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Habitat and conservation status of molinillo (*Magnolia sambuensis*) and laurel arenillo (*Magnolia katiorum*), two endangered species from the lowland, Colombia

Marcela Serna González[1,2] and Ligia Estela Urrego Giraldo[2]

Abstract

The conservation of the Magnoliaceae family is considered a priority worldwide, especially in Colombia, where all of its 36 species are seriously endangered while frustratingly little is known about their ecology. We therefore, assessed some ecological aspects of two lowland forest species: laurel arenillo (*Magnolia katiorum*) and molinillo (*M. sambuensis*). The first is an endemic species of the Urabá region in northwestern Colombia, and the second is distributed from Panama to Colombia along the Chocó Biogeographical region. Both species have a very low tree density and are found in forest stands that are disturbed by the timber exploitation of valuable woody species. The trees of both species had an average height of 26 m and shared similar environmental conditions such as soil (25°C) and air (28°C) temperatures, soil moisture (113%), and slope (25%). A redundancy analysis showed that each *Magnolia* species grows in a different community. Laurel arenillo was not a clear dominant species in a more diverse forest community, and was positively associated to altitude, longitudinal slope, and soil humidity. In contrast, molinillo was positively associated to air temperature and transversal slope and was negatively associated with longitudinal slope. This species was the most dominant in its community, which was less diverse than that of laurel arenillo. The last species should be considered a priority for conservation while the conservation status of molinillo should be further reviewed. Both species displayed large, fragrant, eye-catching flowers throughout most of the year.

Keywords

Magnolia, conservation, endangered species, Darién-Chocó region

Introduction

Magnoliaceae species are distributed along temperate and tropical forests of Southeast and East Asia, North America, The Antilles, and Central and South America, including Colombia, Venezuela, Ecuador, Peru, Bolivia and Brazil (Azuma, García-Franco, Rico-Gray, & Thien, 2001; Velásquez & Serna, 2005). In taxonomic terms, Magnoliaceae is divided into two sub-families: Liriodendroideae and Magnolioideae. The subfamily Magnolioideae is made up of the single genus *Magnolia*, which comprises all of the species found in North, Central and South America (Figlar & Nooteboom, 2004). The distribution patterns of Magnoliaceae in Central and South America suggests that this family prefers habitats with stable environmental conditions and advanced successional stages (Mejía, 1990).

In Colombia 36 *Magnolia* species have been recorded. These species grow between 0 and 2800 m asl and all species are catalogued in some extinction risk category (García, 2007; Samper & García, 2001). Due to their wide geographic distribution across the country, their

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uses among inhabitants, the accurate taxonomy and the resolution of their threat level, the Magnoliaceae group was chosen as a pilot group to implement the National Strategy for Plant Conservation (NSPC) (Samper & García, 2001), in concordance with the Global Conservation status given to the family Magnoliaceae, of which 147 species are listed under some category of extinction risk (Rivers, Beech, Murphy, & Olfield, 2016).

Considering that all *Magnolia* species in Colombia are endangered, and that a phylogenetic diversity index establishes that ancestral species are more relevant for conservation (Vane-Wright, Humphries, & Williams, 1991), the municipality of Mutatá (at tropical lowlands), located in the Urabá region at northwestern Colombia, might be regarded as the highest conservation priority site in the country, due to the presence of two basal species: *Magnolia katiorum* (Lozano) Govaerts (laurel arenillo), and *Magnolia sambuensis* (Pittier) Govaerts (molinillo). While the first species is a critically endangered (CR) species, the second was listed as a near threatened (NT) species. Both species belong to the subsection *Talauma*, which is considered the most primitive group among the Colombian magnolias (Serna, 2005).

According to the targets of the Global Strategy for Plant Conservation (GSPC) (Charrock, Olfield, & Wilson, 2014), these two species should be prioritized for conservation not only due to their threat level, but also to tree scarcity and lack of public awareness of their endangerment status, despite their generalized use as woody species. The first record of laurel arenillo (*M. katiorum*) was made during the 1980s, particularly in Mutatá (Lozano, 1983), and the second was made in 2006 in the same town. However, only one tree was found despite a thorough search (Serna, 2011). In contrast, several records of molinillo (*M. sambuensis*) have been made from the Urabá region (Figure 1).

Based on the GSPC targets (Charrock et al., 2014), our objective was to verify the threat level of both species in the Urabá region, based on their population size, forest disturbance state and potential for reproduction, and use this as the basis for planning the conservation of laurel arenillo and molinillo in the Urabá region. This study addresses i) the habitats and forest communities in which they grow, and ii) the likely threats leading to their conservation status.

Methods

Study area

This study was conducted in the forests surrounding the towns of Chigorodó and Mutatá in the Urabá region at

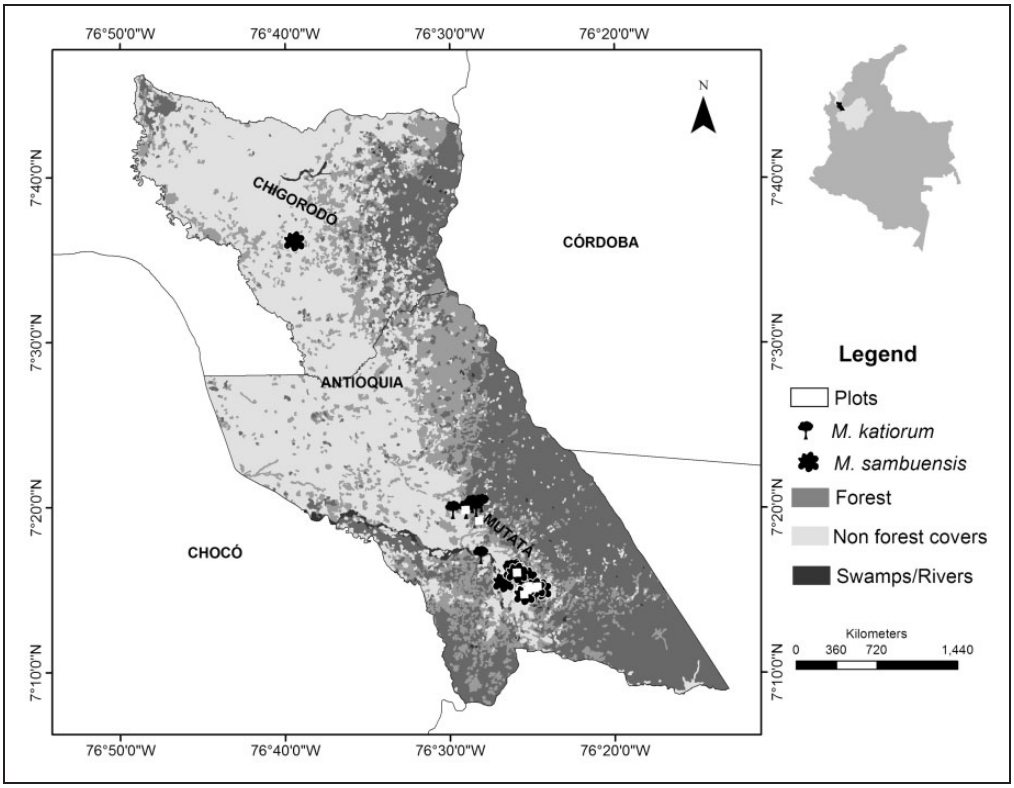

Figure 1. Location of the study area.

north western Colombia (Figure 1). The populations and individuals of both *Magnolia* species were found between 30 and 600 m asl and an average temperature of 28°C in very wet tropical forest, according to the life zone classification system (Holdridge, 1978).

Data collection

Random walks were carried out along the shores of the Mutatá River (7°14′44.4″ N 76°25′30.9″ W) and some of its tributaries, in order to locate trees based on information provided by villagers. Each tree and/or population found was georeferenced and properly marked. Next to each adult tree, the soil moisture and the air and soil temperatures were recorded. In order to compare attributes of the tree species of *Magnolia* (Total height, basal area) and their environmental variables (soil humidity and temperature, air temperature and altitude), One-way ANOVA and Tukey test were performed using R statistical program (R Development Core Team, 2014).

To characterize the forest communities where these species were found, 10 rectangular plots of 50×4 m ($200\,m^2$) were sampled for a total $2000\,m^2$. In each plot, all individuals with a diameter at breast height (DBH) $\geq$2.5 cm were recorded. Total height, DBH, phenological status and floral morphology were recorded for each tree. Botanical samples of individual trees were collected using the standard techniques for exsiccates. The specimens were processed at the HUA herbarium (Universidad de Antioquia, Medellín). The Catalogue of Vascular Plants of Antioquia (Idárraga, Ortiz, Callejas, & Merello, 2011) was used for species identification.

In order to rank the species values within the community, a modified importance value index (IVI) (Finol, 1976) was used based on the sum of its relative abundance and dominance. A redundancy analysis (RDA) was performed to establish the relationship among the flora communities associated with each *Magnolia* species and the measured environmental variables such as air temperature, soil humidity, altitude, transversal and longitudinal slopes. Biotic variables were also included such as species number/plot, IVI_*M. katiorum* and IVI_*M. sambuensis*. These analyses were performed using Canoco v. 4.56 (Ter Braak & Smilauer, 2009).

To understand the ecological processes determining the reproductive success of these species, information related to floral visitors, seed availability and germination was also recorded. Floral visitors were collected in traps located on the crown of three flowering laurel arenillo trees. The flowers were alcohol (30%) embedded to allure visitors. Flower buds and fruits ranging from the immature stage to the mature stage were observed between March 2010 and September 2012.

By conducting interviews with the local people, we gathered ethno-botanical information related to the location of the *Magnolia* trees, as well as their uses, local value and any traditional knowledge related to these species from local people.

Ex situ propagation

Seed germination and the viability of *Magnolia* were assessed based on field observations. Similarly, two experiments on ex-situ seed germination were conducted at the National University of Colombia in Medellín. In the first experiment, 200 seeds of molinillo were moistened with 1% sodium hypochlorite for 15 minutes, before being sown in a previously sterilized 2:1 mixture of soil and sand, and subsequently grown under two contrasting light conditions: full exposure and darkness. The second experiment included 120 seeds of this species that were hydrated for 12 hours and sown in three different substrates: sand, organic soil and a 2:1 mixture of organic soil and sand. Seeds of laurel arenillo were not available at this time.

Results

Distribution and population size of Magnolia species

During field exploration, 24 adult trees of the two *Magnolia* species were recorded: 13 of laurel arenillo and 11 of molinillo. However, only two juveniles of laurel arenillo were found. All the trees were found in small forest relicts immersed in a matrix of grasslands and crops located on wide alluvial plains, along streams or river banks, or in relatively well-preserved forests at foothills. A few isolated trees were found along trails or in grasslands.

The adult trees of both species recorded during field exploration showed an average height of 24 m for laurel arenillo and 29 m for molinillo and average basal area of $0.112\,m^2$/ha and $0.397\,m^2$/ha respectively. However, both species shared similar micro-environmental conditions such as soil (25°C) and air (28°C) average temperatures, soil moisture (113%), and slope (25%). No significant differences were found between the environmental features where these species are growing. However, significant differences between the basal area ($F_{1,22} = 8.51$ and $p \leq 0.0079$) and tree height ($F_{1,22} = 5.22$, $p \leq 0.0322$) were recorded, being higher in the molinillo trees as shown in Figure 2. In addition, these analyses showed that the range of environmental conditions of laurel arenillo is wider.

Floristic composition and environmental variables of the communities

In the 10 sampling plots, 523 trees with a DBH $\geq$ 2.5 belonging to 120 species and 46 plant families were

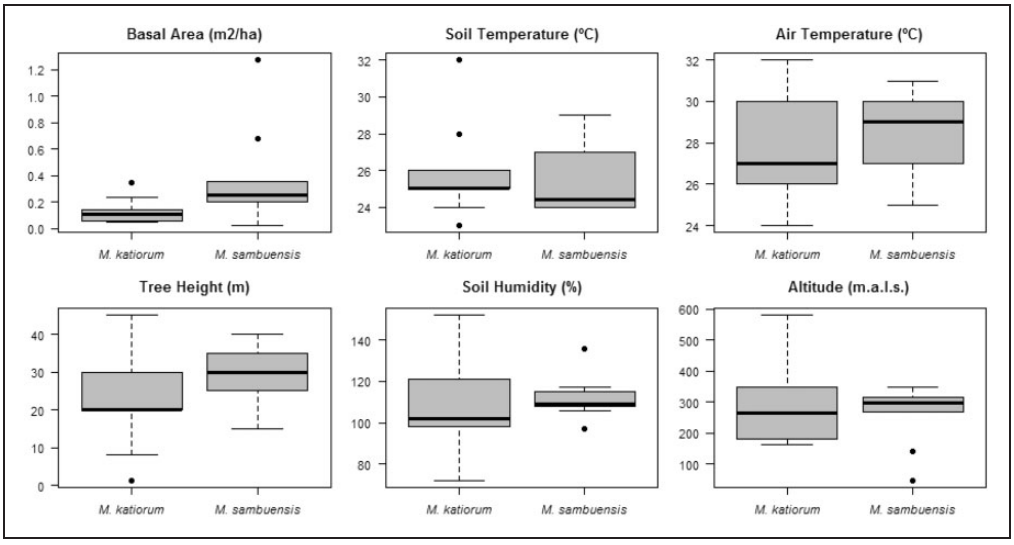

Figure 2. Environmental variables at the sampled sites containing *M. katiorum* (laurel arenillo) and *M. sambuensis* (molinillo) trees. Significant differences between the two *Magnolia* species were indicated for the basal area and tree height. Asterisks indicate outliers.

recorded with an average of 54 trees/plot. Despite the environmental similarity, the RDA analysis showed that each *Magnolia* species grew in a different floristic community. The first two axes of the RDA with self-values of 0.369 and 0.235 explained 60.4% of the data variance. The IVI of laurel arenillo was positively related to altitude, longitudinal slope, soil humidity, and was negatively related to air temperature. On the other hand, molinillo was positively related to air temperature and transversal slope and was negatively related to longitudinal slope (Figure 3, Table 1).

The communities of both species showed contrasting characteristics. While the laurel arenillo was part of a more diverse community, it did not show a clear species dominance. On the other hand, molinillo was the most dominant species in its community which was less diverse (Table 2). However, the molinillo community showed a higher variability since in the RDA two plant communities could be identified as shown in Figure 3.

Laurel arenillo was associated with species such as *Alibertia patinoi, Brosimum guianense*, *Erythroxylum panamense, Guarea glabra, Matisia cordata*, *Miconia trinervia*, *Orphanodendron bernalii*, *Pentaclethra macroloba,* and *Socratea exorrhiza,* among others. This species composition suggests relatively preserved forests. Molinillo, on the other hand, was associated with species such as *Bunchosia macrophylla, Cecropia tessmanii*, *Chrysochlamys dependens*, *Huberodendron patinoi, Hyeronima scabrida*, *Ossaea* sp., *Psychotria acuminate, Pouteria multiflora* and *Tovomita weddeliana*. These species as well as molinillo can be found in open canopy forests, suggesting that are tolerant to forest disturbances.

However, several species were common to both plant communities, such as *Amphirrhox longifolia, Castilla tunu, Cynometra martiana, Dendropanax arboreum, Euterpe oleracea*, *Minquartia guianensis*, *Simira cordifolia, Simaruba amara* and *Unonopsis colombiana*. The forest composition of each community and their IVI values are shown in Appendix 1.

Some insights on reproductive biology and propagation

Based on a nearly two-year period observations, both species displayed large, fragrant, eye-catching flowers throughout most of the year. Molinillo began displaying buds in June and ended the flowering phase in September as ripening fruits began to appear. Ripe fruits and seeds were observed in October. However, in some cases, ripe fruits without dehiscence were found, which resulted in seed putrescence. Pieces of fruits were observed on the forest floor and were occasionally colonized by a fungus of the genus *Xylaria* (Figure 4).

Buds and flowers of laurel arenillo were observed from March through September. For this species, a much smaller fruit production was observed, and seeds could not be collected for propagation, despite having observed the flowers. One fruit was found in March 2010, and a fruit receptacle was observed in January 2012. Only remnants of a single ripe fruit were observed long after its dehiscence in April 2012 (Figure 4).

Regarding flower visitors, bees of the *Halictidae* family were the most obvious. Nocturnal moths of the families *Noctuidae* and *Geometridae* were also collected near the flowers of laurel arenillo and molinillo trees.

Data regarding the anthesis and pollination of both *Magnolia* species remain scarce, despite their importance for understanding the reproductive cycles of both species.

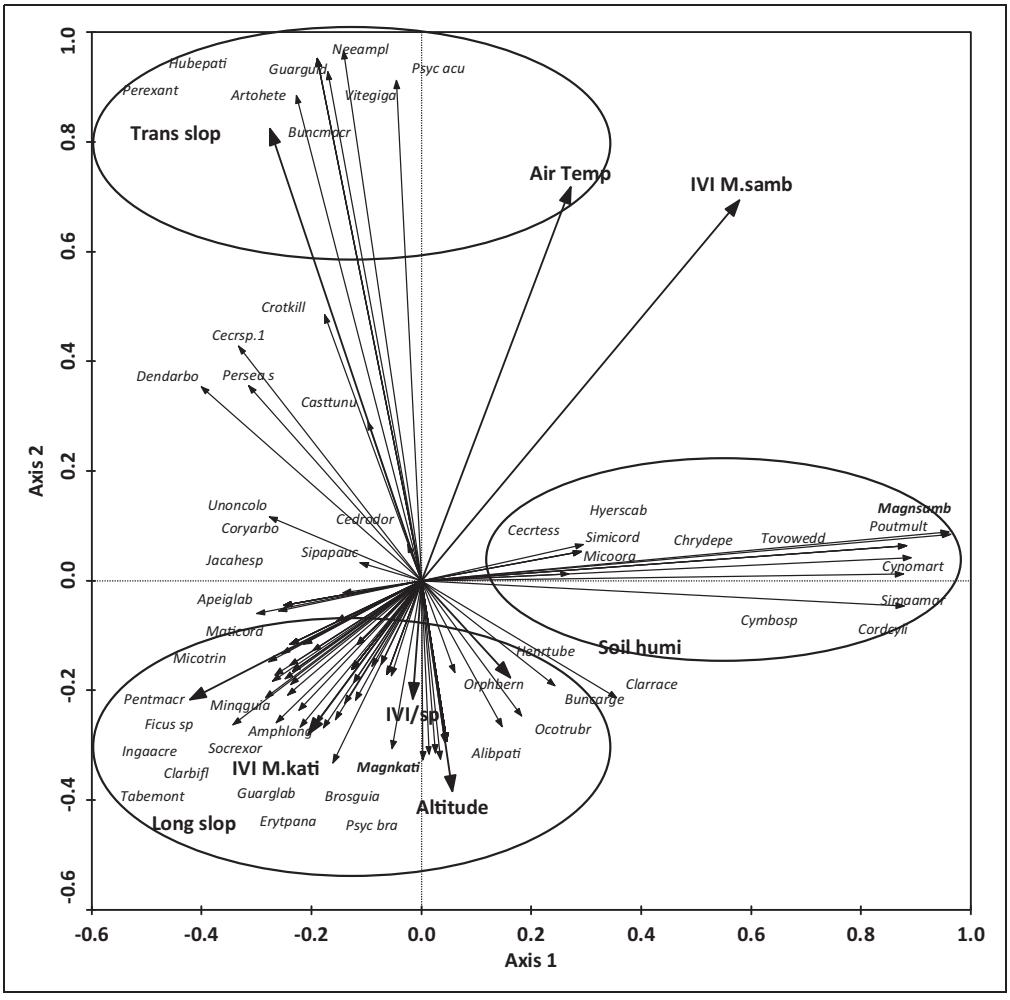

Figure 3. Biplot of the redundancy analysis (RDA) showing the species grouping along the first two axes and the environmental variables related to the species groups.

Table 1. Results of the redundancy analysis.

	Regression/canonical coefficients		Inter-set correlations	
Name	Axis 1	Axis 2	Axis 1	Axis 2
Altitude	**1.163**	**−0.629**	0.055	−0.379
Longitudinal slope	0.039	**0.557**	−0.409	−0.214
Transversal slope	**−0.727**	0.366	−0.267	0.812
IVI/sp	−0.600	0.289	−0.015	−0.212
IVImkati	**−1.126**	0.354	−0.199	−0.275
IVImsamb	0.498	0.446	0.561	0.683
EnvirTem	0.499	**0.629**	0.263	**0.707**
SoilHumi	0.525	0.125	0.157	−0.174

Trees producing flowers and buds year round are very rare, suggesting that the flowers may fall off or are aborted prior to the fruit formation stage. Insects that attack the gynoecium (Figure 4) or immature fruits (Yepes, 2007) could also influence fruit formation. When fruits are formed as in the case of molinillo, they might reach maturity without opening.

Seeds from fruits picked from the ground beneath 25- to 30- m-tall mother trees of molinillo were used in the two germination experiments. In the first experiment with 200 seeds, only three seeds germinated: two at full exposure and the other in the dark. In the second experiment with 120 seeds and three different substrates, 33 seeds germinated as follows: 13 in the sand substrate, 11 in the soil-sand mixture, and nine in the forest soil substrate (Figure 5).

Discussion

Distribution and population size of Magnolia species

Magnolias in the Urabá region are rare and difficult to find, not only due to their characteristic rareness, but also because of forest fragmentation. Similar situations have

Table 2. Features of communities associated to each *Magnolia* species group.

Group	Plot	Average basal area/plot (m^2/ha)	Av. H (m)	No. trees	No. Species	Shannon Index
1	5	1,6614	11,1	35	22	3,82
2	4,7	1,1933	5,7	82	34	3,14
3	1,2,3,6,8,9,10	0,7495	9,9	406	108	4,26

Figure 4. *Magnolia sambuensis* (molinillo): a) flower bud, b) flower bud and gynoecium, c) unripe fruit, d. *Xylaria* sp. on a fruit. *M. katiorum* (laurel arenillo): e) gynoecium, f) female stage, g) male stage, h) flower closed after female stage, i) gynoecium attacked by an unknown insect, j) unripe fruit.

been reported for other Colombian species such as *M. guatapensis, M. jardinensis* and *M. polyhypsophylla* in Andean cloud forests (Gómez, 2011). An additional difficulty for locating trees arose from the common names given to these species by local people. According to herbaria records, the common name "almanegra" actually refers to the species *O. bernalii* (Serna, 2011). According to sawyers in the area, the common name of *M. katiorum* is "guacharaco" or "laurel arenillo"; the latter name is used more often. Interestingly, forestry workers complain that when this species is cut with the chainsaw, it damages (wears out) the chain saw blades. Obviously, this is not well appreciated by the loggers. However, other inhabitants have stated that these species were widespread in the past but are currently rare due to wood overharvesting.

Regarding species composition of the communities, all sampling sites were located in moderately preserved forests except for the highly disturbed plot 6, which was associated with laurel arenillo and was characterized by several pioneer species such as *Urera baccifera*, *Piper*

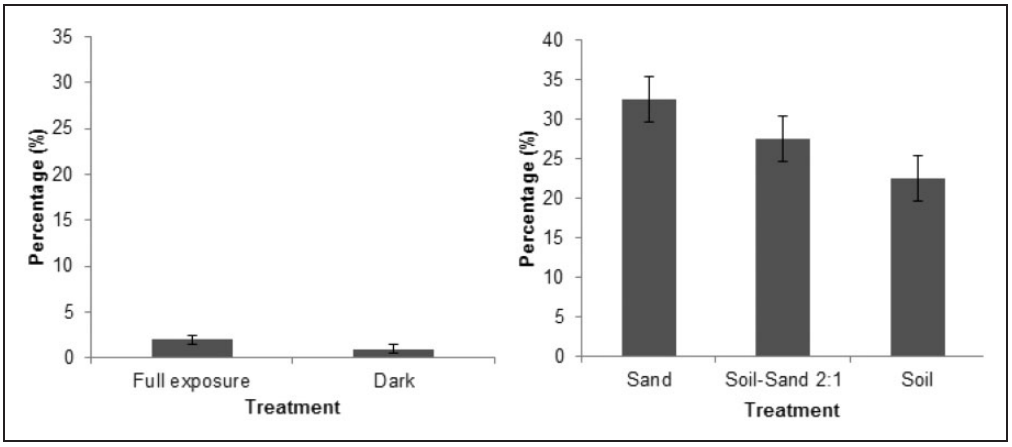

Figure 5. Percentage of seed germination in two experiments. a. Full exposure and dark treatments (n = 200), b. Substrate treatments using seeds soaked for 12 hr (n = 40 per treatment).

auritum and *S. cordifolia*. This suggests that this area had been recently disturbed, as these dominant species belong to the Urticaceae, Rubiaceae and Piperaceae families, respectively (Guariguata & Ostertag, 2002).

Of the 10 most important species, according to the IVI of both communities, at least three belong to *Rubiaceae* family. This is one of the most abundant families in Colombia (Mendoza & Jiménez, 2004) and is common not only in preserved forest ecosystems but also in disturbed areas. In contrast, species such as *C. biflora* (Moraceae), *C. martiana* (Fabaceae), *S. exorrhiza* (Arecaceae) and *M. guianensis* (Olacaceae) are typical of well-preserved forests with low light availability. These differences in species composition might indicate that laurel arenillo inhabits forests that are relatively less disturbed compared to molinillo. However, the floristic composition suggests a high successional process in both forests.

As with several American (Cruz, Vega, & Jiménez, 2008; Dieringer & Espinosa, 1994; Dillon & Sánchez, 2009; Sánchez & Pineda, 2006; Tobe, 2000; Vásquez-García et al., 2013; Weaver, 1997) and Asian (Si, 2000; Xie, Fu, Zeng, Lui, Wen, & Zhong, 2012) magnolias, these two species grow in diverse forests, but are not dominant in them. They also typically exhibit low population densities and are considered rare. However, in some disturbed broad leaf forests in the United States, *M. grandiflora* may be the dominant species (Batista & Platt, 2003; Kwit & Platt, 2003).

Some insights on reproductive biology and propagation

Regarding the pollination process, studies have shown that *Magnolia* flowers are protogynous (Thien, 1974) in order to avoid or minimize self-pollination, such that on day 1 of functional flowering (female stage), the stigmas are receptive for only some hours before and upon the opening of the first flower, while the stamens remain immature. Overnight, the flower closes (i.e., the tepals reflex over gynoecium). On day 2 (male stage), the flower re-opens with ripe stamens that usually detach from the androecium as they dehisce pollen, while the stigmas are no longer receptive. In most *Magnolia* species, female and male stages are separated by c. 24 hours (Dieringer & Espinosa, 1994).

Although it is known that individual flowers of temperate species can last from two to four days, the stigmatic receptivity and the pollen maturity and viability for several *Magnolia* species remain unknown (Dieringer & Espinosa, 1994; Matsuki, Tateno, Shibata, & Isagi, 2008; Thien et al., 1998).

For many *Magnolia* species, bees have been reported to be effective pollinators (Wang, Wang, Liu, Wang, & Shen, 2005). However, in previous studies of magnolias from other countries, most insects were found consuming the flowers rather than pollinating them. Conversely, moths have not been reported to be pollinators but have been reported to be fruit consumers (Yepes, 2007). The role of insects in *Magnolia* pollination in Colombia remains unclear, and knowledge of pollination systems remains limited, especially in tropical America. This limitation may be associated with difficulties of observing pollinators, especially their movements from plant to plant (Thien et al., 1998), due to the difficulty of climbing high trees. Additionally, the existence of a few sparse individuals complicates the observation process as well as the capture of pollinators. Moreover, these species may be self-compatible, as reported for other Magnoliaceae (Thien et al., 1998).

The lack of dehiscence in fruits of molinillo may have been associated with heavy rains and/or long periods of rain that characterized the year 2010 compared to 2011 (METEOMANZ, 2015).

Although we do not know the exact cause of the low germination percentage for seeds of molinillo, we suspect that it is related to the short-term viability that has been recorded for some seeds of *Magnolia* or to improper storage (it took approximately 8 hours to transport the seeds from the field to the lab, under uncontrolled environmental conditions). Nevertheless, the germination percentage of magnolias may vary significantly depending on the species and/or treatment used, as shown in Appendix 2 (Cao et al., 2012; Chalermglin, 2012; Li, Zhou, Chen, & Liu, 2000).

Implications for conservation

Both *Magnolia* species from Urabá region are scarce and must be protected. Indeed, laurel arenillo is critically endangered and should be considered a conservation priority. Despite the fact that molinillo produces large fruits bearing considerable numbers of seeds, individual trees are still uncommon. Thus, seeds of this species should be carefully stored in order to achieve higher germination rates. molinillo should be upgraded to ''vulnerable'' from its current ''near threatened'' category. Another concern about reproduction of both species is the presence of both flower stages (male and female) on the same tree that suggests self-compatibility which could produce inbreeding and thus, production of non-viable seeds. Further exploration of new populations of both *Magnolia* species in the National Natural Park Los Katíos and adjacent areas, would allow a more accurate classification of the threat status of these species.

Although both species were observed to cohabit, laurel arenillo is positively related to altitude. That means, this species may be found at higher elevations compared to molinillo, which may be more abundant at lower elevations. On the other hand, laurel arenillo was found in more diverse forests while molinillo persists in less diverse forests being favored by cleared areas.

People and environmental government representatives (municipality and CORPOURABA) attended the meetings organized by this project in order to familiarize them with the threat risk of both species and what must be done to protect them. Everyone was receptive to these kinds of initiatives. Because of the difficulty in locating individual *Magnolia* trees and populations, it is important to (1) make local inhabitants of this region aware of the need of stop cutting these species, and (2) to inform governmental and scientific authorities of the urgency of data collection in order to design and implement management and conservation programs. Regarding propagation efforts, continuous monitoring of the trees is needed to ensure effective seed collection, as the most appropriate method to propagate these species is through ex-situ propagation from seeds. Once the germplasm has been procured, trials should be implemented in each municipality to develop effective protocols for proper seed processing methods and seedling transportation, thereby reducing the mortality rate. Projects of this type should be developed over the coming 5- to 10-year period.

Despite efforts to collect visiting insects in order to characterize the pollination of these protogynous flowers, none of the insects collected could be linked to pollination, and hence, their role in reproduction of these tropical *Magnolia* species remains in doubt. Advanced studies related to the reproductive biology of *Magnolia* in Colombia are paramount. It is necessary to standardize the collection methods and the timing and depth of sampling since these processes are poorly described for tropical *Magnolia* species.

Appendix

Appendix 1. IVI of the species associated to *M. katiorum* (laurel arenillo) and *M. sambuensis* (molinillo).

	Common name				IVI/Group	
Scientific names	Spanish	Country	English	Sources	*M. katiorum*	*M. sambuensis*
Adelobotrys adscendens (Sw.) Triana	Hoja de solimán, Hoja dulce	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	0,799	
Alibertia bertieriflora K. Schum.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	0,803	

(continued)

Appendix 1. Continued

	Common name				IVI/Group	
Scientific names	Spanish	Country	English	Sources	*M. katiorum*	*M. sambuensis*
Alibertia patinoi (Cuatrec) Delprete & C.H. Perss.	Borojó			www.tropicos.org	4,609	
Alibertia verrucosa Moore	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,652	
Alseis blackiana Hemsl.	Aceituno, Hueso, Palo guitarro	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	0,842	
Alseis yucatanensis Standley	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,696	
Amphirrhox longifolia (A. St.-Hil.) Spreng.	Blanquillo	Bolivia		www.tropicos.org	12,079	4,458
Apeiba glabra Aubl.	Corcho			www.tropicos.org	6,951	3,619
Ardisia standleyana P.H. Allen	Frutita de Paloma			The IUCN Red List of Threatened Species. http://www.iucnredlist.org	0,822	2,574
Artocarpus heterophyllus Lam.	Yaco, Yaca, Árbol del pan	Colombia	Jackfruit, Jak-fruit	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Cyndy Parr, Integrated Taxonomic Information System (ITIS), NCBI Taxonomy, uBio in EOL	2,749	10,542
Aspidosperma sp.	Carreto			www.tropicos.org	0,803	
Asterogyne martiana (H. Wendl.) H. Wendl. ex Hemsl.	Cortadera, Rabihorcao			Henderson, A., Galeano, G. Bernal, R. 1995. Field guide to the Palms of the Americas. Princeton University Press. 352 p.	0,813	
Brosimum guianense (Aubl.) Huber	Azulito, Bordón, Coca, Fruta de pava, Guáimaro, Lechero, Limoncillo, Memecucú, Mestizo, Muí, Oquendo, Palo brasil, Yema de huevo	Colombia	Guiana brosimum, Bastard breadnut	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Integrated Taxonomic	4,51	

(continued)

Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
				Information System (ITIS), uBio in EOL		
Brosimum utile (Kunth) Pittier	Árbol de leche, Árbol vaca, Árbol vaco, Avichure, Caucho, Granadillo, Guáimaro, Lechero, Lechoso, Mare, Marimá, Marimari, Mestizo, Perillo, Sande, Tururí, Vaco, Yumbá	Colombia	Cow tree, cow bread-nut tree	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Integrated Taxonomic Information System (ITIS), uBio in EOL	1,135	
Brownea angustiflora Poco	Flor de mayo			www.tropicos.org	0,955	
Bunchosia argentea (Jacq.) DC.	Ciruela de monte, Ciruelo.	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,696	
Bunchosia macrophylla Rose ex Donn. Sm.	Unkown			Encyclopedia of Life. EOL. http://eol.org/		5,214
Byrsonima hypoleuca Turcz.	Quina	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.e-du.co/nombrescomunes/	2,447	
Calyptranthes speciosa Sagot	Berraquillo, Chontaduro blanco, Poro	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.e-du.co/nombrescomunes/	2,705	
Castilla elastica Sessé	Árbol de caucho, Árbol de caucho negro, Árbol del caucho, Cauchillo, Caucho, Caucho blanco, Caucho de pará, Caucho hembra, Caucho negro, Iparo	Colombia	Panama rubbertree	Integrated Taxonomic Information System (ITIS), uBio; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de	2,08	

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
				Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		
Castilla elastica subsp. costaricana (Liebm.) C.C. Berg	Árbol de caucho, Árbol de caucho negro, Árbol del caucho, Cauchillo, Caucho, Caucho blanco, Caucho de pará, Caucho hembra, Caucho negro, Iparo	Colombia	Panama rubbertree	Integrated Taxonomic Information System (ITIS), uBio; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,649	
Castilla tunu Hemsl.	Castilla, Cauchillo, Cauchillo de rastrojo, Caucho, Caucho negro	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	5,226	8,471
Cecropia sp.1	Yarumo	Colombia		www.tropicos.org	5,084	4,459
Cecropia sp.2	Yarumo	Colombia		www.tropicos.org	1,263	
Cecropia sp.3	Yarumo	Colombia		www.tropicos.org	0,896	
Cecropia tessmannii Mildbr.	Yarumo	Colombia		www.tropicos.org		4,499
Cedrela odorata L.	Cedro, Cedro rosado, Cedro cebollo, Cedro amargo, Bastardo, Cedro bastardo, Cedro blanco, Cedro caoba, Cedro caobo, Cedro cebollín, Cedro cebollino, Cedro clavel, Cedro colorado, Cedro gallo, Cedro hembra, Cedro macho, Cedro oloroso, Cedro rojo, Cedro santo, Poporó	Colombia	Cigar-box wood, Red cedar	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Michael Frankis, IUCN Red List, uBio, IUCN Red List in EOL	0,85	2,563
Chrysochlamys dependens Planch. & Triana	Chagualo, Coloradito, Impamo, Negrito, Rapabarbo, Salcillo, Zanca de araña, Zanco de araña	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		3,041
Cissampelos andromorpha DC.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,899	

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
Clarisia biflora Ruiz & Pav.	Cauchillo, Cauchillo colorao, Cauchillo de loma, Dinde, Dinde mora, Dinde negro, Guayacán, Lecheperra, Lechero blanco, Lechero colorado, Lechero plomo, Lechoso, Mare dinde, Mora, Oquendo, Perillo, Sande, Yambó, Yumbá	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	6,68	2,667
Clarisia racemosa Ruiz & Pav.	Pelacara, Arracacho, Arracacha, Chingongo, Dinde, Guariuba, Guayacán, Juansoco de la sabana, Justarrazón, Mora, Palo amarillo, Pelacar, Sande mora	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,582	
Clathrotropis brachypetala (Tul.) Kleinhoonte	Sapán, Vaino, Aromata	Colombia and others		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/, uBio in EOL	0,98	
Cnemidaria choricarppa (Maxon) R. M. Tryon	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,701	
Cordia cylindrostachya (Ruiz & Pav.) Roem. & Schult	Unkown			Encyclopedia of Life. EOL. http://eol.org/		2,745
Corynostylis arborea (L.) S.F. Blake	Unkown			Encyclopedia of Life. EOL. http://eol.org/	3,118	
Croton killipianus Croizat	Algodón, Algodoncillo, Balso blanco	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,012	6,228
Croton smithianus Croizat	Sangregao, Sangregado, Candelero, Drago, Guacamayo,	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de	2,625	

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
	Sangrerillo, Sangrero			las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		
Cyathea petiolata (Hock) R. M. Tryon	Unkown			Encyclopedia of Life. EOL. http://eol.org/	0,822	
Cymbopetalum sp.	Unkown					2,558
Cynometra martiana (Hayne) J.F. Macbr	Unkown			Encyclopedia of Life. EOL. http://eol.org/	5,238	7,669
Dendrobangia sp.	Unkown				1,363	
Dendropanax arboreum (L.) Decne. & Planch.			Angelica tree	Integrated Taxonomic Information System (ITIS), uBio	9,479	13,837
Dendropanax caucanus (Harms) Harms	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,938	
Diospyros sp.	Unkown				0,827	
Erythroxylum panamense Turcz	Alcarreto				4,327	
Eschweilera calyculata Pittier	Unkown			Encyclopedia of Life. EOL. http://eol.org/	0,808	
Euterpe oleracea Mart.	Naidí, Asaí de pará, Manaca brasilera, Maquenco, Maquenque, Murrapo, Palma murrapo, Palma naidí, Palma triste, Palmicha, Pará, Tapafrío	Colombia	Acai, Assai palm	Integrated Taxonomic Information System (ITIS), uBio, Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	0,934	2,564
Ficus daphniphylla Miq.	Bibosi palomo, Mata-pau			Ubio, IUCN Red List in EOL	2,119	
Ficus sp. 1	Unkown				3,129	
Fusaea longifolia (Aubl.) Saff.	Fuáia (Portuguese)			uBio in EOL	1,609	
Garcinia madruno (Kunth) Hammel	Unkown			Encyclopedia of Life. EOL. http://eol.org/	0,812	
Guarea glabra Vahl.			Alligatorwood	Integrated Taxonomic Information System (ITIS), uBio in EOL	5,976	
Guarea guidonia (L.) Sleumer			American muskwood	Integrated Taxonomic Information System (ITIS), uBio in EOL		2,786
Guatteria sp.1	Unkown				2,499	
Gustavia gracillima Miers	Unkown			Encyclopedia of Life. EOL. http://eol.org/	2,22	3,478
Gustavia speciosa (Kunth) DC.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	2,24	
Gustavia superba (Kunth) O. Berg	Membrillo			uBio in EOL	2,178	
Hasseltia floribunda Kunth	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,249	3,574

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
Henriettela tuberculosa (Donn. Sm.) L.O. Williams	Unkown			Encyclopedia of Life. EOL. http://eol.org/	3,748	
Herrania albiflora Goudot.			Cacao du Pérou (French)	Inventaire National du Patrimoine Naturel in EOL	1,148	2,594
Huberodendron patinoi Cuatrec.	Carrá, Naguare, Carrás, Ceiba sama, Ceiba samá, Coco volador, Masábalo, Volador	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		17,632
Hyeronima scabrida (Tul.) Muell. Arg.	Unkown			Encyclopedia of Life. EOL. http://eol.org/		3,491
Inga acreana Harms	Guamo, Guamo machete	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	5,776	2,68
Inga acrocephala Steud.	Chalahuite			uBio in EOL	2,623	
Inga edulis Mart.	Inga, Guamo, Guama, Churimo, Guaba del putumayo, Guabo, Guamillo, Guamillo de rastrojo, Guamita, Guamo bejuco, Guamo chairus, Guamo churimo, Guamo de mico, Guamo de osito hormiguero, Guamo largo, Guamo macho, Guamo perrero, Guamo rabo de mico, Guamo santafereño, Guauro, Látigo		Pois Doux, Ice cream bean, Icecreambean	uBio in EOL, Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Megan Wannarka, NCBI Taxonomy, uBio, Integrated Taxonomic Information System (ITIS), Megan Wannarka in EOL	1,089	
Jacaranda hesperia Dugand	Chingalé, Gualanday, Cunite, Curnique, Curnite, Pinguasí, Pulga, Tunisco, Vainillo			Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,37	2,853
Lacistema aggregatum (P.J. Bergius) Rusby	Kapawari muyu (Quechua)		Cemp wood	Species 2000 & ITIS Catalogue of Life: April 2013 in EOL	0,923	
Mabea occidentalis Benth.	Cenizo, Mare blanco	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M.	2,713	

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
				Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		
Machaerium kegelii Meisn.	Uña de gato	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,083	
Maclura tinctoria (L.) D. Don ex Steud.	Mora grande, Dinde, Mora, Moral, Ají mora, Avinje, Espino mora, Fustete, Insira, Laurel mora, Morajil, Moral fustete, Morita, Morito, Morón, Muche, Palo amarillo, Palo de mora, Palo mora, Palo moro, Rabito	Colombia	Fustic tree, Drug fustictree, Fustictree, Indian mulberry, Yellow Wood	C. Michael Hogan, uBio, Integrated Taxonomic Information System (ITIS) in EOL	0,81	
Magnolia katiorum (Lozano) Govaerts	Almanegra de uraba, Guacharaco, laurel arenillo	Colombia		The IUCN Red List of Threatened Species. http://www.iucnredlist.org; this work	6,699	
Magnolia sambuensis (Pittier) Govaerts	Molinillo guanabano, Molinillo, Charambirá, Copachí	Colombia		The IUCN Red List of Threatened Species. http://www.iucnredlist.org; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,274	39,097
Matisia cordata Bonpl.	Zapote, Sapote, Chupachupa, Zapote chupachupa	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,254	
Miconia oraria Wurdack	Unkown			Encyclopedia of Life. EOL. http://eol.org/	2,42	4,568

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
Miconia smaragdina Naudin	Nigüito	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	0,815	
Miconia sp. 1	Unkown				1,118	
Miconia sp. 2	Unkown				0,815	
Miconia trinervia (Sw.) D. Don ex Loudon	Tuno, Mora, Morochillo, Oreganito, Tuno blanco	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	6,047	
Minquartia guianensis Aubl.	Wamania, Acapú, Ahumado, Ahumao, Acapú negro, Acaricuara, Aceituno, Acupú, Ahumado caqueteño, Ahumado de hoja pequeña, Ahumado pajarito, Ahumado pedro, Arrayán, Barbasco, Barbasco ahumado, Barbasco negro, Curichichi, Cuyubí, Guacapurana, Guacurí, Trúntago	Colombia	Black manwood	IUCN Red List, uBio in EOL; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	8,148	4,153
Musa ornata Roxb.	Unkown		FLowering banana, French plantain	NCBI Taxonomy, uBio in EOL	2,641	2,575
Neea amplifolia Donn. Sm.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	0,863	6,254
Ocotea insularis (Meisn.) Mez	Laurel, Jigua, Jigua blanco, Jigua pava, Laurel blanco		Laurel sassafras	uBio in EOL; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	2,5	
Ocotea leucoxylon (Sw.) Mez	Hígado del diablo, Hígado de diablo		loblolly sweetwood	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M.	1,89	2,546

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
				Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Integrated Taxonomic Information System (ITIS), uBio in EOL		
Ocotea rubrinervis Mez.	Comino	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,836	
Orphanodendron bernalii Barneby & J.W. Grimes	Tirateté, Almanegra	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	3,241	
Ossaea sp.	Unkown				1,245	7,054
Ouratea lucens (Kunth) Engl	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,983	
Pentaclethra macroloba (Willd.) Kuntze	Dormilón, Capitancillo, Aserrín, Laurel	Colombia	Gavilán Tree	C. Michael Hogan in EOL; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	4,379	
Perebea xanthochyma H. Karst.	Cauchillo, Cauchillo de loma, Cerezo, Gure, Lechoso, Pampanillo	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		4,194
Persea sp.	Unkown				4,664	5,448
Picramnia gracilis Tul.	Arrayán	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	2,014	

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
Piper auritum Kunth.	Santamaría de anís, Yerba santa, Anisillo, Santamaría, Santamarianí, Santamarianís, Señora maría anís	Colombia	Vera cruz pepper	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Integrated Taxonomic Information System (ITIS), NatureServe resource, uBio	2,49	
Piper concepcionis Trel.	Unkown				1,45	
Pleurothyrium sp.	Unkown				2,461	
Posoqueria latifolia (Rudge) Roem. & Schult.	Jazmín de embarcadero, Jazmín de monte, Azuceno, Azuceno de monte, Borojó, Borojocillo, Cachaco, Café, Cafeto de monte, Calabacillo, Calabazo, Churumbelo, Clavo, Dicharachero, Falso borojó, Fruto de pava, Granizo, Guayabo, Guayabo de flor, Lombrirera, Fruta de mono, Guayaba de mono		Jicarita	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; NCBI Taxonomy, uBio in EOL	1,629	
Pourouma sp.1	Unkown				0,815	
Pouteria cuspidata (A. DC.) Baehni	Caimitillo, Caimo amarillo, Caimo sapo, Palo de almidón, Popay, Popay de sapo	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	0,885	
Pouteria multiflora (A. DC.) Eyma	Hakaba, Jacana, Caimito, Lengua de vaca, Lengüevaca, Ojo de venado		Bullytree	uBio, Integrated Taxonomic Information System (ITIS) in EOL; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,094	5,661
Pouteria sp.	Unkown				1,533	
Protium calanense Cuatrec.	Anime	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016.	0,827	

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
				Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		
Protium sp.1	Unkown					5,124
Psychotria acuminata Benth.	Cordoncillo paramero	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	4,998	37,47
Psychotria brachybotrya Müll. Arg.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	10,024	4,435
Psychotria deflexa DC.	Comida de danta	Colombia	nodding wild coffee	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Integrated Taxonomic Information System (ITIS), uBio in EOL	0,823	
Simarouba amara Aubl.	Cedrillo, Aceituno, Aliso, Amargo, Arenillo blanco, Caratero, Chapul, Cimarrú, Garza, Luna, Machaco, Manciribo, Marfil, Marfil otara, Marupá, Nogal, Olivo silvestre, Palo blanco, Papelillo, Pavito	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,737	6,661
Simira cordifolia (Hook. F.) Steyerm.	Pijiño, Paraguatán, Paraguatá, Brasil de loma, Brasilete colorado, Guacamayo caspi, Palo brasil, Palo de arará, Palo guacamayo, Rojo manglillo	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	4,094	13,522
Siparuna pauciflora (Beurl.) A. DC.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	3,265	2,605
		Colombia	Walking Palm		10,251	2,541

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Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
Socratea exorrhiza (Mart.) H. Wendl	Zancona, Palma mulata, Araco, Cachuda zancona, Chuapo, Crespa, Jira, Jira patona, Jira zancona, Maquenque patudo, Pachúa zancona, Palma araña, Palma patona, Palma zancona, Patona, Patuda, Pona lisa, Raíza, Rallador, Yaripa zancona			Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; C. Michael Hogan in EOL		
Sorocea pubivena subsp. hirtella (Mildbr.) C.C. Berg	Cresta de guacamaya, Palo de lombriz	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,533	
Tabernaemontana alba Mill.			White milkwood	Integrated Taxonomic Information System (ITIS), uBio in EOL	3,748	2,564
Tovomita weddelliana Planch. & Triana	Rapabarbo, Araño, Pata de araña, Chagualito, Cucharo, Lengua de potro, Lengua de vaca, Manglecillo, Orejemula, Oyoco, Tiraco, Viga de pajarito, Zanca de araña, Zancoaraña	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/		3,008
Trichilia pleeana (A. Juss.) C. DC.	Unkown			Encyclopedia of Life. EOL. http://eol.org/	1,943	
Triplaris sp.	Unkown				1,282	
Unonopsis colombiana Maas & Westra	Unkown			Encyclopedia of Life. EOL. http://eol.org/	9,647	5,361
Urera baccifera (L.) Gaudich.	Ortiga, Pringamoza, Bosopa, Ortiga blanca, Ortiga morada, Ortiga negra, Ortigo, Ortigo blanco, Pringamoza arbórea, Pringamoza blanca, Pringamoza de caballo, Pringamoza dientona, Pringamoza	Colombia	Scratchbush	Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/; Integrated Taxonomic Information System (ITIS), uBio in EOL	2,416	

(continued)

Appendix 1. Continued

Scientific names	Common name			Sources	IVI/Group	
	Spanish	Country	English		*M. katiorum*	*M. sambuensis*
	negra, Yuyo, Cadillo, Chichicaste					
Virola dixonii Little	Cuángare, Nuánamo, Chalviandé	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	2,883	5,516
Virola elongata (Benth.) Warb.	Sangretoro, Mamita, Cabo de hacha, Carnevaca, Cuajo, Cujupa, Cumala, Falsa sangretoro, Falso sangretoro, Fierro amarillo, Guarutata, Hacha cabo, Mamita pequeña, Mamito, Mamito de hoja ancha, Nuánamo, Nuánamo puntelanza, Otobo, Sangre de toro bajito, Sebo	Colombia		Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	0,805	
Virola surinamensis (Rol. ex Rottb.) Warb.	Chalviande, Cuajo, Sangretoro, Cumalá blanca, Cumalá blanco, Mamito, Nuámano, Nuánamo, Sangretoro de bajo, Sebo, Ucucal	Colombia and others	Dollywood, Baboonwood	Medicinal Plants of the Guianas, IUCN Red List, uBio in EOL; Bernal, R., G. Galeano, A. Rodríguez, H. Sarmiento y M. Gutiérrez. 2016. Nombres Comunes de las Plantas de Colombia. http://www.biovirtual.unal.edu.co/nombrescomunes/	1,813	
Vitex divaricata Sw.	Higuerillo			Integrated Taxonomic Information System (ITIS) in EOL	1,948	
Vitex gigantea Kunth	Tarumacillo			uBio in EOL		2,846

Appendix 2. Germination rates of *Magnolia* species from Asia and America under different treatments.

Species	Common name	Source	Germination Rate (%)	Treatment	Location	Source
M. aromatica (Dandy) V.S. Kumar	香木莲	Encyclopedia of life EOL. http://eol.org/	5		Changsha, China	Cao et al., 2012
M. baillonii Pierre	合果含笑	Encyclopedia of life EOL. http://eol.org/	2–42		Guangzhou, China	Li et al., 2000
M. balansae A. DC.	苦梓含笑	Encyclopedia of life EOL. http://eol.org/	10–43		Guangzhou, China	Li et al., 2000
M. chapensis (Dandy) Sima	乐昌含笑	Encyclopedia of life EOL. http://eol.org/	33–53		Guangzhou, China	Li et al., 2000
M. citrata Noot. & Chalermglin	unknown		1		Thailand	Chalermglin, 2012
M. delavayi Franchet.	unknown		4	Stored 1 month	Guangzhou, China	Li et al., 2000
			36	Stored 2 months		
M. duclouxii Finet & Gagnep.	川滇木莲	Encyclopedia of life EOL. http://eol.org/	13–66		Guangzhou, China	Li et al., 2000
M. espinalii (Lozano) Govaerts	hojarasco de Espinal	The IUCN Red list of Threatened species. http://www.iucnredlist.org	60	Full exposure	Antioquia, Colombia	Gómez, 2011
			80	Dark		
M. foveolata (Merr. Ex Dandy) Figlar	金叶含笑	Encyclopedia of life EOL. http://eol.org/	49–60		Guangzhou, China	Li et al., 2000
M. grandis (Hu & W.C. Cheng) V.S. Kumar	大果木莲	Encyclopedia of life EOL. http://eol.org/	4		Changsha, China	Cao et al., 2012
			56	Stored 3 months	Guangzhou, China	Li et al., 2000
			44	Stored 4 months		
			0	Stored 7 months		
M. guatapensis (Lozano) Govaerts	Almanegra de Guatapé	The IUCN Red list of Threatened species. http://www.iucnredlist.org	25–73		Antioquia, Colombia	Gómez, 2011
M. hernandezii (Lozano) Govaerts	Molinillo del río Cauca	The IUCN Red list of Threatened species. http://www.iucnredlist.org	40–48	Without water	Antioquia, Colombia	Gómez, 2011
			60–68	12-hour watering		
M. insignis Wall.	红花木莲	Encyclopedia of life EOL. http://eol.org/	46–94		Guangzhou, China	Li et al., 2000
M. maudiae (Dunn) Figlar	深山含笑	Encyclopedia of life EOL. http://eol.org/	14–40		Guangzhou, China	Li et al., 2000
M. mediocris (Dandy) Figlar	苦梓	Encyclopedia of life EOL. http://eol.org/	50–56		Guangzhou, China	Li et al., 2000

(continued)

Appendix 2. Continued

Species	Common name	Source	Germination Rate (%)	Treatment	Location	Source
M. dandyi Gagnep	大毛叶木莲	Encyclopedia of life EOL. http://eol.org/	31		Changsha, China	Cao et al., 2012
			25–83		Guangzhou, China	Li et al., 2000
M. odora (Chun) Figlar & Noot.	观光木	Encyclopedia of life EOL. http://eol.org/	17.5		Guangzhou, China	Li et al., 2000
M. polyhypsophylla (Lozano) Govaerts	Almanegra de Ventanas	The IUCN Red list of Threatened species. http://www.iucnredlist.org	60–90	Full exposure	Antioquia, Colombia	Gómez, 2011
			40–100	Dark		
M. rajaniana (Craib.) Figlar	unknown		100		Thailand	Chalermglin, 2012
M. sambuensis (Pittier) Govaerts*	Molinillo	This work	32.5	Substrate/sand	Antioquia, Colombia	This work
			27.5	Substrate/2:1 soil-sand		
			22.5	Substrate/soil		
			1	Dark		
			2	Full exposure		
M. sinica (Law) Noot.	缎子绿豆树	Encyclopedia of life EOL. http://eol.org/	15		Changsha, China	Cao et al., 2012
M. sirindhorniae Noot. & Chalermglin	unknown		100		Thailand	Chalermglin, 2012
M. yarumalensis (Lozano) Govaerts	Almanegra de Yarumal	The IUCN Red list of Threatened species. http://www.iucnredlist.org	90	Dark	Antioquia, Colombia	Gómez, 2011
			68–100	Sawdust		
M. yunnanensis (Hu) Noot.	云南拟克林丽木	Encyclopedia of life EOL. http://eol.org/	66		Changsha, China	Cao et al., 2012
			20	Stored 1 month	Guangzhou, China	Li et al., 2000
			27	Stored 2 months		
			33–66			

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References

Azuma, H., García-Franco, J., Rico-Gray, V., & Thien, L. (2001). Molecular phylogeny of the Magnoliaceae: The biogeography of tropical and temperate disjunctions. *American Journal of Botany*, *88*, 2275–2285.

Batista, W., & Platt, W. (2003). Tree population responses to hurricane disturbance: Syndromes in a south-eastern USA old-growth forest. *Journal of Ecology*, *91*, 197–212.

Cao, J.-W., Liu, C.-L., Wu, Y., Tang, L., Liu, J., Du, K.-G., & Peng, L.W. (2012). Studies on seed germination and seedling growth mechanism of six endangered magnoliaceous plants. In N. Xia, Q.-W. Zeng, F.-X. Xu, & Q. G. Wu (Eds.). *Proceedings of the Second International Symposium of the Family Magnoliaceae* (pp. 247–255). Wuhan, China: Huazhong University of Science and Technology Press.

Chalermglin, P. (2012). Special propagation and conservation of rare and endangered native Thai Magnoliaceae. In N. Xia, Q.-W. Zeng, F.-X. Xu, & Q.-G. Wu (Eds.). *Proceedings of the Second International Symposium of the Family Magnoliaceae* (pp. 180–184). Wuhan, China: Huazhong University of Science and Technology Press.

Charrock, S., Olfield, S., & Wilson, O. (2014). *Plant conservation report 2014: A review of progress towards the global strategy for plant conservation 2011–2020*. Secretariat of the Convention on Biological Diversity. Retrieved form www.cbd.int/doc/publications/cbd-ts-81-en.pdf.

Cruz, R., Vega, K., & Jiménez, J. (2008). *Magnolia vazquezii* (Magnoliaceae), una especie Nueva del Estado de Guerrero, México. *Novon*, *18*, 21–24.

Dieringer, G., & Espinosa, J. E. (1994). Reproductive ecology of *Magnolia schiendeana* (Magnoliaceae), a threatened cloud forest tree in Veracruz, Mexico. *Bulletin of the Torrey Botanical Club*, *121*, 154–159.

Dillon, M., & Sánchez, I. (2009). A new species of Magnolia (Magnoliaceae) from the Alto Mayo, San Martin, Peru. *Arnaldoa*, *16*, 7–12.

Figlar, R., & Nooteboom, H. (2004). Notes on *Magnoliaceae* IV. *Blumea*, *49*, 87–100.

Finol, H. (1976). Estudio Fitosociológico de las unidades II y III de la Reserva Forestal de Carapo, Estado de Barinas. *Acta Botanica Venezuelica*, *10*, 15–103.

García, N. (Ed.). (2007). *Libro rojo de plantas de Colombia. Volumen 5: Las magnoliáceas, las miristicáceas y las podocarpáceas. Serie de libros rojos de especies amenazadas de Colombia*. Bogotá, Colombia: Instituto Alexander von Humboldt – CORANTIOQUIA – Jardín Botánico Joaquín Antonio Uribe de Medellín – Instituto de Ciencias Naturales de la Universidad Nacional de Colombia – Ministerio de Ambiente, Vivienda y Desarrollo Territorial.

Gómez, M. L. (Ed.). (2011). *Avances en la estrategia para la conservación de las especies de la familia Magnoliaceae en jurisdicción de CORANTIOQUIA.* Boletín Técnico Biodiversidad No. 6. Medellín, Colombia: CORANTIOQUIA.

Guariguata, M., & Ostertag, R. (2002). Sucesión secundaria. In M. R. Guariguata, & G. H. Kattan (Eds.). *Ecología y conservación de bosques neotropicales* (pp. 591–616). San José, Costa Rica: Ediciones LUR.

Holdridge, L. R. (1978). *Ecología basada en zonas de vida*. San José, Costa Rica: IICA.

Idárraga, A., Ortiz, R., Callejas, R., & Merello, M. (2011). *Flora de Antioquia. Catálogo de las plantas vasculares Vol. II. Listado de las plantas del departamento de Antioquia. Programa Expedición Antioquia-2103. Series Biodiversidad y Recursos Naturales.* Bogotá, Colombia: Universidad de Antioquia, Missouri Botanical Garden and Oficina de planeación departamental de la gobernación de Antioquia, Editorial D'Vinni. Retrieved from www.tropicos.org/Project/CV.

Kwit, C., & Platt, W. (2003). Disturbance history influences regeneration of non-pioneer understory trees. *Ecology*, *84*, 2575–2581.

Li, Y.-I., Zhou, R.-Z., Chen, F.-L., & Liu, Y.H. (2000). Studies on the biological characteristics of magnoliaceous seeds. In Y.-H. Liu, H.-M. Fan, Z.-Y. Chen, Q.-G. Wu, & Q.-W. Zen (Eds.). *Proceedings of International Symposium on the Family Magnoliaceae* (pp. 276–281). Beijing, China: Science Press.

Lozano, G. (1983). *Flora de Colombia. Magnoliaceae*. Bogotá, Colombia: Universidad Nacional de Colombia, Instituto de Ciencias Naturales.

Matsuki, Y., Tateno, R., Shibata, M., & Isagi, Y. (2008). Pollination efficiencies of flower-visiting insects as determined by direct genetic analysis of pollen origin. *American Journal of Botany*, *95*, 925–930.

Mejía, M. (1990). Germinación de dos especies de magnolia (*Magnoliaceae*) de Puerto Rico y República Dominicana. *Moscosoa*, *6*, 196–201.

Mendoza, H., & Jiménez, L. C. (2004). *Rubiaceae de Colombia. Guía Ilustrada de Géneros*. Bogotá, Colombia: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt.

METEOMANZ. (2015). Retrieved from www.meteomanz.com.

R Development Core Team (2014). *A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from www.Rproject.org.

Rivers, M., Beech, E., Murphy, L., & Olfield, S. (2016). *The red list of Magnoliaceae revised and extended*. Botanic Gardens Conservation International. Retrieved from www.bgci.org/files/Global_Trees_Campaign/Magnolia/Magnoliaceae_RedList2016_LowRes.pdf.

Samper, C., & García, H. (2001). *Estrategia Nacional para la Conservación de Plantas*. Bogotá, Colombia: Instituto De Investigación De Recursos Biológicos Alexander Von Humboldt, Red Nacional De Jardines Botánicos, Ministerio Del Medio Ambiente, Asociación Colombiana De Herbarios.

Sánchez, V. L., & Pineda, L. M. (2006). Species diversity, structure and dynamics of two populations of an endangered species, *Magnolia dealbata* (Magnoliaceae). *Revista de Biología Tropical*, *54*(3): 997–1002.

Serna, M. (2005). *Análisis filogenético de Dugandiodendron (Magnoliaceae) e implicaciones en conservación de Magnoliaceae colombianas* (Thesis Master of Science: Bosques y conservación ambiental). Universidad Nacional de Colombia, Medellín, Colombia.

Serna, M. (2011). Notes on Magnolia field work in Colombia, South America. *Journal of the Magnolia Society*, *87*, 7–12.

Si, J. (2000). Protection and development of Magnolia sinostellata – a precious, rare and endangered plant. In Y.-H. Liu, H-M. Fan, Z.-Y. Chen, Q.-G. Wu, & Q.-W. Zen (Eds.). *Proceedings of International Symposium on the Family Magnoliaceae* (pp. 272–273). Beijing, China: Science Press.

Ter Braak, C. J. F., & Smilauer, P. (2009). *CANOCO for Windows version 4.56*. Wageningen, The Netherlands: Biometrics-Plant Research International.

Thien, L. (1974). Floral biology of Magnolia. *American Journal of Botany*, *61*, 1037–1045.

Thien, L., Kawano, S., Azuma, H., Latimer, S., Devall, M., Rosso, S., . . . Jobes, D. (1998). The floral biology of the Magnoliaceae. In D. Hunt (ed.) *Magnolias and Their Allies: Proceedings of an International Symposium, Royal Holloway* (pp. 37–58). Egham, England: University of London.

Tobe, J. (2000). Vegetation associated with natural populations of Magnolia L. in eastern North America. In Y.-H. Liu, H-M. Fan, Z.-Y. Chen, Q.-G. Wu, & Q.-W. Zen (Eds.). *Proceedings of International Symposium on the Family Magnoliaceae* (pp. 90–125). Beijing, China: Science Press.

Vane-Wright, R., Humphries, C., & Williams, P. (1991). What to protect? Systematics and the agony of choice. *Biology Conservation*, *55*, 235–254.

Vásquez-García, J., Gómez-Domínguez, H., López-Cruz, A., Espinosa-Jiménez, J., Sahagún-Godínez, E., & Muñiz-Castro, M. (2013). *Magnolia perezfarrerae*, a new species and a key to Mexican species of *Magnolia* (section *Talauma*, subsection *Talauma*, Magnoliaceae). *Botanical Sciences*, *91*, 1–9.

Velásquez, C., & Serna, M. (2005). *Magnoliáceas de Antioquia*. Medellín, Colombia: Impregón.

Wang, L., Wang, G., Liu, D., Wang, X., & Shen, Z. (2005). Pollination biology of endangered *Magnolia sieboldii*. *Chinese Journal of Ecology*, *24*, 853–857.

Weaver, P. L. (1997). *Magnolia splendens Urban*. Laurel sabino. New Orleans, LA: Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Xie, C., Fu, L., Zeng, Q., Lui, D., Wen, X., & Zhong, W. (2012). Conservation of rare and endangered species Manglietia longipedunculata (Magnoliaceae). In N. Xia, Q.-W. Zeng, F.-X. Xu, & Q.-G. Wu (Eds.). *Proceedings of the Second International Symposium of the family Magnoliaceae* (pp. 166–179). Wuhan, China: Huazhong University of Science and Technology Press.

Yepes, M. (2007). *Evaluación de las poblaciones del guanábano de monte (Magnolia silvioi) en el área de reserva del distrito de manejo integrado del Cañón del río Alicante*. Medellín, Colombia: CORANTIOQUIA.