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Floristic Characterization of the Padre Julio Marrero Botanical Garden: A Contribution to Biodiversity Conservation in the Ecuadorian Chocó

María Cristina Castillo Torres

Directora: Erika Priscilla Muriel Mera

Quito, 2024

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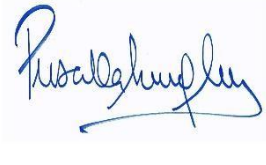

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DECLARACIÓN DE APORTES DE TERCEROS

En la elaboración de esta tesis titulada "*Floristic Characterization of the Padre Julio Marrero Botanical Garden: A Contribution to Biodiversity Conservation in the Ecuadorian Chocó*", he contado con la colaboración y apoyo de diversas personas e instituciones, cuyas contribuciones han sido fundamentales para el desarrollo y culminación de este trabajo de investigación. A continuación, detallo sus aportes específicos:

1. **PhD, Priscilla Muriel, Directora de tesis**. Supervisión y orientación académica durante todo el proceso de investigación. Revisión crítica de los capítulos y sugerencias para mejorar la estructura y contenido del documento.
2. **Mgtr. Álvaro Pérez.** Supervisión y orientación académica durante todo el proceso de investigación. Aporte de conocimientos en la identificación de las muestras y redacción del contenido del documento.
3. **Mgtr. Francisco Sánchez.** Apoyo en la recolección y clasificación de muestras de plantas a lo largo del jardín botánico.
4. **Trabajadores del Jardín Botánico Padre Julio Marrero**. Asistencia en el trabajo de campo. Aporte de conocimientos locales sobre la biodiversidad de la provincia Santo Domingo de los Tsáchilas.
5. **Pontificia Universidad Católica Sede Santo Domingo**. Financió las visitas al Jardín Botánico Padre Julio Marrero en el marco del proyecto *"Estudio de la biodiversidad de plantas, hongos y fauna del Jardín BOotánico Padre Julio Marrero, Santo Domingo"* (Código: PI-05-CP-PUCESD-2023), facilitando el desarrollo de esta investigación.
6. **Mg. Santiago Bravo.** Gestión en la logística de las visitas al Jardín botánico.

Agradezco profundamente a todas las personas e instituciones mencionadas por su valiosa colaboración y apoyo, sin los cuales esta investigación no habría sido posible.

DEDICATORIA

Este trabajo de investigación está dedicado a mi familia por su apoyo incondicional a lo largo de este proceso. En especial, a mis padres, quienes son un pilar fundamental en mi vida y me han inculcado valores de responsabilidad, constancia, disciplina y esfuerzo en cada desafío.

RESUMEN

Ecuador, reconocido como uno de los países con mayor biodiversidad del mundo, abarca la región del Chocó, un punto crítico mundial de biodiversidad y endemismo. Dentro de esta región se encuentra el Jardín Botánico Padre Julio Marrero (JBPJM) en Santo Domingo de los Tsáchilas, una zona que representa una transición ecológica entre las tierras altas andinas y la costa del Pacífico. A pesar de la importancia bien documentada de la diversidad de palmas en Ecuador, particularmente en el Chocó, no se había realizado un inventario florístico exhaustivo del JBPJM antes de este estudio. Esta investigación presenta un inventario florístico detallado y un análisis espacial de la diversidad de plantas en los dos senderos principales del JBPJM. Se documentó un total de 463 plantas, de las cuales 456 se recolectaron e identificaron con éxito, abarcando 93 especies, 81 géneros y 30 familias. El jardín botánico presenta una notable biodiversidad, siendo Arecaceae, Fabaceae y Rutaceae las familias más representativas. El Sendero de las Palmeras y el Sendero de los Botánicos se identificaron como zonas clave de biodiversidad debido a su accesibilidad, el elevado tráfico de visitantes y la rica diversidad de plantas, lo que contribuye significativamente al valor ecológico global del jardín. El análisis espacial en siete zonas distintas reveló variaciones en la distribución de las especies, siendo el sendero de las palmeras el que mostró la mayor abundancia y riqueza de especies. A pesar de las dificultades para la identificación de especies y la recogida de muestras, este estudio proporciona información esencial sobre la composición florística del JBPJM. Situado en la intersección de los Andes y las llanuras costeras, el jardín sirve como reserva vital de biodiversidad, destacando su papel en los esfuerzos de conservación y la investigación ecológica.

Palabras clave: Inventario florístico, Chocó ecuatoriano, conservación de biodiversidad, jardín botánico, usos etnobotánicos.

ABSTRACT

Ecuador, recognized as one of the most biodiverse countries globally, encompasses the Chocó region, a critical global hotspot for biodiversity and endemism. Within this region lies the Padre Julio Marrero Botanical Garden (JBPJM) in Santo Domingo de los Tsáchilas, an area representing an ecological transition between the Andean highlands and the Pacific coast. Despite the well-documented significance of palm diversity in Ecuador, particularly in the Chocó a comprehensive floristic inventory of the JBPJM had not been conducted prior to this study. This research presents a detailed floristic inventory and spatial analysis of plant diversity on the two main trails of the JBPJM. A total of 463 plants were documented, of which 456 were successfully collected and identified, encompassing 93 species, 81 genera, and 30 families. The botanical garden exhibits notable biodiversity, with Arecaceae, Fabaceae, and Rutaceae emerging as the most representative families. The Palms Path and Botánicos Path were identified as key areas of biodiversity due to their accessibility, high visitor traffic, and rich plant diversity, significantly contributing to the overall ecological value of the garden. Spatial analysis across seven distinct zones revealed variation in species distribution, with the Palms Path showing the highest abundance and species richness. Despite challenges in species identification and sample collection, this study provides critical insights into the floristic composition of JBPJM. Situated at the intersection of the Andes and coastal plains, the garden serves as a vital reservoir of biodiversity, emphasizing its role in conservation efforts and ecological research.

Keywords: Floristic inventory, ecuadorian Chocó, biodiversity conservation, botanical garden, ethnobotanical uses.

OBJETIVO GENERAL

Caracterizar la diversidad florística del Jardín Botánico Padre Julio Marrero, para su conservación y manejo.

OBJETIVOS ESPECÍFICOS

- Identificar y caracterizar la flora presente en dos de los senderos principales del Jardín Botánico Padre Julio Marrero.
- Determinar el grado de representatividad de las especies introducidas en relación con las especies nativas de las zonas de vida de la provincia.

DESCRIPCIÓN DEL MANUSCRITO

El presente manuscrito, titulado "*Floristic Characterization of the Padre Julio Marrero Botanical Garden: A Contribution to Biodiversity Conservation in the Ecuadorian Chocó*", ha sido presentado para consideración de publicación de la Revista **Plant Diversity**. El manuscrito ha sido escrito siguiendo los lineamientos de la revista que se encuentran disponibles en el siguiente **enlace**.

La revista Plant Diversity se encuentra indexada en la base de datos de Scopus, de acuerdo con la información del siguiente **enlace**.

MANUSCRITO

A continuación, a manera de anexo, se incluye en manuscrito enviado a la revista científica Plant Diversity.

Highlights

Floristic Characterization of the Padre Julio Marrero Botanical Garden: A Contribution to Biodiversity Conservation in the Ecuadorian Chocó

Cristina Castillo-Torres, Priscilla Muriel, Álvaro Pérez, Francisco Sánchez

- Within the Floristic Inventory of Padre Julio Marrero Botanical Garden (JBPJM), a total of 96 species were documented, distributed across 81 genera and 30 families. The study highlighted the garden's biodiversity, with the Arecaceae family being the most representative.
- The JBPJM plays a crucial role in ex situ conservation of threatened species and the preservation of ancestral knowledge. Its location in the Ecuadorian Chocó, one of the world's most biodiverse and threatened regions, underscores its significance in protecting native species.
- While the garden harbors native species, the predominance of introduced species poses conservation challenges. Some exotic species may impact the local ecosystem, highlighting the need for sustainable management strategies.

Floristic Characterization of the Padre Julio Marrero Botanical Garden: A Contribution to Biodiversity Conservation in the Ecuadorian Chocó

Cristina Castillo-Torres[a], Priscilla Muriel[b,*], Álvaro Pérez[b], Francisco Sánchez[c] ,Santiago Bravo

[a]*Maestría en Biológica mención Conservación y Manejo de Recursos Naturales, Pontificia Universidad Católica del Ecuador PUCE, Quito, 170143, Ecuador*
[b]*Escuela de Ciencias Biológicas, Pontificia Universidad Católica del Ecuador PUCE, Quito, 170143, Ecuador*
[c]*Jardin Botánico Padre Julio Marrero, Pontificia Universidad Católica del Ecuador PUCE, Santo Domingo, 230203, Ecuador*

Abstract

Ecuador, recognized as one of the most biodiverse countries globally, encompasses the Chocó region, a critical global hotspot for biodiversity and endemism. Within this region lies the Padre Julio Marrero Botanical Gar- den (JBPJM) in Santo Domingo de los Tsáchilas, an area representing an ecological transition between the Andean highlands and the Pacific coast. Despite the well-documented significance of palm diversity in Ecuador, particularly in the Chocó a comprehensive floristic inventory of the JBPJM had not been conducted prior to this study.

This research presents a detailed floristic inventory and spatial analysis of plant diversity in the JBPJM. A total of 463 plants were documented, of which 456 were successfully collected and identified, encompassing 93 species, 81 genera, and 30 families. The botanical garden exhibits notable biodiver- sity, with Arecaceae, Fabaceae, and Rutaceae emerging as the most representative families. The Palms Path and Botánicos Path were identified as key areas of biodiversity due to their accessibility, high visitor traffic, and rich plant diversity, significantly contributing to the overall ecological value of the garden.

Spatial analysis across seven distinct zones revealed variation in species

*Corresponding author: P. Muriel - epmuriel@puce.edu.ec

distribution, with the Palms Path showing the highest abundance and species richness. Despite challenges in species identification and sample collection, this study provides critical insights into the floristic composition of JBPJM. Situated at the intersection of the Andes and coastal plains, the garden serves as a vital reservoir of biodiversity, emphasizing its role in conservation efforts and ecological research.

Keywords:
Floristic inventory, Ecuadorian Chocó, Biodiversity Conservation, Botanical garden, Ethnobotanical uses

1. Introduction

The ongoing degradation of our environment by a variety of factors has resulted in significant loss of biodiversity, degradation of vital ecosystems and increased risks associated with climate change [1]. This highlights the urgency of adopting measures focused on conservation and sustainability. One of the challenges for the effective implementation of conservation and sustainability measures of a given area is to have up to date information about its biodiversity through an inventory [2].

Despite the efforts of scientists, the study and conservation of flora remains a challenge due to the large number of species and regions yet to be explored [3]. Therefore, floristic inventories address this gap by documenting and cataloging species, describing habitats, and evaluating ecological processes. These tools are particularly valuable for identifying overlooked species, including those with potential medicinal and nutritional uses [4, 2]. Botanical gardens play a crucial role in global biodiversity conservation through ex situ preservation, environmental education, and scientific research. Their floristic inventories have proven invaluable for developing conservation strategies, managing invasive species, and assessing genetic variability [5]. For instance, inventories at the Rio de Janeiro Botanical Garden have informed conservation management plans, while the Bali Botanical Garden has used them to control species threatening local ecosystems [6, 7]. According to Botanic Gardens Conservation International (BGCI), there are approximately 3,064 botanical gardens worldwide [8]. In Ecuador, BGCI records 21 botanical gardens, including the Reinaldo Espinosa Botanical Garden in Loja and the Quito Botanical Garden. These gardens play a critical role in the country's conservation efforts by implementing ex situ strategies, such as nurseries and germplasm banks, to protect species of ecological, biological, and medicinal importance. Their floristic inventories have generated essential data on species richness, diversity, and applications [9, 10].

Beyond documenting species, botanical gardens are invaluable for preserving ancestral knowledge, as they foster connections between biodiversity and cultural heritage. Inventories enable these institutions to specialize, strengthening their ties to local ecosystems while promoting awareness of conservation, sustainability, and the cultural significance of plants. This dual role reinforces their importance as stewards of both biological and cultural diversity [11, 12].

The Padre Julio Marrero Botanical Garden (JBPJM), located in Ecuador's Chocó biogeographic region, stands out as one of the country's largest botanical gardens. Although internationally accredited and a member of regional and technical networks, the JBPJM lacks a comprehensive floristic inventory. Its strategic location in the Chocó region one of the most biodiverse areas in the world, underscores its significance for plant conservation. In Ecuador, the Chocó region covers Esmeraldas, Manabí, Pichincha, Santo Domingo de los Tsáchilas, Los Ríos and Guayas provinces [13]. It also extends over altitudes of 800 to 1000 m [13]. This region is home to diverse ecosystems such as the low montane evergreen forest of the Chocó Coastal Range, the sea- sonal piedmont evergreen forest of the Chocó Coastal Range, mangroves and flooded grasslands [14], among others, with around 3000 species of vascular plants, 40% of which are endemic [15].

Ecuadorian Chocó faces severe threats from deforestation, resource exploitation, agriculture, mining, and tourism, with 61% forest loss (1.8 million hectares) [16]. Montane forests alone have lost 7,405 km^2 between 1990 and 2016, 60% of which is in the Western Cordillera [17]. These challenges highlight the urgent need for conservation and restoration efforts, as well as the critical role of botanical gardens like the JBPJM in protecting the region's biodiversity.

This study aimed to characterize the floral diversity within the JBPJM, differentiating native and introduced species, identifying highly endangered endemic plants, and exploring their potential uses. By generating comprehensive data on the garden's flora, this research supports conservation initiatives, preservation of ancestral knowledge, and sustainable resource management in the Ecuadorian Chocó.

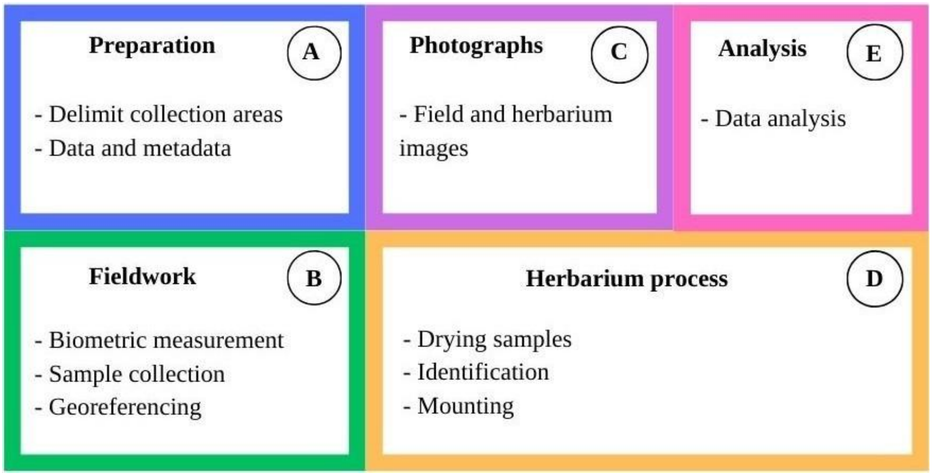


Figure 1: Block diagram of the floristic inventory process at the JBPJM

2. Methodology

The workflow used to develop the JBPJM inventory is shown in Fig. 1.

2.1. Study Preparation

2.1.1. Study Area

The Padre Julio Marrero Botanical Garden (JBPJM), inaugurated on April 26, 2003, is located in the tropical western region of Ecuador, within the province of Santo Domingo de los Tsáchilas ($0^o15'15''S$ $79^o0'19''O$). This botanical garden encompasses an area of 17 hectares and is divided into two main sections: the Secondary Forest (zones 20 to 28) and the Exhibition Collections (zones 1 to 13) (Fig. 2). The Exhibition Collections feature specialized areas such as the Palms Path (zone 9), Citrus (zone 13), Fruit Trees (zone 6), Zingiberales (zone 3), Medicinal (zone 5), Botánicos Path (zone 8), and part of the Regeneration Area.

The region's climate is rainy and tropical, with an average temperature of 23^oC and annual precipitation ranging from 3000 and 4000 mm of annual rainfall [18]. These conditions contribute to the richness and diversity of the flora present in the garden.

This study was carried out within the Exhibition Collections of the JBPJM, focusing on the collection and analysis of plant samples. Sampling was conducted from January 24 to May 2, 2024, in alignment with the garden's divisions and thematic areas to ensure comprehensive coverage.

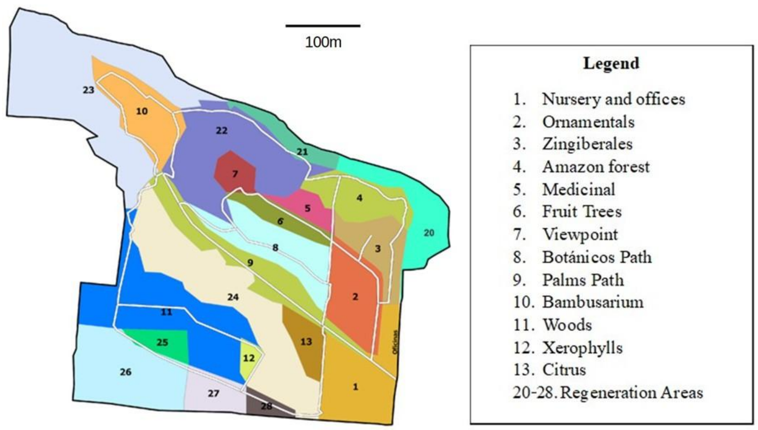


Figure 2: Zoning map of the Padre Julio Marrero Botanical Garden

2.2. Fieldwork

2.2.1. Plant Coding and georeferencing

For this study, we assigned alphanumeric codes to the individuals housed at the JBPJM, in order to associate them with their taxonomic identity and to facilitate their location in the different zones of the garden. These codes were displayed on aluminium tags attached to the trunks of the plants.

The code consisted of three parts XXZYYYY, where XX is the zone number (see Fig. 2), Z is the initial of the zone name and YYYYY is the plant number. Hence, we used the following names and codes: Palms Path (9PYYYY), Citrus (13CYYYY), Medicinal (5MYYYY), Zingiberales (3ZYYYY), Regeneration Area (22RYYYY), Fruit Trees (6FYYYY), Botánicos Path (8AYYYY).

Additionally, we georeferenced each plant using a Garmin GPSmap 60CSx GPS receiver and recorded positions in the UTM (Universal Transverse Mercator) coordinate system.

2.2.2. Biometric measurement

During the collection of plants samples, we considered different categories of plant habits: the shrub stratum (ar), from 1.5 to 5 metres; the sub-arboreal stratum (Ar), from 5 to 12 metres; the lower arboreal stratum (Ai), from 12 to 25 metres; and the upper arboreal stratum (As), from 25 metres and above. These categories were proposed by [19]. Additionally, we measured tree height using a Nikon Forestry Pro II hypsometer at a fixed distance of 15 metres, as outlined in the methodology section of [20]. We measured diameter at breast height (DBH) in trees at 1.30 m above ground level, while low shrubs with low branching were measured at 10 cm above ground level, as recommended by [21].

2.2.3. Reference collection

We collected fertile herbarium vouchers for the species present at the JBPJM, in order to ensure the reliability of the taxonomic identification, gathering leaves, flowers, fruits, and buds [22]. For sterile individuals, we sampled both juvenile and mature parts to ensure a thorough morphological representation, for improving taxonomic accuracy and facilitating the analysis of ontogenetic adaptations, which are crucial for species conservation [23].

The vegetative parts were placed in black plastic bags labeled with the respective code, while the flowers and fruits were stored in transparent bags containing 70% ethanol, each marked with their corresponding code.

2.3. Field and herbarium photographs

We compiled a field photographic register that included images of various plant elements: entire plant (pc); bark (c); upper leaves (hh); lower leaves (he); flower (fl); fruit (fr); and stem (t). In the repository, we assigned alphanumeric codes to the photographs, using the sample code followed by the field photo code. For example: Photograph 5M003c (see Fig. 3b) corresponds to the bark of *Bixa orellana*, while the whole plant is 5M003pc (see Fig. 3a) The photographs were referenced as follows: Fig. 3a 5M003pc displays the entire plant, which is identified with the same code. The bark is presented in Fig. 3b, while Fig. 3c depicts the stem, labeled 5M003t, and Fig. 3d illustrates the flower, marked 5M003fl.

On the other hand, we took photographs of the herbarium samples within two hours of collection to ensure that their color remained unaltered. To standardize the color, we employed RAW photos in DNG format with Calibrite PROFILER color profiling. The images were taken against a black background, showing the following elements: the upper leaves (hh), the lower leaves (he), the flower (fl), and the fruit (fr). Figure 3 displays an example of the photographic documentation of the species *Bixa orellana* L., as observed in the herbarium. Figure 3d shows the leaves, flower, and fruit of the *Bixa orellana* L. specimen. The upper side of the leaf is presented in Fig. 3f, while the underside appears in and Fig. 3g. Finally, the fruit is depicted

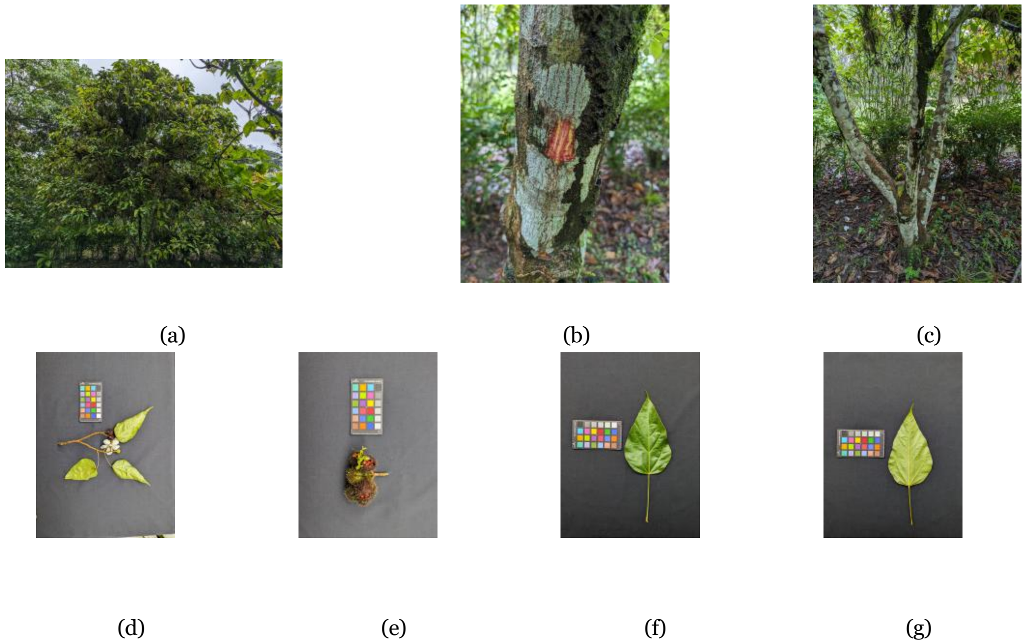


Figure 3: Field and laboratory images for *Bixa orellana*: a) Habit, b) Bark, c) Branches d) Leaves and flower, e) Fruit, f) Leaf upper side g) Leaf underside

in Fig. 3e. The complete photographic collection, which includes both field and herbarium samples, is available for consultation in the repository[1].

2.4. Herbarium processing

2.4.1. Identification

We identified the collected specimens by comparing them with photographs, dichotomous keys, and specimens from the QCA Herbarium at the Pontifical Catholic University of Ecuador. We used resources such as the Red Book of Endemic Plants of Ecuador, Dichotomous keys for plant families, and databases including Tropicos, GBIF, and INABIO. Experts from the QCA Herbarium validated and confirmed the identification.

2.5. Origin and Conservation Status

The species were categorized as either native or introduced. Their global conservation status was determined based on the Red List of Threatened

[1] Repositorio Fotográfico

Species of the International Union for Conservation of Nature, ensuring a standardized and consistent evaluation.

3. Results

3.1. Georeferencing

We georeferenced 456 individuals, Fig. 4 shows the spatial distribution of all identified samples, across the seven distinct zones within the botanical garden. Each zone is represented by a specific color: pink for Zingiberales, blue for Medicinal, purple for Fruit Trees, red for the Botánicos Path, orange for the Palms Path, green for Citrus, and turquoise for part of the Regeneration Area. This color-coded visualization highlights the contributions of each zone to the overall floristic characterization, emphasizing the prominence of the Palms Path and Botánicos Path due to their accessibility, high foot traffic, and significant plant diversity.

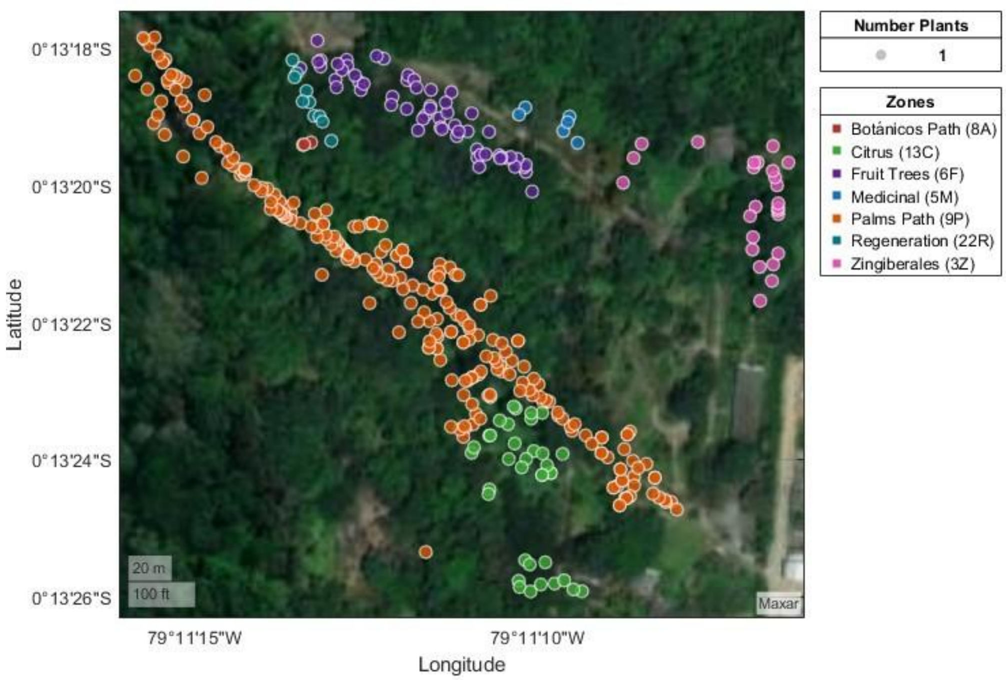


Figure 4: Georeferenced map of the plant samples collected

3.2. *Floristic Inventory*

3.2.1. *Floristic characterization data*

Overall, the JBPJM includes a total of 107 species, distributed across 30 families and 81 genera. Of these, 93 species (86.9\%) were identified at the species level, while 14 species (13.1\%) were identified only at the family and genus levels, or could not be identified due to missing samples or photographic records. Despite these limitations, all plants were coded, and the total inventory recorded an abundance of 456 individuals. Considering the individuals not sampled or photographed, the total estimated abundance of plants in the garden increases to 463 individuals.

The JBPJM features several representative families, including Arecaceae (26 species), Fabaceae (8 species), Rutaceae (5 species), and Lamiaceae (4 species), as illustrated in Fig. 5. We collected and characterised 171 individuals of the Arecaceae family, which accounts for 37.1% of the total samples gathered.

The genera with the highest number of species were *Citrus* (5 species), followed by *Cecropia*, *Areca*,*Phoenix*, and *Psidium* (each with 2 species). The other genera were represented by a single species.

Fig. 6b presents the distribution of the plants samples along the JBPJM, highlighting the predominance of the Arecaceae family in the Palms Path. However, the other plant families are distributed throughout the JBPJM, without a clear organisation.

3.3. *Photographic catalogue and morphological description*

We obtained a total of 1,025 photographs and documented 456 samples in the catalogue. Each species was listed with its respective family, scien- tific name, morphological description, origin, and threat category, along with accompanying photographs.

The species displayed a range of growth habits, with trees making up 96% and shrubs comprising 4%. Among the trees, we observed species such as *Ceiba pentandra* (L.) Gaertn., *Hura crepitans* L., *Cordia alliodora* (Ruiz & Pav.) Oken, *Erythrina fusca* Lour., *Minquartia guianensis* Aubl., which reached heights of 20 meters or more. Among the shrubs, the most abundant genera were *Psidium*, *Nephelium*, and *Citrus*.

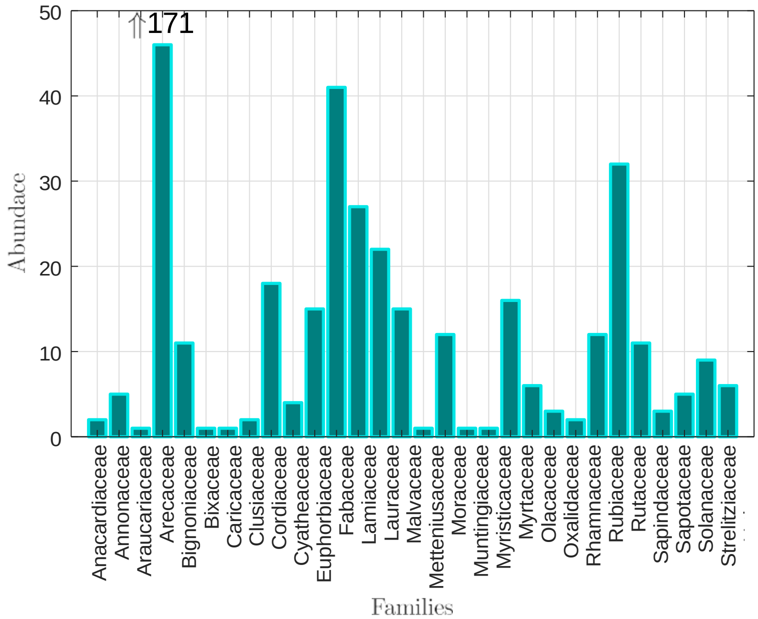
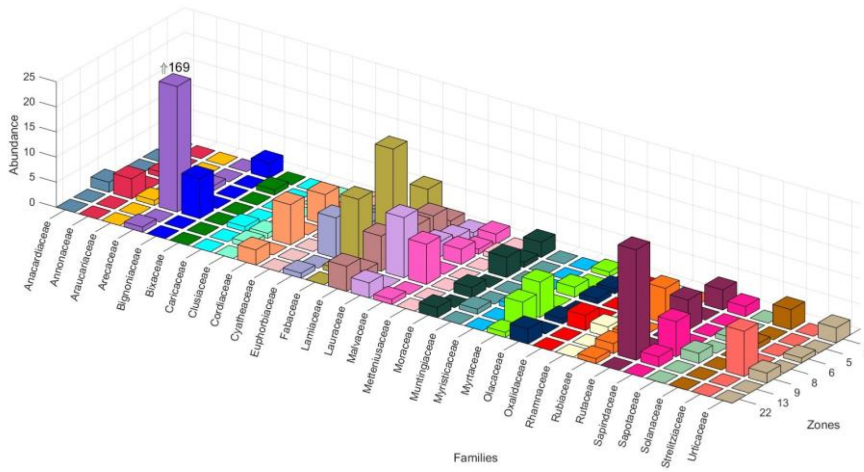


Figure 5: Abundance by family at JBPJM

3.4. Origin

Of the 96 species recorded, 56% are introduced species and 44% are native (see, Table A.1). This distribution is illustrated in Fig. 7, which presents the georeferencing of native and introduced plants. As illustrated in Fig. 7, there is no discernible distinction between native and introduced plants. This is due to the fact that at the beginning, certain portions of the land were designated for cultivation. Consequently, there are instances where cultivated plants, such as cocoa and banana, coexist with natural pioneer wild species in the recolonization of the space (Melastomataceae, Piperaceae, Moraceae). This is corroborated by the findings of the study by [24], which indicates that most botanical gardens were not established with the explicit objective of conserving biodiversity.

Fig. 8 shows the abundance of individuals by family, highlighting the dominance of introduced species (orange) over native species (blue) in most cases. Arecaceae stands out as the most abundant family, primarily composed of introduced species, followed by Fabaceae and Rutaceae, which also have a significant presence of introduced individuals. Conversely, families



(a)

(b)

Figure 6: Plant distribution by Zones at the JBPJM: a) Abundance per family by zones, b) Georeferencing map for plant sample per family.
The colors used in the map and histogram correspond to the same family.

Figure 7: Georeferencing map for native and introduced species

like Lamiaceae, Euphorbiaceae, Moraceae, and Rubiaceae show a notable proportion of native species, albeit with lower overall abundances.

3.5. Conservation Status

Within the IUCN threat categories, the plants identified in the JBPJM are distributed as follows: 32.21% corresponds to Not Evaluated (NE), 1.45% Data Deficient (DD), 60.53% Least Concern (LC), 3.15% Near Threatened (NT), 1.69% Vulnerable (VU) and 0.97% Endangered (EN). This is shown in Figure 9. The existence of 32.21% of NE species demonstrates that the botanical garden also harbours plants whose conservation status is not yet fully documented. This may be indicative of a focus on the research and conservation of lesser-known or newly described species, such as: *Phoenix roebelenii* O'Brien, *Pinanga coronata* (Blume ex Mart.) Blume, *Ptychosperma macarthurii*, *Raphis excelsa*, *Euterpe oleracea*, *Mauritia flexuosa* L.

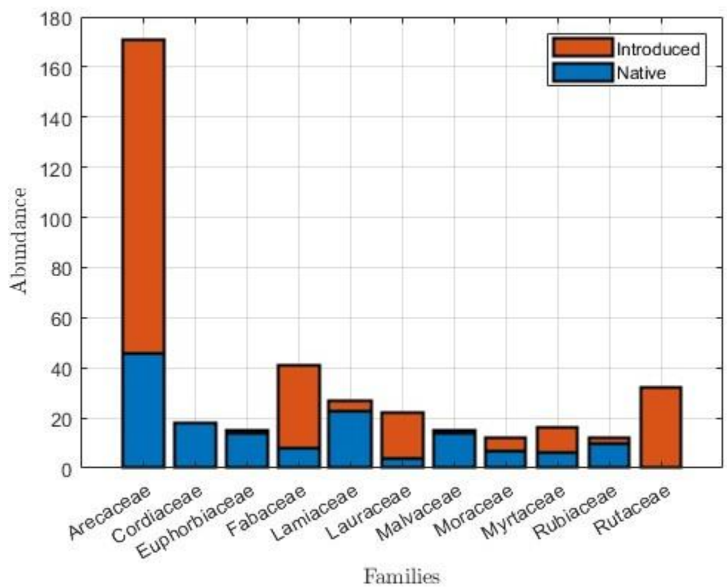


Figure 8: Abundance by family at JBPJM, highlighting Native and Introduced species

f., *Prestoea schultzeana* (Burret) H.E. Moore, *Citrus x sinensis* (L.) Osbeck, *Citrus reticulata*, *Mutingia calabura* L., *Croton lechleri*.

Four species are classified as Vulnerable (VU):*Dypsis decaryi* (Jum.) Beentje & J. Dransf. (Madagascar), *Adonidia merrillii* (Philippines), *Handroanthus chrysanthus* (Jacq.) S.O. Grose (American intertropical zone) and *Araucaria heterophylla* (Salisb.) Franco (Australia).

Most of the plants recorded in the JBPJM belong to the LC category, which may be due to their abundance, wide distribution, and hardiness. In addition, many of these species are easy to grow and have high aes- thetic value, making them ideal choices for garden displays. Examples of native species within this category include *Iriartea deltoidea*, *Socratea exor- rhiza* (Mart.) H. Wendl., *Bactris gasipaes* Kunth, *Aegiphila alba* Moldenke, *Rollinia mucosa* (Jacq.) Baill., *Alibertia patinoi* (Cuatrec.) Delprete & C.H. Perss., *Spondias mombin* L., *Pourouma cecropiifolia* Mart., *Ceiba pentandra*, *Cordia alliodora*, *Brosimum guianense* (Aubl.) Huber, *Hura crepitans* L., *Caryodendron orinocense* H. Karst.

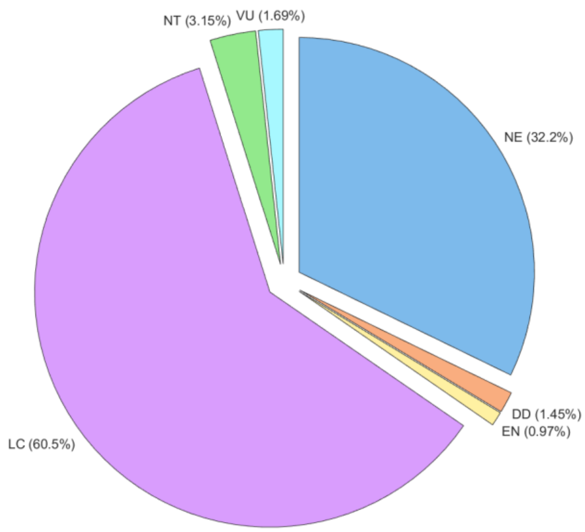


Figure 9: Conservation status for the plant samples at JBPJM

3.6. Use categories

Each species listed in Table A.1 has been assigned to one or more use categories. A comparison between native and introduced plants in terms of uses is shown in Figure 10. It can be seen that the use of native and introduced species is similar in terms of quantity, with the exception of medicinal use and construction, where there is a greater presence of native species in medicinal use, whereas the majority of introduced species are used in construction. This is related to the fact that introduced plant species can be as valuable as native species, which is reflected in their different uses and even as a source of food for many native animals, and in some cases even more beneficial [25]. The main use of native species for medicinal purposes is related to ethnobotanical, or traditional uses.

3.6.1. Ethnobotanical uses

Some of the plants conserved in the JBPJM are used by the Tsáchila ethnic group, who live in the same region where the botanical garden is located. These plants have medicinal and ritual uses, and most of them are collected from patches of disturbed and secondary forest. Examples of these plants are

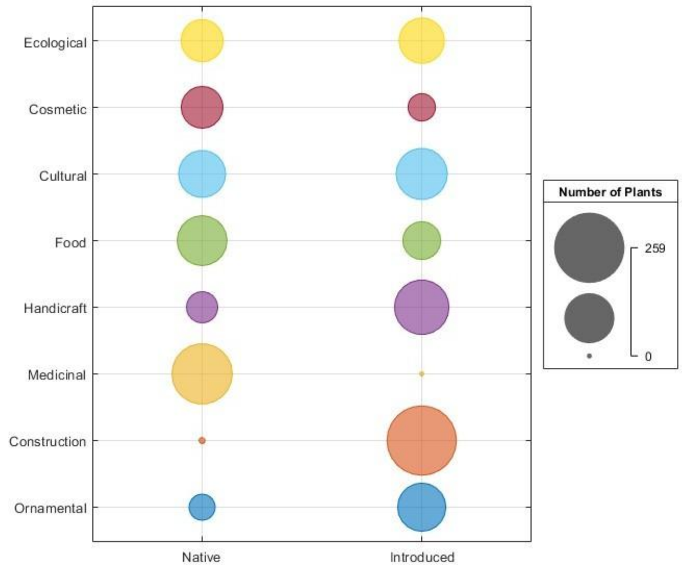


Figure 10: Comparison of uses between native and introduced species

Bixa orellana: Used to dye the hair of the Tsáchilas and as an anticancer agent [26]. *Bauhinia forficata* Link: Used for skin problems. *Bactris gasipaes*: Has food uses. The fruits are cooked and, when ripe, made into chicha. The tender fruits are eaten raw and the young leaves (buds) are eaten as palm heart. *Annona muricata* L.: Used in both medicine and food. The decoction of the leaves is used in hot baths for pregnant women two or three days before childbirth to give them strength. The ripe fruits are eaten as food. *Inga edulis*: It has medicinal, food and fuel uses. The infusion of the leaves is used in hot baths and vaporisations. The ripe fruits are eaten and the trunk is used for firewood. *Ceiba pentandra*: Valued for its wood, which is used to make canoes and formwork. The cotton from its seeds is also used to make pillows and mattresses. As for its ritual use, it was believed that the thorns of the tree could cause tumours if touched, so people avoided going near it when it was growing [27].

4. Discussion

4.0.1. Anthropogenic Impacts on the Chocó region

The province of Santo Domingo de los Tsáchilas, situated within the Chocó region, one of the most biodiverse areasworldwide, is undergoing accelerated landscape transformation due to urban expansion and intensified anthropogenic activities. Livestock farming dominates land use, encompassing 51.01% of the cantonal territory, while agricultural activities, representing 22.58%, also drive significant changes in land use. Among the primary crops cultivated are cacao (27.26%), plantain (24.02%), oil palm (20.62%), palm heart (7.40%), and cassava (4.57%) [28]. These transitions led to the conversion of natural and agricultural areas into impervious surfaces, negatively impacting ecosystems by reducing vegetation cover and limiting the productive capacity of natural landscapes [29, 30, 31].

4.0.2. Role of Botanical Gardens in Conservation and Climate adaptation

Amid these environmental pressures, botanical gardens have emerged as vital institutions for the conservation of biodiversity and adaptation to climate change. By integrating sociocultural and ecological dimensions, they offer solutions to complex environmental challenges [32]. With extensive plant collections, historical records, and outreach initiatives, botanical gardens contribute to the preservation of plant diversity, facilitate scientific research, and maintain seed banks essential for restoration and reintroduction efforts [33]. Furthermore, they provide critical insights into species responses to climate change and act as early detection systems for emerging plant pests and diseases [34]. These functions are complemented by their role in community engagement through environmental education and citizen science programs, which foster collective action and promote ecosystem protection.

4.0.3. Floristic contributions of the JBPJM

The JBPJM houses a collection of 96 species, distributed across 30 families and 81 genera. The Arecaceae family is the most prominent, accounting for 37.1% of the total specimens collected. A notable observation, however, is the predominance of introduced palm species over native ones within the garden. This imbalance may reflect historical and logistical factors influencing plant selection in botanical gardens, such as accessibility, ornamental value, and adaptability to managed environments.

Despite this, the garden includes native palm species, such as *Bactris gasipaes*, *Attalea colenda* (O.F. Cook) Balslev & A.J. Hend., *Euterpe oleraceae* Mart., *Iriartea deltoidea* Ruiz & Pav. [35], emphasizing their ecological importance and the garden's role in showcasing Ecuador's natural heritage.

The garden also features a variety of species from the Fabaceae family, which accounts for 9% of the plant samples collected. This reflects the family's regional diversity, particularly in Ecuador's coastal region, as observed by [36].

While the prevalence of introduced species may challenge the garden's role in promoting local biodiversity, the inclusion of native species underscores its commitment to conservation, education, and raising awareness of Ecuadorian flora.

4.0.4. Ex Situ Conservation of threatened species

The JBPJM plays an important role in both global and regional conservation efforts by housing species that are classified as threatened. Although the majority of plants in the garden fall under the LC category, 1.69% of the species are classified as VU and 0.97% as EN. Notably, most of these threatened species are introduced such as *Dypsis decaryi*, *Adonidia merrillii* and *Araucaria heterophylla*.

Among the native species listed as VU presented in the JBPJM is *Handroanthus chrysanthus*. However there are species native of Ecuador sucha as *Ceroxylon echinulatum* Galeano, *Nectandra* cf. *subbullata* Rohwer, *Blakea rotundifolia* D. Don [17] and others that are endemic to the Chocó and are in this category such as *Huberodendron patinoi* Cuatrec. [37] that conserve biodiversity, support local fauna, require fewer resources and are essential for research, environmental education, and cultural preservation.

In addition, other native species, which are not represented in the gar- den, are classified as EN. These include *Persea brevipes* Meisn., *Graffenrieda calyptrelloides* Wurdack, *Brunellia inermis* Ruiz & Pav., and *Ruagea microphylla* W. Palacios. These species highlight the garden's commitment to conserving Ecuador's native biodiversity.

4.0.5. Introduced and Invasive Species

However, the introduction of non-native species presents additional challenges for botanical gardens and the ecosystems they aim to protect. Globally, 3.9% of vascular plant species have been introduced and naturalized outside their native ranges [38]. In Ecuador, although a comprehensive inventory of introduced species is lacking, preliminary estimates suggest approximately 677 introduced taxa, 13% of which are considered invasive globally [39]. Within the JBPJM, introduced species such as *Spathodea campanulata*, *Roystonea oleracea*, *Roystonea regia*, and *Cocos nucifera* are prominent [40, 41]. While these species contribute to the aesthetic and cultural value of urban landscapes, invasive taxa like *Spathodea campanulata* one of the 100 most harmful invasive species globally pose significant ecological risks [42]. The limited availability of updated inventories and distribution data for invasive species in Ecuador further exacerbates these risks, underscoring the importance of research and monitoring to mitigate their potential impacts on ecosystem structure and function [43].

Thus, the JBPJM not only serves as a repository for regional biodiver- sity but also plays a critical role in addressing global and local conservation challenges. By conserving threatened species, monitoring invasive taxa, and fostering public engagement, the garden exemplifies how botanical institutions can balance the preservation of ecological integrity with the demands of urbanized landscapes.

4.0.6. Ethonotanical uses

The species diversity at the JBPJM reflects the floristic richness of the region and its cultural, economic, and ecological significance. The predominance of the Arecaceae family likely highlights its ecological importance and extensive ethnobotanical applications. Native species such as *Mauritia flexuosa* L.f., *Bactris gasipaes*, and *Iriartea deltoidea* provide essential non-timber products, emphasizing the conservation value and sustainable use potential of this family.

In Santo Domingo de los Tsáchilas, the Tsáchilas people have maintained deep knowledge of the medicinal and utilitarian properties of plants despite challenges such as territorial loss and economic integration. This ancestral knowledge forms a cornerstone of their cultural identity. Notable species used by this community, including *Iriartea deltoidea* and *Bixa orellana* [37], underscore the critical role of native plants in both subsistence and cultural preservation. This knowledge is closely tied to the evergreen montane piedmont forest ecosystem, which harbors economically and culturally valuable native species like *Oenocarpus bataua*, *Carludovica palmata*, *Phytelephas aequatorialis*, *Socratea exhorriza*,*Wettinia maynensis*,*Guadua angustifolia*, *Geonoma macrostachys*, *Perebea xanthochyma* and *Iriartea deltoidea* [37].

Some of these species, including *Iriartea deltoidea* and *Socratea exhorriza*, are represented in the collections of the JBPJM, highlighting the garden's vital role in ex situ conservation and ethnobotanical research. Furthermore, its efforts contribute to preserving biodiversity and fostering the transmission of cultural knowledge.

Introduced species such as banana (*Musa* spp.), African oil palm (*Elaeis guineensis*), and citrus (*Citrus* spp.) are also integral to local agroproductive systems [44]. The presence of both native and introduced plants, including *Inga* spp., *Bixa orellana*, and *Citrus* spp., in the JBPJM collections underscores its significance as a repository for biodiversity documentation and conservation.

The presence of some species like *Iriartea deltoidea*, *Socratea exhorriza* in the collections of the JBPJM underscores its role as a key site for ex situ conservation and ethnobotanical research while highlighting its potential to support cultural knowledge transmission and biodiversity preservation

The integration of traditional knowledge, the economic importance of these species, and the conservation efforts undertaken by the JBPJM underscore its significance as a bridge between biological diversity conservation and cultural heritage appreciation. Moreover, the inclusion of introduced species in the garden highlights the necessity of responsible management, balancing their contributions to agroproductive systems with the potential risks posed by invasive species. This holistic approach enhances the understanding of the region's plant diversity while fostering conservation strategies that incorporate ecological, economic, and cultural perspectives.

5. Conclusions

The floristic inventory of the Padre Julio Marrero Botanical Garden provides critical insights for the effective management and conservation of its plant collections. The observed disparities in abundance and diversity across zones highlight the necessity of tailoring management strategies to the unique ecological characteristics of each area. Notably, zones such as the Palms Path and the Botánicos Path should be prioritized due to their high levels of biodiversity and significant visitor traffic, which present both opportunities and challenges for conservation efforts.

Moreover, the findings underscore the pivotal role of the JBPJM as a cornerstone for ex situ conservation, particularly for species classified as vulnerable, and as a vital educational and scientific resource within the biodiversity-rich Chocó region. To strengthen its conservation impact, periodic monitoring of diversity and floristic composition is recommended. Such efforts would facilitate the evaluation of ecological changes and enable the continuous adaptation of management strategies in response to the garden's dynamic ecological processes.

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Appendix A. Appendix

In the table A.1, information is presented for all samples collected in the JBPJM, in this table the floristic characterization is highlighted, for which the family, genus and species of each sample are defined. The uses of each species are also indicated. It also includes whether the species is native or introduced to the Chocó region, as well as its conservation status.

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
1	9P001	9	Arecaceae	Phoenix	*Phoenix roebelenii*	A	I	Or	NE
2	9P002	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
3	9P003	9	Arecaceae	Phoenix	*Phoenix roebelenii*	A	I	Or	NE
4	9P004	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
5	9P008	9	Arecaceae	Bismarckia	*Bismarckia nobilis*	A	I	Or	LC
6	9P009	9	Arecaceae	Bismarckia	*Bismarckia nobilis*	A	I	Or	LC
7	9P010	9	Arecaceae	Dypsis	*Dypsis decaryi*	A	I	Or	VU
8	9P011	9	Arecaceae	Pinanga	*Pinanga coronata*	A	I	Or Co	NE
9	9P012	9	Arecaceae	Pinanga	*Pinanga coronata*	A	I	Or Co	NE
10	9P013	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
11	9P014	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
12	9P015	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
13	9P016	9	Arecaceae	Prestoea	*Prestoea schultzeana*	A	N	Me Al Cu	NE
14	9P017	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
15	9P018	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
16	9P019	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
17	9P020	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
18	9P021	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
19	9P022	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
20	9P023	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
21	9P024	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
22	9P025	9	Arecaceae	Attalea	*Attalea colenda*	A	N	Ar Al	NE
23	9P026	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
24	9P027	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
25	9P028	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
26	9P029	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
27	9P030	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
28	9P031	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
29	9P032	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
30	9P033	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
31	9P034	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
32	9P035	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
33	9P036	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
34	9P037	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
35	9P038	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
36	9P039	9	Arecaceae	Phoenix	*Phoenix roebelenii*	A	I	Or	NE
37	9P040	9	Arecaceae	Raphis	*Raphis* sp.	A	I	Or Ec	
38	9P042	9	Arecaceae	Phoenix	*Phoenix roebelenii*	A	I	Or	NE
39	9P043	9	Arecaceae	Phoenix	*Phoenix roebelenii*	A	I	Or	NE
40	9P044	9	Arecaceae	Phoenix	*Phoenix roebelenii*	A	I	Or	NE
41	9P045	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
42	9P046	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
43	9P047	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
44	9P048	9	Arecaceae	Attalea	*Attalea colenda*	A	N	Ar Al	NE
45	9P049	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
46	9P050	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
47	9P051	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
48	9P052	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
49	9P053	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
50	9P054	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
51	9P055	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
52	9P056	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
53	9P057	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
54	9P058	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
55	9P059	9	Arecaceae	Mauritia	*Mauritia flexuosa*	A	N	Co Ar Al	NE
56	9P060	9	Arecaceae	Phoenix	*Phoenix reclinata*	A	I	Ar Al	NE
57	9P061	9	Arecaceae	Phoenix	*Phoenix reclinata*	A	I	Ar Al	NE
58	9P062	9	Arecaceae	Aiphanes	*Aiphanes horrida*	A	I	Or	NE
59	9P063	9	Arecaceae	Aiphanes	*Aiphanes horrida*	A	I	Or	NE
60	9P064	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Al	NE
61	9P065	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
62	9P066	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
63	9P067	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
64	9P068	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
65	9P069	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
66	9P070	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
67	9P071	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
68	9P072	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
69	9P073	9	Arecaceae	Roystonea	*Roystonea regia*	A	I	Or Co	LC
70	9P074	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
71	9P075	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
72	9P076	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
73	9P077	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
74	9P078	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
75	9P079	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
76	9P080	9	Arecaceae	Coccothrinax	*Coccothrinax barbadensis*	A	I	Or	NE
77	9P081	9	Arecaceae	Sabal	*Sabal mauritiiformis*	A	I	Co Ar	NE
78	9P082	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
79	9P083	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
80	9P084	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
81	9P085	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
82	9P086	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
83	9P087	9	Arecaceae	Euterpe	*Euterpe oleracea*	A	N	Co Ar Al	NE
84	9P088	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
85	9P089	9	Arecaceae	Adonidia	*Adonidia merrillii*	A	I	Or	VU
86	9P090	9	Arecaceae	Adonidia	*Adonidia merrillii*	A	I	Or	VU
87	9P091	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
88	9P092	9	Arecaceae	Roystonea	*Roystonea regia*	A	I	Or Co	LC
89	9P093	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
90	9P094	9	Arecaceae	Prestoea	*Prestoea schultzeana*	A	N	Me Al Cu	NE
91	9P095	9	Arecaceae	Prestoea	*Prestoea schultzeana*	A	N	Me Al Cu	NE
92	9P096	9	Arecaceae	Prestoea	*Prestoea schultzeana*	A	N	Me Al Cu	NE
93	9P097	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
94	9P098	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
95	9P099	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
96	9P100	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
97	9P101	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
98	9P102	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
99	9P103	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
100	9P104	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
101	9P105	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
102	9P106	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
103	9P107	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
104	9P108	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
105	9P109	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
106	9P110	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
107	9P111	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
108	9P112	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
109	9P113	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
110	9P114	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
111	9P115	9	Arecaceae	Caryota	*Caryota mitis*	A	I	Or Co Me Al	LC
112	9P116	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
113	9P117	9	Arecaceae	Pinanga	*Pinanga coronata*	A	I	Or Co	NE
114	9P118	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
115	9P119	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
116	9P120	9	Arecaceae	Archontophoenix	*Archontophoenix alexandrae*	A	I	Or	NE
117	9P121	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
118	9P122	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
119	9P123	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
120	9P124	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
121	9P125	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
122	9P126	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
123	9P127	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
124	9P128	9	Arecaceae	Pinanga	*Pinanga coronata*	A	I	Or Co	NE
125	9P129	9	Arecaceae	Pinanga	*Pinanga coronata*	A	I	Or Co	NE
126	9P130	9	Arecaceae	Raphis	*Raphis excelsa*	A	I	Or	NE
127	9P131	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
128	9P132	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
129	9P133	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
130	9P134	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
131	9P135	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
132	9P136	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
133	9P137	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
134	9P138	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
135	9P139	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
136	9P140	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
137	9P141	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
138	9P142	9	Arecaceae	Areca	*Areca catechu*	A	I	Me Cu Cm	LC
139	9P143	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
140	9P144	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
141	9P145	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE
142	9P146	9	Arecaceae	Ptychosperma	*Ptychosperma macarthurii*	A	I	Or	NE

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
143	9P147	9	Arecaceae	Areca	*Areca triandra*	A	I	Co Me Al	NE
144	9P148	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
145	9P149	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
146	9P150	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
147	9P151	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
148	9P152	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
149	9P153	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
150	9P154	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
151	9P155	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
152	9P156	9	Strelitziaceae	Ravenala	*Ravenala madagascariensis*	A	I	Me	LC
153	9P157	9	Arecaceae	Roystonea	*Roystonea regia*	A	I	Or Co	LC
154	9P158	9	Arecaceae	Roystonea	*Roystonea regia*	A	I	Or Co	LC
155	9P159	9	Arecaceae	Roystonea	*Roystonea regia*	A	I	Or Co	LC
156	9P160	9	Arecaceae	Socratea	*Socratea exorrhiza*	A	N	Co Ar	LC
157	9P161	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
158	9P162	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
159	9P163	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
160	9P164	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
161	9P165	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
162	9P166	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
163	9P167	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
164	9P168	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
165	9P169	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
166	9P170	9	Arecaceae	Socratea	*Socratea exorrhiza*	A	N	Co Ar	LC
167	9P171	9	Arecaceae	Bactris	*Bactris gasipaes*	A	N	Co Ar Al	LC
168	9P172	9	Arecaceae	Euterpe	*Euterpe precatoria*	A	I	Co Me Al Cu	LC
169	9P173	9	Arecaceae	Euterpe	*Euterpe precatoria*	A	I	Co Me Al Cu	LC
170	9P174	9	Arecaceae	Bactris	*Bactris gasipaes*	A	N	Co Ar Al	LC
171	9P175	9	Arecaceae	Bactris	*Bactris gasipaes*	A	N	Co Ar Al	LC
172	9P176	9	Arecaceae	Socratea	*Socratea exorrhiza*	A	N	Co Ar	LC
173	9P177	9	Arecaceae	Cocos	*Cocos nucifera*	A	I	Co Me Ar Al	NE
174	9P178	9	Arecaceae	Bactris	*SBactris gasipaes*	A	N	Co Ar Al	LC
175	9P179	9	Arecaceae	Dypsis	*Dypsis lutescens*	A	I	Or	NT
176	9P180	9	Arecaceae	Socratea	*Socratea exorrhiza*	A	N	Co Ar	LC
177	9P182	9	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
178	9P183	9	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
179	9P184	9	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
180	9P185	9	Lamiaceae	Tectona	*Tectona grandis*	A	I	Or Co Me Ec	EN

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N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
181	9P186	9	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
182	9P187	9	Lamiaceae	Tectona	*Tectona grandis*	A	I	Or Co Me Ec	EN
183	9P188	9	Annonaceae	Rollinia	*Rollinia mucosa*	A	N	Or Me Al	LC
184	9P189	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
185	9P192	9	Myrtaceae	Eugenia	*AEugenia uniflora*	Ar	I	Or Me Al	LC
186	9P196	9	Myrtaceae	Eugenia	*AEugenia uniflora*	A	I	Or Me Al	LC
187	9P197	9	Sapotaceae	Pouteria	*Pouteria caimito*	A	I	Or Me Ar Al	LC
188	9P198	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
189	9P199	9	Sapotaceae	Pouteria	*Pouteria caimito*	A	I	Or Me Ar Al	LC
190	9P200	9	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Me Al	LC
191	9P203	9	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Me Al	LC
192	9P204	9	Oxalidaceae	Averrhoa	*Averrhoa carambola*	A	N	Or Me Al	DD
193	9P205	9	Oxalidaceae	Averrhoa	*Averrhoa carambola*	A	N	Or Me Al	DD
194	9P206	9	Oxalidaceae	Averrhoa	*Averrhoa carambola*	A	N	Or Me Al	DD
195	9P207	9	Myrtaceae	Psidium	*Psidium guajava*	Ar	N	Me Ar Al	LC
196	9P208	9	Myrtaceae	Psidium	*Psidium guajava*	Ar	N	Me Ar Al	LC
197	9P210	9	Myrtaceae	Psidium	*Psidium guajava*	A	N	Me Ar Al	LC
198	9P211	9	Anacardiaceae	Spondias	*Spondias mombin*	Ar	N	Me Al Cm Ec	LC
199	9P212	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
200	9P213	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	Ar	I	Me Al Cm	LC
201	9P214	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
202	9P215	9	Annonaceae	Annona	*Annona muricata*	A	N	Co Me Al	LC
203	9P216	9	Annonaceae	Annona	*Annona muricata*	A	N	Co Me Al	LC
204	9P217	9	Urticaceae	Pourouma	*Pourouma cecropiifolia*	A	N	Or Al Ec	LC
205	9P218	9	Urticaceae	Pourouma	*Pourouma cecropiifolia*	A	N	Or Al Ec	LC
206	9P220	9	Euphorbiaceae	*Croton*	*Croton* sp.	A	I	Me Al Ec	
207	9P221	9	Malvaceae	Matisia	*Matisia malacocalyx*	A	N	Or Co Me Al	LC
208	9P223	9	Fabaceae	Inga	*Inga edulis*	A	N	Or Al Ec	LC
209	9P225	9	Moraceae	Artocarpus	*Artocarpus altilis*	A	I	Al	LC
210	9P229	9	Annonaceae	Annona	*Annona muricata*	A	N	Co Me Al	LC
211	9P230	9	Clusiaceae	Garcinia	*Garcinia* sp.	A	I	Co Me Al Cm Ec	DD
212	9P234	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
213	9P235	9	Sapindaceae	Nephelium	*Nephelium lappaceum*	Ar	I	Me Al Cm	LC
214	9P239	9	Myrtaceae	Syzygium	*Syzygium samarangense*	Ar	I	Co Al	LC
215	9P240	9	Bignoniaceae	Handroanthus	*Handroanthus chrysanthus*	A	N	Or Co	VU
216	9P241	9	Anacardiaceae	Mangifera	*Mangifera indica*	A	I	Or Me Al	DD
217	9P242	9	Myrtaceae	Syzygium	*Syzygium samarangense*	Ar	I	Co Al	LC
218	9P244	9	Lauraceae	Persea	*Persea americana*	A	I	Me Al Cm	LC

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N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
219	9P245	9	Araucariaceae	Heterophylla	*Araucaria heterophylla*	A	I	Or Co	VU
220	9P247	9	Lauraceae	Ocotea	*Ocotea*sp.	A	N	Co	
221	9P248	9	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
222	9P249	9	Malvaceae	Ceiba	*Ceiba pentandra*	A	N	Co Cu Ec	LC
223	9P250	9	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
224	9P251	9	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
225	9P253	9	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
226	9P254	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
227	9P255	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
228	9P256	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
229	9P257	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
230	9P258	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
231	9P259	9	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
232	9P260	9	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar	LC
233	9P261	9	Fabaceae	Hymenaea	*Hymenaea courbaril*	Ar	I	Co Me Ar Al	LC
234	9P263	9	Moraceae	Brosimum	*Brosimum guianense*	A	N	Co Al	LC
235	9P264	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
236	9P265	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
237	9P266	9	Malvaceae	Ceiba	*Ceiba pentandra*	A	N	Co Cu Ec	LC
238	9P267	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
239	9P269	9	Rhamnaceae	Ziziphus	*Ziziphus thyrsiflora*	A	N	Or Me Al	NE
240	9P271	9	Euphorbiaceae	Hura	*Hura crepitans*	A	N	Or Co Me	LC
241	9P272	9	Euphorbiaceae	Hura	*Hura crepitans*	A	N	Or Co Me	LC
242	9P273	9	Rhamnaceae	Ziziphus	*Ziziphus* sp.	Ar	I	Or Me Al	
243	9P274	9	Euphorbiaceae	Hura	*Hura crepitans*	A	N	Or Co Me	LC
244	9P275	9	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
245	9P276	9	Fabaceae	Andira	*Andira* sp.	A	N	Co Me Ar Al	
246	9P277	9	Euphorbiaceae	Hura	*Hura crepitans*	A	N	Or Co Me	LC
247	9P278	9	Fabaceae	Andira	*Andira* sp.	A	N	Co Me Ar Al	
248	9P279	9	Euphorbiaceae	Hura	*Hura crepitans*	A	N	Or Co Me	LC
249	9P280	9	Fabaceae	Andira	*Andira* sp.	A	N	Co Me Ar Al	
250	9P281	9	Euphorbiaceae	Hura	*Hura crepitans*	A	N	Or Co Me	LC
251	9P282	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	
252	9P283	9	Fabaceae	Andira	*Andira* sp.	A	N	Co Me Ar Al	
253	9P284	9	Caricaceae	Jacaratia	*Jacaratia digitata*	A	N	Or Co	
254	9P285	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
255	9P286	9	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
256	9P288	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
257	9P289	9	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
258	9P290	9	Arecaceae	Areca	*Areca triandra*	A	I	Or Me Al	NE
259	9P291	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
260	9P292	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
261	9P293	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	
262	9P294	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
263	9P295	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	
264	9P296	9	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
265	9P297	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	
266	9P298	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	
267	9P299	9	Bignoniaceae	Tabebuia	*Tabebuia rosea*	A	N	Or Co	
268	9P300	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
269	9P302	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
270	9P303	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
271	9P304	9	Lauraceae	Nectandra	*Nectandra megapotamica*	A	I	Co Me Cm	LC
272	9P305	9	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
273	9P306	9	Myristicaceae	Virola	*Virola peruviana*	A	N	Or Co Me Al Cu	LC
274	9P313	9	Fabaceae	Erythrina	*Erythrina fusca*	A	I	Or Me Al	LC
275	9P314	9	Fabaceae	Erythrina	*Erythrina fusca*	A	I	Or Me Al	LC
276	9P315	9	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
277	9P317	9	Fabaceae	Erythrina	*Erythrina fusca*	A	I	Or Me Al	LC
278	9P318	9	Olacaceae	Minquartia	*Minquartia guianensis*	A	N	Co Me	LC
279	9P319	9	Euphorbiaceae	Caryodendron	*Caryodendron orinocense*	A	N	Co Al Cm Ec	LC
280	9P321	9	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
281	6F001	6	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
282	6F002	6	Olacaceae	Minquartia	*Minquartia guianensis*	A	N	Co Me Ar Ec	LC
283	6F004	6	Moraceae	Ficus	*Ficus americana*	A	N	Or Al Ec	LC
284	6F005	6	Moraceae	Ficus	*Ficus americana*	A	N	Or Al Ec	LC
285	6F006	6	Rutaceae	Citrus	*Citrus x sinensis*	A	I	Me Al	NE
286	6F007	6	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
287	6F008	6	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
288	6F009	6	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
289	6F011	6	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
290	6F012	6	Rutaceae	Citrus	*Citrus limon*	A	I	Me Al	LC
291	6F013	6	Moraceae	Brosimum	*Brosimum guianense*	A	N	Co Al	LC
292	6F014	6	Malvaceae	Guazuma	*Guazuma ulmifolia*	A	N	Or Me Al Cm	LC
293	6F015	6	Malvaceae	Guazuma	*Guazuma ulmifolia*	A	N	Or Me Al Cm	LC
294	6F017	6	Moraceae	Brosimum	*Brosimum guianense*	A	N	Co Al	LC

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
295	6F018	6	Lauraceae	Ocotea	*Ocotea cernua*	A	N	Co Me Ar Cm	LC
296	6F019	6	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
297	6F021	6	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
298	6F022	6	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
299	6F025	6	Solanaceae	Cestrum	*Cestrum racemosum*	A	N		LC
300	6F026	6	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
301	6F029	6	Rubiaceae	Remijia	*Remijia* sp.	A	N	Me Al	
302	6F031	6	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
303	6F032	6	Myrtaceae	Psidium	*Psidium guajava*	A	N	Me Ar Al	LC
304	6F034	6	Annonaceae	Annona	*Annona muricata*	A	N	Co Me Al	LC
305	6F036	6	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
306	6F037	6	Rutaceae	Citrus	*Citrus limon*	Ar	I	Me Al	LC
307	6F038	6	Fabaceae	Senna	*Senna* sp.	A	N	Or Me Cm Ec	
308	6F039	6	Euphorbiaceae	Croton	*Croton lechleri*	A	N	Me	NE
309	6F040	6	Fabaceae	Delonix	*Delonix regia*	A	I	Or Co Me Ar	LC
310	6F041	6	Myrtaceae	Syzygium	*Syzygium malaccense*	A	I	Or Ar	LC
311	6F045	6	Urticaceae	Cecropia	*Cecropia litoralis*	A	N	Me	LC
312	6F046	6	Fabaceae	Delonix	*Delonix regia*	A	I	Or Co Me Ar	LC
313	6F047	6	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
314	6F048	6	Rutaceae	Citrus	*Citrus x sinensis*	Ar	I	Me Al	NE
315	6F049	6	Sapotaceae	Pouteria	*Pouteria caimito*	A	N	Or Me Ar Al	LC
316	6F050	6	Malvaceae	Theobroma	*Theobroma cacao*	A	I	Me Al Cm	DD
317	6F051	6	Rutaceae	Citrus	*Citrus x sinensis*	Ar	I	Me Al	NE
318	6F053	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
319	6F054	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
320	6F055	6	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
321	6F058	6	Euphorbiaceae	Croton	*Croton lechleri*	A	N	Me	NE
322	6F059	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
323	6F060	6	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
324	6F061	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
325	6F062	6	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
326	6F063	6	Fabaceae	Bauhinia	*Bauhinia forficata*	A	I	Co Me	LC
327	6F064	6	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
328	6F065	6	Fabaceae	Bauhinia	*Bauhinia forficata*	Ar	I	Co Me	LC
329	6F066	6	Fabaceae	Bauhinia	*Bauhinia forficata*	A	I	Co Me	LC
330	6F067	6	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
331	6F068	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
332	6F069	6	Euphorbiaceae	Croton	*Croton lechleri*	A	N	Me	NE

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
333	6F070	6	Rutaceae	Citrus	*Citrus x sinensis*	A	I	Me Al	NE
334	6F072	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
335	6F073	6	Fabaceae	Acacia	*Acacia* sp.	A	I	Or Co Me Ar Al Ec	
336	6F074	6	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Co Me Ar Al	LC
337	6F075	6	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Co Me Ar Al	LC
338	6F076	6	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Co Me Ar Al	LC
339	6F078	6	Fabaceae	Bauhinia	*Bauhinia forficata*	A	I	Co Me	LC
340	6F079	6	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Co Me Ar Al	LC
341	6F080	6	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Co Me Ar Al	LC
342	6F081	6	Rubiaceae	Alibertia	*Alibertia patinoi*	A	N	Co Me Ar Al	LC
343	6F082	6	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
344	6F083	6	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
345	5M003	5	Bixaceae	Bixa	*Bixa orellana*	Ar	N	Me Al Cm	LC
346	5M005	5	Metteniusaceae	Calatola	*Calatola costaricensis*	A	N	Or Me Ar	LC
347	5M007	5	Lauraceae	Cinnamomum	*Cinnamomum verum*	A	N	Me Al	NE
348	5M008	5	Moraceae	Artocarpus	*Artocarpus altilis*	A	I	Al	LC
349	5M010	5	Euphorbiaceae	Croton	*Croton lechleri*	Ar	N	Me	NE
350	5M012	5	Euphorbiaceae	Croton	*Croton lechleri*	A	N	Me	NE
351	5M015	5	Euphorbiaceae	Croton	*Croton lechleri*	A	N	Me	NE
352	5M017	5	Cyatheaceae	Cyathea	*Cyathea* sp.	A	N	Or Co Cm Ec	
353	5M018	5	Cyatheaceae	Cyathea	*Cyathea* sp.	A	N	Or Co Cm Ec	
354	5M019	5	Cyatheaceae	Cyathea	*Cyathea* sp.	A	N	Or Co Cm Ec	
355	5M029	5	Cyatheaceae	Cyathea	*Cyathea* sp.	A	N	Or Co Cm Ec	
356	5M031	5	Olacaceae	Minquartia	*Minquartia guianensis*	A	N	Co Me	LC
357	5M032	5	Malvaceae	Apeiba	*Apeiba aspera*	A	N	Co Me Ar	LC
358	5M033	5	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
359	5M034	5	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
360	5M035	5	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
361	5M036	5	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
362	5M037	5	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
363	5M038	5	Lamiaceae	Aegiphila	*Aegiphila integrifolia*	A	N	Me Al	LC
364	3Z004	3	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
365	3Z006	3	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
366	3Z007	3	Solanaceae	Cestrum	*Cestrum nocturnum*	A	N	Or	LC
367	3Z008	3	Solanaceae	Cestrum	*Cestrum nocturnum*	A	N	Or	LC
368	3Z009	3	Solanaceae	Cestrum	*Cestrum nocturnum*	A	N	Or	LC
369	3Z011	3	Urticaceae	Cecropia	*Cecropia obtusifolia*	A	N	Me Al Cu	LC
370	3Z014	3	Rutaceae	Citrus	*Citrus x sinensis*	A	I	Me Al	NE

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N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
371	3Z015	3	Moraceae	Castilla	*Castilla elastica*	A	I	Or Co Me	LC
372	3Z016	3	Urticaceae	Cecropia	*Cecropia obtusifolia*	A	N	Me Al Cu	LC
373	3Z017	3	Urticaceae	Cecropia	*Cecropia obtusifolia*	A	N	Me Al Cu	LC
374	3Z018	3	Solanaceae	Cestrum	*Cestrum nocturnum*	A	N	Or	LC
375	3Z020	3	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
376	3Z021	3	Sapindaceae	Filicium	*Filicium decipiens*	A	I	Or Me	LC
377	3Z022	3	Sapindaceae	Filicium	*Filicium decipiens*	Ar	I	Or Me	LC
378	3Z023	3	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
379	3Z024	3	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
380	3Z025	3	Fabaceae	Inga	*Inga edulis*	A	N	Or Al Ec	LC
381	3Z027	3	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
382	3Z028	3	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
383	3Z029	3	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
384	3Z031	3	Fabaceae	Schizolobium	*Schizolobium parahyba*	A	I	Or Ar	LC
385	3Z032	3	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
386	3Z033	3	Bignoniaceae	Handroanthus	*Handroanthus chrysanthus*	A	N	Or Co Al	VU
387	3Z035	3	Bignoniaceae	Handroanthus	*Handroanthus chrysanthus*	A	N	Or Co Al	VU
388	3Z036	3	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
389	3Z037	3	Fabaceae	Brownea	*Brownea multijuga*	A	N	Co Me Ec	LC
390	3Z038	3	Moraceae	Ficus	*Ficus brevibracteata*	A	N	Ar	LC
391	3Z039	3	Moraceae	Castilla	*Castilla elastica*	Ar	I	Or Co Me	LC
392	3Z040	3	Rutaceae	Citrus	*Citrus x sinensis*	A	I	Me Al	NE
393	3Z041	3	Myrtaceae	Psidium	*Psidium guajava*	A	N	Me Ar Al	LC
394	3Z042	3	Rutaceae	Citrus	*Citrus x sinensis*	A	I	Me Al	NE
395	3Z043	3	Bignoniaceae	Spathodea	*Spathodea campanulata*	A	I	Or Me	LC
396	3Z044	3	Rutaceae	Citrus	*Citrus X sinensis*	A	I	Me Al	NE
397	13C002	13	Rutaceae	Fortunella	*Fortunella* sp.	Ar	I	Me Al Cm	
398	13C003	13	Rutaceae	Fortunella	*Fortunella* sp.	Ar	I	Me Al Cm	
399	13C005	13	Rutaceae	Citrus	*Citrus limon*	Ar	I	Me Al	LC
400	13C006	13	Rutaceae	Citrus	*Citrus maxima*	Ar	I	Me Al Cu Cm	LC
401	13C008	13	Rutaceae	Citrus	*Citrus maxima*	A	I	Me Al Cu Cm	LC
402	13C009	13	Rutaceae	Citrus	*Citrus limon*	Ar	I	Me Al	LC
403	13C010	13	Rutaceae	Citrus	*Citrus limon*	A	I	Me Al	LC
404	13C011	13	Rutaceae	Citrus	*Citrus maxima*	A	I	Me Al Cu Cm	LC
405	13C013	13	Rubiaceae	Morinda	*Morinda citrifolia*	Ar	I	Or Me Al Cu Cm	LC
406	13C014	13	Rubiaceae	Morinda	*Morinda citrifolia*	Ar	I	Or Me Al Cu Cm	LC
407	13C015	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
408	13C016	13	Rutaceae	Citrus	*Citrus maxima*	A	I	Me Al Cu Cm	LC

Table A.1: Floristic Inventory of Padre Julio Marrero Botanical Garden

N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
409	13C018	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
410	13C021	13	Rutaceae	Citrus	*Citrus maxima*	Ar	I	Me Al Cu Cm	LC
411	13C022	13	Rutaceae	Citrus	*Citrus reticulata*	A	I	Or Me Al	NE
412	13C024	13	Myrtaceae	Psidium	*Psidium* sp.	Ar	I	Or Me Al	
413	13C026	13	Myrtaceae	Psidium	*Psidium* sp.	A	I	Or Me Al	
414	13C027	13	Myrtaceae	Psidium	*Psidium* sp.	Ar	I	Or Me Al	
415	13C032	13	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
416	13C035	13	Lamiaceae	Tectona	*Tectona grandis*	A	I	Or Co Me Ec	EN
417	13C037	13	Lamiaceae	Tectona	*Tectona grandis*	A	I	Or Co Me Ec	EN
418	13C039	13	Sapindaceae	Nephelium	*Nephelium lappaceum*	A	I	Me Al Cm	LC
419	13C041	13	Clusiaceae	Garcinia	*Garcinia madruno*	A	N	Or Me Al	LC
420	13C043	13	Myrtaceae	Psidium	*Psidium guineense*	A	I	Me Al Cu	LC
421	13C044	13	Myrtaceae	Psidium	*Psidium guineense*	A	I	Me Al Cu	LC
422	13C050	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
423	13C052	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
424	13C053	13	Rutaceae	Citrus	*Citrus reticulata*	A	I	Or Me Al	NE
425	13C054	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
426	13C055	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
427	13C056	13	Rutaceae	Citrus	*Citrus reticulata*	A	I	Or Me Al	NE
428	13C057	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
429	13C058	13	Rutaceae	Citrus	*Citrus aurantium*	Ar	I	Me Al Cm	NE
430	13C059	13	Rutaceae	Citrus	*Citrus reticulata*	Ar	I	Or Me Al	NE
431	13C060	13	Muntingiaceae	Muntingia	*Mutingia calabura*	A	I	Co Me Al Cm	NE
432	13C061	13	Fabaceae	Gliricidia	*Gliricidia sepium*	A	I	Me Ar Al Ec	LC
433	22R002	22	Euphorbiaceae	Croton	*Croton lechleri*	A	N	Me	NE
434	22R003	22	Olacaceae	Minquartia	*Minquartia guianensis*	A	N	Co Me	LC
435	22R004	22	Moraceae	Castilla	*Castilla elastica*	A	I	Or Co Me	LC
436	22R005	22	Olacaceae	Minquartia	*Minquartia guianensis*	A	N	Co Me	LC
437	22R008	22	Olacaceae	Minquartia	*Minquartia guianensis*	A	N	Co Me	LC
438	22R011	22	Cordiaceae	Cordia	*Cordia alliodora*	Ar	N	Co Me Ec	LC
439	22R012	22	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
440	22R014	22	Cordiaceae	Cordia	*Cordia alliodora*	A	N	Co Me Ec	LC
441	22R015	22	Myrtaceae	Psidium	*Psidium guajava*	Ar	N	Me Ar Al	LC
442	22R016	22	Lauraceae	Ocotea	*Ocotea* sp.	A	N	Me Al Cm	
443	22R018	22	Malvaceae	Ceiba	*Ceiba* sp.	A	N	Or Me Ar Cu	
444	22R019	22	Arecaceae	Iriartea	*Iriartea deltoidea*	A	N	Co Ar Al	LC
445	22R020	22	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
446	22R022	22	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC

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N	Codes	Zones	Families	Genders	Species	Stratum	Origin	Uses	Conservation S.
447	22R023	22	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
448	22R024	22	Lamiaceae	Aegiphila	*Aegiphila alba*	Ar	N	Co Me Ar Cu	LC
449	22R025	22	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
450	22R026	22	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
451	22R027	22	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
452	22R028	22	Moraceae	Castilla	*Castilla elastica*	A	I	Or Co Me	LC
453	22R029	22	Rubiaceae	Pentagonia	*Pentagonia macrophylla*	A	N	Al	LC
454	8A001	8	Lamiaceae	Aegiphila	*Aegiphila alba*	A	N	Co Me Ar Cu	LC
455	8A002	8	Lauraceae	Persea	*Persea americana*	A	I	Co Ar Al	LC
456	8A004	8	Fabaceae	Erythrina	*Erythrina fusca*	A	I	Or Me Al	LC