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Sacred hills of Imerina and the voyage of *Ficus lutea* Vahl (*Amontana*) in Madagascar

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ABSTRACT

Humans have favored the presence of *Ficus* species within anthropogenic landscapes and near human settlements throughout the planet due to a number of beliefs and for practical purposes. An intimate or mutualistic relationship between *Ficus* spp and human societies has been suggested but explanations about the motivations of these proximities between humans and *Ficus* remain very fragmentary. The case study presented in this paper, which was conducted in the sacred hills located in the surroundings of an urban area, Antananarivo, capital city of Madagascar, inhabited by the Merina, aims at finding some answers to the following two questions. To what extent are *Ficus* species integrated into the ecologies of human groups, understood here as interactions between humans (social, political and economic dimensions)? 2) Do humans introduce *Ficus* species into new habitats, potentially offering new ecological opportunities? This study builds on initial work conducted in Madagascar in the region of Fianarantsoa in Betsileo rural communities. Results shown in this paper suggest that: 1) the kings of Imerina, the region located in the north-eastern part of the High Plateau of Madagascar, have planted *Ficus* species abundantly, especially *Ficus lutea* Vahl and *Ficus. polita* Vahl, to claim ownership upon new territories of the Imerina and symbolically establish their political hegemony. Marriages with women from non-Merina cultural groups, such as the Sakalava inhabiting the Western Coast, and the use of *Ficus* species as symbols of power has contributed, with other activities, to the unification process of Madagascar; 2) The ecological distribution of *F. lutea* has been substantially manipulated by people from Imerina by planting this species quite abundantly in the sacred hills surrounding Antananarivo, an area where this species is at its ecological limit of distribution and also in faraway places such as the Western coast where the tree is not naturally distributed.

1. Introduction

The multiple interactions of *Ficus* species with human societies is related to their peculiar biological characteristics and how people perceive the latter in relation to human habits and worldviews. *Ficus* species show a wide variety of growth forms, from huge banyan trees to epiphytes perched in trees in the rainforest or prostrate creepers that crawl on the ground. *Ficus* are widespread all over the tropics and subtropics where they occupy a greater diversity of ecological niches than probably any other woody-plant genus in the world. They play important ecological roles in forests and savannahs and are well known as keystone species for fruit-consuming animals of the rain forests (Shanahan et al., 2001). For many human communities, they are mainly known for the strangling habit of some hemi-epiphytic figs. This growth behavior has since ancient times nourished human beliefs and

imagination. Strangling *Ficus* are often considered to be the home of spirits, gods, devils or symbolic representations of humans that have transformed into trees. For example, Grenand (1982) recorded among the Wayampi of French Guyana, a legend of two lovers transformed into a strangling *Ficus*. Large fig trees are also used in many villages as shelters and play central roles in village life, serving as places for social encounters, political meetings and important ritual ceremonies. Due to their versatility in life form, longevity and ecological strategies, figs can colonize and establish in many different ecological niches. They are thus collectively a major constituent of many tropical and subtropical ecosystems. Wherever humans live in the tropics and subtropics, they encounter figs and interact with them in diverse ways.

Ficus are also well known for their pollination mutualism involving enclosed inflorescences that are entered by tiny species-specific pollinating wasps. This is one of the reasons why *Ficus* have intrigued local

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human communities. Because fig flowers are enclosed within urn-shaped inflorescences and are not visible, figs are believed to be fruits that do not originate from flowers. For example, in Mandarin the fig is called ‘wú huā guǒ’ (無花果) “fruit without flower” (Harrison and Shanahan, 2005). Several studies point at the importance of *Ficus* as having a central role in human founding myths. They are in that respect much more than a non-human, but rather almost a member of hybrid communities assembling humans and non-humans and have participated, due to their prior presence on the land, to the establishment of human communities (Wilson and Wilson, 2013; Kennedy, 2012; Aumeeruddy-Thomas 1994, 2018).

Our work in Madagascar, initiated in the Region of Fianarantsoa constitutes a first case study with a thorough analysis of the importance of the different *Ficus* species for the Betsileo people, one of the social groups inhabiting the High Plateau of Madagascar (Rafidison, 2013; Rafidison et al., 2016). These studies point at the importance of nine *Ficus* species that are preserved as isolated trees within agricultural landscapes and are involved in a diversity of practical and symbolic uses. Among these species, *F. lutea* Vahl is systematically referred to locally as a species of the noble families and of the kings (*Hova*) of the Betsileo (Rafidison, 2013). While *F. lutea* is essentially absent in the nearby forests (western, dry side of the forest that borders the High Plateau to the East), it becomes more abundant in the agricultural lands located on the High Plateau, where it is planted, and near cliffs where it germinates. The trees are also planted or germinate naturally near the tombs of ancient *Hova* families. Local discourse, as analyzed by Rafidison (2013) and Rafidison et al. (2016), suggest that they may have been introduced into the area by the Merina while annexing the Betsileo during the 18th and 19th century, using the tree as a symbol to signify the allegiance of local noble Betsileo representatives (*Hova*). The latter are known to have become intermediaries between Betsileo communities and the central Merina government, especially for collecting taxes and exerting other administrative functions.

Moreover while travelling in Madagascar and given our interest in *Ficus*, people on the road, in small villages, and children systematically chanted a small poem which goes as follows *Isa ny Amontana* (one, *F. lutea*), *Roa ny Avi Avi* (two, *F. polita* Vahl), *Telo fangady* (three *Sida rhombifolia* or *Angady*, the typical Malagasy agrarian tool used in rice fields), etc. This poem is used in all schools in Madagascar for children to learn to count (Razafiarivony, 2006). We presume that it was produced in Madagascar during the Merina Kingdom period as a means of associating these two *Ficus* species to royalty, and that it was dispersed throughout Madagascar during the French colonial period. Indeed, during the 19th century the Kingdom of Madagascar produced a highly developed public school system which was, however, only accessible to Antananarivo noble classes, the *Andriana*. The French colonial authority (1896–1960) steadily expanded the education system in Madagascar into more remote and rural communities while the latter were coming under increased control of the state (https://en.wikipedia.org/wiki/Education_in_Madagascar).

The role attributed to *Ficus* species by the Merina in learning processes for children in Madagascar, led us to start a study at the heart of the Merina territory in Antananarivo and in the surrounding hills known as sacred (*Hasina* or *Masina*) hills and which were inhabited by members of the Royal Merina families. *Hasina* means sacredness associated to ancestors and *Masina* is an adjective meaning who possesses the *Hasina* (Blanchy and Andriamampianina, 2001).

Ficus lutea is assumed to be native to Madagascar but it is also widespread and abundant throughout Africa. To give a measure of its large distribution, the herbarium of the Museum of Natural History in Paris (P), contains specimens from 21 African countries. It belongs to section *Galoglychia* which is almost exclusively restricted to Africa and Indian Ocean islands (Berg and Wiebes, 1992). Furthermore, its two closest relatives, *F. saussureana* DC and *F. chlamydocarpa* Mildbr. & Burret, are restricted to Africa, suggesting that *F. lutea* originated in Africa and colonized Madagascar subsequently (Berg and Wiebes,

1992). *Ficus lutea* is a species of humid forests and gallery forests, but it is often planted outside its natural habitat (Berg and Wiebes, 1992; Compton, 1990; Diop, 2013; Burrows and Burrows, 2003).

The major objective of this contribution is to bring new elements to answer the following two questions:

- 1) To what extent are *Ficus* species integrated into the ecology of human groups, understood here as interactions between humans (involving social, political and economic dimensions)?
- 2) Do humans introduce *Ficus* species into new habitats, potentially offering new ecological opportunities?

2. Material and methods

We made a series of field surveys in Madagascar in 2006, 2007, 2008 and 2009. During these trips we conducted ethnological and ethnobotanical surveys, collected samples of many *Ficus* individuals for the purpose of a large genetic study (results not shown in this paper) as well as samples of ripe fruit odors and fig wasps for chemical ecology analyses. Observation of fig wasps and seedlings on the different sites also helped to document that the species could set seeds naturally.

2.1. Study areas

We surveyed the occurrence of *F. lutea* in many localities in Madagascar. However, the northern part of Madagascar and the southernmost part were not explored. Major surveys focused on the ecological forest corridor that links Ranomafana National Park to Andringitra National park along a mountain ridge that runs, almost uninterrupted, along the Eastern coast of Madagascar. Fig. 1 shows the distribution of *F. lutea* specimens collected by our team in Madagascar, in agrarian landscapes, in the forest corridor mentioned above and in the sacred hills near Antananarivo (Fig. 1). We also visited some places on the Eastern coast including Tamatave (Toamasina) and Andasibe, and on the Western Coast, Tuléar (Toliary) and Majunga (Mahajanga). Names in parentheses refer to Malagasy names that are currently used in Madagascar. Due to the influence in the Indian Ocean of the South-East Trade winds, all areas located on the eastern side of this mountain ridge, from the top to the coast, present high levels of humidity (rainfall range from 1500 to 2400 mm) and the natural vegetation consists of humid tropical forests. The mountain ridge borders to the west the High Plateau of Madagascar that is comparatively drier. Climatic conditions become drier (rainfall is less than 1300 mm) with vegetation characterized as dry tropical savannahs and deciduous tropical forests all the way to the western coast of Madagascar (Moat and Smith, 2007).

Our study sites are a series of hills that were the dwelling places of the ancient kings of Imerina, the region located in the North Eastern part of the High Plateau of Madagascar inhabited by the social group known as Merina (Fig. 2).

2.2. People and history

Madagascar was initially colonized by Austronesian migrations in two phases, first around 2000 B.C. and later between 1500 and 700 B.C. as well as by migrations from East Africa around 1000 B.C., followed by intrusions by Persians and Arabs for trade in the 9th century (Stiles, 1992). Genetic studies of the Malagasy people confirm an admixture of African and Indonesian genetic backgrounds among the people of Madagascar (Hurles et al., 2005). All social groups in Madagascar including the Merina and Betsileo of the High Plateau as well as coastal groups such as the Vezo, present strong Austronesian influences including in the language which is very close to some languages found in Borneo, as well as an admixed culture involving African traits as well as linguistic traits of Swahili and Bantu origin (Hurles et al., 2005).

Madagascar has known a long period (1500–1895) with continuous conflicts and wars between different kingdoms. The kingdom of the

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