-native (invasive and non-invasive combined) tree species. Color bars indicate the distribution of non-native species on the tree; red= invasive and green= non-invasive.

The phylogenetic distance between invasives and natives was significantly greater than that between non-invasives and natives ($PNND_{invasive-}$

$_{native}$ = 250.26 Mya [millions of years] versus $PNND_{noninvasive-native}$ = 241.75 Mya; Mann-Whitney U-test, W = 303208, P<0.001).

Further, comparing phylogenetic distances between non-native (invasive and non-invasive) and native plant categories using randomizations (shuffling taxa labels across the tips of the phylogeny), results show that the mean observed $PNND_{invasive-native}$ distance falls to the right of the null distribution, whereas the mean $PNND_{noninvasive-native}$ falls to the left of this distribution (figure 2.2). Therefore invasives tend to be less closely related to natives, whereas non-invasive species tend to be more closely related to natives, and this difference between invasives and non-invasives is highly significant.

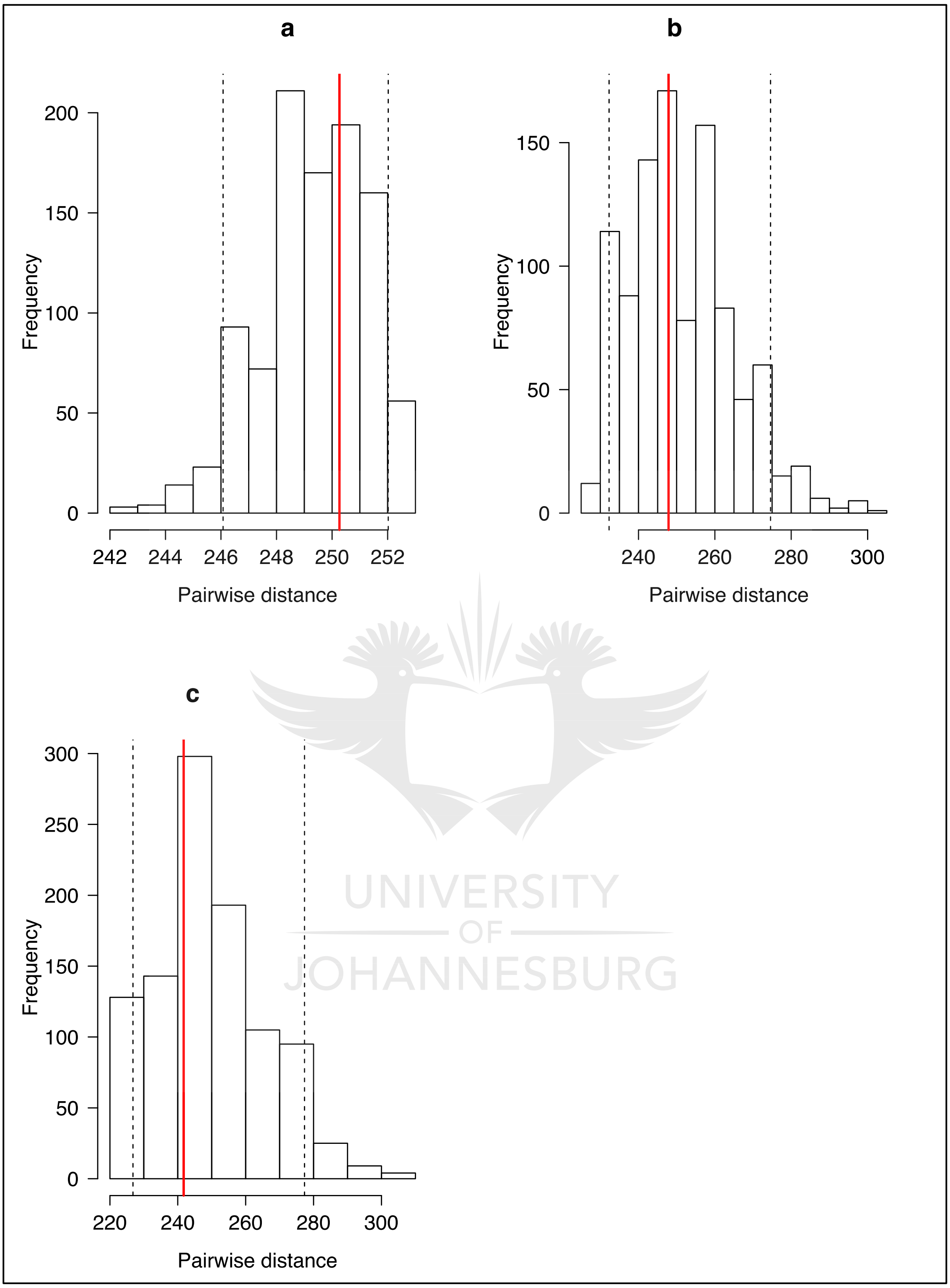

Figure 2.2: Phylogenetic nearest neighbor distances separating (a) native from invasive species, (b) invasive from non-invasive species and (c) native from non-invasives. The difference between observed and the mean random values were assessed using 95% confidence interval (CI) from 1,000 randomizations. Red lines indicate observed values, black broken lines indicate 95% CI.

Additionally, sensitivity results show that invasive species are not significantly phylogenetically clustered (P> 0.05).

In the analysis of flowering phenology, no evidence was found that first or last flowering month was related to invasion success, irrespective of when the start of the growing season was set (see table 2.2 and appendix 2.3). However, non-natives (invasives and non-invasives combined) had significantly longer flowering times than native species (Holm-Bonferroni corrected P = 0.002 from phylogenetic ANOVA; figure 2.3; table 2.2).

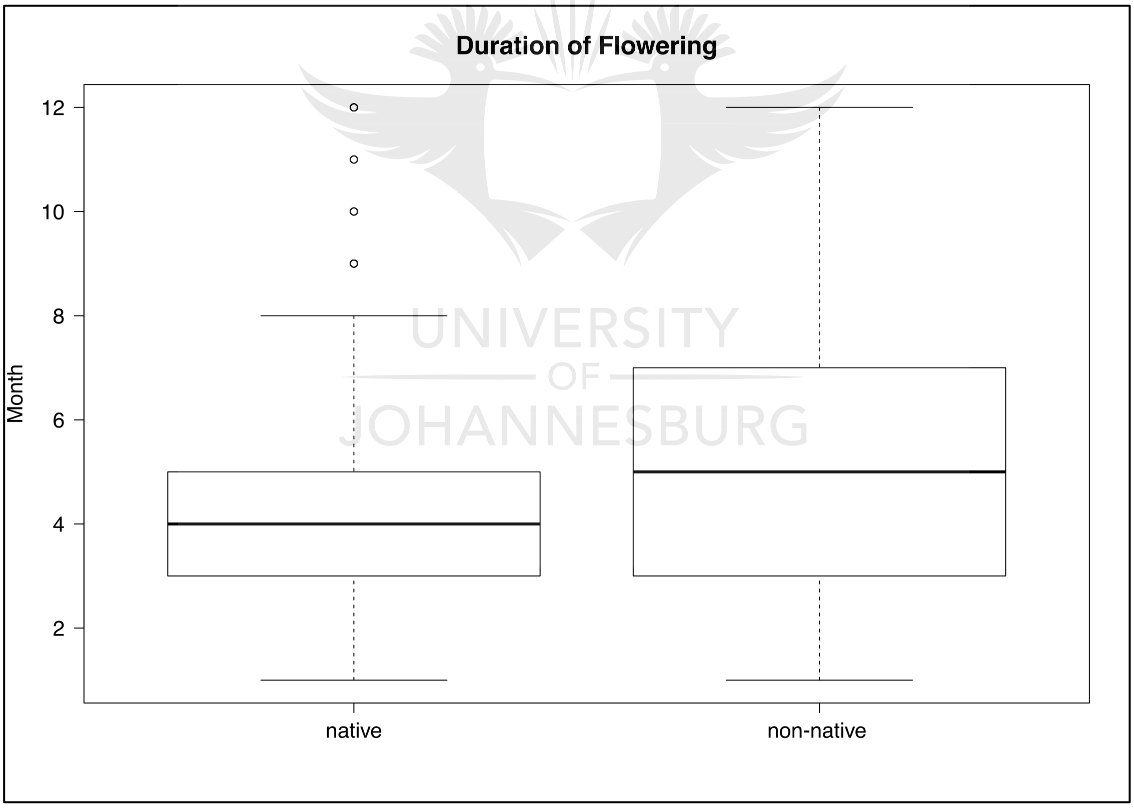

Figure 2.3: Comparisons of phenological differences between non-native (invasive plus non-invasive) and native species. Boxes indicate the first and third quartiles, the horizontal bold line shows the median, the broken lines show the range of the data and circles denote outliers

Table 2.2: Results of the phylogenetic Analysis of Variance of invasion success between natives vs non-native, and invasives vs non-invasives with start of growing season set at January. Pt = Multiple corrected P values from posthoc t-tests.

Phenology	F	Pt	F	Pt
	Natives versus non-natives	Natives versus non-natives	Invasive versus non-invasive	Invasive versus non-invasive
First flowering month	15.79	0.09	0.29	0.64
Last flowering month	0.64	0.74	0.08	0.80
Duration of flowering time	64.47	0.002	0.24	0.67

No significant difference in seed mass or maximum plant height was observed between invasives and non-invasives (P>0.05; table 2.3).

Table 2.3: Phylogenetic independent contrast on biological trait between natives vs non-natives and invasives vs non-invasives. T= t value from test statistics, Df= degree of freedom, p-value= statistical significance.

Biological trait	Number of potential contrasts with data	T	Df	P-value
Maximum height (natives versus non-natives)	103	0.47	102	0.49
Seed mass (invasives versus non-invasives)	26	1.20	25	0.23
Maximum height (invasives versus non-invasives)	22	3.07	21	0.10

Data on pollination mode, dispersal, and sexual system were not sufficiently complete to evaluate differences between non-native (invasives vs non-invasives) species. However, in comparison to natives, non-natives were more often abiotically dispersed (t= 4.0; df= 23; P= 0.005; figure 2.4a; table 2.4) and hermaphroditic (t= 2.5; df= 6; P= 0.04; figure 2.4b; table 2.4).

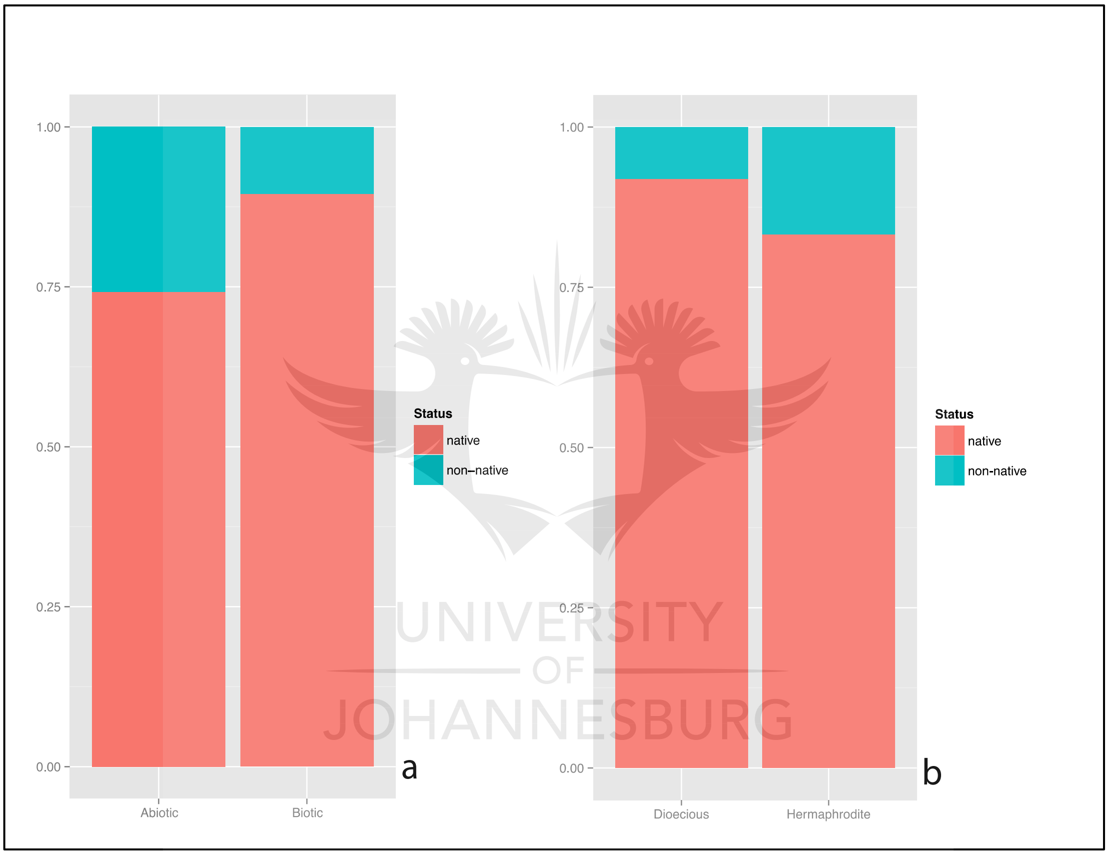

Figure 2.4: Differences in (a) primary dispersal mode and (b) sexual system between non-native and native species.

Table 2.4: Phylogenetic independent contrast on biological trait between natives and non-natives (invasives plus non-invasives). T= t value from test statistics, Df= degree of freedom, p-value= statistical significance.

Biological trait	Number of potential contrasts with data	Number of contrasts differing in trait value	T	Df	P-value
Pollination (natives versus non-natives)	62	4	0.6	2	> 0.05
Dispersal (natives versus non-natives)	74	24	4.0	23	0.005
Sexual system (natives versus non-natives)	62	7	2.5	6	0.04

For sexual system, results were similar whether monoecious species were treated as hermaphrodites or excluded them from the analysis. Non-natives also tended to be abiotically pollinated, but so too did their native close relatives (t= 0.6; df= 2; p> 0.05 for the comparison of non-natives versus native relatives; table 2.4). Perhaps more notable than the ecological differences between natives and non-native species is, therefore, their ecological similarities, for example, out of the 62 possible phylogenetic contrasts with sufficient data, only four differed in primary pollination mode, and seven differed in sexual system (table 2.4).

2.4 Discussion

Identifying the factors that explain why some species become invasive whilst others do not remains a major challenge in invasion biology (Hayes & Barry, 2008). Here, I explored the invasion success of non-native trees and shrubs in southern Africa, a center of high woody plant diversity that is increasingly being impacted by anthropogenic modifications to the environment and climate. Various key biological traits have been linked to invasion success, including dispersal mode, pollination system, phenology, life form and sexual system (e.g. Rejmánek, 1995; Thuiller et al., 2006; Pyšek & Richardson, 2007; van Kleunen et al., 2010; Pyšek et al., 2014), but among the non-native trees and shrubs of southern Africa examined here, no strong differences in ecology or life history was observed between invasive and non-invasive species. However, results reveal that invasive species are significantly less closely related to the native species pool than non-invasive species, with the latter tending to show closer phylogenetic affinities with the native tree and shrub community. This finding may help resolve Darwin's Naturalization Conundrum.

Darwin's Naturalization Conundrum reflects two apparently conflicting predictions regarding invasion success and phylogenetic distance between non-natives and the native species pool (Diez et al., 2008). First, non-natives distantly related to native species may be more successful invaders due to release from natural enemies (e.g. herbivores or pathogens) or because of weak competitive interactions with native species. Second, successful invaders might be expected to be more closely related to the native species pool because they share traits that pre-adapt them to the new environmental conditions in which they find themselves. Tests of Darwin's Naturalization Hypotheses have been mixed, and opposing predictions and mechanisms have been proposed (see table 1 in Jones et al., 2013). For example, there has been both documented evidence for increased susceptibility to attack by natural enemies (Hill & Kotanen, 2009; Ness et al., 2011) and increased mutualisms (Richardson et al., 2000b) among non-natives closely related to the native species pool. Further, in a cautionary note, Jones et al. (2013) use a mathematical model to demonstrate that the influence of phylogenetic relatedness on invasion success is theoretically contingent upon the mode of interspecific interactions (through phenotypic similarities or phenotypic differences), which could additionally be scale-dependent.

Previous work has highlighted the potential importance of spatial scale in resolving Darwin's Naturalization Conundrum (e.g. Procheş et al., 2008; Thuiller et al., 2010). For example, at broad scales, invasion success may be predicted by (pre)adaptation to the environment, whereas at finer spatial and taxonomic scales—the Darwin-Hutchinson zone identified by Vamosi et al. (2009)—invasion success may be determined more by biotic interactions. Thus at large scales invasives will tend to be more closely related to the native pool, whereas at the finer scales at which species interact, invasives will tend to be less closely related to natives (Procheş et al., 2008; Thuiller et al., 2010). Here, I suggest that a similar dichotomy might explain the observed differences between invasives and non-invasives in their relatedness to the native pool.

Non-invasives represent non-native plants that have successfully established and have the ability to reproduce in their introduced ranges (i.e. naturalized *sensu* Richardson et al., 2000a), but have not spread aggressively so as to have detrimental effects on native plant communities. These species might thus have traits that suit them to the environment, as reflected in their close phylogenetic affinities to the native species pool, allowing establishment, but may be biotically suppressed from becoming invasive. In contrast, invasive species represent a subset of naturalized species that have been able to spread aggressively from sites of introduction. Results show that these species are less closely related to the native flora, perhaps indicating evidence of competitive release (Keane & Crawley, 2002; Hill & Kotanen, 2009) and/or support for the vacant niche theory (Elton, 1958), whereby invasives are able to exploit resources unused by native species.

The interpretations of phylogenetic patterns rest upon the assumption that key traits related to environmental adaptation and biotic interactions are conserved on the phylogeny, such that closely related species tend to share similar trait values (Wiens & Graham, 2005; Wiens et al., 2010; Petitpierre et al., 2012; Davies et al., 2013). Although this is likely to be true on average, in some cases close relatives might be highly divergent, and thus phylogeny should be used as a guide only. In addition, the relationship between phylogenetic distance and strength of competition remains a subject of debate (see e.g. Cahill et al., 2008; Mayfield & Levine, 2010; Jones et al., 2013), although this interpretation does not presume direct competition (or its absence in the case of invading species) between natives and non-natives.

Significant associations between key traits and invasion success have been reported elsewhere. For example, Pyšek and colleagues (2014) found that invasiveness of trees and shrubs across central Europe is favoured in tall woody plants that rely on biotic agents (i.e. animals or vertebrates) as their primary dispersal mode. In a separate study of the North American grassland ecosystem, invaders were shown to flower earlier (Willis et al., 2010) or later during the growing season in contrast to native species (Gerlach & Rice, 2003; Pearson et al., 2012). However, no strong relationship between invasion success and biological traits was recovered in this study. It is possible that these results in part reflect a lack of statistical power. Because the test of Darwin's naturalization hypothesis rests upon an assumption of tight evolutionary conservatism, caution was taken to rigorously correct for phylogenetic non-independence in this analysis, which reduced degrees of freedom. In addition, insufficient data prevented the comparison of pollination mode, dispersal and sexual system between non-native species (i.e. invasives and non-invasives). However, even where statistical power was reasonable, as for flowering phenology, still no significant difference between invasives and non-invasives was detected. Further, if the relationship between biotic traits and invasion success had been strong, significant difference would still be detected even with low sample size. It is possible, therefore, that the wrong sets of traits most relevant for invasion success in southern Africa were explored. Alternatively, the traits conferring invasion success may be context specific (Hayes & Barry, 2008; Moodley et al., 2014) and vary along the invasion continuum (Moodley et al., 2013; see also Pyšek et al., 2011). For example Pyšek et al. (2011) revealed a shift of pollination syndrome from introduction through to invasion: at the introductory stage insect mediated pollination is dominant, but at the naturalization stage wind-mediated and auto-pollination become dominant strategies, whereas at the invasion stage non-native species co-opt pollinators of native species. The non-natives included in this analysis likely span all stages of invasion, thus providing mixed signals across this invasion continuum.

Although among non-native species no difference between invasives and non-invasives was found, non-natives (invasives and non-invasives combined) differed significantly from natives in duration of flowering time, primary dispersal mode and sexual system. Non-native species flower for longer, are more often hermaphroditic and dispersed using abiotic means in comparison to their native close relatives. While the pool of potential dispersers cannot be controlled for in this analysis, results suggest that these traits might be linked to establishment success.

Differences in plant phenology between natives and non-natives have been demonstrated previously (e.g. Franks et al., 2007; Matesanz et al., 2010; Willis et al., 2010; Wolkovich & Cleland, 2011; Anderson et al., 2012; Pyšek et al., 2014; Wolkovich et al., 2013). Two alternative models have been proposed to link phenology to invasion success: (1) the vacant niche (Elton, 1958), and (2) invader plasticity (Richards et al., 2006). According to the vacant niche theory, non-native species might successfully establish in new environments if there is little or no overlap in flowering times with native species. In the invader plasticity hypothesis, invading species shift phenologies to match the climatic regime in their new environments (Richards et al., 2006). However, species with longer flowering duration may simply stand a greater chance of successful pollination, and such a strategy might combine aspects of both the vacant niche and plasticity hypotheses.

Both dispersal syndrome and sexual system might also be linked to establishment success. Abiotic dispersal frees non-native species from relying upon animal dispersers that might not have equivalents in the non-native range, whereas hermaphrodism could facilitate establishment of non-native populations through auto-pollination where natural biotic pollinator agents are lacking (Baker, 1955; Rambuda & Johnson, 2004). Interestingly, these traits do not match to those associated with species invasion in temperate biomes (Gerlach & Rice, 2003; Willis et al., 2010; Pyšek et al., 2014), emphasizing that the processes of establishment and invasion is likely highly context specific. However, it is important to note that the apparent success of hermaphroditic non-native species observed here could also be an artefact of biased introductions. For example, dioecious species might have been less favoured as potential crops or ornamentals during the introduction process, perhaps because they are either more difficult to grow or propagate artificially as single sex clones compared to hermaphroditic species.

2.4.1 Conclusion:

In conclusion, results show that invasive trees and shrubs are less closely related to native trees than are non-invasive non-natives. This pattern may help explain Darwin's Naturalization Conundrum. Non-natives that are more closely related to the native species pool might have greater chance of establishment because they are more likely to share traits that pre-adapt them to the new environment in which they find themselves. However, non-natives less closely related to the native community might be more likely to become invasive because they may gain from competitive release and/or vacant niches. No strong relationship between biotic traits and invasion success was observed in this study, which may reflect the context dependent nature of species invasion. However, non-native species are more often abiotically dispersed, flower for longer, and hermaphroditic, suggesting therefore that these traits may enhance establishment success, although further work is needed to explore the pool of potential colonizing species.

CHAPTER THREE

CLIMATE CHANGE MAY REDUCE THE SPREAD OF NON-NATIVE AND INVADING SPECIES IN SOUTH AFRICA

Summary

Alien invasive species are considered a major threat to ecosystem functioning and native biodiversity globally. Their negative impacts on ecosystems and the provisioning of ecosystem services have been widely documented. Globally, South Africa faces one of the most significant challenges from invasive species. To mitigate impacts of non-native species on native biodiversity, between 1995 and 2000 the South African Government spent an estimated US$ 100 million on their control and eradication.

Here, I modelled the current climatic niche of 178 non-native and invading trees and shrubs within South Africa, and used climate projections to evaluate their potential future distributions. Additionally, I compared patterns of species distribution between recent and historical introduction events to assess the equilibrium hypothesis in species distribution models.

Results reveal that over half of these non-native tree and shrub species will experience a decrease in their climatically suitable habitats in the future, although not uniformly, and ranges are predicted to expand into some regions. Further, a similar pattern of species distribution was observed between the most recently and historically introduced species indicating that

possible violation of equilibrium assumptions in the SDM likely does not strongly influence these findings. Results suggest that, climate change may therefore act as a “natural” control to range expansion of many non-native and invading species in the future.

Keywords:

Species distribution models, range shifts, non-native species, trees and shrubs.

3.1 Introduction

South Africa's woody flora is relatively small, with a total land area under forest cover of about seven percent (Poynton, 1979a; 1979b; 2009), atlthough the region is floristically diverse, and harbours three of the six African biodiversity hotspots. However, a rapid increase in human population and associated rapid urbanization generated a huge demand for timber, wood products and other ecosystem services e.g. soil stabilization, that the slow rate of growth and wood production by South Africa's natural forest trees was unable to meet (Poynton, 2009). To supply this demand, there was a large-scale introduction of fast growing non-native tree species dating back to early European settlement. Many of the non-native tree species in South Africa today are a product of this *ad hoc* introduction programme. This influx of non-native species has had profound ecological and economic impacts in South Africa and globally (US Congress, 1993; Mack et al., 2000; Sala et al., 2000; van Wilgen et al., 2001; Richardson & van Wilgen, 2004; Pimentel et al., 2005; Winter et al., 2009; Pyšek et al., 2010; Davies et al., 2011). For example, invasion of the fynbos biome, a global biodiversity hotspot, is estimated to have locally reduced native species richness by 45%-67% (Higgins et al., 1999). In addition, a hypothetical extrapolation of the value of over one million hectares of protected fynbos biome suggested that US$ 11,75 billion could be lost annually (Higgins et al., 1999), through losses in wild flower harvesting, ecotourism, etc. To mitigate impacts of non-native species, between 1995 and 2000 the South African government spent an estimated US$ 100 million on their eradication and management through the Working for Water (WfW) programme (van Wilgen et al., 2001).

Since the earliest introductions, dating to 1652, it is estimated that approximately 750 different non-native tree species are now established in South Africa, together with close to 8,000 invasive, naturalized and casual non-native shrubs, succulents and herbaceous plants (van Wilgen et al., 2001; Henderson, 2006; see also a global review by Richardson & Rejmánek, 2011). Managing and controlling the spread of non-natives outside their native range is an immense challenge (van Wilgen et al., 2011), which is further compounded by potentially complex interactions between global climate change and species geographic distributions (Willis et al., 2008; Willis et al., 2010; Richardson et al., 2010). According to a recent report of the intergovernmental panel on climate change (IPCC), global mean temperatures are predicted to increase by over 4°C by the end of this century due to anthropogenic activities (IPCC, 2007, 2014). Since the geographic pattern of plant distribution correlates primarily with climate, this warming is expected to have a major impact on future patterns of plant diversity through range expansions and contractions (Thomas et al., 2004; Thuiller et al., 2005; Loarie et al., 2008; Bradley, 2009). Investigating how both non-native and native plant species will respond to new climatic regimes is thus critical (Sykes et al., 1996; Hamann & Wang, 2006; Keith et al., 2009).

In recent years, researchers have developed tools that provide increasingly accurate models of species' abiotic niches. Species distribution models (SDMs) have been widely used to predict plant responses to ongoing climatic changes in South Africa and globally (Richardson et al., 2010; Guisan & Zimmermann, 2000; Guisan & Thuiller, 2005; Richards et al., 2007; see also a review by Elith & Leathwick, 2009). By evaluating the correlations between current distribution data and climate, SDMs allows us to define the climate envelope of a species, and project forward under future climate change scenarios to identify geographic regions outside the current geographic range distribution that will fall within the species climate envelope and, conversely, regions within the current range that will no longer be climatically suitable in the future (e.g. Peterson et al., 2002; Thomas et al., 2004; Thuiller et al., 2005; Elith & Leathwick, 2009).

Here, I explore projected range shifts for 178 species of non-native and invading trees and shrubs for which distribution data were available; these taxa represent 20 orders, 38 families and 97 genera of gymnosperms and angiosperms. Using >87,930 occurrence points and various species distribution modelling algorithms, I evaluated the potential distributions of these non-native species under current and future projected climate scenarios. This analysis is the most extensive study to date on the distribution of woody non-native trees and shrubs species in South Africa. Previous efforts to model species distributions for both non-natives and natives within South Africa have generally been taxonomically restricted, often focused on a single species, genera or family (Bomhard et al., 2005; Richardson et al., 2010; van Wilgen et al., 2011; Kaplan et al., 2012; Cabral et al., 2013). The aim of this study was therefore to evaluate how these non-native and invading trees and shrubs species are likely to respond to projected climate change, and to identify regions that might represent invasion hotspots in the future so as to help concentrate conservation efforts in order to reduce the high cost associated with their control and eradication.

3.2 Materials and Methods

3.2.1 Non-native species occurrence data

A list of non-native and invading species was obtained from the southern African Plant Invaders Atlas SAPIA database. This catalogue contains the most up-to-date list of all naturalized/invasive alien plant species in southern Africa, with information on the spatial distribution, abundance, habitat preference and time of introduction for approximately 600 naturalized alien species (Henderson, 2001; but see Henderson, 2007). Occurrence data were obtained from the PRECIS database of the National Herbarium in Pretoria (Germishuizen & Meyer, 2003), which contains records for more than 736,000 specimens across 24,500 taxa from southern Africa. This data was also supplemented with sampling locations from the African Centre for DNA Barcoding ACDB, through the Toyota Enviro Outreach of 2012 www.toyotaoutreach.co.za and the national invasive DNA barcoding project of the WfW programme. Point data were cleaned to remove records with doubtful or imprecise localities. The maximum number of point records was 5,336 for *Solanum mauritianum* Scop. and the minimum was eight, for *Wigandia urens* Ruiz & Pav. Kunth. Although there is a debate as to the accuracy of SDMs when occurrence records are sparse (Wisz et al., 2008), some species with only few records were included in the analysis to maximize taxonomic sampling. However, I conducted a sensitivity analysis to explore robustness of these results by successively removing species with less than 20, 30, and 50 records.

3.2.2 Climatic Data

Current and projected climate data were extracted from the WorldClim database http://www.worldclim.org (Hijmans et al., 2005) representing interpolated climate station records from 1950 - 2000, and projected future scenarios at 2.5 minutes resolution. I included 19 climatic variables as potential predictors (see table 3.1). For future climate projections, I considered several general circulation models (GCM) and emission or concentration scenarios to account for differences across models. First, spatially downscaled estimates of future climate for the year 2080 were obtained from the WorldClim database using the Commonwealth Scientific and Industrial Research Organization CSIRO-Mk3.0 GCM and the Special Report on Emissions Scenarios SRES A1B carbon emission scenario. Additionally, in order to account for the most up to date climate change projections by the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, I further analyzed two additional GCMs; the Geophysical Fluid Dynamics Laboratory Climate Model Version 3 (GFDL-CM3) and Hadley Centre Global Environmental Model version 2 (HadGEM2-AO), considering three greenhouse gas concentration scenarios or representative concentration pathways (RCPs) each; the lowest RCP=2.6, medium RCP=4.5 and highest RCP=8.5 for the year 2070. Climatic projections predict temperature changes of 1.1 - 4.5 °C and precipitation changes of 2.1 - 4.6% by the end of the 21st century (Baek et al., 2013).

Table 3.1: Nineteen bioclimatic variables used as potential predictors in MaxEnt.

Abbreviation	Description
BIO1	Annual Mean Temperature
BIO2	Mean Diurnal Range (Mean of monthly max temp - min temp)
BIO3	Isothermality (BIO2/BIO7) (* 100)
BIO4	Temperature Seasonality (standard deviation *100)
BIO5	Max Temperature of Warmest Month
BIO6	Min Temperature of Coldest Month
BIO7	Temperature Annual Range (BIO5-BIO6)
BIO8	Mean Temperature of Wettest Quarter
BIO9	Mean Temperature of Driest Quarter
BIO10	Mean Temperature of Warmest Quarter
BIO11	Mean Temperature of Coldest Quarter
BIO12	Annual Precipitation
BIO13	Precipitation of Wettest Month
BIO14	Precipitation of Driest Month
BIO15	Precipitation Seasonality (Coefficient of Variation)
BIO16	Precipitation of Wettest Quarter
BIO17	Precipitation of Driest Quarter
BIO18	Precipitation of Warmest Quarter
BIO19	Precipitation of Coldest Quarter

3.2.3 Determination of Suitable Habitat

Here, I applied two classes of SDMs; those that use either presence-only data or presence-background data to establish current and future habitat suitability of all 178 woody non-native and invading trees and shrubs in this data set. (Elith et al., 2006). For presence-only data, I used MaxEnt version 3.3.3 (Phillips et al., 2006) as it outperforms similar methods, and has been shown to provide accurate predictions even when only few occurrence points are available (Elith et al., 2006; Wisz et al., 2008; Mateo et al., 2010). I ran 15 sub-sampling replicates with 5,000 iterations per species for each MaxEnt model, which was sufficient for model convergence. Ensembled forecasts (Araújo & New, 2007) were generated from three alternative presence-background SDM algorithms; generalized linear models (GLM; Guisan et al., 2002), random forests (RF; Breiman, 2001) and the gradient boosting machine (GBM; Friedman et al., 2000). Although actual absence data were not collected, pseudo-absences can be substituted with background data, which characterize the environmental conditions of the study area (Phillips et al., 2009). For each algorithm, background data were generated across the study area containing 1.5 times the number of presence points for each species and applied the same threshold approach for predicting species presence or absence to both current and future climate projections, as described below.

In all models, collinearity resulting from highly correlated climate predictors being included in the SDMs was accounted for by only considering variables with high predictive power as identified by the jackknife statistic (i.e. AUC>0.8). Additionally, temperature- and precipitation-predictors whose correlations were > 0.8 with either mean annual temperature or mean annual precipitation respectively, were removed from the models. In running models, 25% of the occurrence data were assigned for testing whereas the remaining 75% for model training. Duplicate occurrence records were excluded to reduce the impact of model over fitting.

Model outputs followed a logistic distribution, ranging from 0 (climatically unsuitable areas) to 1 (climatically suitable areas). As yet, no consensus has been reached on choosing an appropriate threshold for transforming the modeled probability of occurrence into predictions of species presence or absence. Since threshold selection might greatly affect the results (Liu et al., 2005), I followed a two-fold procedure to minimize such impacts. First, for MaxEnt model, the commonly used 10-percentile training presence threshold was selected to produce prediction probability maps (Ficetola et al., 2007; Phillips & Dudik, 2008). Second, for the GLM-RF-GBM ensemble forecasts, the threshold that maximizes the sum of the true positive rate and the true negative rate was applied, thus minimizing model error for each species model. The resulting probability maps generated by each algorithm were scaled to range between 0 and 1 and averaged weighting by the square of their AUC values above 0.5 (i.e. random expectation), which gives more weight to areas where AUC is higher.

3.2.4 Comparison of current versus future suitable habitat:

For the MaxEnt outputs and GLM-RF-GBM ensemble forecasts, I quantified firstly the the difference in geographical extent of projected distributions between current and future climate scenarios. Negative values indicate a net reduction in climatically suitable areas with climate change, whereas positive values indicate a net expansion of climatically suitable areas with climate change.

Secondly, I further explored model sensitivity by evaluating the relationship between range change and time of earliest introduction across all GCMs using a non-parametric Mann-Whitney U-test to compare pre and post 1900 introductions, and a regression analysis of range change versus date of introduction. This latter timeframe (post 1900) coincides with the formation of the Union of South Africa, and represents a period of rapid globalization. I hypothesized that if more recently introduced species have not had enough time to reach their available climate bounds, they might be a significant difference in projected range shifts between the pre and post 1900 introduction events.

Lastly, I explored potential differences in the important climate variables driving range shifts for pre and post 1900 introductions by running correlations of change in predicted richness against change in each of the environmental variables in turn. Cells that fell outside 1.5 times the interquartile range of environmental shifts were excluded from the correlation analysis.

3.3 Results

Under current climatic conditions, hotspots of habitat suitability for non-native and invading trees and shrubs are centred in the western Cape, eastern Cape, Kwazulu-Natal, Mpumalanga, Limpopo, Gauteng and part of the North West provinces (areas in red figure 3.1).

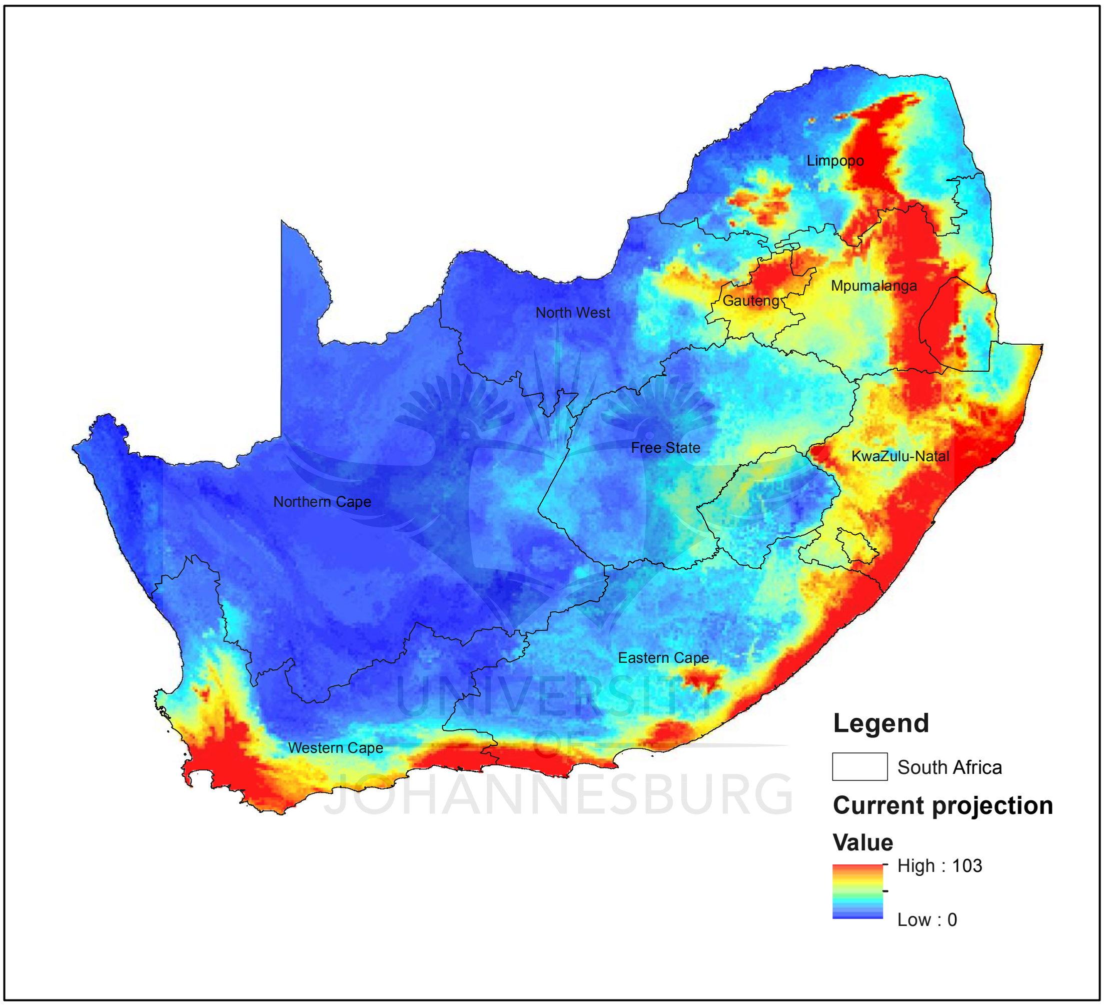

Figure 3.1: Habitat suitability map derived from stacking individual species distributions. The map shows how many species could potentially occupy each area with red colours in areas that are potentially suitable for a higher number of species.

However, results from future projections across all scenarios suggest that up to two-thirds of the non-native trees and shrubs in South Africa may experience a decrease in their climatically suitable habitat (mean percent of species showing a decrease across all SDMs, GCMs and emissions scenarios = 64.48%), with the Ensemble Forecast-GFDL-CM3-8.5 and MaxEnt GFDL-CM3-8.5 showing the highest percentage of species decreasing in extent (69.66%) (see table 3.2 below).

Table 3.2: Percentage of non-native and invading species predicted to show decrease in climatically suitable habitat assuming different general circulation models and sensitivity of results to number of points use. CSIRO= Commonwealth Scientific and Industrial Research Organization, GFDL-CM3= Geophysical Fluid Dynamics Laboratory climate model version 3, HadGEM2-AO= Hadley Centre Global Environmental Model version 2. Representative concentration pathways (RCPs); the lowest RCP=2.6, medium RCP=4.5 and highest RCP=8.5.

All 178 study species	Species with ≥20 occurrence points	Species with ≥30 occurrence points	Species with ≥ 50 occurrence points	SDM algorithm, GCM and emission scenario
66.31	67.36	65.12	69.81	Ensemble Forecast-CSIRO-SRES_A1B
61.24	59.72	58.14	61.32	Ensemble Forecast-GFDL-CM3_2.6
64.04	61.8	61.24	64.15	Ensemble Forecast-GFDL-CM3_4.5
69.66	68.75	68.99	73.58	Ensemble Forecast-GFDL-CM3_8.5
48.31	47.92	47.29	49.06	Ensemble Forecast-HadGEM2-AO_2.6
52.25	53.47	52.71	56.6	Ensemble Forecast-HadGEM2-AO_4.5
54.49	55.56	55.04	57.55	Ensemble Forecast-HadGEM2-AO_8.5

54.5	54.86	55.04	55.66	Maxent-CSIRO-SRES_A1B
66.29	68.06	65.89	65.09	Maxent-GFDL-CM3_2.6
65.17	66.67	64.34	66.98	Maxent-GFDL-CM3_4.5
69.66	70.83	68.99	69.81	Maxent-GFDL-CM3_8.5
59.55	63.89	61.24	60.38	Maxent-HadGEM2-AO_2.6
56.18	58.33	55.04	55.66	Maxent-HadGEM2-AO_4.5
60.67	64.58	61.24	59.43	Maxent-HadGEM2-AO_8.5

Averaged across all GCMs, the two species predicted to show the greatest contraction in climatically suitable habitat at the country level were the hairy hakea (*Hakea gibbosa*), from Australia, and the long-leaf sugar bush (*Protea longifolia*), an invading species indigenous to South Africa, with the former predicted to show an average decrease of ~11,579 x 10^3 km^2, and the latter an average decrease of ~14,037 x 10^3 km^2 (see appendix 3.1).

Figure 3.2: Photographs of non-native species showing the greatest contraction in climatically suitable habitat (a) *Hakea gibbosa* (b) *Protea longifolia*. Photographs: Dorcas Mashudu Lekganyane

Results were similar across all GCMs, emission scenarios and species distribution modelling algorithms with the exception of the Ensemble Forecast-HadGEM2-AO GCM under the lowest emissions scenario (HadGEM2-AO_2.6) (table 3.2). The general trend for contraction of climatically suitable habitat was robust to the removal of species with fewer occurrence points and with respect to alternative thresholds of species occurrence (see table 3.2). Excluding species with less than 20, 30 and 50 occurrence points had little impact on overall trends for contraction in extent of climatically suitable habitat across species (see appendices 3.2, 3.3 and 3.4) (see also Loarie et al., 2008 for more details).

An exception to the general trend of range contraction was observed for the Ensemble Forecast-HadGEM2-AO GCM under the lowest emissions scenario (HadGEM2-AO_2.6) (table 3.1).

By mapping the difference in predicted species distributions between present and future climate scenarios, a number of regions were identified where the threat of invasion from current non-native species might recede, including the provinces of western Cape, eastern Cape, Gauteng, Kwazulu-Natal, Mpumalanga and Limpopo (figure 1b, areas in blue) (figure 3.3, areas in blue).

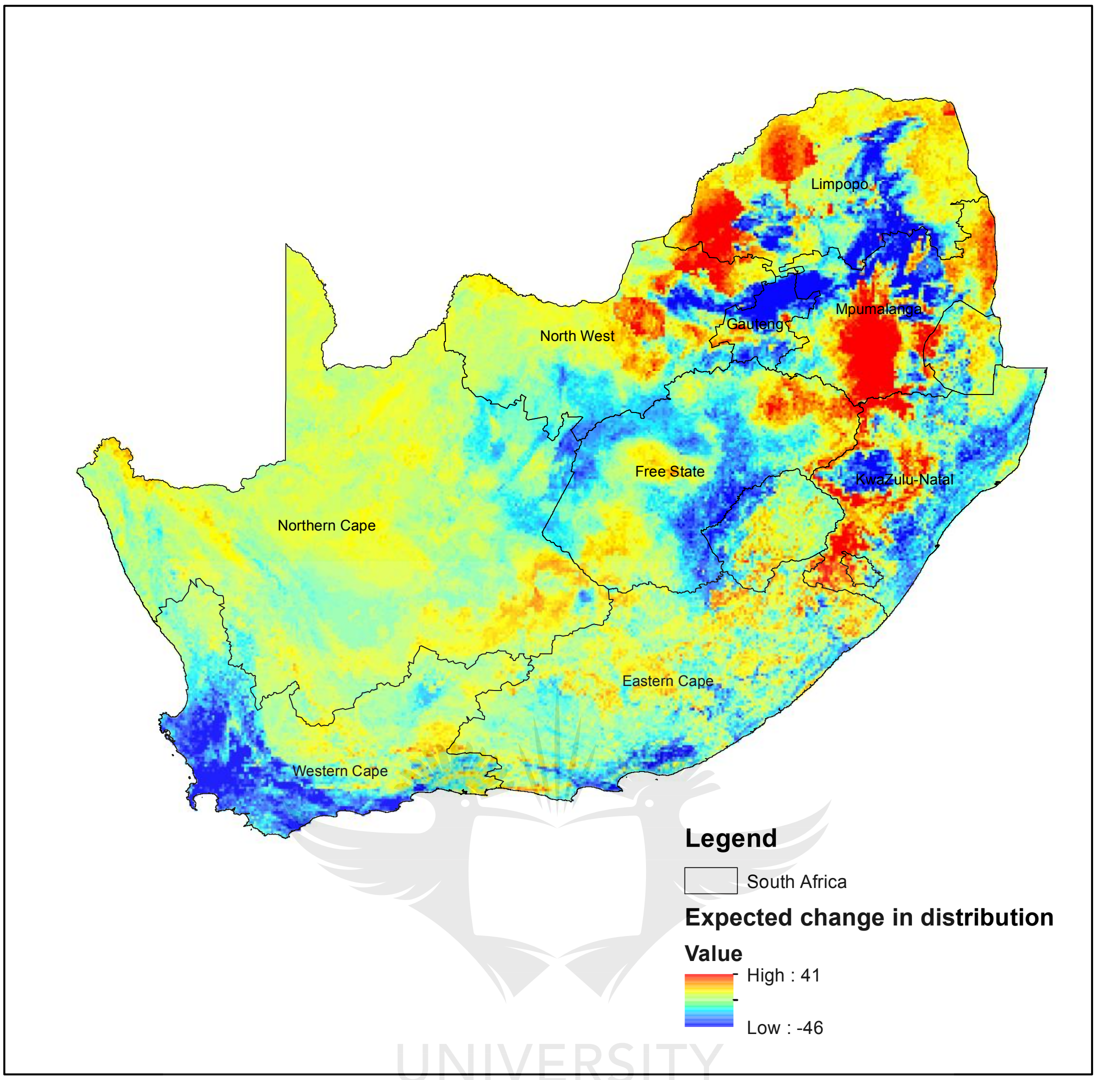

Figure 3.3: Change in potential distributions between current and projected climate for the year 2070 stacked across all 178 non-natives and invading woody taxa. Red areas (positive values) highlight regions that may be particularly vulnerable to spread of non-natives species in the future, blue areas (negative values) highlight regions where the threat from current invasion might recede. Only results from ensemble-forecasts using the future climate projection for the year 2070 under the GFDL-CM3_2.6 climate scenario are shown.

Although results show that the majority of non-natives will experience a contraction in areas of climatically suitable habitat, averaged across all scenarios and SDMs 35.52% of species are still predicted to experience a range expansion. As such, a further spread of these species into some areas (figure 3.3, areas in red) is predicted despite what may be a general decline in non-native range extent. Averaging across all scenarios, the two species with the most significant potential for range expansion were the red ironbark (*Eucalyptus sideroxylon*), native to Australia, and the Chilean mesquite (*Prosopis chilensis*) from South America, with predicted range expansions of ~346,773 x 10^3 km^2 and ~460,454 x10^3 km^2, respectively (see appendix 3.1). Thus the provinces of Mpumalanga and Limpopo may still be particularly vulnerable to future spread of non-natives with the Kwazulu-Natal, Free State and North West provinces showing a mixed pattern of range expansion and contraction (figure 3.3).

Figure 3.4: Photographs of non-native species showing the greatest expansion in climatically suitable habitat (a) *Eucalyptus sideroxylon* (b) *Prosopis chilensis.* Photographs: L.McMahon

3.3.1 Range shifts and dates of introduction

Estimates of shifts in climatically suitable habitat may be less reliable for more recently introduced species if these taxa have not had sufficient time to occupy all potential climatically suitable regions (i.e. reaching climatic equilibrium). SDMs for these species might underestimate their true climate niche. To test this, I compared trends between more recently introduced taxa, and species that were introduced prior to 1900. From the list of species in this data set, 72 species had records indicating introduction prior to 1900, 43 species were introduced after 1900, and 15 species are considered native invasive, precise dates of introduction for the remaining 48 taxa were not established (appendix 3.5).

Surprisingly, no statistically significant difference in predicted change in areas of suitable habitat between pre- and post- 1900 introduction events was found across all GCMs and emission scenarios (Mann-Whitney U-test: $W = 1321$, $P > 0.05$; figure 3.5). In addition, no evidence was found that the geographical ranges of pre- 1900 introduction were expanding while those of post- 1900 introduction were receding or vice versa (figures 3.6 and 3.7). However, stronger signal of geographic range contraction was observed for the Free State province in the post- 1900 introduction (figure 3.7).

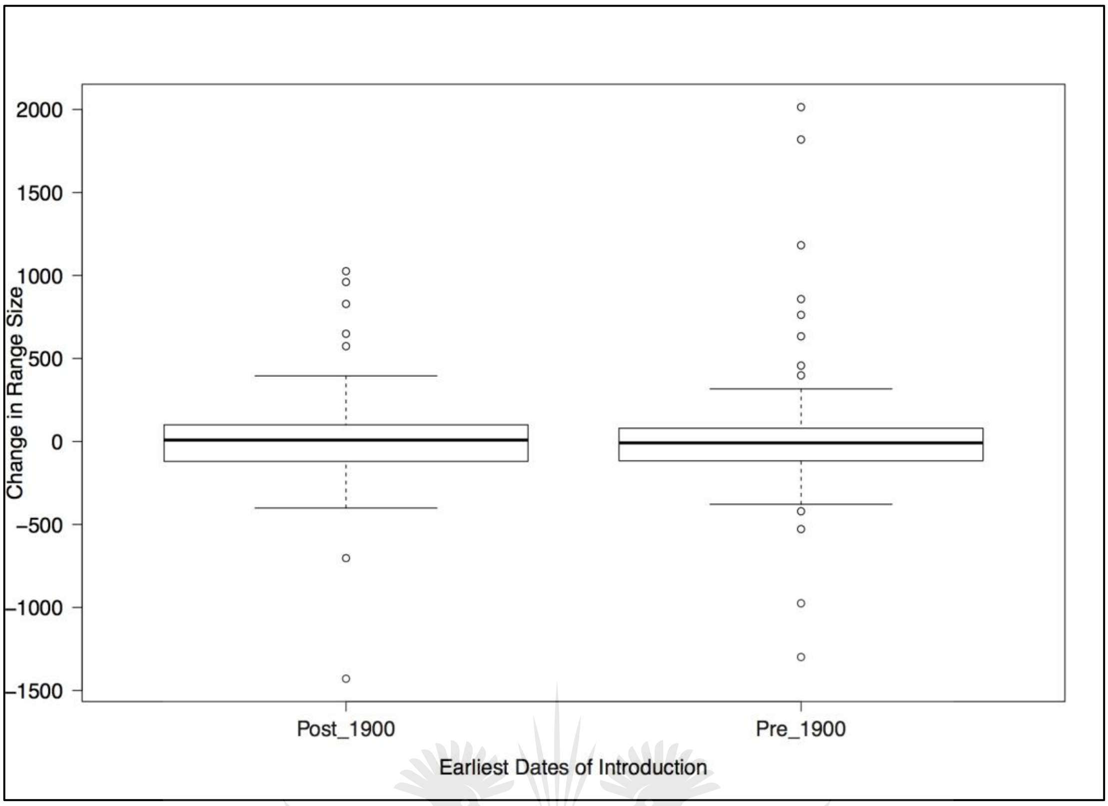

Figure 3.5: Comparison between Pre 1900 and Post 1900 patterns of exotic trees and shrubs species spread in South Africa by the year 2080.

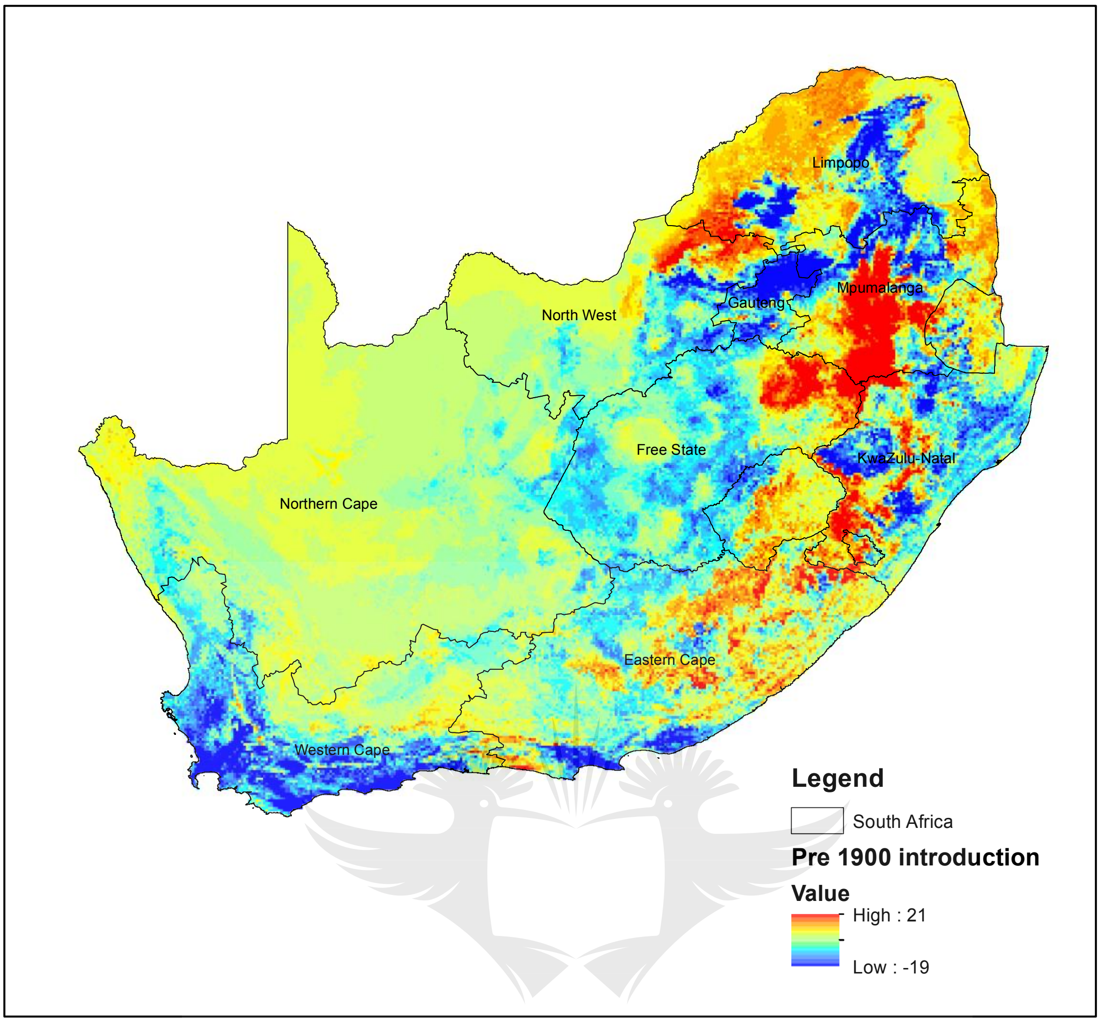

Figure 3.6: Predicted shift in range distributions under projected climate change, highlighting regions of range expansion (red) and contraction (blue) for non-native species introduced before 1900.

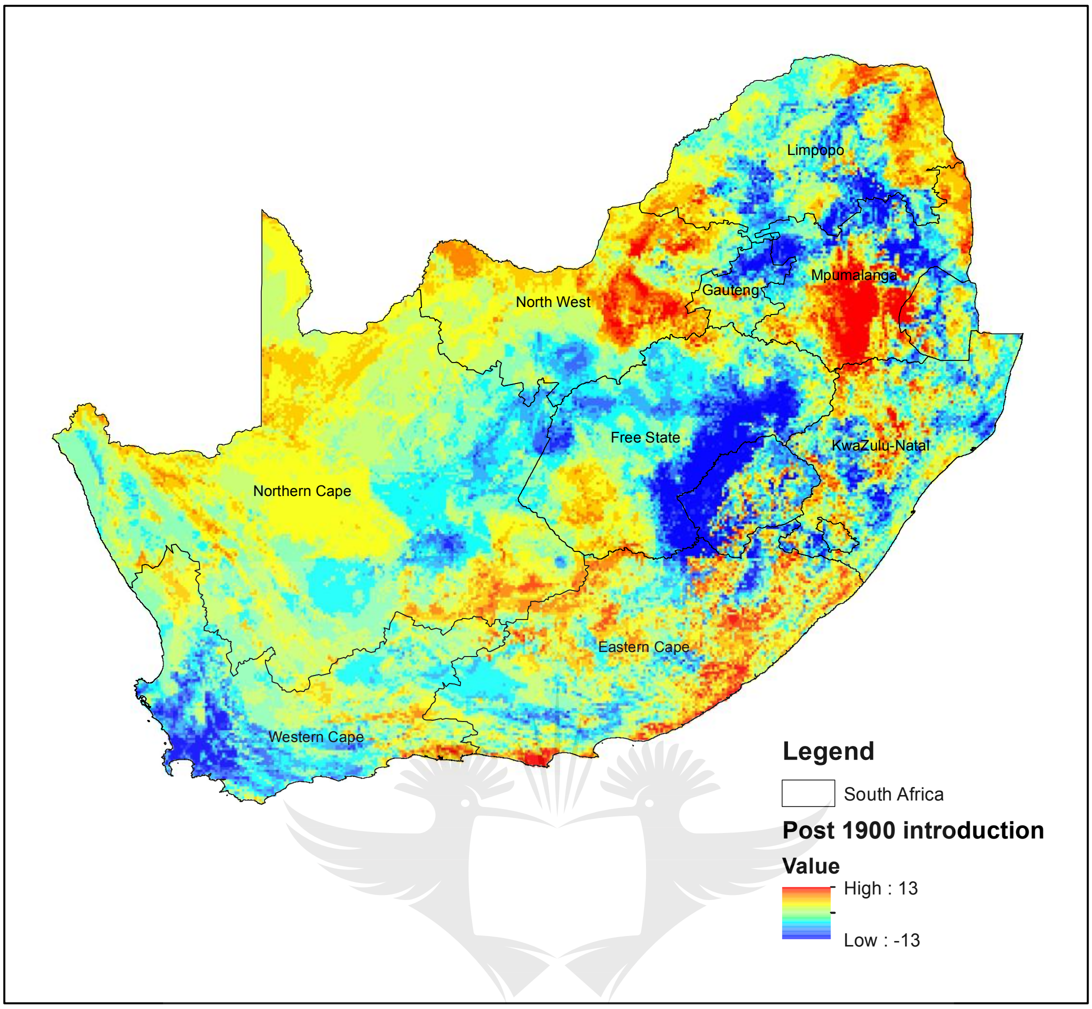

Figure 3.7: Predicted shift in range distributions under projected climate change, highlighting regions of range expansion (red) and contraction (blue) for non-native species introduced after 1900.

Last, to explore whether the environmental drivers of range shifts differed between post and pre 1900 introductions, I examined correlations between changes in predicted richness against changes in each of the environmental predictor variables included in the SDMs. I found that similar temperature-based and precipitation-based bioclimatic variables (i.e. 19 bioclimatic variables except Bio 4, 7 and 18; see table 3.1 for full meanings) were important in explaining range shifts for both taxon sets across GCMs. Also, I found that the correlation strengths between the temperature-based and precipitation-based bioclimatic variables to be highly correlated (e.g. r^2 = 0.82 from the correlation of climate predictor correlation strengths from the ensemble forecast SDM under the GFDL-CM3_2.6 climate projection scenario for pre- and post- 1900 introductions).

3.4 Discussion

There is increasing evidence that anthropogenic activities are driving climate change, and that rates of change are likely to increase in the future (Lenton et al., 2008; IPCC, 2014). Many species are predicted to shift in their distributions to track their climate niche, for example moving northwards or upwards in elevation (Lenoir et al., 2008; Loarie et al., 2009). Several studies have attempted to model the future potential distribution of alien species in South Africa and globally, and have shown projected increases in their range sizes with climate change (Walther et al., 2009; Trethowan et al., 2011; Bradley et al., 2012). In one recent example Bellard et al. (2013) modeled the potential future distribution for 100 of the world's most invasive alien species and found that a majority of these species are predicted to expand their ranges northwards.

Here, I use species distribution models (SDMs) and future climate projections (i.e. employing different GCMs and future dates) to explore the potential shift in the distribution of some 178 non-native and invading trees and shrubs in South Africa. Results reveal that on average, the geographical extent of suitable climate space for a majority of non-native and invading trees and shrubs species is predicted to contract in the future. Results were consistent across alternative algorithms, emission scenarios and general circulation models. The Ensemble Forecast-HadGEM2-AO GCM under the lowest RCP for year 2070 (i.e. HadGEM2-AO_2.6) was an exception to this general trend, suggesting a tendency towards range expansion for over half of the 178 non-native and invading species studied (table 3.2). Under this scenario, however, maximum carbon dioxide concentrations are expected to peak at 443 ppm for the year 2050, and thus emissions (and temperatures) would already be decreasing by 2070, the target year for which I modelled future range extents.

Projecting the future distribution of these species, some regions were identified where threats from potential non-native species might lessen including including the provinces of the western Cape, eastern Cape, Gauteng, Kwazulu-Natal, Mpumalanga and Limpopo. Similar trends of decrease in habitat suitability was observed even after removing species with few occurrence points, for which range projections might be less accurate. However, species' responses are idiosyncratic, and models still predict the potential for an increased spread of some species with climate change. In addition, some non-native species might not yet occupy all currently suitable climate space available to them because they may not have reached climatic equilibrium. Hence, these species may continue to spread in their geographical distribution even though the total area of climatically suitable habitat might remain unchanged or even decrease (García-Valdés et al., 2013).

Assuming current climatic conditions, potential hotspots for non-native trees and shrubs in South Africa include the western Cape, eastern Cape, Kwazulu-Natal, Mpumalanga, Gauteng, Limpopo and part of the North West provinces. These provinces are a source pool for many non-natives because of their high rainfall, high urban development, and farming and silvicultural practices (Schulze, 1997; Henderson, 2006; Henderson, 2007; Poynton, 2009). Under climate change, several additional geographical regions may be particularly vulnerable to range expansion of non-native species in the future, such as Mpumalanga. These provinces represent high elevation or topographically variable regions, suggesting that climate change might create new opportunities for species to move into areas of high elevation (Rebelo & Siegfried, 1992; Richardson et al., 1996; Bomhard et al., 2005; Loarie et al., 2009; Bellard et al., 2013).

Since invasion is a dynamic process (Dostál et al., 2013), it is possible that the true climatic envelopes for some species, especially for recent introductions, which may not yet have had sufficient time to reach equilibrium with climate, might have been mischaracterized. One alternative approach would be to generate SDMs including data from the native range (Mau-Crimmins et al., 2006; Broennimann & Guisan, 2008; Beaumont et al., 2009; Trethowan et al., 2011; Kaplan et al., 2012; O'Donnell et al., 2012). However, detailed distribution data on the native range for most species considered here are lacking. Furthermore, previous studies have illustrated that models trained with native range data can be a poor estimate of the fundamental climate niche of a species given that many non-native expand beyond the climate envelope realized in their native distribution (Rödder & Lötters, 2009). I therefore compared trends between pre- and post- 1900 introductions. If more recently introduced species have not yet had sufficient time to reach the boundaries of their climate niche, SDMs calibrated with such data might be expected to show differences in range shift predictions. The more recently introduced species weakly tend to decrease in geographical extent with climate warming, however, the likelihood to expand or contract in their range was almost similar for both pre- and post- 1900 introductions. Furthermore, similar climate variable were found to drive range shifts in both taxon sets.

These results match to some earlier studies on native and non-native species in this region, for example, a majority of species in the South African Proteaceae are predicted to experience a range contraction with climate change, and some species might even experience a complete loss of bioclimatically suitable habitat (Midgley et al., 2002; Bomhard et al., 2005; Cabral et al., 2013). In a study on the potential distribution of the non-native Peruvian pepper tree (*Schinus molle* L.), Richardson et al. (2010) also showed that the future range of this species will likely contract (see also results by Rouget et al., 2004; Kaplan et al., 2012). Here, I have shown that this trend of range contraction with projected climate change might be a more general feature for non-native and invading trees and shrubs in South Africa.

Some caution must be excercised when interpreting results from species distribution modeling especially those pertaining to non-native species (Guisan & Zimmermann, 2000; Schelderman & van Zonnenveld, 2010). First, a key assumption of SDMs is that species distributions are in equilibrium with their new environment (Guisan & Zimmermann, 2000; Araújo & Pearson, 2005). Therefore, the interpretation of the niche models extrapolated to future climate change are highly dependent on the assumption that the population growth and genetic structure of invasive species is identical or stays the same. This assumption is likely invalid for many non-natives species, especially at the early stages of invasion (Thuiller et al., 2005; Václavík & Meentemeyer, 2009; 2012), and many non-natives may not attain equilibrium with their environments even many years after their introduction (Svenning & Skov, 2004; Jones, 2012). However, results from the sensitivity analysis indicate that violation of this assumption likely does not strongly influence the findings presented here. Nonetheless, SDMs for non-native species need to be carefully implemented as most modelling techniques still ignore potentially important drivers of non-native species spread (e.g. stage of invasion along the continuum, population dynamics, biotic interactions, dispersal limitations etc.). Although not currently available for most species, modelling techniques that incorporate such limitations will be able to allow the more accurate prediction of spread rates as well as the level of invasion risks (see also Prasad et al., 2010). Second, when projecting SDMs into the future it is important to also consider the variability associated with different modelling techniques and climate change projection scenarios (i.e. different GCMs and RCPs; Araújo & Peterson, 2012). In this study, I considered four types of SDMs, across three GCMs and four different emission scenarios, and show results to be highly consistent (table 3.2 but see also Loarie et al., 2008; O'Donnell et al., 2012; Bellard et al., 2013).

It is important to appreciate that SDMs themselves provide only a probabilistic framework on species true distributions, and these need to be validated using empirical data as multiple factors are known to influence the realized distribution of a species (Schelderman & van Zonnenveld, 2010).

3.4.1 Implications for non-native species management under climate change

The rapid urbanization of South Africa has generated a demand for various goods and services that the native flora is unable to meet. This gap has led to the introduction of fast growing non-native trees to supply the needs of the growing human population. Many of these introduced species have become invasive, and pose a threat to native biodiversity. However, results presented here show that the potential area of climatically suitable habitat for many of these species may reduce with projected climate change. These results thus suggest that the impact of current non-native species might be lessened in the future. Nonetheless, some regions are predicted to become more suitable for currently invading species, these include the Mpumalanga, Kwazulu-Natal, Free State, North West and Limpopo provinces (i.e. future invasion hotspots). These regions should be areas of increased focus for invasive management if future threats from climate change are to be lessened. Further, newly introduced species that have yet to establish might pose novel threats. It is essential, therefore, that current efforts to control the introduction and eradication of currently invading non-native species, for example, through programme such as the early detection and rapid response (EDRR) initiative of the South African National Biodiversity Institute (SANBI) are continued. Importantly, the contraction of suitable habitat for many non-natives species might provide new opportunities for habitat restoration through assisted recolonization by native species that once occupied these regions (Bradley et al., 2009). These opportunities should be seized upon as they represent a rare opening in the ongoing battle against species invasions.

CHAPTER FOUR

GENERAL CONCLUSIONS

4.1 Why is southern Africa heavily invaded?

The rise in urban development in the southern African region has generated a great demand for various ecosystem goods and services that the slow growing native tree flora is unable to meet. The natural slow tree production rate is the consequence of several ecological conditions (topography, soils, climate etc.) that prevent the establishment of forests in much of the region. Additionally, frequent periodic fire occurring in the natural fire-prone vegetation limits native tree regeneration. Although some tree species eventually survive fire; for example, trees with insulating layer of bark (Bond, 1983). Hence, the absence of trees is the main distinctive feature of the vegetation in this region (i.e. savanna or grassland; Mucina & Rutherford, 2006). The slow rate of tree production by the native flora motivated the introduction of fast growing non-native tree species into southern Africa to meet the increasing demand for tree related services from the growing human population. Many of these introduced species have naturalized and some are now invasive and pose severe ecological disruptions to regional native biodiversity (Mack et al., 2000; Sala et al., 2000; Winter et al., 2009; Pyšek et al., 2010), with risk of huge economic losses (van Wilgen et al., 2001).

In South Africa, a country ranked as the third most biodiverse in the world (Le Maitre et al., 2000), over 8% of the country's total land area has been invaded by non-native species (van Wilgen et al., 2001), which are increasingly threatening its rich native biodiversity (see details in chapter one). The invasion success of these introduced species is a complex process that encompasses three broad stages: introduction, naturalization and invasion (Richardson & Pyšek, 2012), with different factors at play at each stage (Richardson & Pyšek, 2012). At the invasion stage, species must have already passed through several barriers at the introduction and naturalization stages, and the success at this final stage has been linked to various factors (see chapter one for more details). Globally, these factors include reproductive traits, dispersal traits, residence time, climate, and evolutionary affinities to the resident native species (Strauss et al., 2006; Schaefer et al., 2011; Bezeng et al., 2013). Recent research, however, shows that correlates of invasion success are context specific or scale dependent (Thuiller et al., 2010; Richardson & Pyšek, 2012; Moodley et al., 2014; Pyšek et al., 2014). In this thesis I explore the biological and evolutionary factors that predispose some species to become invasive in southern African, and investigate how non-native plant species may respond to changes in climatic conditions.

4.2 Recent initiatives to control non-native species

As a result of the negative impacts of non-native species on native biodiversity, some countries including South Africa are now developing 'early warning programmes' to control non-native species before they become harmful and to reduce the threats from currently invading species. In South

Africa, one such initiative is the “working for water” programme, established in 1995 by the South African government with the main aim of clearing currently invading species (Working for Water, 2004). More recently, the early detection and rapid response (EDRR) initiative of the South African National Biodiversity Institute (SANBI) has been established to identify and assess problem plants in order to develop management plans for their control and eradication. These programmes have been instrumental in invasive species management within South Africa but need to be extended more widely into other southern African countries if invasive species are to be successfully controlled across this region. However, currently there are insufficient financial and human resources available for such widespread programmes, and invasive control and management operates under triage. It is critical, therefore, to prioritize efforts, and such prioritization would benefit from the identification of current and future hotspots of invasive species (as predicted by climate change) and biological parameters that predispose species to invasion.

4.3 Recent studies on non-native species invasion and knowledge gaps

The rate at which introduced species are naturalizing in new environments is increasing. There is therefore an urgent need to understand the drivers of invasion success so as to design efficient management plans (Strauss et al., 2006; Thuiller et al., 2006; Schaefer et al., 2011; Harvey et al., 2012; Bezeng et al., 2013; Moodley et al., 2014). Several studies have attempted to identify species traits that correlate with invasion success or environmental factors associated with their invasiveness (Pyšek & Richardson, 2007; Schaefer et al., 2011; Moodley et al., 2014; Pyšek et al., 2014; see more detailed review in chapter one). However, results have not been consistent amongst studies (Kolar & Lodge, 2001; Fitzpatrick et al., 2007; Broennimann & Guisan, 2008; Harry & Barry, 2008; Wolkovich et al., 2013). For example, testing the efficiency of plant functional traits in explaining invasion success has identified certain traits (e.g. plant height, seed mass) as major predictors of invasion success in some studies (Ordonez & Olff, 2013; Moodley et al., 2013; Pyšek et al., 2014) but not in others (Lim et al., 2014). Although limitations of trait-based models of invasion success are well known (Hayes & Barry, 2008), results from trait-based analysis within some clades have been generalized to other clades (Kolar & Lodge, 2001) perhaps incautiously. Several reasons have been set forth to explain discrepancies between studies (see Mau-Crimmins et al., 2006; Wolkovich et al., 2013):

- traits that drive invasion success in some clades or regions might not necessarily do so in others (Cadotte et al., 2006; Pyšek & Richardson, 2007; Higgins & Richardson, 2014) given the site-specificity (Moodley et al., 2014) or context dependent (Richardson & Pyšek, 2012) nature of biological invasion.
- species relatedness has largely been ignored in most analyses (but see Miller-Rushing & Primack, 2008; Davis et al., 2010; Davies et al., 2013) and species have been treated as statistically independent (Felsenstein 1985; Harvey & Pagel, 1991). New evidence reveals that failure to account for species shared evolutionary history in such analysis might lead to: (i) reduced ability to detect significant relationships between traits and

invasion success because many species may show some degree of trait similarity simply as a result of shared evolutionary history (Wiens & Graham, 2005; Donoghue, 2008; Losos, 2008; Davies et al., 2013), and (ii) inflation of type I error rates because of overestimated degrees of freedom when testing hypothesis.

- most studies on trait interactions have been limited in terms of taxonomic sampling, focusing on few species to draw general conclusions (Kolar & Lodge, 2001; but see Wolkovich et al., 2013). Hence, patterns might not extrapolate as the spatial or taxonomic scale increases (Richardson & Pyšek, 2012).

This study builds and improves on our current understanding of species invasion, and attempts to identify the biological and evolutionary factors that predispose some species to become invasive in this region.

4.4 Synthesis of main findings of this study

In this thesis, I focus on the tree and shrub flora of southern Africa to understand drivers of plant invasion success using phylogenetic and niche modeling approaches. I focus on woody trees and shrubs because this flora has been well studied in the region and invasive trees present a major ecological and economic challenge in the region (van Wilgen et al., 2001; De Lange & Van Wilgen, 2010). I combine climate change data, biological traits, and phylogeny in an attempt to provide a robust understanding of invasion success of trees in southern Africa. Because of limited data collection efforts in other southern African countries, I focused mainly in South Africa.

First, I explored the evolutionary relationships between non-native (invasive and non-invasive) and native species in order to test DNH, which posits that “introduced species are more likely to become naturalized and successful invaders in recipient environments where (phylogenetically) close relatives are absent” (Daehler, 2001; but see also Rejmánek, 1999). I found that invasive species are distantly related to native species in comparison to their non-invasives counterparts, which tend to show closer phylogenetic affinities with the native flora. This pattern is consistent with Darwin’s naturalization hypothesis (Daehler, 2001), which has been a topic of debate in the recent literature (e.g. see Strauss et al., 2006; Diez et al., 2009; Schaefer et al., 2011; Bezeng et al., 2013; Lim et al., 2014). Non-natives that are more closely related to the native species pool may be more likely to possess traits suited to the new environment in which they find themselves, and thus have greater chance of establishment. However, successful invaders are less closely related to the native tree community, indicating evidence for competitive release or support for the vacant niche theory.

Second, I modeled the current and future potential distributions of non-native tree species in South Africa using species distribution models (SDMs) to evaluate how these species are likely to respond to changes in climatic conditions in the future. I identified potential hotspots for invasions under climate change, and also areas where the threat from currently invading species may recede in the future. Additionally, I tested how patterns of invasion change over time by comparing recent versus historical introduction events in order to assess whether violation of assumptions that species are in equilibrium with environment influence my conclusions. I found that under current climate, potential hotspots for non-native trees and shrubs are centred in the western Cape, eastern Cape, Kwazulu-Natal, Mpumalanga, Limpopo, Gauteng and part of the North West provinces. However, results from future projections across all scenarios suggest that up to two-thirds of the non-native trees and shrubs in South Africa may experience a decrease in their climatically suitable habitat. By mapping the difference in predicted species distributions between present and future climate scenarios, I identified a number of regions where the threat of invasion from current non-native species might recede. These regions include the provinces of western Cape, eastern Cape, Gauteng, Kwazulu-Natal, Mpumalanga and Limpopo. However, although a majority of non-natives were predicted to experience a contraction in areas of climatically suitable habitat, a few species were still predicted to demonstrate a range expansion. As such, spread of these species is predicted into suitable areas despite what may be the general range contraction in non-native species geographic extent. Testing how patterns of species invasion change over time, I found no evidence that geographical ranges of pre- 1900 introduction were expanding while those of post- 1900 introduction were receding or vice versa. Notwithstanding, I observed a stronger signal of geographic range contraction for the Free State province in the post- 1900 introduction event.

4.4.1 Resolving Darwin's Naturalization Conundrum

The use of molecular phylogenetic information is rapidly gaining grounds in the field of invasion biology. This information has been used to help understand why some alien species fail to invade whereas others are successful invaders in their introduced ranges (Strauss et al., 2006). Darwin in analysing how species struggle for co-existence, hypothesized that "introduced species are more likely to become naturalized and successful invaders in recipient environments where (phylogenetically) close relatives are absent". This hypothesis is often referred to as Darwin's Naturalization Hypothesis (Rejmánek, 1999). However, Darwin also recognized that species introduced into new environments might have a better chance to establish or become invasive since they share similar traits that pre-adapts them to local environmental conditions with allied native species. These two apparently contradicting explanations for species invasion success are not, however, mutually exclusive. A newly introduced species with no close relatives may suffer from both a loss of benefits from mutualisms (negative impact) and a concurrent advantage from the reduction in pests and diseases (positive impact).

Although, recent studies evaluating DNH have provided valuable insights (Diez et al., 2009; Schaefer et al., 2011; Lim et al., 2014; Bezeng et al., 2015), it is difficult to draw broad generalizations because results are often conflicting, and studies differ in spatial scales and invasion stages. We have yet to fully resolve Darwin's conundrum, and major challenges remain in terms of data acquisition and analysis. As such, as new data on non-native species accumulate and with increasingly accurate and objective classification of non-native species into either naturalized or invasive, our understanding of the mechanisms explaining invasion success will increase, and it may be possible to finally resolve the invasion conundrum. To do this, new research will require taking into consideration long term and small-scale studies (i.e. plot level studies where species interact closely and strongly). In addition, data will be needed on how both native and non-native species composition change over time; given that many species experience successional changes due to extrinsic factors (e.g. climate change), irrespective of native status. Last but not least, there is a need to evaluate how patterns are comparable across the invasion continuum (i.e. from introduction through establishment/naturalization and on to invasion/spread).

4.5 Implications for non-native species management in this region

Efforts to prevent or control further spread of currently invading non-native species will rely on a better understanding of the factors that predispose non-native species to become invasive in new environments. Although I found no significant relationship between biological traits and invasion success, I show that non-native species are characterized by some traits that may be important for establishment. For example, non-native species were shown to be more often abiotically dispersed, flower for extended periods, and possess a hermaphroditic sexual system compared to native species. Non-native species with such traits might have an advantage since their natural biotic dispersal and pollinator agents are generally lacking (Baker, 1955; Rambuda

& Johnson, 2004), although some research suggests that in time invasive species might also be able to co-opt native pollinators (Pyšek et al., 2011).

Importantly, I show that within South Africa, changing climatic conditions may reduce the spread of a majority currently invading non-native tree species. But despite this general pattern of decrease in non-native species ranges, some species are still predicted to expand their geographic distributions into suitable climatic niche spaces (i.e. invasion hotspots). These regions should therefore be the main focus of intensive invasive species management where management efforts should be concentrated in order to maximize the limited resources available for their control and eradication. Effective invasive management also presents restoration potential for native species that once occupied these invaded habitats. However, it is important to note that newly introduced species that have not yet had sufficient time to establish self-sustaining populations in new ranges might pose novel threats in the future.

4.6 Future research and challenges

Species invasion is a dynamic process, and with a rise in globalization, non-native species will continue to be introduced into new environments at ever increasing frequency. Coupled with changing climatic conditions, future patterns of species invasion are complex to predict. Studies on how climate change is likely to interact with biological traits to effect invasion dynamics are still lacking, especially in tropical systems. As new climate data accumulate, it will be possible to compare tropical versus temperate systems, and search for general patterns. Recent work has also suggested that attributes of the native range, such as geographical extent, might also be important predictors of invasion success (Hui et al., 2014; Pyšek et al., 2014). For example, larger native range size is a good indicator of propagule pressure, wider environmental tolerances (Rejmánek, 1996; Richardson & Pyšek, 2006; 2012; Hui et al., 2014). Such predictions remain to be tested using a broader plant taxonomic sampling (but see Hui et al., 2014).

Correlates of species invasion have tended to focus on the latter stages (i.e. the invasion stage, where introduced species have naturalized and are able to spread and reproduce unaided), but have not explored so intensively patterns of introduction and establishment. The ecological and evolutionary processes important to these earlier stages may be key to understanding the progression of species invasion along the whole continuum (Richardson & Pyšek, 2012). Future research should explore how ecological and evolutionary differences amongst species along this continuum could help explain final invasion success. In addition, analyses of key traits should also consider the potential for interactions among them. Plant (and animal) traits are not independent from each other but exhibit co-evolutionary dynamics, and in some case may demonstrate trade-offs due to extrinsic and evolutionary constraints (Westoby & Wright, 2006; Küster et al., 2008). A better understanding of these interactions might help identify not only key traits, but also key trait combinations important in explaining invasion success, which, like most ecological processes, is context dependent.

In modeling species potential future distribution, a range of emission scenarios, future dates, general circulation models and SDM algorithms should be explored, since results may vary (Hayhoe et al., 2004; Wiens et al., 2009). Critically, new modeling techniques that can account for species' bitotic and abiotic interactions will help move us towards better predictive models of non-native species spread since such factors are important in defining a species' realized niche.

To conclude, invasive species will continue to be major drivers of global change due to increased globalization and the increasing need for the services they provide from a growing human population. Understanding why and under which sets of conditions introduced species become invasive would provide a basis for proactive invasion management. Such information will allow managers to target potentially invasive species before they become ecologically harmful and will thus help in reducing their economic burdens.

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APPENDIX

Appendix 2.1: A checklist of native and non-native woody tree species recorded in this study area with voucher information and GenBank accession numbers.

Taxon Author	Family APG	Voucher (Herbarium)	Genbank ***rbcLa***	Genbank ***matK***
Abutilon angulatum (Guill. & Perr.) Mast.	Malvaceae	*OM1934* (JRAU)	JX572177	JX517944
Abutilon sonneratianum (Cav.) Sweet	Malvaceae	*LTM034* (JRAU)	JX572178	JX518201
Acacia adenocalyx Brenan & Exell	Fabaceae	*OM2439* (JRAU)	JX572179	JX518166
Acacia amythethophylla A.Rich.	Fabaceae	*RL1314* (JRAU)	JX572180	JX518139
Acacia arenaria Schinz	Fabaceae	*OM1048* (JRAU)	JX572181	JX517408
Acacia ataxacantha DC.	Fabaceae	*RL1326* (JRAU)	JX572182	JX517415
Acacia baileyana F.Muell.	Fabaceae	*MvdB0057* (JRAU)	JX572184	JX517809
Acacia borleae Burtt Davy	Fabaceae	*OM1902* (JRAU)	JX572185	JX518132
Acacia brevispica Harms	Fabaceae	*RL1333* (JRAU)	JF265244	JF270602
Acacia burkei Benth.	Fabaceae	*RL1479* (JRAU)	JX572186	JX517664
Acacia caffra (Thunb.) Willd.	Fabaceae	*RL1335* (JRAU)	JX572187	JX518058
Acacia chariessa Milne-Redh.	Fabaceae	*MvdB2158* (JRAU)	JX572188	JX518001

Acacia cyclops G.Don	Fabaceae	*BS0068* (JRAU)	JQ412305	JQ412187
Acacia davyi N.E.Br.	Fabaceae	*RL1315* (JRAU)	JF265247	-
Acacia dealbata Link	Fabaceae	*KMS-0227* (JRAU)	KM392262	-
Acacia decurrens Willd.	Fabaceae	*PPRI-0226* (JRAU)	KM392263	KM392249
Acacia dyeri P.P.Sw. ex Coates Palgr	Fabaceae	*RL1309* (JRAU)	JX572189	JX517665
Acacia elata Benth.	Fabaceae	*OM1900* (JRAU)	JX572190	JX517661
Acacia eriocarpa Brenan	Fabaceae	*MvdB2157* (JRAU)	JX572191	JX518050
Acacia erioloba E.Mey.	Fabaceae	*RL1298* (JRAU)	JX572192	JX517384
Acacia erubescens Oliv.	Fabaceae	*OM0780* (JRAU)	JF265248	JF270605
Acacia exuvialis Verd.	Fabaceae	*OM0260* (JRAU)	JF265249	JF270606
Acacia farnesiana (L.) Willd.	Fabaceae	*Entwisle2708* (MEL)	-	AF523115
Acacia fleckii Schinz	Fabaceae	*RL1328* (JRAU)	JX572193	JX517897
Acacia galpinii Burtt Davy	Fabaceae	*RL1304* (JRAU)	JX572194	JX518092
Acacia gerrardii Benth.	Fabaceae	*OM0315* (JRAU)	JX572195	JX517886
Acacia goetzei subsp. *goetzei* Harms	Fabaceae	*RL1320* (JRAU)	JX572196	JX517303
Acacia goetzei subsp. *microphylla* Brenan	Fabaceae	*RL1322* (JRAU)	-	JQ230131
Acacia grandicornuta Gerstner	Fabaceae	*RL1286* (JRAU)	JX572197	JX517869

Acacia haematoxylon Willd.	Fabaceae	*OM1069* (JRAU)	JX572198	JX517376
Acacia hebeclada subsp. *chobiensis* Schreib.	Fabaceae	*OM1034* (JRAU)	JX572199	JX517672
Acacia hebeclada subsp. *hebeclada* DC.	Fabaceae	*RL1317* (JRAU)	JX572200	JX517617
Acacia hebeclada subsp. *tristis* A.Schreib.	Fabaceae	*OM1049* (JRAU)	JX572201	JX517346
Acacia hereroensis Engl.	Fabaceae	*RL1332* (JRAU)	JX572202	JX517996
Acacia karroo Hayne	Fabaceae	*OM3013* (JRAU)	JX572203	JX517490
Acacia kirkii Oliv.	Fabaceae	*RL1307* (JRAU)	JX572204	JX517387
Acacia kosiensis P.P.Sw.	Fabaceae	*RL1305* (JRAU)	JX572205	JX518109
Acacia kraussiana Benth.	Fabaceae	*RL1287* (JRAU)	JX572206	JX517710
Acacia longifolia (Andrews) Willd.	Fabaceae	*Genbank*	HM849735.1	HM850600.1
Acacia luederitzii Engl.	Fabaceae	*RL1500* (JRAU)	JX572207	JX518240
Acacia luederitzii var. *retinens* (Sim) J. Ross & Brenan	Fabaceae	*RL1285* (JRAU)	JX572208	JX517653
Acacia mearnsii De Wild.	Fabaceae	*RMK0006* (JRAU)	JX572209	JX517946
Acacia melanoxylon R.Br.	Fabaceae	*OM1985* (JRAU)	JX572210	JX517503
Acacia mellifera (M.Vahl) Benth.	Fabaceae	*OM1060* (JRAU)	JX572212	JX518210
Acacia mellifera subsp. *detinens* (Burch.) Brenan	Fabaceae	*RL1329* (JRAU)	JX572211	JX517310
Acacia montis-usti Merxm. & A.Schreib.	Fabaceae	*OM1065* (JRAU)	JX572213	JX517640

Acacia natalitia E.Mey.	Fabaceae	*RL1330* (JRAU)	JX572214	JX517566
Acacia nebrownii Burtt Davy	Fabaceae	*OM1050* (JRAU)	JX572215	JX517304
Acacia nigrescens Oliv.	Fabaceae	*RBN314* (KNP)	JX572216	JX518103
Acacia nilotica (L.) Delile	Fabaceae	*RL1302* (JRAU)	JX572217	JX517797
Acacia ormocarpoides P.J.H.Hurter	Fabaceae	*RL1293* (JRAU)	JX572218	JX517884
Acacia permixta Burtt Davy	Fabaceae	*Johan2* (JRAU)	-	GQ872240
Acacia podalyriifolia G.Don	Fabaceae	*OM1898* (JRAU)	JX572219	JX970902
Acacia polyacantha subsp. *campylacantha* (A.Rich.) Brenan	Fabaceae	*RL1323* (JRAU)	-	GQ872241
Acacia reficiens Wawra	Fabaceae	*Acaref* (JRAU)	JX572220	JX518096
Acacia rehmanniana Schinz	Fabaceae	*RL1288* (JRAU)	JX572221	JX517925
Acacia robbertsei P.P.Sw	Fabaceae	*RL1289* (JRAU)	-	GQ872244.1
Acacia robusta Burch.	Fabaceae	*RL1310* (JRAU)	JX572223	JX517736
Acacia robusta subsp. clavigera (E.Mey.) Brenan	Fabaceae	*RBN354* (KNP)	JF265249	JF270606
Acacia robusta subsp. *usambarensis* (Taub.) Brenan	Fabaceae	*OM2458* (JRAU)	JX572222	JX517547
Acacia robynsiana Merxm. & A.Schreib.	Fabaceae	*OM1066* (JRAU)	JX572224	JX517895

Acacia saligna (Labill.) Wendl.	Fabaceae	*Gómez-Acevedo s.n* (MEXU, USCG)	-	HM020727.1
Acacia schweinfurthii Brenan & Exell	Fabaceae	*OM1539* (JRAU)	JX572225	JX517495
Acacia sekhukhuniensis P.J.H.Hurter	Fabaceae	*RL1296* (JRAU)	JX572226	JX518234
Acacia senegal (L.) Willd.	Fabaceae	*OM0255* (JRAU)	JF265258	JF270615
Acacia senegal var. *leiorhachis* Brenan	Fabaceae	*OM0866* (JRAU)	JX572227	JX517568
Acacia sieberiana DC.	Fabaceae	*OM1029* (JRAU)	JX572228	JX517353
Acacia sieberiana var. *woodii* (Burtt Davy) Keay & Brenan	Fabaceae	*OM0966* (JRAU)	JF265259	JF270616
Acacia stuhlmannii Taub.	Fabaceae	*RL1294* (JRAU)	JX572230	JX517951
Acacia swazica Burtt Davy	Fabaceae	*RL1327* (JRAU)	JF265260	JF270617
Acacia theronii P.P.Sw.	Fabaceae	*RL1313* (JRAU)	JX572231	JX517894
Acacia torrei Brenan	Fabaceae	*OM2429* (JRAU)	JX572232	JX518215
Acacia tortilis subsp. *heteracantha* (Burch.) Brenan	Fabaceae	*RL1337* (JRAU)	JX572233	JX517619
Acacia welwitschii subsp. *delagoensis* (Harms) J.H.Ross & Brenan	Fabaceae	*OM2548* (JRAU)	JX572234	JX518159
Acacia xanthophloea Benth.	Fabaceae	*OM2579* (JRAU)	JX572235	JX517302
Acalypha chirindica S.Moore	Euphorbiaceae	*OM2341* (JRAU)	JX572236	JX518178

Acalypha glabrata f. *pilosior* (Kuntze) Prain & Hutch.	Euphorbiaceae	*OM1979* (JRAU)	JX572238	JX518120
Acalypha glabrata Thunb.	Euphorbiaceae	*OM0441* (JRAU)	JX572237	JX517655
Acer buergerianum Miq.	Sapindaceae	*BS 0566* (JRAU)	KM392252	KM392235
Acer negundo L.	Sapindaceae	*Genbank*	HQ593879.1	HQ593152.1
Acokanthera oblongifolia (Hochst.) Benth. & Hook.f. ex B.D.Jacks.	Apocynaceae	*OM2240* (JRAU)	JX572239	JX517911
Acokanthera oppositifolia (Lam.) Codd	Apocynaceae	*OM3240* (JRAU)	JX572240	JX517680
Acokanthera rotundata (Codd) Kupicha	Apocynaceae	*OM2009* (JRAU)	JF265266	JF270623
Acridocarpus natalitius A.Juss.	Malpighiaceae	*OM2034* (JRAU)	JF265267	JF270624
Adansonia digitata L.	Malvaceae	*OM1306* (JRAU)	JQ025018	JQ024933
Adenia fruticosa Burtt Davy	Passifloraceae	*OM1950* (JRAU)	JX572241	JX905957
Adenia gummifera (Harv.) Harms	Passifloraceae	*OM2473* (JRAU)	JX572242	JX517347
Adenia spinosa Burtt Davy	Passifloraceae	*OM1618* (JRAU)	JF265269	JX905950
Adenium multiflorum Klotzsch	Apocynaceae	*OM1161* (JRAU)	JX572243	JX517509
Adenium swazicum Stapf	Apocynaceae	*OM1172* (JRAU)	JX572244	JX517457
Adenopodia spicata (E.Mey.) C.Presl	Fabaceae	*MWC28710* (K)	JX572245	JX517808
Afrocanthium lactescens (Hiern) Lantz	Rubiaceae	*Luke&Luke9045* (UPS)	-	HM119502.1

Afrocanthium mundianum (Cham. & Schltdl.) Lantz	Rubiaceae	*Abbott9224* (BNRH)	JX572367	JX517319
Afrocanthium racemulosum (S.Moore) Lantz	Rubiaceae	*OM2592* (JRAU)	JX572246	JX517417
Afrocarpus falcatus (Thunb.) C.N.Page	Podocarpaceae	*Adelaide BG G870288*	AF249589.1	AF457111.1
Afzelia quanzensis Welw.	Fabaceae	*OM2113* (JRAU)	JX572247	JX518045
Agave americana L.	Asparagaceae	*JG048* (JRAU)	JX572248	JX517987
Agave sisalana Perrine	Asparagaceae	*RMK0026* (JRAU)	JX572249	JX517955
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	*JG032* (JRAU)	JX572250	JX517969
Alangium chinense (Lour.) Harms	Cornaceae	*US Natl. Arb. 49003/ Arnold Arb. #15866*	L11209.2	JF308671.1
Alberta magna E.Mey.	Rubiaceae	*Abbott9117* (BNRH)	JX572251	JX517760
Albizia adianthifolia (Schum.) W.Wight	Fabaceae	*OM2610* (JRAU)	JX572252	JX518130
Albizia amara subsp. *sericocephala* (Benth.) Brenan	Fabaceae	*OM2136* (JRAU)	JX572253	JX517531
Albizia anthelmintica Brongn.	Fabaceae	*OM2576* (JRAU)	JX572254	JX517977
Albizia brevifolia Schinz	Fabaceae	*OM0826* (JRAU)	JF265276	JF270632
Albizia forbesii Benth.	Fabaceae	*OM0331* (JRAU)	JX572255	JX517431
Albizia glaberrima (Schum. & Thonn.) Benth.	Fabaceae	*OM2605* (JRAU)	JX572256	JX518104
Albizia harveyi E.Fourn.	Fabaceae	*OM0773* (JRAU)	JX572257	JX518176
Albizia julibrissin Durazz.	Fabaceae	*Genbank*	GU135262.1	GU135096.1

Albizia lebbeck (L.) Benth.	Fabaceae	*Genbank*	GU135158.1	GU134994.1
Albizia procera (Roxb.) Benth.	Fabaceae	*Genbank*	JF739049.1	-
Albizia petersiana subsp. *evansii* (Burtt Davy) Brenan	Fabaceae	*OM1378* (JRAU)	JX572258	JX517499
Albizia suluensis Gerstner	Fabaceae	*OM2227* (JRAU)	JX572259	JX517858
Albizia tanganyicensis Baker f.	Fabaceae	*OM1972* (JRAU)	JF265280	JF270636
Albizia versicolor Oliv.	Fabaceae	*OM2535* (JRAU)	JX572260	JX518194
Albizia zimmermannii Harms	Fabaceae	*OM2363* (JRAU)	JX572261	JX517424
Alchornea hirtella f. *glabrata* (Müll.Arg.) Pax & K.Hoffm.	Euphorbiaceae	*MWC36209* (K)	JX572262	JX518052
Alchornea laxiflora (Benth.) Pax & K.Hoffm.	Euphorbiaceae	*OM2330* (JRAU)	JX572263	JX517659
Alhagi maurorum Medik.	Fabaceae	AAD 1366	-	JF501101
Allocassine laurifolia (Harv.) N.Robson	Celastraceae	*Abbott9147* (BNRH)	JX572264	JX517481
Allophylus africanus P.Beauv.	Sapindaceae	*Abbott9141* (BNRH)	JX572265	JX518006
Allophylus decipiens (E.Mey.) Radlk.	Sapindaceae	*OM1846* (JRAU)	JF265283	JF270639
Allophylus dregeanus (Sond.) De Winter	Sapindaceae	*Abbott9136* (BNRH)	JX572266	JX518230
Allophylus natalensis (Sond.) De Winter	Sapindaceae	*OM2224* (JRAU)	-	JX905946

Allophylus rubifolius (Hochst. ex A.Rich.) Engl.	Sapindaceae	*OM2348* (JRAU)	JX572267	JX517604
Aloe africana Mill.	Xanthorrhoeaceae	*OM3190* (JRAU)	JX572268	JX518056
Aloe angelica Pole-Evans	Xanthorrhoeaceae	*OM2960* (JRAU)	-	JQ024109
Aloe arborescens Mill.	Xanthorrhoeaceae	*Abbott9167* (BNRH)	JX572272	JX518144
Aloe barberae Dyer	Xanthorrhoeaceae	*Abbott9219* (BNRH)	JX572274	JX518237
Aloe castanea Schönland	Xanthorrhoeaceae	*OM2961* (JRAU)	-	JQ024120
Aloe comosa Marloth & A.Berger	Xanthorrhoeaceae	*BHD385* (JRAU)	JQ024499	JQ024124
Aloe dichotoma Masson	Xanthorrhoeaceae	*OM2953* (JRAU)	JQ024501	JQ024126
Aloe dichotoma subsp. *pillansii* (L.Guthrie) Zonn.	Xanthorrhoeaceae	*BHD390* (JRAU)	JQ024502	JQ024127
Aloe dichotoma subsp. *ramosissima* (Pillans) Zonn.	Xanthorrhoeaceae	*OM2954* (JRAU)	JQ024503	JQ024128
Aloe excelsa A.Berger	Xanthorrhoeaceae	*OM1621* (JRAU)	JF265284	JF270640
Aloe ferox Mill.	Xanthorrhoeaceae	*Abbott9235* (BNRH)	JX572282	JX518209
Aloe hexapetala Salm-Dyck.	Xanthorrhoeaceae	*BHD394* (JRAU)	JQ024515	JQ024141
Aloe marlothii A.Berger	Xanthorrhoeaceae	*OM1490* (JRAU)	JF265285	JF270641
Aloe plicatilis (L.) Mill.	Xanthorrhoeaceae	*BHD193* (JRAU)	JQ024531	JQ024159
Aloe pluridens Haw.	Xanthorrhoeaceae	*Abbott9217* (BNRH)	JX572293	JX518078
Aloe spicata L.f.	Xanthorrhoeaceae	*OM1522* (JRAU)	JF265286	JF270642
Aloe thraskii Baker	Xanthorrhoeaceae	*BHD411* (JRAU)	JQ024542	JQ024170

Alnus glutinosa (L.) Gaertn.	Betulaceae	*Genbank*	JN893291.1	JN895386.1
Amblygonocarpus andongensis (Oliv.) Exell & Torre	Fabaceae	*OM2609* (JRAU)	JX572301	JX517615
Anacardium occidentale L.	Anacardiaceae	*Mori24142* (NYBG)	-	AY594459.1
Ancylobothrys capensis (Oliv.) Pichon	Apocynaceae	*OM1615* (JRAU)	JX572303	JX517602
Androstachys johnsonii Prain	Euphorbiaceae	*OM3354* (JRAU)	-	JX517380
Anginon difforme (L.) B.L.Burtt	Apiaceae	*OM2292* (JRAU)	JX572304	JX518113
Anisotes formosissimus (Klotzsch) Milne-Redh.	Acanthaceae	*OM0868* (JRAU)	JF265288	JF270643
Annona senegalensis Pers.	Annonaceae	*OM2732* (JRAU)	JX572305	JX517836
Anthocleista grandiflora Gilg	Gentianaceae	*OM2671* (JRAU)	JX572306	JX518238
Antidesma venosum E.Mey. ex Tul.	Euphorbiaceae	*223021* (IBSC)	-	HQ415372.1
Aphloia theiformis (Vahl) Benn.	Aphloiaceae	*OM3397* (JRAU)	JX572308	JX518161
Apodytes dimidiata E.Mey. ex Arn.	Icacinaceae	*OM2485* (JRAU)	JX572309	JX517375
Ardisia crenata Sims	Primulaceae	*Davis0570* (FLAS)	GU135270.1	GU134982.1
Ardisia elliptica Thunb.	Primulaceae	*Genbank*	GU135176.1	GU135013.1
Argomuellera macrophylla Pax	Euphorbiaceae	*Gereau6285* (MO)	AB267915.1	AB268019.1
Artabotrys brachypetalus Benth.	Annonaceae	*OM2697* (JRAU)	JX572311	JX517688
Aspalathus linearis (Burm.f.) R.Dahlgren	Fabaceae	*AMM4783* (BOL)	JX572312	JX517437

Aspalathus pendula R.Dahlgren	Fabaceae	*AMM4066* (BOL)	JX572313	JX518088
Atalaya alata (Sim) H.M.L.Forbes	Sapindaceae	*Chase1126* (K)	AY724345.1	AY724274.1
Atalaya natalensis R.A.Dyer	Sapindaceae	*Abbott9212* (BNRH)	JX572315	JX517838
Atriplex nummularia Lindl.	Amaranthaceae	*PPRI-0097* (JRAU)	KM392275	-
Avicennia marina (Forssk.) Vierh.	Acanthaceae	*OM2475* (JRAU)	JX572318	JX518100
Azanza garckeana (F.Hoffm.) Exell & Hillc.	Malvaceae	*OM2525* (JRAU)	JX572319	JX517364
Azima tetracantha Lam.	Salvadoraceae	*OM1315* (JRAU)	JX572320	JX517351
Bachmannia woodii (Oliv.) Gilg	Capparaceae	*MWC35838* (K)	JX572321	JX518041
Baikiaea plurijuga Harms	Fabaceae	*M660* (JRAU)	JX572322	JX517704
Balanites aegyptiaca (L.) Delile	Zygophyllaceae	*OM3548* (JRAU)	JX572323	JX517722
Balanites maughamii Sprague	Zygophyllaceae	*OM0994* (JRAU)	JX572324	JX517309
Balanites pedicellaris Mildbr. & Schltr.	Zygophyllaceae	*OM0901* (JRAU)	JF265297	JF270651
Baphia massaiensis subsp. *obovata* (Schinz) Brummitt	Fabaceae	*RBN130* (KNP)	JF265298	JF270652
Banksia ericifolia L.f.	Proteaceae	*Genbank*	DQ875843.1	-
Banksia integrifolia L.f.	Proteaceae	*Genbank*	HM849807.1	HM850598.1
Baphia racemosa (Hochst.) Baker	Fabaceae	*OM2221* (JRAU)	-	JX517582
Barleria albostellata C.B.Clarke	Acanthaceae	*OM0899* (JRAU)	JF265299	JF270653

Barleria rotundifolia Oberm.	Acanthaceae	*OM1327* (JRAU)	JF265300	JF270654
Barringtonia racemosa (L.) Spreng.	Lecythidaceae	*OM1830* (JRAU)	JX572325	JX517528
Bauhinia forficata Link	Fabaceae	*V-0009* (JRAU)	KM392259	KM392245
Bauhinia galpinii N.E.Br.	Fabaceae	*Forest347* (NBG)	EU361875.1	AM234262.1
Bauhinia natalensis Hook.	Fabaceae	*CS07* (JRAU)	JX572326	JX518033
Bauhinia petersiana Bolle	Fabaceae	*OM2243* (JRAU)	JX572327	JX517937
Bauhinia purpurea L.	Fabaceae	*BS 0571* (JRAU)	KM392254	KM392239
Bauhinia tomentosa L.	Fabaceae	*OM2391* (JRAU)	JX572328	JX517621
Bauhinia variegata L.	Fabaceae	*Abbott24907* (FLAS)	GU135196.1	GU135033.1
Berberis thunbergii DC.	Berberidaceaea	*Genbank*	HE963352.1	HE967355.1
Berchemia discolor (Klotzsch) Hemsl.	Rhamnaceae	*OM2437* (JRAU)	JX572329	JX517834
Berchemia zeyheri (Sond.) Grubov	Rhamnaceae	*OM1165* (JRAU)	JX572330	JX517781
Bersama lucens (Hochst.) Szyszyl.	Melianthaceae	*OM1562* (JRAU)	JF265304	JF270657
Bersama tysoniana Oliv.	Melianthaceae	*OM1891* (JRAU)	JX572331	JX517517
Berzelia lanuginosa (L.) Brongn.	Bruniaceae	*OM3091* (JRAU)	JX572332	JX517959
Bivinia jalbertii Tul.	Salicaceae	*OM2418* (JRAU)	JX572333	JX517831
Blighia unijugata Baker	Sapindaceae	*OM1856* (JRAU)	JX572334	JX517638

Bobgunnia madagascariensis (Desv.) J.H.Kirkbr. & Wiersema	Fabaceae	*OM3566* (JRAU)	JX572335	JX518002
Bolusanthus speciosus (Bolus) Harms	Fabaceae	*OM0240* (JRAU)	JF265305	JF270658
Boscia albitrunca (Burch.) Gilg & Benedict	Capparaceae	*OM1274* (JRAU)	JX572338	JX518051
Boscia angustifolia var. *corymbosa* (Gilg) DeWolf	Capparaceae	*OM2069* (JRAU)	-	JX517529
Boscia foetida Schinz	Capparaceae	*OM0296* (JRAU)	JF265309	JF270662
Boscia foetida subsp. *filipes* (Gilg) Lötter	Capparaceae	*OM1916* (JRAU)	JX572339	JX518084
Boscia mossambicensis Klotzsch	Capparaceae	*OM0250* (JRAU)	JX572340	JX517670
Boscia salicifolia Oliv.	Capparaceae	*OM2543* (JRAU)	JX572341	JX518071
Bowkeria cymosa MacOwan	Scrophulariaceae	*OM2026* (JRAU)	JX572342	JX517768
Bowkeria verticillata (Eckl. & Zeyh.) Druce	Scrophulariaceae	*OM&MvdB72* (JRAU)	JX572343	JX517524
Brabejum stellatifolium L.	Proteaceae	*OM2257* (JRAU)	JX572344	JX517823
Brachychiton populneus (Schott & Endl.) R.Br.	Malvaceae	*Genbank*	-	AY082351.1
Brachylaena discolor DC.	Asteraceae	*BS0103* (JRAU)	JQ412332	JQ412216
Brachylaena discolor var. *transvaalensis* (E.Phillips & Schweick.) Beentje.	Asteraceae	*OM0571* (JRAU)	JF265312	JF270665
Brachylaena elliptica (Thunb.) Less.	Asteraceae	*Koekemoer&Funk1971* (PRE)	EU384952.1	EU385330.1

Brachylaena huillensis O.Hoffm.	Asteraceae	*OM0247* (JRAU)	JF265311	JF270664
Brachylaena neriifolia (L.) R.Br.	Asteraceae	*OM3093* (JRAU)	JX572345	JX517590
Brachylaena rotundata S.Moore	Asteraceae	*OM1938* (JRAU)	JX572346	JX518142
Brachystegia boehmii Taub.	Fabaceae	*OM3534* (JRAU)	JX572347	JX518131
Brachystegia bussei Harms	Fabaceae	*Herendeen 20-XII-97-2* (US)	-	EU361887.1
Breonadia salicina (Vahl) Hepper & J.R.I.Wood	Rubiaceae	*OM2571* (JRAU)	JX572348	JX518162
Brexia madagascariensis (Lam.) Thouars ex Ker Gawl.	Celastraceae	*OM2676* (JRAU)	JX572349	JX517980
Bridelia atroviridis Müll.Arg.	Euphorbiaceae	*Mwangoka1371* (M)	-	FJ439961.1
Bridelia cathartica Bertol.	Euphorbiaceae	*OM0455* (JRAU)	JX572350	JX517968
Bridelia micrantha (Hochst.) Baill.	Euphorbiaceae	*OM1435* (JRAU)	JF265315	JF270668
Bridelia mollis Hutch.	Euphorbiaceae	*OM1958* (JRAU)	JX572351	JX518053
Bridelia tenuifolia Müll.Arg.	Euphorbiaceae	*Leyens&Lobin206* (M)	-	FJ439963.1
Bruguiera gymnorhiza (L.) Lam.	Rhizophoraceae	*OM2487* (JRAU)	JX905966	AF105088
Brunia albifora Phillips	Bruniaceae	*OM3116* (JRAU)	JX572352	JX517948
Buddleja dysophylla (Benth.) Radlk.	Scrophulariaceae	*OM2296* (JRAU)	JX572353	JX518066

Buddleja davidii Franch.	Scrophulariaceae	*C-L_R-0106* (JRAU)	HE963361.1	HE967360.1
Buddleja madagascariensis Lam.	Scrophulariaceae	*Genbank*	KM392258	KM392244
Buddleja saligna Willd.	Scrophulariaceae	*OM1783* (JRAU)	JX572354	JX518195
Buddleja salviifolia (L.) Lam.	Scrophulariaceae	*OM1780* (JRAU)	JX572355	JX517705
Burchellia bubalina (L.f.) Sims	Rubiaceae	*OM3160* (JRAU)	JX572356	JX517467
Burkea africana Hook.	Fabaceae	*OM2128* (JRAU)	JX572357	JX517992
Burttdavya nyasica Hoyle	Rubiaceae	*OM1666* (JRAU)	JX572358	JX517314
Buxus macowanii Oliv.	Buxaceae	*OM1762* (JRAU)	JX572359	JX517876
Buxus natalensis (Oliv.) Hutch.	Buxaceae	*OM1768* (JRAU)	JX572360	JX517505
Cadaba aphylla (Thunb.) Wild	Capparaceae	*OM3203* (JRAU)	JX572361	JX517921
Cadaba kirkii Oliv.	Capparaceae	*OM3579* (JRAU)	JX572362	JX517687
Cadaba termitaria N.E.Br.	Capparaceae	*OM1930* (JRAU)	JF265318	JF270671
Caesalpinia bonduc (L.) Roxb.	Fabaceae	*OM3615* (JRAU)	-	JX517899
Caesalpinia decapetala (Roth) Alston	Fabaceae	*PS1589MT01* (IMPLAD)	-	HM049555.1
Caesalpinia gilliesii (Hook.) D.Dietr.	Fabaceae	AM086829	-	AM086829
Callistemon citrinus (Curtis) Skeels	Mrytaceae	*Genbank*	AM235652.1	-
Callistemon viminalis (Sol. ex Gaertn.) G.Don ex Loudon	Myrtaceae	*BS0179* (JRAU)	JX905973	JX970912

Callitris endlicheri (Parl.) F.M.Bailey	Cupressaceae	*Miller4* (BH)	AY988231.1	AY988331.1
Calodendrum capense (L.f.) Thunb.	Rutaceae		JF265319	JF270672
Calotropis procera (Aiton) Dryand.	Apocynaceae	Genbank	JN114791.1	JN114742.1
Calpurnia aurea (Aiton) Benth.	Fabaceae	*OM1532* (JRAU)	JF265320	JF270673
Calpurnia sericea Harv.	Fabaceae	*Abbott9196* (BNRH)	JX572364	JX518205
Camellia sinensis (L.) Kuntze	Theaceae	Pr*ince s.n.* (UNC) / *Erixon&Bremer40* (UPS)	AF380037.1	AJ429305.1
Canthium armatum (K.Schum.) Lantz	Rubiaceae	*OM1548* (JRAU)	JX572859	JX517643
Canthium ciliatum (D.Dietr.) Kuntze	Rubiaceae	*OM1741* (JRAU)	JX572365	JX518137
Canthium inerme (L.f.) Kuntze	Rubiaceae	*OM1547* (JRAU)	JX572366	JX517491
Canthium setiflorum Hiern	Rubiaceae	*OM0574* (JRAU)	JX572368	JX518042
Canthium spinosum (Klotzsch ex Eckl. & Zeyh.) Kuntze	Rubiaceae	*Abbott9256* (BNRH)	JX572369	JX517559
Canthium suberosum Codd	Rubiaceae	*Abbott9239* (BNRH)	JX572370	JX517637
Canthium vanwykii Tilney & Kok	Rubiaceae	*Abbott9155* (BNRH)	JX572371	JX517690
Capparis erythrocarpos Isert	Capparaceae	*OM2332* (JRAU)	JX572372	JX517706
Capparis fascicularis DC.	Capparaceae	*OM1640* (JRAU)	JF265323	JF270676

Capparis sepiaria var. *subglabra* (Oliv.) DeWolf	Capparaceae	*OM2746* (JRAU)	JX572373	JX517328
Capparis tomentosa Lam.	Capparaceae	*OM1112* (JRAU)	JX572374	JX518213
Carissa bispinosa (L.) Desf. ex Brenan	Apocynaceae	*OM0409* (JRAU)	JX572375	JX518098
Carissa macrocarpa (Eckl.) A.DC.	Apocynaceae	*OM1751* (JRAU)	JX572377	JX517764
Carissa praetermissa Kupicha	Apocynaceae	*OM2650* (JRAU)	JX572378	JX518202
Carissa spinarum L.	Apocynaceae	*RL1148* (JRAU)	JX572376	JX517623
Carissa tetramera (Sacleux) Stapf	Apocynaceae	*RBN210* (KNP)	JX572379	JX517545
Carpolobia goetzei Gürke	Polygalaceae	*OM2459* (JRAU)	JX572380	JX517551
Casearia gladiiformis Mast.	Salicaceae	*OM2323* (JRAU)	JX572383	JX517926
Casearia sp. nov. Abbott	Salicaceae	*Abbott9191* (BNRH)	JX573112	JX905955
Cassia abbreviata Oliv.	Fabaceae	*OM2047* (JRAU)	JX572384	JX517898
Cassia abbreviata subsp. *beareana* (Holmes) Brenan	Fabaceae	*OM3388* (JRAU)	JX572385	JX518172
Cassia afrofistula Brenan	Fabaceae	*OM2629* (JRAU)	JX572386	JX518010
Cassine crocea (Thunb.) C.Presl.	Celastraceae	*Abbott9197* (BNRH)	JX572546	JX517420
Cassine matabelica (Loes.) Steedman	Celastraceae	*Archer s.n.* (PRE)	-	DQ217537.1
Cassine peragua L.	Celastraceae	*Abbott9178* (BNRH)	JX572546	JX517420
Cassine reticulata (Eckl. & Zeyh.) Codd	Celastraceae	*Proches s.n.* (PRE)	-	DQ217535.1

Cassine schinoides (Spreng.) R.H.Archer	Celastraceae	*Van Jaarsveld s.n.* (PRE)	-	DQ217536.1
Cassine transvaalensis (Burtt Davy) Codd.	Celastraceae	*OM1229* (JRAU)	JX572547	JX517826
Cassinopsis ilicifolia (Hochst.) Sleumer	Icacinaceae	*OM1892* (JRAU)	JF265330	JF270683
Cassinopsis tinifolia Harv.	Icacinaceae	*Abbott9166* (BNRH)	JX572388	JX517588
Cassipourea gummiflua Tul.	Rhizophoraceae	*OM1882* (JRAU)	JX572389	JX517458
Cassipourea malosana (Baker) Alston	Rhizophoraceae	*Abbott9115* (BNRH)	JX572390	JX517355
Casuarina cunninghamiana Miq.	Casuarinaceae	*JG061* (JRAU)	JX572391	JX517494
Casuarina equisetifolia L.	Casuarinaceae	*Abbott24914* (FLAS)	GU135200.1	GU135038.1
Catha edulis (Vahl) Endl.	Celastraceae	*OM2079* (JRAU)	JX572392	JX517954
Catunaregam obovata (Hochst.) A.E.Gon.	Rubiaceae	*OM3277* (JRAU)	JX572393	JX517479
Catunaregam swynnertonii (S.Moore) Bridson	Rubiaceae	*OM2353* (JRAU)	JX572394	JX517530
Cavacoa aurea (Cavaco) J.Léonard	Euphorbiaceae	*OM2035* (JRAU)	JX572395	JX518036
Ceiba pentandra (L.) Gaertn.	Malvaceae	*Alverson s.n.* (SP)	-	HQ696701.1
Celtis africana Burm.f.	Ulmaceae	*OM1225* (JRAU)	JF265333	JF270686
Celtis australis L.	Ulmaceae	*Genbank*	HE963395.1	-
Celtis gomphophylla Baker	Ulmaceae	*Abbott9159* (BNRH)	JX572396	JX517812
Celtis mildbraedii Engl.	Ulmaceae	*OM1567* (JRAU)	JX572397	JX517381

Celtis sinensis Pers.	Ulmaceae	*Song s.n.* (PE)	-	AF345316.1
Cephalanthus natalensis Oliv.	Rubiaceae	*OM1583* (JRAU)	JF265334	JF270687
Ceraria fruticulosa H.Pearson & Stephens	Portulacaceae	*EJE96* (YU)	AY875218.1	AY875371.1
Cereus jamacaru DC.	Cactaceae	*KMS-0229* (JRAU)	KM392271	-
Ceriops tagal (Perr.) C.B.Rob.	Rhizophoraceae	*SetoguchiS93028* (MAK) / *Chang9711902* (SYS)	AF006756.1	AF105089.1
Cestrum aurantiacum Lindl.	Solanaceae	*Genbank*	JX856311.1	-
Cestrum elegans (Brongn. ex Neumann) Schltdl.	Solanaceae	*Chase12217* (K)	-	AJ585891.1
Cestrum laevigatum Schltdl.	Solanaceae	*OM1773* (JRAU)	JX572398	JX517961
Cestrum parqui (Lam.) L'Hér.	Solanaceae	Ce001	-	EF439054
Chaetachme aristata Planch.	Ulmaceae	*OM1530* (JRAU)	JX572399	JX517429
Chazaliella abrupta (Hiern) E.M.A.Petit & Verdc.	Rubiaceae	*OM2440* (JRAU)	JX572400	JX518149
Chionanthus foveolatus (E.Mey.) Stearn	Oleaceae	*OM1832* (JRAU)	JF265336	JF270689
Chionanthus peglerae (C.H.Wright) Stearn	Oleaceae	*OM1766* (JRAU)	JF265337	JF270690
Chromolaena DC.	Asteraceae	*Panero8841* (TENN)	-	EU337052.1
Chrysanthemoides monilifera (L.) Norl.	Asteraceae	*Abbott9171* (BNRH)	JX572403	JX517413
Chrysophyllum viridifolium J.M.Wood & Franks	Sapotaceae	*OM2668* (JRAU)	JX572404	JX518108
Cinnamomum camphora (L.) J.Presl	Lauraceae	*904158* (IBSC)	HQ427259.1	HQ427401.1

Cissus cactiformis Gilg	Vitaceae	*OM1316* (JRAU)	JX572405	JX517930
Cissus cornifolia (Baker) Planch.	Vitaceae	*OM2542* (JRAU)	JX572406	JX517833
Cissus integrifolia (Baker) Planch.	Vitaceae	*OM2397* (JRAU)	JX572407	JX517840
Citrus limon (L.) Burm. f.	Rutaceae	*JG043* (JRAU)	JX572408	JX517803
Citrus sinensis (L.) Osbeck	Rutaceae	n.a.	-	AB071323.1
Cladostemon kirkii (Oliv.) Pax & Gilg	Capparaceae	*OM2389* (JRAU)	JX572409	JX517981
Clausena anisata (Willd.) Hook.f. ex Benth.	Rutaceae	*Abbott9249* (BNRH)	JX572410	JX517957
Cleistanthus polystachyus subsp. *milleri* (Dunkley) Radcl.-Sm.	Euphorbiaceae	*Festo457* (MO)	-	FJ439971.1
Cleistanthus schlechteri (Pax) Hutch.	Euphorbiaceae	*OM2539* (JRAU)	JX572411	JX970903
Cleistochlamys kirkii (Benth.) Oliv.	Annonaceae	*OM2339* (JRAU)	JX572412	JX517486
Clematis brachiata Thunb.	Ranunculaceae	*OM1974* (JRAU)	JF265340	JF270693
Clerodendrum eriophyllum Gürke	Lamiaceae	*OM2759* (JRAU)	JX572413	JX517512
Clerodendrum glabrum E.Mey.	Lamiaceae	*Abbott9161* (BNRH)	JX572414	JX517832
Clutia abyssinica Jaub. & Spach	Euphorbiaceae	*Abbott9231* (BNRH)	JX572415	JX518174
Clutia Boerh. sp. nov.	Euphorbiaceae	*Abbott9205* (BNRH)	JX572417	JX517450
Clutia pulchella L.	Euphorbiaceae	*Abbott9112* (BNRH)	JX572416	JX517825

Cnestis polyphylla Lam.	Connaraceae	*Abbott9113* (BNRH)	JX572418	JX517860
Cocculus DC.	Menispermaceae	*Hong YP H419* (PE)	HQ260774.1	EF143860.1
Coddia rudis (E.Mey. ex Harv.) Verdc.	Rubiaceae	*OM2687* (JRAU)	JX572419	JX517674
Coffea arabica L.	Rubiaceae	*Swensen228* (USNC) / n.a.	HM446782.1	AM412456.1
Coffea ligustroides S.Moore	Rubiaceae	*MWC16159* (K)	-	JX517673
Coffea racemosa Lour.	Rubiaceae	*OM2434* (JRAU)	JX572420	JX517631
Coffea salvatrix Swynn. & Philipson	Rubiaceae	*MWC19445* (K)	JX572421	JX517922
Cola greenwayi Brenan	Malvaceae	*OM2160* (JRAU)	-	JX517703
Cola mossambicensis Wild	Malvaceae	*OM2321* (JRAU)	JX572422	JX517410
Cola natalensis Oliv.	Malvaceae	*OM1860* (JRAU)	JX572423	JX518169
Coleonema album (Thunb.) Bartl. & H.L.Wendl.	Rutaceae	*OM3124* (JRAU)	JX572424	JX517370
Colophospermum mopane (Benth.) Leonard	Fabaceae	*RL1558* (JRAU)	JX572425	JX517743
Colubrina asiatica (L.) Brongn.	Rhamnaceae	*Abbott24812* (FLAS)	GU135186.1	GU135023.1
Combretum adenogonium Steud. ex A.Rich.	Combretaceae	*OM2123* (JRAU)	EU338151.1	JX517478
Combretum albopunctatum Suess.	Combretaceae	*OM1038* (JRAU)	JX572427	JX517725
Combretum apiculatum Sond.	Combretaceae	*OM1018* (JRAU)	JX572429	JX517366
Combretum apiculatum subsp. *leutweinii* (Schinz) Exell	Combretaceae	*OM2066* (JRAU)	JX572428	JX517678

Combretum bracteosum (Hochst.) Engl. & Diels	Combretaceae	*OM1676* (JRAU)	JX572430	JX517513
Combretum caffrum (Eckl. & Zeyh.) Kuntze	Combretaceae	*OM1750* (JRAU)	JX572431	JX517848
Combretum celastroides subsp. *orientale* Exell	Combretaceae	*OM1917* (JRAU)	JX572426	JX517779
Combretum celastroides Welw. ex M.A.Lawson	Combretaceae	*OM&MvdB28* (JRAU)	JX572432	JX517316
Combretum collinum subsp. *gazense* (Swynn. & Baker f.) Okafa	Combretaceae	*OM1024* (JRAU)	EU338158.1	JX518029
Combretum collinum subsp. *suluense* (Engl. & Diels) Okafa	Combretaceae	*OM&MvdB34* (JRAU)	JX572434	JX517634
Combretum collinum subsp. *taborense* (Engl.) Okafa	Combretaceae	*RBN170* (KNP)	JX572435	JX517383
Combretum edwardsii Exell	Combretaceae	*OM1584* (JRAU)	JX572436	JX517430
Combretum elaeagnoides Klotzsch	Combretaceae	*OM1028* (JRAU)	JX572437	JX517727
Combretum engleri Schinz, De Wild. & T.Durand	Combretaceae	*OM1025* (JRAU)	JX572438	JX517943
Combretum erythrophyllum (Burch.) Sond.	Combretaceae	*RL1344* (JRAU)	JX572439	JX517552
Combretum hereroense Schinz	Combretaceae	*OM2400* (JRAU)	JX572440	JX517597
Combretum imberbe Wawra	Combretaceae	*OM1019* (JRAU)	JX572441	JX517371
Combretum kirkii M.A.Lawson	Combretaceae	*OM2714* (JRAU)	JX572442	JX518242

Combretum kraussii Hochst.	Combretaceae	*OM1582* (JRAU)	JX572443	JX517576
Combretum microphyllum Klotzsch	Combretaceae	*OM2038* (JRAU)	JX572444	JX517523
Combretum mkuzense J.D.Carr & Retief	Combretaceae	*OM1569* (JRAU)	JX572445	JX517806
Combretum moggii Exell	Combretaceae	*OM1586* (JRAU)	JX572446	JX517385
Combretum molle R.Br. ex G.Don	Combretaceae	*RL1644* (JRAU)	JX572447	JX517775
Combretum mossambicense (Klotzsch) Engl.	Combretaceae	*OM2068* (JRAU)	JX572448	JX517652
Combretum nelsonii Dummer	Combretaceae	*MvdB0026* (JRAU)	EU338135.1	JX517805
Combretum oxystachyum Welw. ex M.A.Lawson	Combretaceae	*OM1056* (JRAU)	JX572449	JX517306
Combretum padoides Engl. & Diels	Combretaceae	*OM2388* (JRAU)	JX572450	JX517793
Combretum paniculatum Vent.	Combretaceae	*RL1661* (JRAU)	JQ025035	JQ024950
Combretum petrophilum Retief	Combretaceae	*OM2007* (JRAU)	JX572451	JX518046
Combretum pisoniiflorum (Klotzsch) Engl.	Combretaceae	*OM2600* (JRAU)	JX572452	JX518020
Combretum platypetalum Welw. ex M.A.Lawson	Combretaceae	*OM2092* (JRAU)	JX572453	JX517352
Combretum psidioides subsp. *dinteri* (Schinz, De Wild. & T.Durand) Exell	Combretaceae	*OM1039* (JRAU)	JX572455	JX517603
Combretum psidioides Welw.	Combretaceae	*OM2052* (JRAU)	JX572454	JX518060
Combretum stylesii O.Maurin, Jordaan & A.E.van Wyk	Combretaceae	*OM0997* (JRAU)	HM208690	HM208689

Combretum tenuipes Engl.	Combretaceae	*OM1089* (JRAU)	JX572456	JX517521
Combretum vendae A.E.van Wyk	Combretaceae	*OM&MvdB09* (JRAU)	JX572457	JX517642
Combretum wattii Exell	Combretaceae	*OM0995* (JRAU)	JX572458	JX517772
Combretum woodii Dummer	Combretaceae	*OM1646* (JRAU)	JX572459	JX517558
Combretum zeyheri Sond.	Combretaceae	*RL1440* (JRAU)	JX572460	JX518241
Commiphora africana (A.Rich.) Endl.	Burseraceae	*OM0334* (JRAU)	JX572461	JX518153
Commiphora edulis (Klotzsch) Engl.	Burseraceae	*OM1309* (JRAU)	JX572462	JX517660
Commiphora glandulosa Schinz	Burseraceae	*RBN160* (KNP)	JF265359	JF270712
Commiphora harveyi (Engl.) Engl.	Burseraceae	*OM1455* (JRAU)	JX572463	JX517769
Commiphora marlothii Engl.	Burseraceae	*OM1587* (JRAU)	JF265361	JF270714
Commiphora mollis (Oliv.) Engl.	Burseraceae	*OM1275* (JRAU)	JX572464	JX517798
Commiphora neglecta Verd.	Burseraceae	*RL1343* (JRAU)	JF265363	JF270716
Commiphora pyracanthoides Engl.	Burseraceae	*OM1310* (JRAU)	JX572465	JX517515
Commiphora schimperi (O.Bergman) Engl.	Burseraceae	*OM1361* (JRAU)	JF265364	JF270717
Commiphora serrata Engl.	Burseraceae	*OM2660* (JRAU)	JX572466	JX517449
Commiphora woodii Engl.	Burseraceae	*OM2276* (JRAU)	JX572467	JX517409
Commiphora zanzibarica (Baill.) Engl.	Burseraceae	*OM2432* (JRAU)	JX572468	JX517960

Coptosperma rhodesiacum (Bremek.) Degreef	Rubiaceae	*CS24* (JRAU)	JX572559	JX517753
Coptosperma supra-axillare (Hemsl.) Degreef	Rubiaceae	*RBN302* (KNP)	JX572470	JX517476
Coptosperma zygoon (Bridson) Degreef	Rubiaceae	*OM1908* (JRAU)	JF265621	JF270963
Cordia africana Lam.	Boraginaceae	*OM1983* (JRAU)	JX572471	JX517865
Cordia caffra Sond.	Boraginaceae	*OM1561* (JRAU)	JF265366	JF270719
Cordia grandicalyx Oberm.	Boraginaceae	*OM0837* (JRAU)	JF265367	JF270720
Cordia monoica Roxb.	Boraginaceae	*OM0353* (JRAU)	JX572472	JX517641
Cordia sinensis Lam.	Boraginaceae	*OM0354* (JRAU)	JF265370	JF270723
Cordia stuhlmannii Gürke	Boraginaceae	*OM2410* (JRAU)	JX572473	JX517742
Cordia torrei E.S.Martins	Boraginaceae	*OM2588* (JRAU)	JX572474	JX517572
Cordyla africana Lour.	Fabaceae	*OM2745* (JRAU)	JX572475	JX517855
Corymbia ficifolia (F.Muell.) K.D.Hill & L.A.S.Johnson	Myrtaceae	*C-L_R-0157* (JRAU)	KM392268	KM392246
Cotoneaster franchetii Bois	Rosaceae	*JG027* (JRAU)	JX572476	JX517527
Cotoneaster pannosus Franch.	Rosaceae	*DXP033* (IRVC)	-	AF288098.1
Craibia brevicaudata subsp. *baptistarum* (Buttner) J.B.Gillett	Fabaceae	*OM1813* (JRAU)	JX572477	JX517315
Craibia zimmermannii (Harms) Dunn	Fabaceae	*OM2230* (JRAU)	JX572478	JX518072

Crassula arborescens (Mill.) Willd.	Crassulaceae	*JG053* (JRAU)	JX572479	JX517536
Craterispermum schweinfurthii Hiern	Rubiaceae	*OM2654* (JRAU)	JX572480	JX517952
Crossopteryx febrifuga (Afzel. ex G.Don) Benth.	Rubiaceae	*OM2347* (JRAU)	JX572481	JX517365
Crotalaria agatiflora Schweinf.	Fabaceae	*MvdB0040* (JRAU)	JX572482	JX518228
Crotalaria capensis Jacq.	Fabaceae	*OM3786* (JRAU)	JX905970	JX905953
Crotalaria laburnifolia subsp. *australis* (Baker f.) Polhill	Fabaceae	*OM0608* (JRAU)	JF265373	JF270726
Crotalaria monteiroi Baker f.	Fabaceae	*MIR008* (JRAU)	JQ041241	JQ041083
Croton gratissimus Burch.	Euphorbiaceae	*OM1946* (JRAU)	JX572483	JX517905
Croton madandensis S.Moore	Euphorbiaceae	*RL1539* (JRAU)	JX572484	JX517472
Croton megalobotrys MŸll.Arg.	Euphorbiaceae	*RL1574* (JRAU)	JX572485	JX517792
Croton pseudopulchellus Pax	Euphorbiaceae	*RBN262* (KNP)	JX572486	JX517535
Croton steenkampianus Gerstner	Euphorbiaceae	*RBN151* (KNP)	JX572487	JX517563
Croton sylvaticus Hochst.	Euphorbiaceae	*OM2246* (JRAU)	JX572488	JX517596
Cryptocarya latifolia Sond.	Lauraceae	*Abbott9255* (BNRH)	JX572489	JX518146
Cryptocarya liebertiana Engl.	Lauraceae	*OM2300* (JRAU)	JX572490	JX517403
Cryptocarya myrtifolia Stapf	Lauraceae	*Abbott9137* (BNRH)	JX572491	JX517396

Cryptocarya natalensis (Ross) Kosterm.	Lauraceae	*Abbott9240* (BNRH)	JX572498	JX517839
Cryptocarya woodii Engl.	Lauraceae	*Abbott9116* (BNRH)	JX572492	JX518198
Cryptocarya wyliei Stapf	Lauraceae	*Abbott9110* (BNRH)	JX572493	JX517616
Cunonia capensis L.	Cunoniaceae	*Abbott9237* (BNRH)	JX572494	JX517913
Cupressus arizonica Greene	Cupressaceae	*Genbank*	AF127430.1	AF152188.1
Cupressus lusitanica Mill.	Cupressaceae	*Adams7072* (BAYLU)	AY380889.1	AY988351.1
Curtisia dentata (Burm.f.) C.A.Sm.	Cornaceae	*OM3167* (JRAU)	JX572495	JX517790
Cussonia arborea Hochst. ex A.Rich.	Araliaceae	*BDV010* (JRAU)	JX905967	JX970898
Cussonia arenicola Strey	Araliaceae	*BDV105* (JRAU)	-	JX970904
Cussonia natalensis Sond.	Araliaceae	*OM0975* (JRAU)	JF265381	JF270733
Cussonia spicata Thunb.	Araliaceae	*OM1553* (JRAU)	JF265382	JF270734
Cussonia thyrsiflora Thunb.	Araliaceae	*OM3100* (JRAU)	JX572496	JX517785
Cussonia transvaalensis Reyneke	Araliaceae	*BDV058* (JRAU)	JX905963	JX970897
Cycas thouarsii R.Br.	Cycadaceae	*Gaudichaud100422* (HEID) / n.a.	AF394336.1	AB116589.1
Cyclopia genistoides (L.) Vent.	Fabaceae	*JWB022* (NH)	JX572497	JX518243
Cyphomandra betacea (Cav.) Miers	Solanaceae	*CY001* (BGN)	-	EF438983.1
Cytisus scoparius (L.) Link	Fabaceae	*Schaefer2008/445* (BM) /	HM849943.1	AY386902.1

		Wojciechowski1000 (ASU)		
Dais cotinifolia L.	Thymelaeaceae	*OM1708* (JRAU)	-	JX517520
Dalbergia arbutifolia Baker	Fabaceae	*OM2712* (JRAU)	JX572499	JX517956
Dalbergia armata E.Mey.	Fabaceae	*OM3271* (JRAU)	JX572500	JX517400
Dalbergia boehmii Taub.	Fabaceae	*OM2452* (JRAU)	JX572501	JX517962
Dalbergia melanoxylon Guill. & Perr.	Fabaceae	*OM2394* (JRAU)	JX572502	JX517916
Dalbergia multijuga E.Mey.	Fabaceae	*Abbott9158* (BNRH)	JX572503	JX517995
Dalbergia nitidula Baker	Fabaceae	*OM2534* (JRAU)	-	JX970899
Dalbergia obovata E.Mey.	Fabaceae	*Abbott9170* (BNRH)	JX572504	JX517804
Dalbergiella nyassae Baker f.	Fabaceae	*Lavin s.n.* (K) / *HU1074* (USDA)	AF308724.1	AF142706.1
Deinbollia oblongifolia (E.Mey.) Radlk.	Sapindaceae	*RL1351* (JRAU)	JX572505	JX517693
Deinbollia xanthocarpa (Klotzsch) Radlk.	Sapindaceae	*OM2067* (JRAU)	JX572506	JX518221
Delonix regia (Hook.) Raf.	Fabaceae	*Genbank*	-	AM086834.1
Derris trifoliata Lour.	Fabaceae	*PS0263MT01* (IMPLAD)	-	HM049528.1
Dialium schlechteri Harms	Fabaceae	*OM2498* (JRAU)	JX572507	JX517752
Dichrostachys cinerea subsp. *africana* Brenan &	Fabaceae	*RBN359* (KNP)	JF265387	JF270739

Brummitt				
Dichrostachys cinerea subsp. *nyassana* (Taub.) Brenan	Fabaceae	*OM0283* (JRAU)	JX572508	JX517857
Didelta spinosa (L.f.) Aiton	Asteraceae	*MWC27188* (K)	JX572509	JX517877
Dioscorea elephantipes (L'Hér.) Engl.	Dioscoreaceae	*LTM019* (JRAU)	JX572510	JX517322
Diospyros abyssinica (Hiern) F.White	Ebenaceae	*Gilbert&Sebseke8803* (K)	-	DQ923990.1
Diospyros batocana Hiern	Ebenaceae	*MWC21210* (K)	-	JX518223
Diospyros dichrophylla (Gand.) De Winter	Ebenaceae	*Abbott9162* (BNRH)	JX572512	JX517311
Diospyros ferrea (Willd.) Bakh.	Ebenaceae	*MWC21193* (K)	-	JX517320
Diospyros glabra (L.) De Winter	Ebenaceae	*OM2933* (JRAU)	JX572513	JX517984
Diospyros inhacaensis F.White	Ebenaceae	*OM2225* (JRAU)	JX572514	JX518070
Diospyros loureiroana G.Don	Ebenaceae	*OM2145* (JRAU)	JX572515	JX517697
Diospyros lycioides Desf.	Ebenaceae	*OM2126* (JRAU)	JX572516	JX517594
Diospyros lycioides subsp. *guerkei* (Kuntze) De Winter	Ebenaceae	*RBN343* (KNP)	JX572517	JX517451
Diospyros mespiliformis Hochst. ex A.DC.	Ebenaceae	*OM0218* (JRAU)	JF265390	JF270742
Diospyros natalensis (Harv.) Brenan	Ebenaceae	*OM1763* (JRAU)	JF265391	JF270743
Diospyros natalensis subsp. *nummularia* (Brenan)	Ebenaceae	*OM1838* (JRAU)	JX572518	JX518127

F. White				
Diospyros rotundifolia Hiern	Ebenaceae	*OM2468* (JRAU)	JX572519	JX517440
Diospyros scabrida (Harv. ex Hiern) De Winter	Ebenaceae	*Abbott9246* (BNRH)	JX572520	JX517782
Diospyros simii (Kuntze) De Winter	Ebenaceae	*Abbott9204* (BNRH)	JX572521	JX517301
Diospyros squarrosa Klotzsch	Ebenaceae	*OM3485* (JRAU)	JX572511	JX517402
Diospyros verrucosa Hiern	Ebenaceae	*OM2379* (JRAU)	JX572522	JX517758
Diospyros villosa (L.) De Winter	Ebenaceae	*OM1575* (JRAU)	JF265392	JF270744
Diospyros villosa var. *parvifolia* De Winter	Ebenaceae	*OM1365* (JRAU)	JX572523	JX517761
Diospyros whyteana (Hiern) P.White	Ebenaceae	*OM&MvdB59* (JRAU)	JX572524	JX517711
Diplorhynchus condylocarpon (Müll.Arg.) Pichon	Apocynaceae	*OM2073* (JRAU)	JX572525	JX517728
Dissotis princeps (Kunth) Triana	Melastomataceae	*OM2481* (JRAU)	-	JX970895
Distephanus divaricatus (Steetz) H.Rob. & B.Kahn	Asteraceae	*OM2758* (JRAU)	JX572526	JX517719
Dodonaea viscosa Jacq.	Sapindaceae	*Abbott9229* (BNRH)	JX572528	JX517889
Dodonaea viscosa subsp. *angustifolia* (L.f.) J.G.West.	Sapindaceae	*OM2129* (JRAU)	JX572527	JX517975
Dombeya autumnalis Verd.	Malvaceae	*OM2004* (JRAU)	JX572529	JX518097
Dombeya burgessiae Gerrard ex Harv. & Sond.	Malvaceae	*OM1537* (JRAU)	JX572530	JX517847

Dombeya cymosa Harv.	Malvaceae	*OM1507* (JRAU)	JX572531	JX518206
Dombeya rotundifolia Planch.	Malvaceae	*OM0489* (JRAU)	JQ025044	JQ024959
Dombeya tiliacea (Endl.) Planch.	Malvaceae	*Abbott9252* (BNRH)	JX572532	JX517694
Dovyalis caffra (Hook. f. & Harv.) Warb.	Salicaceae	*RBN286* (KNP)	JX572533	JX518128
Dovyalis hispidula Wild	Salicaceae	*OM2581* (JRAU)	JX572534	JX518035
Dovyalis longispina Warb.	Salicaceae	*OM2602* (JRAU)	JX572535	JX517689
Dovyalis lucida Sim	Salicaceae	*Abbott9221* (BNRH)	JX572536	JX517715
Dovyalis rhamnoides (Burch. ex DC.) Burch. ex Harv. & Sond.	Salicaceae	*Chase271* (NCU)	Z75677.1	EF135529.1
Dovyalis xanthocarpa Bullock	Salicaceae	*OM2442* (JRAU)	JX572537	JX517323
Dracaena aletriformis (Haw.) Bos	Asparagaceae	*Abbott9145* (BNRH)	JX572538	JX517850
Dracaena mannii Baker	Asparagaceae	*OM1828* (JRAU)	JX572539	JX517338
Dracaena transvaalensis Baker	Asparagaceae	*OM2008* (JRAU)	JX572540	JX517732
Drypetes arguta (Müll.Arg.) Hutch.	Euphorbiaceae	*Abbott9149* (BNRH)	JX572541	JX905959
Drypetes reticulata Pax	Euphorbiaceae	*RBN270* (KNP)	JF265400	JF270750
Duranta erecta L.	Verbenaceae	*RBN217* (KNP)	JX572542	JX517883
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	*JSB-0480* (JRAU)	KM392256	KM392241

Ehretia amoena Klotzsch	Boraginaceae	*OM2533* (JRAU)	JX572543	JX518091
Ehretia rigida (Thunb.) Druce	Boraginaceae	*OM0396* (JRAU)	JX572544	JX518014
Ekebergia pterophylla (C.DC.) Hofmeyr	Meliaceae	*OM3263* (JRAU)	JX572545	JX517845
Elephantorrhiza burkei Benth.	Fabaceae	*OM1945* (JRAU)	JX572548	JX517971
Elephantorrhiza elephantina (Burch.) Skeels	Fabaceae	*OM0483* (JRAU)	JF265409	JF270759
Elephantorrhiza goetzei (Harms) Harms	Fabaceae	*OM1207* (JRAU)	JX572549	JX517358
Embelia xylocarpa P.Halliday	Primulaceae	*OM2653* (JRAU)	JX572550	JX517939
Empogona coriacea (Sond.) Tosh & Robbr.	Rubiaceae	*OM3281* (JRAU)	JX573062	JX517841
Empogona kirkii subsp. *junodii* (Schinz) Tosh & Robbr.	Rubiaceae	*OM1601* (JRAU)	JX573060	JX517789
Empogona lanceolata (Sond.) Tosh & Robbr.	Rubiaceae	*MWC24261* (K)	JX573061	JX517571
Encephalartos aemulans Vorster	Zamiaceae	*PR861* (JRAU)	JQ025439	JQ046261
Encephalartos altensteinii Lehm.	Zamiaceae	*PR668* (JRAU)	JQ025442	JQ046260
Encephalartos arenarius R.A.Dyer	Zamiaceae	*PR854* (JRAU)	JQ025455	JQ046257
Encephalartos brevifoliolatus Vorster	Zamiaceae	*Xdk2* (JRAU)	JQ025459	JQ046253
Encephalartos chimanimaniensis R.A.Dyer & Verdoorn	Zamiaceae	*PR888* (JRAU)	JQ025476	JQ046247

Encephalartos concinnus R.A.Dyer & Verdoorn	Zamiaceae	*PR890* (JRAU)	JQ025479	JQ046246
Encephalartos cupidus R.A.Dyer	Zamiaceae	*PR691* (JRAU)	JQ025481	JQ046245
Encephalartos dolomiticus Lavranos & D.L.Goode	Zamiaceae	*PR865* (JRAU)	JQ025489	JQ046242
Encephalartos dyerianus Lavranos & D.L.Goode	Zamiaceae	*PR731* (JRAU)	JQ025491	JQ046241
Encephalartos eugene-maraisii Verd.	Zamiaceae	*PR872* (JRAU)	JQ025502	JQ046238
Encephalartos ferox G.Bertol.	Zamiaceae	*PR844* (JRAU)	JQ025506	JQ046236
Encephalartos friderici-guilielmi Lehm.	Zamiaceae	*PR853* (JRAU)	JQ025512	JQ046234
Encephalartos ghellinckii Lem.	Zamiaceae	*PR773* (JRAU)	JQ025518	JQ046232
Encephalartos heenanii R.A.Dyer	Zamiaceae	*PR775* (JRAU)	JQ025528	JQ046229
Encephalartos hirsutus P.J.H.Hurter	Zamiaceae	*PR718* (JRAU)	JQ025534	JQ046226
Encephalartos inopinus R.A.Dyer	Zamiaceae	*PR864* (JRAU)	JQ025547	JQ046221
Encephalartos laevifolius Stapf & Burtt Davy	Zamiaceae	*PR845* (JRAU)	JQ025555	JQ046215
Encephalartos lanatus Stapf & Burtt Davy	Zamiaceae	*PR828* (JRAU)	JQ025562	JQ046213
Encephalartos latifrons Lehm.	Zamiaceae	*PR811* (JRAU)	JQ025566	JQ046211
Encephalartos lebomboensis Verd.	Zamiaceae	*PR831* (JRAU)	JQ025580	JQ046207
Encephalartos lehmannii Lehm.	Zamiaceae	*PR780* (JRAU)	JQ025583	JQ046205
Encephalartos longifolius (Jacq.) Lehm.	Zamiaceae	*PR873* (JRAU)	JQ025592	JQ046203
Encephalartos manikensis (Gilliland) Gilliland	Zamiaceae	*PR903* (JRAU)	JQ025597	JQ046201

Encephalartos middelburgensis Vorster, Robbertse & S.van der Westh.	Zamiaceae	*PR726* (JRAU)	JQ025608	JQ046199
Encephalartos msinganus Vorster	Zamiaceae	*PR701* (JRAU)	JQ025610	JQ046198
Encephalartos natalensis R.A.Dyer & Verdoorn	Zamiaceae	*PR802* (JRAU)	JQ025619	JQ046194
Encephalartos nubimontanus P.J.H.Hurter	Zamiaceae	*PR704* (JRAU)	JQ025629	JQ046190
Encephalartos paucidentatus Stapf & Burtt Davy	Zamiaceae	*PR849* (JRAU)	JQ025636	JQ046283
Encephalartos princeps R.A.Dyer	Zamiaceae	*PR871* (JRAU)	JQ025639	JQ046185
Encephalartos relictus P.J.H.Hurter	Zamiaceae	*PR732* (JRAU)	JQ025643	JQ025643
Encephalartos senticosus Vorster	Zamiaceae	*PR833* (JRAU)	JQ025652	JQ046181
Encephalartos transvenosus Stapf & Burtt Davy	Zamiaceae	*PR832* (JRAU)	JQ025667	JQ046178
Encephalartos villosus Lem.	Zamiaceae	*PR838* (JRAU)	JQ025594	JQ046172
Encephalartos woodii Sander	Zamiaceae	*PR875* (JRAU)	JQ025701	JQ046169
Englerodaphne ovalifolia (Meisn.) E.Phillips	Thymelaeaceae	*Abbott9108* (BNRH)	JX572551	JX517508
Englerodaphne pilosa Burtt Davy	Thymelaeaceae	*OM1893* (JRAU)	JX572552	JX518068
Englerophytum magalismontanum (Sond.) T.D.Penn.	Sapotaceae	*MvdB18* (JRAU)	JX572553	JX517982
Englerophytum natalense (Sond.) T.D.Penn.	Sapotaceae	*OM1544* (JRAU)	JX572554	JX517936

Ensete ventricosum (Welw.) Cheesman	Musaceae	*CS02* (JRAU)	JX572555	JX517741
Entada abyssinica A.Rich.	Fabaceae	*OM2316* (JRAU)	JX572556	JX517780
Entada rheedii Spreng.	Fabaceae	*OM2417* (JRAU)	JQ025045	JQ024960
Entada wahlbergii Harv.	Fabaceae	*OM2586* (JRAU)	JX572557	JX517580
Entandrophragma caudatum (Sprague) Sprague	Meliaceae	*OM1342* (JRAU)	JX572558	JX517565
Ephippiocarpa orientalis (S.Moore) Markgr.	Apocynaceae	*OM2181* (JRAU)	JX572363	JX517331
Erica caffra L.	Ericaceae	*OM2307* (JRAU)	JX572560	JX517891
Erica natalitia Bolus	Ericaceae	*Abbott9208* (BNRH)	JX572561	JX518173
Erica triflora L.	Ericaceae	*MWC23115* (K)	-	JX518211
Eriobotrya japonica (Thunb.) Lindl.	Rosaceae	*JG051* (JRAU)	JX572562	JX517887
Erythrina abyssinica DC.	Fabaceae	*OM2095* (JRAU)	JX572563	JX518054
Erythrina caffra Thunb.	Fabaceae	*BS0057* (JRAU)	JQ412356	JQ412236
Erythrina humeana Spreng.	Fabaceae	*OM0741* (JRAU)	JF265413	JF270763
Erythrina livingstoniana Baker	Fabaceae	*OM2354* (JRAU)	JX572564	JX517778
Erythrina lysistemon Hutch.	Fabaceae	*RBN329* (KNP)	JF265415	JF270764
Erythrina zeyheri Harv.	Fabaceae	*OM1589* (JRAU)	JX572565	JX517714
Erythrococca Benth. sp.nov.	Euphorbiaceae	*Abbott9148* (BNRH)	JX572566	JX517713
Erythrococca menyharthii (Pax) Prain	Euphorbiaceae	*OM2431* (JRAU)	JX572567	JX517550

Erythrophleum africanum (Benth.) Harms	Fabaceae	*OM2537* (JRAU)	JX572568	JX517525
Erythrophleum suaveolens (Guill. & Perr.) Brenan	Fabaceae	*OM2674* (JRAU)	JX572569	JX517934
Erythroxylum delagoense Schinz	Erythroxylaceae	*OM1499* (JRAU)	JF265416	JF270765
Erythroxylum emarginatum Thonn.	Erythroxylaceae	*OM1545* (JRAU)	JX572570	JX517436
Erythroxylum pictum E.Mey. ex Harv. & Sond.	Erythroxylaceae	*Abbott9129* (BNRH)	JX572571	JX517740
Eucalyptus camaldulensis Deh (NH).	Myrtaceae	n.a.	-	HQ995676.1
Eucalyptus cinerea F. Muell. ex Benth.	Myrtaceae	*BS 0572* (JRAU)	KM392255	-
Eucalyptus diversicolor F.Muell.	Myrtaceae	*DN1438* (UTH)	-	HQ287623.1
Eucalyptus globulus Labill.	Myrtaceae	*Genbank*	HM849985.1	HM851050.1
Eucalyptus grandis W.Hill	Myrtaceae	*Genbank*	AB537496.1	-
Eucalyptus conferruminata D.J.Carr & S.G.M.Carr	Myrtaceae	*Genbank*	AM235653.1	-
Eucalyptus paniculata Sm.	Myrtaceae	*PPRI-0288* (JRAU)	KM392264	KM392248
Eucalyptus sideroxylon A.Cunn. ex Woolls	Myrtaceae	*PPRI-0287* (JRAU)	KM392272	KM392240
Eucalyptus tereticornis Sm.	Myrtaceae	*BS 0570* (JRAU)	KM392273	-
Euclea coriacea A.DC.	Ebenaceae	*MWC22169* (K)	JX572573	JX517506
Euclea crispa (Thunb.) Gürke	Ebenaceae	*OM2254* (JRAU)	JX572574	JX517391
Euclea divinorum Hiern	Ebenaceae	*OM1102* (JRAU)	JF265418	JF270767

Euclea natalensis A.DC.	Ebenaceae	*OM0936* (JRAU)	JX572575	JX517663
Euclea natalensis subsp. *angustifolia* F. White	Ebenaceae	*RBN287* (KNP)	JX572576	JX517900
Euclea natalensis subsp. *obovata* F.White	Ebenaceae	*OM2658* (JRAU)	JX572577	JX517787
Euclea pseudebenus E.Mey. ex A.DC.	Ebenaceae	*MWC21190* (K)	JX572578	JX517308
Euclea racemosa L.	Ebenaceae	*OM1538* (JRAU)	JX572579	JX518155
Euclea racemosa subsp. *daphnoides* (Hiern) F.White	Ebenaceae	*OM1381* (JRAU)	JF265422	JF270771
Euclea undulata Thunb.	Ebenaceae	*OM1572* (JRAU)	JQ025046	JQ024962
Eugenia capensis (Eckl. & Zeyh.) Harv.	Myrtaceae	*Abbott9225* (BNRH)	JX572580	JX517357
Eugenia capensis subsp. *natalitia* (Sond.) F.White	Myrtaceae	*OM2699* (JRAU)	JX572582	JX517466
Eugenia capensis subsp. *zeyheri* (Harv.) F.White	Myrtaceae	*OM1800* (JRAU)	JX572587	JX517750
Eugenia erythrophylla Strey	Myrtaceae	*Abbott9121* (BNRH)	JX572581	JX517830
Eugenia L. sp. nov. C	Myrtaceae	*Abbott9151* (BNRH)	JX572583	JX517627
Eugenia umtamvunensis A.E.van Wyk	Myrtaceae	Abbott9120 (BNRH)	JX572584	JX517784
Eugenia uniflora L.	Myrtaceae	*PGW1335* (NSW)	-	AF368207.2
Eugenia verdoorniae A.E.van Wyk	Myrtaceae	*Abbott9122* (BNRH)	JX572585	JX517398
Eugenia woodii Dummer	Myrtaceae	*OM1795* (JRAU)	JX572586	JX518025
Eugenia zuluensis Dummer	Myrtaceae	*Abbott9188* (BNRH)	JX572588	JX517795

Euphorbia cooperi N.E.Br. ex A.Berger	Euphorbiaceae	*OM1464* (JRAU)	JF265425	JF270774
Euphorbia espinosa Pax	Euphorbiaceae	*RBN189* (KNP)	JF265426	JF270775
Euphorbia guerichiana Pax ex Engl.	Euphorbiaceae	*OM0894* (JRAU)	JX572589	JX517679
Euphorbia leucocephala Lotsy	Euphorbiaceae	*BS 0561* (JRAU)		
Euphorbia matabelensis Pax	Euphorbiaceae	*OM2416* (JRAU)	JX572590	JX517557
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	*BS 0562* (JRAU)	KM392251	-
Euphorbia rowlandii R.A.Dyer	Euphorbiaceae	*RBN263* (KNP)	JF265427	JF270776
Euphorbia tirucalli L.	Euphorbiaceae	*OM0569* (JRAU)	JX572591	JX518075
Euphorbia triangularis Desf. ex A.Berger	Euphorbiaceae	*Abbott9222* (BNRH)	JX572592	JX517682
Excoecaria bussei (Pax) Pax	Euphorbiaceae	*OM2385* (JRAU)	JX572593	JX518133
Excoecaria simii (Kuntze) Pax	Euphorbiaceae	*Abbott9211* (BNRH)	JX572594	JX517636
Fadogia tetraquetra K.Schum. & K.Krause	Rubiaceae	*OM3266* (JRAU)	JX572912	JX518047
Faidherbia albida (Delile) A.Chev.	Fabaceae	*RBN165* (KNP)	JF265429	JF270778
Faurea galpinii E.Phillips	Proteaceae	*OM1818* (JRAU)	JX572595	JX517907
Faurea macnaughtonii E.Phillips	Proteaceae	*Abbott9123* (BNRH)	JX572596	JX517418
Faurea rochetiana (A.Rich.) Chiov. ex Pic.Serm.	Proteaceae	*OM1461* (JRAU)	JX572597	JX517828
Faurea saligna Harv.	Proteaceae	*MvdB0027* (JRAU)	JF265431	JF270780

Fernandoa magnifica Seem.	Bignoniaceae	*OM2336* (JRAU)	JX572598	JX517318
Ficus abutilifolia (Miq.) Miq.	Moraceae	*OM0280* (JRAU)	JX572599	JX517731
Ficus bizanae Hutch. & Burtt Davy	Moraceae	*Abbott9218* (BNRH)	JX572600	JX518182
Ficus burkei (Miq.) Miq.	Moraceae	*OM0972* (JRAU)	JF265432	JF270781
Ficus burtt-davyi Hutch.	Moraceae	*MWC20234* (K)	-	JX517875
Ficus bussei Warb. ex Mildbr. & Burret	Moraceae	*OM2444* (JRAU)	JX573113	JX970907
Ficus capreifolia Delile	Moraceae	*OM2566* (JRAU)	JX572601	JX517811
Ficus carica L.	Moraceae	*Genbank*	HE963487.1	HE966929.1
Ficus cordata subsp. *salicifolia* (Vahl) C.C.Berg	Moraceae	*OM2005* (JRAU)	JX572609	JX518207
Ficus cordata Thunb.	Moraceae	*OM1481* (JRAU)	-	JF270784.1
Ficus craterostoma Warb. ex Mildbr. & Burret	Moraceae	*Abbott9168* (BNRH)	JX572602	JX517933
Ficus glumosa Delile	Moraceae	*OM0564* (JRAU)	JX572603	JX517465
Ficus ilicina (Sond.) Miq.	Moraceae	*MWC20240* (K)	JX572604	JX517393
Ficus ingens (Miq.) Miq.	Moraceae	*OM0593* (JRAU)	JF265434	JF270782
Ficus lutea Vahl	Moraceae	*OM1822* (JRAU)	JX572605	JX517686
Ficus polita Vahl	Moraceae	*OM1823* (JRAU)	JX572607	JX518117
Ficus pygmaea Welw. ex Hiern	Moraceae	*MWC20237* (K)	JX572608	JX517453
Ficus rokko Warb. & Schweinf	Moraceae	*OM2249* (JRAU)	-	JX517518

Ficus stuhlmannii Warb.	Moraceae	*OM0749* (JRAU)	JF265437	JF270785
Ficus sur Forssk.	Moraceae	*OM1556* (JRAU)	JF265438	JF270786
Ficus sycomorus L.	Moraceae	*RBN197* (KNP)	JX572610	JX518017
Ficus tettensis Hutch.	Moraceae	*RBN265* (KNP)	JX572611	JX517998
Ficus thonningii Blume	Moraceae	*RL1487* (JRAU)	JX572606	JX518112
Ficus tremula Warb.	Moraceae	*OM2738* (JRAU)	JX573114	JX970900
Ficus trichopoda Baker	Moraceae	*OM1817* (JRAU)	JX572612	JX517724
Filicium decipiens (Wight & Arn.) Thwaites	Sapindaceae	*Chase2128* (K)	AY724352.1	AY724294.1
Flacourtia indica (Burm. f.) Merr.	Salicaceae	*RL1216* (JRAU)	JX572613	JX518082
Flueggea virosa (Roxb. ex Willd.) Royle	Euphorbiaceae	*OM0362* (JRAU)	JX572614	JX517340
Fockea Endl. sp.	Apocynaceae	*MWC03853* (K)	JX572615	JX518200
Fraxinus americana L.	Oleaceae	*BS0213* (JRAU)	JX905968	JX905945
Fraxinus angustifolia Vahl	Oleaceae	*Genbank*	-	HM171493.1
Fraxinus pennsylvanica Marshall	Oleaceae	*AP270* (COLG)	-	HQ593301.1
Freylinia lanceolata (L.) G.Don	Scrophulariaceae	*OM2306* (JRAU)	JX572616	JX517908
Friesodielsia obovata (Benth.) Verdc.	Annonaceae	*OM2395* (JRAU)	JX572617	JX517635
Funtumia africana (Benth.) Stapf	Apocynaceae	*LeymanS3855* (BR)	-	EF456323.1

Galpinia transvaalica N.E.Br.	Lythraceae	*OM0319* (JRAU)	JF265443	JF270791
Garcinia gerrardii Harv. ex Sim	Clusiaceae	*OM2242* (JRAU)	-	JX517432
Garcinia livingstonei T.Anderson	Clusiaceae	*OM1189* (JRAU)	JX572619	JX517696
Gardenia cornuta Hemsl.	Rubiaceae	*OM2241* (JRAU)	JX572620	JX517901
Gardenia resiniflua Hiern	Rubiaceae	*OM1272* (JRAU)	JX572621	JX517583
Gardenia ternifolia Schumach. & Thonn.	Rubiaceae	*OM2356* (JRAU)	JX572622	JX517388
Gardenia thunbergia Thunb.	Rubiaceae	*OM3222* (JRAU)	JX572623	JX517827
Gardenia volkensii K.Schum.	Rubiaceae	*OM1966* (JRAU)	JX572624	JX518233
Genista monspessulana (L.) L.A.S.Johnson	Fabaceae	*Genbank*	HM850024.1	HM851130.1
Gerrardina foliosa Oliv.	Gerrardinaceae	*Abbott9228* (BNRH)	JX572625	JX517543
Gleditsia triacanthos L.	Fabaceae	*JG033* (JRAU)	JX572626	JX517819
Glenniea africana (Radlk.) Lee (NH)	Sapindaceae	*OM1857* (JRAU)	JX572627	JX518034
Gloveria integrifolia (L.f.) Jordaan	Celastraceae	*MWC32835* (K)	JX572628	JX518163
Glyphaea tomentosa Mast.	Malvaceae	*OM2599* (JRAU)	JX572629	JX517593
Gonioma kamassi E.Mey.	Apocynaceae	*OM3158* (JRAU)	JX572630	JX517633
Gossypium herbaceum subsp. *africanum* (G.Watt) Vollesen	Malvaceae	*YBK109* (JRAU)	JX572631	JX517350
Grevillea banksii R.Br.	Proteaceae	n.a.	-	AF542583.2

Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	n.a. / *Anderson9* (UPS)	AF193973.1	EU169631.1
Grewia bicolor Juss.	Malvaceae	*RL1583* (JRAU)	JX572633	JX518121
Grewia caffra Meisn.	Malvaceae	*OM2329* (JRAU)	JX572634	JX517589
Grewia flava DC.	Malvaceae	*KMS-0188* (JRAU)	KM392261	KM392250
Grewia flavescens Juss.	Malvaceae	*RL1365* (JRAU)	JX572635	JX517463
Grewia gracillima Wild	Malvaceae	*OM0870* (JRAU)	JF265451	JF270798
Grewia hexamita Burret	Malvaceae	*OM0351* (JRAU)	JF265452	JF270799
Grewia inaequilatera Garcke	Malvaceae	*OM0872* (JRAU)	JF265453	JF270800
Grewia lasiocarpa E.Mey. ex Harv.	Malvaceae	*Abbott9236* (BNRH)	JX572636	JX518043
Grewia lepidopetala Garcke	Malvaceae	*OM2456* (JRAU)	JX572637	JX517945
Grewia micrantha Bojer	Malvaceae	*OM2448* (JRAU)	JX572638	JX517762
Grewia microcarpa K.Schum.	Malvaceae	*OM2324* (JRAU)	JX572639	JX517607
Grewia microthyrsa K.Schum. ex Burret	Malvaceae	*OM1286* (JRAU)	JX572640	JX517514
Grewia monticola Sond.	Malvaceae	*RL1114* (JRAU)	JX572641	JX517425
Grewia occidentalis L.	Malvaceae	*OM3228* (JRAU)	JX572642	JX517699
Grewia pondoensis Burret	Malvaceae	*Abbott9105* (BNRH)	JX572643	JX518171
Grewia sulcata Mast.	Malvaceae	*RL1496* (JRAU)	JX572644	JX517675

Grewia transzambesica Wild	Malvaceae	*OM2628* (JRAU)	JX572645	JX517601
Grewia vernicosa Schinz	Malvaceae	*OM1999* (JRAU)	JX572632	JX518099
Grewia villosa Willd.	Malvaceae	*RL1523* (JRAU)	JX572646	JX517723
Greyia flanaganii Bolus	Melianthaceae	*OM2294* (JRAU)	JX572647	JX517681
Greyia sutherlandii Hook. & Harv.	Melianthaceae	*OM&MvdB73* (JRAU)	JX572648	JX518196
Guettarda speciosa L.	Rubiaceae	*OM2491* (JRAU)	JX572649	JX517544
Guibourtia coleosperma (Benth.) Leonard	Fabaceae	*OM2116* (JRAU)	JX572650	JX518076
Guibourtia conjugata (Bolle) J.Leonard	Fabaceae	*OM1287* (JRAU)	JF265457	JF270804
Gymnosporia bachmannii Loes.	Celastraceae	*Abbott9144* (BNRH)	JX572652	JX518062
Gymnosporia buxifolia (L.) Szyszyl.	Celastraceae	*RL1397* (JRAU)	JX572653	JX517419
Gymnosporia devenishii Jordaan	Celastraceae	*Abbott9244* (BNRH)	JX572654	JX517493
Gymnosporia harveyana Loes.	Celastraceae	*NQ1* (JRAU)	JX572655	JX518059
Gymnosporia heterophylla (Eckl. & Zeyh.) Loes.	Celastraceae	*OM0623* (JRAU)	JF265458	JF270805
Gymnosporia maranguensis (Loes.) Loes.	Celastraceae	*OM1637* (JRAU)	JF265459	JF270806
Gymnosporia mossambicensis (Klotzsch) Loes.	Celastraceae	*OM2633* (JRAU)	JX572656	JX518105
Gymnosporia nemorosa (Eckl. & Zeyh.) Szyszyl.	Celastraceae	*Abbott9187* (BNRH)	JX572657	JX517324
Gymnosporia oxycarpa (N.Robson) Jordaan	Celastraceae	*RBN282* (KNP)	JX572658	JX517648
Gymnosporia polyacantha (Sond.) Szyszyl.	Celastraceae	*OM2248* (JRAU)	JX572659	JX517462

Gymnosporia pubescens (N.Robson) Jordaan	Celastraceae	*OM1929* (JRAU)	JF265461	JF270808
Gymnosporia putterlickioides Loes.	Celastraceae	*OM0909* (JRAU)	JX572660	JX517707
Gymnosporia senegalensis (Lam.) Loes.	Celastraceae	*RBN285* (KNP)	JX572661	JX517756
Gymnosporia tenuispina (Sond.) Szyszyl.	Celastraceae	*NQ2* (JRAU)	-	JX970906
Gyrocarpus americanus Jacq.	Hernandiaceae	*OM0874* (JRAU)	JF265465	JF270812
Haematoxylum L.	Fabaceae	*HastonV200308* (RBGE) / *Wojciechowski953* (ASU)	AY904386.1	AY386905.1|
Hakea gibbosa Cav.	Proteaceae	*PG54* (JRAU)	JX572663	JX518065
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	*MWC26714* (K)	JX572664	JX517394
Halleria lucida L.	Scrophulariaceae	*OM2269* (JRAU)	JX572665	JX517441
Haplocoelum foliolosum (Hiern) Bullock	Sapindaceae	*OM1849* (JRAU)	JX572666	JX517599
Harpephyllum caffrum Ber (NH). ex C.Krauss	Anacardiaceae	*OM1555* (JRAU)	JF265467	JF270814
Heeria argentea Meisn.	Anacardiaceae	*PG16* (JRAU)	JX572667	JX518129
Heinsia crinita subsp. *parviflora* (K.Schum. & K.Krause) Verdc.	Rubiaceae	*RBN129* (KNP)	JF265467	JF270814
Helinus integrifolius (Lam.) Kuntze	Rhamnaceae	*OM2430* (JRAU)	JX572668	JX518160
Hemizygia albiflora (N.E.Br.) Ashby	Lamiaceae	*OM2021* (JRAU)	-	JX517856

Heritiera littoralis Aiton	Malvaceae	*Alverson s.n.* (WIS)	-	AY321181.1
Heteromorpha arborescens Cham. & Schltdl.	Apiaceae	*OM2726* (JRAU)	JX572669	JX517406
Heteromorpha arborescens var. *frutescens* P. Winter	Apiaceae	*OM1430* (JRAU)	JX572670	JX517330
Heteropyxis natalensis Harv.	Myrtaceae	*OM1944* (JRAU)	JX572671	JX518023
Hexalobus monopetalus (A.Rich.) Engl. & Diels	Annonaceae	*OM1284* (JRAU)	JX572672	JX517754
Heywoodia lucens Sim	Euphorbiaceae	*CS09* (JRAU)	JX572673	JX518107
Hibiscus calyphyllus Cav.	Malvaceae	*RBN108* (KNP)	JX572674	JX517307
Hibiscus micranthus L.f.	Malvaceae	*OM1608* (JRAU)	JX572675	JX518190
Hibiscus tiliaceus L.	Malvaceae	*OM2157* (JRAU)	JX572676	JX517796
Hippobromus pauciflorus Radlk.	Sapindaceae	*OM1996* (JRAU)	JX572677	JX518197
Hippocratea crenata K. Schum. & Loes.	Celastraceae	*OM2441* (JRAU)	JX572678	JX517629
Hippocratea indica Willd.	Celastraceae	*OM1925* (JRAU)	JX572921	JX517591
Hirtella zanzibarica Oliv.	Chrysobalanaceae	*OM2649* (JRAU)	JX572679	JX518073
Holarrhena pubescens Wall.	Apocynaceae	*OM2083* (JRAU)	JX572680	JX517447
Homalanthus populifolius Graham	Apocynaceae	*C-L_R-0084* (JRAU)	KM392269	KM392242
Homalium dentatum Warb.	Salicaceae	*OM1420* (JRAU)	JX572681	JX517416
Homalium rufescens Benth.	Salicaceae	*Abbott9215* (BNRH)	JX572682	JX517770

Hugonia busseana Engl.	Linaceae	*OM2364* (JRAU)	JX572683	JX518087
Hugonia orientalis Engl.	Linaceae	*RBN145* (KNP)	JF265478	JF270825
Hunteria zeylanica (Retz.) Gardner ex Thwaites	Apocynaceae	*OM2380* (JRAU)	-	JX517717
Hyaenanche globosa (Gaertn.) Lamb. & Vahl	Euphorbiaceae	*OM1873* (JRAU)	JX572684	JX905949
Hymenaea verrucosa Gaertn.	Fabaceae	*Herendeen11-XII-97-3* (US)	L08480.1	EU361974.1
Hymenocardia ulmoides Oliv.	Euphorbiaceae	*OM2686* (JRAU)	JX572685	JX517929
Hymenodictyon floribundum (Hochst. & Steud.) B.L.Rob.	Rubiaceae	*Anderson s.n.* (GB)	AY538488.1	AY538392.1
Hymenodictyon parvifolium Oliv.	Rubiaceae	*OM1250* (JRAU)	JX572686	JX517708
Hyperacanthus amoenus (Sims) Bridson	Rubiaceae	*RBN320* (KNP)	JX572687	JX517662
Hypericum perforatum L.	Hypericaceae	*Genbank*	JX664053.1	JX661947.1
Hyphaene coriacea Gaertn.	Arecaceae	*OM2427* (JRAU)	JX572688	JX518101
Hyphaene petersiana Klotzsch ex Mart.	Arecaceae	*OM1296* (JRAU)	JX572689	JX517767
Hypocalyptus sophoroides (P.J.Bergius) Baill.	Fabaceae	*OM3051* (JRAU)	JX572690	JX518069
Ilex L.	Aquifoliaceae	*Shawpc0988K* (HKU)	JN407234.2	JN407088.1
Indigofera filifolia Thunb.	Fabaceae	*Stirton13192* (BOL)	JX572691	JX517626

Indigofera frutescens L.f.	Fabaceae	*CS01* (JRAU)	JX572692	JX517595
Indigofera fulgens Baker	Fabaceae	*OM2382* (JRAU)	JX572693	JX518024
Indigofera natalensis Bolus	Fabaceae	*Abbott9172* (BNRH)	JX572694	JX518009
Indigofera rhynchocarpa Baker	Fabaceae	*OM0669* (JRAU)	JX905964	JX905943
Indigofera suffruticosa Mill.	Fabaceae	*HU1102* (USDA)	-	AF142697.1
Indigofera tinctoria L.	Fabaceae	*OM1933* (JRAU)	JF265485	JF270832
Inhambanella henriquezii (Engl. & Warb.) Dubard	Sapotaceae	*OM2760* (JRAU)	JX572695	JX517677
Ipomoea fistulosa Mart. ex Choisy	Convolvulaceae	*Abbott25278* (FLAS)	GU135243.1	GU135080.1
Ipomoea carnea Jacq.	Convolvulaceae	*Genbank*	GU135243.1	GU135080.1
Itea L.	Iteaceae	*1204041* (XB)	-	HQ415356.1
Ixora narcissodora K.Schum.	Rubiaceae	*OM2673* (JRAU)	JX572696	JX517349
Jacaranda mimosifolia D.Don	Bignoniaceae	*OM3454* (JRAU)	JX572697	JX518220
Jasminum humile L.	Oleaceae	*PPRI-0032* (JRAU)	KM392267	KM392247
Jasminum fluminense Vell.	Oleaceae	*OM0273* (JRAU)	JQ025057	JQ024970
Jasminum mesnyi Hance	Oleaceae	*Genbank*	DQ673296.1	-
Jasminum multipartitum Hochst.	Oleaceae	*OM0782* (JRAU)	JX572698	JX517738
Jasminum stenolobum Rolfe	Oleaceae	*RBN133* (KNP)	JX572699	JX517716
Jatropha curcas L.	Euphorbiaceae	*OM1182* (JRAU)	JX572700	JX518021

Jatropha gossypiifolia var. *elegans* (Pohl) Müll.Arg.	Euphorbiaceae	*PS0192MT01* (IMD)	-	GU441803.1
Jubaeopsis caffra Becc.	Arecaceae	*Sikhakhane139* (NH)	AJ829876.1	AM114633.1
Julbernardia globiflora (Benth.) Troupin	Fabaceae	*OM2517* (JRAU)	JX572701	JX517829
Juniperus procera Hochst. ex Endl.	Cupressaceae	*BU-6187* (LZU)	HM024324.1	HM024046.1
Juniperus virginiana L.	Cupressaceae	*BU-6187* (LZU)	HM024343.1	HM024065.1
Justicia aconitiflora (A.Meeuse) Cubey	Acanthaceae	*OM1816* (JRAU)	JF265402	JF270752
Justicia adhatodoides (Nees) V.A.W.Graham	Acanthaceae	*OM1759* (JRAU)	JF265403	JF270753
Justicia campylostemon T. Anders.	Acanthaceae	*OM2299* (JRAU)	JX572702	JX518170
Karomia speciosa (Hutch. & Corbishley) R.Fern.	Lamiaceae	*OM0700* (JRAU)	JF265489	JF270836
Keetia gueinzii (Sond.) Bridson	Rubiaceae	*Abbott9160* (BNRH)	JX572703	JX518184
Khaya anthotheca (Welw.) C.DC.	Meliaceae	*OM2604* (JRAU)	JX572704	JX517573
Kigelia africana (Lam.) Benth.	Bignoniaceae	*OM3497* (JRAU)	JX572705	JX517880
Kiggelaria africana L.	Salicaceae	*OM2260* (JRAU)	JX572706	JX518019
Kirkia acuminata Oliv.	Kirkiaceae	*OM2720* (JRAU)	JX572707	JX517399
Kirkia wilmsii Engl.	Kirkiaceae	*RL1230* (JRAU)	JF265493	JF270840
Kraussia floribunda Harv.	Rubiaceae	*OM1180* (JRAU)	JX572708	JX517560
Lachnostylis bilocularis R.A.Dyer	Euphorbiaceae	*Kurzweil83/88* (K)	-	AY552431.1

Lagynias dryadum (S.Moore) Robyns	Rubiaceae	*OM0896* (JRAU)	JF265495	JF270842
Landolphia kirkii Dyer	Apocynaceae	*RBN295* (KNP)	JX905972	JX905958
Lannea antiscorbutica (Hiern) Engl.	Anacardiaceae	*OM2704* (JRAU)	JX572709	JX518185
Lannea discolor (Sond.) Engl.	Anacardiaceae	*RL1235* (JRAU)	JF265496	JF270843
Lannea edulis (Sond.) Engl.	Anacardiaceae	*OM1991* (JRAU)	JX572710	JX518111
Lannea schweinfurthii (Engl.) Engl.	Anacardiaceae	*OM2446* (JRAU)	JX572711	JX517613
Lantana camara L.	Verbenaceae	*OM0739* (JRAU)	JF265499	JF270846
Lantana rugosa Thunb.	Verbenaceae	*OM0459* (JRAU)	JX572712	JX517746
Lagerstroemia indica L.	Lythraceae	*BS 0568* (JRAU)	KM392274	KM392237
Lasiodiscus pervillei Baill.	Rhamnaceae	*OM2345* (JRAU)	JX572713	JX517978
Laurophyllus capensis Thunb.	Anacardiaceae	*MWC28623* (K)	JX572714	JX517726
Lebeckia sericea Thunb.	Fabaceae	*Boatwright151* (JRAU) / *van der Meruve215* (K)	EU347924.1	GQ246144.1
Lecaniodiscus fraxinifolius Baker	Sapindaceae	*OM2365* (JRAU)	JX572715	JX518177
Leonotis leonurus (L.) R.Br.	Lamiaceae	*LTM032* (JRAU)	JQ025060	JQ024972
Lepisanthes senegalensis (Poir.) Lee (NH)	Sapindaceae	*Callmander627* (MO)	-	EU720654.1
Leptactina delagoensis K.Schum.	Rubiaceae	*OM1598* (JRAU)	JF265502	JF270849
Leptospermum laevigatum (Gaertn.) F.Muell.	Myrtaceae	BS0158 (JRAU)	JQ412378	JQ412255

Leucadendron argenteum (L.) R. Br.	Proteaceae	*OM2263* (JRAU)	JX572716	JX517459
Leucadendron coniferum Meisn.	Proteaceae	*OM2313* (JRAU)	JX572717	JX517657
Leucadendron galpinii E.Phillips & Hutch.	Proteaceae	*MWC25211* (K)	JX572718	JX517879
Leucadendron macowanii E.Phillips	Proteaceae	*MWC28334* (K)	JX572719	JX518193
Leucadendron pubescens R. Br.	Proteaceae	*MWC28389* (K)	JX572720	JX517455
Leucadendron rubrum Burm. f.	Proteaceae	*PG63* (JRAU)	JX572721	JX518007
Leucadendron salicifolium I.A. Williams	Proteaceae	*PG56* (JRAU)	JX572722	JX518063
Leucadendron strobilinum Druce	Proteaceae	*MWC28010* (K)	JX572723	JX517923
Leucaena leucocephala (Lam.) de Wit	Fabaceae	*JG056* (JRAU)	JX572724	JX517864
Leucosidea sericea Eckl. & Zeyh.	Rosaceae	*OM&MvdB48* (JRAU)	JX572725	JX518044
Leucospermum conocarpodendron (L.) H.St.John	Proteaceae	*OM3102* (JRAU)	JX572726	JX517516
Leucospermum conocarpodendron subsp. *viridum* Rourke	Proteaceae	*MWC27983* (K)	-	JX518219
Leucospermum cuneiforme Rourke	Proteaceae	*OM2267* (JRAU)	JX572727	JX517928
Leucospermum gerrardii Stapf	Proteaceae	*MWC26648* (K)	JX572728	JX517341
Leucospermum rodolentum Rourke	Proteaceae	*OM2812* (JRAU)	JX572729	JX518225
Leucospermum saxosum S.Moore	Proteaceae	*MWC28315* (K)	JX572730	JX517935

Ligustrum japonicum Thunb.	Oleaceae	*JG038* (JRAU)	JX572731	JX517970
Ligustrum lucidum W.T.Aiton	Oleaceae	*BS0102* (JRAU)	JQ412380	JQ412257
Ligustrum ovalifolium Hassk.	Oleaceae	*Schaefer2008/251* (BM)	HM850124.1	HM850980.1
Ligustrum sinense Lour.	Oleaceae	*Abbott23510* (FLAS)	GU135150.1	GU134986.1
Ligustrum vulgare L.	Oleaceae	*LegMedMO35* (MOD)	HQ619759.1	HQ619820.1
Liparia hirsuta Thunb.	Fabaceae	*JWB020* (NH)	JX572732	JX517359
Liparia myrtifolia Thunb.	Fabaceae	*JWB039* (NH)	JX572733	JX517632
Liparia rafnioides A.L.Schutte	Fabaceae	*JWB033* (NH)	JX572734	JX517668
Lippia javanica (Burm.f.) Spreng.	Verbenaceae	*RBN348* (KNP)	JX572735	JX517480
Liquidambar styraciflua L.	Altingiaceae	Genbank	EU002281	EU002182
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	*PS5037MT01* (GXCM)	HM019482.1	HM019342.1
Lopholaena coriifolia (Sond.) E.Phillips & C.A.Sm.	Asteraceae	*OM&MvdB41* (JRAU)	JX572736	JX517496
Loxostylis alata Spreng. ex Rchb.	Anacardiaceae	*OM1827* (JRAU)	JX572737	JX517988
Ludwigia octovalvis (Jacq.) P.H.Raven	Onagraceae	*OM0213* (JRAU)	JF265505	JX517844
Lumnitzera racemosa Willd.	Combretaceae	*OM2478* (JRAU)	JX572738	JX517488
Lycium afrum L.	Solanaceae	*BS0140* (JRAU)	JQ412384	JQ412259
Lycium cinereum Thunb.	Solanaceae	*Gubb12801* (PRE)	-	AB036623.1
Lycium ferocissimum Miers	Solanaceae	*OM2993* (JRAU)	JX572739	JX517342

Lycium oxycarpum Dunal	Solanaceae	*OM2936* (JRAU)	JX572740	JX517868
Lycium schizocalyx C.H.Wright	Solanaceae	*Gubb12489* (PRE)	-	AB036622.1
Lycium villosum Schinz	Solanaceae	*McDonald77/64* (PRE)	-	AB036624.1
Lydenburgia abbottii (A.E.van Wyk & M.Prins) Steenkamp, A.E.van Wyk & M.Prins	Celastraceae	*Abbott9242* (BNRH)	JX572741	JX517339
Lydenburgia cassinoides N. Robson	Celastraceae	*Archer&Archer2570* (PRE)	-	DQ217548.1
Mackaya bella Harv.	Acanthaceae	*CS14* (JRAU)	JX572742	JX518061
Maclura africana (Bureau) Corner	Moraceae	*OM2106* (JRAU)	JX572743	JX518158
Macphersonia gracilis var. *hildebrandtii* (O. Hoffm.) Capuron	Sapindaceae	*Rabenantonadro1081* (MO)	-	EU720697.1
Maerua angolensis DC.	Capparaceae	*OM1449* (JRAU)	JX572744	JX518208
Maerua cafra Pax	Capparaceae	*OM3189* (JRAU)	JX572745	JX517702
Maerua decumbens (Brongn.) DeWolf	Capparaceae	*OM2097* (JRAU)	JX572746	JX517701
Maerua juncea subsp. *crustata* Wild	Capparaceae	*OM1592* (JRAU)	JX572747	JX517737
Maerua parvifolia Pax	Capparaceae	*RL1199* (JRAU)	-	JX518011
Maerua rosmarinoides Gilg & Ben.	Capparaceae	*OM1476* (JRAU)	JX572748	JX517903
Maesa lanceolata Forssk.	Primulaceae	*OM2020* (JRAU)	JF265513	JF270859

Mallotus oppositifolius (Geiseler) Müll.Arg.	Euphorbiaceae	*Okoli25* (JRAU)	-	JX517554
Mangifera indica L.	Anacardiaceae	*75538* (KUH)	-	EF205595.2
Manihot esculenta Crantz	Euphorbiaceae	*Okoli24* (JRAU)	-	JX517554
Manilkara concolor (Harv.) Gerstner	Sapotaceae	*OM0989* (JRAU)	JX572750	JX517949
Manilkara discolor (Sond.) J.H.Hemsl.	Sapotaceae	*OM2642* (JRAU)	JX572752	JX518015
Manilkara mochisia (Baker) Dubard	Sapotaceae	*OM1392* (JRAU)	JF265514	JF270860
Manilkara nicholsonii A.E.van Wyk	Sapotaceae	*Abbott9202* (BNRH)	JX572753	JX517570
Maprounea africana Müll.Arg.	Euphorbiaceae	*OM2619* (JRAU)	JX572754	JX517335
Margaritaria discoidea (Baill.) G.L.Webster	Euphorbiaceae	*OM2639* (JRAU)	JX572755	JX518168
Margaritaria discoidea var. *nitida* (Pax) Radcl.-Sm.	Euphorbiaceae	*OM1922* (JRAU)	JF265515	JF270861
Markhamia obtusifolia (Baker) Sprague	Bignoniaceae	*OM2375* (JRAU)	JX572756	JX517405
Markhamia zanzibarica (Bojer ex DC.) K.Schum.	Bignoniaceae	*OM3500* (JRAU)	JX572757	JX517896
Mascarenhasia arborescens A.DC.	Apocynaceae	*OM2664* (JRAU)	JX572758	JX517477
Maurocenia frangula Mill.	Celastraceae	*Archer2169* (PRE)	AM234957.1	DQ217538.1
Maytenus abbottii A.E.van Wyk	Celastraceae	*Abbott9139* (BNRH)	JX572759	JX517940
Maytenus acuminata (L.f.) Loes.	Celastraceae	*Abbott9201* (BNRH)	JX572760	JX517555
Maytenus albata (N.E.Br.) E.Schmidt bis & Jordaan	Celastraceae	*OM1855* (JRAU)	JX572761	JX517851
Maytenus cordata (E.Mey. ex Sond.) Loes.	Celastraceae	*Abbott9138* (BNRH)	JX572762	JX517915

Maytenus oleoides (Lam.) Loes.	Celastraceae	*OM2262* (JRAU)	JX572763	JX517991
Maytenus peduncularis Loes.	Celastraceae	*MWC27163* (K)	JX572764	JX517460
Maytenus procumbens (L. f.) Loes.	Celastraceae	*OM3602* (JRAU)	-	JX970911
Maytenus Molina sp. nov. A	Celastraceae	*Abbott9140* (BNRH)	JX572765	JX517794
Maytenus undata (Thunb.) Blakelock	Celastraceae	*OM2644* (JRAU)	JX572766	JX517671
Meiostemon tetrandrus (Exell) Exell & Stace	Combretaceae	*OM1653* (JRAU)	JX572767	JX518048
Melaleuca hypericifolia Sm.	Myrtaceae	MTJ-0068 (JRAU)	KM392257	KM392243
Melia azedarach L.	Meliaceae	*OM1735* (JRAU)	JX905969	JX517878
Memecylon natalense Markg.	Melastomataceae	*MWC35866* (K)	-	JX517426
Metalasia densa (Lam.) P.O.Karis	Asteraceae	*BS0166* (JRAU)	JQ412390	JQ412265
Metalasia muricata (L.) D.Don	Asteraceae	*AM0154* (JRAU)	JX572769	JX517917
Metarungia longistrobus (C.B.Clarke) Baden	Acanthaceae	*CS15* (JRAU)	JF265518	JF270864
Metrosideros angustifolia (L.) Sm.	Myrtaceae	*OM2303* (JRAU)	JX572770	JX517871
Metrosideros excelsa Sol. ex Gaertn.	Myrtaceae	Genbank	HM850177	HM851052
Milicia excelsa (Welw.) C.C.Berg	Moraceae	*OM2696* (JRAU)	JX572771	JX517997
Millettia grandis (E.Mey.) Skeels	Fabaceae	*OM1757* (JRAU)	-	JX517504
Millettia mossambicensis J.B.Gillett	Fabaceae	*OM2335* (JRAU)	JX572772	JX517618

Millettia stuhlmannii Taub.	Fabaceae	*OM2522* (JRAU)	JX572773	JX517411
Millettia usaramensis Taub.	Fabaceae	*OM2433* (JRAU)	JX905971	JX905956
Mimetes arboreus Rourke	Proteaceae	*Latimer27107* (NBG)	GQ248642.1	GQ248156.1
Mimetes fimbriifolius Salisb. ex Knight	Proteaceae	*AM0151* (JRAU)	JX572774	JX518183
Mimosa pigra L.	Fabaceae	*OM3598* (JRAU)	JX572775	JX517729
Mimusops caffra E.Mey. ex A.DC.	Sapotaceae	*OM2472* (JRAU)	JX572776	JX517777
Mimusops obovata Sond.	Sapotaceae	*OM1554* (JRAU)	JX572777	JX517628
Mimusops obtusifolia Lam.	Sapotaceae	*OM2627* (JRAU)	JX572778	JX518165
Mimusops zeyheri Sond.	Sapotaceae	*RBN248* (KNP)	JX572779	JX517445
Mitriostigma axillare Hochst.	Rubiaceae	*Abbott9153* (BNRH)	JX572780	JX517739
Monanthotaxis buchananii (Engl.) Verdc.	Annonaceae	*OM2624* (JRAU)	JX572781	JX517585
Monanthotaxis caffra Verdc.	Annonaceae	*OM0276* (JRAU)	JF265520	JF270866
Mondia Skeels sp.	Apocynaceae	*Sennblad215* (TL)	-	AY899941.1
Mondia whiteii (Hook.f.) Skeels	Apocynaceae	*BS 0569* (JRAU)	-	KM392238
Monodora junodii Engl. & Diels	Annonaceae	*RBN288* (KNP)	JX572782	JX518164
Monodora junodii Engl. & Diels var.macrantha	Annonaceae	*RBN159* (KNP)	JX572783	JX517853
Monodora stenopetala Oliv.	Annonaceae	*OM2358* (JRAU)	JX572784	JX518064
Monotes glaber Sprague	Dipterocarpaceae	*OM2130* (JRAU)	JX572785	JX517931

Montanoa hibiscifolia (Benth.) Standl.	Asteraceae	*BS 0567* (JRAU)	KM392253	KM392236
Montinia caryophyllacea Thunb.	Montiniaceae	*Bremer3521* (UPS)	-	AJ429359.1
Morella cordifolia (L.) Killick	Myricaceae	*OM2290* (JRAU)	JX572786	JX517650
Morella pilulifera (Rendle) Killick	Myricaceae	*OM2024* (JRAU)	JF265521	JF270867
Morella serrata (Lam.) Killick	Myricaceae	*Abbott9173* (BNRH)	JX572787	JX517577
Moringa oleifera Lam.	Moringaceae	*Iltis30501* (WIS)	L11359.2	AY483223.1
Moringa ovalifolia Dinter & A.Berger	Moringaceae	*2000-0148-09* (BR)	-	AY461577.1
Morus alba L.	Moraceae	*BS0124* (JRAU)	JQ412393	JQ412268
Morus australis Poir.	Moraceae	*ME-0158* (n.a.)	GU145573.1	GU145559.1
Morus nigra L.	Moraceae	Genbank	GU145572	GU145558
Mundulea sericea (Willd.) A.Chev.	Fabaceae	*OM2625* (JRAU)	JX572788	JX517667
Murraya paniculata (L.) Jack	Rutaceae	*Genbank*	GU135173.1	GU135010.1
Mussaenda arcuata Poir.	Rubiaceae	*McPehrson16213* (MO)	Y11854.1	HM119551.1
Myoporum laetum G.Forst.	Scrophulariaceae	BS0122	JQ412397	JQ412269
Myrsine africana L.	Primulaceae	*OM2822* (JRAU)	JX572789	JX518081
Mystroxylon aethiopicum subsp. *schlechteri* (Loes.) R.H. Archer	Celastraceae	*RBN355* (KNP)	JX572790	JX517904

Necepsia Prain sp.	Euphorbiaceae	*Schmidt3474* (MO)	-	AB233764.1
Nectaropetalum capense Stapf & Boodle	Erythroxylaceae	*Abbott9146* (BNRH)	JX572791	JX970913
Neoboutonia mannii Benth. & Hook.f.	Euphorbiaceae	*Fay6701* (MO)	AY794896.1	AB233777.1
Nerium oleander L.	Apocynaceae	*BS0125* (JRAU)	JQ412398	JQ412271
Newtonia buchananii (Baker) G.C.C.Gilbert & Boutiqu	Fabaceae	*BNBG69-6494* (BR)	-	AF521847
Newtonia hildebrandtii (Vatke) Torre	Fabaceae	*BNBG73-2891* (BR)	-	AF521848
Nicotiana africana Merxm.	Solanaceae	*Clarkson020* (BM)	-	AJ585881.1
Nicotiana glauca Graham	Solanaceae	*OM3016* (JRAU)	JX572792	JX517989
Nuxia congesta R.Br. ex Fresen.	Scrophulariaceae	*OM&MvdB52* (JRAU)	JF265525	JF270871
Nuxia floribunda Benth.	Scrophulariaceae	*OM2025* (JRAU)	JF265526	JF270872
Nuxia oppositifolia (Hochst.) Benth.	Scrophulariaceae	*OM2648* (JRAU)	JX572793	JX517443
Nylandtia Dumort. sp.	Polygalaceae	*Forest250* (K, NBG)	GQ248650.1	AM889730.1
Nymania capensis Lindb.	Meliaceae	*OM1096* (JRAU)	JX572794	JX518038
Obetia tenax Friis	Urticaceae	*OM0567* (JRAU)	JX572795	JX518232
Ochna serrulata Walp.	Ochnaceae	*Schaefer2008/796* (BM)	-	HM850999.1
Ocotea bullata (Burch.) E. Meyer in Drege	Lauraceae	*Abbott9194* (BNRH)	JQ025066	JQ024978
Olax dissitiflora Oliv.	Olacaceae	*OM2070* (JRAU)	JX572796	JX517428

Oldenburgia grandis (Thunb.) Baill.	Asteraceae	*Trinder-Smith s. n.* (BOL)	-	EU385379.1
Olea capensis L.	Oleaceae	*OM3183* (JRAU)	JX572797	JX517691
Olea capensis subsp. *hochstetteri* (Baker) Friis & P.S.Green	Oleaceae	*OM2677* (JRAU)	JX572798	JX518236
Olea europaea L.	Oleaceae	*OM2818* (JRAU)	JX572799	JX518175
Olea exasperata Jacq.	Oleaceae	*OM3219* (JRAU)	JX572800	JX518125
Olea woodiana Knobl.	Oleaceae	*OM1527* (JRAU)	JX572801	JX517442
Olinia capensis Klotzsch	Penaeaceae	*Schoenenberger519* (Z, BOL)	AM235624.1	AY151569.1
Olinia emarginata Burtt Davy	Penaeaceae	*OM2252* (JRAU)	JX572802	JX970901
Olinia radiata Hofmeyr & E.Phillips	Penaeaceae	*Abbott9119* (BNRH)	JX572803	JX517492
Olinia vanguerioides Baker f.	Penaeaceae	*Blarer s.n.* (Z)	AM235626.1	AY151572.1
Olinia ventosa (L.) Cufod.	Penaeaceae	*OM3184* (JRAU)	JX572804	JX517344
Oncinotis tenuiloba Stapf	Apocynaceae	*Abbott9254* (BNRH)	JX572805	JX517556
Oncoba spinosa Forssk.	Salicaceae	*RBN322* (KNP)	JX572806	JX517821
Opilia Roxb. sp.	Opiliacea	*Chase1903* (K)	-	AY042621.1
Opuntia engelmannii Salm-Dyck	Cactaceae	*Genbank*	-	JF786778.1

Opuntia ficus-indica (L.) Mill.	Cactaceae	*JG047* (JRAU)	JX572807	JX517861
Opuntia humifusa (Raf.) Raf.	Cactaceae	*Genbank*	JF787228.1	JF786791.1
Opuntia microdasys (Lehm.) Pfeiff.	Cactaceae	*Genbank*	JF787551.1	JF786809.1
Opuntia monacantha Haw.	Cactaceae	*Genbank*	-	JF786810.1
Opuntia robusta J.C. Wendl.	Cactaceae	*Genbank*	-	JF786838.1
Oreobambos buchwaldii K.Schum.	Poaceae	*Kare s.n.* (TCD)	-	EU434272.1
Ormocarpum kirkii S.Moore	Fabaceae	*OM2014* (JRAU)	JX572809	JX517953
Ormocarpum trichocarpum (Taub.) Engl.	Fabaceae	*OM2508* (JRAU)	JX572810	JX517885
Osyris compressa A.DC.	Santalaceae	*Abbott9227* (BNRH)	JX572811	JX517721
Osyris lanceolata Hochst. & Steud.	Santalaceae	*OM2016* (JRAU)	JX572812	JX517317
Otholobium caffrum (Eckl. & Zeyh.) C.H.Stirt.	Fabaceae	*Abbott9245* (BNRH)	JX572813	JX970905
Otholobium spicatum (L.) C.H.Stirt.	Fabaceae	*AMM3445* (BOL)	JX572814	JX517502
Otholobium wilmsii (Harms) C.H.Stirt.	Fabaceae	*AMM3782* (BOL)	JX572815	JX517354
Oxyanthus latifolius Sond.	Rubiaceae	*OM2344* (JRAU)	JX572816	JX517392
Oxyanthus pyriformis (Hochst.) Skeels	Rubiaceae	*OM2191* (JRAU)	JX572817	JX517942
Oxyanthus speciosus subsp. *gerrardii* (Sond.) Bridson	Rubiaceae	*Abbott9253* (BNRH)	JX572818	JX517484
Oxytenanthera abyssinica (A.Rich.) Munro	Poaceae	*OM2572* (JRAU)	JX572819	JX905952

Ozoroa engleri R.Fern. & A.Fern.	Anacardiaceae	*OM1169* (JRAU)	JX572820	JX518126
Ozoroa obovata (Oliv.) R. Fern. & A. Fern.	Anacardiaceae	*OM2511* (JRAU)	JX572821	JX517800
Ozoroa paniculosa var. *paniculosa* R.Fern. & A.Fern.	Anacardiaceae	*OM1948* (JRAU)	JX572822	JX517435
Ozoroa sphaerocarpa R.Fern. & A.Fern.	Anacardiaceae	*OM1106* (JRAU)	JX572823	JX517468
Pachypodium namaquanum (Wyley ex Harv.) Welw.	Apocynaceae	*OM2796* (JRAU)	JX572824	JX517791
Pachypodium saundersii N.E.Br.	Apocynaceae	*OM1149* (JRAU)	JX572825	JX517532
Pancovia golungensis (Hiern) Exell & Mendonça	Sapindaceae	*OM2208* (JRAU)	JX572826	JX517712
Pandanus Parkinson sp.	Pandanaceae	*Shawpc0686L* (CUHK)	JN407333.1	JN407167.2
Pappea capensis Eckl. & Zeyh.	Sapindaceae	*OM0230* (JRAU)	JX572827	JX517327
Paranomus bracteolaris Salisb. ex Knight	Proteaceae	*MWC28485* (K)	JX572828	JX517606
Paranomus tomentosus N.E. Br.	Proteaceae	*MWC28312* (K)	JX572829	JX517966
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	*Genbank*	-	HM851146.1
Parinari capensis Harv.	Chrysobalanaceae	*OM3613* (JRAU)	-	JX905947
Parinari curatellifolia Planch. ex Benth.	Chrysobalanaceae	*OM2621* (JRAU)	JX572830	JX517369
Parkinsonia aculeata L.	Fabaceae	*Hawkins94/59* (RBGE) / *Salywon668* (ASU)	AY904403.1	AY386917.1

Paropsia braunii Gilg	Passifloraceae	*Zyhra949* (WIS)	-	EF135576.1
Passerina corymbosa Eckl. ex C.H. Wright	Thymelaeaceae	*OM3106* (JRAU)	JX572831	JX517973
Passerina filiformis L.	Thymelaeaceae	*Abbott9175* (BNRH)	JX572832	JX518022
Passerina montana Thoday	Thymelaeaceae	*OM3400* (JRAU)	JX572833	JX517533
Passerina rigida Wikstr.	Thymelaeaceae	*OM1753* (JRAU)	JX572834	JX518094
Pauridiantha symplocoides (S.Moore) Bremek.	Rubiaceae	*Cable1389* (K)	-	AY538410.1
Paulownia tomentosa Steud.	Paulowniaceae	*Genbank*	-	AJ429339.1
Pavetta bowkeri Harv.	Rubiaceae	*Abbott9184* (BNRH)	JX572836	JX518106
Pavetta catophylla K.Schum.	Rubiaceae	*OM0335* (JRAU)	JX572837	JX517846
Pavetta edentula Sond.	Rubiaceae	*OM2504* (JRAU)	JX572838	JX517382
Pavetta galpinii Bremek.	Rubiaceae	*Abbott9251* (BNRH)	JX572839	JX518147
Pavetta inandensis Bremek.	Rubiaceae	*Abbott9250* (BNRH)	JX572840	JX517852
Pavetta lanceolata Eckl.	Rubiaceae	*OM2234* (JRAU)	JX572841	JX518143
Pavetta revoluta Hochst.	Rubiaceae	*OM2195* (JRAU)	JX572842	JX517474
Pavetta schumanniana F.Hoffm. ex K.Schum.	Rubiaceae	*OM0941* (JRAU)	JX572843	JX518179
Pavetta zeyheri Sond.	Rubiaceae	*OM1939* (JRAU)	JX572844	JX518055
Peddiea africana Harv.	Thymelaeaceae	*OM2469* (JRAU)	JX572845	JX518167
Peltophorum africanum Sond.	Fabaceae	*OM2401* (JRAU)	JX572846	JX517837

Pereskia aculeata Mill.	Cactaceae	*OM3711* (JRAU)	JX905965	JX905944
Persea americana Mill.	Lauraceae	*Genbank*	JQ592393.1	JQ588149.1
Phaeoptilum spinosum Radlk.	Nyctaginaceae	*OM2957* (JRAU)	JX572847	JX518227
Philenoptera bussei (Harms) Schrire	Fabaceae	*OM2376* (JRAU)	JX572848	JX518116
Philenoptera violacea (Klotzsch) Schrire	Fabaceae	*OM0242* (JRAU)	JF265547	JF270890
Phoenix reclinata Jacq.	Arecaceae	*OM1122* (JRAU)	JX572849	JX518180
Phylica buxifolia L.	Rhamnaceae	*OM3096* (JRAU)	JX572850	JX488292
Phylica oleaefolia Vent.	Rhamnaceae	*MWC03273* (K)	JX572851	JX517337
Phylica paniculata Willd.	Rhamnaceae	*Abbott9174* (BNRH)	JX572852	JX517422
Phylica villosa Thunb.	Rhamnaceae	*MWC03309* (K)	-	JX517300
Phyllanthus hutchinsonianus S.Moore	Euphorbiaceae	*Poilecot7974* (G, K)	-	AY936601.1
Phyllanthus inflatus Hutch.	Euphorbiaceae	*OM1884* (JRAU)	JX572853	JX518030
Phyllanthus ovalifolius Forssk.	Euphorbiaceae	*OM2455* (JRAU)	JX572854	JX518152
Phyllanthus pinnatus (Wight) G.L.Webster	Euphorbiaceae	*OM0843* (JRAU)	JF265549	JF270892
Phyllanthus reticulatus Poir.	Euphorbiaceae	*OM0224* (JRAU)	JF265550	JF270893
Phymaspermum acerosum (DC.) Källersjö	Asteraceae	*Magee306* (NH)	JX572855	JX517882
Phytolacca dioica L.	Phytolaccaceae	*OM2000* (JRAU)	JX572856	JX517912

Pinus canariensis C.Sm.	Pinaceae	*BU-10230* (LZU)	AB019823.1	AB084494.1
Pinus elliottii Engelm.	Pinaceae	*Genbank*	AY724755.1	AY724747.1
Pinus halepensis Mill.	Pinaceae	*BS0081* (JRAU)	-	JX905942
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	n.a.	AB063381.1	AB063513.1
Pinus pinaster Aiton	Pinaceae	*Wang s.n.* (NF)	AB019818.1	AB084493.1
Pinus pinea L.	Pinaceae	*Wang s.n.* (NF)	AB019822.1	AB084496.1
Pinus radiata D.Don	Pinaceae	n.a.	AB063383.1	AB080934.1
Pinus roxburghii Sarg.	Pinaceae	n.a.	AB064339.1	AB084495.1
Pinus taeda L.	Pinaceae	n.a.	-	AY724750.1
Piper L. sp.	Piperaceae	*Chao&Zhang s.n.* (SHMU) / *Tamura&Fuse10016* (OSA)	EF450315.1	AB040153.2
Pittosporum undulatum Vent.	Pittosporaceae	*Schaefer2008/117* (BM)	HM850262.1	HM850707.1
Pittosporum viridiflorum Sims	Pittosporaceae	*OM2815* (JRAU)	JX572857	JX517842
Platylophus trifoliatus D. Don	Cunoniaceae	*OM3163* (JRAU)	JX572858	JX517817
Pleiocarpa pycnantha (K.Schum.) Stapf	Apocynaceae	*OM2652* (JRAU)	JX572860	JX517964
Pleioceras orientale Vollesen	Apocynaceae	*Jongkind2131* (MO)	-	EF456364.1
Pleurostylia capensis Oliv.	Celastraceae	*OM1867* (JRAU)	JX572861	JX517549

Plumbago auriculata Lam.	Plumbaginaceae	*OM1686* (JRAU)	EU002283.1	JF270896
Podalyria calyptrata (Retz.) Willd.	Fabaceae	*MWC16091* (K)	JX572864	JX518039
Podalyria myrtillifolia Willd.	Fabaceae	*AMM5052* (BOL)	JX572865	JX517747
Podocarpus elongatus (Aiton) L'Hér. ex Pers.	Podocarpaceae	n.a.	HM593643.1	HM593746.1
Podocarpus henkelii Stapf ex Dallim. & B.D.Jacks.	Podocarpaceae	*Adelaide BG 842959*	AF249610.1	HM593751.1
Podocarpus latifolius (Thunb.) R.Br. ex Mirb.	Podocarpaceae	*Mt Lofty BG G900695*	AF249612.1	HM593754.1
Polygala myrtifolia L.	Polygalaceae	*MWC18613* (K)	JX572866	JX517548
Polygala virgata var. *decora* (Sond.) Harv.	Polygalaceae	*Abbott9243* (BNRH)	JX572868	JX517329
Polyscias fulva (Hiern) Harms	Araliaceae	*OM1896* (JRAU)	JX572870	JX517735
Polysphaeria lanceolata Hiern	Rubiaceae	*OM2647* (JRAU)	JX572871	JX518079
Populus alba L.	Salicaceae	*Schaefer2008/422* (BM)	HM850277.1	AM889739.1
Populus canescens (Aiton) Sm.	Salicaceae	*OM3468* (JRAU)	JX572872	JX970910
Populus deltoides W. Bartram ex Marshall	Salicaceae	*JG023* (JRAU)	JX572873	JX517356
Populus nigra var. *italica* Koehne	Salicaceae	*Schaefer2008/423* (BM) / n.a.	HM850278.1	AB038186.1
Portulacaria afra Jacq.	Portulacaceae	*OM3198* (JRAU)	JX572874	JX517924
Pouteria adolfi-friedericii subsp. *australis*	Sapotaceae	*NH200203* (TL)	-	FJ037946.1

(J.H.Hemsl.) L.Gaut.				
Pouzolzia mixta Solms	Urticaceae	*OM1417* (JRAU)	JQ025073	JQ024983
Premna mooiensis (H.Pearson) W.Piep.	Lamiaceae	*OM1645* (JRAU)	JX572875	JX517986
Prionostemma delagoensis (Loes.) N.Hallé	Celastraceae	*OM3738* (JRAU)	-	JX517579
Pristimera longipetiolata (Oliv.) N. Hallé	Celastraceae	*OM1098* (JRAU)	JX572876	JX517581
Prosopis glandulosa var. *torreyana* (L.D.Benson)	Fabaceae	*Wojciechowski875* (ASU)	-	AY386851.1
M.C.Johnst.				
Prosopis velutina Wooton	Fabaceae	*R. Gutierrez658* (ASU)	-	EU025910.1
Protea aurea subsp. *aurea* Rourke	Proteaceae	*MWC24059* (K)	JX572877	JX517773
Protea caffra Meisn.	Proteaceae	*Abbott9234* (BNRH)	JX572878	JX517909
Protea coronata Lam.	Proteaceae	*MWC25806* (K)	JX572879	JX517822
Protea glabra Thunb.	Proteaceae	*MWC25805* (K)	JX572880	JX517612
Protea laurifolia Thunb.	Proteaceae	*MWC25802* (K)	JX572881	JX517919
Protea mundii Klotzsch	Proteaceae	*MWC24058* (K)	JX572882	JX517639
Protea neriifolia R.Br.	Proteaceae	*Anderson10* (UPS)	-	EU169659.1
Protea nitida Mill.	Proteaceae	*MWC25791* (K)	JX572883	JX517372
Protea punctata Meisn.	Proteaceae	*MWC24085* (K)	JX572884	JX517553
Protea repens L.	Proteaceae	*OM3109* (JRAU)	JQ025075	JX905940

Protea roupelliae subsp. *roupelliae* Meisn.	Proteaceae	*Abbott9165* (BNRH)	JX572885	JX517802
Protea welwitschii Engl.	Proteaceae	*MvdB0024* (JRAU)	JX905962	JX970896
Protorhus longifolia (Ber (NH).) Engl.	Anacardiaceae	*OM1764* (JRAU)	JX572886	JX517542
Prunus africana (Hook. f.) Kalkman	Rosaceae	*OM1568* (JRAU)	JQ025076	JQ024985
Prunus armeniaca L.	Rosaceae	*Genbank*	HQ235389.1	HQ235107.1
Prunus persica (L.) Stokes	Rosaceae	*OM1899* (JRAU)	JX572887	JX518003
Prunus serotina Ehrh.	Rosaceae	*Beyersdorfer8-84* (US) / *AP269* (COLG)	DQ006123.1	HQ593401.1
Pseudarthria hookeri Wight & Arn.	Fabaceae	*OM1473* (JRAU)	JF265559	JF270902
Pseudobersama mossambicensis (Sim) Verdc.	Meliaceae	*OM2645* (JRAU)	JX572888	JX517407
Pseudophyllanthus ovalis (E.Mey. ex Sond.) Voronts. & Petra Hoffm.	Euphorbiaceae	*Muller&Scheepers4286* (K)	-	AY830260.1
Pseudosalacia streyi Codd	Celastraceae	*Abbott9248* (BNRH)	JX572889	JX517644
Psidium cattleianum Afzel. ex Sabine	Myrtaceae	*Abbott24905* (FLAS)	GU135194.1	GU135031.1
Psidium guajava L.	Myrtaceae	*CS36* (JRAU)	JQ025077	JQ024986
Psidium guineense Sw.	Myrtaceae	*Genbank*	JQ592985.1	JQ588513.1
Psoralea aphylla L.	Fabaceae	*AMM3400* (BOL)	JX572890	JX517348

Psoralea arborea Sims	Fabaceae	*AMM3407* (BOL)	JX572895	JX517541
Psoralea axillaris L.f.	Fabaceae	*AMM5874* (BOL)	JX572891	JX518186
Psoralea filifolia Eckl. & Zeyh.	Fabaceae	*AMM4321* (BOL)	JX572892	JX517464
Psoralea glabra E.Mey.	Fabaceae	*AMM3646* (BOL)	JX572893	JX517873
Psoralea pinnata L.	Fabaceae	*OM3107* (JRAU)	JX572894	JX517859
Psychotria capensis (Eckl.) Vatke	Rubiaceae	*OM1577* (JRAU)	JX572896	JX517469
Psychotria kirkii Hiern	Rubiaceae	*OM3487* (JRAU)	JX572835	JX518135
Psydrax locuples (K.Schum.) Bridson	Rubiaceae	*OM2483* (JRAU)	JX572897	JX518031
Psydrax micans (Bullock) Bridson	Rubiaceae	*OM2678* (JRAU)	JX572898	JX517914
Psydrax obovata (Klotzsch ex Eckl. & Zeyh.) Bridson	Rubiaceae	*OM1756* (JRAU)	JX572899	JX970909
Ptaeroxylon obliquum (Thunb.) Radlk.	Rutaceae	*OM1326* (JRAU)	JQ025079	JQ024988
Pteleopsis anisoptera (Welw. ex M.A.Lawson) Engl. & Diels	Combretaceae	*OM1656* (JRAU)	JX572900	JX517605
Pteleopsis myrtifolia (M.A.Lawson) Engl. & Diels	Combretaceae	*OM2368* (JRAU)	JX572901	JX517526
Pterocarpus angolensis DC.	Fabaceae	*OM2717* (JRAU)	JX572902	JX517843
Pterocarpus brenanii Barbosa & Torre	Fabaceae	*OM2510* (JRAU)	JX572903	JX517771
Pterocarpus rotundifolius (Sond.) Druce	Fabaceae	*RBN174* (KNP)	JX572904	JX517562

Pterocarpus rotundifolius subsp. *polyanthus* (Harms) Mendonca & Sousa	Fabaceae	*OM2317* (JRAU)	JX572905	JX518110
Pterocelastrus echinatus N.E.Br.	Celastraceae	*OM1868* (JRAU)	JX572906	JX517334
Pterocelastrus rostratus Walp.	Celastraceae	*Abbott9203* (BNRH)	JX572907	JX517539
Pterocelastrus tricuspidatus Walp.	Celastraceae	*Abbott9213* (BNRH)	JX572908	JX517816
Pterolobium stellatum (Forssk.) Brenan	Fabaceae	*RBN219* (KNP)	-	JF270908
Pulchea dioscoridis (L.) DC.	Asteraceae	*OM2428* (JRAU)	JX572909	JX517666
Punica granatum L.	Punicaeae	*Genbank*	HE963623.1	HE967472.1
Putterlickia pyracantha (L.) Endl.	Celastraceae	*AM0234* (JRAU)	JX572910	JX517305
Putterlickia retrospinosa A.E.van Wyk & Mostert	Celastraceae	*Abbott9126* (BNRH)	JX572911	JX518119
Putterlickia verrucosa (E. Mey. ex Sond.) Szyszyl.	Celastraceae	*OM1404* (JRAU)	JF265566	JF270909
Pycnostachys urticifolia Hook.f.	Lamiaceae	*OM1992* (JRAU)	JF265567	JF270910
Pyracantha coccinea M. Roem.	Rosaceae	*Atha5823* (YU) / *Kenneth&Hills5274* (ILLS)	JQ391058.1	DQ860472.1
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	*Genbank*	JF943796.1	JF955872.1
Pyrostria bibracteata (Baker) Cavaco	Rubiaceae	*OM2679* (JRAU)	JX572914	JX517448
Pyrostria hystrix (Bremek.) Bridson	Rubiaceae	*OM1195* (JRAU)	JX572915	JX517362

Quercus acutissima Carruth.	Fagaceae	*Genbank*	AB060578.1	AB060069.1
Quercus robur L.	Fagaceae	*Genbank*	JN892128.1	JN895016.1
Quisqualis parviflora Gerrard ex Sond.	Combretaceae	*Abbott8891* (BNRH)	JX572916	JX517360
Rapanea melanophloeos (L.) Mez	Primulaceae	*OM3166* (JRAU)	JQ025081	JQ024989
Raphia australis Oberm. & Strey	Arecaceae	*CS18* (JRAU)	JX572917	JX517810
Raphia farinifera (Gaertn.) Hyl.	Arecaceae	*MWC14927* (K)	JX572918	JX517656
Raspalia trigyna Dummer	Bruniaceae	*De Lange6* (NBG)	-	AY490925.1
Rauvolfia caffra Sond.	Apocynaceae	*OM1376* (JRAU)	JQ025082	JQ024990
Rawsonia lucida Harv. & Sond.	Salicaceae	*OM2662* (JRAU)	JX572920	JX517624
Rhamnus prinoides L'Hér.	Rhamnaceae	*OM3174* (JRAU)	JX572922	JX518229
Rhigozum obovatum Burch.	Bignoniaceae	*OM2942* (JRAU)	JX572923	JX517487
Rhigozum zambesiacum Baker	Bignoniaceae	*OM1590* (JRAU)	JX572924	JX517751
Rhodognaphalon schumannianum A.Robyns.	Malvaceae	*OM2342* (JRAU)	JX572336	JX517920
Rhoicissus digitata (L. f.) Gilg & M. Brandt	Vitaceae	*Abbott9200* (BNRH)	JX572925	JX518018
Rhoicissus revoilii Planch.	Vitaceae	*OM2657* (JRAU)	JX572926	JX517321
Rhoicissus Planch. sp. nov. A	Vitaceae	*Abbott9206* (BNRH)	JX572928	JX517692
Rhoicissus tomentosa (Lam.) Wild & R.B. Drumm.	Vitaceae	*OM1546* (JRAU)	JF265573	JF270916
Rhoicissus tridentata (L. f.) Wild & R.B. Drumm.	Vitaceae	*OM0452* (JRAU)	JQ025083	JQ024991

Rhynchocalyx lawsonioides Oliv.	Penaeaceae	*Abbott9125* (BNRH)	JX572931	JX517938
Ricinus communis L.	Euphorbiaceae	*OM1359* (JRAU)	JF265575	JF270918
Rinorea angustifolia (Thouars) Baill.	Violaceae	*Abbott9152* (BNRH)	JX572932	JX517564
Rinorea domatiosa A.E.van Wyk	Violaceae	*Abbott9186* (BNRH)	JX573115	JX905954
Rinorea elliptica (Oliv.) Kuntze	Violaceae	*OM2333* (JRAU)	JX572933	JX517999
Rinorea ilicifolia (Welw. ex Oliv.) Kuntze	Violaceae	*Enti-sp644* (MO)	-	AB354504.1
Ritchiea R. Br. ex G. Don	Capparaceae	*Hall210* (WIS)	-	EU371785.1
Robinia pseudoacacia L.	Fabaceae	*MvdB0058* (JRAU)	JX572934	JX517993
Robsonodendron eucleiforme (Eckl. & Zeyh.) R.H.Archer	Celastraceae	*Abbott9132* (BNRH)	JX572935	JX517361
Robsonodendron maritimum (Bolus) R.H.Archer	Celastraceae	*MWC28690* (K)	-	JX518231
Rosa rubiginosa L.	Rosaceae	*OM3451* (JRAU)	JX572936	JX970908
Rotheca myricoides (Hochst.) Steane & Mabb.	Lamiaceae	*OM2598* (JRAU)	JX572937	JX517676
Rothmannia capensis Thunb.	Rubiaceae	*OM1786* (JRAU)	JX572938	JX517592
Rothmannia fischeri (K.Schum.) Bullock ex Oberm.	Rubiaceae	*OM1611* (JRAU)	JX572939	JX518115
Rothmannia globosa (Hochst.) Keay	Rubiaceae	*OM1887* (JRAU)	JX572940	JX517976
Rothmannia manganjae (Hiern) Keay	Rubiaceae	*OM2185* (JRAU)	-	JX517759

Rourea orientalis Baill.	Connaraceae	*OM2513* (JRAU)	JX572941	JX518032
Rubus cuneifolius Pursh	Rosaceae	*BS 0559* (JRAU)	KM392260	-
Rubus flagellaris Willd.	Rosaceae	*Genbank*	HM850313.1	HM850694.1
Rubus fruticosus L. agg.	Rosaceae	*Genbank*	JN891407.1	JN894501.1
Ruspolia hypocrateriformis (Vahl) Milne-Redh.	Acanthaceae	*OM1345* (JRAU)	JX572942	JX517979
Ruttya ovata Harv.	Acanthaceae	*OM1150* (JRAU)	JF265578	JF270921
Salacia gerrardii Harv. & Sprague	Celastraceae	*Abbott9241* (BNRH)	JX572944	JX517567
Salacia kraussii (Harv.) Harv.	Celastraceae	*RBN102* (KNP)	JF265579	JF270922
Salix babylonica L.	Salicaceae	n.a.	-	AJ849593.1
Salix fragilis L.	Salicaceae	*Chase991* (K) / n.a.	AJ418841.1	AJ849589.1
Salix mucronata Thunb.	Salicaceae	*OM1198* (JRAU)	JF265580	JF270923
Salvadora australis Schweick.	Salvadoraceae	*OM1317* (JRAU)	JF265581	JF270924
Salvadora persica Wall.	Salvadoraceae	*OM0824* (JRAU)	JF265582	JF270925
Sambucus canadensis L.	Adoxaceae	*Genbank*	HQ590258.1	HQ593429.1
Sambucus nigra L.	Adoxaceae	*Genbank*	HE963645.1	HE967483.1
Schefflera actinophylla (Endl.) Harms	Araliaceae	*Genbank*	GU135189.1	GU135026.1
Schefflera arboricola (Hayata) Merr.	Araliaceae	*Genbank*	U50255.1	U58619.1
Schefflera umbellifera (Sond.) Baill.	Araliaceae	*OM2187* (JRAU)	JX572950	JX517700

Schinus molle L.	Anacardiaceae	*MvdB0046* (JRAU)	JX572951	JX517745
Schinus terebinthifolia Raddi	Anacardiaceae	*OM1982* (JRAU)	JX572952	JX518124
Schinziophyton rautanenii (Schinz) Radcl.-Sm.	Euphorbiaceae	*OM2449* (JRAU)	JX572953	JX518188
Schizolobium parahyba (Vell.) S.F.Blake	Fabaceae	*Genbank*	GQ981870.1	GQ982090.1
Schotia afra (L.) Thunb.	Fabaceae	*OM2274* (JRAU)	JX572954	JX517439
Schotia brachypetala Sond.	Fabaceae	*OM1166* (JRAU)	JQ025087	JQ024995
Schotia capitata Bolle	Fabaceae	*OM1159* (JRAU)	JF265584	JF270927
Schotia latifolia Jacq.	Fabaceae	*Bruneau s.n.* (K)	-	EU362039.1
Schrebera alata (Hochst.) Welw.	Oleaceae	*OM1221* (JRAU)	JX572955	JX517941
Schrebera trichoclada Welw.	Oleaceae	*OM2636* (JRAU)	JX572956	JX517454
Sclerocarya birrea subsp. caffra (Sond.) Kokwaro	Anacardiaceae	*OM0498* (JRAU)	JF265586	JF270929
Sclerochiton harveyanus Nees	Acanthaceae	*Abbott9185* (BNRH)	JX572957	JX517343
Sclerochiton kirkii (T. Anderson) C.B. Clarke	Acanthaceae	*OM2359* (JRAU)	JX572958	JX518192
Sclerocroton integerrimus Hochst.	Euphorbiaceae	*OM2489* (JRAU)	JX572947	JX517685
Scolopia mundii Warb.	Salicaceae	*OM2309* (JRAU)	JX572959	JX517610
Scolopia stolzii Gilg	Salicaceae	*OM2675* (JRAU)	JX572960	JX518217
Scolopia zeyheri (Nees) Szyszyl.	Salicaceae	*OM1781* (JRAU)	JX572945	JX517872

Scutia myrtina (Burm. f.) Kurz	Rhamnaceae	*OM3232* (JRAU)	JX572961	JX517733
Searsia acocksii (Moffett) Moffett	Anacardiaceae	*Abbott9154* (BNRH)	JX572962	JX517985
Searsia angustifolia (L.) F.A.Barkley	Anacardiaceae	*OM2847* (JRAU)	JX572963	JX517801
Searsia chirindensis (Baker f.) Moffett	Anacardiaceae	*OM2284* (JRAU)	JX572964	JX517658
Searsia crenata (Thunb.) Moffett	Anacardiaceae	*OM1986* (JRAU)	JX572965	JX517881
Searsia fastigiata (Eckl. & Zeyh.) Moffett	Anacardiaceae	*Abbott9135* (BNRH)	JX572966	JX517893
Searsia gueinzii (Sond.) F.A.Barkley	Anacardiaceae	*OM0265* (JRAU)	JX572967	JX517709
Searsia incisa (L.f.) F.A.Barkley	Anacardiaceae	*OM3059* (JRAU)	JX572968	JX517587
Searsia laevigata (L.) F.A.Barkley	Anacardiaceae	*OM3214* (JRAU)	JX572969	JX518086
Searsia lancea (L. f.) F.A. Barkley	Anacardiaceae	*OM1942* (JRAU)	JX572970	JX518157
Searsia leptodictya (Diels) T.S.Yi, A.J.Mill. & J.Wen	Anacardiaceae	*RL1655* (JRAU)	JX572971	JX517890
Searsia longispina (Eckl. & Zeyh.) Moffett	Anacardiaceae	*AM0243* (JRAU)	JX572972	JX517438
Searsia lucida (L.) F.A.Barkley	Anacardiaceae	*MWC05809* (K)	JX905961	JX905941
Searsia magalismontana (Sond.) Moffett	Anacardiaceae	*OM1836* (JRAU)	JF265591	JF270934
Searsia natalensis (Ber (NH). ex C.Krauss) F.A.Barkley	Anacardiaceae	*OM2655* (JRAU)	JX572973	JX518140
Searsia nebulosa (Schönland) Moffett	Anacardiaceae	*Abbott9106* (BNRH)	JX572974	JX517862
Searsia pendulina (Jacq.) Moffett	Anacardiaceae	*OM1984* (JRAU)	JX572975	JX517444

Searsia pentheri (Zahlbr.) Moffett	Anacardiaceae	*OM0945* (JRAU)	JX572976	JX517813
Searsia pyroides (Burch.) Moffett	Anacardiaceae	*OM1236* (JRAU)	JX572977	JX517333
Searsia pyroides var. *integrifolia* (Engl.) Moffett.	Anacardiaceae	*OM2477* (JRAU)	JX572929	JX517483
Searsia transvaalensis (Engl.) Moffett	Anacardiaceae	*RL1427* (JRAU)	JX572930	JX518204
Searsia tumulicola (S.Moore) Moffett	Anacardiaceae	*OM2028* (JRAU)	JX572978	JX518095
Searsia undulata (Jacq.) T.S.Yi, A.J.Mill. & J.Wen	Anacardiaceae	*OM2940* (JRAU)	JQ025088	JQ024996
Searsia zeyheri (Sond.) Moffett	Anacardiaceae	*OM2256* (JRAU)	JX572979	JX905948
Securidaca longipedunculata Fresen.	Polygalaceae	*OM3358* (JRAU)	JX572980	JX517755
Seemannaralia gerrardii (Seem.) R.Vig.	Araliaceae	*MWC28187* (K)	JX572981	JX517534
Senna bicapsularis (L.) Roxb.	Fabaceae	*Marazzi&AlvdrezBM159* (PMA, STRI, Z)	-	AM086849.1
Senna corymbosa (Lam.) H.S.Irwin & Barneby	Fabaceae	*MarazziBM103* (CTES, Z)	-	AM086856.1
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	*Irwin&Bameby s.n.* (Z)	Z70154.1	AM086860.1
Senna hirsuta (L.) H.S.Irwin & Barneby	Fabaceae	*Salywon1374* (ASU)	-	EU025912.1
Senna multiglandulosa (Jacq.) H.S.Irwin & Barneby	Fabaceae	*BS 0560* (JRAU)	KM392265	KM392233
Senna occidentalis (L.) Link	Fabaceae	*Marazzi et al. BM060* (PY, CTES, Z)	-	AM086883.1

Senna pendula (Willd.) H.S.Irwin & Barneby	Fabaceae	*Davis0496* (FLAS)	GU135268.1	GU135101.1
Senna petersiana (Bolle) Lock	Fabaceae	*OM2515* (JRAU)	JX572982	JX517765
Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	*OM0910* (JRAU)	JX572983	JX517744
Senna spectabilis (DC.) H.S.Irwin & Barneby	Fabaceae	*Marazzietal.BM029* (PMA, STRI, Z)	-	AM086900.1
Seriphium plumosum L.	Asteraceae	*OM1785* (JRAU)	JX572997	JX517389
Sesamothamnus lugardii N.E.Br. ex Stapf	Pedaliaceae	*OM1622* (JRAU)	JF265597	JF270939
Sesbania bispinosa (Jacq.) W.Wight	Fabaceae	*OM0675* (JRAU)	JX572984	JX517377
Sesbania cinerascens Baker	Fabaceae	*Smith4127* (K)	-	HQ730423.1
Sesbania punicea (Cav.) Benth.	Fabaceae	*Genbank*	GU135148.1	GU135119.1
Shirakiopsis elliptica (Hochst.) Esser	Euphorbiaceae	*OM1843* (JRAU)	JX572946	JX517498
Sideroxylon inerme L.	Sapotaceae	*OM0266* (JRAU)	JX572985	JX517620
Smelophyllum capense Radlk.	Sapindaceae	*Forest755* (NBG) / *KE506* (JCT)	AM235131.1	AY724330.1
Solanecio mannii (Hook.f.) C.Jeffrey	Asteraceae	*Knox555* (L)	-	AF459994.1
Solanum aculeastrum Dunal	Solanaceae	*OM2755* (JRAU)	JQ025091	JQ024998
Solanum betaceum Cav.	Solanaceae	Cy001	-	EF438983
Solanum catombelense Peyr.	Solanaceae	*OM0934* (JRAU)	JF265599	JF270941

Solanum chrysotrichum Schltdl.	Solanaceae	*Genbank*	HM850362.1	HM851099.1
Solanum giganteum Jacq.	Solanaceae	*Abbott9142* (BNRH)	JX572986	JX517374
Solanum lichtensteinii Willd.	Solanaceae	*OM1904* (JRAU)	JF265600	JF270942
Solanum mauritianum Scop.	Solanaceae	*OM0916* (JRAU)	JX572987	JX517446
Solanum panduriforme E. Mey.	Solanaceae	*OM0326* (JRAU)	JF265601	JF270943
Solanum sisymbriifolium Lam.	Solanaceae	Genbank		EF439069
Sonneratia alba Sm.	Lythraceae	n.a.	-	EF408669.1
Sparmannia africana L.f.	Malvaceae	*Alverson4000* (WIS)	-	AY321194.1
Spartium junceum L.	Fabaceae	*Genbank*	HM850377.1	HM851134.1
Spathodea campanulata P.Beauv.	Bignoniaceae	*Genbank*	HM446873.1	HM446746.1
Spiraea cantoniensis Lour.	Rosaceae	*Genbank*	-	AF288127
Spirostachys africana Sond.	Euphorbiaceae	*OM2396* (JRAU)	JX572988	JX517519
Stadmania oppositifolia Lam.	Sapindaceae	*OM0863* (JRAU)	JF265603	JF270945
Stangeria eriopus (Kunze) Baill.	Stangeriaceae	*PR706* (JRAU)	JQ025707	JQ046267
Steganotaenia araliacea Hochst.	Apiaceae	*OM2540* (JRAU)	JX572989	JX517647
Sterculia africana (Lour.) Fiori	Malvaceae	*OM2362* (JRAU)	JX572990	JX517698
Sterculia alexandri Harv.	Malvaceae	*OM1864* (JRAU)	JX572991	JX517774

Sterculia appendiculata K.Schum. ex Engl.	Malvaceae	*OM2360* (JRAU)	JX572992	JX517368
Sterculia murex Hemsl.	Malvaceae	*OM1133* (JRAU)	JX572993	JX517910
Sterculia quinqueloba (Garcke) K.Schum.	Malvaceae	*OM2314* (JRAU)	JX572994	JX518037
Sterculia rogersii N.E.Br.	Malvaceae	*OM1227* (JRAU)	JF265606	JF270948
Stereospermum kunthianum Cham.	Bignoniaceae	*OM2086* (JRAU)	JX572995	JX517630
Stoeberia utilis (L.Bolus) van Jaarsv.	Aizoaceae	*AM0034* (JRAU)	JX572996	JX518027
Streblus Lour.	Moraceae	*PS1238MT01* (IMDY)	-	GQ434235.1
Strelitzia alba (L.f.) Skeels	Strelitziaceae	*Pedersen1154* (C)	-	AF434874.1
Strelitzia nicolai Regel & K.Koch	Strelitziaceae	*OM1678* (JRAU)	JX572998	JX517866
Strophanthus kombe Oliv.	Apocynaceae	*OM2111* (JRAU)	JX572999	JX517906
Strophanthus petersianus Klotzsch	Apocynaceae	*OM1616* (JRAU)	JF265608	JF270950
Strophanthus speciosus (Ward & Harv.) Reber	Apocynaceae	*Abbott9180* (BNRH)	JX573000	JX517730
Strychnos cocculoides Baker	Loganiaceae	*HG4080* (JRAU)	JX573001	JX517336
Strychnos decussata (Pappe) Gilg	Loganiaceae	*OM1259* (JRAU)	JX573002	JX517983
Strychnos henningsii Gilg	Loganiaceae	*Abbott9223* (BNRH)	JX573003	JX518189
Strychnos madagascariensis Poir.	Loganiaceae	*OM2443* (JRAU)	JX573004	JX517867
Strychnos mitis S.Moore	Loganiaceae	*OM1870* (JRAU)	-	JX518090
Strychnos panganensis Gilg	Loganiaceae	*OM2646* (JRAU)	JX573005	JX517363

Strychnos potatorum L.f.	Loganiaceae	*OM2390* (JRAU)	JX573006	JX517683
Strychnos pungens Soler.	Loganiaceae	*MvdB0022* (JRAU)	JF265612	JF270954
Strychnos spinosa Lam.	Loganiaceae	*OM2438* (JRAU)	JX573007	JX517766
Strychnos usambarensis Gilg	Loganiaceae	*OM2593* (JRAU)	JX573008	JX517734
Strychnos xantha Leeuwenb.	Loganiaceae	*OM2756* (JRAU)	JX573009	JX517510
Styphnolobium japonicum (L.) Schott	Fabaceae	Genbank	-	AY386962
Suregada africana (Sond.) Müll.Arg.	Euphorbiaceae	*OM1839* (JRAU)	JF265615	JF270957
Suregada procera (Prain) Croizat	Euphorbiaceae	*OM1829* (JRAU)	JX573010	JX518080
Suregada zanzibariensis Baill.	Euphorbiaceae	*OM1845* (JRAU)	JX573011	JX518191
Synadenium cupulare L.C. Wheeler	Euphorbiaceae	*OM1511* (JRAU)	JQ025098	JQ025004
Synadenium kirkii N.E.Br.	Euphorbiaceae	*OM2556* (JRAU)	JX573012	JX905960
Synaptolepis alternifolia Oliv.	Thymelaeaceae	*OM2747* (JRAU)	JX573013	JX518008
Syncarpia glomulifera (Sm.) Nied.	Myrtaceae	*BS 0563* (JRAU)	KM392266	KM392234
Synsepalum brevipes (Baker) T.D.Penn.	Sapotaceae	*OM2694* (JRAU)	JX573014	JX517918
Synsepalum passargei (Engl.) T.D.Penn.	Sapotaceae	*OM1879* (JRAU)	JX573015	JX517799
Syzygium cordatum Hochst. ex Krauss	Myrtaceae	*OM1470* (JRAU)	JX573016	JX517332
Syzygium cumini (L.) Skeels	Myrtaceae	*Hahn5897* (WIS)	-	AY525140.1

Syzygium gerrardii (Harv. ex Hook.f.) Burtt Davy	Myrtaceae	*OM1799* (JRAU)	JX573017	JX517397
Syzygium guineense (Willd.) DC.	Myrtaceae	*MWC37683* (K)	JX573018	JX517609
Syzygium guineense subsp. *afromontana* F. White	Myrtaceae	*OM2297* (JRAU)	JX573021	JX517489
Syzygium guineense subsp. *barotsense* F. White	Myrtaceae	*MWC37689* (K)	JX573019	JX517990
Syzygium guineense subsp. *macrocarpum* (Engl.) F. White	Myrtaceae	*MWC37688* (K)	JX573020	JX517695
Syzygium jambos (L.) Alston	Myrtaceae	*Biffin42* (CANB)	-	DQ088583.1
Syzygium legatii Burtt Davy & Greenway	Myrtaceae	*OM1792* (JRAU)	JX573022	JX518187
Syzygium masukuense (Baker) R.E.Fr.	Myrtaceae	*Gadek s.n.* (JCT)	-	DQ088591.1
Syzygium paniculatum Gaertn.	Myrtaceae	*Richardson et al.49a* (CANB)	-	DQ088598.1
Syzygium pondoense Engl.	Myrtaceae	*OM1798* (JRAU)	JX573023	JX518226
Tabernaemontana elegans Stapf	Apocynaceae	*OM2144* (JRAU)	JX573024	JX517818
Tabernaemontana ventricosa Hochst. ex A.DC.	Apocynaceae	*OM2235* (JRAU)	JX573025	JX518222
Tacazzea apiculata Oliv.	Apocynaceae	*Venter9188* (MSTR) / *Venter9188* (TL)	AJ419764.1	AY899945.1
Tamarindus indica L.	Fabaceae	*OM2447* (JRAU)	JX573026	JX517967
Tamarix aphylla (L.) H.Karst.	Tamaricaceae	*Genbank*	AY099903.1	-

Tamarix chinensis Lour.	Tamaricaceae	*Genbank*	JQ412426.1	JQ412293.1
Tamarix gallica L.	Tamaricaceae	*Genbank*	-	AF204861.1
Tamarix ramosissima Ledeb.	Tamaricaceae	*Genbank*	AY099899.1	-
Tamarix usneoides E.Mey. ex Bunge	Tamaricaceae	*MWC28701* (K)	JX573027	JX517452
Tannodia swynnertonii (S.Moore) Prain	Euphorbiaceae	*OM1858* (JRAU)	JX573028	JX517763
Tapura fischeri Engl.	Dichapetalaceae	*OM3496* (JRAU)	JX572337	JX518005
Tarchonanthus camphoratus L.	Asteraceae	*OM1515* (JRAU)	JQ025099	JQ025005
Tarchonanthus trilobus DC.	Asteraceae	*OM3270* (JRAU)	JX573029	JX517783
Tarenna pavettoides (Harv.) Sim	Rubiaceae	*Abbott9247* (BNRH)	JX573030	JX517414
Teclea gerrardii Verd.	Rutaceae	*Abbott9183* (BNRH)	JX573031	JX517313
Teclea natalensis Engl.	Rutaceae	*Abbott9193* (BNRH)	JX573032	JX518224
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	*OM3432* (JRAU)	JX573034	JX517475
Tecomaria capensis (Thunb.) Spach	Bignoniaceae	*OM0454* (JRAU)	JX573033	JX517434
Tephrosia pondoensis (Codd) Schrire	Fabaceae	*Abbott9232* (BNRH)	JX573035	JX517379
Tephrosia grandiflora (Aiton) Pers.	Fabaceae	Genbank	Z95542	-
Terminalia brachystemma Welw. ex Hiern	Combretaceae	*OM&MvdB18* (JRAU)	FJ381810.1	JX518028
Terminalia catappa L.	Combretaceae	*OM1578* (JRAU)	JX573036	JX518026

Terminalia mollis M.A.Lawson	Combretaceae	*OM1032* (JRAU)	JX573037	JX518150
Terminalia phanerophlebia Engl. & Diels	Combretaceae	*OM1191* (JRAU)	JX573038	JX517994
Terminalia prunioides M.A.Lawson	Combretaceae	*OM1061* (JRAU)	JF265625	JF270967
Terminalia randii Baker f.	Combretaceae	*OM2115* (JRAU)	JX573039	JX518067
Terminalia sambesiaca Engl. & Diels	Combretaceae	*OM2392* (JRAU)	JX573040	JX517421
Terminalia sericea Burch. ex DC.	Combretaceae	*OM1037* (JRAU)	JX573041	JX517972
Terminalia stenostachya Engl. & Diels	Combretaceae	*OM2059* (JRAU)	JX573042	JX517373
Terminalia trichopoda Diels	Combretaceae	*OM1657* (JRAU)	JX573043	JX517390
Tetradenia riparia (Hochst.) Codd	Lamiaceae	*OM0881* (JRAU)	JF265627	JF270969
Thamnocalamus tessellatus (Nees) Soderstr. & R.P.Ellis	Poaceae	*OM2308* (JRAU)	JX573044	JX518203
Thespesia acutiloba (Baker f.) Exell & Mendonca	Malvaceae	*OM2492* (JRAU)	JX573045	JX518214
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	*Sennblad223* (UPS)	X91773.1	Z70188.1
Thilachium africanum Scott-Elliot	Capparaceae	*OM2549* (JRAU)	JX573046	JX517312
Tiliacora funifera (Miers) Oliv.	Menispermaceae	*OM2328* (JRAU)	JX573047	JX517404
Tinnea barbata Vollesen	Lamiaceae	*OM2288* (JRAU)	JX573048	JX518083
Tinnea rhodesiana S.Moore	Lamiaceae	*RBN143* (KNP)	JX573049	JX518148
Tinospora caffra (Miers) Troupin	Menispermaceae	*OM2373* (JRAU)	JX573050	JX517395

Tinospora tenera Miers	Menispermaceae	*OM1369* (JRAU)	JX573051	JX517669
Tipuana tipu (Benth.) Kuntze	Fabaceae	*Genbank*	-	AF270882.1
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	*OM3435* (JRAU)	JX573052	JX517326
Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	*Genbank*	JQ590724.1	JQ586935.1
Toddalia asiatica (L.) Lam.	Rutaceae	*OM2688* (JRAU)	JX573053	JX518156
Toona ciliata M.Roem.	Meliaceae	*MWC22907* (K)	-	JX518246
Tournefortia argentea L. f.	Boraginaceae	*FI9205* (BGF)	-	EU599648.1
Toxicodendron succedaneum (L.) Kuntze	Anacardiaceae	n.a.	HQ427194.1	HQ427343.1
Trema orientalis (L.) Blume	Ulmaceae	*OM2500* (JRAU)	JX573054	JX518199
Triaspis glaucophylla Engl.	Malpighiaceae	*OM2003* (JRAU)	JX573055	JX518181
Triaspis hypericoides Burch.	Malpighiaceae	*OM1336* (JRAU)	JX573056	JX517622
Tricalysia capensis (Meisn. ex Hochst.) Sim	Rubiaceae	*Abbott9182* (BNRH)	JX573057	JX517423
Tricalysia delagoensis Schinz	Rubiaceae	*MWC24252* (K)	JX573058	JX517378
Tricalysia jasminiflora (Klotzsch) Benth. & Hook.f. ex Hiern	Rubiaceae	*OM2340* (JRAU)	JX573059	JX517757
Trichilia capitata Klotzsch	Meliaceae	*OM2460* (JRAU)	JX573063	JX518085
Trichilia dregeana Sond.	Meliaceae	*OM1793* (JRAU)	JF265635	JF270976

Trichilia emetica Vahl	Meliaceae	*OM2103* (JRAU)	JQ025100	JQ025007
Trichocladus crinitus Pers.	Hamamelidaceae	*OM1767* (JRAU)	JX573064	JX518141
Trichocladus ellipticus Eckl. & Zeyh.	Hamamelidaceae	*Abbott9189* (BNRH)	JX573065	JX517927
Trichocladus grandiflorus Oliv.	Hamamelidaceae	*Abbott9207* (BNRH)	JX573066	JX517614
Trimeria grandifolia (Hochst.) Warb.	Salicaceae	*OM1549* (JRAU)	JF265637	JF270978
Triplaris americana L.	Polygonaceae	*Genbank*	AY16910.1	AY042668.1
Triplochiton zambesiacus Milne-Redh.	Malvaceae	*OM2124* (JRAU)	JX573068	JX518093
Turraea floribunda Hochst.	Meliaceae	*OM3278* (JRAU)	JX573069	JX517433
Turraea nilotica Kotschy & Peyr.	Meliaceae	*OM1491* (JRAU)	JX573070	JX517345
Turraea obtusifolia Hochst.	Meliaceae	*OM0744* (JRAU)	JF265641	JF270982
Tylecodon paniculatus (L.f.) Toelken	Crassulaceae	*JWB508* (NH)	JQ412433	JQ412300
Ulex europaeus L.	Fabaceae	*Schaefer2008/659* (BM)	HM850431.1	HM851132.1
Umtiza listerana Sim	Fabaceae	*OM1802* (JRAU)	JX573071	JX517963
Urera trinervis (Hochst.) Friis & Immelman	Urticaceae	*Abbott9169* (BNRH)	JX573072	JX517974
Uvaria caffra E.Mey. ex Sond.	Annonaceae	*RBN148* (KNP)	JX573073	JX517820
Uvaria gracilipes N.Robson	Annonaceae	*RBN365* (KNP)	JX573074	JX517815
Uvaria lucida subsp. *virens* (N.E.Br.) Verdc.	Annonaceae	*OM1863* (JRAU)	JX572310	JX517870
Vaccinium L.	Ericaceae	n.a.	-	AB623177.1

Vangueria esculenta S.Moore	Rubiaceae	*OM2435* (JRAU)	JX573075	JX517807
Vangueria infausta Burch.	Rubiaceae	*OM2409* (JRAU)	JX573076	JX517485
Vangueria madagascariensis J.F.Gmel.	Rubiaceae	*OM2018* (JRAU)	JF265645	JF270986
Vangueria parvifolia Sond.	Rubiaceae	*MvdB0040* (JRAU)	JX573077	JX517776
Vangueria randii S.Moore	Rubiaceae	*OM3751* (JRAU)	JX573078	JX517473
Vepris bachmannii (Engl.) Mziray	Rutaceae	*OM2168* (JRAU)	JX572808	JX517461
Vepris reflexa Verd.	Rutaceae	*OM1299* (JRAU)	JX573080	JX517574
Vepris undulata Verdoorn & C. A. Sm.	Rutaceae	*OM3224* (JRAU)	JX573079	JX517578
Virgilia divaricata Adamson	Fabaceae	*OM3169* (JRAU)	JX573081	JX517500
Vitellariopsis dispar (N.E.Br.) Aubrév.	Sapotaceae	*OM2178* (JRAU)	JX573082	JX518040
Vitex buchananii Baker ex Gürke	Lamiaceae	*OM2751* (JRAU)	JX573083	JX517569
Vitex ferruginea Schumach. & Thonn.	Lamiaceae	*RBN141* (KNP)	JF265650	JF270991
Vitex harveyana H.Pearson	Lamiaceae	*OM1501* (JRAU)	JX573084	JX518136
Vitex patula E.A.Bruce	Lamiaceae	*OM0839* (JRAU)	JX573085	JX517538
Vitex payos (Lour.) Merr.	Lamiaceae	*OM1819* (JRAU)	JX573086	JX518012
Vitex petersiana Klotzsch	Lamiaceae	*OM2725* (JRAU)	JX573087	JX517600
Vitex rehmannii Gürke	Lamiaceae	*RL1385* (JRAU)	JX573088	JX517958

Vitex trifolia L.	Lamiaceae	*Genbank*	GU135285.1	GU135123.1
Vitis rhomboidea (E. Mey. ex Harv.) Szyszyl.	Vitaceae	*Abbott9181* (BNRH)	JX572927	JX518114
Voacanga africana Stapf ex Scott-Elliot	Apocynaceae	*OM1876* (JRAU)	JX573089	JX905951
Voacanga thouarsii Roem. & Schult.	Apocynaceae	*Abbott9118* (BNRH)	JX573090	JX517507
Warburgia salutaris (G.Bertol.) Chiov.	Canellaceae	*OM1853* (JRAU)	JF265653	JF270994
Widdringtonia nodiflora (L.) E.Powrie	Cupressaceae	*Hardy277* (Z, BH)	AY988266.1	AY988364.1
Widdringtonia schwarzii (Marloth) Mast.	Cupressaceae	*UNSW23247* (SYD)	-	AF152218.1
Wrightia natalensis Stapf	Apocynaceae	*OM1580* (JRAU)	JX573091	JX517947
Xanthocercis zambesiaca (Baker) Dumaz-le-Grand	Fabaceae	*OM2735* (JRAU)	JX573092	JX517427
Xeroderris stuhlmannii (Taub.) Mendonca & Sousa	Fabaceae	*OM2398* (JRAU)	JX573093	JX517470
Xerophyta retinervis Baker	Velloziaceae	*OM1591* (JRAU)	JQ025106	JQ025013
Ximenia americana L.	Olacaceae	*OM0299* (JRAU)	JX573094	JX517654
Ximenia caffra Sond.	Olacaceae	*RL1182* (JRAU)	JX573095	JX518138
Xylia torreana Brenan	Fabaceae	*OM2612* (JRAU)	JX573096	JX518118
Xylopia parviflora Spruce	Annonaceae	*RBN255* (KNP)	JF265661	JF271002
Xylotheca kraussiana Hochst.	Salicaceae	*OM2210* (JRAU)	JX573097	JX517892
Xylotheca tettensis (Klotzsch) Gilg	Salicaceae	*OM2370* (JRAU)	JX573098	JX517814
Xymalos monospora (Harv.) Baill.	Monimiaceae	*OM1748* (JRAU)	JX573099	JX517511

Zanthoxylum capense (Thunb.) Harv.	Rutaceae	*OM3231* (JRAU)	JX573100	JX517645
Zanthoxylum davyi Waterm.	Rutaceae	*Abbott9195* (BNRH)	JX573101	JX517950
Zanthoxylum holtzianum (Engl.) P.G. Waterman	Rutaceae	*OM2357* (JRAU)	JX573102	JX518057
Zanthoxylum humile Waterm.	Rutaceae	*OM0708* (JRAU)	JX573103	JX517824
Zanthoxylum leprieurii Guill. & Perr.	Rutaceae	*RBN131* (KNP)	JX573104	JX517932
Ziziphus abyssinica Hochst. ex A.Rich.	Rhamnaceae	*OM2582* (JRAU)	JX573105	JX517646
Ziziphus mauritiana Lam.	Rhamnaceae	*OM2037* (JRAU)	JX573106	JX518013
Ziziphus mucronata Willd.	Rhamnaceae	*OM2031* (JRAU)	JX573107	JX518049
Ziziphus pubescens Oliv.	Rhamnaceae	*OM2325* (JRAU)	JX573108	JX517471
Ziziphus rivularis Codd	Rhamnaceae	*OM1380* (JRAU)	JX573109	JX518212

Appendix 2.2: Trait database for the native and non-native (invasive and non-invasive combined) species in southern African region. (SM=seed mass, SS=sexual system, FF=first flowering month, LF=last flowering month, DF=duration of flowering, H=hermaphrodite, D=dieocious).

Species Name	APG III Family	Status	Height	SM	SS	FF	LF	DF	Dispersal	Pollination
Abutilon angulatum (Guill. & Perr.) Mast.	Malvaceae	native	3.5	NA	H	NA	NA	NA	biotic	biotic
Abutilon sonneratianum (Cav.) Sweet	Malvaceae	native	2	NA	H	NA	NA	NA	biotic	biotic
Acacia baileyana F.Muell.	Fabaceae	invasive	9	21.8	H	7	9	3	biotic	abiotic
Acacia cyclops G.Don	Fabaceae	invasive	6	30.3	H	1	12	12	biotic	NA
Acacia dealbata Link	Fabaceae	invasive	15	11.9	H	7	8	2	biotic	biotic
Acacia decurrens Willd.	Fabaceae	invasive	15	14.8	H	7	8	2	biotic	biotic
Acacia elata Benth.	Fabaceae	invasive	20	31.5	H	10	12	3	biotic	abiotic
Acacia fleckii Schinz	Fabaceae	native	10	NA	H	11	3	5	biotic	biotic
Acacia longifolia (Andrews) Willd.	Fabaceae	invasive	10	14.7	H	7	9	3	biotic	abiotic
Acacia mearnsii De Wild.	Fabaceae	invasive	15	13.2	H	8	9	2	biotic	biotic
Acacia melanoxylon R.Br.	Fabaceae	invasive	20	13	H	8	9	2	biotic	NA
Acacia podalyriifolia G.Don	Fabaceae	invasive	10	24.6	H	6	8	3	biotic	biotic
Acacia saligna (Labill.) Wendl.	Fabaceae	invasive	10	16	H	8	11	4	biotic	biotic
Acacia sekhukhuniensis P.J.H.Hurter	Fabaceae	native	3.5	NA	H	NA	NA	NA	biotic	NA
Acacia theronii P.P.Sw.	Fabaceae	native	6	NA	H	NA	NA	NA	NA	NA
Acalypha chirindica S.Moore	Euphorbiaceae	native	NA	NA	H	NA	NA	NA	NA	NA

Acalypha glabrata f. *pilosior* (Kuntze) Prain & Hutch.	Euphorbiaceae	native	5	NA	H	10	10	1	biotic	biotic
Acalypha glabrata Thunb.	Euphorbiaceae	native	5	NA	H	10	10	1	biotic	biotic
Acer buergerianum Miq.	Sapindaceae	invasive	25	11	H	8	10	3	biotic	biotic
Acer negundo L.	Sapindaceae	invasive	20	36	H	8	9	2	biotic	biotic
Acokanthera oblongifolia (Hochst.) Benth. & Hook.f. ex	Apocynaceae	native	7	NA	H	8	11	4	abiotic	biotic
Acokanthera oppositifolia (Lam.) Codd	Apocynaceae	native	5	NA	H	4	12	9	biotic	biotic
Acokanthera rotundata (Codd) Kupicha	Apocynaceae	native	6	NA	H	2	5	4	biotic	biotic
Acridocarpus natalitius A.Juss.	Malpighiaceae	native	5	NA	H	11	2	4	biotic	biotic
Adansonia digitata L.	Malvaceae	native	28	NA	H	10	12	3	biotic	biotic
Adenia fruticosa Burtt Davy	Passifloraceae	native	2	NA	D	8	9	2	abiotic	biotic
Adenia gummifera (Harv.) Harms	Passifloraceae	native	30	NA	D	NA	NA	NA	abiotic	biotic
Adenia spinosa Burtt Davy	Passifloraceae	native	2.5	NA	D	NA	NA	NA	abiotic	biotic
Adenium multiflorum Klotzsch	Apocynaceae	native	3	NA	H	5	8	4	abiotic	biotic
Adenium swazicum Stapf	Apocynaceae	native	1	NA	H	NA	NA	NA	NA	biotic
Adenopodia spicata (E.Mey.) C.Presl	Fabaceae	native	10	NA	H	12	1	2	biotic	biotic
Afrocanthium lactescens (Hiern) Lantz	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Afrocanthium mundianum (Cham. & Schltdl.) Lantz	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Afrocanthium racemulosum (S.Moore) Lantz	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	abiotic
Afzelia quanzensis Welw.	Fabaceae	native	35	NA	H	7	11	5	biotic	biotic
Agave americana L.	Asparagaceae	invasive	9	7.6	H	12	3	4	biotic	biotic

Agave sisalana Perrine	Asparagaceae	invasive	6	7.2	H	12	3	4	biotic	biotic
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	invasive	25	27.9	D	10	11	2	biotic	biotic
Alangium chinense (Lour.) Harms	Cornaceae	native	24	NA	H	11	3	5	biotic	biotic
Alberta magna E.Mey.	Rubiaceae	native	13	NA	H	1	6	6	biotic	biotic
Albizia adianthifolia (Schum.) W.Wight	Fabaceae	native	40	NA	H	8	11	4	abiotic	biotic
Albizia amara subsp. *sericocephala* (Benth.) Brenan	Fabaceae	native	12	NA	H	9	10	2	biotic	biotic
Albizia anthelmintica Brongn.	Fabaceae	native	10	NA	H	7	9	3	biotic	biotic
Albizia brevifolia Schinz	Fabaceae	native	10	NA	H	10	11	2	biotic	biotic
Albizia forbesii Benth.	Fabaceae	native	20	NA	H	11	12	2	biotic	biotic
Albizia glaberrima (Schum. & Thonn.) Benth.	Fabaceae	native	25	NA	H	10	11	2	biotic	biotic
Albizia harveyi E.Fourn.	Fabaceae	native	11	NA	H	10	11	2	biotic	biotic
Albizia lebbeck (L.) Benth.	Fabaceae	invasive	15	92.8	H	11	3	5	biotic	biotic
Albizia petersiana subsp. *evansii* (Burtt Davy) Brenan	Fabaceae	native	21	NA	H	11	11	1	biotic	biotic
Albizia procera (Roxb.) Benth.	Fabaceae	invasive	15	NA	H	11	3	5	biotic	biotic
Albizia suluensis Gerstner	Fabaceae	native	15	NA	H	12	12	2	biotic	biotic
Albizia tanganyicensis Baker f.	Fabaceae	native	20	NA	H	8	10	3	biotic	biotic
Albizia versicolor Oliv.	Fabaceae	native	18	NA	H	10	11	2	biotic	biotic
Albizia zimmermannii Harms	Fabaceae	native	15	NA	H	9	10	2	biotic	biotic
Alchornea hirtella f. *glabrata* (Müll.Arg.) Pax & K.Hoffm.	Euphorbiaceae	native	12	NA	H	10	12	3	biotic	biotic

Alchornea laxiflora (Benth.) Pax & K.Hoffm.	Euphorbiaceae	native	6	NA	H	9	12	4	biotic	biotic
Alhagi maurorum Medik.	Fabaceae	invasive	1.5	4.1	H	12	1	2	biotic	biotic
Allocassine laurifolia (Harv.) N.Robson	Celastraceae	native	5	NA	H	9	1	5	biotic	biotic
Allophylus africanus P.Beauv.	Sapindaceae	native	10	NA	H	11	3	5	biotic	biotic
Allophylus decipiens (E.Mey.) Radlk.	Sapindaceae	native	4	NA	H	2	5	4	biotic	biotic
Allophylus dregeanus (Sond.) De Winter	Sapindaceae	native	7	NA	H	2	5	4	biotic	biotic
Allophylus natalensis (Sond.) De Winter	Sapindaceae	native	5	NA	H	3	5	3	biotic	biotic
Allophylus rubifolius (Hochst. ex A.Rich.) Engl.	Sapindaceae	native	6	NA	H	11	3	5	biotic	biotic
Alnus glutinosa (L.) Gaertn.	Betulaceae	invasive	30	2	H	NA	NA	NA	biotic	biotic
Aloe africana Mill.	Xanthorrhoeaceae	native	4	NA	H	7	9	3	biotic	biotic
Aloe angelica Pole-Evans	Xanthorrhoeaceae	native	4	NA	H	6	6	1	biotic	biotic
Aloe arborescens Mill.	Xanthorrhoeaceae	native	3	NA	H	5	6	2	biotic	biotic
Aloe barberae Dyer	Xanthorrhoeaceae	native	18	NA	H	6	8	3	biotic	biotic
Aloe castanea Schönland	Xanthorrhoeaceae	native	4	NA	H	6	8	3	biotic	biotic
Aloe comosa Marloth & A.Berger	Xanthorrhoeaceae	native	2	NA	H	12	1	2	biotic	biotic
Aloe dichotoma Masson	Xanthorrhoeaceae	native	7	NA	H	6	8	3	biotic	biotic
Aloe excelsa A.Berger	Xanthorrhoeaceae	native	4	NA	H	7	9	3	biotic	biotic
Aloe ferox Mill.	Xanthorrhoeaceae	native	5	NA	H	5	10	6	biotic	biotic
Aloe marlothii A.Berger	Xanthorrhoeaceae	native	4	NA	H	6	8	3	biotic	biotic
Aloe pillansii L.Guthrie	Xanthorrhoeaceae	native	10	NA	H	10	10	1	biotic	biotic

Aloe plicatilis (L.) Mill.	Xanthorrhoeaceae	native	5	NA	H	8	10	3	biotic	biotic
Aloe pluridens Haw.	Xanthorrhoeaceae	native	5	NA	H	5	7	3	biotic	biotic
Aloe ramosissima Pillans	Xanthorrhoeaceae	native	3	NA	H	6	8	3	biotic	biotic
Aloe speciosa Baker	Xanthorrhoeaceae	native	6	NA	H	7	9	3	biotic	biotic
Aloe spicata L.f.	Xanthorrhoeaceae	native	2	NA	H	7	8	2	biotic	biotic
Aloe thraskii Baker	Xanthorrhoeaceae	native	4	NA	H	5	7	3	biotic	biotic
Amblygonocarpus andongensis (Oliv.) Exell & Torre	Fabaceae	native	20	NA	H	10	10	1	biotic	biotic
Anacardium occidentale L.	Anacardiaceae	non_invasive	12	NA	D	NA	NA	NA	biotic	biotic
Ancylobothrys capensis (Oliv.) Pichon	Apocynaceae	native	2	NA	H	NA	NA	NA	NA	NA
Andrachne ovalis (E.Mey. ex Sond.) Müll.Arg.	Phyllanthaceae	native	6	NA	H	11	1	3	abiotic	biotic
Androstachys johnsonii Prain	Euphorbiaceae	native	20	NA	H	10	11	2	abiotic	biotic
Anginon difforme (L.) B.L.Burtt	Apiaceae	native	3	NA	H	NA	NA	NA	NA	biotic
Anisotes formosissimus (Klotzsch) Milne-Redh.	Acanthaceae	native	NA	NA	NA	NA	NA	NA	abiotic	abiotic
Annona senegalensis Pers.	Annonaceae	native	8	NA	H	10	12	3	biotic	biotic
Anthocleista grandiflora Gilg	Gentianaceae	native	30	NA	H	5	9	5	biotic	biotic
Antidesma venosum E.Mey. ex Tul.	Euphorbiaceae	native	7	NA	D	10	1	4	abiotic	biotic
Aphloia theiformis (Vahl) Benn.	Aphloiaceae	native	13	NA	H	9	11	3	biotic	biotic
Apodytes dimidiata E.Mey. ex Arn.	Icacinaceae	native	5	NA	H	10	4	7	biotic	biotic
Ardisia crenata Sims	Primulaceae	invasive	2	221	H	6	11	6	biotic	biotic

Ardisia elliptica Thunb.	Primulaceae	invasive	4	NA	H	1	12	12	biotic	biotic
Argomuellera macrophylla Pax	Euphorbiaceae	native	4.5	NA	NA	10	10	1	abiotic	biotic
Artabotrys brachypetalus Benth.	Annonaceae	native	NA	NA	H	9	12	4	biotic	biotic
Aspalathus linearis (Burm.f.) R.Dahlgren	Fabaceae	native	2.5	NA	H	NA	NA	NA	NA	NA
Aspalathus pendula R.Dahlgren	Fabaceae	native	3.5	NA	H	NA	NA	NA	NA	NA
Atalaya alata (Sim) H.M.L.Forbes	Sapindaceae	native	10	NA	H	9	12	4	biotic	biotic
Atalaya natalensis R.A.Dyer	Sapindaceae	native	20	NA	H	11	1	3	biotic	biotic
Atriplex nummularia Lindl.	Amaranthaceae	invasive	3	NA	D	1	12	12	biotic	abiotic
Avicennia marina (Forssk.) Vierh.	Acanthaceae	native	10	NA	H	9	2	6	biotic	biotic
Azanza garckeana (F.Hoffm.) Exell & Hillc.	Malvaceae	native	10	NA	H	12	5	6	biotic	biotic
Azima tetracantha Lam.	Salvadoraceae	native	8	NA	H	9	3	7	biotic	biotic
Bachmannia woodii (Oliv.) Gilg	Capparaceae	native	3	NA	H	4	8	5	biotic	biotic
Baikiaea plurijuga Harms	Fabaceae	native	16	NA	H	12	3	4	biotic	biotic
Balanites aegyptiaca (L.) Delile	Zygophyllaceae	native	5	NA	H	11	11	1	biotic	biotic
Balanites maughamii Sprague	Zygophyllaceae	native	20	NA	H	9	10	2	biotic	biotic
Balanites pedicellaris Mildbr. & Schltr.	Zygophyllaceae	native	6	NA	H	9	10	2	biotic	biotic
Banksia ericifolia L.f.	Proteaceae	invasive	6	20	H	4	8	5	biotic	abiotic
Banksia integrifolia L.f.	Proteaceae	invasive	16	13.7	H	5	7	3	biotic	biotic
Baphia massaiensis subsp. *obovata* (Schinz)	Fabaceae	native	6	NA	H	10	6	9	biotic	biotic
Baphia racemosa (Hochst.) Baker	Fabaceae	native	10	NA	H	11	12	2	biotic	biotic

Barleria albostellata C.B.Clarke	Acanthaceae	native	2	NA	H	10	10	1	biotic	biotic
Barleria rotundifolia Oberm.	Acanthaceae	native	1.5	NA	H	9	1	5	biotic	biotic
Barringtonia racemosa (L.) Spreng.	Lecythidaceae	native	15	NA	H	11	1	3	biotic	biotic
Bauhinia forficata Link	Fabaceae	invasive	9	206.4	H	10	2	5	abiotic	biotic
Bauhinia galpinii N.E.Br.	Fabaceae	native	5	NA	H	11	3	5	biotic	biotic
Bauhinia natalensis Hook.	Fabaceae	native	2.5	NA	H	10	4	7	biotic	biotic
Bauhinia petersiana Bolle	Fabaceae	native	7	NA	H	12	1	2	biotic	biotic
Bauhinia purpurea L.	Fabaceae	invasive	10	290	H	1	12	12	biotic	biotic
Bauhinia tomentosa L.	Fabaceae	native	4	NA	H	12	3	4	biotic	biotic
Bauhinia variegata L.	Fabaceae	invasive	10	325.9	H	8	10	3	biotic	biotic
Berberis thunbergii DC.	Berberidaceaea	invasive	1.2	NA	H	4	5	2	biotic	biotic
Berchemia discolor (Klotzsch) Hemsl.	Rhamnaceae	native	20	NA	H	10	1	4	biotic	biotic
Berchemia zeyheri (Sond.) Grubov	Rhamnaceae	native	10	NA	H	9	12	4	biotic	biotic
Bersama lucens (Hochst.) Szyszyl.	Melianthaceae	native	10	NA	H	11	8	10	biotic	biotic
Bersama tysoniana Oliv.	Melianthaceae	native	10	NA	H	8	5	10	biotic	biotic
Berzelia lanuginosa (L.) Brongn.	Bruniaceae	native	2	NA	H	NA	NA	NA	NA	NA
Bivinia jalbertii Tul.	Salicaceae	native	30	NA	H	1	3	3	biotic	biotic
Blighia unijugata Baker	Sapindaceae	native	25	NA	H	9	10	2	biotic	biotic
Bobgunnia madagascariensis (Desv.) J.H.Kirkbr. & Wiersema	Fabaceae	native	7	NA	H	8	12	5	biotic	biotic

Bolusanthus speciosus (Bolus) Harms	Fabaceae	native	35	NA	H	7	10	4	abiotic	biotic
Boscia albitrunca (Burch.) Gilg & Benedict	Capparaceae	native	7	NA	H	8	10	3	biotic	biotic
Boscia angustifolia var. *corymbosa* (Gilg) DeWolf	Capparaceae	native	8	NA	H	1	12	12	biotic	biotic
Boscia foetida Schinz	Capparaceae	native	5	NA	H	8	8	1	biotic	biotic
Boscia foetida subsp. *filipes* (Gilg) Lötter	Capparaceae	native	5	NA	H	8	9	2	biotic	biotic
Boscia mossambicensis Klotzsch	Capparaceae	native	6	NA	H	4	6	3	biotic	biotic
Boscia salicifolia Oliv.	Capparaceae	native	15	NA	H	8	10	3	biotic	biotic
Bowkeria cymosa MacOwan	Scrophulariaceae	native	4	NA	H	11	4	6	biotic	biotic
Bowkeria verticillata (Eckl. & Zeyh.) Druce	Scrophulariaceae	native	10	NA	H	10	4	7	biotic	biotic
Brabejum stellatifolium L.	Proteaceae	native	8	NA	H	12	1	2	biotic	biotic
Brachychiton populneus (Schott & Endl.) R.Br.	Malvaceae	invasive	20	NA	H	10	10	1	biotic	biotic
Brachylaena discolor DC.	Asteraceae	native	10	NA	D	7	9	3	abiotic	biotic
Brachylaena elliptica (Thunb.) Less.	Asteraceae	native	4	NA	D	4	6	3	abiotic	biotic
Brachylaena huillensis O.Hoffm.	Asteraceae	native	8	NA	D	7	8	2	abiotic	biotic
Brachylaena neriifolia (L.) R.Br.	Asteraceae	native	8	NA	D	12	2	3	abiotic	biotic
Brachylaena rotundata S.Moore	Asteraceae	native	8	NA	D	8	9	2	abiotic	biotic
Brachylaena transvaalensis Hutch. ex E.Phillips & Schweick.	Asteraceae	native	30	NA	D	7	11	5	abiotic	biotic
Brachystegia boehmii Taub.	Fabaceae	native	16	NA	H	9	12	4	biotic	biotic
Brachystegia bussei Harms	Fabaceae	native	20	NA	H	NA	NA	NA	NA	NA
Breonadia salicina (Vahl) Hepper & J.R.I.Wood	Rubiaceae	native	40	NA	H	12	3	4	biotic	biotic

Brexia madagascariensis (Lam.) Thouars ex Ker Gawl.	Celastraceae	native	7	NA	H	NA	NA	NA	NA	NA
Bridelia atroviridis Müll.Arg.	Euphorbiaceae	native	22	NA	H	12	1	2	abiotic	biotic
Bridelia cathartica Bertol.	Euphorbiaceae	native	6	NA	H	12	4	5	abiotic	biotic
Bridelia micrantha (Hochst.) Baill.	Euphorbiaceae	native	20	NA	H	10	12	3	abiotic	biotic
Bridelia mollis Hutch.	Euphorbiaceae	native	7	NA	H	11	2	4	abiotic	biotic
Bridelia tenuifolia Müll.Arg.	Euphorbiaceae	native	10	NA	H	12	1	2	abiotic	biotic
Bruguiera gymnorhiza (L.) Lam.	Rhizophoraceae	native	10	NA	H	1	12	12	biotic	biotic
Brunia albifora Phillips	Bruniaceae	native	3	NA	H	NA	NA	NA	NA	NA
Buddleja davidii Franch.	Scrophulariaceae	non_invasive	3	NA	H	10	4	7	biotic	biotic
Buddleja dysophylla (Benth.) Radlk.	Scrophulariaceae	native	4	NA	H	5	9	5	biotic	biotic
Buddleja madagascariensis Lam.	Scrophulariaceae	invasive	4	NA	H	7	10	4	biotic	biotic
Buddleja saligna Willd.	Scrophulariaceae	native	7	NA	H	8	1	6	biotic	biotic
Buddleja salviifolia (L.) Lam.	Scrophulariaceae	native	8	NA	H	8	10	3	biotic	biotic
Burchellia bubalina (L.f.) Sims	Rubiaceae	native	10	NA	H	9	12	4	biotic	biotic
Burkea africana Hook.	Fabaceae	native	10	NA	H	NA	NA	NA	NA	NA
Burttdavya nyasica Hoyle	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	abiotic
Buxus macowanii Oliv.	Buxaceae	native	7	NA	H	7	10	4	abiotic	biotic
Buxus natalensis (Oliv.) Hutch.	Buxaceae	native	10	NA	H	8	9	2	abiotic	biotic
Cadaba aphylla (Thunb.) Wild	Capparaceae	native	3	NA	H	8	1	6	biotic	biotic

Cadaba kirkii Oliv.	Capparaceae	native	5	NA	H	5	9	5	biotic	biotic
Cadaba termitaria N.E.Br.	Capparaceae	native	5	NA	H	9	10	2	biotic	biotic
Caesalpinia bonduc (L.) Roxb.	Fabaceae	invasive	3	NA	H	5	11	7	biotic	biotic
Caesalpinia decapetala (Roth) Alston	Fabaceae	invasive	3	NA	H	8	10	3	biotic	biotic
Caesalpinia gilliesii (Hook.) D.Dietr.	Fabaceae	native	3	NA	H	10	2	5	biotic	biotic
Callistemon citrinus (Curtis) Skeels	Mrytaceae	invasive	3	NA	H	NA	NA	NA	biotic	biotic
Callistemon viminalis (Sol. ex Gaertn.) G.Don ex Loudon	Myrtaceae	invasive	8	NA	H	1	12	12	abiotic	biotic
Callitris endlicheri (Parl.) F.M.Bailey	Cupressaceae	non_invasive	20	NA	H	NA	NA	NA	biotic	NA
Calodendrum capense (L.f.) Thunb.	Rutaceae	native	20	NA	H	10	12	3	biotic	biotic
Calotropis procera (Aiton) Dryand.	Apocynaceae	invasive	2	10.14	H	8	2	6	biotic	biotic
Calpurnia aurea (Aiton) Benth.	Fabaceae	native	15	NA	H	12	2	3	biotic	biotic
Calpurnia sericea Harv.	Fabaceae	native	NA	NA	H	NA	NA	NA	NA	NA
Canthium armatum (K.Schum.) Lantz	Rubiaceae	native	8	NA	H	NA	NA	NA	NA	NA
Canthium ciliatum (D.Dietr.) Kuntze	Rubiaceae	native	4	NA	H	10	2	5	biotic	biotic
Canthium inerme (L.f.) Kuntze	Rubiaceae	native	14	NA	H	9	12	4	biotic	biotic
Canthium setiflorum Hiern	Rubiaceae	native	5	NA	H	1	4	4	biotic	biotic
Canthium spinosum (Klotzsch ex Eckl. & Zeyh.) Kuntze	Rubiaceae	native	10	NA	H	7	12	6	biotic	biotic
Canthium suberosum Codd	Rubiaceae	native	8	NA	H	9	11	3	biotic	biotic
Canthium vanwykii Tilney & Kok	Rubiaceae	native	6	NA	H	9	11	3	biotic	biotic
Capparis erythrocarpos Isert	Capparaceae	native	3	NA	H	NA	NA	NA	biotic	biotic

Capparis fascicularis DC.	Capparaceae	native	5	NA	H	NA	NA	NA	NA	NA
Capparis sepiaria var. *subglabra* (Oliv.) DeWolf	Capparaceae	native	6	NA	H	10	11	2	biotic	biotic
Capparis tomentosa Lam.	Capparaceae	native	10	NA	H	8	11	4	biotic	biotic
Carissa bispinosa (L.) Desf. ex Brenan	Apocynaceae	native	5	NA	H	8	3	8	biotic	biotic
Carissa macrocarpa (Eckl.) A.DC.	Apocynaceae	native	5	NA	H	9	12	4	biotic	biotic
Carissa praetermissa Kupicha	Apocynaceae	native	4	NA	H	7	11	5	biotic	biotic
Carissa spinarum L.	Apocynaceae	native	3	NA	H	NA	NA	NA	NA	NA
Carissa tetramera (Sacleux) Stapf	Apocynaceae	native	3	NA	H	10	5	8	biotic	biotic
Carpolobia goetzei Gürke	Polygalaceae	native	5	NA	H	NA	NA	NA	NA	NA
Casearia gladiiformis Mast.	Salicaceae	native	15	NA	H	8	10	3	biotic	biotic
Casearia sp. nov. Abbott	Salicaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Cassia abbreviata Oliv.	Fabaceae	native	10	NA	H	9	10	2	biotic	biotic
Cassia abbreviata subsp. *beareana* (Holmes) Brenan	Fabaceae	native	10	NA	H	9	10	2	biotic	biotic
Cassia afrofistula Brenan	Fabaceae	native	5	NA	H	NA	NA	NA	NA	NA
Cassine peragua L.	Celastraceae	native	NA	NA	H	NA	NA	NA	NA	biotic
Cassine reticulata (Eckl. & Zeyh.) Codd	Celastraceae	native	4.5	NA	H	NA	NA	NA	NA	NA
Cassine schinoides (Spreng.) R.H.Archer	Celastraceae	native	5	NA	H	10	1	4	biotic	biotic
Cassinopsis ilicifolia (Hochst.) Sleumer	Icacinaceae	native	5	NA	H	9	11	3	biotic	biotic
Cassinopsis tinifolia Harv.	Icacinaceae	native	10	NA	H	NA	NA	NA	NA	NA

Cassipourea gummiflua Tul.	Rhizophoraceae	native	20	NA	H	12	4	5	biotic	biotic
Cassipourea malosana (Baker) Alston	Rhizophoraceae	native	20	NA	H	9	1	5	biotic	biotic
Casuarina cunninghamiana Miq.	Casuarinaceae	invasive	38	0.6	H	9	3	7	biotic	biotic
Casuarina equisetifolia L.	Casuarinaceae	invasive	38	3	H	9	3	7	biotic	biotic
Catha edulis (Vahl) Endl.	Celastraceae	native	15	NA	H	1	11	11	biotic	biotic
Catunaregam obovata (Hochst.) A.E.Gon.	Rubiaceae	native	7	NA	H	8	11	4	biotic	biotic
Catunaregam swynnertonii (S.Moore) Bridson	Rubiaceae	native	NA	NA	H	8	11	4	biotic	biotic
Cavacoa aurea (Cavaco) J.Léonard	Euphorbiaceae	native	15	NA	D	10	12	3	abiotic	abiotic
Ceiba pentandra (L.) Gaertn.	Malvaceae	non_invasive	61	59	H	NA	NA	NA	biotic	biotic
Celtis africana Burm.f.	Ulmaceae	native	30	NA	H	8	10	3	biotic	biotic
Celtis australis L.	Ulmaceae	non_invasive	25	188.8	H	8	10	3	biotic	biotic
Celtis gomphophylla Baker	Ulmaceae	native	25	NA	H	7	10	4	abiotic	biotic
Celtis mildbraedii Engl.	Ulmaceae	native	30	NA	H	9	10	2	biotic	biotic
Celtis sinensis Pers.	Ulmaceae	invasive	11	NA	H	8	10	3	biotic	biotic
Cephalanthus natalensis Oliv.	Rubiaceae	native	8	NA	H	7	2	8	biotic	biotic
Ceraria fruticulosa H.Pearson & Stephens	Portulacaceae	native	1.5	NA	H	NA	NA	NA	NA	NA
Cereus jamacaru DC.	Cactaceae	invasive	15	NA	H	11	1	3	biotic	NA
Ceriops tagal (Perr.) C.B.Rob.	Rhizophoraceae	native	7	NA	H	8	3	8	biotic	biotic
Cestrum aurantiacum Lindl.	Solanaceae	invasive	6	NA	H	10	5	8	biotic	biotic
Cestrum elegans (Brongn. ex Neumann) Schltdl.	Solanaceae	invasive	6	NA	H	10	5	8	biotic	biotic

Cestrum laevigatum Schltdl.	Solanaceae	invasive	15	NA	H	10	5	8	biotic	biotic
Cestrum parqui (Lam.) L'Hér.	Solanaceae	invasive	2	NA	H	10	5	8	biotic	biotic
Chaetachme aristata Planch.	Ulmaceae	native	13	NA	H	10	12	3	biotic	biotic
Chazaliella abrupta (Hiern) E.M.A.Petit & Verdc.	Rubiaceae	native	4.5	NA	H	10	1	4	biotic	biotic
Chionanthus foveolatus (E.Mey.) Stearn	Oleaceae	native	30	NA	H	9	5	5	biotic	abiotic
Chionanthus peglerae (C.H.Wright) Stearn	Oleaceae	native	18	NA	H	8	2	7	biotic	biotic
Chromolaena DC.	Asteraceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Chrysanthemoides monilifera (L.) Norl.	Asteraceae	native	6	NA	H	5	10	6	biotic	biotic
Chrysophyllum viridifolium J.M.Wood & Franks	Sapotaceae	native	40	NA	H	1	2	2	biotic	biotic
Cinnamomum camphora (L.) J.Presl	Lauraceae	invasive	26	NA	H	9	11	3	biotic	biotic
Cissus cactiformis Gilg	Vitaceae	native	5	NA	H	NA	NA	NA	NA	NA
Cissus cornifolia (Baker) Planch.	Vitaceae	native	2	NA	H	8	10	3	biotic	biotic
Cissus integrifolia (Baker) Planch.	Vitaceae	native	15	NA	H	NA	NA	NA	NA	biotic
Citrus limon (L.) Burm. f.	Rutaceae	invasive	6	NA	H	8	2	7	abiotic	biotic
Citrus sinensis (L.) Osbeck	Rutaceae	non_invasive	10	NA	H	8	2	7	biotic	biotic
Cladostemon kirkii (Oliv.) Pax & Gilg	Capparaceae	native	6	NA	H	9	11	3	biotic	biotic
Clausena anisata (Willd.) Hook.f. ex Benth.	Rutaceae	native	10	NA	H	8	11	4	biotic	biotic
Cleistanthus polystachyus subsp. *milleri* (Dunkley) Radcl.-Sm.	Euphorbiaceae	native	20	NA	D	9	12	4	abiotic	biotic
Cleistanthus schlechteri (Pax) Hutch.	Euphorbiaceae	native	20	NA	D	9	11	3	abiotic	biotic

Cleistochlamys kirkii (Benth.) Oliv.	Annonaceae	native	9	NA	H	9	10	2	biotic	biotic
Clematis brachiata Thunb.	Ranunculaceae	native	6	NA	NA	NA	NA	NA	abiotic	biotic
Clerodendrum eriophyllum Gürke	Lamiaceae	native	10	NA	H	12	4	5	biotic	biotic
Clerodendrum glabrum E.Mey.	Lamiaceae	native	10	NA	H	1	12	12	biotic	biotic
Clutia abyssinica Jaub. & Spach	Euphorbiaceae	native	6	NA	D	3	6	4	abiotic	NA
Clutia pulchella L.	Euphorbiaceae	native	6	NA	D	11	1	3	abiotic	biotic
Clutia Boerh. sp. nov.	Euphorbiaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Cnestis polyphylla Lam.	Connaraceae	native	4	NA	NA	NA	NA	NA	abiotic	biotic
Cocculus DC.	Menispermaceae	native	15	NA	NA	NA	NA	NA	abiotic	biotic
Coddia rudis (E.Mey. ex Harv.) Verdc.	Rubiaceae	native	4	NA	H	10	3	6	biotic	biotic
Coffea arabica L.	Rubiaceae	non_invasive	12	NA	H	8	10	3	biotic	biotic
Coffea ligustroides S.Moore	Rubiaceae	native	4	NA	H	10	12	3	biotic	biotic
Coffea racemosa Lour.	Rubiaceae	native	3.5	NA	H	9	12	4	biotic	biotic
Coffea salvatrix Swynn. & Philipson	Rubiaceae	native	5	NA	H	10	11	2	biotic	biotic
Cola greenwayi Brenan	Malvaceae	native	25	NA	H	10	11	2	biotic	biotic
Cola mossambicensis Wild	Malvaceae	native	27	NA	H	6	6	1	biotic	biotic
Cola natalensis Oliv.	Malvaceae	native	10	NA	H	10	11	2	biotic	biotic
Coleonema album (Thunb.) Bartl. & H.L.Wendl.	Rutaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Colophospermum mopane (Benth.) Leonard	Fabaceae	native	18	NA	H	10	3	6	biotic	biotic
Colubrina asiatica (L.) Brongn.	Rhamnaceae	native	5	NA	H	9	5	9	biotic	biotic

Combretum adenogonium Steud. ex A.Rich.	Combretaceae	native	10	NA	H	8	10	3	abiotic	biotic
Combretum albopunctatum Suess.	Combretaceae	native	5	NA	H	10	12	3	abiotic	biotic
Combretum apiculatum Sond.	Combretaceae	native	10	NA	H	9	2	6	abiotic	biotic
Combretum apiculatum subsp. *leutweinii* (Schinz) Exell	Combretaceae	native	10	NA	H	9	2	6	abiotic	biotic
Combretum bracteosum (Hochst.) Engl. & Diels	Combretaceae	native	8	NA	H	9	12	4	abiotic	biotic
Combretum caffrum (Eckl. & Zeyh.) Kuntze	Combretaceae	native	10	NA	H	8	11	4	abiotic	biotic
Combretum celastroides subsp. *orientale* Exell	Combretaceae	native	7	NA	H	12	3	4	abiotic	biotic
Combretum celastroides Welw. ex M.A.Lawson	Combretaceae	native	7	NA	H	12	3	4	abiotic	biotic
Combretum collinum subsp. *gazense* (Swynn. & Baker f.) Okafa	Combretaceae	native	10	NA	H	NA	NA	NA	abiotic	biotic
Combretum collinum subsp. *suluense* (Engl. & Diels) Okafa	Combretaceae	native	15	NA	H	NA	NA	NA	abiotic	biotic
Combretum collinum subsp. *taborense* (Engl.) Okafa	Combretaceae	native	15	NA	H	NA	NA	NA	abiotic	biotic
Combretum edwardsii Exell	Combretaceae	native	5	NA	H	9	10	2	abiotic	biotic
Combretum elaeagnoides Klotzsch	Combretaceae	native	6	NA	H	9	1	5	abiotic	NA
Combretum engleri Schinz. De Wild. & T.Durand	Combretaceae	native	4	NA	H	10	11	2	abiotic	biotic
Combretum erythrophyllum (Burch.) Sond.	Combretaceae	native	12	NA	H	9	11	3	abiotic	biotic
Combretum hereroense Schinz	Combretaceae	native	10	NA	H	9	11	3	abiotic	biotic
Combretum imberbe Wawra	Combretaceae	native	15	NA	H	11	3	5	abiotic	biotic
Combretum kirkii M.A.Lawson	Combretaceae	native	15	NA	H	NA	NA	NA	abiotic	biotic
Combretum kraussii Hochst.	Combretaceae	native	12	NA	H	8	1	6	abiotic	biotic

Combretum microphyllum Klotzsch	Combretaceae	native	4	NA	H	8	11	4	abiotic	biotic
Combretum mkuzense J.D.Carr & Retief	Combretaceae	native	5	NA	H	9	9	2	abiotic	biotic
Combretum moggii Exell	Combretaceae	native	5	NA	H	10	10	1	abiotic	biotic
Combretum molle R.Br. ex G.Don	Combretaceae	native	10	NA	H	9	11	3	abiotic	biotic
Combretum mossambicense (Klotzsch) Engl.	Combretaceae	native	5	NA	H	8	11	4	abiotic	biotic
Combretum nelsonii Dummer	Combretaceae	native	2.5	NA	H	9	11	3	abiotic	biotic
Combretum oxystachyum Welw. ex M.A.Lawson	Combretaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Combretum padoides Engl. & Diels	Combretaceae	native	5	NA	H	12	2	3	abiotic	biotic
Combretum paniculatum Vent.	Combretaceae	native	4	NA	H	8	11	4	abiotic	biotic
Combretum petrophilum Retief	Combretaceae	native	4	NA	H	10	11	2	abiotic	biotic
Combretum pisoniiflorum (Klotzsch) Engl.	Combretaceae	native	4	NA	H	10	10	1	abiotic	biotic
Combretum platypetalum Welw. ex M.A.Lawson	Combretaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Combretum psidioides subsp. *dinteri* (Schinz. De Wild. & T.Durand) Exell	Combretaceae	native	10	NA	H	9	10	2	abiotic	biotic
Combretum psidioides Welw.	Combretaceae	native	10	NA	H	9	10	2	abiotic	biotic
Combretum stylesii O.Maurin. Jordaan & A.E.van Wyk	Combretaceae	native	14	NA	H	NA	NA	NA	abiotic	biotic
Combretum tenuipes Engl.	Combretaceae	native	10	NA	H	NA	NA	NA	abiotic	biotic
Combretum vendae A.E.van Wyk	Combretaceae	native	5	NA	H	9	10	2	abiotic	biotic
Combretum wattii Exell	Combretaceae	native	6	NA	H	8	10	3	abiotic	biotic
Combretum woodii Dummer	Combretaceae	native	7	NA	H	8	12	5	abiotic	biotic

Combretum zeyheri Sond.	Combretaceae	native	10	NA	H	9	11	3	abiotic	biotic
Commiphora africana (A.Rich.) Endl.	Burseraceae	native	5	NA	H	10	10	1	abiotic	biotic
Commiphora edulis (Klotzsch) Engl.	Burseraceae	native	10	NA	H	10	12	3	abiotic	biotic
Commiphora glandulosa Schinz	Burseraceae	native	10	NA	H	9	10	2	abiotic	biotic
Commiphora harveyi (Engl.) Engl.	Burseraceae	native	18	NA	H	10	12	3	abiotic	biotic
Commiphora marlothii Engl.	Burseraceae	native	13	NA	H	10	10	1	abiotic	biotic
Commiphora mollis (Oliv.) Engl.	Burseraceae	native	8	NA	H	9	1	5	abiotic	biotic
Commiphora neglecta Verd.	Burseraceae	native	8	NA	H	9	10	2	abiotic	biotic
Commiphora pyracanthoides Engl.	Burseraceae	native	3	NA	H	9	10	2	abiotic	biotic
Commiphora schimperi (O.Bergman) Engl.	Burseraceae	native	8	NA	H	8	10	3	abiotic	biotic
Commiphora serrata Engl.	Burseraceae	native	8	NA	H	10	11	2	abiotic	biotic
Commiphora woodii Engl.	Burseraceae	native	15	NA	H	10	12	3	abiotic	biotic
Commiphora zanzibarica (Baill.) Engl.	Burseraceae	native	12	NA	H	11	1	3	abiotic	biotic
Coptosperma rhodesiacum (Bremek.) Degreef	Rubiaceae	native	10	NA	H	11	5	7	biotic	biotic
Coptosperma supra-axillare (Hemsl.) Degreef	Rubiaceae	native	7	NA	H	NA	NA	NA	NA	NA
Coptosperma zygoon (Bridson) Degreef	Rubiaceae	native	2	NA	H	NA	NA	NA	NA	NA
Cordia africana Lam.	Boraginaceae	native	15	NA	H	4	6	3	abiotic	biotic
Cordia caffra Sond.	Boraginaceae	native	13	NA	H	9	10	2	abiotic	biotic
Cordia grandicalyx Oberm.	Boraginaceae	native	5	NA	H	10	12	3	abiotic	biotic

Cordia monoica Roxb.	Boraginaceae	native	7	NA	H	10	5	8	abiotic	biotic
Cordia sinensis Lam.	Boraginaceae	native	8	NA	H	12	2	3	biotic	biotic
Cordia stuhlmannii Gürke	Boraginaceae	native	8	NA	H	NA	NA	NA	NA	biotic
Cordia torrei E.S.Martins	Boraginaceae	native	5	NA	H	NA	NA	NA	NA	biotic
Cordyla africana Lour.	Fabaceae	native	25	NA	H	7	10	4	abiotic	biotic
Corymbia ficifolia (F.Muell.) K.D.Hill & L.A.S.Johnson	Myrtaceae	non_invasive	15	NA	H	10	4	7	abiotic	biotic
Cotoneaster franchetii Bois	Rosaceae	invasive	3	NA	H	8	1	6	biotic	biotic
Cotoneaster pannosus Franch.	Rosaceae	invasive	3	NA	H	5	7	3	abiotic	biotic
Craibia brevicaudata subsp. *baptistarum* (Buttner) J.B.Gillett	Fabaceae	native	18	NA	H	10	1	4	biotic	biotic
Craibia zimmermannii (Harms) Dunn	Fabaceae	native	15	NA	H	9	11	3	biotic	biotic
Crassula arborescens (Mill.) Willd.	Crassulaceae	native	3	NA	H	10	12	3	biotic	biotic
Craterispermum schweinfurthii Hiern	Rubiaceae	native	15	NA	H	10	10	1	biotic	biotic
Crossopteryx febrifuga (Afzel. ex G.Don) Benth.	Rubiaceae	native	10	NA	H	11	1	3	biotic	biotic
Crotalaria agatiflora Schweinf.	Fabaceae	invasive	3	NA	H	8	4	9	biotic	biotic
Crotalaria capensis Jacq.	Fabaceae	native	6	NA	H	10	2	5	biotic	biotic
Crotalaria laburnifolia subsp. *australis* (Baker f.) Polhill	Fabaceae	native	2	NA	H	NA	NA	NA	NA	NA
Crotalaria monteiroi Baker f.	Fabaceae	native	4	NA	H	NA	NA	NA	NA	biotic
Croton gratissimus Burch.	Euphorbiaceae	native	10	NA	H	9	11	3	abiotic	biotic
Croton madandensis S.Moore	Euphorbiaceae	native	5	NA	H	11	3	5	abiotic	biotic
Croton megalobotrys MŸll.Arg.	Euphorbiaceae	native	15	NA	H	9	11	3	abiotic	biotic

Croton pseudopulchellus Pax	Euphorbiaceae	native	5	NA	H	11	12	2	abiotic	biotic
Croton steenkampianus Gerstner	Euphorbiaceae	native	7	NA	H	11	11	2	abiotic	biotic
Croton sylvaticus Hochst.	Euphorbiaceae	native	30	NA	H	9	1	5	abiotic	biotic
Cryptocarya latifolia Sond.	Lauraceae	native	20	NA	D	9	11	3	abiotic	abiotic
Cryptocarya liebertiana Engl.	Lauraceae	native	35	NA	D	12	2	3	abiotic	biotic
Cryptocarya myrtifolia Stapf	Lauraceae	native	20	NA	D	1	2	2	abiotic	biotic
Cryptocarya woodii Engl.	Lauraceae	native	20	NA	D	10	12	3	abiotic	biotic
Cryptocarya wyliei Stapf	Lauraceae	native	4	NA	D	12	1	2	abiotic	biotic
Cunonia capensis L.	Cunoniaceae	native	30	NA	H	3	3	1	biotic	biotic
Cupressus arizonica Greene	Cupressaceae	invasive	25	15.2	H	NA	NA	NA	biotic	biotic
Cupressus lusitanica Mill.	Cupressaceae	invasive	27	3.8	H	NA	NA	NA	biotic	biotic
Curtisia dentata (Burm.f.) C.A.Sm.	Cornaceae	native	20	NA	H	10	3	6	biotic	biotic
Cussonia arborea Hochst. ex A.Rich.	Araliaceae	native	10	NA	H	9	11	3	biotic	biotic
Cussonia arenicola Strey	Araliaceae	native	3	NA	H	10	1	4	biotic	biotic
Cussonia natalensis Sond.	Araliaceae	native	10	NA	H	2	5	4	biotic	biotic
Cussonia spicata Thunb.	Araliaceae	native	10	NA	H	11	5	7	biotic	biotic
Cussonia thyrsiflora Thunb.	Araliaceae	native	5	NA	H	11	1	3	biotic	biotic
Cussonia transvaalensis Reyneke	Araliaceae	native	5	NA	H	NA	NA	NA	NA	biotic
Cycas thouarsii R.Br.	Cycadaceae	native	10	NA	NA	NA	NA	NA	abiotic	biotic

Cyclopia genistoides (L.) Vent.	Fabaceae	native	2	NA	H	NA	NA	NA	NA	biotic
Cyphomandra betacea (Cav.) Miers	Solanaceae	invasive	4	9	H	9	3	7	biotic	NA
Cytisus scoparius (L.) Link	Fabaceae	native	20	NA	D	11	11	1	abiotic	biotic
Dais cotinifolia L.	Thymelaeaceae	native	13	NA	H	11	2	4	biotic	biotic
Dalbergia arbutifolia Baker	Fabaceae	native	12	NA	H	NA	NA	NA	NA	NA
Dalbergia armata E.Mey.	Fabaceae	native	5	NA	H	10	11	2	biotic	biotic
Dalbergia boehmii Taub.	Fabaceae	native	10	NA	H	10	12	3	biotic	biotic
Dalbergia melanoxylon Guill. & Perr.	Fabaceae	native	7	NA	H	10	12	3	biotic	biotic
Dalbergia multijuga E.Mey.	Fabaceae	native	5	NA	H	8	10	3	biotic	biotic
Dalbergia nitidula Baker	Fabaceae	native	7	NA	H	8	9	2	biotic	biotic
Dalbergia obovata E.Mey.	Fabaceae	native	6	NA	H	10	11	2	biotic	biotic
Dalbergiella nyassae Baker f.	Fabaceae	native	9	NA	H	8	10	3	biotic	biotic
Deinbollia oblongifolia (E.Mey.) Radlk.	Sapindaceae	native	3.5	NA	H	3	6	4	abiotic	biotic
Deinbollia xanthocarpa (Klotzsch) Radlk.	Sapindaceae	native	10	NA	H	7	9	3	biotic	biotic
Delonix regia (Hook.) Raf.	Fabaceae	invasive	18	NA	H	10	2	5	biotic	biotic
Derris trifoliata Lour.	Fabaceae	native	15	NA	H	NA	NA	NA	NA	NA
Dialium schlechteri Harms	Fabaceae	native	15	NA	H	9	11	3	biotic	biotic
Dichrostachys cinerea subsp. *africana* Brenan & Brummitt	Fabaceae	native	6	NA	H	10	1	4	biotic	biotic
Dichrostachys cinerea subsp. *nyassana* (Taub.) Brenan	Fabaceae	native	6	NA	H	10	1	4	biotic	biotic
Didelta spinosa (L.f.) Aiton	Asteraceae	native	3	NA	H	8	9	2	biotic	biotic

Dioscorea elephantipes (L'Hér.) Engl.	Dioscoreaceae	native	3	NA	NA	NA	NA	NA	abiotic	biotic
Diospyros abyssinica (Hiern) F.White	Ebenaceae	native	36	NA	D	10	1	4	abiotic	biotic
Diospyros batocana Hiern	Ebenaceae	native	8	NA	D	6	9	4	abiotic	biotic
Diospyros dichrophylla (Gand.) De Winter	Ebenaceae	native	3	NA	D	11	3	5	abiotic	abiotic
Diospyros ferrea (Willd.) Bakh.	Ebenaceae	native	20	NA	D	11	3	5	abiotic	abiotic
Diospyros glabra (L.) De Winter	Ebenaceae	native	5	NA	D	10	12	3	abiotic	abiotic
Diospyros inhacaensis F.White	Ebenaceae	native	15	NA	D	11	3	5	abiotic	biotic
Diospyros loureiroana G.Don	Ebenaceae	native	10	NA	D	10	12	3	abiotic	abiotic
Diospyros lycioides Desf.	Ebenaceae	native	7	NA	D	9	12	4	abiotic	abiotic
Diospyros lycioides subsp. *guerkei* (Kuntze) De Winter	Ebenaceae	native	7	NA	D	9	12	4	abiotic	abiotic
Diospyros mespiliformis Hochst. ex A.DC.	Ebenaceae	native	25	NA	D	10	11	2	abiotic	biotic
Diospyros natalensis (Harv.) Brenan	Ebenaceae	native	10	NA	D	7	11	5	abiotic	NA
Diospyros natalensis subsp. *nummularia* (Brenan) F. White	Ebenaceae	native	9	NA	D	10	11	2	abiotic	biotic
Diospyros rotundifolia Hiern	Ebenaceae	native	3	NA	D	11	4	6	abiotic	biotic
Diospyros scabrida (Harv. ex Hiern) De Winter	Ebenaceae	native	7	NA	D	6	9	4	abiotic	biotic
Diospyros simii (Kuntze) De Winter	Ebenaceae	native	8	NA	D	11	12	2	abiotic	biotic
Diospyros squarrosa Klotzsch	Ebenaceae	native	5	NA	D	2	2	1	abiotic	biotic
Diospyros verrucosa Hiern	Ebenaceae	native	4	NA	D	3	5	3	abiotic	biotic
Diospyros villosa (L.) De Winter	Ebenaceae	native	4	NA	D	3	5	3	abiotic	biotic

Diospyros villosa var. *parvifolia* De Winter	Ebenaceae	native	7	NA	D	8	11	4	abiotic	NA
Diospyros whyteana (Hiern) P.White	Ebenaceae	native	10	NA	D	7	11	5	abiotic	biotic
Diplorhynchus condylocarpon (Müll.Arg.) Pichon	Apocynaceae	native	12	NA	H	9	12	4	biotic	biotic
Dissotis princeps (Kunth) Triana	Melastomataceae	native	3	NA	H	NA	NA	NA	NA	NA
Distephanus divaricatus (Steetz) H.Rob. & B.Kahn	Asteraceae	native	8	NA	H	NA	NA	NA	NA	NA
Dodonaea viscosa Jacq.	Sapindaceae	native	9	NA	H	4	8	5	biotic	biotic
Dodonaea viscosa subsp. *angustifolia* (L.f.) J.G.West.	Sapindaceae	native	2	NA	H	4	8	5	biotic	biotic
Dombeya autumnalis Verd.	Malvaceae	native	5	NA	H	NA	NA	NA	NA	NA
Dombeya burgessiae Gerrard ex Harv. & Sond.	Malvaceae	native	5	NA	H	4	8	5	biotic	biotic
Dombeya cymosa Harv.	Malvaceae	native	10	NA	H	3	9	7	biotic	biotic
Dombeya rotundifolia Planch.	Malvaceae	native	8	NA	H	7	11	5	biotic	biotic
Dombeya tiliacea (Endl.) Planch.	Malvaceae	native	10	NA	H	2	5	4	abiotic	biotic
Dovyalis caffra (Hook. f. & Harv.) Warb.	Salicaceae	native	8	NA	D	11	1	3	abiotic	biotic
Dovyalis hispidula Wild	Salicaceae	native	4	NA	D	10	11	2	abiotic	biotic
Dovyalis longispina Warb.	Salicaceae	native	15	NA	D	8	10	3	abiotic	abiotic
Dovyalis lucida Sim	Salicaceae	native	15	NA	D	7	10	4	abiotic	biotic
Dovyalis rhamnoides (Burch. ex DC.) Burch. ex Harv. & Sond.	Salicaceae	native	7	NA	D	6	9	4	abiotic	biotic
Dovyalis xanthocarpa Bullock	Salicaceae	native	7	NA	D	6	9	4	abiotic	NA
Dracaena aletriformis (Haw.) Bos	Asparagaceae	native	5	NA	H	11	2	4	biotic	biotic
Dracaena mannii Baker	Asparagaceae	native	12	NA	H	8	10	3	biotic	biotic

Dracaena transvaalensis Baker	Asparagaceae	native	4	NA	H	1	3	3	biotic	biotic
Drypetes arguta (Müll.Arg.) Hutch.	Euphorbiaceae	native	10	NA	D	11	12	2	abiotic	biotic
Drypetes reticulata Pax	Euphorbiaceae	native	18	NA	D	10	11	2	abiotic	biotic
Duranta erecta L.	Verbenaceae	invasive	7	56.8	H	11	3	5	biotic	biotic
Duvernoia aconitiflora A.Meeuse	Acanthaceae	native	6	NA	H	NA	NA	NA	NA	NA
Duvernoia adhatodoides E.Mey. ex Nees	Acanthaceae	native	3	NA	H	NA	NA	NA	NA	NA
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	invasive	2	16.3	H	11	3	5	biotic	biotic
Ehretia amoena Klotzsch	Boraginaceae	native	5	NA	H	10	2	5	biotic	biotic
Ehretia rigida (Thunb.) Druce	Boraginaceae	native	4	NA	H	9	7	11	biotic	biotic
Ekebergia pterophylla (C.DC.) Hofmeyr	Meliaceae	native	10	NA	H	8	11	4	biotic	biotic
Elaeodendron croceum (Thunb.) DC.	Celastraceae	native	10	NA	H	10	5	8	biotic	biotic
Elaeodendron matabelicum Loes.	Celastraceae	native	20	NA	H	8	12	5	biotic	biotic
Elaeodendron transvaalense (Burtt Davy) R.H.Archer	Celastraceae	native	15	NA	H	12	4	5	biotic	biotic
Elephantorrhiza burkei Benth.	Fabaceae	native	6	NA	H	10	11	2	biotic	biotic
Elephantorrhiza elephantina (Burch.) Skeels	Fabaceae	native	1	NA	H	NA	NA	NA	NA	NA
Elephantorrhiza goetzei (Harms) Harms	Fabaceae	native	7	NA	H	8	12	5	biotic	biotic
Embelia xylocarpa P.Halliday	Primulaceae	native	7	NA	H	NA	NA	NA	NA	NA
Empogona coriacea (Sond.) Tosh & Robbr.	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Empogona kirkii subsp. *junodii* (Schinz) Tosh & Robbr.	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic

Empogona lanceolata (Sond.) Tosh & Robbr.	Rubiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Encephalartos aemulans Vorster	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos altensteinii Lehm.	Zamiaceae	native	7.6	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos arenarius R.A.Dyer	Zamiaceae	native	1	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos brevifoliolatus Vorster	Zamiaceae	native	2.5	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos chimanimaniensis R.A.Dyer & Verdoorn	Zamiaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos concinnus R.A.Dyer & Verdoorn	Zamiaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos cupidus R.A.Dyer	Zamiaceae	native	1	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos dolomiticus Lavranos & D.L.Goode	Zamiaceae	native	2.5	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos dyerianus Lavranos & D.L.Goode	Zamiaceae	native	5	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos eugene-maraisii Verd.	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos ferox G.Bertol.	Zamiaceae	native	1.7	NA	D	NA	NA	NA	abiotic	abiotic
Encephalartos friderici-guilielmi Lehm.	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos ghellinckii Lem.	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos heenanii R.A.Dyer	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	abiotic
Encephalartos hirsutus P.J.H.Hurter	Zamiaceae	native	4.2	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos inopinus R.A.Dyer	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos laevifolius Stapf & Burtt Davy	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos lanatus Stapf & Burtt Davy	Zamiaceae	native	1.5	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos latifrons Lehm.	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	biotic

Encephalartos lebomboensis Verd.	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	abiotic
Encephalartos lehmannii Lehm.	Zamiaceae	native	2	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos longifolius (Jacq.) Lehm.	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos manikensis (Gilliland) Gilliland	Zamiaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos middelburgensis Vorster. Robbertse & S.van der Westh.	Zamiaceae	native	4.3	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos msinganus Vorster	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	abiotic
Encephalartos natalensis R.A.Dyer & Verdoorn	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	abiotic
Encephalartos nubimontanus P.J.H.Hurter	Zamiaceae	native	2.5	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos paucidentatus Stapf & Burtt Davy	Zamiaceae	native	6	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos princeps R.A.Dyer	Zamiaceae	native	3	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos relictus P.J.H.Hurter	Zamiaceae	native	2.5	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos senticosus Vorster	Zamiaceae	native	4	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos transvenosus Stapf & Burtt Davy	Zamiaceae	native	13	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos villosus Lem.	Zamiaceae	native	2	NA	D	NA	NA	NA	abiotic	biotic
Encephalartos woodii Sander	Zamiaceae	native	6	NA	D	NA	NA	NA	abiotic	biotic
Englerodaphne ovalifolia (Meisn.) E.Phillips	Thymelaeaceae	native	3	NA	H	1	12	12	biotic	biotic
Englerodaphne pilosa Burtt Davy	Thymelaeaceae	native	12	NA	H	1	4	4	biotic	biotic
Englerophytum magalismontanum (Sond.) T.D.Penn.	Sapotaceae	native	10	NA	H	6	12	7	biotic	biotic

Englerophytum natalense (Sond.) T.D.Penn.	Sapotaceae	native	20	NA	H	11	3	5	biotic	biotic
Ensete ventricosum (Welw.) Cheesman	Musaceae	native	12	NA	H	10	11	2	abiotic	biotic
Entada abyssinica A.Rich.	Fabaceae	native	10	NA	H	11	11	1	biotic	biotic
Entada rheedii Spreng.	Fabaceae	native	25	NA	H	10	10	1	biotic	biotic
Entada wahlbergii Harv.	Fabaceae	native	30	NA	H	10	10	1	biotic	biotic
Entandrophragma caudatum (Sprague) Sprague	Meliaceae	native	4	NA	H	7	12	6	biotic	biotic
Erica caffra L.	Apocynaceae	native	2.5	NA	H	NA	NA	NA	NA	NA
Erica natalitia Bolus	Ericaceae	native	4	NA	H	6	11	6	biotic	biotic
Erica triflora L.	Ericaceae	native	8	NA	H	NA	NA	NA	NA	NA
Eriobotrya japonica (Thunb.) Lindl.	Ericaceae	invasive	10	NA	H	5	5	2	biotic	biotic
Erythrina abyssinica DC.	Rosaceae	native	20	NA	H	8	9	2	biotic	biotic
Erythrina caffra Thunb.	Fabaceae	native	4	NA	H	9	2	6	biotic	biotic
Erythrina humeana Spreng.	Fabaceae	native	15	NA	H	1	2	2	biotic	biotic
Erythrina livingstoniana Baker	Fabaceae	native	10	NA	H	7	10	4	abiotic	biotic
Erythrina lysistemon Hutch.	Fabaceae	native	0.5	NA	H	NA	NA	NA	NA	biotic
Erythrina zeyheri Harv.	Fabaceae	native	6	NA	D	10	12	3	abiotic	abiotic
Erythrococca Benth. sp.nov.	Fabaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Erythrococca menyharthii (Pax) Prain	Euphorbiaceae	native	12	NA	H	8	10	3	biotic	biotic
Erythrophleum africanum (Benth.) Harms	Euphorbiaceae	native	20	NA	H	8	11	4	biotic	biotic
Erythrophleum suaveolens (Guill. & Perr.) Brenan	Fabaceae	native	5	NA	H	9	2	5	biotic	biotic

Erythroxylum delagoense Schinz	Fabaceae	native	9	NA	H	9	12	4	biotic	biotic
Erythroxylum emarginatum Thonn.	Erythroxylaceae	native	13	NA	H	10	2	5	biotic	biotic
Erythroxylum pictum E.Mey. ex Harv. & Sond.	Erythroxylaceae	native	40	NA	H	7	11	5	biotic	biotic
Eucalyptus camaldulensis Deh (NH).	Erythroxylaceae	invasive	15	2.87	H	1	12	12	biotic	NA
Eucalyptus cinerea F. Muell. ex Benth.	Myrtaceae	invasive	40	8.4	H	10	12	3	biotic	biotic
Eucalyptus diversicolor F.Muell.	Myrtaceae	invasive	8	11.6	H	NA	NA	NA	biotic	biotic
Eucalyptus globulus Labill.	Myrtaceae	invasive	58	3.2	H	1	12	12	biotic	biotic
Eucalyptus grandis W.Hill	Myrtaceae	invasive	60	37.4	H	8	11	4	biotic	biotic
Eucalyptus conferruminata D.J.Carr & S.G.M.Carr	Myrtaceae	invasive	72	1.18	H	4	8	5	biotic	NA
Eucalyptus paniculata Sm.	Myrtaceae	invasive	50	2.4	H	1	12	12	biotic	biotic
Eucalyptus sideroxylon A.Cunn. ex Woolls	Myrtaceae	invasive	26	2.36	H	2	10	9	biotic	biotic
Eucalyptus tereticornis Sm.	Myrtaceae	invasive	50	0.71	H	6	11	6	biotic	biotic
Euclea coriacea A.DC.	Ebenaceae	native	10	NA	D	9	10	2	abiotic	biotic
Euclea crispa (Thunb.) Gürke	Ebenaceae	native	20	NA	D	10	2	5	abiotic	abiotic
Euclea divinorum Hiern	Ebenaceae	native	8	NA	D	2	5	4	abiotic	biotic
Euclea natalensis A.DC.	Ebenaceae	native	8	NA	D	7	1	7	abiotic	biotic
Euclea natalensis subsp. *angustifolia* F. White	Ebenaceae	native	5	NA	D	3	1	11	abiotic	biotic
Euclea natalensis subsp. *obovata* F.White	Ebenaceae	native	12	NA	D	5	6	2	abiotic	biotic
Euclea pseudebenus E.Mey. ex A.DC.	Ebenaceae	native	7	NA	D	5	6	2	abiotic	biotic

Euclea racemosa L.	Ebenaceae	native	10	NA	D	8	9	2	abiotic	biotic
Euclea racemosa subsp. *daphnoides* (Hiern) F.White	Ebenaceae	native	12	NA	D	12	3	4	abiotic	biotic
Euclea undulata Thunb.	Ebenaceae	native	7	NA	D	12	4	5	abiotic	biotic
Eugenia capensis (Eckl. & Zeyh.) Harv.	Myrtaceae	native	4	NA	D	1	3	3	abiotic	biotic
Eugenia capensis subsp. *natalitia* (Sond.) F.White	Myrtaceae	native	10	NA	D	11	12	2	abiotic	biotic
Eugenia capensis subsp. *zeyheri* (Harv.) F.White	Myrtaceae	native	10	NA	D	6	12	7	abiotic	biotic
Eugenia erythrophylla Strey	Myrtaceae	native	20	NA	D	NA	NA	NA	abiotic	biotic
Eugenia L. sp. nov. C	Myrtaceae	native	10	NA	D	10	11	2	abiotic	biotic
Eugenia umtamvunensis A.E.van Wyk	Myrtaceae	invasive	7	NA	H	6	7	2	biotic	biotic
Eugenia uniflora L.	Myrtaceae	native	3	NA	D	6	7	2	abiotic	biotic
Eugenia verdoorniae A.E.van Wyk	Myrtaceae	native	20	NA	D	9	12	4	abiotic	abiotic
Eugenia woodii Dummer	Myrtaceae	native	4	NA	D	10	5	8	abiotic	biotic
Eugenia zuluensis Dummer	Myrtaceae	native	10	NA	D	11	12	2	abiotic	biotic
Euphorbia cooperi N.E.Br. ex A.Berger	Euphorbiaceae	native	7	NA	H	9	10	2	biotic	biotic
Euphorbia espinosa Pax	Euphorbiaceae	native	3.5	NA	H	7	11	5	biotic	biotic
Euphorbia guerichiana Pax ex Engl.	Euphorbiaceae	native	6	NA	H	10	1	4	biotic	biotic
Euphorbia matabelensis Pax	Euphorbiaceae	native	4	NA	H	5	6	2	biotic	biotic
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	non_invasive	3	NA	H	5	7	3	abiotic	biotic
Euphorbia rowlandii R.A.Dyer	Euphorbiaceae	native	NA	NA	H	NA	NA	NA	NA	biotic
Euphorbia tirucalli L.	Euphorbiaceae	native	10	NA	H	1	12	3	biotic	biotic

Euphorbia triangularis Desf. ex A.Berger	Euphorbiaceae	native	18	NA	H	6	6	1	biotic	biotic
Excoecaria bussei (Pax) Pax	Euphorbiaceae	native	10	NA	H	11	11	1	biotic	biotic
Excoecaria simii (Kuntze) Pax	Euphorbiaceae	native	2.5	NA	H	9	12	4	biotic	biotic
Faidherbia albida (Delile) A.Chev.	Fabaceae	native	30	NA	H	5	9	5	biotic	biotic
Faurea galpinii E.Phillips	Proteaceae	native	18	NA	H	10	1	4	biotic	biotic
Faurea macnaughtonii E.Phillips	Proteaceae	native	20	NA	H	12	2	3	biotic	biotic
Faurea rochetiana (A.Rich.) Chiov. ex Pic.Serm.	Proteaceae	native	7	NA	H	3	9	7	biotic	biotic
Faurea saligna Harv.	Proteaceae	native	20	NA	H	8	2	7	biotic	biotic
Fernandoa magnifica Seem.	Bignoniaceae	native	4	NA	H	8	10	3	biotic	biotic
Ficus abutilifolia (Miq.) Miq.	Moraceae	native	8	NA	H	NA	NA	NA	abiotic	biotic
Ficus bizanae Hutch. & Burtt Davy	Moraceae	native	18	NA	H	NA	NA	NA	abiotic	biotic
Ficus burkei (Miq.) Miq.	Moraceae	native	18	NA	H	NA	NA	NA	abiotic	biotic
Ficus burtt-davyi Hutch.	Moraceae	native	5	NA	H	NA	NA	NA	abiotic	biotic
Ficus bussei Warb. ex Mildbr. & Burret	Moraceae	native	18	NA	H	NA	NA	NA	abiotic	biotic
Ficus capreifolia Delile	Moraceae	native	7	NA	H	NA	NA	NA	abiotic	biotic
Ficus carica L.	Moraceae	invasive	3	NA	D	10	2	5	biotic	biotic
Ficus cordata subsp. *salicifolia* (Vahl) C.C.Berg	Moraceae	native	20	NA	H	NA	NA	NA	abiotic	biotic
Ficus cordata Thunb.	Moraceae	native	12	NA	H	NA	NA	NA	abiotic	biotic
Ficus craterostoma Warb. ex Mildbr. & Burret	Moraceae	native	13	NA	H	NA	NA	NA	abiotic	biotic

Ficus glumosa Delile	Moraceae	native	5	NA	H	NA	NA	NA	abiotic	biotic
Ficus ilicina (Sond.) Miq.	Moraceae	native	13	NA	H	NA	NA	NA	abiotic	biotic
Ficus ingens (Miq.) Miq.	Moraceae	native	12	NA	H	NA	NA	NA	abiotic	biotic
Ficus lutea Vahl	Moraceae	native	16	NA	H	NA	NA	NA	abiotic	biotic
Ficus polita Vahl	Moraceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Ficus pygmaea Welw. ex Hiern	Moraceae	native	40	NA	H	NA	NA	NA	abiotic	biotic
Ficus rokko Warb. & Schweinf	Moraceae	native	9	NA	H	NA	NA	NA	abiotic	biotic
Ficus stuhlmannii Warb.	Moraceae	native	10	NA	H	NA	NA	NA	abiotic	biotic
Ficus sur Forssk.	Moraceae	native	30	NA	H	NA	NA	NA	abiotic	biotic
Ficus sycomorus L.	Moraceae	native	25	NA	H	NA	NA	NA	abiotic	biotic
Ficus tettensis Hutch.	Moraceae	native	7	NA	H	NA	NA	NA	abiotic	biotic
Ficus thonningii Blume	Moraceae	native	10	NA	H	NA	NA	NA	abiotic	biotic
Ficus tremula Warb.	Moraceae	native	12	NA	H	NA	NA	NA	abiotic	biotic
Ficus trichopoda Baker	Moraceae	native	25	NA	H	NA	NA	NA	abiotic	biotic
Filicium decipiens (Wight & Arn.) Thwaites	Sapindaceae	native	25	NA	H	11	12	2	biotic	biotic
Flacourtia indica (Burm. f.) Merr.	Salicaceae	native	10	NA	H	9	12	4	biotic	biotic
Flueggea virosa (Roxb. ex Willd.) Royle	Euphorbiaceae	native	4	NA	D	10	1	4	abiotic	biotic
Fockea Endl. sp.	Apocynaceae	native	15	NA	H	NA	NA	NA	NA	NA
Fraxinus americana L.	Oleaceae	invasive	20	38.1	D	8	9	2	biotic	biotic
Fraxinus angustifolia Vahl	Oleaceae	invasive	25	NA	D	8	10	3	biotic	biotic

Fraxinus pennsylvanica Marshall	Oleaceae	invasive	15	32.3	D	8	10	3	biotic	biotic
Freylinia lanceolata (L.) G.Don	Scrophulariaceae	native	5	NA	H	2	7	6	biotic	biotic
Friesodielsia obovata (Benth.) Verdc.	Annonaceae	native	7	NA	H	11	2	4	biotic	biotic
Funtumia africana (Benth.) Stapf	Apocynaceae	native	27	NA	H	10	12	3	biotic	biotic
Galpinia transvaalica N.E.Br.	Lythraceae	native	7	NA	H	11	5	7	biotic	biotic
Garcinia gerrardii Harv. ex Sim	Clusiaceae	native	13	NA	H	9	11	3	biotic	biotic
Garcinia livingstonei T.Anderson	Clusiaceae	native	10	NA	D	8	9	2	abiotic	biotic
Gardenia cornuta Hemsl.	Rubiaceae	native	5	NA	H	11	3	5	biotic	biotic
Gardenia resiniflua Hiern	Rubiaceae	native	7	NA	H	11	12	2	biotic	biotic
Gardenia ternifolia Schumach. & Thonn.	Rubiaceae	native	7	NA	H	9	12	4	biotic	biotic
Gardenia thunbergia Thunb.	Rubiaceae	native	5	NA	H	10	2	5	biotic	biotic
Gardenia volkensii K.Schum.	Rubiaceae	native	7	NA	H	7	12	6	biotic	biotic
Genista monspessulana (L.) L.A.S.Johnson	Fabaceae	invasive	3	NA	H	8	1	6	abiotic	biotic
Gerrardina foliosa Oliv.	Gerrardinaceae	native	10	NA	H	1	7	7	biotic	biotic
Gleditsia triacanthos L.	Fabaceae	invasive	20	165.8	H	10	11	2	biotic	biotic
Glenniea africana (Radlk.) Lee (NH)	Sapindaceae	native	12	NA	H	9	4	8	biotic	biotic
Gloveria integrifolia (L.f.) Jordaan	Celastraceae	native	2	NA	H	10	12	3	biotic	biotic
Glyphaea tomentosa Mast.	Malvaceae	native	4	NA	H	1	1	1	biotic	biotic
Gonioma kamassi E.Mey.	Apocynaceae	native	6	NA	H	10	10	1	biotic	biotic

Gossypium herbaceum subsp. *africanum* (G.Watt) Vollesen	Malvaceae	native	1.5	NA	H	NA	NA	NA	NA	biotic
Grevillea banksii R.Br.	Proteaceae	invasive	10	NA	H	1	12	12	abiotic	biotic
Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	invasive	30	12.7	H	9	11	3	biotic	biotic
Grewia bicolor Juss.	Malvaceae	native	7	NA	H	10	1	4	biotic	biotic
Grewia caffra Meisn.	Malvaceae	native	4	NA	H	11	5	7	biotic	biotic
Grewia flava DC.	Malvaceae	native	3	NA	H	8	5	10	biotic	biotic
Grewia flavescens Juss.	Malvaceae	native	5	NA	H	12	3	4	biotic	biotic
Grewia gracillima Wild	Malvaceae	native	5	NA	H	10	2	5	biotic	biotic
Grewia hexamita Burret	Malvaceae	native	5	NA	H	9	12	4	biotic	biotic
Grewia inaequilatera Garcke	Malvaceae	native	7	NA	H	10	2	5	biotic	biotic
Grewia lasiocarpa E.Mey. ex Harv.	Malvaceae	native	5	NA	H	1	3	3	biotic	biotic
Grewia lepidopetala Garcke	Malvaceae	native	6	NA	H	11	1	3	biotic	biotic
Grewia micrantha Bojer	Malvaceae	native	5	NA	H	11	12	2	biotic	biotic
Grewia microcarpa K.Schum.	Malvaceae	native	4	NA	H	10	11	2	biotic	biotic
Grewia microthyrsa K.Schum. ex Burret	Malvaceae	native	4	NA	H	10	1	4	biotic	biotic
Grewia monticola Sond.	Malvaceae	native	10	NA	H	10	1	4	biotic	biotic
Grewia occidentalis L.	Malvaceae	native	6	NA	H	10	1	4	biotic	biotic
Grewia pondoensis Burret	Malvaceae	native	5	NA	H	10	1	4	biotic	biotic
Grewia sulcata Mast.	Malvaceae	native	5	NA	H	5	8	4	abiotic	biotic
Grewia transzambesica Wild	Malvaceae	native	7	NA	H	2	3	2	biotic	biotic

Grewia vernicosa Schinz	Malvaceae	native	1.5	NA	H	NA	NA	NA	NA	biotic
Grewia villosa Willd.	Malvaceae	native	4	NA	H	10	3	6	biotic	biotic
Greyia flanaganii Bolus	Melianthaceae	native	3	NA	H	4	11	8	biotic	biotic
Greyia sutherlandii Hook. & Harv.	Melianthaceae	native	7	NA	H	8	10	3	biotic	biotic
Guettarda speciosa L.	Rubiaceae	native	5	NA	H	9	5	9	biotic	biotic
Guibourtia coleosperma (Benth.) Leonard	Fabaceae	native	20	NA	H	12	3	4	biotic	biotic
Guibourtia conjugata (Bolle) J.Leonard	Fabaceae	native	9	NA	H	11	1	3	biotic	biotic
Guilandina bonduc Griseb.	Celastraceae	native	6	NA	H	NA	NA	NA	NA	biotic
Gymnosporia bachmannii Loes.	Celastraceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Gymnosporia buxifolia (L.) Szyszyl.	Celastraceae	native	9	NA	D	9	4	8	abiotic	biotic
Gymnosporia devenishii Jordaan	Celastraceae	native	8	NA	D	12	3	4	abiotic	biotic
Gymnosporia harveyana Loes.	Celastraceae	native	9	NA	D	NA	NA	NA	abiotic	biotic
Gymnosporia heterophylla (Eckl. & Zeyh.) Loes.	Celastraceae	native	1.5	NA	D	NA	NA	NA	abiotic	biotic
Gymnosporia maranguensis (Loes.) Loes.	Celastraceae	native	6	NA	D	9	4	8	abiotic	biotic
Gymnosporia mossambicensis (Klotzsch) Loes.	Celastraceae	native	2	NA	D	NA	NA	NA	abiotic	biotic
Gymnosporia nemorosa (Eckl. & Zeyh.) Szyszyl.	Celastraceae	native	5	NA	D	9	3	7	abiotic	biotic
Gymnosporia oxycarpa (N.Robson) Jordaan	Celastraceae	native	5	NA	D	NA	NA	NA	abiotic	biotic
Gymnosporia polyacantha (Sond.) Szyszyl.	Celastraceae	native	4	NA	D	NA	NA	NA	abiotic	biotic
Gymnosporia pubescens (N.Robson) Jordaan	Celastraceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic

Gymnosporia putterlickioides Loes.	Celastraceae	native	6	NA	D	9	11	3	abiotic	NA
Gymnosporia senegalensis (Lam.) Loes.	Celastraceae	native	9	NA	D	5	6	2	abiotic	biotic
Gymnosporia tenuispina (Sond.) Szyszyl.	Celastraceae	native	1.5	NA	D	NA	NA	NA	abiotic	biotic
Gyrocarpus americanus Jacq.	Hernandiaceae	native	15	NA	NA	NA	NA	NA	abiotic	biotic
Haematoxylum L.	Fabaceae	native	2	NA	H	NA	NA	NA	NA	biotic
Hakea gibbosa Cav.	Proteaceae	invasive	4	55.7	H	6	9	4	biotic	abiotic
Hakea salicifolia (Vent.) B.L.Burtt	Proteaceae	invasive	8	NA	H	9	1	5	biotic	biotic
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	invasive	5	44.6	H	6	9	4	biotic	abiotic
Halleria lucida L.	Scrophulariaceae	native	20	NA	H	5	2	10	biotic	biotic
Haplocoelum foliolosum (Hiern) Bullock	Sapindaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Harpephyllum caffrum Ber (NH). ex C.Krauss	Anacardiaceae	native	15	NA	D	11	2	5	abiotic	abiotic
Heeria argentea Meisn.	Anacardiaceae	native	5	NA	H	1	7	7	abiotic	biotic
Heinsia crinita subsp. *parviflora* (K.Schum. & K.Krause) Verdc.	Rubiaceae	native	7.5	NA	H	11	2	4	biotic	biotic
Helinus integrifolius (Lam.) Kuntze	Rhamnaceae	native	6	NA	NA	NA	NA	NA	abiotic	biotic
Hemizygia albiflora (N.E.Br.) Ashby	Lamiaceae	native	3	NA	H	NA	NA	NA	NA	NA
Heritiera littoralis Aiton	Malvaceae	native	25	NA	H	6	6	1	biotic	biotic
Heteromorpha arborescens Cham. & Schltdl.	Apiaceae	native	8	NA	H	12	1	2	abiotic	biotic
Heteromorpha arborescens var. *frutescens* P. Winter	Apiaceae	native	7	NA	H	12	1	2	abiotic	biotic
Heteropyxis natalensis Harv.	Myrtaceae	native	10	NA	D	12	3	4	abiotic	NA
Hexalobus monopetalus (A.Rich.) Engl. & Diels	Annonaceae	native	7	NA	H	10	11	2	biotic	biotic

Heywoodia lucens Sim	Euphorbiaceae	native	25	NA	D	10	10	1	abiotic	biotic
Hibiscus calyphyllus Cav.	Malvaceae	native	3	NA	H	NA	NA	NA	NA	biotic
Hibiscus micranthus L.f.	Malvaceae	native	2.5	NA	H	NA	NA	NA	NA	biotic
Hibiscus tiliaceus L.	Malvaceae	native	6	NA	H	NA	NA	NA	NA	biotic
Hippobromus pauciflorus Radlk.	Sapindaceae	native	5	NA	H	3	9	7	biotic	biotic
Hippocratea crenata K. Schum. & Loes.	Celastraceae	native	4	NA	H	NA	NA	NA	NA	biotic
Hippocratea indica Willd.	Celastraceae	native	20	NA	H	10	1	4	biotic	biotic
Hippocratea longipetiolata Oliv.	Celastraceae	native	6	NA	H	NA	NA	NA	NA	biotic
Hirtella zanzibarica Oliv.	Chrysobalanaceae	native	20	NA	H	NA	NA	NA	NA	biotic
Holarrhena pubescens Wall.	Apocynaceae	native	7	NA	H	11	1	3	biotic	biotic
Homalanthus populifolius Graham	Apocynaceae	invasive	10	NA	H	10	2	5	abiotic	biotic
Homalium dentatum Warb.	Salicaceae	native	20	NA	H	1	5	5	biotic	NA
Homalium rufescens Benth.	Salicaceae	native	7	NA	H	9	12	4	biotic	biotic
Hugonia busseana Engl.	Linaceae	native	10	NA	H	10	12	3	biotic	biotic
Hugonia orientalis Engl.	Linaceae	native	10	NA	H	10	12	3	biotic	biotic
Hunteria zeylanica (Retz.) Gardner ex Thwaites	Apocynaceae	native	40	NA	H	8	12	5	biotic	biotic
Hyaenanche globosa (Gaertn.) Lamb. & Vahl	Euphorbiaceae	native	5	NA	D	7	9	3	abiotic	biotic
Hymenaea verrucosa Gaertn.	Fabaceae	native	25	NA	H	2	3	2	biotic	biotic
Hymenocardia ulmoides Oliv.	Euphorbiaceae	native	5	NA	D	NA	NA	NA	abiotic	biotic

Hymenodictyon floribundum (Hochst. & Steud.) B.L.Rob.	Rubiaceae	native	8	NA	H	9	12	4	biotic	biotic
Hymenodictyon parvifolium Oliv.	Rubiaceae	native	5	NA	H	10	1	4	biotic	biotic
Hyperacanthus amoenus (Sims) Bridson	Rubiaceae	native	7	NA	H	11	3	5	biotic	biotic
Hypericum perforatum L.	Hypericaceae	invasive	1	NA	NA	10	1	4	biotic	biotic
Hyphaene coriacea Gaertn.	Arecaceae	native	18	NA	D	9	10	2	abiotic	biotic
Hyphaene petersiana Klotzsch ex Mart.	Arecaceae	native	18	NA	D	9	10	2	abiotic	biotic
Hypocalyptus sophoroides (P.J.Bergius) Baill.	Fabaceae	native	4	NA	H	NA	NA	NA	NA	biotic
Ilex L.	Aquifoliaceae	native	30	NA	D	9	12	4	abiotic	abiotic
Indigofera filifolia Thunb.	Fabaceae	native	NA	NA	H	NA	NA	NA	NA	NA
Indigofera frutescens L.f.	Fabaceae	native	NA	NA	H	NA	NA	NA	NA	NA
Indigofera fulgens Baker	Fabaceae	native	NA	NA	H	NA	NA	NA	NA	biotic
Indigofera natalensis Bolus	Fabaceae	native	3	NA	H	12	3	4	biotic	biotic
Indigofera rhynchocarpa Baker	Fabaceae	native	3	NA	H	10	12	3	biotic	biotic
Indigofera suffruticosa Mill.	Fabaceae	native	NA	NA	H	NA	NA	NA	NA	biotic
Indigofera tinctoria L.	Fabaceae	native	2	NA	H	NA	NA	NA	NA	NA
Inhambanella henriquezii (Engl. & Warb.) Dubard	Sapotaceae	native	40	NA	H	8	8	1	biotic	biotic
Ipomoea carnea Jacq.	Convolvulaceae	invasive	3	79.2	H	1	12	12	biotic	biotic
Itea L.	Iteaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Ixora narcissodora K.Schum.	Rubiaceae	native	5	NA	H	5	12	8	biotic	biotic
Jacaranda mimosifolia D.Don	Bignoniaceae	invasive	22	NA	H	9	11	3	biotic	biotic

Jasminum humile L.	Oleaceae	native	9	NA	NA	NA	NA	NA	abiotic	biotic
Jasminum fluminense Vell.	Oleaceae	invasive	4	NA	H	9	3	7	biotic	biotic
Jasminum mesnyi Hance	Oleaceae	invasive	3	NA	H	8	2	7	biotic	biotic
Jasminum multipartitum Hochst.	Oleaceae	native	3	NA	NA	NA	NA	NA	abiotic	biotic
Jasminum stenolobum Rolfe	Oleaceae	native	1.8	NA	NA	NA	NA	NA	abiotic	biotic
Jatropha curcas L.	Euphorbiaceae	invasive	3	430.3	H	10	12	3	biotic	biotic
Jatropha gossypiifolia var. *elegans* (Pohl) Müll.Arg.	Euphorbiaceae	invasive	2	46.04	H	10	4	7	biotic	biotic
Jubaeopsis caffra Becc.	Arecaceae	native	5	NA	H	NA	NA	NA	abiotic	biotic
Julbernardia globiflora (Benth.) Troupin	Fabaceae	native	15	NA	H	1	5	5	biotic	biotic
Juniperus procera Hochst. ex Endl.	Cupressaceae	native	35	21	H	NA	NA	NA	biotic	biotic
Juniperus virginiana L.	Cupressaceae	invasive	18	10.4	H	NA	NA	NA	biotic	biotic
Justicia campylostemon T. Anders.	Acanthaceae	native	2.5	NA	H	7	12	6	biotic	biotic
Karomia speciosa (Hutch. & Corbishley) R.Fern.	Acanthaceae	native	6	NA	H	3	7	5	biotic	biotic
Keetia gueinzii (Sond.) Bridson	Acanthaceae	native	3	NA	H	4	11	8	biotic	biotic
Khaya anthotheca (Welw.) C.DC.	Meliaceae	native	60	NA	H	9	12	4	biotic	biotic
Kigelia africana (Lam.) Benth.	Bignoniaceae	native	25	NA	H	8	10	3	biotic	biotic
Kiggelaria africana L.	Salicaceae	native	13	NA	D	8	1	6	abiotic	biotic
Kirkia acuminata Oliv.	Kirkiaceae	native	15	NA	H	10	12	3	abiotic	biotic
Kirkia wilmsii Engl.	Kirkiaceae	native	8	NA	H	10	12	3	abiotic	biotic

Kraussia floribunda Harv.	Rubiaceae	native	6	NA	H	10	1	4	biotic	biotic
Lachnostylis bilocularis R.A.Dyer	Euphorbiaceae	native	3	NA	NA	NA	NA	NA	abiotic	biotic
Lagynias dryadum (S.Moore) Robyns	Rubiaceae	invasive	8	2.1	H	11	12	2	biotic	biotic
Landolphia kirkii Dyer	Apocynaceae	native	5	NA	H	11	12	2	biotic	biotic
Lannea antiscorbutica (Hiern) Engl.	Anacardiaceae	native	8	NA	H	NA	NA	NA	NA	NA
Lannea discolor (Sond.) Engl.	Anacardiaceae	native	15	NA	H	10	10	1	abiotic	biotic
Lannea edulis (Sond.) Engl.	Anacardiaceae	native	15	NA	H	9	10	2	abiotic	biotic
Lannea schweinfurthii (Engl.) Engl.	Anacardiaceae	native	0.3	NA	H	NA	NA	NA	abiotic	abiotic
Lantana camara L.	Verbenaceae	native	20	NA	H	11	1	3	abiotic	biotic
Lantana rugosa Thunb.	Verbenaceae	invasive	2	16	H	1	12	12	biotic	biotic
Lagerstroemia indica L.	Lythraceae	native	1	NA	NA	NA	NA	NA	abiotic	biotic
Lasiodiscus pervillei Baill.	Rhamnaceae	native	9	NA	H	8	11	4	biotic	biotic
Laurophyllus capensis Thunb.	Anacardiaceae	native	6	NA	D	8	1	6	abiotic	biotic
Lebeckia sericea Thunb.	Fabaceae	native	3	NA	H	8	4	9	biotic	biotic
Lecaniodiscus fraxinifolius Baker	Sapindaceae	native	10	NA	H	10	12	3	biotic	biotic
Leonotis leonurus (L.) R.Br.	Lamiaceae	native	5	NA	H	NA	NA	NA	NA	NA
Lepisanthes senegalensis (Poir.) Lee (NH)	Sapindaceae	native	15	NA	H	7	9	3	biotic	biotic
Leptactina delagoensis K.Schum.	Rubiaceae	native	4	NA	H	11	3	5	biotic	biotic
Leptospermum laevigatum (Gaertn.) F.Muell.	Myrtaceae	invasive	8	2.8	H	8	10	3	biotic	biotic
Leucadendron argenteum (L.) R. Br.	Proteaceae	native	10	NA	D	8	9	2	abiotic	biotic

Leucadendron coniferum Meisn.	Proteaceae	native	4	NA	D	8	9	2	abiotic	biotic
Leucadendron galpinii E.Phillips & Hutch.	Proteaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Leucadendron macowanii E.Phillips	Proteaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Leucadendron pubescens R. Br.	Proteaceae	native	3	NA	D	7	7	2	abiotic	biotic
Leucadendron rubrum Burm. f.	Proteaceae	native	2.5	NA	D	NA	NA	NA	abiotic	biotic
Leucadendron salicifolium I.A. Williams	Proteaceae	native	3	NA	D	7	9	3	abiotic	biotic
Leucadendron strobilinum Druce	Proteaceae	native	3	NA	D	9	10	2	abiotic	biotic
Leucaena leucocephala (Lam.) de Wit	Fabaceae	invasive	4	31.6	H	7	3	9	biotic	biotic
Leucosidea sericea Eckl. & Zeyh.	Rosaceae	native	15	NA	H	8	12	5	biotic	biotic
Leucospermum conocarpodendron (L.) H.St.John	Proteaceae	native	5	NA	D	8	1	6	abiotic	abiotic
Leucospermum conocarpodendron subsp. *viridum* Rourke	Proteaceae	native	5	NA	D	8	1	6	abiotic	biotic
Leucospermum cuneiforme Rourke	Proteaceae	native	3	NA	D	8	2	7	abiotic	biotic
Leucospermum gerrardii Stapf	Proteaceae	native	NA	NA	D	NA	NA	NA	abiotic	biotic
Leucospermum rodolentum Rourke	Proteaceae	native	3	NA	D	8	10	3	abiotic	abiotic
Leucospermum saxosum S.Moore	Proteaceae	native	2	NA	D	NA	NA	NA	abiotic	biotic
Ligustrum japonicum Thunb.	Oleaceae	invasive	6	NA	H	10	2	5	biotic	biotic
Ligustrum lucidum W.T.Aiton	Oleaceae	invasive	10	31	H	10	2	5	biotic	biotic
Ligustrum ovalifolium Hassk.	Oleaceae	invasive	3	NA	H	10	2	5	biotic	biotic
Ligustrum sinense Lour.	Oleaceae	invasive	6	17	H	10	2	5	biotic	biotic

Ligustrum vulgare L.	Oleaceae	invasive	3	21.8	H	10	2	5	biotic	biotic
Liparia hirsuta Thunb.	Fabaceae	native	3	NA	H	8	4	9	biotic	biotic
Liparia myrtifolia Thunb.	Fabaceae	native	3	NA	H	3	6	4	abiotic	biotic
Liparia rafnioides A.L.Schutte	Fabaceae	native	4	NA	H	10	2	5	biotic	biotic
Lippia javanica (Burm.f.) Spreng.	Verbenaceae	native	4.5	NA	NA	NA	NA	NA	abiotic	biotic
Liquidambar styraciflua L.	Altingiaceae	non_invasive	30	5	H	8	2	7	biotic	biotic
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	invasive	10	146	D	10	5	8	biotic	biotic
Lopholaena coriifolia (Sond.) E.Phillips & C.A.Sm.	Asteraceae	native	2	NA	H	5	7	3	biotic	biotic
Loxostylis alata Spreng. ex Rchb.	Anacardiaceae	native	5	NA	D	9	1	7	abiotic	abiotic
Ludwigia octovalvis (Jacq.) P.H.Raven	Onagraceae	native	4	NA	NA	NA	NA	NA	abiotic	biotic
Lumnitzera racemosa Willd.	Combretaceae	native	10	NA	H	1	12	12	abiotic	biotic
Lycium afrum L.	Solanaceae	native	5	NA	H	7	9	3	biotic	biotic
Lycium cinereum Thunb.	Solanaceae	native	2	NA	H	NA	NA	NA	NA	NA
Lycium ferocissimum Miers	Solanaceae	native	2	NA	H	NA	NA	NA	NA	biotic
Lycium oxycarpum Dunal	Solanaceae	native	4.5	NA	H	7	9	3	biotic	biotic
Lycium schizocalyx C.H.Wright	Solanaceae	native	2	NA	H	NA	NA	NA	NA	biotic
Lycium villosum Schinz	Solanaceae	native	3	NA	H	NA	NA	NA	NA	NA
Lydenburgia abbottii (A.E.van Wyk & M.Prins) Steenkamp. A.E.van Wyk & M.Prins	Celastraceae	native	30	NA	H	9	10	2	biotic	biotic
Lydenburgia cassinoides N. Robson	Celastraceae	native	9	NA	H	11	1	3	biotic	biotic

Mackaya bella Harv.	Acanthaceae	native	4	NA	H	7	12	6	biotic	biotic
Maclura africana (Bureau) Corner	Moraceae	native	8	NA	NA	NA	NA	NA	abiotic	biotic
Macphersonia gracilis var. *hildebrandtii* (O. Hoffm.) Capuron	Sapindaceae	native	10	NA	H	NA	NA	NA	NA	biotic
Maerua angolensis DC.	Capparaceae	native	10	NA	H	7	12	6	biotic	biotic
Maerua cafra Pax	Capparaceae	native	9	NA	H	8	10	3	biotic	biotic
Maerua decumbens (Brongn.) DeWolf	Capparaceae	native	1	NA	H	NA	NA	NA	NA	NA
Maerua juncea subsp. *crustata* Wild	Capparaceae	native	NA	NA	H	NA	NA	NA	NA	NA
Maerua parvifolia Pax	Capparaceae	native	2	NA	H	NA	NA	NA	NA	NA
Maerua rosmarinoides Gilg & Ben.	Capparaceae	native	5	NA	H	9	12	4	biotic	biotic
Maesa lanceolata Forssk.	Primulaceae	native	NA	NA	H	NA	NA	NA	NA	biotic
Mallotus oppositifolius (Geiseler) Müll.Arg.	Euphorbiaceae	native	10	NA	D	11	12	2	abiotic	biotic
Mangifera indica L.	Anacardiaceae	invasive	30	16466	H	5	7	3	biotic	biotic
Manihot esculenta Crantz	Euphorbiaceae	invasive	5	NA	H	10	2	5	biotic	biotic
Manilkara concolor (Harv.) Gerstner	Sapotaceae	native	7	NA	H	8	10	3	biotic	biotic
Manilkara discolor (Sond.) J.H.Hemsl.	Sapotaceae	native	17	NA	H	6	12	7	biotic	biotic
Manilkara mochisia (Baker) Dubard	Sapotaceae	native	15	NA	H	9	12	4	biotic	biotic
Manilkara nicholsonii A.E.van Wyk	Sapotaceae	native	15	NA	H	6	8	3	biotic	biotic
Maprounea africana Müll.Arg.	Euphorbiaceae	native	8	NA	H	8	10	3	abiotic	biotic
Margaritaria discoidea (Baill.) G.L.Webster	Euphorbiaceae	native	20	NA	D	9	11	3	abiotic	biotic

Margaritaria discoidea var. *nitida* (Pax) Radcl.-Sm.	Euphorbiaceae	native	20	NA	D	9	11	3	abiotic	biotic
Markhamia obtusifolia (Baker) Sprague	Bignoniaceae	native	13	NA	H	11	6	7	biotic	biotic
Markhamia zanzibarica (Bojer ex DC.) K.Schum.	Bignoniaceae	native	7	NA	H	9	1	5	biotic	biotic
Mascarenhasia arborescens A.DC.	Apocynaceae	native	8	NA	H	9	12	4	biotic	biotic
Maurocenia frangula Mill.	Celastraceae	native	3	NA	D	5	6	2	abiotic	biotic
Maytenus abbottii A.E.van Wyk	Celastraceae	native	4	NA	H	3	6	4	abiotic	biotic
Maytenus acuminata (L.f.) Loes.	Celastraceae	native	15	NA	H	1	2	2	biotic	biotic
Maytenus albata (N.E.Br.) E.Schmidt bis & Jordaan	Celastraceae	native	6	NA	H	NA	NA	NA	NA	NA
Maytenus cordata (E.Mey. ex Sond.) Loes.	Celastraceae	native	3.5	NA	H	10	12	3	biotic	biotic
Maytenus oleoides (Lam.) Loes.	Celastraceae	native	4	NA	H	9	11	3	biotic	biotic
Maytenus peduncularis Loes.	Celastraceae	native	20	NA	H	3	8	6	biotic	biotic
Maytenus procumbens (L. f.) Loes.	Celastraceae	native	10	NA	H	6	7	2	biotic	biotic
Maytenus Molina sp. nov. A	Celastraceae	native	NA	NA	H	NA	NA	NA	NA	NA
Maytenus undata (Thunb.) Blakelock	Celastraceae	native	10	NA	H	9	5	9	biotic	biotic
Meiostemon tetrandrus (Exell) Exell & Stace	Combretaceae	native	5	NA	H	12	1	2	abiotic	biotic
Melaleuca hypericifolia Sm.	Myrtaceae	invasive	5	0.49	H	11	1	3	abiotic	biotic
Melia azedarach L.	Meliaceae	invasive	23	348	H	9	11	3	biotic	biotic
Memecylon natalense Markg.	Melastomataceae	native	6	NA	H	10	12	3	biotic	biotic
Metalasia densa (Lam.) P.O.Karis	Asteraceae	native	4	NA	H	NA	NA	NA	abiotic	biotic
Metalasia muricata (L.) D.Don	Asteraceae	native	4	NA	H	1	12	12	biotic	biotic

Metarungia longistrobus (C.B.Clarke) Baden	Acanthaceae	native	6	NA	H	NA	NA	NA	abiotic	biotic
Metrosideros angustifolia (L.) Sm.	Myrtaceae	native	7	NA	D	10	2	5	abiotic	abiotic
Metrosideros excelsa Sol. ex Gaertn.	Myrtaceae	invasive	20	NA	H	12	1	2	biotic	biotic
Milicia excelsa (Welw.) C.C.Berg	Moraceae	native	50	NA	NA	NA	NA	NA	abiotic	biotic
Millettia grandis (E.Mey.) Skeels	Fabaceae	native	13	NA	H	1	1	1	biotic	biotic
Millettia mossambicensis J.B.Gillett	Fabaceae	native	7	NA	H	9	10	2	biotic	biotic
Millettia stuhlmannii Taub.	Fabaceae	native	20	NA	H	11	1	3	biotic	biotic
Millettia usaramensis Taub.	Fabaceae	native	10	NA	H	11	12	2	biotic	biotic
Mimetes arboreus Rourke	Proteaceae	native	6	NA	H	4	7	4	abiotic	biotic
Mimetes fimbriifolius Salisb. ex Knight	Proteaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Mimosa pigra L.	Fabaceae	invasive	6	17	H	1	12	12	biotic	biotic
Mimusops caffra E.Mey. ex A.DC.	Sapotaceae	native	15	NA	H	9	3	7	biotic	biotic
Mimusops obovata Sond.	Sapotaceae	native	15	NA	H	8	11	4	biotic	biotic
Mimusops obtusifolia Lam.	Sapotaceae	native	10	NA	H	3	9	7	biotic	biotic
Mimusops zeyheri Sond.	Sapotaceae	native	15	NA	H	10	3	6	biotic	biotic
Mitriostigma axillare Hochst.	Rubiaceae	native	4	NA	H	8	11	4	biotic	biotic
Monanthotaxis buchananii (Engl.) Verdc.	Annonaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Monanthotaxis caffra Verdc.	Annonaceae	native	10	NA	H	2	3	2	biotic	biotic
Mondia Skeels sp.	Apocynaceae	native	12	NA	H	NA	NA	NA	abiotic	biotic

Mondia whiteii (Hook.f.) Skeels	Apocynaceae	native	26	NA	H	10	2	5	biotic	biotic
Monodora junodii Engl. & Diels	Annonaceae	native	7	NA	H	9	11	3	biotic	biotic
Monodora junodii Engl. & Diels var.macrantha	Annonaceae	native	7	NA	H	9	11	3	biotic	biotic
Monodora stenopetala Oliv.	Annonaceae	native	8	NA	H	11	11	1	biotic	biotic
Monotes glaber Sprague	Dipterocarpaceae	native	10	NA	H	11	3	5	biotic	biotic
Montanoa hibiscifolia (Benth.) Standl.	Asteraceae	invasive	6	NA	H	5	10	6	biotic	biotic
Montinia caryophyllacea Thunb.	Montiniaceae	native	2	NA	H	9	10	2	abiotic	biotic
Morella cordifolia (L.) Killick	Myricaceae	native	3	NA	D	4	7	4	abiotic	biotic
Morella pilulifera (Rendle) Killick	Myricaceae	native	4	NA	D	7	9	3	abiotic	abiotic
Morella serrata (Lam.) Killick	Myricaceae	native	10	NA	D	8	9	2	abiotic	biotic
Moringa oleifera Lam.	Moringaceae	non_invasive	12	NA	H	1	12	12	biotic	biotic
Moringa ovalifolia Dinter & A.Berger	Moringaceae	native	10	NA	H	NA	NA	NA	abiotic	biotic
Morus alba L.	Moraceae	invasive	7	NA	H	9	10	2	biotic	biotic
Morus australis Poir.	Moraceae	native	15	NA	H	2	4	3	abiotic	abiotic
Morus nigra L.	Moraceae	non_invasive	10	NA	H	NA	NA	NA	biotic	biotic
Mundulea sericea (Willd.) A.Chev.	Fabaceae	native	5	NA	H	NA	NA	NA	abiotic	biotic
Muraltia L.	Polygalaceae	native	2	NA	D	6	8	3	abiotic	biotic
Murraya paniculata (L.) Jack	Rutaceae	non_invasive	12	NA	H	10	2	5	abiotic	biotic
Mussaenda arcuata Poir.	Rubiaceae	native	14	NA	H	10	4	7	biotic	biotic
Myoporum laetum G.Forst.	Scrophulariaceae	non_invasive	10	71.3	H	10	10	1	biotic	biotic

Myrsine africana L.	Primulaceae	native	3	NA	H	10	5	8	biotic	biotic
Mystroxylon aethiopicum subsp. *schlechteri* (Loes.) R.H. Archer	Celastraceae	native	12	NA	H	12	2	3	biotic	biotic
Necepsia Prain sp.	Euphorbiaceae	native	9	NA	H	10	10	1	abiotic	biotic
Nectaropetalum capense Stapf & Boodle	Erythroxylaceae	native	15	NA	H	7	11	5	biotic	biotic
Neoboutonia mannii Benth. & Hook.f.	Euphorbiaceae	native	20	NA	D	NA	NA	NA	abiotic	biotic
Nerium oleander L.	Apocynaceae	invasive	6	NA	H	9	3	7	biotic	NA
Newtonia buchananii (Baker) G.C.C.Gilbert & Boutiqu	Fabaceae	native	40	NA	H	7	10	4	abiotic	biotic
Newtonia hildebrandtii (Vatke) Torre	Fabaceae	native	25	NA	H	10	11	2	biotic	biotic
Nicotiana africana Merxm.	Solanaceae	native	2.5	NA	H	NA	NA	NA	abiotic	biotic
Nicotiana glauca Graham	Solanaceae	invasive	6	0.031	H	1	12	12	biotic	biotic
Nuxia congesta R.Br. ex Fresen.	Scrophulariaceae	native	20	NA	H	5	7	3	biotic	biotic
Nuxia floribunda Benth.	Scrophulariaceae	native	25	NA	H	5	9	5	biotic	biotic
Nuxia oppositifolia (Hochst.) Benth.	Scrophulariaceae	native	7	NA	H	10	2	5	biotic	biotic
Nymania capensis Lindb.	Meliaceae	native	5	NA	H	7	7	1	biotic	biotic
Obetia tenax Friis	Urticaceae	native	7	NA	H	8	9	2	biotic	biotic
Ochna serrulata Walp.	Ochnaceae	native	3	NA	H	9	11	3	biotic	biotic
Ocotea bullata (Burch.) E. Meyer in Drege	Lauraceae	native	30	NA	D	12	2	3	abiotic	biotic
Olax dissitiflora Oliv.	Olacaceae	native	10	NA	H	10	10	1	biotic	biotic
Oldenburgia grandis (Thunb.) Baill.	Asteraceae	native	5	NA	H	NA	NA	NA	abiotic	biotic

Olea capensis L.	Oleaceae	native	12	NA	H	10	4	7	biotic	biotic
Olea capensis subsp. *hochstetteri* (Baker) Friis & P.S.Green	Oleaceae	native	10	NA	H	10	4	7	biotic	biotic
Olea europaea L.	Oleaceae	native	18	NA	H	10	2	5	biotic	biotic
Olea exasperata Jacq.	Oleaceae	native	7	NA	H	NA	NA	NA	abiotic	biotic
Olea woodiana Knobl.	Oleaceae	native	25	NA	H	NA	NA	NA	abiotic	biotic
Olinia capensis Klotzsch	Penaeaceae	native	5	NA	H	5	7	3	biotic	biotic
Olinia emarginata Burtt Davy	Penaeaceae	native	20	NA	H	10	1	4	biotic	biotic
Olinia radiata Hofmeyr & E.Phillips	Penaeaceae	native	21	NA	H	9	2	6	biotic	biotic
Olinia vanguerioides Baker f.	Penaeaceae	native	25	NA	H	12	3	4	biotic	biotic
Olinia ventosa (L.) Cufod.	Penaeaceae	native	4	NA	H	5	10	6	biotic	biotic
Oncinotis tenuiloba Stapf	Apocynaceae	native	30	NA	H	9	10	2	biotic	biotic
Oncoba spinosa Forssk.	Salicaceae	native	8	NA	H	9	1	5	biotic	biotic
Opilia Roxb. sp.	Opiliacea	native	5	NA	D	NA	NA	NA	abiotic	biotic
Opuntia engelmannii Salm-Dyck	Cactaceae	invasive	1.5	NA	H	10	12	3	abiotic	biotic
Opuntia ficus-indica (L.) Mill.	Cactaceae	invasive	5	NA	H	10	12	3	biotic	biotic
Opuntia humifusa (Raf.) Raf.	Cactaceae	invasive	0.3	NA	H	10	12	3	biotic	biotic
Opuntia microdasys (Lehm.) Pfeiff.	Cactaceae	invasive	3	NA	H	NA	NA	NA	biotic	biotic
Opuntia monacantha Haw.	Cactaceae	invasive	5	NA	H	10	4	7	biotic	biotic
Opuntia robusta J.C. Wendl.	Cactaceae	invasive	4	NA	H	10	12	3	biotic	biotic
Oreobambos buchwaldii K.Schum.	Poaceae	native	7	NA	H	NA	NA	NA	abiotic	biotic

Oricia bachmannii (Engl.) Verd.	Fabaceae	native	15	NA	H	7	12	6	biotic	biotic
Ormocarpum kirkii S.Moore	Fabaceae	native	7	NA	H	9	1	5	biotic	biotic
Ormocarpum trichocarpum (Taub.) Engl.	Santalaceae	native	5	NA	H	9	1	5	biotic	biotic
Osyris compressa A.DC.	Santalaceae	native	5	NA	H	3	8	6	biotic	biotic
Osyris lanceolata Hochst. & Steud.	Fabaceae	native	6	NA	H	10	2	5	biotic	biotic
Otholobium caffrum (Eckl. & Zeyh.) C.H.Stirt.	Fabaceae	native	6	NA	H	5	9	5	biotic	biotic
Otholobium spicatum (L.) C.H.Stirt.	Fabaceae	native	2.5	NA	H	10	11	2	biotic	biotic
Otholobium wilmsii (Harms) C.H.Stirt.	Fabaceae	native	3	NA	H	6	1	8	biotic	biotic
Oxyanthus latifolius Sond.	Rubiaceae	native	5	NA	H	11	1	3	biotic	biotic
Oxyanthus pyriformis (Hochst.) Skeels	Rubiaceae	native	10	NA	H	9	2	6	biotic	biotic
Oxyanthus speciosus subsp. *gerrardii* (Sond.) Bridson	Rubiaceae	native	10	NA	H	11	2	4	biotic	biotic
Oxytenanthera abyssinica (A.Rich.) Munro	Poaceae	native	7	NA	H	NA	NA	NA	abiotic	biotic
Ozoroa engleri R.Fern. & A.Fern.	Anacardiaceae	native	8	NA	H	10	2	5	abiotic	abiotic
Ozoroa obovata (Oliv.) R. Fern. & A. Fern.	Anacardiaceae	native	8	NA	H	1	5	5	abiotic	biotic
Ozoroa paniculosa var. *paniculosa* R.Fern. & A.Fern.	Anacardiaceae	native	6	NA	H	8	2	7	abiotic	biotic
Ozoroa sphaerocarpa R.Fern. & A.Fern.	Anacardiaceae	native	7	NA	H	9	11	3	abiotic	biotic
Pachypodium namaquanum (Wyley ex Harv.) Welw.	Apocynaceae	native	4	NA	H	7	9	3	biotic	biotic
Pachypodium saundersii N.E.Br.	Apocynaceae	native	1.5	NA	H	NA	NA	NA	abiotic	biotic
Pancovia golungensis (Hiern) Exell & Mendonça	Sapindaceae	native	12	NA	H	10	12	3	biotic	biotic

Pandanus Parkinson sp.	Pandanaceae	native	13	NA	NA	NA	NA	NA	abiotic	biotic
Pappea capensis Eckl. & Zeyh.	Sapindaceae	native	13	NA	H	1	5	5	biotic	biotic
Paranomus bracteolaris Salisb. ex Knight	Proteaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Paranomus tomentosus N.E. Br.	Proteaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	invasive	15	NA	H	6	8	3	biotic	biotic
Parinari capensis Harv.	Chrysobalanaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Parinari curatellifolia Planch. ex Benth.	Chrysobalanaceae	native	13	NA	H	7	10	4	abiotic	biotic
Parkinsonia aculeata L.	Fabaceae	invasive	9	107	H	10	4	7	biotic	biotic
Paropsia braunii Gilg	Passifloraceae	native	10	NA	H	8	9	2	abiotic	biotic
Passerina corymbosa Eckl. ex C.H. Wright	Thymelaeaceae	native	2.5	NA	H	NA	NA	NA	abiotic	biotic
Passerina filiformis L.	Thymelaeaceae	native	4	NA	H	9	12	4	biotic	biotic
Passerina montana Thoday	Thymelaeaceae	native	3	NA	H	10	12	3	biotic	biotic
Passerina rigida Wikstr.	Thymelaeaceae	native	4	NA	H	10	12	3	biotic	biotic
Pauridiantha symplocoides (S.Moore) Bremek.	Rubiaceae	non_invasive	20	0.2	NA	7	10	4	biotic	biotic
Paulownia tomentosa Steud.	Paulowniaceae	native	10	NA	H	9	11	3	biotic	biotic
Pavetta bowkeri Harv.	Rubiaceae	native	3	NA	H	11	12	2	biotic	biotic
Pavetta catophylla K.Schum.	Rubiaceae	native	4	NA	H	10	2	5	biotic	biotic
Pavetta edentula Sond.	Rubiaceae	native	5	NA	H	10	1	4	biotic	biotic
Pavetta galpinii Bremek.	Rubiaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Pavetta inandensis Bremek.	Rubiaceae	native	4	NA	H	10	1	4	biotic	biotic

Pavetta lanceolata Eckl.	Rubiaceae	native	7	NA	H	11	1	3	biotic	biotic
Pavetta revoluta Hochst.	Rubiaceae	native	10	NA	H	11	3	5	biotic	biotic
Pavetta schumanniana F.Hoffm. ex K.Schum.	Rubiaceae	native	7	NA	H	9	2	6	biotic	biotic
Pavetta zeyheri Sond.	Rubiaceae	native	3	NA	H	10	1	4	biotic	biotic
Peddiea africana Harv.	Thymelaeaceae	native	7	NA	H	9	2	6	biotic	biotic
Peltophorum africanum Sond.	Fabaceae	native	10	NA	H	9	2	6	biotic	biotic
Pereskia aculeata Mill.	Cactaceae	native	10	NA	NA	NA	NA	NA	abiotic	biotic
Persea americana Mill.	Lauraceae	invasive	20	NA	H	NA	NA	NA	biotic	biotic
Phaeoptilum spinosum Radlk.	Nyctaginaceae	native	4	NA	H	NA	NA	NA	biotic	biotic
Philenoptera bussei (Harms) Schrire	Fabaceae	native	15	NA	H	8	10	3	biotic	biotic
Philenoptera violacea (Klotzsch) Schrire	Fabaceae	native	10	NA	H	9	11	3	biotic	biotic
Phoenix reclinata Jacq.	Arecaceae	native	10	NA	D	8	10	3	abiotic	biotic
Phylica buxifolia L.	Rhamnaceae	native	4	NA	H	3	8	6	biotic	biotic
Phylica oleaefolia Vent.	Rhamnaceae	native	3	NA	H	3	6	4	abiotic	biotic
Phylica paniculata Willd.	Rhamnaceae	native	6	NA	H	12	1	2	biotic	biotic
Phylica villosa Thunb.	Rhamnaceae	native	1	NA	H	NA	NA	NA	abiotic	biotic
Phyllanthus hutchinsonianus S.Moore	Euphorbiaceae	native	2.5	NA	NA	NA	NA	NA	abiotic	biotic
Phyllanthus inflatus Hutch.	Euphorbiaceae	native	10	NA	D	8	8	1	abiotic	biotic
Phyllanthus ovalifolius Forssk.	Euphorbiaceae	native	4	NA	D	10	11	2	abiotic	biotic

Phyllanthus pinnatus (Wight) G.L.Webster	Euphorbiaceae	native	5	NA	D	9	11	3	abiotic	biotic
Phyllanthus reticulatus Poir.	Euphorbiaceae	native	8	NA	D	9	12	4	abiotic	abiotic
Phymaspermum acerosum (DC.) Källersjö	Asteraceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Phytolacca dioica L.	Phytolaccaceae	invasive	20	NA	H	9	12	4	biotic	biotic
Pinus canariensis C.Sm.	Pinaceae	invasive	20	101.5	H	NA	NA	NA	biotic	biotic
Pinus elliottii Engelm.	Pinaceae	invasive	30	33.2	H	NA	NA	NA	biotic	biotic
Pinus halepensis Mill.	Pinaceae	invasive	20	19.7	H	NA	NA	NA	biotic	biotic
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	invasive	40	8	H	NA	NA	NA	biotic	biotic
Pinus pinaster Aiton	Pinaceae	invasive	30	50.4	H	NA	NA	NA	biotic	biotic
Pinus pinea L.	Pinaceae	invasive	30	757.9	H	NA	NA	NA	biotic	biotic
Pinus radiata D.Don	Pinaceae	invasive	30	31	H	NA	NA	NA	abiotic	biotic
Pinus roxburghii Sarg.	Pinaceae	invasive	20	80.9	H	NA	NA	NA	biotic	biotic
Pinus taeda L.	Pinaceae	invasive	36	25.9	H	NA	NA	NA	biotic	biotic
Piper L. sp.	Piperaceae	native	4	NA	H	8	2	7	biotic	biotic
Pittosporum undulatum Vent.	Pittosporaceae	invasive	12	8.35	D	8	9	2	biotic	biotic
Pittosporum viridiflorum Sims	Pittosporaceae	native	30	NA	H	11	12	2	biotic	biotic
Platylophus trifoliatus D. Don	Cunoniaceae	native	30	NA	H	NA	NA	NA	abiotic	biotic
Pleiocarpa pycnantha (K.Schum.) Stapf	Apocynaceae	native	30	NA	H	9	12	4	biotic	biotic
Pleioceras orientale Vollesen	Apocynaceae	native	8	NA	H	12	12	2	biotic	biotic
Pleurostylia capensis Oliv.	Celastraceae	native	20	NA	H	NA	NA	NA	abiotic	biotic

Plumbago auriculata Lam.	Plumbaginaceae	native	3	NA	H	NA	NA	NA	abiotic	NA
Podalyria calyptrata (Retz.) Willd.	Fabaceae	native	5	NA	H	7	9	3	biotic	biotic
Podalyria myrtillifolia Willd.	Fabaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Podocarpus elongatus (Aiton) L'Hér. ex Pers.	Podocarpaceae	native	6	NA	D	NA	NA	NA	abiotic	abiotic
Podocarpus henkelii Stapf ex Dallim. & B.D.Jacks.	Podocarpaceae	native	60	NA	D	NA	NA	NA	abiotic	biotic
Podocarpus latifolius (Thunb.) R.Br. ex Mirb.	Podocarpaceae	native	20	NA	D	NA	NA	NA	abiotic	biotic
Polygala myrtifolia L.	Polygalaceae	native	30	NA	D	NA	NA	NA	abiotic	biotic
Polygala virgata var. *decora* (Sond.) Harv.	Polygalaceae	native	4	NA	H	5	9	5	biotic	biotic
Polyscias fulva (Hiern) Harms	Araliaceae	native	3	NA	H	10	2	5	biotic	biotic
Polysphaeria lanceolata Hiern	Rubiaceae	native	25	NA	H	2	5	4	abiotic	biotic
Populus alba L.	Salicaceae	native	5	NA	H	5	6	2	biotic	biotic
Populus canescens (Aiton) Sm.	Salicaceae	invasive	35	NA	D	8	10	3	biotic	biotic
Populus deltoides W. Bartram ex Marshall	Salicaceae	invasive	25	NA	D	8	10	3	biotic	biotic
Populus nigra var. *italica* Koehne	Salicaceae	invasive	35	1.15	D	8	10	3	biotic	biotic
Portulacaria afra Jacq.	Portulacaceae	invasive	32	0.81	D	8	10	3	biotic	biotic
Pouteria adolfi-friedericii subsp. *australis* (J.H.Hemsl.) L.Gaut.	Sapotaceae	native	4	NA	H	10	11	2	biotic	biotic
Pouzolzia mixta Solms	Urticaceae	native	40	NA	H	NA	NA	NA	abiotic	biotic
Premna mooiensis (H.Pearson) W.Piep.	Lamiaceae	native	4	NA	H	11	12	2	biotic	biotic
Prionostemma delagoensis (Loes.) N.Hallé	Celastraceae	native	12	NA	H	9	2	6	biotic	biotic

Pristimera longipetiolata (Oliv.) N. Hallé	Celastraceae	native	9	NA	H	NA	NA	NA	abiotic	biotic
Prosopis glandulosa var. *torreyana* (L.D.Benson) M.C.Johnst.	Fabaceae	invasive	10	NA	H	6	11	6	biotic	biotic
Prosopis velutina Wooton	Fabaceae	invasive	4	NA	H	6	11	6	biotic	biotic
Protea aurea subsp. *aurea* Rourke	Proteaceae	native	5	NA	H	1	6	6	biotic	biotic
Protea caffra Meisn.	Proteaceae	native	8	NA	H	11	3	5	biotic	biotic
Protea coronata Lam.	Proteaceae	native	4	NA	H	4	9	6	biotic	biotic
Protea glabra Thunb.	Proteaceae	native	5	NA	H	7	11	5	biotic	biotic
Protea laurifolia Thunb.	Proteaceae	native	8	NA	H	5	7	3	biotic	biotic
Protea mundii Klotzsch	Proteaceae	native	13	NA	H	2	4	3	biotic	biotic
Protea neriifolia R.Br.	Proteaceae	native	4	NA	H	2	11	10	biotic	biotic
Protea nitida Mill.	Proteaceae	native	7	NA	H	5	8	4	abiotic	biotic
Protea punctata Meisn.	Proteaceae	native	4	NA	H	3	4	2	biotic	biotic
Protea repens L.	Proteaceae	native	5	NA	H	NA	NA	NA	abiotic	biotic
Protea roupelliae subsp. *roupelliae* Meisn.	Proteaceae	native	8	NA	H	2	3	2	biotic	biotic
Protea welwitschii Engl.	Proteaceae	native	4	NA	H	1	2	2	biotic	biotic
Protorhus longifolia (Ber (NH).) Engl.	Anacardiaceae	native	15	NA	D	8	10	3	abiotic	biotic
Prunus africana (Hook. f.) Kalkman	Rosaceae	native	24	NA	H	3	12	10	biotic	biotic
Prunus armeniaca L.	Rosaceae	invasive	10	909.6	H	8	10	3	biotic	biotic
Prunus persica (L.) Stokes	Rosaceae	native	9	NA	H	3	4	2	biotic	biotic
Prunus serotina Ehrh.	Rosaceae	invasive	3	NA	H	7	9	3	biotic	biotic

Pseudarthria hookeri Wight & Arn.	Fabaceae	invasive	30	83.9	H	9	10	2	abiotic	biotic
Pseudobersama mossambicensis (Sim) Verdc.	Meliaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Pseudophyllanthus ovalis (E.Mey. ex Sond.) Voronts. & Petra Hoffm.	Euphorbiaceae	native	15	NA	H	12	12	2	biotic	biotic
Pseudosalacia streyi Codd	Celastraceae	native	5	NA	H	10	2	5	biotic	biotic
Psidium cattleianum Afzel. ex Sabine	Myrtaceae	invasive	8	NA	H	10	12	3	biotic	biotic
Psidium guajava L.	Myrtaceae	invasive	10	NA	H	10	12	3	biotic	biotic
Psidium guineense Sw.	Myrtaceae	invasive	10	NA	H	10	12	3	biotic	biotic
Psoralea aphylla L.	Fabaceae	native	4	NA	H	9	5	9	biotic	biotic
Psoralea arborea Sims	Fabaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Psoralea axillaris L.f.	Fabaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Psoralea filifolia Eckl. & Zeyh.	Fabaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Psoralea glabra E.Mey.	Fabaceae	native	4	NA	H	2	12	11	biotic	biotic
Psoralea pinnata L.	Fabaceae	native	9	NA	H	8	1	6	biotic	biotic
Psychotria capensis (Eckl.) Vatke	Rubiaceae	native	6	NA	H	NA	NA	NA	abiotic	biotic
Psychotria kirkii Hiern	Rubiaceae	native	5	NA	H	10	12	3	biotic	biotic
Psydrax locuples (K.Schum.) Bridson	Rubiaceae	native	4	NA	H	NA	NA	NA	abiotic	biotic
Psydrax micans (Bullock) Bridson	Rubiaceae	native	17	NA	H	11	4	6	biotic	biotic
Psydrax obovata (Klotzsch ex Eckl. & Zeyh.) Bridson	Rubiaceae	native	20	NA	D	8	12	5	abiotic	biotic

Ptaeroxylon obliquum (Thunb.) Radlk.	Rutaceae	native	12	NA	H	11	4	6	abiotic	biotic
Pteleopsis anisoptera (Welw. ex M.A.Lawson) Engl. & Diels	Combretaceae	native	12	NA	H	11	4	6	abiotic	biotic
Pteleopsis myrtifolia (M.A.Lawson) Engl. & Diels	Combretaceae	native	20	NA	H	8	12	5	biotic	biotic
Pterocarpus angolensis DC.	Fabaceae	native	6	NA	H	10	11	2	biotic	biotic
Pterocarpus brenanii Barbosa & Torre	Fabaceae	native	20	NA	H	9	1	5	biotic	biotic
Pterocarpus rotundifolius (Sond.) Druce	Fabaceae	native	20	NA	H	9	1	5	biotic	biotic
Pterocarpus rotundifolius subsp. *polyanthus* (Harms) Mendonca & Sousa	Fabaceae	native	10	NA	H	11	6	7	biotic	biotic
Pterocelastrus echinatus N.E.Br.	Celastraceae	native	20	NA	H	10	4	7	biotic	biotic
Pterocelastrus rostratus Walp.	Celastraceae	native	7	NA	H	NA	NA	NA	abiotic	biotic
Pterocelastrus tricuspidatus Walp.	Celastraceae	native	15	NA	H	2	5	4	abiotic	biotic
Pterolobium stellatum (Forssk.) Brenan	Fabaceae	native	3	NA	H	3	9	7	biotic	biotic
Pulchea dioscoridis (L.) DC.	Asteraceae	invasive	5	26.3	H	8	2	7	abiotic	biotic
Punica granatum L.	Punicaeae	native	6	NA	H	11	1	3	biotic	biotic
Putterlickia pyracantha (L.) Endl.	Celastraceae	native	5	NA	H	10	12	3	biotic	biotic
Putterlickia retrospinosa A.E.van Wyk & Mostert	Celastraceae	native	4	NA	H	7	10	4	abiotic	biotic
Putterlickia verrucosa (E. Mey. ex Sond.) Szyszyl.	Celastraceae	native	2.5	NA	H	NA	NA	NA	abiotic	biotic
Pycnostachys urticifolia Hook.f.	Lamiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Pyracantha coccinea M. Roem.	Rosaceae	invasive	2	NA	H	10	2	5	biotic	biotic
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	invasive	3	NA	H	10	12	3	biotic	biotic

Pyrostria bibracteata (Baker) Cavaco	Rubiaceae	native	10	NA	H	8	9	2	biotic	biotic
Pyrostria hystrix (Bremek.) Bridson	Rubiaceae	native	4	NA	H	10	4	7	biotic	biotic
Quercus acutissima Carruth.	Fagaceae	non_invasive	30	4446.9	H	NA	NA	NA	biotic	biotic
Quercus robur L.	Fagaceae	invasive	30	3378	H	8	9	2	biotic	biotic
Quisqualis parviflora Gerrard ex Sond.	Combretaceae	native	5	NA	H	2	5	4	abiotic	biotic
Rapanea melanophloeos (L.) Mez	Primulaceae	native	20	NA	H	5	12	8	biotic	biotic
Raphia australis Oberm. & Strey	Arecaceae	native	24	NA	D	NA	NA	NA	abiotic	biotic
Raphia farinifera (Gaertn.) Hyl.	Arecaceae	native	6	NA	D	NA	NA	NA	abiotic	abiotic
Raspalia trigyna Dummer	Bruniaceae	native	2.5	NA	H	NA	NA	NA	abiotic	biotic
Rauvolfia caffra Sond.	Apocynaceae	native	20	NA	H	7	10	4	abiotic	biotic
Rawsonia lucida Harv. & Sond.	Salicaceae	native	11	NA	H	9	11	3	biotic	biotic
Rhamnus prinoides L'Hér.	Rhamnaceae	native	7	NA	H	10	12	3	biotic	biotic
Rhigozum obovatum Burch.	Bignoniaceae	native	4.5	NA	H	NA	NA	NA	abiotic	biotic
Rhigozum zambesiacum Baker	Bignoniaceae	native	7	NA	H	9	12	4	biotic	biotic
Rhodognaphalon schumannianum A.Robyns.	Malvaceae	native	15	NA	H	11	1	3	biotic	biotic
Rhoicissus digitata (L. f.) Gilg & M. Brandt	Vitaceae	native	7	NA	H	11	2	4	biotic	biotic
Rhoicissus revoilii Planch.	Vitaceae	native	20	NA	H	9	1	5	biotic	biotic
Rhoicissus Planch. sp. nov. A	Vitaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Rhoicissus tomentosa (Lam.) Wild & R.B. Drumm.	Vitaceae	native	20	NA	H	10	1	4	biotic	biotic

Rhoicissus tridentata (L. f.) Wild & R.B. Drumm.	Vitaceae	native	10	NA	H	11	4	6	biotic	biotic
Rhynchocalyx lawsonioides Oliv.	Penaeaceae	native	6	NA	H	3	5	3	biotic	biotic
Ricinus communis L.	Euphorbiaceae	invasive	4	NA	H	1	12	12	biotic	biotic
Rinorea angustifolia (Thouars) Baill.	Violaceae	native	6	NA	H	10	12	3	biotic	biotic
Rinorea domatiosa A.E.van Wyk	Violaceae	native	10	NA	H	9	10	2	biotic	biotic
Rinorea elliptica (Oliv.) Kuntze	Violaceae	native	8	NA	H	10	11	2	biotic	biotic
Rinorea ilicifolia (Welw. ex Oliv.) Kuntze	Violaceae	native	4	NA	H	8	12	5	biotic	biotic
Ritchiea R. Br. ex G. Don	Capparaceae	native	15	NA	H	1	2	2	biotic	biotic
Robinia pseudoacacia L.	Fabaceae	invasive	25	20.4	H	9	11	3	biotic	biotic
Robsonodendron eucleiforme (Eckl. & Zeyh.) R.H.Archer	Celastraceae	native	12	NA	H	1	12	12	biotic	biotic
Robsonodendron maritimum (Bolus) R.H.Archer	Celastraceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Rosa eglanteria L.	Rosaceae	native	2.5	NA	H	5	6	2	biotic	biotic
Rosa rubiginosa L.	Rosaceae	invasive	5	NA	H	10	12	3	biotic	biotic
Rotheca myricoides (Hochst.) Steane & Mabb.	Lamiaceae	native	8	NA	H	10	1	4	biotic	biotic
Rothmannia capensis Thunb.	Rubiaceae	native	20	NA	H	12	2	3	biotic	biotic
Rothmannia fischeri (K.Schum.) Bullock ex Oberm.	Rubiaceae	native	8	NA	H	10	12	3	biotic	biotic
Rothmannia globosa (Hochst.) Keay	Rubiaceae	native	12	NA	H	8	11	4	biotic	biotic
Rothmannia manganjae (Hiern) Keay	Rubiaceae	native	6	NA	H	9	11	3	biotic	biotic
Rourea orientalis Baill.	Connaraceae	native	6	NA	NA	NA	NA	NA	abiotic	biotic
Rubus cuneifolius Pursh	Rosaceae	invasive	2	NA	H	9	1	5	biotic	biotic

Rubus flagellaris Willd.	Rosaceae	invasive	2	3.43	H	10	10	1	biotic	biotic
Rubus fruticosus L. agg.	Rosaceae	invasive	2	2.89	H	9	1	5	biotic	NA
Ruspolia hypocrateriformis (Vahl) Milne-Redh.	Acanthaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Ruttya ovata Harv.	Acanthaceae	native	4	NA	H	NA	NA	NA	abiotic	biotic
Salacia gerrardii Harv. & Sprague	Celastraceae	native	8	NA	H	6	8	3	biotic	biotic
Salacia kraussii (Harv.) Harv.	Celastraceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Salix babylonica L.	Salicaceae	invasive	18	NA	D	8	10	3	biotic	biotic
Salix fragilis L.	Salicaceae	invasive	15	0.14	D	9	10	2	biotic	biotic
Salix mucronata Thunb.	Salicaceae	native	12	NA	D	8	9	2	abiotic	biotic
Salvadora australis Schweick.	Salvadoraceae	native	6	NA	H	5	11	7	biotic	biotic
Salvadora persica Wall.	Salvadoraceae	native	5	NA	H	6	9	4	abiotic	biotic
Sambucus canadensis L.	Adoxaceae	invasive	3	2.6	H	10	10	1	biotic	biotic
Sambucus nigra L.	Adoxaceae	invasive	10	6.1	H	10	12	3	biotic	biotic
Schefflera actinophylla (Endl.) Harms	Araliaceae	invasive	15	9.1	H	2	4	3	biotic	biotic
Schefflera arboricola (Hayata) Merr.	Araliaceae	invasive	6	NA	H	2	7	6	biotic	biotic
Schefflera umbellifera (Sond.) Baill.	Araliaceae	native	20	NA	H	1	5	5	biotic	biotic
Schinus molle L.	Anacardiaceae	invasive	20	22	D	9	3	7	biotic	biotic
Schinus terebinthifolia Raddi	Anacardiaceae	invasive	15	18.1	D	9	3	7	biotic	biotic
Schinziophyton rautanenii (Schinz) Radcl.-Sm.	Euphorbiaceae	native	20	NA	D	10	11	2	abiotic	biotic

Schizolobium parahyba (Vell.) S.F.Blake	Fabaceae	non_invasive	30	NA	H	8	10	3	biotic	biotic
Schotia afra (L.) Thunb.	Fabaceae	native	5	NA	H	8	10	3	biotic	biotic
Schotia brachypetala Sond.	Fabaceae	native	16	NA	H	9	10	2	biotic	biotic
Schotia capitata Bolle	Fabaceae	native	7	NA	H	11	1	3	biotic	biotic
Schotia latifolia Jacq.	Fabaceae	native	10	NA	H	11	1	3	biotic	biotic
Schrebera alata (Hochst.) Welw.	Oleaceae	native	15	NA	H	9	5	9	biotic	biotic
Schrebera trichoclada Welw.	Oleaceae	native	10	NA	H	11	1	3	biotic	biotic
Sclerocarya birrea subsp. caffra (Sond.) Kokwaro	Anacardiaceae	native	17	NA	H	9	11	3	abiotic	biotic
Sclerochiton harveyanus Nees	Acanthaceae	native	4	NA	H	3	3	1	biotic	biotic
Sclerochiton kirkii (T. Anderson) C.B. Clarke	Acanthaceae	native	6	NA	H	11	1	3	biotic	biotic
Sclerocroton integerrimus Hochst.	Euphorbiaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Scolopia mundii Warb.	Salicaceae	native	20	NA	H	5	8	4	abiotic	biotic
Scolopia stolzii Gilg	Salicaceae	native	10	NA	H	9	3	7	biotic	biotic
Scolopia zeyheri (Nees) Szyszyl.	Salicaceae	native	10	NA	H	4	9	6	biotic	biotic
Scutia myrtina (Burm. f.) Kurz	Rhamnaceae	native	8	NA	H	9	1	5	biotic	biotic
Searsia acocksii (Moffett) Moffett	Anacardiaceae	native	1.5	NA	H	NA	NA	NA	abiotic	abiotic
Searsia angustifolia (L.) F.A.Barkley	Anacardiaceae	native	4	NA	H	10	11	2	abiotic	biotic
Searsia chirindensis (Baker f.) Moffett	Anacardiaceae	native	23	NA	H	8	3	8	abiotic	biotic
Searsia crenata (Thunb.) Moffett	Anacardiaceae	native	5	NA	H	4	4	1	abiotic	biotic
Searsia fastigiata (Eckl. & Zeyh.) Moffett	Anacardiaceae	native	3	NA	H	12	4	5	abiotic	biotic

Searsia gueinzii (Sond.) F.A.Barkley	Anacardiaceae	native	8	NA	H	9	4	8	abiotic	biotic
Searsia incisa (L.f.) F.A.Barkley	Anacardiaceae	native	4	NA	H	6	12	7	abiotic	biotic
Searsia laevigata (L.) F.A.Barkley	Anacardiaceae	native	4	NA	H	10	4	7	abiotic	biotic
Searsia lancea (L. f.) F.A. Barkley	Anacardiaceae	native	8	NA	H	4	9	6	abiotic	biotic
Searsia leptodictya (Diels) T.S.Yi. A.J.Mill. & J.Wen	Anacardiaceae	native	9	NA	H	12	4	5	abiotic	biotic
Searsia longispina (Eckl. & Zeyh.) Moffett	Anacardiaceae	native	4	NA	H	5	10	6	abiotic	biotic
Searsia lucida (L.) F.A.Barkley	Anacardiaceae	native	5	NA	H	4	5	2	abiotic	biotic
Searsia magalismontana (Sond.) Moffett	Anacardiaceae	native	7	NA	H	6	10	5	abiotic	biotic
Searsia natalensis (Ber (NH). ex C.Krauss) F.A.Barkley	Anacardiaceae	native	5	NA	H	NA	NA	NA	abiotic	abiotic
Searsia nebulosa (Schönland) Moffett	Anacardiaceae	native	5	NA	H	3	5	3	abiotic	biotic
Searsia pendulina (Jacq.) Moffett	Anacardiaceae	native	4	NA	H	2	4	3	abiotic	abiotic
Searsia pentheri (Zahlbr.) Moffett	Anacardiaceae	native	10	NA	H	9	3	7	abiotic	biotic
Searsia pyroides (Burch.) Moffett	Anacardiaceae	native	5	NA	H	8	3	6	abiotic	biotic
Searsia pyroides var. *integrifolia* (Engl.) Moffett.	Anacardiaceae	native	6	NA	H	10	2	5	abiotic	biotic
Searsia transvaalensis (Engl.) Moffett	Anacardiaceae	native	5	NA	H	10	12	3	abiotic	biotic
Searsia tumulicola (S.Moore) Moffett	Anacardiaceae	native	4	NA	H	9	11	3	abiotic	biotic
Searsia undulata (Jacq.) T.S.Yi. A.J.Mill. & J.Wen	Anacardiaceae	native	3	NA	H	2	5	4	abiotic	biotic
Searsia zeyheri (Sond.) Moffett	Anacardiaceae	native	4	NA	H	10	2	5	abiotic	biotic
Securidaca longipedunculata Fresen.	Polygalaceae	native	6	NA	H	8	11	4	biotic	biotic

Seemannaralia gerrardii (Seem.) R.Vig.	Araliaceae	native	10	NA	H	3	6	4	abiotic	biotic
Senegalia adenocalyx (Brenan & Exell) Kyal. & Boatwr.	Fabaceae	native	5	NA	H	10	4	7	biotic	biotic
Senegalia ataxacantha (DC.) Kyal. & Boatwr.	Fabaceae	native	15	NA	H	1	2	2	biotic	biotic
Senegalia brevispica (Harms) Seigler & Ebinger	Fabaceae	native	8	NA	H	10	10	1	biotic	biotic
Senegalia burkei (Benth.) Kyal. & Boatwr.	Fabaceae	native	30	NA	H	10	1	4	biotic	biotic
Senegalia caffra (Thunb.) P.J.H. Hurter & Mabb.	Fabaceae	native	12	NA	H	9	11	4	biotic	biotic
Senegalia chariessa (Milne-Redh.) Kyal. & Boatwr.	Fabaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Senegalia eriocarpa (Brenan) Kyal. & Boatwr.	Fabaceae	native	6	NA	H	12	2	3	biotic	biotic
Senegalia erubescens (Welw. ex Oliv.) Kyal. & Boatwr.	Fabaceae	native	10	NA	H	8	10	3	biotic	biotic
Senegalia galpinii (Burtt Davy) Seigler & Ebinger	Fabaceae	native	25	NA	H	9	10	2	biotic	biotic
Senegalia goetzei (Harms) Kyal. & Boatwr	Fabaceae	native	20	NA	H	9	11	3	biotic	biotic
Senegalia goetzei subsp. microphylla (Brenan) Kyal. & Boatwr.	Fabaceae	native	20	NA	H	9	11	3	biotic	biotic
Senegalia hereroensis (Engl.) Kyal. & Boatwr.	Asteraceae	native	10	NA	H	11	1	3	biotic	biotic
Senegalia kraussiana (Meisn. ex Benth.) Kyal. & Boatwr	Pedaliaceae	native	6	NA	H	10	1	4	biotic	abiotic
Senegalia mellifera (Benth.) Seigler & Ebinger	Fabaceae	native	8	NA	H	9	11	4	biotic	biotic
Senegalia montis-usti (Merxm. & A. Schreib.) Kyal. & Boatwr.	Fabaceae	native	9	NA	H	11	12	2	biotic	biotic
Senegalia nigrescens (Oliv.) P. J. H. Hurter	Fabaceae	native	30	NA	H	7	11	5	biotic	abiotic
Senegalia polyacantha (Willd.) Seigler & Ebinger	Fabaceae	native	8	NA	H	8	11	4	biotic	biotic
Senegalia robynsiana (Merxm. & A.Schreiber) Kyal. & Boatwr.	Fabaceae	native	9	NA	H	8	10	3	biotic	biotic
Senegalia schweinfurthii (Harms) Kyal. & Boatwr.	Fabaceae	native	12	NA	H	NA	NA	NA	abiotic	biotic

Senegalia senegal leioharchis (Harms) Kyal. & Boatwr.	Fabaceae	native	9	NA	H	6	10	5	biotic	biotic
Senegalia senegal (L.) Britton & P. Wilson	Fabaceae	native	4	NA	H	11	2	4	biotic	biotic
Senegalia welwitschii subsp. Delagoensis (Oliv.) Kyal. & Boatwr.	Fabaceae	native	12	NA	H	12	12	2	biotic	biotic
Senna bicapsularis (L.) Roxb.	Fabaceae	invasive	9	NA	H	5	10	6	biotic	biotic
Senna corymbosa (Lam.) H.S.Irwin & Barneby	Fabaceae	invasive	3	NA	H	2	7	6	biotic	NA
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	invasive	4	61	H	1	12	12	biotic	biotic
Senna hirsuta (L.) H.S.Irwin & Barneby	Fabaceae	invasive	2.7	6.6	H	4	7	4	biotic	biotic
Senna multiglandulosa (Jacq.) H.S.Irwin & Barneby	Fabaceae	invasive	4	30	H	1	12	12	biotic	biotic
Senna occidentalis (L.) Link	Fabaceae	invasive	2	17.5	H	1	12	12	biotic	biotic
Senna pendula (Willd.) H.S.Irwin & Barneby	Fabaceae	native	7	NA	H	1	6	6	biotic	biotic
Senna petersiana (Bolle) Lock	Fabaceae	native	4	NA	H	NA	NA	NA	abiotic	biotic
Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	invasive	10	NA	H	1	12	12	biotic	biotic
Senna spectabilis (DC.) H.S.Irwin & Barneby	Fabaceae	non_invasive	3	NA	H	NA	NA	NA	biotic	biotic
Seriphium plumosum L.	Asteraceae	native	4	NA	H	11	2	4	biotic	biotic
Sesamothamnus lugardii N.E.Br. ex Stapf	Pedaliaceae	invasive	7	6.98	H	9	3	7	biotic	biotic
Sesbania bispinosa (Jacq.) W.Wight	Fabaceae	native	4	NA	H	NA	NA	NA	biotic	biotic
Sesbania cinerascens Baker	Fabaceae	invasive	4	85.5	H	9	3	7	biotic	biotic
Sesbania punicea (Cav.) Benth.	Fabaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Shirakiopsis elliptica (Hochst.) Esser	Euphorbiaceae	native	10	NA	H	1	7	7	biotic	biotic

Sideroxylon inerme L.	Sapotaceae	native	4	NA	H	12	12	2	biotic	biotic
Smelophyllum capense Radlk.	Sapindaceae	native	7	NA	H	9	10	2	biotic	biotic
Solanecio mannii (Hook.f.) C.Jeffrey	Asteraceae	native	5	NA	H	9	1	5	biotic	biotic
Solanum aculeastrum Dunal	Solanaceae	invasive	6	NA	H	1	12	12	abiotic	NA
Solanum betaceum Cav.	Solanaceae	native	1	NA	H	NA	NA	NA	abiotic	biotic
Solanum catombelense Peyr.	Solanaceae	invasive	4	NA	H	1	12	12	biotic	biotic
Solanum chrysotrichum Schltdl.	Solanaceae	native	5	NA	H	12	4	5	biotic	biotic
Solanum giganteum Jacq.	Solanaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Solanum lichtensteinii Willd.	Solanaceae	invasive	10	NA	H	1	12	12	biotic	biotic
Solanum mauritianum Scop.	Solanaceae	native	0.6	NA	H	NA	NA	NA	abiotic	biotic
Solanum panduriforme E. Mey.	Solanaceae	invasive	1.5	NA	H	1	12	12	biotic	biotic
Solanum sisymbriifolium Lam.	Solanaceae	native	15	NA	H	6	11	6	biotic	biotic
Sonneratia alba Sm.	Lythraceae	native	7	NA	H	6	11	6	biotic	biotic
Sparmannia africana L.f.	Malvaceae	invasive	4	NA	H	8	11	4	biotic	NA
Spartium junceum L.	Fabaceae	invasive	18	5	H	1	2	2	biotic	biotic
Spathodea campanulata P.Beauv.	Bignoniaceae	non_invasive	1.5	NA	H	8	10	3	biotic	biotic
Spiraea cantoniensis Lour.	Rosaceae	native	15	NA	NA	9	9	1	abiotic	abiotic
Spirostachys africana Sond.	Euphorbiaceae	native	10	NA	H	10	12	3	biotic	biotic
Stadmania oppositifolia Lam.	Sapindaceae	native	2.4	NA	D	NA	NA	NA	abiotic	biotic
Stangeria eriopus (Kunze) Baill.	Stangeriaceae	native	10	NA	H	8	10	3	abiotic	biotic

Steganotaenia araliacea Hochst.	Apiaceae	native	25	NA	H	9	11	3	biotic	biotic
Sterculia africana (Lour.) Fiori	Malvaceae	native	8	NA	H	5	8	4	abiotic	biotic
Sterculia alexandri Harv.	Malvaceae	native	40	NA	H	6	7	2	biotic	biotic
Sterculia appendiculata K.Schum. ex Engl.	Malvaceae	native	10	NA	H	7	11	5	biotic	biotic
Sterculia murex Hemsl.	Malvaceae	native	25	NA	H	1	4	4	biotic	biotic
Sterculia quinqueloba (Garcke) K.Schum.	Malvaceae	native	5	NA	H	7	1	7	biotic	biotic
Sterculia rogersii N.E.Br.	Malvaceae	native	13	NA	H	8	10	3	biotic	biotic
Stereospermum kunthianum Cham.	Bignoniaceae	native	1.8	NA	H	NA	NA	NA	abiotic	biotic
Stoeberia utilis (L.Bolus) van Jaarsv.	Aizoaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Streblus Lour.	Moraceae	native	5	NA	NA	NA	NA	NA	abiotic	biotic
Strelitzia alba (L.f.) Skeels	Strelitziaceae	native	10	NA	NA	7	12	6	abiotic	biotic
Strelitzia nicolai Regel & K.Koch	Strelitziaceae	native	12	NA	NA	NA	NA	NA	abiotic	biotic
Strophanthus kombe Oliv.	Apocynaceae	native	3.5	NA	H	NA	NA	NA	abiotic	biotic
Strophanthus petersianus Klotzsch	Apocynaceae	native	17	NA	H	NA	NA	NA	abiotic	biotic
Strophanthus speciosus (Ward & Harv.) Reber	Apocynaceae	native	20	NA	H	9	12	4	biotic	biotic
Strychnos cocculoides Baker	Loganiaceae	native	8	NA	H	9	11	3	biotic	biotic
Strychnos decussata (Pappe) Gilg	Loganiaceae	native	12	NA	H	10	1	4	biotic	biotic
Strychnos henningsii Gilg	Loganiaceae	native	21	NA	H	6	1	8	biotic	biotic
Strychnos madagascariensis Poir.	Loganiaceae	native	15	NA	H	10	12	3	biotic	biotic

Strychnos mitis S.Moore	Loganiaceae	native	40	NA	H	11	4	6	biotic	biotic
Strychnos panganensis Gilg	Loganiaceae	native	15	NA	H	NA	NA	NA	abiotic	biotic
Strychnos potatorum L.f.	Loganiaceae	native	15	NA	H	10	12	3	biotic	biotic
Strychnos pungens Soler.	Loganiaceae	native	7	NA	H	10	10	1	biotic	biotic
Strychnos spinosa Lam.	Loganiaceae	native	7	NA	H	9	2	6	biotic	biotic
Strychnos usambarensis Gilg	Loganiaceae	native	20	NA	H	1	5	5	biotic	biotic
Strychnos xantha Leeuwenb.	Loganiaceae	native	10	NA	H	NA	NA	NA	abiotic	biotic
Styphnolobium japonicum (L.) Schott	Fabaceae	invasive	12	NA	H	11	12	2	biotic	biotic
Suregada africana (Sond.) Müll.Arg.	Euphorbiaceae	native	6	NA	D	8	10	3	abiotic	biotic
Suregada procera (Prain) Croizat	Euphorbiaceae	native	15	NA	D	9	11	3	abiotic	biotic
Suregada zanzibariensis Baill.	Euphorbiaceae	native	10	NA	D	10	3	6	abiotic	biotic
Swartzia madagascariensis Desv.	Euphorbiaceae	native	15	NA	H	10	11	2	biotic	biotic
Synadenium cupulare L.C. Wheeler	Euphorbiaceae	native	5	NA	NA	4	5	2	abiotic	biotic
Synadenium kirkii N.E.Br.	Euphorbiaceae	native	3	NA	NA	NA	NA	NA	abiotic	biotic
Synaptolepis alternifolia Oliv.	Thymelaeaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Syncarpia glomulifera (Sm.) Nied.	Myrtaceae	invasive	60	0.46	H	8	2	7	biotic	biotic
Synsepalum brevipes (Baker) T.D.Penn.	Sapotaceae	native	20	NA	H	1	5	5	biotic	biotic
Synsepalum passargei (Engl.) T.D.Penn.	Sapotaceae	native	8	NA	H	4	9	6	biotic	biotic
Syzygium cordatum Hochst. ex Krauss	Myrtaceae	native	15	NA	D	NA	NA	NA	abiotic	biotic
Syzygium cumini (L.) Skeels	Myrtaceae	invasive	15	833.3	H	10	5	8	biotic	biotic

Syzygium gerrardii (Harv. ex Hook.f.) Burtt Davy	Myrtaceae	native	20	NA	D	9	10	2	abiotic	biotic
Syzygium guineense (Willd.) DC.	Myrtaceae	native	30	NA	D	8	11	4	abiotic	biotic
Syzygium guineense subsp. *afromontana* F. White	Myrtaceae	native	12	NA	D	8	11	4	abiotic	abiotic
Syzygium guineense subsp. *barotsense* F. White	Myrtaceae	native	10	NA	D	8	11	4	abiotic	abiotic
Syzygium guineense subsp. *macrocarpum* (Engl.) F. White	Myrtaceae	native	12	NA	D	8	11	4	abiotic	biotic
Syzygium jambos (L.) Alston	Myrtaceae	invasive	10	NA	H	8	3	8	biotic	biotic
Syzygium legatii Burtt Davy & Greenway	Myrtaceae	native	8	NA	D	12	7	8	abiotic	biotic
Syzygium masukuense (Baker) R.E.Fr.	Myrtaceae	native	20	NA	D	9	2	6	abiotic	abiotic
Syzygium paniculatum Gaertn.	Myrtaceae	invasive	10	121.1	H	9	6	10	biotic	abiotic
Syzygium pondoense Engl.	Myrtaceae	native	2	NA	D	11	12	2	abiotic	biotic
Tabernaemontana elegans Stapf	Apocynaceae	native	10	NA	H	10	2	5	biotic	biotic
Tabernaemontana ventricosa Hochst. ex A.DC.	Apocynaceae	native	25	NA	H	9	12	4	biotic	biotic
Tacazzea apiculata Oliv.	Apocynaceae	native	20	NA	H	NA	NA	NA	abiotic	biotic
Tamarindus indica L.	Fabaceae	native	24	NA	H	11	3	5	biotic	NA
Tamarix aphylla (L.) H.Karst.	Tamaricaceae	non_invasive	18	NA	H	NA	NA	NA	biotic	biotic
Tamarix chinensis Lour.	Tamaricaceae	invasive	6	NA	H	8	2	7	biotic	biotic
Tamarix gallica L.	Tamaricaceae	non_invasive	18	0.03	H	NA	NA	NA	biotic	biotic
Tamarix ramosissima Ledeb.	Tamaricaceae	invasive	6	NA	H	8	2	7	biotic	abiotic
Tamarix usneoides E.Mey. ex Bunge	Tamaricaceae	native	5	NA	H	1	3	3	biotic	biotic

Tannodia swynnertonii (S.Moore) Prain	Euphorbiaceae	native	20	NA	D	10	12	3	abiotic	abiotic
Tapura fischeri Engl.	Dichapetalaceae	native	20	NA	H	10	12	3	biotic	biotic
Tarchonanthus camphoratus L.	Asteraceae	native	9	NA	D	2	8	7	abiotic	abiotic
Tarchonanthus trilobus DC.	Asteraceae	native	10	NA	D	8	2	7	abiotic	biotic
Tarenna pavettoides (Harv.) Sim	Rubiaceae	native	10	NA	H	9	2	6	biotic	biotic
Teclea gerrardii Verd.	Rutaceae	native	6	NA	H	8	9	2	abiotic	biotic
Teclea natalensis Engl.	Rutaceae	native	8	NA	H	8	9	2	abiotic	biotic
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	invasive	6	9	H	10	5	8	biotic	biotic
Tecomaria capensis (Thunb.) Spach	Bignoniaceae	native	4	NA	H	6	11	6	biotic	biotic
Tephrosia grandiflora (Aiton) Pers.	Fabaceae	native	5	10.5	H	8	12	5	biotic	biotic
Tephrosia pondoensis (Codd) Schrire	Fabaceae	native	5	NA	H	11	12	2	biotic	biotic
Terminalia brachystemma Welw. ex Hiern	Combretaceae	native	10	NA	H	10	2	5	abiotic	biotic
Terminalia catappa L.	Combretaceae	non_invasive	20	2473	H	NA	NA	NA	biotic	biotic
Terminalia mollis M.A.Lawson	Combretaceae	native	15	NA	H	10	12	3	abiotic	biotic
Terminalia phanerophlebia Engl. & Diels	Combretaceae	native	6	NA	H	10	2	5	abiotic	biotic
Terminalia prunioides M.A.Lawson	Combretaceae	native	13	NA	H	10	1	4	abiotic	biotic
Terminalia randii Baker f.	Combretaceae	native	10	NA	H	11	3	5	abiotic	biotic
Terminalia sambesiaca Engl. & Diels	Combretaceae	native	25	NA	H	12	1	2	abiotic	biotic
Terminalia sericea Burch. ex DC.	Combretaceae	native	10	NA	H	9	12	4	abiotic	biotic
Terminalia stenostachya Engl. & Diels	Combretaceae	native	10	NA	H	10	1	4	abiotic	biotic

Terminalia trichopoda Diels	Combretaceae	native	10	NA	H	11	1	3	abiotic	biotic
Tetradenia riparia (Hochst.) Codd	Lamiaceae	native	5	NA	H	7	9	3	biotic	biotic
Thamnocalamus tessellatus (Nees) Soderstr. & R.P.Ellis	Poaceae	native	4	NA	H	NA	NA	NA	abiotic	biotic
Thespesia acutiloba (Baker f.) Exell & Mendonca	Malvaceae	native	6	NA	H	1	4	4	biotic	biotic
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	invasive	10	3431.32	H	1	12	12	biotic	biotic
Thilachium africanum Scott-Elliot	Capparaceae	native	5	NA	H	8	10	3	biotic	biotic
Tiliacora funifera (Miers) Oliv.	Menispermaceae	native	20	NA	NA	NA	NA	NA	abiotic	biotic
Tinnea barbata Vollesen	Lamiaceae	native	4	NA	H	NA	NA	NA	abiotic	biotic
Tinnea rhodesiana S.Moore	Lamiaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Tinospora caffra (Miers) Troupin	Menispermaceae	native	10	NA	D	NA	NA	NA	abiotic	biotic
Tinospora tenera Miers	Menispermaceae	native	2	NA	D	NA	NA	NA	abiotic	biotic
Tipuana tipu (Benth.) Kuntze	Fabaceae	invasive	23	200	H	9	1	5	biotic	biotic
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	invasive	3.5	NA	H	4	6	3	biotic	abiotic
Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	invasive	3	NA	H	2	7	6	biotic	biotic
Toddalia asiatica (L.) Lam.	Rutaceae	native	NA	NA	NA	NA	NA	NA	abiotic	biotic
Toona ciliata M.Roem.	Meliaceae	invasive	35	3.2	H	9	3	7	biotic	biotic
Tournefortia argentea L. f.	Boraginaceae	invasive	10	NA	D	8	9	2	biotic	biotic
Toxicodendron succedaneum (L.) Kuntze	Anacardiaceae	native	13	NA	H	12	2	3	biotic	biotic
Trema orientalis (L.) Blume	Ulmaceae	native	5	NA	H	11	2	4	biotic	biotic

Triaspis glaucophylla Engl.	Malpighiaceae	native	3	NA	H	11	2	4	biotic	biotic
Triaspis hypericoides Burch.	Malpighiaceae	native	7	NA	H	8	11	4	biotic	biotic
Tricalysia capensis (Meisn. ex Hochst.) Sim	Rubiaceae	native	5	NA	H	8	11	4	biotic	biotic
Tricalysia delagoensis Schinz	Rubiaceae	native	5	NA	H	7	10	4	abiotic	biotic
Tricalysia jasminiflora (Klotzsch) Benth. & Hook.f. ex Hiern	Rubiaceae	native	7	NA	H	5	12	8	biotic	biotic
Trichilia capitata Klotzsch	Meliaceae	native	15	NA	H	1	4	4	biotic	biotic
Trichilia dregeana Sond.	Meliaceae	native	30	NA	H	10	11	2	biotic	biotic
Trichilia emetica Vahl	Meliaceae	native	20	NA	H	8	10	3	biotic	biotic
Trichocladus crinitus Pers.	Hamamelidaceae	native	4	NA	H	4	8	5	abiotic	biotic
Trichocladus ellipticus Eckl. & Zeyh.	Hamamelidaceae	native	10	NA	H	9	12	4	abiotic	biotic
Trichocladus grandiflorus Oliv.	Hamamelidaceae	native	30	NA	H	12	1	2	abiotic	biotic
Trimeria grandifolia (Hochst.) Warb.	Salicaceae	native	10	NA	D	11	2	4	abiotic	biotic
Triplaris americana L.	Polygonaceae	invasive	20	NA	H	4	5	3	biotic	abiotic
Triplochiton zambesiacus Milne-Redh.	Malvaceae	native	18	NA	H	12	4	5	biotic	biotic
Turraea floribunda Hochst.	Meliaceae	native	13	NA	H	11	12	2	biotic	biotic
Turraea nilotica Kotschy & Peyr.	Meliaceae	native	10	NA	H	6	10	5	biotic	biotic
Turraea obtusifolia Hochst.	Meliaceae	native	3	NA	H	1	2	2	biotic	biotic
Tylecodon paniculatus (L.f.) Toelken	Crassulaceae	native	3	NA	H	11	1	3	biotic	biotic
Ulex europaeus L.	Fabaceae	invasive	3	6.6	H	8	10	3	biotic	NA
Umtiza listerana Sim	Fabaceae	native	8	NA	H	3	7	5	biotic	biotic

Urera trinervis (Hochst.) Friis & Immelman	Urticaceae	native	10	NA	H	12	3	4	biotic	biotic
Uvaria caffra E.Mey. ex Sond.	Annonaceae	native	4	NA	H	10	3	6	biotic	biotic
Uvaria gracilipes N.Robson	Annonaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Uvaria lucida subsp. *virens* (N.E.Br.) Verdc.	Annonaceae	native	4	NA	H	11	11	1	biotic	biotic
Vaccinium L.	Ericaceae	native	7	NA	H	8	10	3	biotic	biotic
Vachellia amythethophylla (Steud. ex A.Rich.) Kyal. & Boatwr.	Fabaceae	native	15	NA	H	1	3	3	biotic	biotic
Vachellia arenaria (Schinz) Kyal. & Boatwr.	Fabaceae	native	9	NA	H	12	4	5	biotic	biotic
Vachellia borleae (Burtt Davy) Kyal. & Boatwr.	Fabaceae	native	5	NA	H	11	3	5	biotic	biotic
Vachellia davyi (N.E.Br.) Kyal. & Boatwr.	Fabaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Vachellia dyeri (P.P.Swartz) Kyal. & Boatwr.	Fabaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Vachellia erioloba (E.Mey.) P.J.H.Hurter	Fabaceae	native	16	NA	H	7	9	3	biotic	biotic
Vachellia exuvialis (Verdoorn) Kyal. & Boatwr.	Fabaceae	native	4.5	NA	H	10	2	5	biotic	biotic
Vachellia gerrardii (Benth.) P.J.H.Hurter	Fabaceae	native	8	NA	H	10	2	5	biotic	biotic
Vachellia grandicornuta (Gerstner) Seigler & Ebinger	Fabaceae	native	10	NA	H	12	1	2	biotic	biotic
Vachellia haematoxylon (Willd.) Seigler & Ebinger	Fabaceae	native	10	NA	H	10	2	5	biotic	biotic
Vachellia hebeclada subsp. hebeclada (DC.) Kyal. & Boatwr.	Fabaceae	native	7	NA	H	NA	NA	NA	abiotic	biotic
Vachellia karroo (Hayne) Banfi & Galasso	Fabaceae	native	15	33.69	H	10	2	5	biotic	biotic
Vachellia kirkii (Oliv.) Kyal. & Boatwr.	Fabaceae	native	15	NA	H	7	10	4	abiotic	biotic
Vachellia kosiensis (P.P.Sw. ex Coates Palgr.) Kyal. & Boatwr.	Fabaceae	native	17	NA	H	11	4	6	biotic	biotic

Vachellia luederitzii var. luederitzii (Engl.) Kyal. & Boatwr.	Fabaceae	native	12	NA	H	10	3	6	biotic	biotic
Vachellia luederitzii var. retinens (Engl.) Kyal. & Boatwr.	Fabaceae	native	10	NA	H	10	3	6	biotic	biotic
Vachellia natalitia (E.Mey.) Kyal. & Boatwr.	Fabaceae	native	5	NA	H	12	3	4	biotic	biotic
Vachellia nebrownii (Burtt Davy) Seigler & Ebinger	Fabaceae	native	7	NA	H	8	10	3	biotic	biotic
Vachellia nilotica (L.) P.J.H.Hurter & Mabb.	Fabaceae	native	15	110	H	9	4	9	biotic	biotic
Vachellia ormocarpoides (P.J.H.Hurter) Kyal. & Boatwr.	Fabaceae	native	NA	NA	H	NA	NA	NA	abiotic	biotic
Vachellia permixta (Burtt Davy) Kyal. & Boatwr.	Fabaceae	native	4	NA	H	12	12	2	biotic	biotic
Vachellia reficiens (Wawra) Kyal. & Boatwr.	Fabaceae	native	5	NA	H	1	2	2	biotic	biotic
Vachellia rehmanniana (Schinz) Kyal. & Boatwr.	Fabaceae	native	10	NA	H	11	2	4	biotic	biotic
Vachellia robbertsei (P.P.Swartz) Kyal. & Boatwr.	Fabaceae	native	4	NA	H	12	12	2	biotic	biotic
Vachellia robusta subsp. clavigera (Burch.) Kyal. & Boatwr.	Fabaceae	native	12	NA	H	8	10	3	biotic	biotic
Vachellia robusta subsp. robusta (Burch.) Kyal. & Boatwr.	Fabaceae	native	8	NA	H	8	10	3	biotic	biotic
Vachellia robusta subsp. usambarensis (Burch.) Kyal. & Boatwr.	Fabaceae	native	12	NA	H	NA	NA	NA	abiotic	biotic
Vachellia sieberiana var. sieberiana (DC.) Kyal. & Boatwr.	Fabaceae	native	17	NA	H	9	11	3	biotic	biotic
Vachellia sieberiana var. woodii (DC.) Kyal. & Boatwr.	Fabaceae	native	17	NA	H	9	11	3	biotic	biotic
Vachellia stuhlmannii (Taub.) Kyal. & Boatwr.	Fabaceae	native	4	NA	H	8	10	3	biotic	biotic
Vachellia swazica (Burtt Davy) Kyal. & Boatwr.	Fabaceae	native	3	NA	H	10	11	2	biotic	biotic
Vachellia torrei (Brenan) Kyal. & Boatwr.	Fabaceae	native	2	NA	H	NA	NA	NA	abiotic	biotic
Vachellia tortilis subsp. heteracantha (Forssk.) Galasso & Banfi	Fabaceae	native	15	43.64	H	12	2	3	biotic	biotic
Vachellia xanthophloea (Benth.) P.J.H.Hurter	Fabaceae	native	25	NA	H	9	11	3	biotic	biotic

Vangueria esculenta S.Moore	Rubiaceae	native	12	NA	H	10	10	1	biotic	biotic
Vangueria infausta Burch.	Rubiaceae	native	8	NA	H	9	10	2	biotic	biotic
Vangueria madagascariensis J.F.Gmel.	Rubiaceae	native	15	NA	H	10	12	3	biotic	biotic
Vangueria parvifolia Sond.	Rubiaceae	native	6	NA	H	10	12	3	biotic	biotic
Vangueria randii S.Moore	Rubiaceae	native	7	NA	H	10	3	6	biotic	biotic
Vepris lanceolata G. Don	Rutaceae	native	20	NA	H	12	3	4	biotic	biotic
Vepris reflexa Verd.	Rutaceae	native	6	NA	H	7	12	6	biotic	biotic
Virgilia divaricata Adamson	Fabaceae	native	10	NA	H	8	9	2	biotic	biotic
Vitellariopsis dispar (N.E.Br.) Aubrév.	Sapotaceae	native	10	NA	H	9	12	4	biotic	biotic
Vitex buchananii Baker ex Gürke	Lamiaceae	native	6	NA	H	11	2	4	biotic	biotic
Vitex ferruginea Schumach. & Thonn.	Lamiaceae	native	9	NA	H	11	2	4	biotic	biotic
Vitex harveyana H.Pearson	Lamiaceae	native	4	NA	H	10	12	3	biotic	biotic
Vitex patula E.A.Bruce	Lamiaceae	native	5	NA	H	11	1	3	biotic	biotic
Vitex payos (Lour.) Merr.	Lamiaceae	native	10	NA	H	11	2	4	biotic	biotic
Vitex petersiana Klotzsch	Lamiaceae	native	3	NA	H	1	4	4	biotic	biotic
Vitex rehmannii Gürke	Lamiaceae	native	9	NA	H	11	2	4	biotic	biotic
Vitex trifolia L.	Lamiaceae	invasive	8	NA	H	8	2	7	biotic	biotic
Voacanga africana Stapf ex Scott-Elliot	Apocynaceae	native	10	NA	H	11	1	3	biotic	biotic
Voacanga thouarsii Roem. & Schult.	Apocynaceae	native	20	NA	H	4	5	2	biotic	biotic

Warburgia salutaris (G.Bertol.) Chiov.	Canellaceae	native	6	NA	D	NA	NA	NA	abiotic	biotic
Widdringtonia nodiflora (L.) E.Powrie	Cupressaceae	native	30	NA	D	NA	NA	NA	abiotic	biotic
Widdringtonia schwarzii (Marloth) Mast.	Cupressaceae	native	8	NA	H	NA	NA	NA	abiotic	biotic
Wrightia natalensis Stapf	Apocynaceae	native	15	NA	H	8	11	4	biotic	biotic
Xanthocercis zambesiaca (Baker) Dumaz-le-Grand	Fabaceae	native	30	NA	H	9	12	4	biotic	biotic
Xeroderris stuhlmannii (Taub.) Mendonca & Sousa	Fabaceae	native	10	NA	H	9	10	2	biotic	biotic
Xerophyta retinervis Baker	Velloziaceae	native	4	NA	NA	NA	NA	NA	abiotic	biotic
Ximenia americana L.	Olacaceae	native	4	NA	H	9	12	4	biotic	biotic
Ximenia caffra Sond.	Olacaceae	native	6	NA	H	9	10	2	biotic	biotic
Xylia torreana Brenan	Fabaceae	native	15	NA	H	9	10	2	biotic	biotic
Xylopia parviflora Spruce	Annonaceae	native	30	NA	H	NA	NA	NA	abiotic	biotic
Xylotheca kraussiana Hochst.	Salicaceae	native	5	NA	H	9	11	3	biotic	biotic
Xylotheca tettensis (Klotzsch) Gilg	Salicaceae	native	5	NA	H	8	1	6	biotic	biotic
Xymalos monospora (Harv.) Baill.	Monimiaceae	native	25	NA	NA	NA	NA	NA	abiotic	biotic
Zanthoxylum capense (Thunb.) Harv.	Rutaceae	native	10	NA	H	1	1	1	biotic	biotic
Zanthoxylum davyi Waterm.	Rutaceae	native	30	NA	H	10	1	4	biotic	biotic
Zanthoxylum holtzianum (Engl.) P.G. Waterman	Rutaceae	native	15	NA	H	NA	NA	NA	abiotic	biotic
Zanthoxylum humile Waterm.	Rutaceae	native	3	NA	H	NA	NA	NA	abiotic	biotic
Zanthoxylum leprieurii Guill. & Perr.	Rutaceae	native	20	NA	H	10	12	3	biotic	biotic
Ziziphus abyssinica Hochst. ex A.Rich.	Rhamnaceae	native	13	NA	H	12	2	3	biotic	biotic

Ziziphus mauritiana Lam.	Rhamnaceae	native	20	NA	H	7	10	4	abiotic	biotic
Ziziphus mucronata Willd.	Rhamnaceae	native	9	NA	H	11	2	4	biotic	biotic
Ziziphus pubescens Oliv.	Rhamnaceae	native	7	NA	H	11	12	2	biotic	biotic
Ziziphus rivularis Codd	Rhamnaceae	native	7	NA	H	11	11	1	biotic	biotic

Appendix 2.3: Results of the phylogenetic Analysis of Variance of invasion success between natives vs non-natives. and invasives vs non-invasives with start of growing season set at September. Pt = Multiple corrected P values from posthoc t-tests.

Phenology	F	Pt	F	Pt
	Natives versus non-natives	Natives versus non-natives	Invasive versus non-invasive	Invasive versus non-invasive
First flowering month	7.60	0.26	0.54	0.43
Last flowering month	0.32	0.81	0.44	0.47

Appendix 3.1: Future estimated sum of pixel gained or lost for 178 non-native and invading trees and shrubs in South Africa. (Negative signs indicate range contraction)

Species	APG III Family	Pixel gained or lost	Number of points used
Acacia ataxacantha DC.	Fabaceae	-260.266	129
Acacia baileyana F.Muell.	Fabaceae	-124.764	136
Acacia caffra (Thunb.) Willd.	Fabaceae	-57.041	325
Acacia cyclops G.Don	Fabaceae	-18.881	434
Acacia dealbata Link	Fabaceae	-77.361	564
Acacia decurrens Willd.	Fabaceae	-262.022	162
Acacia elata Benth.	Fabaceae	-149.030	62
Acacia erubescens Welw. ex Oliver	Fabaceae	-142.038	72
Acacia haematoxylon Willd.	Fabaceae	-24.725	259
Acacia hebeclada DC.	Fabaceae	282.800	43
Acacia implexa Benth.	Fabaceae	-49.871	74
Acacia karroo Hayne	Fabaceae	-22.167	1416
Acacia longifolia (Andrews) Willd.	Fabaceae	80.642	183
Acacia mearnsii De Wild.	Fabaceae	-105.747	1085
Acacia melanoxylon R.Br.	Fabaceae	-220.482	316
Acacia mellifera (Vahl) Benth.	Fabaceae	-27.013	159

Acacia nigrescens Oliv.	Fabaceae	-10.801	129
Acacia nilotica (L.) Delile	Fabaceae	-77.288	60
Acacia podalyriifolia G.Don	Fabaceae	-289.958	105
Acacia pycnantha Benth.	Fabaceae	18.638	87
Acacia saligna (Labill.) Wendl.	Fabaceae	21.304	411
Acacia tortilis (Forssk.) Hayne	Fabaceae	-64.849	109
Acer buergerianum Miq.	Sapindaceae	-1092.008	23
Acer negundo L.	Sapindaceae	315.995	26
Agave americana L.	Asparagaceae	101.273	537
Agave sisalana Perrine	Asparagaceae	257.200	191
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	857.740	79
Albizia lebbeck (L.) Benth.	Fabaceae	1025.743	15
Alhagi maurorum Medik.	Fabaceae	648.941	10
Alnus glutinosa (L.) Gaertn.	Betulaceae	-458.313	12
Ardisia crenata Sims	Primulaceae	-115.007	18
Atriplex nummularia Lindl.	Amaranthaceae	-527.908	82
Banksia ericifolia L.f.	Proteaceae	-458.252	10
Banksia integrifolia L.f.	Proteaceae	-38.107	54
Bauhinia variegata L.	Fabaceae	-21.321	22

Caesalpinia decapetala (Roth) Alston	Fabaceae	38.835	491
Caesalpinia gilliesii (Hook.) D.Dietr.	Fabaceae	-76.455	49
Callistemon rigidus R.Br.	Myrtaceae	-138.706	34
Callistemon viminalis (Sol. ex Gaertn.) G.Don ex Loudon	Myrtaceae	713.404	12
Casuarina cunninghamiana Miq.	Casuarinaceae	322.987	33
Casuarina equisetifolia L.	Casuarinaceae	-34.558	29
Cereus jamacaru DC.	Cactaceae	41.833	208
Cestrum aurantiacum Lindl.	Solanaceae	1182.174	11
Cestrum laevigatum Schltdl.	Solanaceae	68.085	125
Cestrum parqui L´Hér.	Solanaceae	-368.895	18
Cinnamomum camphora (L.) J.Presl	Lauraceae	-206.220	20
Citrus limon (L.) Burm. f.	Rutaceae	-981.405	16
Colophospermum mopane (Benth.) Leonard	Fabaceae	-43.970	59
Cotoneaster franchetii Bois	Rosaceae	33.721	19
Cotoneaster pannosus Franch.	Rosaceae	39.763	622
Crotalaria agatiflora Schweinf.	Fabaceae	-212.764	39
Cupressus arizonica Greene	Cupressaceae	101.101	55
Cytisus scoparius (L.) Link	Fabaceae	-275.468	24

Duranta erecta L.	Verbenaceae	53.238	41
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	394.693	106
Eriobotrya japonica (Thunb.) Lindl.	Rosaceae	-168.649	11
Eucalyptus camaldulensis Dehnh.	Myrtaceae	-132.470	208
Eucalyptus cinerea F. Muell. ex Benth.	Myrtaceae	855.271	21
Eucalyptus cladocalyx F.Muell.	Myrtaceae	-133.150	63
Eucalyptus diversicolor F.Muell.	Myrtaceae	54.466	53
Eucalyptus globulus Labill.	Myrtaceae	-1355.388	45
Eucalyptus gomphocephala DC.	Myrtaceae	-7.917	16
Eucalyptus grandis W.Hill	Myrtaceae	-74.728	157
Eucalyptus sideroxylon A.Cunn. ex Woolls	Myrtaceae	-176.987	27
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	900.567	13
Ficus carica L.	Moraceae	-860.325	23
Fraxinus americana L.	Oleaceae	822.391	21
Gleditsia triacanthos L.	Fabaceae	101.105	262
Grevillea banksii R.Br.	Proteaceae	-144.395	9
Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	-145.267	162
Grewia flava DC.	Malvaceae	-186.369	824
Hakea gibbosa Cav.	Proteaceae	27.874	90

Hakea salicifolia (Vent.) B.L.Burtt	Proteaceae	633.597	20
Hakea saligna (Andrews) Knight	Proteaceae	-580.664	60
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	7.665	607
Harrisia martinii (Labour.) Britton	Cactaceae	71.961	33
Hypericum perforatum L.	Hypericaceae	44.386	16
Ipomoea carnea Jacq.	Convolvulaceae	-24.385	27
Jacaranda mimosifolia D.Don	Bignoniaceae	82.598	485
Jasminum humile L.	Oleaceae	-4.962	56
Jatropha curcas L.	Euphorbiaceae	298.247	14
Jatropha gossypiifolia L.	Euphorbiaceae	415.660	15
Juniperus virginiana L.	Cupressaceae	192.450	26
Lagerstroemia indica L.	Lythraceae	468.089	15
Lantana camara L.	Verbenaceae	42.596	729
Leptospermum laevigatum (Gaertn.) F.Muell.	Myrtaceae	-113.044	41
Leucaena leucocephala (Lam.) de Wit	Fabaceae	12.306	85
Ligustrum japonicum Thunb.	Oleaceae	-401.117	18
Ligustrum lucidum W.T.Aiton	Oleaceae	457.067	31
Ligustrum sinense Lour.	Oleaceae	73.407	18

Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	-279.255	67
Mangifera indica L.	Anacardiaceae	-3.651	33
Manihot esculenta Crantz	Euphorbiaceae	55.498	34
Melia azedarach L.	Meliaceae	69.916	3062
Mimosa pigra L.	Fabaceae	573.960	22
Montanoa hibiscifolia (Benth.) Standl.	Asteraceae	-100.974	37
Morus alba L.	Moraceae	-257.656	593
Nerium oleander L.	Apocynaceae	97.754	53
Nicotiana glauca Graham	Solanaceae	-326.002	1026
Opuntia aurantiaca Lindl.	Cactaceae	137.405	157
Opuntia engelmannii Salm-Dyck	Cactaceae	-216.422	71
Opuntia ficus-indica (L.) Mill.	Cactaceae	88.450	3592
Opuntia humifusa (Raf.) Raf.	Cactaceae	-109.929	111
Opuntia microdasys (Lehm.) Pfeiff.	Cactaceae	-366.225	38
Opuntia monacantha Haw.	Cactaceae	-40.517	138
Opuntia robusta J.C. Wendl.	Cactaceae	-107.333	654
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	-28.718	507
Parkinsonia aculeata L.	Fabaceae	-420.619	37
Persea americana Mill.	Lauraceae	-742.539	16

Phaeoptilum spinosum Radlk.	Nyctaginaceae	151.885	275
Phytolacca dioica L.	Phytolaccaceae	316.612	114
Pinus canariensis C.Sm.	Pinaceae	-0.303	16
Pinus elliottii Engelm.	Pinaceae	-6.260	54
Pinus halepensis Mill.	Pinaceae	78.949	230
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	91.652	349
Pinus pinaster Aiton	Pinaceae	18.762	504
Pinus pinea L.	Pinaceae	60.760	33
Pinus radiata D.Don	Pinaceae	44.466	239
Pinus roxburghii Sarg.	Pinaceae	398.295	54
Pinus taeda L.	Pinaceae	-39.568	17
Pittosporum undulatum Vent.	Pittosporaceae	-158.657	53
Populus xcanescens (Aiton) Sm.	Salicaceae	11.868	188
Populus alba L.	Salicaceae	762.578	51
Populus deltoides W. Bartram ex Marshall	Salicaceae	-378.556	263
Populus nigra L.	Salicaceae	-63.680	216
Prosopis chilensis (Molina) Stuntz	Fabaceae	-508.904	10
Prosopis glandulosa Torr.	Fabaceae	960.765	36

Prosopis velutina Wooton	Fabaceae	-702.725	66
Protea longifolia Andrews	Proteaceae	1.949	1698
Protea subvestita N.E. Br.	Proteaceae	99.661	447
Prunus armeniaca L.	Rosaceae	213.093	77
Prunus persica (L.) Stokes	Rosaceae	-106.672	428
Prunus serotina Ehrh.	Rosaceae	428.593	10
Psidium guajava L.	Myrtaceae	72.112	1120
Punica granatum L.	Lythraceae	-949.560	35
Pyracantha angustifolia (Franch.) C.K. Schneid.	Rosaceae	89.319	607
Pyracantha coccinea M. Roem.	Rosaceae	319.877	19
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	112.415	102
Quercus robur L.	Fagaceae	2014.249	122
Rhigozum trichotomum Burch.	Bignoniaceae	-113.460	683
Ricinus communis L.	Euphorbiaceae	12.011	1871
Robinia pseudoacacia L.	Fabaceae	-192.547	448
Rosa rubiginosa L.	Rosaceae	5.157	122
Rubus cuneifolius Pursh	Rosaceae	-63.740	531
Rubus fruticosus L. agg.	Rosaceae	-91.635	202
Rubus rosifolius Sm.	Rosaceae	5093.957	10

Salix babylonica L.	Salicaceae	207.320	1068
Salix fragilis L.	Salicaceae	-49.501	280
Sambucus canadensis L.	Adoxaceae	-478.855	31
Schinus molle L.	Anacardiaceae	-250.527	508
Schinus terebinthifolia Raddi	Anacardiaceae	31.144	46
Senna bicapsularis (L.) Roxb.	Fabaceae	-41.536	55
Senna corymbosa (Lam.) H.S.Irwin & Barneby	Fabaceae	1818.777	14
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	-136.929	446
Senna multiglandulosa (Jacq.) H.S.Irwin & Barneby	Fabaceae	-1298.748	12
Senna occidentalis (L.) Link	Fabaceae	220.657	130
Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	108.942	224
Sesbania bispinosa (Jacq.) W.Wight	Fabaceae	465.823	40
Sesbania punicea (Cav.) Benth.	Fabaceae	-23.252	1139
Solanum chrysotrichum Schltdl.	Solanaceae	-48.422	49
Solanum mauritianum Scop.	Solanaceae	8.576	5336
Solanum sisymbriifolium Lam.	Solanaceae	5.071	352
Spartium junceum L.	Fabaceae	-119.639	53
Spathodea campanulata P.Beauv.	Bignoniaceae	-60.576	17

Styphnolobium japonicum (L.) Schott	Fabaceae	58.266	39
Syncarpia glomulifera (Sm.) Nied.	Myrtaceae	736.680	11
Syzygium cumini (L.) Skeels	Myrtaceae	-1429.305	14
Tamarix ramosissima Ledeb.	Tamaricaceae	828.528	22
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	-96.694	334
Tephrosia grandiflora (Ait.) Pers.	Fabaceae	-116.946	105
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	-12.284	52
Tipuana tipu (Benth.) Kuntze	Fabaceae	-87.217	1457
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	8.463	137
Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	-182.525	107
Toona ciliata M.Roem.	Meliaceae	-109.227	104
Ulex europaeus L.	Fabaceae	-974.885	16
Ulmus parvifolia Jacq.	Ulmaceae	-22.187	53
Wigandia urens (Ruiz & Pav.) Kunth	Boraginaceae	-1898.868	8

Appendix 3.2: Future estimated sum of pixel gained or lost for non-native trees and shrubs with greater than or equals to 20 occurrence points. (Negative signs indicate range contraction)

Species	APG III Family	Pixel gained or lost	Number of points used
Acacia ataxacantha DC.	Fabaceae	-260.266	129
Acacia baileyana F.Muell.	Fabaceae	-124.764	136
Acacia caffra (Thunb.) Willd.	Fabaceae	-57.041	325
Acacia cyclops G.Don	Fabaceae	-18.881	434
Acacia dealbata Link	Fabaceae	-77.361	564
Acacia decurrens Willd.	Fabaceae	-262.022	162
Acacia elata Benth.	Fabaceae	-149.030	62
Acacia erubescens Welw. ex Oliver	Fabaceae	-142.038	72
Acacia haematoxylon Willd.	Fabaceae	-24.725	259
Acacia hebeclada DC.	Fabaceae	282.800	43
Acacia implexa Benth.	Fabaceae	-49.871	74
Acacia karroo Hayne	Fabaceae	-22.167	1416
Acacia longifolia (Andrews) Willd.	Fabaceae	80.642	183
Acacia mearnsii De Wild.	Fabaceae	-105.747	1085
Acacia melanoxylon R.Br.	Fabaceae	-220.482	316
Acacia mellifera (Vahl) Benth.	Fabaceae	-27.013	159

Acacia nigrescens Oliv.	Fabaceae	-10.801	129
Acacia nilotica (L.) Delile	Fabaceae	-77.288	60
Acacia podalyriifolia G.Don	Fabaceae	-289.958	105
Acacia pycnantha Benth.	Fabaceae	18.638	87
Acacia saligna (Labill.) Wendl.	Fabaceae	21.304	411
Acacia tortilis (Forssk.) Hayne	Fabaceae	-64.849	109
Acer buergerianum Miq.	Sapindaceae	-1092.008	23
Acer negundo L.	Sapindaceae	315.995	26
Agave americana L.	Asparagaceae	101.273	537
Agave sisalana Perrine	Asparagaceae	257.200	191
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	857.740	79
Atriplex nummularia Lindl.	Amaranthaceae	-527.908	82
Banksia integrifolia L.f.	Proteaceae	-38.107	54
Bauhinia variegata L.	Fabaceae	-21.321	22
Caesalpinia decapetala (Roth) Alston	Fabaceae	38.835	491
Caesalpinia gilliesii (Hook.) D.Dietr.	Fabaceae	-76.455	49
Callistemon rigidus R.Br.	Myrtaceae	-138.706	34
Casuarina cunninghamiana Miq.	Casuarinaceae	322.987	33
Casuarina equisetifolia L.	Casuarinaceae	-34.558	29

Cereus jamacaru DC.	Cactaceae	41.833	208
Cestrum laevigatum Schltdl.	Solanaceae	68.085	125
Cinnamomum camphora (L.) J.Presl	Lauraceae	-206.220	20
Colophospermum mopane (Benth.) Leonard	Fabaceae	-43.970	59
Cotoneaster pannosus Franch.	Rosaceae	39.763	622
Crotalaria agatiflora Schweinf.	Fabaceae	-212.764	39
Cupressus arizonica Greene	Cupressaceae	101.101	55
Cytisus scoparius (L.) Link	Fabaceae	-275.468	24
Duranta erecta L.	Verbenaceae	53.238	41
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	394.693	106
Eucalyptus camaldulensis Dehnh.	Myrtaceae	-132.470	208
Eucalyptus cinerea F. Muell. ex Benth.	Myrtaceae	855.271	21
Eucalyptus cladocalyx F.Muell.	Myrtaceae	-133.150	63
Eucalyptus diversicolor F.Muell.	Myrtaceae	54.466	53
Eucalyptus globulus Labill.	Myrtaceae	-1355.388	45
Eucalyptus grandis W.Hill	Myrtaceae	-74.728	157
Eucalyptus sideroxylon A.Cunn. ex Woolls	Myrtaceae	-176.987	27
Ficus carica L.	Moraceae	-860.325	23

Fraxinus americana L.	Oleaceae	822.391	21
Gleditsia triacanthos L.	Fabaceae	101.105	262
Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	-145.267	162
Grewia flava DC.	Malvaceae	-186.369	824
Hakea gibbosa Cav.	Proteaceae	27.874	90
Hakea salicifolia (Vent.) B.L.Burtt	Proteaceae	633.597	20
Hakea saligna (Andrews) Knight	Proteaceae	-580.664	60
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	7.665	607
Harrisia martinii (Labour.) Britton	Cactaceae	71.961	33
Ipomoea carnea Jacq.	Convolvulaceae	-24.385	27
Jacaranda mimosifolia D.Don	Bignoniaceae	82.598	485
Jasminum humile L.	Oleaceae	-4.962	56
Juniperus virginiana L.	Cupressaceae	192.450	26
Lantana camara L.	Verbenaceae	42.596	729
Leptospermum laevigatum (Gaertn.) F.Muell.	Myrtaceae	-113.044	41
Leucaena leucocephala (Lam.) de Wit	Fabaceae	12.306	85
Ligustrum lucidum W.T.Aiton	Oleaceae	457.067	31
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	-279.255	67
Mangifera indica L.	Anacardiaceae	-3.651	33

Manihot esculenta Crantz	Euphorbiaceae	55.498	34
Melia azedarach L.	Meliaceae	69.916	3062
Mimosa pigra L.	Fabaceae	573.960	22
Montanoa hibiscifolia (Benth.) Standl.	Asteraceae	-100.974	37
Morus alba L.	Moraceae	-257.656	593
Nerium oleander L.	Apocynaceae	97.754	53
Nicotiana glauca Graham	Solanaceae	-326.002	1026
Opuntia aurantiaca Lindl.	Cactaceae	137.405	157
Opuntia engelmannii Salm-Dyck	Cactaceae	-216.422	71
Opuntia ficus-indica (L.) Mill.	Cactaceae	88.450	3592
Opuntia humifusa (Raf.) Raf.	Cactaceae	-109.929	111
Opuntia microdasys (Lehm.) Pfeiff.	Cactaceae	-366.225	38
Opuntia monacantha Haw.	Cactaceae	-40.517	138
Opuntia robusta J.C. Wendl.	Cactaceae	-107.333	654
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	-28.718	507
Parkinsonia aculeata L.	Fabaceae	-420.619	37
Phaeoptilum spinosum Radlk.	Nyctaginaceae	151.885	275
Phytolacca dioica L.	Phytolaccaceae	316.612	114

Pinus elliottii Engelm.	Pinaceae	-6.260	54
Pinus halepensis Mill.	Pinaceae	78.949	230
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	91.652	349
Pinus pinaster Aiton	Pinaceae	18.762	504
Pinus pinea L.	Pinaceae	60.760	33
Pinus radiata D.Don	Pinaceae	44.466	239
Pinus roxburghii Sarg.	Pinaceae	398.295	54
Pittosporum undulatum Vent.	Pittosporaceae	-158.657	53
Populus xcanescens (Aiton) Sm.	Salicaceae	11.868	188
Populus alba L.	Salicaceae	762.578	51
Populus deltoides W. Bartram ex Marshall	Salicaceae	-378.556	263
Populus nigra L.	Salicaceae	-63.680	216
Prosopis glandulosa Torr.	Fabaceae	960.765	36
Prosopis velutina Wooton	Fabaceae	-702.725	66
Protea longifolia Andrews	Proteaceae	1.949	1698
Protea subvestita N.E. Br.	Proteaceae	99.661	447
Prunus armeniaca L.	Rosaceae	213.093	77
Prunus persica (L.) Stokes	Rosaceae	-106.672	428
Psidium guajava L.	Myrtaceae	72.112	1120

Punica granatum L.	Lythraceae	-949.560	35
Pyracantha angustifolia (Franch.) C.K. Schneid.	Rosaceae	89.319	607
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	112.415	102
Quercus robur L.	Fagaceae	2014.249	122
Rhigozum trichotomum Burch.	Bignoniaceae	-113.460	683
Ricinus communis L.	Euphorbiaceae	12.011	1871
Robinia pseudoacacia L.	Fabaceae	-192.547	448
Rosa rubiginosa L.	Rosaceae	5.157	122
Rubus cuneifolius Pursh	Rosaceae	-63.740	531
Rubus fruticosus L. agg.	Rosaceae	-91.635	202
Salix babylonica L.	Salicaceae	207.320	1068
Salix fragilis L.	Salicaceae	-49.501	280
Sambucus canadensis L.	Adoxaceae	-478.855	31
Schinus molle L.	Anacardiaceae	-250.527	508
Schinus terebinthifolia Raddi	Anacardiaceae	31.144	46
Senna bicapsularis (L.) Roxb.	Fabaceae	-41.536	55
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	-136.929	446
Senna occidentalis (L.) Link	Fabaceae	220.657	130

Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	108.942	224
Sesbania bispinosa (Jacq.) W.Wight	Fabaceae	465.823	40
Sesbania punicea (Cav.) Benth.	Fabaceae	-23.252	1139
Solanum chrysotrichum Schltdl.	Solanaceae	-48.422	49
Solanum mauritianum Scop.	Solanaceae	8.576	5336
Solanum sisymbriifolium Lam.	Solanaceae	5.071	352
Spartium junceum L.	Fabaceae	-119.639	53
Styphnolobium japonicum (L.) Schott	Fabaceae	58.266	39
Tamarix ramosissima Ledeb.	Tamaricaceae	828.528	22
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	-96.694	334
Tephrosia grandiflora (Ait.) Pers.	Fabaceae	-116.946	105
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	-12.284	52
Tipuana tipu (Benth.) Kuntze	Fabaceae	-87.217	1457
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	8.463	137
Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	-182.525	107
Toona ciliata M.Roem.	Meliaceae	-109.227	104
Ulmus parvifolia Jacq.	Ulmaceae	-22.187	53

Appendix 3.3: Future estimated sum of pixel gained or lost for non-native trees and shrubs with greater than or equal to 30 occurrence points. (Negative signs indicate range contraction)

Species	APG III Family	Pixel gained or lost	Number of points used
Acacia ataxacantha DC.	Fabaceae	-260.266	129
Acacia baileyana F.Muell.	Fabaceae	-124.764	136
Acacia caffra (Thunb.) Willd.	Fabaceae	-57.041	325
Acacia cyclops G.Don	Fabaceae	-18.881	434
Acacia dealbata Link	Fabaceae	-77.361	564
Acacia decurrens Willd.	Fabaceae	-262.022	162
Acacia elata Benth.	Fabaceae	-149.030	62
Acacia erubescens Welw. ex Oliver	Fabaceae	-142.038	72
Acacia haematoxylon Willd.	Fabaceae	-24.725	259
Acacia hebeclada DC.	Fabaceae	282.800	43
Acacia implexa Benth.	Fabaceae	-49.871	74
Acacia karroo Hayne	Fabaceae	-22.167	1416
Acacia longifolia (Andrews) Willd.	Fabaceae	80.642	183
Acacia mearnsii De Wild.	Fabaceae	-105.747	1085
Acacia melanoxylon R.Br.	Fabaceae	-220.482	316

Acacia mellifera (Vahl) Benth.	Fabaceae	-27.013	159
Acacia nigrescens Oliv.	Fabaceae	-10.801	129
Acacia nilotica (L.) Delile	Fabaceae	-77.288	60
Acacia podalyriifolia G.Don	Fabaceae	-289.958	105
Acacia pycnantha Benth.	Fabaceae	18.638	87
Acacia saligna (Labill.) Wendl.	Fabaceae	21.304	411
Acacia tortilis (Forssk.) Hayne	Fabaceae	-64.849	109
Agave americana L.	Asparagaceae	101.273	537
Agave sisalana Perrine	Asparagaceae	257.200	191
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	857.740	79
Atriplex nummularia Lindl.	Amaranthaceae	-527.908	82
Banksia integrifolia L.f.	Proteaceae	-38.107	54
Caesalpinia decapetala (Roth) Alston	Fabaceae	38.835	491
Caesalpinia gilliesii (Hook.) D.Dietr.	Fabaceae	-76.455	49
Callistemon rigidus R.Br.	Myrtaceae	-138.706	34
Casuarina cunninghamiana Miq.	Casuarinaceae	322.987	33
Cereus jamacaru DC.	Cactaceae	41.833	208
Cestrum laevigatum Schltdl.	Solanaceae	68.085	125
Colophospermum mopane (Benth.) Leonard	Fabaceae	-43.970	59

Cotoneaster pannosus Franch.	Rosaceae	39.763	622
Crotalaria agatiflora Schweinf.	Fabaceae	-212.764	39
Cupressus arizonica Greene	Cupressaceae	101.101	55
Duranta erecta L.	Verbenaceae	53.238	41
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	394.693	106
Eucalyptus camaldulensis Dehnh.	Myrtaceae	-132.470	208
Eucalyptus cladocalyx F.Muell.	Myrtaceae	-133.150	63
Eucalyptus diversicolor F.Muell.	Myrtaceae	54.466	53
Eucalyptus globulus Labill.	Myrtaceae	-1355.388	45
Eucalyptus grandis W.Hill	Myrtaceae	-74.728	157
Gleditsia triacanthos L.	Fabaceae	101.105	262
Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	-145.267	162
Grewia flava DC.	Malvaceae	-186.369	824
Hakea gibbosa Cav.	Proteaceae	27.874	90
Hakea saligna (Andrews) Knight	Proteaceae	-580.664	60
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	7.665	607
Harrisia martinii (Labour.) Britton	Cactaceae	71.961	33
Jacaranda mimosifolia D.Don	Bignoniaceae	82.598	485

Jasminum humile L.	Oleaceae	-4.962	56
Lantana camara L.	Verbenaceae	42.596	729
Leptospermum laevigatum (Gaertn.) F.Muell.	Myrtaceae	-113.044	41
Leucaena leucocephala (Lam.) de Wit	Fabaceae	12.306	85
Ligustrum lucidum W.T.Aiton	Oleaceae	457.067	31
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	-279.255	67
Mangifera indica L.	Anacardiaceae	-3.651	33
Manihot esculenta Crantz	Euphorbiaceae	55.498	34
Melia azedarach L.	Meliaceae	69.916	3062
Montanoa hibiscifolia (Benth.) Standl.	Asteraceae	-100.974	37
Morus alba L.	Moraceae	-257.656	593
Nerium oleander L.	Apocynaceae	97.754	53
Nicotiana glauca Graham	Solanaceae	-326.002	1026
Opuntia aurantiaca Lindl.	Cactaceae	137.405	157
Opuntia engelmannii Salm-Dyck	Cactaceae	-216.422	71
Opuntia ficus-indica (L.) Mill.	Cactaceae	88.450	3592
Opuntia humifusa (Raf.) Raf.	Cactaceae	-109.929	111
Opuntia microdasys (Lehm.) Pfeiff.	Cactaceae	-366.225	38
Opuntia monacantha Haw.	Cactaceae	-40.517	138

Opuntia robusta J.C. Wendl.	Cactaceae	-107.333	654
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	-28.718	507
Parkinsonia aculeata L.	Fabaceae	-420.619	37
Phaeoptilum spinosum Radlk.	Nyctaginaceae	151.885	275
Phytolacca dioica L.	Phytolaccaceae	316.612	114
Pinus elliottii Engelm.	Pinaceae	-6.260	54
Pinus halepensis Mill.	Pinaceae	78.949	230
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	91.652	349
Pinus pinaster Aiton	Pinaceae	18.762	504
Pinus pinea L.	Pinaceae	60.760	33
Pinus radiata D.Don	Pinaceae	44.466	239
Pinus roxburghii Sarg.	Pinaceae	398.295	54
Pittosporum undulatum Vent.	Pittosporaceae	-158.657	53
Populus xcanescens (Aiton) Sm.	Salicaceae	11.868	188
Populus alba L.	Salicaceae	762.578	51
Populus deltoides W. Bartram ex Marshall	Salicaceae	-378.556	263
Populus nigra L.	Salicaceae	-63.680	216
Prosopis glandulosa Torr.	Fabaceae	960.765	36

Prosopis velutina Wooton	Fabaceae	-702.725	66
Protea longifolia Andrews	Proteaceae	1.949	1698
Protea subvestita N.E. Br.	Proteaceae	99.661	447
Prunus armeniaca L.	Rosaceae	213.093	77
Prunus persica (L.) Stokes	Rosaceae	-106.672	428
Psidium guajava L.	Myrtaceae	72.112	1120
Punica granatum L.	Lythraceae	-949.560	35
Pyracantha angustifolia (Franch.) C.K. Schneid.	Rosaceae	89.319	607
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	112.415	102
Quercus robur L.	Fagaceae	2014.249	122
Rhigozum trichotomum Burch.	Bignoniaceae	-113.460	683
Ricinus communis L.	Euphorbiaceae	12.011	1871
Robinia pseudoacacia L.	Fabaceae	-192.547	448
Rosa rubiginosa L.	Rosaceae	5.157	122
Rubus cuneifolius Pursh	Rosaceae	-63.740	531
Rubus fruticosus L. agg.	Rosaceae	-91.635	202
Salix babylonica L.	Salicaceae	207.320	1068
Salix fragilis L.	Salicaceae	-49.501	280
Sambucus canadensis L.	Adoxaceae	-478.855	31

Schinus molle L.	Anacardiaceae	-250.527	508
Schinus terebinthifolia Raddi	Anacardiaceae	31.144	46
Senna bicapsularis (L.) Roxb.	Fabaceae	-41.536	55
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	-136.929	446
Senna occidentalis (L.) Link	Fabaceae	220.657	130
Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	108.942	224
Sesbania bispinosa (Jacq.) W.Wight	Fabaceae	465.823	40
Sesbania punicea (Cav.) Benth.	Fabaceae	-23.252	1139
Solanum chrysotrichum Schltdl.	Solanaceae	-48.422	49
Solanum mauritianum Scop.	Solanaceae	8.576	5336
Solanum sisymbriifolium Lam.	Solanaceae	5.071	352
Spartium junceum L.	Fabaceae	-119.639	53
Styphnolobium japonicum (L.) Schott	Fabaceae	58.266	39
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	-96.694	334
Tephrosia grandiflora (Ait.) Pers.	Fabaceae	-116.946	105
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	-12.284	52
Tipuana tipu (Benth.) Kuntze	Fabaceae	-87.217	1457
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	8.463	137

Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	-182.525	107
Toona ciliata M.Roem.	Meliaceae	-109.227	104
Ulmus parvifolia Jacq.	Ulmaceae	-22.187	53

Appendix 3.4: Future estimated sum of pixel gained or lost for non-native trees and shrubs with greater than or equal to 50 occurrence points. (Negative signs indicate range contraction)

Species	APG III Family	Pixel gained or lost	Number of points used
Acacia ataxacantha DC.	Fabaceae	-260.266	129
Acacia baileyana F.Muell.	Fabaceae	-124.764	136
Acacia caffra (Thunb.) Willd.	Fabaceae	-57.041	325
Acacia cyclops G.Don	Fabaceae	-18.881	434
Acacia dealbata Link	Fabaceae	-77.361	564
Acacia decurrens Willd.	Fabaceae	-262.022	162
Acacia elata Benth.	Fabaceae	-149.030	62
Acacia erubescens Welw. ex Oliver	Fabaceae	-142.038	72
Acacia haematoxylon Willd.	Fabaceae	-24.725	259
Acacia implexa Benth.	Fabaceae	-49.871	74
Acacia karroo Hayne	Fabaceae	-22.167	1416
Acacia longifolia (Andrews) Willd.	Fabaceae	80.642	183
Acacia mearnsii De Wild.	Fabaceae	-105.747	1085
Acacia melanoxylon R.Br.	Fabaceae	-220.482	316
Acacia mellifera (Vahl) Benth.	Fabaceae	-27.013	159

Acacia nigrescens Oliv.	Fabaceae	-10.801	129
Acacia nilotica (L.) Delile	Fabaceae	-77.288	60
Acacia podalyriifolia G.Don	Fabaceae	-289.958	105
Acacia pycnantha Benth.	Fabaceae	18.638	87
Acacia saligna (Labill.) Wendl.	Fabaceae	21.304	411
Acacia tortilis (Forssk.) Hayne	Fabaceae	-64.849	109
Agave americana L.	Asparagaceae	101.273	537
Agave sisalana Perrine	Asparagaceae	257.200	191
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	857.740	79
Atriplex nummularia Lindl.	Amaranthaceae	-527.908	82
Banksia integrifolia L.f.	Proteaceae	-38.107	54
Caesalpinia decapetala (Roth) Alston	Fabaceae	38.835	491
Cereus jamacaru DC.	Cactaceae	41.833	208
Cestrum laevigatum Schltdl.	Solanaceae	68.085	125
Colophospermum mopane (Benth.) Leonard	Fabaceae	-43.970	59
Cotoneaster pannosus Franch.	Rosaceae	39.763	622
Cupressus arizonica Greene	Cupressaceae	101.101	55
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	394.693	106
Eucalyptus camaldulensis Dehnh.	Myrtaceae	-132.470	208

Eucalyptus cladocalyx F.Muell.	Myrtaceae	-133.150	63
Eucalyptus diversicolor F.Muell.	Myrtaceae	54.466	53
Eucalyptus grandis W.Hill	Myrtaceae	-74.728	157
Gleditsia triacanthos L.	Fabaceae	101.105	262
Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	-145.267	162
Grewia flava DC.	Malvaceae	-186.369	824
Hakea gibbosa Cav.	Proteaceae	27.874	90
Hakea saligna (Andrews) Knight	Proteaceae	-580.664	60
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	7.665	607
Jacaranda mimosifolia D.Don	Bignoniaceae	82.598	485
Jasminum humile L.	Oleaceae	-4.962	56
Lantana camara L.	Verbenaceae	42.596	729
Leucaena leucocephala (Lam.) de Wit	Fabaceae	12.306	85
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	-279.255	67
Melia azedarach L.	Meliaceae	69.916	3062
Morus alba L.	Moraceae	-257.656	593
Nerium oleander L.	Apocynaceae	97.754	53
Nicotiana glauca Graham	Solanaceae	-326.002	1026

Opuntia aurantiaca Lindl.	Cactaceae	137.405	157
Opuntia engelmannii Salm-Dyck	Cactaceae	-216.422	71
Opuntia ficus-indica (L.) Mill.	Cactaceae	88.450	3592
Opuntia humifusa (Raf.) Raf.	Cactaceae	-109.929	111
Opuntia monacantha Haw.	Cactaceae	-40.517	138
Opuntia robusta J.C. Wendl.	Cactaceae	-107.333	654
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	-28.718	507
Phaeoptilum spinosum Radlk.	Nyctaginaceae	151.885	275
Phytolacca dioica L.	Phytolaccaceae	316.612	114
Pinus elliottii Engelm.	Pinaceae	-6.260	54
Pinus halepensis Mill.	Pinaceae	78.949	230
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	91.652	349
Pinus pinaster Aiton	Pinaceae	18.762	504
Pinus radiata D.Don	Pinaceae	44.466	239
Pinus roxburghii Sarg.	Pinaceae	398.295	54
Pittosporum undulatum Vent.	Pittosporaceae	-158.657	53
Populus xcanescens (Aiton) Sm.	Salicaceae	11.868	188
Populus alba L.	Salicaceae	762.578	51
Populus deltoides W. Bartram ex Marshall	Salicaceae	-378.556	263

Populus nigra L.	Salicaceae	-63.680	216
Prosopis velutina Wooton	Fabaceae	-702.725	66
Protea longifolia Andrews	Proteaceae	1.949	1698
Protea subvestita N.E. Br.	Proteaceae	99.661	447
Prunus armeniaca L.	Rosaceae	213.093	77
Prunus persica (L.) Stokes	Rosaceae	-106.672	428
Psidium guajava L.	Myrtaceae	72.112	1120
Pyracantha angustifolia (Franch.) C.K. Schneid.	Rosaceae	89.319	607
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	112.415	102
Quercus robur L.	Fagaceae	2014.249	122
Rhigozum trichotomum Burch.	Bignoniaceae	-113.460	683
Ricinus communis L.	Euphorbiaceae	12.011	1871
Robinia pseudoacacia L.	Fabaceae	-192.547	448
Rosa rubiginosa L.	Rosaceae	5.157	122
Rubus cuneifolius Pursh	Rosaceae	-63.740	531
Rubus fruticosus L. agg.	Rosaceae	-91.635	202
Salix babylonica L.	Salicaceae	207.320	1068
Salix fragilis L.	Salicaceae	-49.501	280

Schinus molle L.	Anacardiaceae	-250.527	508
Senna bicapsularis (L.) Roxb.	Fabaceae	-41.536	55
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	-136.929	446
Senna occidentalis (L.) Link	Fabaceae	220.657	130
Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	108.942	224
Sesbania punicea (Cav.) Benth.	Fabaceae	-23.252	1139
Solanum mauritianum Scop.	Solanaceae	8.576	5336
Solanum sisymbriifolium Lam.	Solanaceae	5.071	352
Spartium junceum L.	Fabaceae	-119.639	53
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	-96.694	334
Tephrosia grandiflora (Ait.) Pers.	Fabaceae	-116.946	105
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	-12.284	52
Tipuana tipu (Benth.) Kuntze	Fabaceae	-87.217	1457
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	8.463	137
Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	-182.525	107
Toona ciliata M.Roem.	Meliaceae	-109.227	104
Ulmus parvifolia Jacq.	Ulmaceae	-22.187	53

Appendix 3.5: Earliest dates of introduction for 178 non-native trees and shrubs in South Africa.

Species	APG III Family	Earliest Date of Introduction	References
Acacia ataxacantha DC.	Fabaceae	NA	
Acacia baileyana F.Muell.	Fabaceae	1919	Sim. 1919
Acacia caffra (Thunb.) Willd.	Fabaceae	NA	
Acacia cyclops G.Don	Fabaceae	1835	Stirton. 1978
Acacia dealbata Link	Fabaceae	1858	McGibbon. 1858
Acacia decurrens Willd.	Fabaceae	1880-1890	Van den Berg. 1977
Acacia elata Benth.	Fabaceae	1937	Pretoria National Herbarium
Acacia erubescens Welw. ex Oliver	Fabaceae	NA	
Acacia haematoxylon Willd.	Fabaceae	NA	
Acacia hebeclada DC.	Fabaceae	NA	
Acacia implexa Benth.	Fabaceae	1850	Pretoria National Herbarium
Acacia karroo Hayne	Fabaceae	NA	
Acacia longifolia (Andrews) Willd.	Fabaceae	1827	Stirton. 1978
Acacia mearnsii De Wild.	Fabaceae	1858	McGibbon. 1858
Acacia melanoxylon R.Br.	Fabaceae	1848	Stirton. 1978
Acacia mellifera (Vahl) Benth.	Fabaceae	NA	
Acacia nigrescens Oliv.	Fabaceae	NA	
Acacia nilotica (L.) Delile	Fabaceae	NA	
Acacia podalyriifolia G.Don	Fabaceae	1942	Pretoria National Herbarium
Acacia pycnantha Benth.	Fabaceae	1892	Stirton. 1978
Acacia saligna (Labill.) Wendl.	Fabaceae	1833	Stirton. 1978
Acacia tortilis (Forssk.) Hayne	Fabaceae	NA	
Acer buergerianum Miq.	Sapindaceae	NA	

Acer negundo L.	Sapindaceae	NA	
Agave americana L.	Asparagaceae	1858	McGibbon. 1858
Agave sisalana Perrine	Asparagaceae	1929	Smith. 1929
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	1834	Zimmermann &Van de Venter. 1981
Albizia lebbeck (L.) Benth.	Fabaceae	1905	Sim. 1905
Alhagi maurorum Medik.	Fabaceae	1922	Pretoria National Herbarium
Alnus glutinosa (L.) Gaertn.	Betulaceae	NA	
Ardisia crenata Sims	Primulaceae	1955	Pretoria National Herbarium
Atriplex nummularia Lindl.	Amaranthaceae	1887	Pretoria National Herbarium literature
Banksia ericifolia L.f.	Proteaceae	NA	
Banksia integrifolia L.f.	Proteaceae	NA	
Bauhinia variegata L.	Fabaceae	1891	Pretoria National Herbarium
Caesalpinia decapetala (Roth) Alston	Fabaceae	1858	McGibbon. 1858
Caesalpinia gilliesii (Hook.) D.Dietr.	Fabaceae	NA	
Callistemon rigidus R.Br.	Myrtaceae	NA	
Callistemon viminalis (Sol. ex Gaertn.) G.Don ex Loudon	Myrtaceae	NA	
Casuarina cunninghamiana Miq.	Casuarinaceae	1903	Pretoria National Herbarium
Casuarina equisetifolia L.	Casuarinaceae	1858	McGibbon. 1858
Cereus jamacaru DC.	Cactaceae	1925	Pretoria National Herbarium
Cestrum aurantiacum Lindl.	Solanaceae	1850-1900	Wells et al.. 1986
Cestrum laevigatum Schltdl.	Solanaceae	1892	Pretoria National Herbarium
Cestrum parqui L´Hér.	Solanaceae	1927	Pretoria National Herbarium
Cinnamomum camphora (L.) J.Presl	Lauraceae	1846	Pretoria National Herbarium
Citrus limon (L.) Burm. f.	Rutaceae	NA	
Colophospermum mopane (Benth.) Leonard	Fabaceae	NA	
Cotoneaster franchetii Bois	Rosaceae	1937	Pretoria National Herbarium

Cotoneaster pannosus Franch.	Rosaceae	1931	Pretoria National Herbarium
Crotalaria agatiflora Schweinf.	Fabaceae	NA	
Cupressus arizonica Greene	CuPretoria National Herbariumssaceae	NA	
Cytisus scoparius (L.) Link	Fabaceae	1858	McGibbon. 1858
Duranta erecta L.	Verbenaceae	NA	
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	Cactaceae	1940	Pretoria National Herbarium
Eriobotrya japonica (Thunb.) Lindl.	Rosaceae	1858	McGibbon. 1858
Eucalyptus camaldulensis Dehnh.	Myrtaceae	1896	Poynton. 1959
Eucalyptus cinerea F. Muell. ex Benth.	Myrtaceae	NA	
Eucalyptus cladocalyx F.Muell.	Myrtaceae	1883	Poynton. 1959
Eucalyptus diversicolor F.Muell.	Myrtaceae	1881	Poynton. 1959
Eucalyptus globulus Labill.	Myrtaceae	NA	
Eucalyptus gomphocephala DC.	Myrtaceae	NA	
Eucalyptus grandis W.Hill	Myrtaceae	1885	Poynton. 1959
Eucalyptus sideroxylon A.Cunn. ex Woolls	Myrtaceae	NA	
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	NA	
Ficus carica L.	Moraceae	NA	
Fraxinus americana L.	Oleaceae	NA	
Gleditsia triacanthos L.	Fabaceae	1831	Bradlow. 1965
Grevillea banksii R.Br.	Proteaceae	NA	
Grevillea robusta A.Cunn. ex R.Br.	Proteaceae	1858	McGibbon. 1858
Grewia flava DC.	Malvaceae	NA	
Hakea gibbosa Cav.	Proteaceae	1835	Shaughnessy. 1986
Hakea salicifolia (Vent.) B.L.Burtt	Proteaceae	1858	McGibbon. 1858
Hakea saligna (Andrews) Knight	Proteaceae	NA	
Hakea sericea Schrad. & J.C.Wendl.	Proteaceae	1858	Shaughnessy. 1986

Harrisia martinii (Labour.) Britton	Cactaceae	1900	De Beer & Zimmermann 1986
Hypericum perforatum L.	Hypericaceae	1942	Henderson et al.. 1987
Ipomoea carnea Jacq.	Convolvulaceae	1953	Pretoria National Herbarium
Jacaranda mimosifolia D.Don	Bignoniaceae	1830	Bradlow. 1965
Jasminum humile L.	Oleaceae	1881	Pretoria National Herbarium
Jatropha curcas L.	Euphorbiaceae	NA	
Jatropha gossypiifolia L.	Euphorbiaceae	NA	
Juniperus virginiana L.	CuPretoria National Herbariumssaceae	1906	Poynton. 1959
Lagerstroemia indica L.	Lythraceae	NA	
Lantana camara L.	Verbenaceae	1858	McGibbon. 1858
Leptospermum laevigatum (Gaertn.) F.Muell.	Myrtaceae	1850	Shaughnessy. 1986
Leucaena leucocephala (Lam.) de Wit	Fabaceae	1850-1900	Wells et al.. 1986
Ligustrum japonicum Thunb.	Oleaceae	1927	Pretoria National Herbarium
Ligustrum lucidum W.T.Aiton	Oleaceae	1858	McGibbon. 1858
Ligustrum sinense Lour.	Oleaceae	1924	Pretoria National Herbarium
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	1902-1903	Sim. 1905
Mangifera indica L.	Anacardiaceae	NA	
Manihot esculenta Crantz	Euphorbiaceae	NA	
Melia azedarach L.	Meliaceae	1800	Smith. 1966
Mimosa pigra L.	Fabaceae	1954	Pretoria National Herbarium
Montanoa hibiscifolia (Benth.) Standl.	Asteraceae	1910	Pretoria National Herbarium
Morus alba L.	Moraceae	1831	Bradlow. 1965
Nerium oleander L.	Apocynaceae	1811	Stirton. 1978
Nicotiana glauca Graham	Solanaceae	1830	Bradlow. 1965
Opuntia aurantiaca Lindl.	Cactaceae	1843	Zimmermann & Van de Venter. 1981
Opuntia engelmannii Salm-Dyck	Cactaceae	1937	Pretoria National Herbarium

Opuntia ficus-indica (L.) Mill.	Cactaceae	1656	Wells et al.. 1986
Opuntia humifusa (Raf.) Raf.	Cactaceae	1930	Pretoria National Herbarium
Opuntia microdasys (Lehm.) Pfeiff.	Cactaceae	NA	
Opuntia monacantha Haw.	Cactaceae	1772	Neser & Annecke. 1973
Opuntia robusta J.C. Wendl.	Cactaceae	NA	
Paraserianthes lophantha (Willd.) I.C.Nielsen	Fabaceae	1833	Stirton. 1978
Parkinsonia aculeata L.	Fabaceae	1858	McGibbon. 1858
Persea americana Mill.	Lauraceae	NA	
Phaeoptilum spinosum Radlk.	Nyctaginaceae	NA	
Phytolacca dioica L.	Phytolaccaceae	1858	McGibbon. 1858
Pinus canariensis C.Sm.	Pinaceae	1884	Poynton. 1959
Pinus elliottii Engelm.	Pinaceae	1919	Poynton. 1959
Pinus halepensis Mill.	Pinaceae	1827	Shaughnessy. 1986
Pinus patula Schiede ex Schltdl. & Cham.	Pinaceae	1907	Poynton. 1959
Pinus pinaster Aiton	Pinaceae	1685-1693	Shaughnessy. 1986
Pinus pinea L.	Pinaceae	1685-1693	Shaughnessy. 1986
Pinus radiata D.Don	Pinaceae	1858	McGibbon. 1858
Pinus roxburghii Sarg.	Pinaceae	1858	McGibbon. 1858
Pinus taeda L.	Pinaceae	1899	Poynton. 1959
Pittosporum undulatum Vent.	Pittosporaceae	NA	
Populus xcanescens (Aiton) Sm.	Salicaceae	1875	Hubbard. 1926
Populus alba L.	Salicaceae	1858	McGibbon. 1858
Populus deltoides W. Bartram ex Marshall	Salicaceae	1878	Poynton. 1959
Populus nigra L.	Salicaceae	1858	McGibbon. 1858
Prosopis chilensis (Molina) Stuntz	Fabaceae	NA	
Prosopis glandulosa Torr.	Fabaceae	1900	Stirton. 1978

Prosopis velutina Wooton	Fabaceae	1914	Pretoria National Herbarium
Protea longifolia Andrews	Proteaceae	NA	
Protea subvestita N.E. Br.	Proteaceae	NA	
Prunus armeniaca L.	Rosaceae	NA	
Prunus persica (L.) Stokes	Rosaceae	NA	
Prunus serotina Ehrh.	Rosaceae	NA	
Psidium guajava L.	Myrtaceae	1948	Wells et al.. 1986
Punica granatum L.	Lythraceae	NA	
Pyracantha angustifolia (Franch.) C.K. Schneid.	Rosaceae	1919	Pretoria National Herbarium
Pyracantha coccinea M. Roem.	Rosaceae	NA	
Pyracantha crenulata (D. Don) M. Roem.	Rosaceae	1918	Pretoria National Herbarium
Quercus robur L.	Fagaceae	1656	Geldenhuys et al.. 1986
Rhigozum trichotomum Burch.	Bignoniaceae	NA	
Ricinus communis L.	Euphorbiaceae	NA	
Robinia pseudoacacia L.	Fabaceae	1858	McGibbon. 1858
Rosa rubiginosa L.	Rosaceae	1937	Pretoria National Herbarium
Rubus cuneifolius Pursh	Rosaceae	1898	Phillips et al.. 1939
Rubus fruticosus L. agg.	Rosaceae	1858	McGibbon. 1858
Rubus rosifolius Sm.	Rosaceae	NA	
Salix babylonica L.	Salicaceae	1679-1699	Smith. 1966
Salix fragilis L.	Salicaceae	1914	Pretoria National Herbarium
Sambucus canadensis L.	Adoxaceae	NA	
Schinus molle L.	Anacardiaceae	1883	Pretoria National Herbarium
Schinus terebinthifolia Raddi	Anacardiaceae	1926	Pretoria National Herbarium
Senna bicapsularis (L.) Roxb.	Fabaceae	1858	McGibbon. 1858
Senna corymbosa (Lam.) H.S.Irwin & Barneby	Fabaceae	1858	McGibbon. 1858
Senna didymobotrya (Fresen.) H.S.Irwin & Barneby	Fabaceae	1909	Pretoria National Herbarium

Senna multiglandulosa (Jacq.) H.S.Irwin & Barneby	Fabaceae	1898	Pretoria National Herbarium
Senna occidentalis (L.) Link	Fabaceae	1858	McGibbon. 1858
Senna septemtrionalis (Viv.) H.S.Irwin & Barneby	Fabaceae	1909	Pretoria National Herbarium
Sesbania bispinosa (Jacq.) W.Wight	Fabaceae	NA	
Sesbania punicea (Cav.) Benth.	Fabaceae	1858	McGibbon. 1858
Solanum chrysotrichum Schltdl.	Solanaceae	NA	
Solanum mauritianum Scop.	Solanaceae	1862	Pretoria National Herbarium
Solanum sisymbriifolium Lam.	Solanaceae	1906	Pretoria National Herbarium
Spartium junceum L.	Fabaceae	1858	McGibbon. 1858
Spathodea campanulata P.Beauv.	Bignoniaceae	NA	
Styphnolobium japonicum (L.) Schott	Fabaceae	NA	
Syncarpia glomulifera (Sm.) Nied.	Myrtaceae	NA	
Syzygium cumini (L.) Skeels	Myrtaceae	1917	Pretoria National Herbarium
Tamarix ramosissima Ledeb.	Tamaricaceae	1923	Pretoria National Herbarium
Tecoma stans (L.) Juss. ex Kunth	Bignoniaceae	1858	McGibbon. 1858
Tephrosia grandiflora (Ait.) Pers.	Fabaceae	NA	
Thevetia peruviana (Pers.) K.Schum.	Apocynaceae	1858	McGibbon. 1858
Tipuana tipu (Benth.) Kuntze	Fabaceae	1916	Pretoria National Herbarium
Tithonia diversifolia (Hemsl.) A.Gray	Asteraceae	1900	Pretoria National Herbarium
Tithonia rotundifolia (Mill.) S.F.Blake	Asteraceae	1900	Pretoria National Herbarium
Toona ciliata M.Roem.	Meliaceae	1902	Pretoria National Herbarium
Ulex europaeus L.	Fabaceae	1858	McGibbon. 1858
Ulmus parvifolia Jacq.	Ulmaceae	NA	
Wigandia urens (Ruiz & Pav.) Kunth	Boraginaceae	NA	

Appendix 3.6: Correlations of changes in predicted richness against changes in each environmental predictor variables (*** highly significant).

Year	Bioclimatic variables	Corellation coefficient	r^2	P value	Year	Bioclimatic variables	Corellation coefficient	r^2	P value
Post_1900	Bio_1	-0.211	0.044	<2e-16 ***	Pre_1900	Bio_1	-0.081	0.006	84<2e-16 ***
Post_1900	Bio_2	-0.353	0.125	<2e-16 ***	Pre_1900	Bio_2	-0.121	0.014	85<2e-16 ***
Post_1900	Bio_3	-0.098	0.011	<2e-16 ***	Pre_1900	Bio_3	0.023	0.005	86<2e-16 ***
Post_1900	Bio_4	-0.234	0.055	<2e-16 ***	Pre_1900	Bio_4	-0.129	0.016	87<2e-16 ***
Post_1900	Bio_5	-0.150	0.023	<2e-16 ***	Pre_1900	Bio_5	-0.085	0.007	88<2e-16 ***
Post_1900	Bio_6	0.188	0.035	<2e-16 ***	Pre_1900	Bio_6	0.065	0.004	89<2e-16 ***
Post_1900	Bio_7	-0.316	0.099	<2e-16 ***	Pre_1900	Bio_7	-0.149	0.022	90<2e-16 ***
Post_1900	Bio_8	-0.388	0.150	<2e-16 ***	Pre_1900	Bio_8	-0.091	0.008	91<2e-16 ***
Post_1900	Bio_9	-0.134	0.018	<2e-16 ***	Pre_1900	Bio_9	-0.069	0.005	92<2e-16 ***
Post_1900	Bio_10	-0.245	0.060	<2e-16 ***	Pre_1900	Bio_10	-0.119	0.014	93<2e-16 ***
Post_1900	Bio_11	-0.145	0.021	<2e-16 ***	Pre_1900	Bio_11	-0.053	0.003	94<2e-16 ***
Post_1900	Bio_12	0.302	0.125	<2e-16 ***	Pre_1900	Bio_12	0.138	0.015	95<2e-16 ***
Post_1900	Bio_13	0.374	0.139	<2e-16 ***	Pre_1900	Bio_13	0.090	0.008	96<2e-16 ***
Post_1900	Bio_14	0.009	6.56E-05	<2e-16 ***	Pre_1900	Bio_14	-0.079	0.006	97<2e-16 ***
Post_1900	Bio_15	-0.108	0.012	<2e-16 ***	Pre_1900	Bio_15	-0.067	0.005	98<2e-16 ***
Post_1900	Bio_16	0.368	0.135	<2e-16 ***	Pre_1900	Bio_16	0.105	0.011	99<2e-16 ***
Post_1900	Bio_17	0.050	0.002	<2e-16 ***	Pre_1900	Bio_17	-0.069	0.005	100<2e-16 ***
Post_1900	Bio_18	0.054	0.003	<2e-16 ***	Pre_1900	Bio_18	0.042	0.001	101<2e-16 ***
Post_1900	Bio_19	-0.013	0.000	0.005	Pre_1900	Bio_19	-0.035	0.001	102<2e-16 ***