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# Woody plants of the Machalilla National Park, Ecuador: A check list

# Plantas leñosas del Parque Nacional Machalilla, Ecuador: Una lista de especies

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## Abstract

Biodiversity conservation requires maintaining an updated knowledge of the species. Therefore, we developed an updated check-list of woody plant species in Machalilla National Park, using three complementary data sources: i) publications and reports, ii) herbarium specimens, and iii) and botanical databases. A total of 579 morpho-species, belonging to 371 genera and 93 families have been recorded in the Park. The most species- and genera-rich families were Fabaceae and Malvaceae. The most specious genera were *Passiflora* and *Inga*. 5.35 % of the total set of species is endemic to Ecuador. The park contains significant levels of species richness and endemism, and a quarter of the species are useful for local people. The conservation status of most species still needs to be assessed.

**Keywords**: Ecuadorian dry forest, Tumbes-Chocó-Magdalena, biodiversity hotspot, Manabí, endemism, checklist, woody plants.

## Resumen

Para garantizar la conservación de la biodiversidad es necesario mantener un conocimiento actualizado de las especies. En consecuencia, este trabajo presenta una lista de chequeo actualizada de las especies de plantas leñosas del Parque Nacional Machalilla, que fue elaborada a partir de tres fuentes de datos complementarias: i) revisión de publicaciones e informes, ii) colecciones de muestras botánicas, y iii) consulta de bases de datos botánicos. En el parque se ha registrado un total de 579 morfo-especies, pertenecientes a 371 géneros y 93 familias. Las familias con el mayor número de especies y géneros fueron Fabaceae y Malvaceae. Los géneros con el mayor número de especies fueron *Passiflora* e *Inga*. El 5,35% del conjunto total de especies corresponde a especies endémicas de Ecuador. El parque contiene niveles significativos de riqueza y endemismo de especies. Asimismo, una cuarta parte de las especies son utilizadas por la población local. El estado de conservación de la mayoría de las especies aún requiere ser evaluado.

**Palabras clave:** Bosque Seco Ecuatoriano, Tumbes-Chocó-Magdalena, Punto caliente de biodiversidad, Manabí, endemismo, lista de chequeo, plantas leñosas

## Introduction

Ecuador's central coast is part of the ecoregion of the Ecuadorian dry forest (Olson *et al*., 2001) and the biodiversity hotspot Tumbes-Chocó-Magdalena (Myers *et al*., 2000; Rodriguez-Mahecha *et al*., 2004; Marchese 2015). It is a region of great biological importance due to the high number of species and the high levels of endemism (Parker & Carr 1992). Despite of that, it is under threat by deforestation, fragmentation and degradation (Dodson & Gentry 1991; Tapia-Armijos *et al*., 2015) and by the low level of protected areas (Peralvo *et al*., 2007; Ganzenmüller *et al*., 2010; Lessmann *et al*., 2014). For all these reasons and due to the strong anthropogenic pressure, it is a priority area for biodiversity conservation worldwide (Myers *et al*., 2000). The Machalilla National Park (MNP) is the only National Park on the continental coastal area of Ecuador. In the past, several botanical studies have been conducted in the park (Allan 1989; Cerón 1991, 1993; Gentry 1992a, 1992b; Foster 1992a, 1992b; Tickell 1993; Bonifaz de Elao 1994; Bonifaz de Elao 1994, *et al*., 1994; Josse 1996; Josse & Balslev 1994; Cerón & Montalvo 1997; Hernández & Josse 1997), being the most complete records of plant species the lists of Foster *et al.* (1992) and Cerón & Montalvo (1997), although neither of them covered the whole park. Since then there has not been published any update to the plant list of the park, even though it is known that biodiversity inventories and regular monitoring are

key issues to achieve the goals for plant conservation set in the Convention on Biological Diversity (Joppa *et al*., 2013). This study aims to compile a comprehensive and updated list of known woody plant species of the entire area of Machalilla National Park, both on the Mainland as well as on the islands of La Plata and Salango, providing base line information required for park management and future studies.

## Materials and Methods

### Study area

The study area covers the entire Machalilla National Park (Fig. 1). It includes 56,184 ha of land and 14,430 ha of sea (INEFAN 1998). According to the Holdridge classification (1947), there are four climatic vegetation formations: tropical thorn scrub, very dry tropical forest, dry tropical forest and premontane dry forest (Cañadas 1983). The average annual rainfall ranges between 100 and 1,100 mm (CLIRSEN- SENPLADES 2012). This dry climate is strongly influenced by two ocean currents. The cold Humboldt Current determines a period of low rainfall, but high levels of humidity during the dry season from May to December. The warm Panama Current brings higher rainfall between January and April, during the wet season (Josse & Balslev 1994, Martínez *et al*., 2006). The weather conditions and the presence of coastal Cordillera Chongón-Colonche with elevations up to 800 m strongly influence the spatial distribution of winds, precipitation and atmospheric moisture. These conditions induce a steady rainfall of low intensity and a condensation of moisture at ground level as persistent fog in the higher areas, during the dry season. This phenomenon, denominated "garúa", represents a horizontal or hidden rainfall, and it occurs during the dry season above 200 m altitude along the mountainsides. "Garúa" plays a crucial role in the distribution of vegetation types in the park, it determines the noticeable hydrological and altitudinal gradient, where humidity increases with altitude (Cerón *et al.,* 1999) and distance from the coastline. According to this gradient, the vegetation formations in the park are: coastal scrub along the sea coast, dry scrub and deciduous forest up to 250-300 m, and cloud forest above 300 m; (Foster 1992a, Foster 1992b; Gentry 1992b; Cerón & Montalvo 1997). The latter formation has evergreen canopy despite the dry climate (Fig. 2B).

### Data Collection

A database was developed with taxonomic identification of all woody taxa recorded in the study area, including trees, palms, shrubs, lianas and hemi-epiphytes. The database information was obtained using three complementary sources: i) review of publications and available unpublished reports (Allan 1989; Foster *et al.*, 1992; Cerón 1993; Tickell 1993; Josse & Balslev 1994; Bonifaz 1994, Bonifaz *et al.,* 1994; Cerón & Montalvo 1997; Hernández & Josse 1997; Núñez 1997; Cerón & Montalvo 1998), ii) querying the Missouri Botanical Garden's Tropicos database (Tropicos 2015), Gentry´s Data Set (2014) and Herbarium Database of Aarhus University (AAU 2015), as well as iii) data collection in the field by V. Parés-Jiménez and L. Hernández through inventories, and botanical vouchers, conducted in two research projects (Hernández 2015, http://faunamanabi.github.io). Specimens were collected according to standard herbarium procedures for subsequent identification in the National Herbarium of Ecuador (QCNE), and using available literature such as Aguirre-Mendoza *et al.* (2006b), Bonifaz de Elao *et al.* (1994), Cerón (1991), Cerón (1993), Cerón & Montalvo (1997), Cerón

& Montalvo (1998), Foster *et al.* (1992), Gentry (1992), Hernández & Josse (1997), Núñez (1997), and Jørgensen & León-Yánez (1999). Many tree specimens were difficult to collect, since the samples taken from the treetops are mostly difficult to reach. In addition, most vouchers were taken from sterile plants, so replicated vouchers of such specimens were often needed to reliably distinguish morpho-species. Botanical collections were carried out under the research permit numbers: 013-2014-DPAM-MAE and 015-2014-At-DPAM-MAE of the Ministry of Environment of Ecuador. The checklist is presented in tabular form, arranged in alphabetical order of families, genera and species. Nomenclature from Missouri Botanical Garden's Tropicos database was followed (Tropicos 2015), and species names were standardized using The Plant List database (The Plant List 2015). The list provides, for each species, the botanical name, the information source(s) reporting species in the park, the voucher when available, as well as the conservation- and the endemism status. We defined endemic species restricted to Ecuador. Endemism and conservation assessment were checked using the Red List of Ecuadorian endemic plants (León-Yánez *et al.*, 2011) and the online IUCN Red List database (IUCN 2015). The vouchers indicated in the list were collected by Alwin H. Gentry, Bente Bang Klitgaard, Carlos Cerón-M, Consuelo Hernández, Carmen Josse, Claes Häkan Persson, Lionel Hernández, Lindsay Woodruff, Herbario of Museo the Salango, Tamara Núñez, Violeta Parés-Jiménez and Xavier Cornejo. To our knowledge, the largest botanical collections (more than 500 vouchers) in the park were made by A. Gentry, C. Cerón-M, C. Josse and L. Hernández. The checklist does not include those specimens collected in the park and deposited in herbaria, which have not been registered in publications, available reports nor public databases.

## Results

A total of 579 morpho-species of woody plants have been recorded, belonging to 371 genera and 93 families (Table 1). The ten most diverse families were Fabaceae (69 species), Malvaceae (35), Euphorbiaceae (30), Solanaceae (25), Rubiaceae (24), Bignoniaceae (18), Asteraceae (17), Meliaceae (16), Moraceae (16), and Boraginaceae (14). The most genera-rich family was Fabaceae with 42 genera, followed by Malvaceae (24 genera), Rubiaceae (19), Asteraceae (17), Euphorbiaceae (15), Solanaceae (12), Bignoniaceae (12), Apocynaceae (10), Moraceae (8), and Sapindaceae (7). However, seven other families (Arecaceae, Capparaceae, Lamiaceae, Lauraceae, Meliaceae, Primulaceae and Urticaceae) have seven genera as well. The most specious genera were: *Passiflora* (13 species), *Inga* (11), *Piper* (10), *Euphorbia* (9), *Trichilia* (9), *Cordia* (8), *Ficus* (8), *Ipomoea* (8) *Solanum* (8), *Senna* (6) and *Sida* (6). The most genera have only one species.

Thirty-one species are endemic to Ecuador, which corresponds to 5,35% of the total set of species. The conservation status of most species (95%) has not yet been evaluated or the available information is insufficient. Information was available for the thirty-one endemic species. It was assessed that, twenty-one of them fall under threatened categories: three vulnerable (VU), seventeen endangered (EN) and one critically endangered (CR). Based on the studies of Cerón (1993) and Hernández & Josse (1997), we found that 143 species (24,7 %) in the list are used by local people as food, fertilizer, handicrafts, fuel, medicine, fodder, building materials, toiletries, utensils, furniture, and poison (information

not indicated in Table 1).

Fig. 1. Location map of Machalilla National Park, Manabí and collection sites — at three sites outside the park, we made fertile vouchers of species for which we had not found individuals with flowers or fruits in the park.

Table 1. Checklist of woody species of the Machalilla National Park, Ecuador.

Legend of table 1:

S=Conservation Status according to IUCN red list of threatened species; * Categories: DD: data deficient; LC: least concern; NT: nearly threatened; VU: vulnerable; EN: endangered; CR: critically endangered. E=endemic to Ecuador. Source=Information source for each species, with bold number for voucher source, as follows: #(1) Violeta Parés Jiménez own collection in field; (2) Lionel Hernández own collection in field; (3) Cerón & Montalvo (1997); (4) Cerón (1991); (5) Foster *et al*. (1992); (6) Gentry´s Data Set (2014); (7) Josse & Balsev (1994); (8) Hernández & Josse (1997); (9) Cerón (1993); (10) Tickell, 1993; (11) Allan, 1989; (12) Bonifaz de Elao (1994); (13) Bonifaz de Elao *et al.* (1994); (14) Tropicos database; (15) Cerón & Montalvo (1998); (16) Núñez (1997); (17) AAU (2015). Voucher: Voucher number and initials of collector; $: AG: Alwin H. Gentry, BK: Bente Bang Klitgaard, CC: Carlos E. Cerón-M, CH: Consuelo Hernández, CJ: Carmen Josse, CP: Claes Häkan Persson, LH: Lionel Hernández, LW: Lindsay Woodruff, SH: Herbario del Museo de Salango, TN: Tamara Núñez, VP: Violeta Parés Jiménez, XC: Xavier Cornejo.

## Discussion

The present study includes morpho-species of only woody plants, so it is difficult to compare the results with findings of other studies in western Ecuador, which consider all vascular plant species, such as at Jauneche (Dodson *et al.* 1985), Palenque (Dodson & Gentry 1978) and Mache-Chindul Mountains (Clark *et al.,* 2006). Despite this limitation we dared to compare. We found that the species richness in the Machalilla National Park is almost half of the richness (1,346 species) of the Mache-Chindul Mountains (Clark *et al*., 2006) and slightly lower than Jauneche's richness of 728 species (Dodson *et al*., 1985), and Palenque's richness of 870 species (Dodson & Gentry 1978). The most specious families are mainly the families with the largest number of genera. With the exception of three families (Solanaceae, Rubiaceae and Asteraceae), the first ten most species-rich families in our list match the top ten most diverse families in the list of woody species reported by Linares-Palomino *et al.* (2010) for the Ecuadorian and Northern Peruvian seasonally dry forests (Equatorial Pacific Region after Peralvo *et al*., 2007). The species- and genera-richness highlights the dominance of Fabaceae which doubles the richness of Malvaceae, the second most diverse family. On the contrary, *Passiflora*, the most diverse genus belongs to the Passifloraceae family with only one genus in park, but the second most diverse genus, *Inga*, belongs to Fabaceae. The prevalence of Fabaceae is not surprising because this family is considered to be the most species-rich family in the Neotropical dry forests (Gentry 1995, Penington *et al*., 2009). The relative poverty of typical families of Neotropical dry forests, such as Capparaceae and Cactaceae (Penington *et al*., 2009) is striking. The level of endemism found in this study (5,35 %) is lower than the levels of around 20 % of endemism of vascular plants estimated for Western Ecuador (Dodson & Gentry 1991) and 21

% for dry forests in the western lowlands of the coast of Ecuador and Perú, but it is similar to the endemism of 7 % estimated for woody species in the dry forests in the western lowlands of coastal Ecuador (Aguirre-Mendoza *et al.*, 2006a). This relatively low level of endemism may have been resulted from three factors: (1) The recent increase in botanical collections have led to a better knowledge on the geographic distribution of species, thus the distribution of species previously considered endemics has expanded (Villaseñor 2015); (2) Changes in species nomenclature regarding to the original description, and (3) Endemism defined within the political boundaries of Ecuador ruled out some species with restricted distribution just beyond the border, especially those species endemic to the Equatorial Pacific Region, a phytogeographic region which unifies the seasonally dry forests of western Ecuador and Northern Perú (Peralvo *et al.*, 2007, Linares-Palomino *et al.*, 2010)-*Cynophalla heterophylla* exemplifies this case. Also, the number of endemic species estimated in this study would possibly increase significantly by incorporating species with other growth forms, especially epiphytes like orchids. Orchid endemism is unusually high at several sites of western Ecuador, like at Juaneche with 24%, at Capeira with 50%, and concerning Río Palenque with 28% (Dodson & Gentry 1991).

In summary, we found that the woody flora of the park contains significant levels of species richness and endemism, and about a quarter of the species are useful for local people, but there is no available information on the conservation status of most species, nor information about ecosystem dynamics and processes. Consequently, we conclude that there is an important lack of information about vegetation of the Machalilla Nacional Park, hampering the adequate work of conservation and management measures. Finally, it should be noted that the database of the present study represents a baseline. It serves to answer the initial questions of which and how many species of woody plants are in the park. Thus, the future challenge is to know how big the populations are, find out what their spatial distribution is and assess what their conservation status is. This is important in order to provide robust information to develop an efficient and applicable management tools for the Park.

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| Botanical name | S* | E | Source# | Voucher$ |
|---|---|---|---|---|
| **Acanthaceae** | | | | |
| *Aphelandra* sp. R. Br. | | | 13 | |
| *Blechum pyramidatum* (Lam.) Urb. | | | 10-11 | |
| *Dicliptera* sp. Juss. | | | 5, 11, 14 | SH395 |
| *Justicia ianthina* Wassh. | VU | X | 11 | SH161 |
| *Ruellia floribunda* Hook. | | | 14 | TN107 |
| *Ruellia inundata* Kunth | | | 10 | |
| *Tetramerium nervosum* Nees | | | 10, 14 | |
| **Achatocarpaceae** | | | | |
| *Achatocarpus pubescens* C. H. Wright | | | 1, 3, 14-15, 17 | |
| **Adoxaceae** | | | | |
| *Viburnum* sp. L. | | | 5 | |
| **Aizoaceae** | | | | |
| *Sesuvium portulacastrum* (L.) L. | | | 14 | CC11761 |
| *Trianthema portulacastrum* L. | | | 14 | CC13982 |
| **Alstroemeriaceae** | | | | |
| *Bomarea obovata* Herb. | | | 5, 14 | AG72588 |
| **Amaranthaceae** | | | | |
| *Alternanthera echinocephala* (Hook. f.) Christoph. | | | 14 | CC14009 |
| *Alternanthera halimifolia* (Lam.) Standl. ex Pittier | | | 11 | SH87 |
| *Amaranthus* aff. *viridis* L. | | | 10 | |
| *Chamissoa altissima* (Jacq.) Kunth | | | 2-3, 5-6, 14 | AG72447 |
| *Iresine angustifolia* Euphrasén | | | 11 | SH50 |
| *Iresine diffusa* Humb. & Bonpl. ex Willd. | | | 3 | |
| *Pleuropetalum sprucei* (Hook. f.) Standl. | | | 14 | AG72605 |
| **Anacardiaceae** | | | | |
| *Loxopterygium huasango* Spruce ex Engl. | | | 5 | |
| *Mauria heterophylla* Kunth | | | 1-2, 3, 7 | VP088 |
| *Spondias mombin* L. | | | 3, 14 | |
| *Spondias purpurea* L. | | | 9, 14 | CC11717 |
| *Tapirira* sp. Aubl. | | | 5-6, 14 | |
| **Annonaceae** | | | | |
| *Annona cherimolioides* Triana & Planch. | | | 2 | LH2063 |
| *Annona conica* Ruiz & Pav. ex G. Don | | | 8 | |
| *Annona deceptrix* (Westra) H. Rainer | | | 14 | AG72449 |
| *Annona muricata* L. | | | 8 | |
| *Cremastosperma gracilipes* R.E. Fr. | | | 14 | CC13949 |
| *Klarobelia lucida* (Diels) Chatrou | EN | X | 3 | |
| *Raimondia quinduensis* (Kunth) Saff. | | | 3, 5 | |

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| **Apocynaceae** | | | | |
| *Asclepias curassavica* L. | | | 5, 14 | CC11697 |
| *Aspidosperma* sp. Mart. & Zucc. | | | 5, 13 | |
| *Cynanchum* sp. L. | | | 2 | LH2139 |
| *Mandevilla veraguasensis* (Seem.) Hemsl. | | | 5-6, 14 | AG72492 |
| *Marsdenia macrophylla* (Humb. & Bonpl. ex Schult.) E. Fourn. | | | 14 | AG72595 |
| *Prestonia mollis* Kunth | | | 5, 11, 13-14, 16 | SH167 |
| *Rauvolfia littoralis* Rusby | | | 1, 3, 5, 9, 14 | VP068 |
| *Rauvolfia tetraphyla* L. | | | 3, 7 | |
| *Stenosolen* sp. (Müll. Arg.) Markgr. | | | 13 | |
| *Tabernaemontana amygdalifolia* Jacq. | | | 3, 5, 9, 14 | |
| *Tabernaemontana heterophylla* Vahl | | | 14 | CC16558 |
| *Vallesia glabra* (Cav.) Link. | | | 1, 3-4, 9-10, 14-15 | |
| **Araceae** | | | | |
| *Heteropsis* sp. Kunth | | | 5 | |
| **Araliaceae** | | | | |
| *Dendropanax macrocarpus* Cuatrec. | | | 1- 3 | VP064 |
| **Arecaceae** | | | | |
| *Astrocaryum standleyanum* L. H. Bailey | | | 3, 5 | |
| *Bactris gasipaes* Kunth | | | 17 | CJ935 |
| *Bactris setulosa* H. Karst. | | | 1-2-3, 9, 14 | LH2025 |
| *Chamaedorea linearis* (Ruiz & Pav.) Mart. | | | 1, 3, 5-6, 9, 14, 17 | AG72453 |
| *Chamaedorea pinnatifrons* (Jacq.) Oerst. | | | 14 | CC16516 |
| *Geonoma undata* Willd. | | | 5-6, 14, 17 | CJ888 |
| *Phytelephas aequatorialis* Spruce | DD | X | 1, 3, 5-6, 8-9, 11, 14 | AG72441 |
| *Prestoea decurrens* (H. Wendl. ex Burret) H. E. Moore | | | 14 | AG72575 |
| *Synechanthus warscewiczianus* H. Wendl. | | | 8 | |
| **Aristolochiaceae** | | | | |
| *Aristolochia* sp. L. | | | 13 | |
| **Asteraceae** | | | | |
| *Baccharis inamoena* Gardner | | | 5, 14 | AG72371 |
| *Baccharis latifolia* (Ruiz & Pav.) Pers. | | | 14 | CC13931 |
| *Clibadium* sp. F. Allam. ex L. | | | 11 | SH176 |
| *Elaphandra quinquenervis* (S. F. Blake) H. Rob. | | | 15 | |
| *Eupatorium* sp. L. | | | 6, 14 | AG72431 |
| *Hebeclinium macrophyllum* (L.) DC. | | | 5 | |
| *Hidalgoa ternata* La Llave | | | 5, 14 | AG72418 |

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| *Liabum eggersii* Hieron. | | | 14 | AG72509 |
| *Lycoseris trinervis* (D.Don) S. F. Blake | | | 13 | |
| *Mikania* sp. Willd. | | | 2-3, 13-14 | |
| *Pappobolus ecuadoriensis* Panero | VU | X | 3, 15 | |
| *Pluchea carolinensis* (Jacq.) G. Don | | | 14 | CC11679 |
| *Tessaria integrifolia* Ruiz & Pav. | | | 3, 5 | |
| *Tilesia baccata* (L.) Pruski | | | 6, 14 | AG72450 |
| *Verbesina minuticeps* S. F. Blake | EN | X | 3 | |
| *Vernonanthura patens* (Kunth) H. Rob. | | | 7, 11, 17 | |
| *Wedelia grandiflora* Benth. | | | 1 | VP110 |
| **Bignoniaceae** | | | | |
| *Amphilophium crucigerum* (L.) L. G. Lohmann | | | 3, 5-6, 14 | AG72490 |
| *Amphilophium ecuadorense* A. H. Gentry | | | 5-6, 14 | |
| *Amphilophium paniculatum* (L.) Kunth | | | 5, 14 | |
| *Anemopaegma chrysanthum* Dugand | | | 2-3, 5-6, 9, 14 | CC16590 |
| *Anemopaegma puberulum* (Seibert) Miranda | | | 14 | BK99467 |
| *Bignonia decora* (S. Moore) L. G. Lohmann | | | 5-6, 14 | AG72633 |
| *Bignonia longiflora* Cav. | | | 5, 9, 12-14 | CC11692 |
| *Clytostoma* sp. Miers ex Bureau | | | 5-6 | AG72666 |
| *Delostoma gracile* A. H. Gentry | | | 5, 14 | AG72743 |
| *Dolichandra unguis-cati* (L.) L. G. Lohmann | | | 5-6, 13 | AG72622 |
| *Fridericia schumanniana* (Loes.) L. G. Lohmann | | | 3 | |
| *Handroanthus billbergii* (Bureau & K. Schum.) S. O. Grose | | | 1, 3, 14 | VP057 |
| *Handroanthus chrysanthus* (Jacq.) S. O. Grose | | | 1-3, 5-6, 9, 11, 14-15 | AG72650 |
| *Mansoa hymenaea* (DC.) A. H. Gentry | | | 2, 3, 5, 9, 14 | LH2185 |
| *Mansoa verrucifera* (Schltdl.) A. H. Gentry | | | 5, 14 | CC13925 |
| *Tabebuia elegans* Urb. | | | 3 | |
| *Tanaecium pyramidatum* (Rich.) L. G. Lohmann | | | 3, 5-6 | AG72645 |
| *Tecoma castaneifolia* (D. Don) Melch. | | | 3 | |
| **Bixaceae** | | | | |
| *Bixa orellana* L. | | | 8 | |
| *Cochlospermum vitifolium* (Willd.) Spreng. | | | 3-5, 9, 13-14 | CC11690 |
| **Boraginaceae** | | | | |
| *Cordia alliodora* (Ruiz & Pav.) Oken | | | 2-3, 5-6, 9, 13-14 | LH2075 |
| *Cordia bifurcata* Roem. & Schult. | | | 1 | VP112 |
| *Cordia cylindrostachya* (Ruiz & Pav.) Roem. & Schult. | | | 3 | |
| *Cordia eriostigma* Pittier | | | 1-2-3, 7 | LH2078 |
| *Cordia lutea* Lam. | | | 1-2-5, 9-11, 13-15 | LH2080 |

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| *Cordia macrocephala* (Desv.) Kunth | | | 2-3, 9-10, 14-15 | LH2081 |
| *Cordia panamensis* L. Riley | | | 9 | CC16501 |
| *Cordia sericicalyx* A. DC. | | | 7, 13 | |
| *Heliotropium angiospermum* Murray | | | 11, 14 | CC11765 |
| *Heliotropium curassavicum* L. | | | 10, 14 | CC18734 |
| *Tournefortia bicolor* Sw. | | | 14-15 | AG72369 |
| *Tournefortia microcalyx* (Ruiz & Pav.) I. M. Johnst. | | | 5-6, 14 | AG72651 |
| *Tournefortia psilostachya* Kunth | | | 14 | CC18692 |
| *Tournefortia pubescens* Hook. f. | | | 16 | |
| **Burseraceae** | | | | |
| *Bursera graveolens* (Kunth) Triana & Planch. | | | 1, 3, 9, 13-15 | VP136 |
| *Protium* sp. Burm. f. | | | 9 | CC16543 |
| **Cactaceae** | | | | |
| *Armatocereus cartwrightianus* (Britton & Rose) Backeb. ex A.W. Hill | | | 1, 3-4, 8-9 ,14-15 | CC11711 |
| *Cereus diffusus* (Britton & Rose) Werderm. | | | 1, 3, 8-9, 11, 13-14 | CC13900 |
| *Hylocereus lemairei* (Hook.) Britton & Rose | | | 2-3, 9, 11, 14-15 | CC13920 |
| *Opuntia dillenii* (Ker Gawl.) Haw. | | | 3, 8, 15 | |
| *Opuntia quitensis* F.A.C. Weber | | | 3, 15 | |
| *Pilosocereus tweedyanus* (Britton & Rose) Byles & G.D. Rowley | | | 11 | SH691 |
| **Calophyllaceae** | | | | |
| *Calophyllum* sp. L. | | | 13 | |
| *Mammea americana* L. | | | 14 | CC11721 |
| **Campanulaceae** | | | | |
| *Burmeistera brachyandra* E. Wimm. | NT | X | 14 | AG72514 |
| *Burmeistera sodiroana* Zahlbr. | LC | X | 14 | AG72409 |
| **Cannabaceae** | | | | |
| *Celtis iguanaea* (Jacq.) Sarg. | | | 2-3, 5-6, 8-9, 14 | CC11676 |
| *Trema micrantha* (L.) Blume | | | 3 | |
| **Capparaceae** | | | | |
| *Beautempsia avicenniifolia* (Kunth) Gaudich. | | | 3, 5, 10, 14-15 | CC11760 |
| *Capparicordis crotonoides* (Kunth) Iltis & Cornejo | | | 3, 5, 9-10, 13-15 | CC11669 |
| *Capparidastrum quinum* (J. F. Macbr.) Cornejo & Iltis | | | 14 | AG72375 |
| *Capparis baducca* L. | | | 14 | CC13901 |
| *Colicodendron scabridum* (Kunth) Seem. | | | 1, 3, 5, 9 ,14 | CC11671 |
| *Cynophalla ecuadorica* (Iltis) Iltis & Cornejo | | | 2-3, 5-7, 14 | LH2098 |
| *Cynophalla flexuosa* (L.) J. Presl | | | 1, 3, 9-11, 14-15 | CC11677 |
| *Cynophalla heterophylla* (Ruiz & Pav. ex DC.) Iltis & Cornejo | | | 1, 3, 5, 9-11, 14-15 | VP134 |

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| *Cynophalla polyantha* (Triana & Planch.) Cornejo & Iltis | | | 3 | |
| *Cynophalla sclerophylla* (Iltis & Cornejo) Iltis & Cornejo | | | 1 | VP133 |
| *Morisonia americana* L. | | | 3, 5, 9, 13-14 | CC13970 |
| *Morisonia oblongifolia* Britton | | | 14 | AG72429 |
| **Caricaceae** | | | | |
| *Vasconcellea microcarpa* (Jacq.) A. DC. | | | 1-3, 6, 8-9, 14 | VP049 |
| *Vasconcellea parviflora* A. DC. | | | 1, 3, 5, 9, 13-14 | VP114 |
| **Celastraceae** | | | | |
| *Hippocratea* sp. L. | | | 3 | |
| *Maytenus macrocarpa* (Ruiz & Pav.) Briq. | | | 3 | |
| *Maytenus octogona* (L'Hér.) DC. | | | 3, 9-11, 14 | CC13933 |
| *Salacia cordata* (Miers) Mennega | | | 2, 14 | LH2261 |
| *Salacia spectabilis* A. C. Sm. | | | 3, 9, 14 | |
| **Chrysobalanaceae** | | | | |
| *Hirtella mutisii* Killip & Cuatrec. | | | 3 | |
| *Licania* sp. Aubl. | | | 9 | CC16622 |
| **Cleomaceae** | | | | |
| *Podandrogyne trichopus* (Benth.) Iltis & Cochrane | EN | X | 14 | AG72506 |
| **Clusiaceae** | | | | |
| *Clusia dixonii* Little | | | 9 | CC11721 |
| *Garcinia intermedia* (Pittier) Hammel | | | 8 | |
| *Garcinia madruno* (Kunth) Hammel | | | 2 | LH2221 |
| *Garcinia macrophylla* Mart. | | | 3, 14 | CJ907 |
| **Combretaceae** | | | | |
| *Combretum* sp. Loefl. | | | 9 | CC16551 |
| *Conocarpus erectus* L. | | | 3 | |
| **Commelinaceae** | | | | |
| *Commelina diffusa* Burm. f. | | | 3 | |
| *Commelina erecta* L. | | | 11, 14 | CC18769 |
| **Convolvulaceae** | | | | |
| *Evolvulus convolvuloides* (Willd. ex Schult.) Stearn | | | 3, 14 | CC18737 |
| *Ipomoea alba* L. | | | 15 | |
| *Ipomoea asarifolia* (Desr.) Roem. & Schult. | | | 12 | |
| *Ipomoea batatas* (L.) Lam. | | | 14-15 | CC18775 |
| *Ipomoea carnea* Jacq. | | | 1, 4, 12, 14 | VP002 |
| *Ipomoea imperati* (Vahl) Griseb. | | | 16 | |
| *Ipomoea nil* (L.) Roth | | | 3, 15 | |
| *Ipomoea pes-caprae* (L.) R. Br. | | | 14, 16 | CC18669 |
| *Ipomoea triloba* L. | | | 15 | |
| *Jacquemontia corymbulosa* Benth. | | | 3, 10-11, 15, 17 | |

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| *Jacquemontia pentanthos* (Jacq.) G. Don | | | 14 | CC18750 |
| *Merremia umbellata* (L.) Hallier f. | | | 12 | |
| *Turbina* sp. Raf. | | | 13 | |
| **Cucurbitaceae** | | | | |
| *Luffa sepium* (G.Mey.) C.Jeffrey | | | 16 | |
| *Momordica charantia* L. | | | 3 | |
| **Dichapetalaceae** | | | | |
| *Dichapetalum* sp. Thouars | | | 9 | CC16566 |
| **Dipentodontaceae** | | | | |
| *Perrottetia sessiliflora* Lundell | | | 5 | |
| **Ebenaceae** | | | | |
| *Diospyros inconstans* Jacq. | | | 1-2, 14 | LH2118 |
| **Elaeocarpaceae** | | | | |
| *Sloanea grandiflora* Sm. | | | 1 | VP076 |
| **Ericaceae** | | | | |
| *Sphyrospermum* sp. Poepp. & Endl. | | | 5 | |
| **Erythroxylaceae** | | | | |
| *Erythroxylum acuminatum* Ruiz & Pav. | | | 2-3, 5 | LH2128 |
| *Erythroxylum glaucum* O. E. Schulz | | | 1, 3, 6 | AG72630 |
| *Erythroxylum ruizii* Peyr. | | | 3, 7, 14-15 | CC11759 |
| **Euphorbiaceae** | | | | |
| *Acalypha diversifolia* Jacq. | | | 1, 5, 13 | VP084 |
| *Acalypha parvula* Hook. f. | LC | X | 14 | CC18733 |
| *Adelia triloba* (Müll. Arg.) Hemsl. | | | 2, 5 | |
| *Alchornea* aff. *leptogyna* Diels | NT | X | 1-2 | LH2017 |
| *Alchornea glandulosa* subsp. *iricurana* (Casar.) Secco | | | 3, 5-6, 9, 14 | AG72459 |
| *Argythamnia* P. Browne | | | 15 | |
| *Astraea lobata* (L.) Klotzsch | | | 3, 14 | CC18671 |
| *Croton* aff. *churutensis* Riina & Cornejo | EN | X | 2 | LH2088 |
| *Croton rivinifolius* Kunth | | | 1, 3, 9, 11, 14-15 | VP003 |
| *Croton schiedeanus* Schltdl. | | | 3 | |
| *Croton scouleri* Hook.f. | | | 16 | |
| *Dalechampia scandens* L. | | | 3, 10-11, 13-14-15 | CC18763 |
| *Euphorbia arenaria* Kunth | | | 14 | CC18694 |
| *Euphorbia equisetiformis* A. Stewart | CR | X | 14 | CC13944 |
| *Euphorbia graminea* Jacq. | | | 11 | SH619 |
| *Euphorbia hirta* L. | | | 14 | CC18764 |
| *Euphorbia hypericifolia* L. | | | 14 | CC18726 |
| *Euphorbia hyssopifolia* L. | | | 3 | |

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| *Euphorbia insulana*Vell. | | | 3 | |
| *Euphorbia lasiocarpa* Klotzsch | | | 14 | CC18731 |
| *Euphorbia punctulata* Andersson | | | 14 | TN112 |
| *Hippomane mancinella* L. | | | 3, 5, 9, 14 | CC11758 |
| *Jatropha curcas* L. | | | 3 | |
| *Jatropha nudicaulis* Benth. | | | 3 | |
| *Mabea occidentalis* Benth. | | | 3 | |
| *Manihot esculenta* Crantz | | | 3 | |
| *Ricinus communis* L. | | | 9, 13-14 | CC11707 |
| *Sapium laurifolium* (A. Rich.) Griseb. | | | 2-3 | LH2263 |
| *Sapium marmieri* Huber | | | 1 | VP067 |
| *Tetrorchidium andinum* Müll. Arg. | | | 14 | AG72560 |
| **Fabaceae** | | | | |
| *Acacia farnesiana* (L.) Willd. | | | 2, 9, 14 | CC13967 |
| *Acacia huarango* Ruiz ex J. F. Macbr. | | | 13 | |
| *Acacia rorudiana* Christoph. | | | 9, 14 | CC11727 |
| *Aeschynomeneae* sp. Hutch. | | | 14-15 | TN116 |
| *Albizia guachapele* (Kunth) Dugand | | | 5, 9 | CC11687 |
| *Albizia multiflora* (Kunth) Barneby & J. W. Grimes | | | 1-3, 5, 7, 13-14 | VP011 |
| *Bauhinia aculeata* L. | | | 2, 11, 13-15 | LH2026 |
| *Browneopsis* aff. *disepala* (Little) Klitg. | EN | X | 2-3 | LH2038 |
| *Caesalpinia bonduc* (L.) Roxb. | | | 14 | CC13965 |
| *Caesalpinia paipai* Ruiz & Pav. | | | 1, 3, 9, 14 | CC11691 |
| *Caesalpinia pulcherrima* (L.) Sw. | | | 9, 14 | CC11678 |
| *Cajanus cajan* (L.) Huth | | | 9, 14 | CC11708 |
| *Canavalia rosea* (Sw.) DC. | | | 14 | CC11757 |
| *Cassia* sp. L. | | | 13 | |
| *Centrolobium ochroxylum* Rose ex Rudd | | | 3, 13 | |
| *Chamaecrista* sp. Moench | | | 14 | CC18747 |
| *Cojoba rufescens* (Benth.) Britton & Rose | | | 3, 5-6 | AG72635 |
| *Coursetia caribaea* (Jacq.) Lavin | | | 14-15 | BK564 |
| *Cynometra bauhiniifolia* Benth. | | | 2-3 | LH2096 |
| *Desmanthus virgatus* (L.) Willd. | | | 14 | CC13981 |
| *Dioclea* sp. Kunth | | | 14 | AG72510 |
| *Dussia lehmannii* Harms | | | 2-3, 14 | LH2127 |
| *Entada polystachya* (L.) DC. | | | 13 | |
| *Erythrina fusca* Lour. | | | 14 | CJ704 |
| *Erythrina megistophylla* Diels | NT | X | 5, 14 | AG72407 |
| *Erythrina smithiana* Krukoff | EN | X | 3, 13 | |
| *Erythrina velutina* Willd. | | | 1, 14 | VP135 |

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| *Galactia tenuiflora* (Klein ex Willd.) Wight & Arn. | | | 10 | |
| *Geoffroea spinosa* Jacq. | | | 1, 3, 14-15 | VP116 |
| *Gliricidia sepium* (Jacq.) Kunth ex Walp. | | | 1 | VP127 |
| *Inga acrocephala* Steud. | | | 5-6 | AG72652 |
| *Inga alatocarpa* T. S. Elias | | | 13 | |
| *Inga auristellae* Harms | | | 3 | |
| *Inga chartacea* Poepp. | | | 5-6, 14 | AG72475 |
| *Inga coruscans* Humb. & Bonpl. ex Willd. | | | 1, 3, 5-6, 14 | AG72242 |
| *Inga densiflora* Benth. | | | 3 | |
| *Inga leiocalycina* Benth. | | | 5-6 ,14 | AG72545 |
| *Inga manabiensis* T. D. Penn. | | | 2 | LH2167 |
| *Inga pavoniana* G. Don | | | 6 | AG72644 |
| *Inga punctata* Willd. | | | 5, 14 | AG72591 |
| *Inga sapindoides* Willd. | | | 5, 8 | |
| *Leucaena leucocephala* (Lam.) de Wit | | | 14 | CC11680 |
| *Leucaena trichodes* (Jacq.) Benth. | | | 1, 6, 14 | VP012 |
| *Lonchocarpus* sp. Kunth | | | 6 | AG72628 |
| *Machaerium millei* Standl. | | | 1, 3, 5, 7, 9, 14 | VP122 |
| *Macroptilium lathyroides* (L.) Urb. | | | 14 | CC14000 |
| *Mimosa acantholoba* (Humb. & Bonpl. ex Willd.) Poir. | | | 1, 14 | VP007 |
| *Mimosa albida* Humb. & Bonpl. ex Willd. | | | 3, 10, 14-15 | CC13997 |
| *Mimosa pigra* L. | | | 5 | |
| *Mucuna rostrata* Benth. | | | 3, 17 | CJ696 |
| *Myroxylon balsamum* (L.) Harms | | | 5, 9, 13-14 | CJ840 |
| *Myroxylon peruiferum* L. f. | | | 14 | AG72728 |
| *Neptunia plena* (L.) Benth. | | | 3, 15 | |
| *Ormosia* sp. Jacks. | | | 6 | AG72526 |
| *Parkia* sp. R. Br. | | | 13 | |
| *Pithecellobium excelsum* (Kunth) Mart. | | | 1, 3, 9-11, 13-15 | VP005 |
| *Platymiscium* aff. *pinnatum* (Jacq.) Dugand | | | 1 | VP125 |
| *Prosopis juliflora* (Sw.) DC. | | | 1-5, 9, 14-15 | CC11754 |
| *Pterocarpus* sp. Jacq. | | | 6 | AG72637 |
| *Schizolobium* sp.Vogel | | | 9 | CC11688 |
| *Senna macrophylla* (Kunth) H. S. Irwin & Barneby | | | 9, 14 | CC16563 |
| *Senna mollissima* (Humb. & Bonpl. ex Willd.) H.S. Irwin & Barneby | | | 14 | CC11695 |
| *Senna occidentalis* (L.) Link | | | 9, 13 | |
| *Senna oxyphylla* (Kunth) H. S. Irwin & Barneby | | | 9, 14 | AG72603 |
| *Senna pistaciifolia* (Kunth) H. S. Irwin & Barneby | | | 14 | CC11746 |
| *Senna spectabilis* (DC.) H. S. Irwin & Barneby | | | 7 | |

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| *Tephrosia decumbens* Benth. | | | 3, 10, 14-15 | CC13992 |
| *Vigna* sp. Savi | | | 14 | AG72416 |
| *Zapoteca tetragona* (Willd.) H. M. Hern. | | | 13 | |
| **Goodeniaceae** | | | | |
| *Scaevola plumieri* (L.) Vahl | | | 3, 5 | |
| **Hernandiaceae** | | | | |
| *Hernandia* sp. L. | | | 5 | |
| **Lamiaceae** | | | | |
| *Aegiphila alba* Moldenke | | | 1, 3, 5-6, 9, 14 | VP045 |
| *Clerodendrum* sp. L. | | | 1 | VP129 |
| *Cornutia microcalycina* Pav. & Moldenke | | | 5 | |
| *Cornutia odorata* (Poepp.) Poepp. ex Schau | | | 3 | |
| *Cornutia pyramidata* L. | | | 3, 7, 14 | AG72412 |
| *Hyptis* sp. Jacq. | | | 14 | AG72423 |
| *Origanum vulgare* L. | | | 14 | CC11704 |
| *Salvia alvajaca* Oerst. | | | 5, 14 | CC11705 |
| *Vitex flavens* Kunth | | | 14 | AG72401 |
| *Vitex gigantea* Kunth | | | 2-3, 5, 7- 9, 14 | CC11723 |
| **Lauraceae** | | | | |
| *Beilschmiedia alloiophylla* (Rusby) Kosterm. | | | 1, 3, 14 | VP065 |
| *Cinnamomum* aff. *triplinerve* (Ruiz & Pav.) Kosterm. | | | 14 | AG72530 |
| *Endlicheria* sp. Nees | | | 9 | CC16577 |
| *Nectandra acutifolia* (Ruiz & Pav.) Mez | | | 3 | |
| *Nectandra* cf. *parviflora* Rohwer | | | 14 | CJ889 |
| *Ocotea cernua* (Nees) Mez | | | 2-3, 5, 14 | LH2216 |
| *Ocotea floribunda* (Sw.) Mez | | | 3 | |
| *Persea* sp. Mill. | | | 9 | CC16581 |
| *Pleurothyrium* sp. Nees | | | 14 | CJ918 |
| **Lecythidaceae** | | | | |
| *Grias peruviana* Miers | | | 1, 3, 5-6, 8-9, 14 | VP056 |
| *Gustavia angustifolia* Benth. | | | 13 | |
| *Gustavia pubescens* Ruiz & Pav. ex O. Berg | | | 5 | |
| *Gustavia serrata* S. A. Mori | EN | X | 13 | |
| **Loasaceae** | | | | |
| *Gronovia scandens* L. | | | 14 | CC18729 |
| *Mentzelia aspera* L. | | | 14 | CC18727 |
| **Loranthaceae** | | | | |
| *Oryctanthus* sp. (Griseb.) Eichler | | | 5 | |
| **Lythraceae** | | | | |
| *Cuphea* sp. P. Browne | | | 5 | |

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| **Malpighiaceae** | | | | |
| *Bunchosia* aff. *argentea* (Jacq.) DC. | | | 3 | |
| *Bunchosia* cf. *nitida* (Jacq.) A. Rich. | | | 8 | |
| *Hiraea idroboana* Cuatrec. | | | 14 | AG72554 |
| *Malpighia emarginata* DC. | | | 14 | CC11753 |
| *Malpighia glabra* L. | | | 3, 8-9, 14-15 | CC13962 |
| *Mascagnia divaricata* (Kunth) Nied. | | | 6, 14 | AG72489 |
| *Mascagnia ovatifolia* (Kunth) Griseb. | | | 5 | |
| *Stigmaphyllon eggersii* C. E. Anderson | EN | X | 6 | AG72667 |
| *Stigmaphyllon ellipticum* (Kunth) A. Juss. | | | 14 | AG72374 |
| **Malvaceae** | | | | |
| *Abutilon depauperatum* (Hook. f.) Andersson | | | 14-15 | TN104 |
| *Abutilon pictum* (Gillies ex Hook. & Arn.) Walp. | | | 14 | TN113 |
| *Abutilon reflexum* (Lam.) Sweet | | | 11 | SH46 |
| *Anoda* sp. Cav. | | | 11 | SH94 |
| *Byttneria glabrescens* Benth. | | | 3, 14-15 | TN129 |
| *Byttneria parviflora* Benth. | | | 14 | CC14006 |
| *Ceiba trischistandra* (A. Gray) Bakh. | | | 1, 3, 5 | |
| *Cienfuegosia tripartita* (Kunth) Gürke | | | 14 | CC13998 |
| *Corchorus orinocensis* Kunth | | | 10 | |
| *Eriotheca ruizii* (K. Schum.) A. Robyns | | | 1, 3, 5, 13 | |
| *Gossypium barbadense* L. | | | 14, 16 | TN128 |
| *Gossypium herbaceum* L. | | | 10 | |
| *Guazuma ulmifolia* Lam. | | | 2, 3, 5, 7-9, 13-14 | CC13976 |
| *Heliocarpus americanus* L. | | | 2, 3, 5, 9, 14 | CC16595 |
| *Hibiscus tiliaceus* L. | | | 7 | |
| *Malachra* sp. L. | | | 13 | |
| *Malvastrum americanum* (L.) Torr. | | | 11 | SH556 |
| *Matisia grandifolia* Little | | | 1-3, 5-6, 9, 11, 14 | VP060 |
| *Melochia lupulina* Sw. | | | 14 | CC18751 |
| *Ochroma pyramidale* (Cav. ex Lam.) Urb. | | | 3, 5-6, 9, 14 | CC13977 |
| *Pachira rupicola* (A. Robyns) W. S. Alverson | | | 5, 14 | AG72365 |
| *Pavonia* cf. *schiedeana* Steud. | | | 14 | AG72512 |
| *Pavonia rosea* Wall. ex Moris | | | 5 | |
| *Pochota trinitensis* (Urb.) Steyerm. & W. D. Stevens | | | 5-6 ,13 | AG72629 |
| *Pseudobombax millei* (Standl.) A. Robyns | | | 2- 4, 9, 14 | CC11755 |
| *Quararibea asterolepis* Pittier | | | 3, 9, 13 | |
| *Sida ciliaris* L. | | | 14 | CC18677 |
| *Sida glabra* Mill. | | | 9 | CC13936 |
| *Sida rhombifolia* L. | | | 3, 9, 14 | CC11718 |

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| *Sida setosa* Mart. ex Colla | | | 3 | |
| *Sida spinosa* L. | | | 14 | CC18675 |
| *Sida weberbaueri* Ulbr. | | | 14 | CC18739 |
| *Sidastrum paniculatum* (L.) Fryxell | | | 9, 11, 14 | CC13939 |
| *Waltheria indica* L. | | | 10, 14 | LW589 |
| *Waltheria ovata* Cav. | | | 3, 14-15 | CC14011 |
| **Marcgraviaceae** | | | | |
| *Marcgravia brownei* (Triana & Planch.) Krug & Urb. | | | 14 | AG72563 |
| *Souroubea* sp. Aubl. | | | 5-6 | AG72623 |
| **Melastomataceae** | | | | |
| *Arthrostemma ciliatum* Pav. ex D. Don | | | 14 | AG72421 |
| *Blakea campii* Wurdack | | | 14 | AG72527 |
| *Blakea subconnata* O. Berg ex Triana | | | 5, 14 | AG72552 |
| *Conostegia cuatrecasii* Gleason | | | 3 | |
| *Miconia brevitheca* Gleason | | | 14 | AG72562 |
| *Ossaea micrantha* (Sw.) Macfad. ex Cogn. | | | 1-2, 5-6, 14 | LH2225 |
| *Topobea* sp. Aubl. | | | 5 | |
| **Meliaceae** | | | | |
| *Azadirachta indica* A. Juss. | | | 14 | CC11701 |
| *Carapa guianensis* Aubl. | | | 3, 5-6, 9, 13-14 | AG72455 |
| *Cedrela odorata* L. | | | 13 | |
| *Guarea glabra* Vahl | | | 3, 6-7, 13-14 | AG72636 |
| *Guarea guidonia* (L.) Sleumer | | | 5-6, 14 | AG72465 |
| *Melia azedarach* L. | | | 9 | CC11701 |
| *Ruagea glabra* Triana & Planch. | | | 1, 3, 9, 14 | AG72557 |
| *Trichilia elegans* A. Juss. | | | 5, 7, 14 | AG72738 |
| *Trichilia glabra* L. | | | 2 | LH2295 |
| *Trichilia hirta* L. | | | 3, 5, 7, 14 | AG72388 |
| *Trichilia martiana* C. DC. | | | 6, 14 | AG72531 |
| *Trichilia moschata* Sw. | | | 3, 14 | AG72737 |
| *Trichilia pallida* Sw. | | | 1-3, 5-6, 9, 14 | AG72555 |
| *Trichilia pleeana* (A. Juss.) C. DC. | | | 3, 5, 7 | |
| *Trichilia septentrionalis* C. DC. | | | 9, 14 | CC16519 |
| *Trichilia solitudinis* Harms | | | 5 | |
| **Menispermaceae** | | | | |
| *Abuta* cf. *fluminum* Krukoff & Barneby | | | 14 | AG72404 |
| *Cissampelos tropaeolifolia* DC. | | | 13 | |
| *Disciphania* sp. Eichler | | | 13 | |
| **Moraceae** | | | | |
| *Brosimum alicastrum* Sw. | | | 2-3, 5-6, 9 | LH2036 |

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| *Castilla elastica* Sessé | | | 5 | |
| *Clarisia biflora* Ruiz & Pav. | | | 13-14 | CC16529 |
| *Clarisia racemosa* Ruiz & Pav. | | | 3, 13 | |
| *Ficus citrifolia* Mill. | | | 3, 9, 14 | CC11675 |
| *Ficus cuatrecasana* Dugand | | | 3, 5 | |
| *Ficus maxima* Mill. | | | 5-6, 9, 14 | AG72524 |
| *Ficus nymphaeifolia* Mill. | | | 9 | CC16597 |
| *Ficus obtusifolia* Kunth | | | 5, 9, 14 | CC13923 |
| *Ficus trigonata* L. | | | 5 | |
| *Ficus velutina* Humb. & Bonpl. ex Willd. | | | 9, 14 | CC13972 |
| *Ficus yoponensis* Desv. | | | 5 | |
| *Maclura tinctoria* (L.) D. Don ex Steud. | | | 3, 5, 7, 8-9, 13 | CC16613 |
| *Poulsenia armata* (Miq.) Standl. | | | 1-2, 6, 9, 14 | CC16502 |
| *Pseudolmedia rigida* (Klotzsch & H. Karst.) Cuatrec. | | | 3, 13 | |
| *Sorocea sarcocarpa* Lanj. & Wess. Boer | EN | X | 3 | |
| **Muntingiaceae** | | | | |
| *Muntingia calabura* L. | | | 1-2-3, 8-9, 13-14 | LH2199 |
| **Myristicaceae** | | | | |
| *Virola elongata* (Benth.) Warb. | | | 3 | |
| *Virola sebifera* Aubl. | | | 3 | |
| **Myrtaceae** | | | | |
| *Calyptranthes* sp. Sw. | | | 3, 5-6, 14 | |
| *Eugenia* cf. *pustulescens* McVaugh | EN | X | 11 | SH554 |
| *Eugenia florida* DC. | | | 3 | |
| *Eugenia oerstediana* O. Berg | | | 1, 8, 14 | VP092 |
| *Myrcia splendens* (Sw.) DC. | | | 3, 5, 14 | AG72456 |
| *Psidium acutangulum* DC. | | | 14 | AG72598 |
| *Psidium guajava* L. | | | 8 | |
| *Syzygium jambos* (L.) Alston | | | 13 | |
| **Nyctaginaceae** | | | | |
| *Boerhavia coccinea* Mill. | | | 14 | CC18738 |
| *Boerhavia erecta* L. | | | 10, 14 | TN118 |
| *Cryptocarpus pyriformis* Kunth | | | 3, 5, 9, 12, 15 | CC11684 |
| *Guapira myrtiflora* (Standl.) Lundell | | | 3 | |
| *Neea* sp. Ruiz & Pav. | | | 1-2 | LH2025 |
| *Pisonia aculeata* L. | | | 2, 5, 13-14 | LH2237 |
| **Olacaceae** | | | | |
| *Heisteria acuminata* (Bonpl.) Engl. | | | 3, 13 | |
| **Oleaceae** | | | | |
| *Chionanthus* sp. L. | | | 5-6, 13 | |

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| *Priogymnanthus apertus* (B. Ståhl) P. S. Green | EN | X | 14 | CJ702 |
| **Onagraceae** | | | | |
| *Ludwigia* sp.L. | | | 11 | SH661 |
| **Oxalidaceae** | | | | |
| *Oxalis* sp.L. | | | 10 | |
| **Passifloraceae** | | | | |
| *Passiflora anfracta* Mast & André | EN | X | 3, 9 | CC16559 |
| *Passiflora biflora* Lam. | | | 14 | CH95 |
| *Passiflora capsularis* L. | | | 5 | |
| *Passiflora* cf. *ambigua* Hemsl. | | | 6 | AG72544 |
| *Passiflora filipes* Benth. | | | 14 | CH47 |
| *Passiflora foetida* L. | | | 3, 8, 10, 13-14 | CC13993 |
| *Passiflora macrophylla* Spruce ex Mast. | | | 1, 3, 5, 14 | VP066 |
| *Passiflora maliformis* L. | | | 8 | |
| *Passiflora oerstedii* Mast. | | | 14 | AG72558 |
| *Passiflora rubra* L. | | | 14 | CC16559 |
| *Passiflora sprucei* Mast. | LC | X | 8, 11 | SH625 |
| *Passiflora suberosa* L. | | | 14 | CJ688 |
| *Passiflora tenella* Killip | | | 11 | SH624 |
| **Phyllanthaceae** | | | | |
| *Hieronyma duquei* Cuatrec. | | | 3 | |
| *Margaritaria nobilis* L. f. | | | 1, 3, 14 | VP072 |
| *Phyllanthus anisolobus* Müll. Arg. | | | 1 | VP121 |
| **Phytolaccaceae** | | | | |
| *Gallesia integrifolia* (Spreng.) Harms | | | 2-3, 5, 13-14 | LH2144 |
| *Microtea debilis* Sw. | | | 11 | SH20 |
| *Phytolacca dioica* L. | | | 3 | |
| *Phytolacca weberbaueri* H. Walter | | | 14 | AG72405 |
| *Trichostigma octandrum* (L.) H. Walter | | | 5-6, 14 | AG 72451 |
| **Piperaceae** | | | | |
| *Peperomia chimboana* C. DC. | | | 14 | AG72572 |
| *Peperomia glabella* (Sw.) A. Dietr. | | | 14 | AG72581 |
| *Peperomia sneidernii* Yunck. | | | 14 | AG72579 |
| *Piper aduncum* L. | | | 1 | VP071 |
| *Piper* aff. *imperiale* (Miq.) C. DC. | | | 6 | AG72546 |
| *Piper* aff. *reticulatum* L. | | | 6 | AG72481 |
| *Piper amalago* L. | | | 2-3, 14 | LH2233 |
| *Piper arboreum* Aubl. | | | 9, 14 | CC16553 |
| *Piper cavendishioides* Trel. & Yunck. | | | 6 | AG72528 |

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| *Piper cuspidilimbum* C. DC. | | | 14 | AG72528 |
| *Piper hispidum* Sw. | | | 14 | AG72569 |
| *Piper marginatum* Jacq. | | | 9, 11, 13-14 | CC16564 |
| *Piper obliquum* Ruiz & Pav. | | | 5 | |
| **Plantaginaceae** | | | | |
| *Galvezia fruticosa* J. F. Gmel. | | | 14 | TN138 |
| *Galvezia leucantha* Wiggins | EN | X | 3, 10 | |
| *Scoparia dulcis* L. | | | 11 | SH264 |
| **Polygonaceae** | | | | |
| *Antigonon* sp. Endl. | | | 13 | |
| *Coccoloba* aff. *lehmannii* Lindau | | | 1 | VP082 |
| *Coccoloba* aff. *obovata* Kunth | | | 6 | AG72761 |
| *Coccoloba densifrons* Mart. ex Meisn. | | | 3 | |
| *Coccoloba mollis* Casar. | | | 3 | |
| *Coccoloba ruiziana* Lindau | | | 1, 3, 15 | VP131 |
| *Triplaris cumingiana* Fisch. & C.A. Mey. | | | 1, 3, 5-6, 9, 13-14 | CC11713 |
| **Portulacaceae** | | | | |
| *Portulaca umbraticola* Kunth | | | 14 | TN136 |
| **Primulaceae** | | | | |
| *Bonellia sprucei* (Mez) B. Ståhl & Källersjö | | | 1, 3, 4-5, 14-15 | VP008 |
| *Clavija eggersiana* Mez | | | 1, 3, 8, 14 | AG72482 |
| *Clavija pungens* (Willd. ex Roem. & Schult.) Decne. | VU | X | 8 | |
| *Cybianthus kayapii* (Lundell) Pipoly | | | 14 | CC16508 |
| *Cybianthus simplex* (Hook. f.) G. Agostini | | | 14 | AG72499 |
| *Geissanthus longistamineus* (A.C. Sm.) Pipoly | | | 1, 5-6, 14 | AG72470 |
| *Myrsine coriacea* (Sw.) R. Br. ex Roem. & Schult. | | | 14 | CC16592 |
| *Myrsine pellucida* (Ruiz & Pav.) Spreng. | | | 3 | |
| *Parathesis adenanthera* (Miq.) Hook. f. ex Mez | | | 14 | AG72533 |
| *Stylogyne* cf. *turbacensis* subsp. *laevis* (Oerst.) Ricketson & Pipoly | | | 5 | |
| **Putranjivaceae** | | | | |
| *Drypetes* cf. *standleyi* G.L. Webster | | | 2 | LH2248 |
| **Ranunculaceae** | | | | |
| *Clematis* sp.L. | | | 5-6, 14 | |
| **Rhamnaceae** | | | | |
| *Gouania* sp. Jacq. | | | 5 | |
| *Scutia spicata* (Humb. & Bonpl. ex Willd.) Weberb. | | | 9, 14 | CC11702 |
| *Ziziphus thyrsiflora* Benth. | | | 1-7, 9, 11, 13-14 | CC11666 |
| **Rosaceae** | | | | |
| *Prunus subcorymbosa* Ruiz ex Koehne | | | 5-6-7, 14 | AG72523 |

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| **Rubiaceae** | | | | |
| *Alibertia claviflora* K. Schum. | | | 5- 6 | AG72551 |
| *Alseis* sp. Schott | | | 5 | |
| *Chiococca alba* (L.) Hitchc. | | | 2 | LH2061 |
| *Coffea arabica* L. | | | 9, 14 | CC11734 |
| *Faramea* sp. Aubl. | | | 13 | |
| *Gonzalagunia* sp. Ruiz & Pav. | | | 2, 13 | LH2184 |
| *Hamelia patens* Jacq. | | | 3 | |
| *Hillia parasitica* Jacq. | | | 5, 14 | XC1224 |
| *Hoffmannia* sp. Sw. | | | 5, 7 | |
| *Isertia hypoleuca* Benth. | | | 5 | |
| *Notopleura macrophylla* (Ruiz & Pav.) C.M.Taylor | | | 5 | |
| *Palicourea* cf. *thyrsiflora* (Ruiz & Pav.) DC. | | | 14 | AG72427 |
| *Palicourea perquadrangularis* Wernham | | | 14 | CP50 |
| *Palicourea stipularis* Benth. | | | 1, 14 | CC16524 |
| *Pentagonia grandiflora* Standl. | | | 6, 9 | AG72457 |
| *Pentagonia macrophylla* Benth. | | | 1 | VP044 |
| *Posoqueria* sp. Aubl. | | | 2 | LH2220 |
| *Psychotria cornejoi* C. M. Taylor | | | 14 | XC1235 |
| *Randia armata* (Sw.) DC. | | | 6, 8-9, 14 | CC13903 |
| *Rosenbergiodendron formosum* (Jacq.) Fagerl. | | | 13 | |
| *Simira* cf. *rubescens* (Benth.) Bremek. ex Steyerm. | | | 6 | |
| *Simira ecuadorensis* (Standl.) Steyerm. | | | 13, 17 | |
| *Simira tinctoria* Aubl. | | | 9 | CC16624 |
| *Tocoyena pittieri* (Standl.) Standl. | | | 14 | CC16515 |
| **Rutaceae** | | | | |
| *Amyris pinnata* Kunth | | | 1 | VP124 |
| *Citrus reticulata* Blanco | | | 9, 14 | CC11732 |
| *Erythrochiton giganteus* Kaastra & A. H. Gentry | EN | X | 3 | |
| *Zanthoxylum acuminatum* (Sw.) Sw. | | | 14 | AG72521 |
| *Zanthoxylum* cf. *fagara* (L.) Sarg. | | | 7 | |
| *Zanthoxylum culantrillo* Kunth | | | 2-3 | LH2319 |
| *Zanthoxylum setulosum* P. Wilson | | | 1 | |
| **Salicaceae** | | | | |
| *Casearia aculeata* Jacq. | | | 2 | LH2044 |
| *Casearia mariquitensis* Kunth | | | 5-6 | AG72480 |
| *Casearia silvestris* Sw. | | | 5, 9 | CC16541 |
| *Xylosma* sp. G. Forst. | | | 5 | |
| **Sapindaceae** | | | | |
| *Cupania cinerea* Poepp. | | | 1 | VP089 |

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| *Cupania latifolia* Kunth | | | 3, 7, 13 | |
| *Matayba* sp.Aubl. | | | 5 | |
| *Paullinia alata* G. Don | | | 5, 9, 14 | CC16591 |
| *Paullinia bracteosa* Radlk. | | | 3 | |
| *Paullinia* cf. *subnuda* Radlk. | | | 14 | CC11726 |
| *Paullinia pinnata* L. | | | 13 | |
| *Sapindus saponaria* L. | | | 5, 9, 13-14 | CC11703 |
| *Serjania* sp.Mill. | | | 3, 13 | |
| *Talisia equatoriensis* Acev.-Rodr. | | | 1 | VP075 |
| *Talisia setigera* Radlk. | EN | X | 5-6, 14 | AG72491 |
| *Thinouia* sp.*Triana* & Planch. | | | 5 | |
| **Sapotaceae** | | | | |
| *Chrysophyllum argenteum* Jacq. | | | 2-3, 5, 8-9, 14 | LH2063 |
| *Pouteria glomerata* (Miq.) Radlk. | | | 6 | AG72653 |
| **Scrophulariaceae** | | | | |
| *Buddleja americana* L. | | | 2, 5, 14 | |
| **Simaroubaceae** | | | | |
| *Picrasma excelsa* (Sw.) Planch. | | | 14 | AG72452 |
| **Siparunaceae** | | | | |
| *Siparuna eggersii* Hieron. | EN | X | 1, 14 | CP51 |
| **Smilacaceae** | | | | |
| *Smilax purhampuy* Ruiz | | | 5 | |
| **Solanaceae** | | | | |
| *Acnistus arborescens* (L.) Schltdl. | | | 2-3, 7, 13 | LH2006 |
| *Acnistus frutescens* Bello | | | 5-6 | AG72648 |
| *Browallia* sp. L. | | | 5, 11 | SH622 |
| *Capsicum* aff. *hookerianum* (Miers) Kuntze | | | 1 | VP137 |
| *Cestrum racemosum* Ruiz & Pav. | | | 3 | |
| *Cestrum reflexum* Sendtn. | | | 3 | |
| *Cestrum schlechtendalii* G. Don | | | 14 | AG72559 |
| *Cuatresia riparia* (Kunth) Hunz. | | | 14 | CC16573 |
| *Cyphomandra* sp. *Mart*. ex Sendtn. | | | 3 | |
| *Juanulloa pavonii* (Miers) Benth. & Hook. | | | 14 | CC16593 |
| *Lycianthes cyathocalyx* (Van Heurck & Müll. Arg.) Bitter | | | 14 | CC18774 |
| *Lycianthes inaequilatera* (Rusby) Bitter | | | 1 | VP051 |
| *Lycium americanum* Jacq. | | | 14 | CC11764 |
| *Lycium minimum* C.L. Hitchc. | LC | X | 3, 14-15 | CC18776 |
| *Lycium tweedianum* Griseb. | | | 14-15 | TN122 |
| *Markea* sp. Rich. | | | 5, 14 | |

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|---|---|---|---|---|
| *Physalis angulata* L. | | | 8, 10, 14 | |
| *Solanum americanum* Mill. | | | 8 | |
| *Solanum aphyodendron* S. Knapp | | | 15 | |
| *Solanum caricaefolium* Rusby | | | 5 | |
| *Solanum confertiseriatum* Bitter | | | 3, 7 | |
| *Solanum lancifolium* Sessé & Moc. | | | 5 | |
| *Solanum pimpinellifolium* L. | | | 8, 14 | LW583 |
| *Solanum sessiliflorum* Dunal | | | 8 | |
| *Solanum subinerme* Jacq. | | | 13 | |
| **Staphyleaceae** | | | | |
| *Turpinia occidentalis* Sw. | | | 1, 3, 5, 9, 14 | AG72466 |
| **Talinaceae** | | | | |
| *Talinum paniculatum* (Jacq.) Gaertn. | | | 3, 11 | SH60 |
| **Ulmaceae** | | | | |
| *Ampelocera* aff. *longissima* Todzia | LC | X | 3 | |
| *Ampelocera macphersonii* Todzia | | | 17 | JC677 |
| **Urticaeae** | | | | |
| *Cecropia angustifolia* Trécul | | | 6 , 14 | AG72522 |
| *Cecropia insignis* Liebm. | | | 5 | |
| *Cecropia litoralis* Snethl. | | | 3 | |
| *Cecropia obtusifolia* Bertol. | | | 5, 7 | |
| *Cecropia reticulata* Cuatrec. | | | 1, 14 | AG72460 |
| *Coussapoa* sp. Aubl. | | | 3, 11, 13 | SH694 |
| *Hemistylus boehmerioides* Benth. | | | 14 | CC18682 |
| *Myriocarpa stipitata* Benth. | | | 2, 5, 11 | SH275 |
| *Pilea microphylla* (L.) Liebm. | | | 11 | SH82 |
| *Pilea pubescens* Liebm. | | | 14 | CC16510 |
| *Pouzolzia* sp. Gaudich. | | | 15 | |
| *Urera baccifera* (L.) Gaudich. ex Wedd. | | | 6, 14 | CC16554 |
| *Urera capitata* Wedd. | | | 14 | AG72540 |
| *Urera caracasana* (Jacq.) Gaudich. ex Griseb. | | | 1, 3, 5-6, 14 | AG72458 |
| **Verbenaceae** | | | | |
| *Citharexylum chartaceum* Moldenke | | | 3, 7, 14 | CJ806 |
| *Citharexylum gentryi* Moldenke | | | 2, 14 | CC13907 |
| *Lantana canescens* Kunth | | | 14 | CC18698 |
| *Lantana peduncularis* Andersson | LC | X | 3, 10, 14-15 | |
| *Lantana sprucei* Hayek | | | 1 | VP132 |
| *Priva lappulacea* (L.) Pers. | | | 11 | SH21 |
| *Stachytarpheta* sp.Vahl | | | 2 | LH2286 |
| **Violaceae** | | | | |

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|---|---|---|---|---|
| *Rinorea deflexa* (Benth.) S.F. Blake | EN | X | 6 | AG72673 |
| **Vitaceae** | | | | |
| *Vitis tiliifolia* Humb. & Bonpl. ex Schult. | | | 5-6, 14 | AG72432 |
| **Ximeniaceae** | | | | |
| *Ximenia americana* L. | | | 1, 14 | VP126 |

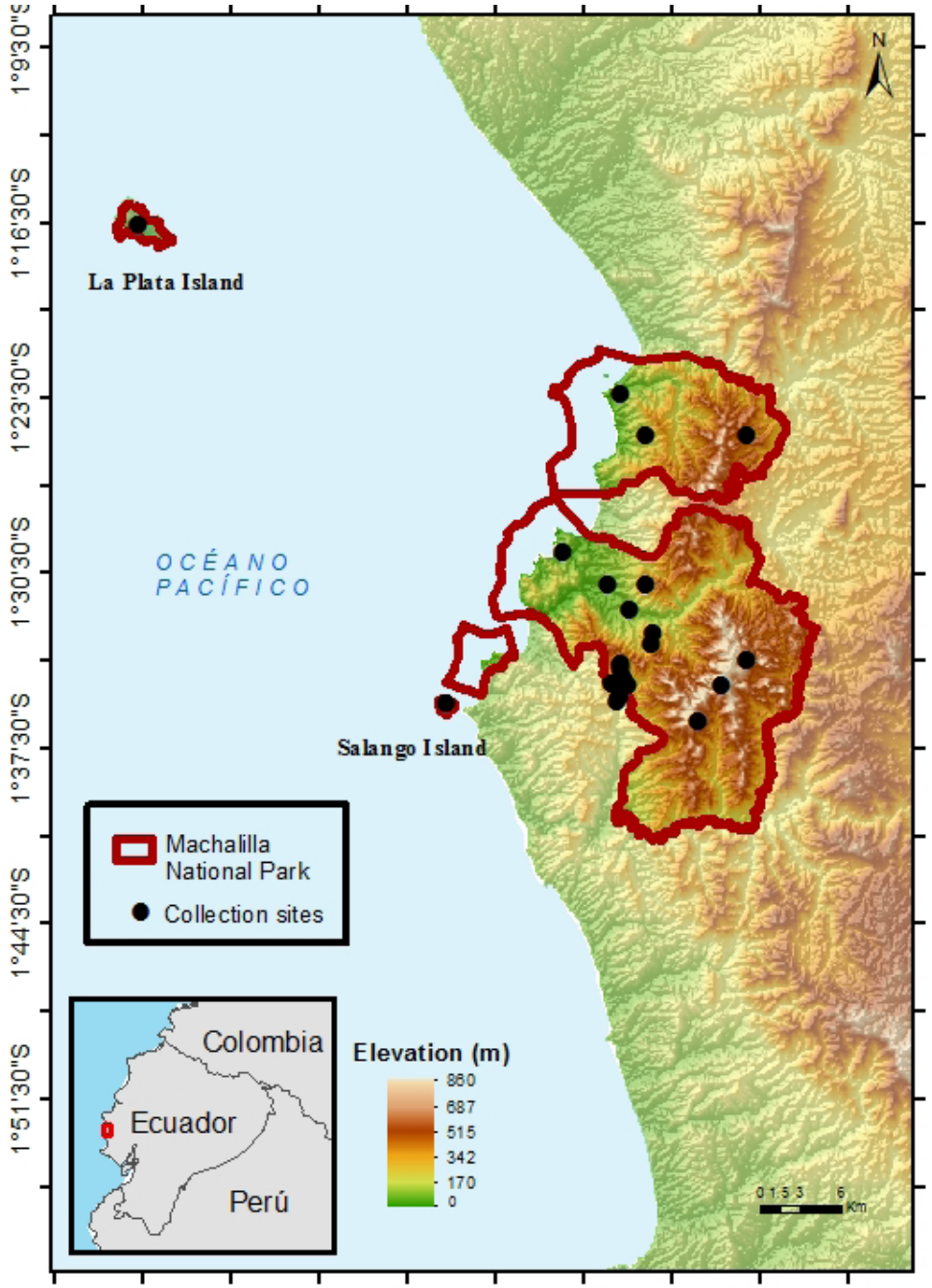


**Fig. 1.** Location map of Machalilla National Park, Manabí and collection sites


Fig. 2. A. *Ceiba trischistandra* (A. Gray) Bakh. , a typical tree species of deciduous forest.; B. Forest landscape of Machalilla National Park.