New records of plants for San Andres and Old Providence islands (International Biosphere Reserve *Seaflower*), Caribbean Colombia

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**ABSTRACT:** Fifty seven new records of vascular plants are reported for the Archipelago of San Andres and Old Providence, part of the International Biosphere Reserve *Seaflower*. Of these, about 81% have been introduced for agriculture or ornamental purpose. With these introductions, we report ten new families and 30 new genera for the Archipelago. The possible impacts of some of these introductions are discussed.

**INTRODUCTION**

The archipelago of San Andres, Old Providence and Sainte Cataline islands is located about 200 km off the coast of Nicaragua and due to its vicinity with the Central American continental platform, the vascular flora has a higher affinity with the flora of Central America and Northern South America, compared to the Antillean flora (Lowy 2000).

The island vegetation is classified as transitional, with elements of both dry forest and wet tropical forest (González *et al.* 1995; Lowy 2000). Due to the high population density, the natural vegetation on San Andres Island has been completely transformed, while on Old Providence Island the original vegetation is still present on the top of the hill (the Peak, Marquez *et al.* 2006).

The flora of the Archipelago has not been extensively studied. Díaz and Lowy (1992) reported 374 species of vascular plants (366 angiosperms and 7 pteridophytes). Later, Lowy (2000) updated all the botanical information available for the islands, including reports (e.g. Barriga 1969; González *et al.* 1995) and herbarium specimens, registering a total of 409 species of vascular plants, 77% of which were considered native, and the other 23% introduced.

More recently, Tobar and Gavio (2011) reported the presence of the invasive *Pteridium caudatum* on Old Providence Island.

Introduced plants are an important component of the actual flora of most countries (Chacón and Saborío 2006), and may cause extensive damage (Mack and Lonsdale 2000). Particularly, introduced species are the most important threat for native species in oceanic islands (Chacón and Saborío 2006).

To contribute to the knowledge of the vascular flora of the International Biosphere Reserve, we carried out an inventory of species not previously reported for the islands. All species have been introduced for agricultural or ornamental purposes. The possible impact of some of these species is discussed.

**MATERIALS AND METHODS**

**Study area**

The Archipelago of San Andres, Old Providence and Sainte Cataline is located in the southwestern Caribbean, in the intertropical region, with a marine area of more than 250,000 km² of oceanic waters and only 70 km² of terrestrial landmass (Marquez 2006). The islands lie in the transition zone between tropical dry and the tropical wet climate. The influence of trade winds mitigates the dry and warm climate. The annual mean temperature is 27.4°C, with maximum values between 29 and 30°C (May to June) and minimum between 25.5 and 26.0°C (December to February). The annual mean precipitation is 1797.8 mm, unevenly distributed in a dry season (January to April), with stronger winds, and a wet season (October to December) when 80% of the annual rain falls. During the period from May to July the rains are moderate in intensity (IDEAM 1995).

The islands are volcanic in origin with the subsidence of the volcanic base of San Andres Island, and its simultaneous cover with calcareous deposits, biogenic in origin, during the Tertiary and Quaternary, gave rise to the present island (Gonzalez *et al.* 1995), while Old Providence Island maintained its volcanic nature.

The flora was collected at different sites on the two main islands (Figures 1 and 2).

**Sampling method**

To complete the inventory of the flora of the archipelago, we collected both in anthropogenic and natural areas (Tables 1-2). Species were taxonomically identified using taxonomic literature and personal knowledge. The samples were mounted and deposited in the herbarium of the Universidad Nacional de Colombia sede Caribe, with a duplicate sent to the National Herbarium (COL).

**RESULTS AND DISCUSSION**

We found fifty-seven new records for the archipelago, distributed in thirty families and forty-seven genera. Of
these, ten families and thirty genera are reported for the first time from the islands (Table 3). All species encountered have a wide tropical and subtropical distribution, and have been introduced for ornamental and agricultural purposes. While 81% of the species listed herein are still confined to greenhouses, backyards and gardens, the other 19% of the new records are naturalised and often escaped into the surrounding areas.

With this study, the percentage of introduced plant species in the International Biosphere Reserve increases to 30%, from the 23% reported by Lowy (2000). The majority of the taxa newly reported have ornamental use (Table 2). Of these, *X. sagittifolium*, *C. maxima*, *M. x paradisiaca*, *A. macrocarpon*, *C. melo*, *T. divaricata*, *C. warscewiczii*, *P. ebenea* and *S. podophyllum* have been observed in wild settings on the islands.

Among the species reported, two may become a possible nuisance, due to its invasive behaviour reported in other regions. *S. podophyllum* (Abrecht et al. 2003) is a species which is difficult to eradicate and tends to expand rapidly at the expense of other species because it has an epiphytical growth form that may suffocate native species. *S. podophyllum* has been observed in several parts of San Andres Island, in the wild, completely covering other plants.

*Casuarina equisetifolia* is an invasive tree native to Southeast Asia, Australia and southern Pacific islands to Tahiti and Samoa. Its non-native range now extends to North and Central America, much of the Caribbean as well as islands in the northern Pacific and Indian Oceans. It is thought to be one of the most common tree species on beaches in the tropics (Wheeler et al. 2011). If *Casuarina* expands, it may alter the habitat of infested areas, inhibiting native plants with rapid growth, dense coverage, and thick litter accumulation (Hammerton, 2001). *Casuarina* is thought to promote beach erosion (Austin 1978; Deaton 1994; Hammerton 2001), reduce populations of small mammals (Mazzotti et al. 1981), and interfere with the nesting of

![Figure 1. Map of San Andres Island with sample sites.](image1)

**Table 1.** Sampling sites on San Andres Island.

| Number | Name and Abbreviation |
|--------|-----------------------|
| 1      | Police Station (PNS)  |
| 2      | San Luis, Harmony Hill (SHH) |
| 3      | Duppy Gully (DG)      |
| 4      | School Cajasai (CS)   |
| 5      | Sarie Bay (SB)        |
| 6      | Airport surroundings (ARP) |
| 7      | School Sagrada familia (CSF) |
| 8      | Avenida 20 de Julio (A20J) |
| 9      | Parque Simón Bolívar (PSB) |
| 10     | La Loma diagonal San Francisco Church (LLR) |
| 11     | Center (CEN)          |
| 12     | New Point Mall (CNP)  |
| 13     | Los Almendros (BLA)   |
| 14     | Elsy Bar (SEB)        |
| 15     | Simpson Well (BSW)    |
| 16     | Vietnam (BVC)         |
| 17     | School Modelo Adventista (CMA) |
| 18     | Via San Luis in front of basketball stadium (VSL) |
| 19     | Juan XXIII (J23)      |
| 20     | Center (CEN)          |
| 21     | Botanical Garden (JBU) |

![Figure 2. Map of Old Providence Island with sample sites.](image2)

**Table 2.** Sampling sites on Old Providence Island.

| Number | Name and Abbreviation |
|--------|-----------------------|
| 15     | Agua Dulce (ADP)     |
| 21     | Surroundings of the catholic church María Inmaculada (IMI) |
| 22     | The peak (PEP)       |
endangered sea turtles (Schmid et al. 2008). Planted along beaches and near homes for protection against wind, the trees are among the first to fall during high winds because of their great height and shallow roots (Schmid et al. 2008; Wheeler et al. 2011). Its wood is susceptible to termites, and if planted close to traditional wooden houses may accelerate their deterioration.

The species Allamanda blanchetii, Aglaonema commutatum and Cnidoscolus chayamansa are toxic if consumed, while Allamanda blanchetii produces a latex which may irritate the skin upon contact.

As for the highly invasive and carcinogenic fern Pteridium caudatum, reported recently for Old Providence (Tobar and Gavio 2011), all the species registered here have been voluntarily introduced by the inhabitants of the islands. It is necessary to improve environmental education in the islands and explain the potential risks of introduced species to the population, to avoid negative impacts on the native flora of the archipelago. Small islands are more susceptible to invasive species, and particular care should be taken to reduce the introduction of exotic species and mitigate their impact once established.

### Table 3. Species list of new botanical records in San Andres and Old Providence islands. New families are marked with **, new genera with *.

| SPECIES ORIGIN AND DISTRIBUTION | COMMON NAME | COLLECTION SITE | VOUCHER NUMBER | NOTES |
|---------------------------------|-------------|-----------------|----------------|-------|
| **ACANTHACEAE**                 | Pseuderanthemum carruthersii var. reticulatum (Seem.) Guillaumin. | Thought to be originally from Polynesia or Melanesia. Cultivated in tropical America | golden Pseuderanthemum, El dorado, golden net-bush | VSL, LLR, BSB, CEN, BOO | ATV195 | Ornamental |
| **AGAVACEAE**                   | Agave angustifolia var. marginata Hort. ex Gentry. | Native of the tropical regions of Costa Rica and Mexico. Found in North and Central America and in India | agave, agave caribe | VSL, SHH | ATV407 | Ornamental, food |
| **AMARYLLADACEAE**             | *Crinum bulbispermum* (Burm. f.) Miïne-Redb. and Schweick. | Native from tropical West Africa, distributed in Central America and the Caribbean | lirio | BSB | ATV402 | Ornamental |
| **AMARANTHACEAE**              | *Celosia argéntea* var. argentea | Native from Asia, found in the tropical regions of the Americas | plumón, pluma, plumero rosa | VSL, LLR | ATV412 | Ornamental |
|                                | Celosia argentea var. cristata (L.) Kuntze. | Found in tropical regions. Cultivated in Central America. | cresta de gallo | VSL, CNP | ATV406 | Ornamental |
|                                | Gomphrena globosa L. | Native from India, it is found in anthropogenic areas, in temperate and tropical regions of the world. | Inmortales, botón lila | JBU, CNP, A20J | ATV405 | Ornamental and medicinal |
| **ANNONACEAE**                 | Anona cherimola Mill. | Possibly native of Ecuador. Cultivated in Central and South America | Chirimoya | IM1, LLR | ATV146 | Edible |
| **APOCYNACEAE**                | Allamanda blanchetii A. DC. | Native of Brazil, cultivated along in other parts of tropical America | trompeta morada, allamanda violácea | VSL, LLR, BSB, BLA | ATV423 | Ornamental. Produces a irritating latex |
|                                | Tabernaemontana diversicota L) R. Br. ex Roemer and J.A. Schultes. | Native of South East Asia. Cultivated in tropical and subtropical regions | Jazmín crepé, Flor del Molinet, Jazmín de la India | VSL, BSB, LLR, BOO | ATV420 | Ornamental. Poisonous |
| **ARACEAE**                    | *Aglaonema commutatum* Schott. | Native of Southeast Asia. Now a pantropical distribution | Aglaonema, cafeto ornamental | BSB | ATV230; ATV439 | Ornamental, toxic |
|                                | *Alocasia plumbea* Van Houtte. | Native of Southeast Asia. Tropical distribution | Pato morado | BSB, BOQ, LLR, JBU | ATV73; ATV434 | Ornamental |
|                                | Alocasia cucullata (Lour.) G. Don. | Possibly native of China. Commonly found in Caribbean, Central and South America and Pacific Islands | Colombus | BSB, BOQ, LLR, JBU | ATV63; ATV441 | Ornamental |
|                                | Alocasia sinuata N.E Br. | Native of the Philippines. Tropical distribution | Alocacia | BSB, BOO, LLR, JBU | ATV172; ATV431 | Ornamental |
|                                | Alocasia macrorrhizos (L.) G.Don. | Native of Southeast Asia. Tropical distribution | Oreja de elefante, tara gigante, fiame de canarias | JBU, LLR, BSB, MDG, VSL, A20J | ATV172; ATV431 | Ornamental |
|                                | *Caladium bicolor* Vent. | Native of Asia. Distributed in Central and South America | Caladío, corazón de Jesús, paleta del pintor | BSB, VSL | ATV70; ATV421 | Ornamental |
|                                | *Philodendron"Autumn" | Neotropical distribution. | Corazón | ARP, BOO | Photographic record | Hybrid |
|                                | Philodendron bipinnatifidum Schott ex Endl. | Native of tropical South America | Filodendro paraguay, guaraní, imbe, Giembe | BOQ, JBU | ATV61; ATV 440 | Ornamental edible fruit |
|                                | Syngonium podophyllum Schott, Bot. Zeitung. | Native of tropical America | Singonio, pata de gancho, esmeralda | VSL, JBU, BSB | ATV228; ATV427 | Invasive behavior |
| SPecies | Origin and Distribution | Common Name | Collection Site | Voucher Number | Notes |
|---------|-------------------------|-------------|----------------|----------------|-------|
| *Xanthosoma sagittifolium* (L.) Schott. | Native of South America, and Antilles. | Mafafa | MDG, LLR, VSL | ATV173 | Food |
| **Araucariaceae** | | | | | |
| *Araucaria heterophylla* (Salisb.) Franco. | Native of Australia, cultivated in South America | Araucaria | ISB, JBU, LLR | ATV74; ATV433 | Ornamental |
| *Caryota mitis* Lour. | Native of Southeast Asia. Distributed in Central America | Palma de Gola de pescado, palma mariposa | ARP, JBU, LLR | ATV212 | Ornamental |
| **Arecales** | | | | | |
| *Ananas comosus* (L.) Merr. | Native of Southeast Asia. Distributed in Central America | Piña, ananas, piña tropical | JBU, LLR | ATV415 | Only in culture. Edible fruits and medicinal use |
| **Bromeliaceae** | | | | | |
| *Ananas comosus* (L.) Merr. | Native of South America, cultivated in the tropics | Piña, ananas, piña tropical | JBU, LLR | ATV415 | Only in culture. Edible fruits and medicinal use |
| **Cannaceae** | | | | | |
| *Canna warscewiczii* A.Dietr. | Native of South America, cultivated in the tropics | Achira, Achira roja | ADP, MDG | ATV120; ATV442 | Ornamental |
| **Casuarinaceae** | | | | | |
| *Casuarina equisetifolia* L. | Native of Australia, cultivated in the tropics, especially in coastal areas. | Casuarina, Árbol del madero, Pino australiano, pino de mar | VSL | Photographic record. | Ornamental, used for wood and invasive use |
| **Cupressaceae** | | | | | |
| *Platycladus orientalis* (L.) Franco. | Native of Central Asia. | Árbol de la vida, Pino libro | ISB, JBU | ATV72; ATV432 | Ornamental, medicinal and wood use |
| **Cucurbitaceae** | | | | | |
| *Citrillus lanatus* (Thunb.) Matsum. and Nakai. | Native of South Africa. Cultivated worldwide | Sandía, Patilla, watermelon | LLR, VSL, COV | ATV409 | Food |
| *Cucurbita maxima* Duchesne. | Native of South Africa. Cultivated worldwide | Asaya, Pumplín, Sapayo | ADP, LLR, VSL | ATV80 | Food |
| *Cucumis melo* L. | Native of Paleotropics, cultivated worldwide | Melón | VSL, BSB, LLR, | ATV413 | Food, used as diuretic |
| **Cyadaceae** | | | | | |
| *Cynas revoluta* Thunb. | Native of Japan. Introduced in Central America | Cica, palma fúnebre, Sago palm | JBU, LLR, BSB, BLA | ATV183/182 | Ornamental |
| **Euphorbiaceae** | | | | | |
| Acalypha hispida* Burm. f. | Probably native of Indonesia. Cultivated in the tropics | Cola de gato, Gusano roja, cola de zorro | EPN, LLR | ATV177; ATV410 | Ornamental |
| Acalypha amencatae subsp. wilkesiana (Müll.Arg.) Fosberg. | Probably native of Oceania. Cultivated in the tropics. | Bronce | A20J, VSL, LLR | ATV418 | Ornamental |
| Codiaeum variegatum* (L.) Blume. | Native of India. Cultivated worldwide. | Hoja de la Independencia, Acuarela, cruto, cruto | VSL, BSB, LLR, VSL | Photographic record. | Ornamental |
| *Cnidoscolus chayamansa* McVaugh. | Native of America. | Árbol espinaca, Chaya | VSL, LLR, BOO | ATV417 | Ornamental and edible, toxic if consumed raw |
| Euphorbia aphylla* Brouss. ex Wild. | Endemic of the Canary islands. | Árbol desnudo, Tolda, Árbol palito | JBU, VSL, LLR, ISB | ATV208; ATV426 | Ornamental |
| Euphorbia milli var. splendens* (Bojer ex Hook.) Ursh and Leandri. | Native of Madagascar. Pantropical distribution | Corona de cristo, corona de espinas, espinas de cristo | LLR, VSL, JBU | ATV438 | Ornamental latex used to cure wounds |
| Jatropha podagrica* Hook. | Native of Central America. Pantropical distribution. | Árbol botella, Yunco, Corales | JBU, BVC | ATV430 | Ornamental |
| **Heliconiaceae** | | | | | |
| *Heliconia episcopalis* Vell. | Native of Neotropics | Platanillo, Lanza, Platanillo | JBU, LLR | ATV90 | Ornamental |
| SPECIES ORIGIN AND DISTRIBUTION | COMMON NAME | COLLECTION SITE | VOUCHER NUMBER | NOTES |
|--------------------------------|-------------|-----------------|----------------|-------|
| Heliconia psittacorum x spathocircinata “Golden Torch” Native of Guyana. Tropical distribution | Platanillo amarillo | JBU, LLR | ATV 222 | Ornamental hybrid |
| Heliconia wagneriana Petersen. Native of Neotropics | Heliconia, platanillo | JBU | ATV443 | Ornamental and medicinal |
| **LILIACEAE** | | | | |
| *Cordyline terminalis* (L.) Kunth. Native of Southeast Asia. Pantropical distribution | Cordyline, palmita roja | JBU, SEB, VSL | ATV429 | Ornamental |
| **MUSACEAE** | | | | |
| *Musa x paradisiaca* L. Native of Asia. Cultivated in tropics regions | Banano, Banana, platano, guineo plantain. | VSL, BOO, LLR, COV, ADP | ATV437 | Food and medicinal |
| **MALVACEAE** | | | | |
| Hibiscus rosa-sinensis L. var. kermesinus Origin unknown. Pantropical distribution | Hibiscus | VSL, JBU, BSB, CEN | ATV403 | Ornamental |
| **MYRACEAE** | | | | |
| Eugenia uniflora L. Native of South America, it is cultivated and/ or naturalised in large parts of the Old World tropics and subtropics but is not native. | pitanga | BSB | ATV422 | Food and ornamental. |
| **PLUMBAGINACEAE** | | | | |
| Plumbago auriculata Lam. Native of South Africa. | Plumbago, Jazmín azul, Azulina, Jazmín celeste, Cape leadwort | JBU, VSL, LLR | ATV175 | Ornamental |
| **POACEAE** | | | | |
| *Bambusa vulgaris* Schrad. ex J.C. Wendl. Native of India and Native of Indonesia. Now pantropical distribution | Bambú, Bambú amarillo, Guadua pintada | CSF, CMA, MDG | ATV425 | Food, ornamental, wood |
| **PTERIDACEAE** | | | | |
| *Pityrogramma ebenea* (L.) Proctor. Distributed in the Caribbean, Central and South America | Helecho tatuaje | MDG | ATV105 | Ornamental |
| **ROSACEAE** | | | | |
| *Rosa chinensis* Jacq. Native of China Worldwide distribution | Rosa, rose | ADP, BSB, BLA, LLR | ATV118 | Ornamental and medicinal |
| **RUSCACEAE** | | | | |
| *Dracaena marginata* Lam. Native of Madagascar | Punta de lanza, lanza roja | JBU, LLR, VSL | ATV226 | Ornamental |
| *Sansevieria trifasciata* Hort. ex Prain Laurentii Native of tropical Africa Tropical distribution | Lengua de tigre, Rabo de tigre, espada de San Jorge | BOQ, BSR, BLA, CEN | ATV436 | Ornamental |
| **Solanaceae** | | | | |
| *Capsicum chinense* Jacq. Native of the Neotropics, cultivated in the whole continent | Aji, Chile | MDG, CEN, VSL | ATV108 | Food, medicinal and ritual use |
| *Lycopersicon esculentum* Mill. Native of the Neotropics, cultivated worldwide | Tomate, gold-apple | VSL, LLR, COV | Photographic record | Food, medicinal |
| **STRELITZIACEAE** | | | | |
| *Ravenala madagascariensis* Sonn. Native of Madagascar Tropical distribution, found in greenhouses in temperate climates | Palma del viajero, palma abanico, árbol del viajero | JBU, VSL | Photographic record | Ornamental |
| **ZINGIBERACEAE** | | | | |
| *Costus barbatus* Saxes. Native of tropical America | Spiral ginger | CS, BLA, ADP | ATV57; ATV 416 | Ornamental |
| *Alpinia purpurata* (Visell.) K. Schum. Native of New Guinea. Tropical distribution | Yimper, Ginger | CS, ADP | ATV58; ATV408 | Ornamental |
| *Alpinia zerumbet* (Pers.) B.L. Burtt and R.M. Sm. Native of Asia, distributed in Central and South America | Shellflower, shell-ginger | SHH, LLR | ATV401 | Ornamental |

**Acknowledgments:** We wish to thank Johnny Walker Cárdenas for logistic support and Luis Guerra, Eder Ortiz and Rita Vargas for field assistance. We thank Billy Pertuz and Camilo Rodriguez who helped mounting the specimens, and Douglas Rivera who provided the map. Jaime Polanía improved the text of the manuscript, for which we are grateful. We are indebted to all the employees of the Botanical Garden of the UNAL sede Caribe who helped and participated in the research. Financial support was provided by the Universidad Nacional de Colombia, sede Caribe, through projects # 40202022100, # 20501003000, # 20101003960.

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