Species richness of the vascular plants of the Bijagual high Andean forest, Colombia

Riqueza de las plantas vasculares del bosque altoandino de Bijagual, Colombia

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Abstract:
Background and Aims: The high Andean forest in Colombia corresponds to a plant community located between 2400-3200(-3500) m a.s.l., characterized by the presence of arboreal species with restricted distributions that determine their physiognomy and composition. Nevertheless, these species have been affected by agricultural activity that has generated a loss of connectivity and richness. This research records the species richness, composition, and distributional data for the vascular flora in the high Andean forest of the Bijagual Massif, Bocayá, Colombia.

Methods: Sampling was carried out in 27 transects. The specimens were organized under the APG IV classification system, curated and deposited in the UPTC herbarium (Universidad Pedagógica y Tecnológica de Colombia). The number of species, list of taxa, distributions for Colombia, and conservation categories according to the IUCN were noted.

Results: We registered 327 species distributed in 151 genera and 69 families; 187 species (56%) were native to the Andean region, 51 (15%) were endemic to the Andes and 24 (7%) were endemic to the Eastern cordillera of the Andes, Colombia. Schefflera bejucosa is a new distributional record for Bocayá. Greigia stenolepis, Hieronyma rufa, Puya goudotiana and Tillandsia pallescens are Near Threatened (NT). Plutarchia guascensis, Quercus humboldtii and Symplacos venulosa are classified as Vulnerable (VU), and Diplostephium oblongifolium and Dunalia trianaei as Endangered (EN).

Conclusions: Bijagual is a biological corridor with great potential for biodiversity compared to other high Andean areas in Colombia. Species richness is influenced by other localities near the Massif (Tota and Mampacha), in addition to a possible stochastic and heterogeneous distribution between sampling units. Miconia, Pentacalia, Epidendrum, Elaphoglossum, Tillandsia, and some other genera are species-rich. Clusia alata, Weinmannia balbisiana, Weinmannia rolottii, Ternstroemia cf. camellifolia, and Brunellia comocladafolia define the arboreal and shrub physiognomy of Bijagual.

Keywords: Andes, distribution, endemic species, floristic composition, high Andean forest, specific richness.

Resumen:
Antecedentes y Objetivos: El bosque altoandino en Colombia corresponde a una formación vegetal, localizada entre 2400-3200(-3500) m.s.n.m. Se caracteriza por la presencia de especies arbóreas con distribución restringida que determinan su fisionomía y composición. No obstante, dichas especies han sido afectadas por la actividad agrícola que ha generado pérdida de conectividad y de riqueza. Esta investigación registra la riqueza, composición y datos de distribución de flora vascular en el bosque altoandino del Macizo de Bijagual, Bocayá, Colombia.

Métodos: Se realizaron muestreos en 27 transectos. Los ejemplares fueron organizados bajo el sistema de clasificación APG IV, curados y depositados en el herbario UPTC (Universidad Pedagógica y Tecnológica de Colombia). Se obtuvo el número de especies, listado de taxa, distribución para Colombia y categorías de conservación según la UICN.

Resultados: Se registraron 327 especies, distribuidas en 151 géneros y 69 familias; 187 especies (56%) son nativas de la región andina, 51 (15%) son endémicas de los Andes y 24 (7%) son endémicas de la cordillera Oriental colombiana. Schefflera bejucosa es un nuevo registro de distribución para Bocayá. Greigia stenolepis, Hieronyma rufa, Puya goudotiana y Tillandsia pallescens presentan la categoría Casi Amenazado (NT). Plutarchia guascensis, Quercus humboldtii y Symplacos venulosa, Vulnerable (VU); Diplostephium oblongifolium y Dunalia trianaei En Peligro (EN).

Conclusiones: Bijagual es un corredor biológico con gran potencial de biodiversidad comparado con otras áreas altoandinas en Colombia. La riqueza es influenciada por otras localidades cercanas al Macizo (Tota y Mampacha), además de una posible distribución estocástica y heterogénea entre unidades de muestreo. Miconia, Pentacalia, Epidendrum, Elaphoglossum, Tillandsia y algunos otros géneros son ricos en especies. Clusia alata, Weinmannia balbisiana, Weinmannia rolottii, Ternstroemia cf. camellifolia y Brunellia comocladafolia definen la fisionomía arbórea y arbustiva de Bijagual.

Palabras clave: Andes, bosques altoandinos, composición florística, distribución, especies endémicas, riqueza específica.
Introduction

The high Andean forests are distributed in the Western, Central, and Eastern cordilleras of the Andes in Colombia. The area is located at an altitudinal range of 2400-3500 m a.s.l. (Rangel-Ch. et al., 1997). However, floristic research has occurred mainly in the Western and Central cordilleras (Mosquera-Ramos et al., 2007; León et al., 2009; Idárraga and Callejas, 2011; Alzate et al., 2013; David et al., 2014; Ramírez-Padilla et al., 2015). Existing research in the Eastern cordillera is focused on distributional patterns and dominance of plant communities (Marín and Betancur, 1997; Franco-R. and Betancur, 1999; Galindo et al., 2003; Cortés, 2003; Arias and Barrera, 2007; Fernández-A. and Hernández-S., 2007).

The high Andean forests are characterized by the presence of biogeographically restricted elements that define the physiognomy and composition of the forests (Rangel-Ch. et al., 1997). The forests are very humid and rich in woody and herbaceous plants. Because of these characteristics, species composition is specific at local levels in the Eastern cordillera (Van der Hammen and Cleef, 1983).

The high Andean forests have had the constant influence of farming (especially of potatoes, onions, apples, pears, and peaches), ungulate-grazing (cattle, horses, and pigs), and mining (coal, emeralds, and iron). It also has lost areas to a matrix of grasslands (Pennisetum Rich., Brachiaria (Trin.) Griseb., and Holcus lanatus L.), and this has led to a loss not only of forest biodiversity, but also of connectivity (Armenteras et al., 2003, 2013; Etter et al., 2006; Medina et al., 2015).

The objective of this research is presenting the description of the composition, richness and distribution of species of the high Andean forest of the Bijagual Massif, Boyacá, Colombia. Additionally, we have included data of threatened categories and endemic species.

Materials and Methods

Study area

The Bijagual Massif is located in the department of Boyacá, Colombia, at the coordinates 5°26'10.28"-5°15'40.21"N and 73°13'5.20"-73°21'58.19"W, with an area of extension of 8604 ha (Gil-Leguizamón et al., 2020). Its limits are the Tota lake to the north and the Mampacha Massif to the south (Tota-Bijagual-Mampacha complex; Morales et al., 2007). The high Andean forest distribution (2682-3268 m a.s.l.) abuts paramo flora at the highest altitudes (2990-3460 m a.s.l.). Currently, Bijagual is not a protected natural area. There are excessive activities of inappropriate soil use with more than 50% committed to farming and cattle (Fig. 1; Gil, 2016).

Data collection

We established 27 transects in the high Andean forest of Bijagual (100 × 5 m=500 m²) (Rangel-Ch. and Velásquez, 1997). For each individual, the abundance, growth form, height, coverage, diameter at breast height for trees, and basal area for shrubs were noted (data published in Gil-Leguizamón et al., 2020).

For determination of botanical material, specialized literature for families and genera of the woody plants (Gentry, 1993), Flora de Colombia (FDC, 2021), Flora Neotropica (SFNM, 2021), Flora de Costa Rica (BMCR, 2021), and Flora de Panamá (PAC, 2021) were used, as well as the International Plant Name Index (IPNI, 2021) for correct citations of the scientific names; for suprafamilial classification APG IV (2016) was used. Each specimen was confirmed with the HECASA (Universidad de Pamplona, Colombia) and UPTC (Universidad Pedagógica y Tecnológica de Colombia) herbarium collections, virtual herbarium reviews (COL herbarium; COL, 2021), and web pages (Botanicus, 2021; TPL , 2021; Tropicos, 2021) and with a botanical specialist. Vouchers were deposited in the UPTC herbarium reference collection under Gil-Leguizamón P.A. collection numbers.

Data analysis

This study of vascular plants involved the families and genera with high species richness. For each species, distributional data were obtained in Colombia (of endemic and native species) according to Bernal et al. (2016). We present the table in order to corroborate new records and species identification with their conservation category (IUCN, 2021). The results presented here expand the information of Gil-Leguizamón et al. (2020) about the structure and diversity of the vegetation of the Bijagual Massif paramo complex.
Results

We recorded 327 species, distributed in 151 genera and 69 families (Appendix; Figs. 2, 3, 4, 5, 6, 7, 8, 9 show some of these species). The families with the highest species richness (16 families or 23%) are: Asteraceae, Orchidaceae, Melastomataceae, Ericaceae, Bromeliaceae, Rubiaceae, Poaceae, Rosaceae and Araliaceae. These contained 59% of the genera and 70% of the species (Table). The most diverse genera are (16 or 11%) *Miconia* Ruiz & Pav., *Pentacalia* Cass., *Epidendrum* L., *Tillandsia* L., *Ageratina* Spach, *Diplostephium* Kunth, *Stelis* Sw., *Pleurothallis* R. Br., *Rubus* L., and represent 35% of the total number of species (Table).

Twenty percent of the families (14 families) are represented by three or four species and 57% (39 families) by one or two. Of the genera, 13% (20 genera) have three or four species, and 76% (117 genera) one or two taxa, respectively (Appendix).
**Figure 2:** Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A-C. *Viburnum triphyllum* Benth.; D, E. *Anthurium* sp.; F. *Oreopanax mutisianus* (Kunth) Decne. & Planch.; H, I. *Diplostephium floribundum* (Benth.) Wedd.; J, K. *Diplostephium tenuifolium* Cuatrec.; L-N. *Espeletia boyacensis* Cuatrec.
Figure 3: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A-C. *Espeletia murilloi* Cuatrec.; D-F. *Pentacalia pulchella* (Kunth) Cuatrec.; G, H. *Greigia stenolepis* L.B. Sm.; I, J. *Puya goudotiana* Mez.
Figure 4: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A, B. Tillandsia turneri Baker; C-E. Brunellia propinqua Kunth; F, G. Siphocampylus sp.; H-J. Clusia multiflora Kunth; K-M. Weinmannia fagaroides Kunth.
Figure 5: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A. *Weinmannia rollottii* Killip; B, C. *Weinmannia tomentosa* L. f.; D-F. *Vallea stipularis* L. f.; G, H. *Disterigma alaternoides* (Kunth) Nied.; I, J. *Gaultheria anastomosans* (L. f.) Kunth.
Figure 6: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A, B. Gaultheria erecta Vent.; C, D. Macleania rupestris (Kunth) A.C. Sm.; E-G. Pernettya prostrata (Cav.) DC.; H-J. Escallonia myrtilloides L. f.
Figure 7: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A, B. *Halenia asclepiadea* (Kunth) G. Don; C, D. *Symbolanthus calygonus* (Ruiz & Pav.) Griseb. ex Gilg; E-G. *Gunnera* cf. *schultesii* L.E. Mora; H-J. *Gaiadendron punctatum* (Ruiz & Pav.) G. Don; K, L. *Bucquetia glutinosa* (L. f.) DC.; M-O. *Miconia cleefii* L. Uribe.
**Figure 8**: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A, B. *Miconia stipularis* Naudin; C, D. *Monochaetum myrtoideum* Naudin; E, F. *Myrcianthes rhopaloides* (Kunth) McVaugh; G, H. *Fernandezia lanceolata* (L.O. Williams) Garay & Dunst.; I-K. *Chusquea tessellata* Munro; L, M. *Morella parvifolia* (Benth.) Parra-Os.
Figure 9: Recorded vascular plants in the Bijagual Massif, Boyacá, Colombia. A-C. *Myrsine dependens* (Ruiz & Pav.) Spreng.; D, E. *Arcyrophyllum muticum* (Wedd.) Standl.; F-I. *Arcyrophyllum nitidum* (Kunth) Schtdl.; J-L. *Galium hypocarpium* (L.) Endl. ex Griseb.; M, N. *Nertera granadensis* (Mutis ex L. f.) Druce; O-Q. *Symplocos theiformis* (L. f.) Oken.
Table: Most representative families and genera in the Bijagual Massif, Boyacá, Colombia.

| N°  | Families       | Genera | Species | Genera       | Species |
|-----|----------------|--------|---------|--------------|---------|
| 1   | Asteraceae     | 14     | 47      | Miconia Ruiz & Pav. | 15      |
| 2   | Orchidaceae    | 13     | 42      | Pentacalia Cass. | 12      |
| 3   | Melastomataceae| 6      | 22      | Epidendrum L.  | 10      |
| 4   | Ericaceae      | 10     | 21      | Tillandsia L.  | 9       |
| 5   | Bromeliaceae   | 7      | 19      | Ageratina Spach | 8       |
| 6   | Rubiaceae      | 6      | 12      | Diplostephium Kunth | 7    |
| 7   | Poaceae        | 6      | 11      | Stelis Sw.     | 7       |
| 8   | Rosaceae       | 4      | 8       | Pleurothallis R. Br. | 6    |
| 9   | Araliaceae     | 3      | 8       | Palicourea Aubl. | 6       |
| 10  | Solanaceae     | 5      | 7       | Rubus L.      | 5       |
| 11  | Cyperaceae     | 4      | 7       | Anthurium Schott | 5       |
| 12  | Piperaceae     | 2      | 6       | Oreopanax Decne. & Planch. | 5 |
| 13  | Lauraceae      | 4      | 5       | Weinmannia L.  | 5       |
| 14  | Primulaceae    | 3      | 5       | Disterigma (Klotzsch) Nied. | 5 |
| 15  | Araceae        | 1      | 5       | Gaultheria L.  | 5       |
| 16  | Cunoniaceae    | 1      | 5       | Lepanthes Sw.  | 5       |

Representative families: 16 (23%) 89 (59%) 230 (70%)
Representative genera: 16 (11%) 115 (35%)

Other families: 53 (77%) 62 (41%) 97 (30%)
Other genera: 135 (89%) 212 (65%)

Total families: 69 (100%) 151 (100%) 327 (100%)
Total genera: 151 (100%) 327 (100%)

One hundred eighty-seven species (56%) are native to the Andean region, and 51 (15%) are endemic to the Andes from this area. Only 24 (7%) are endemic to the Colombian Eastern cordillera. *Passiflora adulterina* L. f., and *Plutarchia guascensis* (Cuatrec.) A.C. Sm. are restricted to the Cundinamarca-Boyacá highlands. The latter two species are also recorded in the departments of Quindío and Santander (Bernal et al., 2016, Appendix). *Schefflera bejucosa* Cuatrec. (Araliaceae) is a new record for the department of Boyacá. According to the IUCN (2021) records and the Colombian Red Books, 78 species do not have information about their conservation assessment and threat categorization, but 151 taxa are categorized as Not Evaluated (NE) and 89 as Least Concern (LC) (García et al., 2005; Betancur and García, 2006; Hernández and García, 2006; Bernal et al., 2016). *Greigia stenolepis* L.B. Sm. (Fig. 3: G, H), *Hieronyma rufa* P. Franco, *Puya goudotiana* Mez (Fig. 3: I, J) and *Tillandsia pallescens* Betancur & García Nestor are Near Threatened (NT) (Betancur and García, 2006). *Plutarchia guascensis* (Cuatrec.) A.C. Sm., *Quercus humboldtii* Bonpl. and *Symlocos venulosa* Cuatrec. are classified as Vulnerable (VU) (Cárdenas and Salinas, 2007), and *Diplostephium oblongifolium* Cuatrec., and *Dunalia trianae* Dammer as Endangered (EN).

**Discussion**

The study area comprised 1.35 ha and overlapped with a minimum unit (0.1 ha) (Gentry, 1982, 1995; Rangel-Ch. and Velásquez, 1997). We determined that the Bijagual flora has great biodiversity potential as a biological corridor. The species richness and composition in Bijagual is higher compared to other localities in the Colombian Eastern cordillera (Avella-M. et al., 2014; Gil, 2016; Carrillo et al., 2017; Gil-Leguizamón et al., 2020).

In 0.1 ha the average estimated species richness is 109 spp. ±17 (some of the species are shown here (Figs. 2, 3, 4, 5, 6, 7, 8, 9)), so the results suggest that the number of taxa was very high compared to that reported from...
other high Andean forests. Species richness fluctuates between 43 and 53 species in other forests in the same cordillera (Marín and Betancur, 1997; Galindo et al., 2003; Arias and Barrera, 2007) and between 18 and 69 species for forests in the Central and Western cordilleras (Gentry, 1995; León et al., 2009; Alvear et al., 2010; Bohórquez et al., 2011; Abud-H. and Torres, 2016; Segura-Madrigal et al., 2019).

Our study found that the total floral richness (327 spp.) is greater for Bijagual than that recorded by Carvajal et al. (2014). These authors determined for the same area 275 species in 86 families. This result is influenced by the total assessed area including species with trunk diameters ≤ to 2.5 cm. This criterion extends the richness to 152 species (39%). Characteristics that contribute to the species richness are strongly associated with the flora from the Tota corridor (north) and Mampacha (south) in the altitudinal and latitudinal gradients. This is possibly a stochastic species distribution with high species replacement between sampling units (Gil-Leguizamón et al., 2020).

The Bijagual high Andean forests have typical floristic elements of rocky formations (Cuatrecasas, 1934; Rangel-Ch., 1995; Arias and Barrera, 2007). Alvear et al. (2010) and Carvajal et al. (2014) recorded the families Asteraceae, Ericaceae, Melastomataceae, Rubiaceae, Cunoniaceae, and Poaceae as main groups that characterize the ecosystem, which is consistent with the data obtained in this study. However, the Bijagual flora is also represented by families such as Orchidaceae, Rosaceae, Solanaceae, Cyperaceae, Bromeliaceae, and Arajaceae. These make up 29% (95 species) of the total assessed area.

Genera such as Miconia, Pentacalia, Epidendrum, Elaphoglossum Schott ex J. Sm., Tillandsia, Ageratina, Diplosteophyllum, Weinmannia L., Stelis, and Hymenophyllum Sm. are representative in Bijagual and they are diverse (Table). These are recorded by Cuatrecasas (1958), Marín and Betancur (1997), Franco-R. and Betancur (1999), Fernández-A. and Hernández-S. (2007), Montenegro and Vargas (2008), Álvaro-Fajardo et al. (2013) and Jadán et al. (2017), for Colombian and Ecuadorian high mountain formations. Likewise, the abovementioned authors included Brunellia Ruiz & Pav. (Figs. 4C-E), Clusia L. (Figs. 4H-J), Drimys J.R. Forst. & G. Forst., Oreopanax Decne. & Planch., Geissanthus Hook. f., Palicourea Aubl., Piper L., Escallonia Mutis ex L. f., Symplocos Jacq. (Figs. 90-Q), Hesperomeles Lindl., Clethra L., Ilex L., and Ocotea Aubl., which are also recorded with low species richness in this research (Figs. 2, 3, 4, 5, 6, 7, 8, 9).

In the high Andean Eastern cordillera, records of Lauraceae (Ocotea and Persea Mill.) and Melastomataceae (Axinea A. Juss., Tibouchina Aubl., Buccquetia DC., and Miconia) are dominant in the arboreal and shrubby strata and are also registered for Bijagual, with species like Clusia alata Planch. & Triana, C. elliptica Kunth and C. multiflora Kunth (Figs. 4H-J) (Clusiaceae), Weinmannia balbisiana Kunth, W. fagaroides Kunth (Figs. 4K-M), W. reticulata Ruiz & Pav., W. rolloittii Killip (Fig. 5A), W. tomentosa L. f. (Figs. 5B, C) (Cunoniaceae), Ternstroemia cf. camellifolia Linden & Planch. (Pentaphylacaceae), Brunellia cf. comocladiifolia Bonpl. and B. propinqua Kunth (Figs. 4C-E) (Brunelliaeae) (Gentry, 2001; Avella-M. et al., 2014).

Between the altitudes of 2900-3000(-3200) m, the families Ericaceae and Primulaceae (Myrsine L. and Geissanthus), as well as the genera Oreopanax, Weinmannia, Hedyosmum Sw., Viburnum L., Vallea Mutis ex L. f., Clusia, Gaidendron G. Don, Myrica L., Piper, Hesperomeles, Palicourea, and Muehlenbeckia Meisn. are recorded (Gentry, 2001; Galindo et al., 2003; Olaya-Angarita et al., 2019; and Gil-Leguizamón et al., 2020). Similarly, some genera recorded in high Andean forest include species that are typical of the forest-paramo transitions in Bijagual, such as Gaidendrum punctatum (Ruiz & Pav.) G. Don. (Figs. 7H-J), Hesperomeles obtusifolia (Pers.) Lindl., Weinmannia fagaroides (Figs. 4K-M) and W. balbisiana.

Species from subparamo and paramo ecosystems were recorded in the high Andean forest due to vertical migration, although they do not belong to the actual forest (Rangel-Ch., 2000). Suitable features for colonization and development are found at lower altitudes (paramo colonization; Van der Hammen, 1998). Special cases are Hypericum lycopodioides Triana & Planch., Arctophyllum nitidum (Kunth) Schldl., Puya goudotiana Mez, Paepalanthus columbiensis Ruhland, Espeletia murilloi Cuatrec., and E. boyacensis Cuatrec., which are also documented by Cortés (2003) for the Eastern cordillera and by Alvear et al. (2010) for the Central cordillera in Colombia.
Author contributions

PAG, MEM, and MYC conceived and designed the study, performed the analyses, contributed to data acquisition and interpretation, and wrote the manuscript. All authors contributed to the discussion, review, and approval of the final manuscript.

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Appendix: Recorded flora from the high Andean forest of the Bijagual Massif, Boyacá, Colombia. The Eastern cordillera mountains abbreviations: NA: Native Andean, EA: Endemic Andean, End: Endemic, SN San. Marta: Sierra Nevada of Santa Marta, ECO: Endemic Andean from the Eastern cordillera mountains. Departments: Ant: Antioquia, Ara: Arauca, Boy: Boyacá, Cal: Caldas, Cas: Casanare, Cau: Cauca, Ces: Cesar, Cho: Chocó, Cun: Cundinamarca, Gua: Guajira, Hui: Huila, Nor San: Norte de Santander, Mag: Magdalena, Met: Meta, Nar: Nariño, Qui: Quindío, Ris: Risaralda, San: Santander, Tol: Tolima, Val: Valle, Vau: Vaupés. IUCN Red List Status: EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern, NE: Not evaluated. All voucher specimens are deposited in the herbarium UPTC.

| Family                  | Specie                                                                 | Voucher | Status/Biogeographical Region | IUCN Red List Status |
|-------------------------|------------------------------------------------------------------------|---------|-------------------------------|----------------------|
| MAGNOLIIDS              |                                                                        |         |                               |                      |
| Chloranthaceae          |                                                                        |         |                               |                      |
| *Hedyosmum colombianum* | Cuatrec.                                                               | 1324, 1416, 1454, 2049, 2206, 2372, 2445, 2533 | ECO (2100-3500 m) | LC                   |
| *Hedyosmum crenatum*    | Occhioni                                                               | 1372    | NA, SN San. Marta (1990-3700 m) | NE            |
| *Hedyosmum parvifolium* | Cordem.                                                               | 1885, 2074, 2170 | NA (2700-3400 m) | NE            |
| *Hedyosmum translucidum*| Cuatrec.                                                               | 1860, 2093, 2180 | NA (2000-3100 m) | LC            |
| Lauraceae               |                                                                        |         |                               |                      |
| *Hedyosmum crenatum*    | Occhioni                                                               | 1372    | NA, SN San. Marta (1990-3700 m) | NE            |
| *Hedyosmum parvifolium* | Cordem.                                                               | 1885, 2074, 2170 | NA (2700-3400 m) | NE            |
| *Hedyosmum translucidum*| Cuatrec.                                                               | 1860, 2093, 2180 | NA (2000-3100 m) | LC            |
| *Ocotea cerna* (Nees) Mez|                                                                      | 2491    | NA, SN San. Marta, Valle del Cauca (0-1400 m) | LC            |
| *Ocotea sericea* Kunth  |                                                                        | 1439, 1999 | NA                              | LC            |
| *Persea mutisii* Kunth  |                                                                        | 1551, 1626, 2072, 2274 | NA (2000-3500 m) | LC            |
| *Pleurothyrium velutinum*| Meisn.                                                                | 1646, 1804, 2112 | NA (2250-3900 m) | NE            |
| Monimiaceae             |                                                                        |         |                               |                      |
| *Mollinedia* sp.        |                                                                        | 2444    |                               | -                 |
| Piperaceae              |                                                                        |         |                               |                      |
| *Peperomia acuminata*   | Ruiz & Pav.                                                           | 2059, 2119, 2254 | NA (1800-3600 m) | NE            |
| *Peperomia* sp. 1       |                                                                        | 1342, 1850, 1986 | -                               | -                 |
| *Peperomia* sp. 2       |                                                                        | 2402    | -                               | -                 |
| *Piper artanthe* C. DC. |                                                                        | 1548, 1566, 2177, 2468, 1979 | NA (1600-2950 m) | NE            |
| *Piper bogotense* C. DC.|                                                                        | 1582    | NA (200-3500 m)                 | LC            |
| *Piper irazuanum* C. DC.|                                                                        | 1343, 1386, 1461, 2110, 2392, 2443 | NA (2000-2800 m) | NE            |
| Winteraceae             |                                                                        |         |                               |                      |
| *Drimys granadensis* L. f.|                                                                    | 1378, 1476, 2092, 2147 | NA (1800-3900 m) | NE            |
| MONOCOTS                |                                                                        |         |                               |                      |
| Alstroemeriacae         |                                                                        |         |                               |                      |
| *Bomarea angustipetala* | Baker                                                                  | 1788, 1920 | EA (2600-3850 m) | NE            |
| *Bomarea setacea* (Ruiz & Pav.) Herb.|                                               | 1296, 1388, 1797, 1900, 2034, 2227, 2386, 2411, 1719, 1706, 2597 | NA (1900-4000m) | LC            |
| *Bomarea sp.*           |                                                                        | 1844, 2117, 2338 | -                               | -                 |
| Araceae                 |                                                                        |         |                               |                      |
| *Anthurium nigrescens*  | Engl.                                                                  | 1377, 2044 | NA, from Pacífico (150-3600m) | LC            |
| *Anthurium oxybelium* Shott |                                                                    | 1437, 1957, 2051, 2100, 2201, 2244, 2354, 1414 | NA (1350-3860m) | LC            |
### Appendix: Continuation.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| **Anthurium sp. 1** | 1875, 1382 | - | - |
| **Anthurium sp. 2** | 1478 | - | - |
| **Anthurium sp. 3** | 1387, 1508 | - | - |

#### Asphodelaceae

*Eccremis coarctata* (Ruiz & Pav.) Baker

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2191, 2503, 1828, 1905 | NA, SN San. Marta, from Ant, Boy, Cun, Guai, Hui, Mag, San (1990-3600 m) | NE |

#### Bromeliaceae

*Grezia stenolepis* L.B. Sm.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1312, 1381, 1477, 1511, 2403, 2451 | ECO (2500-3720 m) | NT |

*Guzmania gloriosa* (André) André ex Mez

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2178, 2193, 2454 | NA (900-3170 m) | LC |

*Guzmania squarrosa* (Mez & Sodiro) L.B. Sm. & Pittendr.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1329, 1481, 2436 | NA, Guayana, Macarena (1000-3680 m) | LC |

*Mezobromelia capituligera* (Griseb.) J.R. Grant

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2026, 2176 | NA, Amazonía, SN San. Marta (310-2820 m) | LC |

*Puya goudotiana* Mez

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1333, 1904, 2356, 1820, 1408, 1771 | ECO (2760-3550 m) | NT |

*Puya sp.*

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2382, 2497 | - | - |

*Racinaea riocreuxii* (André) M.A. Spencer & L.B. Sm.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1562, 1618, 1633, 2007, 2069, 2135, 2296, 2522 | NA (1789-3330 m) | LC |

*Racinaea sp.*

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2523 | - | - |

*Racinaea tetrantha* (Ruiz & Pav.) M.A. Spencer & L.B. Sm.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1617, 1893, 2158, 2521, 1680, 1681 | NA, SN San. Marta (1280-3900 m) | LC |

*Tillandsia biflora* Ruiz & Pav.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2306 | NA, Caribe, SN San. Marta (1390-3680 m) | LC |

*Tillandsia compacta* Griseb.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1874, 2179 | NA (1700-3850 m) | LC |

*Tillandsia complanata* Benth.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1581, 1632, 2025 | NA, SN San. Marta, Valle del Magdalena (800-3650 m) | LC |

*Tillandsia pallescens* Betancur & García Nestor

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2498 | ECO (2950-3100 m) | NT |

*Tillandsia restrepona* André

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2282 | NA, SN San. Marta (2300-2984 m) | LC |

*Tillandsia sp. 1*

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2542 | - | - |

*Tillandsia sp. 2*

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1360 | - | - |

*Tillandsia sp. 3*

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2160 | - | - |

*Tillandsia turneri* Baker

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1527, 1619, 2534, 1676 | NA (2600-3600 m) | LC |

*Vriesea rubrobacteata* Rauh

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2311 | ECO (1000-2850 m) | LC |

#### Cyperaceae

*Carex cf. livida* (Wahlenb.) Willd.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1823 | NA (2880-3730 m) | NE |

*Carex jamesoni* Boott

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2495 | NA (1560-4100 m) | LC |

*Carex luridiformis* Mack. ex Reiznicek & S. Gozélez

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 2019 | EA (2500-3800 m) | LC |

*Kyllinga brevifolia* Rottb.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|------------------------------|----------------------|
| 1580 | NA, Caribe, Orinoquia, Pacífico, SN San. Marta, Valle del Cauca (0-2850 m) | LC |
| Voucher P.A. Gil-Leguizamón | Status/Biogeographical Region | IUCN Red List Status |
|-----------------------------|-----------------------------|------------------------|
| Oreobolus goeppeingeri Suess. | 2017, 1762 | NA (3000-4200 m) | NE |
| Rhynchospora ruiziana Boeckeler | 1895, 2554, 2636 | NA (1200-4000 m) | NE |
| Rhynchospora sp. | 2168, 2366, 1695, 1741 | - | - |

**Dioscoreaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-----------------------------|------------------------|
| Dioscorea cf. killipii R. Knuth | 2237 | NA (1700-3680 m) | NE |
| Dioscorea coriacea Humb. & Bonpl. ex Willd. | 1530, 1854, 2169 | NA, SN San. Marta (1200-3900 m) | NE |

**Eriocaulaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-----------------------------|------------------------|
| Paepalanthus columbiensis Ruhland | 1554, 1903, 2085, 2363, 2557, 1694, 1733, 1777 | EA (1900-3600 m) | NE |
| Paepalanthus sp. | 2388 | - | - |

**Juncaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-----------------------------|------------------------|
| Juncus effusus L. | 1573, 1639, 1821 | NA, SN San. Marta (1500-3700 m) | LC |
| Luzula gigantea Desv. | 1787 | NA, SN San. Marta (2700-4500 m) | NE |

**Orchidaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-----------------------------|------------------------|
| Anathallis sclerophylla (Lindl.) Pridgeon & M.W.Chase | 1808, 2488 | NA (1980-3100 m) | NE |
| Brachionidium tuberculatum Lindl. | 1447, 1965 | NA (280 m) | NE |
| Cranichis sp. | 2389 | - | - |
| Cyrtochilum ramosissimum (Lindl.) Dalström | 1513, 2060, 2124, 2129, 1731, 2137 | NA (1900-3600 m) | NE |
| Cyrtochilum sp. | 1987 | - | - |
| Elleanthus cf. ensantus (Lindl.) Rchb. f. | 1374, 1628, 2225, 2346 | NA (2300 m) | NE |
| Elleanthus cf. sphaerocephalus Schltr. | 2263, 2340, 2549 | NA (2300 m) | NE |
| Epidendrum sissaense Hágsater | 1319 | EA (2750 m) | NE |
| Epidendrum cf. frutex Rchb. F. | 1298, 1358, 1475, 2353, 1730, 1919 | NA (2740-3800 m) | NE |
| Epidendrum cf. macrostachyum Lindl. | 1327, 2226 | NA, Amazonia (330-2000 m) | NE |
| Epidendrum cylindraceum Lindl. | 1631, 2021 | NA (2700-3200 m) | NE |
| Epidendrum oxysepalum Hágsater & E. Santiago A. | 1611, 1621 | NA (3200-3950 m) | NE |
| Epidendrum sp. 1 | 1320, 1758, 2371, 2412 | - | - |
| Epidendrum sp. 2 | 1847 | - | - |
| Epidendrum sp. 3 | 1389, 1480 | - | - |
| Epidendrum sp. 4 | 1556, 1883, 1923, 1991 | - | - |
| Epidendrum sp. 5 | 1501 | - | - |
| Fernandezia tortuosa (Foldats) M.W. Chase | 2334 | NA (3150 m) | NE |
| Fernandezia lanceolata (L.O. Williams) Garay & Dunst. | 1330, 1586, 2071, 2464 | NA (3000-3500 m) | NE |
| Fernandezia pastii (Rchb.f.) M.W.Chase | 1557, 1627, 1886, 2077, 2205, 2289, 2387 | NA (2100-4000 m) | NE |
| Fernandezia sp. | 1855 | - | - |
| Hofmeisterella falcata (Linden & Rchb.f.) Nauray & A.Galán | 2000 | ECO (2700 m) | NE |
| Lepanthes dunstervilleorum Foldats | 2207 | NA (2600-2930 m) | NE |
**Appendix: Continuation.**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Lepanthes sp. 1** | 1492 | - | - |
| **Lepanthes sp. 2** | 2061, 2094, 2198, 2256, 2342 | - | - |
| **Lepanthes sp. 3** | 1558 | - | - |
| **Lepanthes sp. 4** | 1326, 1426 | - | - |
| **Oncidium ornithorhynchum** Kunth | 1574, 1629, 2185 | NA (2000-3400 m) | NE |
| **Pleurothallis cf. secunda** Poepp. & Endl. | 2126 | NA (2500-3500 m) | NE |
| **Pleurothallis sp. 1** | 1489, 2028 | - | - |
| **Pleurothallis sp. 2** | 1537, 2127 | - | - |
| **Pleurothallis sp. 3** | 1803 | - | - |
| **Pleurothallis sp. 4** | 2287 | - | - |
| **Pleurothallis sp. 5** | 2538 | - | - |
| **Stelis cf. aviceps** Lindl. | 2195, 2484, 2541 | NA (2000 m) | NE |
| **Stelis sp. 1** | 1487 | - | - |
| **Stelis sp. 2** | 1806 | - | - |
| **Stelis sp. 3** | 2128, 2196 | - | - |
| **Stelis sp. 4** | 2032 | - | - |
| **Stelis sp. 5** | 2218 | - | - |
| **Stelis sp. 6** | 2547 | - | - |
| **Telipogon sp.** | 1609, 1873, 2293, 2332 | - | - |

**Poaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Arthrostylidium sp.** | 2438 | - | - |
| **Aulonemia sp.** | 1496, 2037, 2239, 1302, 1901, 2011, 2358, 2635 | NA, SN San. Marta (2500-4500 m) | NE |
| **Calamagrostis effusa** (Kunth) Steud. | 1699, 1769, 1776, 1906, 2635 | NA, SN San. Marta (2500-4500 m) | NE |
| **Calamagrostis sp.** | 1645 | - | - |
| **Chusquea scandens** Kunth | 2175, 2270, 2315 | NA (2500-3500 m) | NE |
| **Chusquea sp. 1** | 1314, 1349, 1357, 1876, 2133 | - | - |
| **Chusquea sp. 2** | 1453, 2369, 2530 | - | - |
| **Chusquea tessellata** Munro | 2016, 1712, 1940, 1397, 1698, 1707, 1734, 2596 | NA (2800-4350 m) | NE |
| **Cortaderia nitida** (Kunth) Pilg. | 1303, 1553, 1825, 1944, 1402, 1740 | NA (2500-4000 m) | NE |
| **Neurolepis aperta** (Munro) Pilg. | 1436, 1452 | NA (2500-4000 m) | NE |
| **Neurolepis cf. acuminatissima** (Munro) Pilg. | 1433, 2634 | NA (2500-4000 m) | NE |

**Smilacaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Smilax domingensis** Willd. | 1805, 2075, 1869, 2105, 2216, 2248, 2271, 2285, 2510 | NA, Amazonia, Caribe, Pacífico, SN San. Marta, Valle del Cau, Valle del Magdalena (0-3320 m) | NE |
| **Smilax sp.** | 1620 | - | - |
Appendix: Continuation.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-----------------------------|----------------------|
| Smilax tomentosa Kunth | 2249, 2314 | NA, Guayana, Macarena (1700-3680 m) | NE |

**EUDICOTS**

**Adoxaceae**

*Viburnum tinoides* L. f. 1651 | NA (920-3724 m) | NE |

*Viburnum triphyllum* Benth. 1483, 1587, 1778, 2182, 2485, 2527 | NA (1700-3200 m) | NE |

**Aquifoliaceae**

*Ilex obtusata* Triana & Planch. 1438, 1486 | NA, SN San. Marta (2400-3400m) | LC |

*Ilex pernervata* Cuatrec. 1898, 1990 | NA, SN San. Marta (2000-3600m) | LC |

**Araliaceae**

*Hydrocotyle andina* Cuatrec. 1606 | EA (1450-3400 m) | NE |

*Hydrocotyle sphenoloba* Wedd. 1966 | EA (2000-2900 m) | NE |

*Oreopanax bogotensis* Cuatrec. 1946, 2148, 2381 | NA (2050-4117m) | NE |

*Oreopanax sp.* 1522 | - | - |

*Oreopanax incisus* (Willd. ex Schult.) Decne. & Planch. 2241, 2574 | NA, Orinoquía, from Ant, Boy, Cal, Cas, Cua, Ces, Cun, Hui, Qui, Ris, San, Tol (200-3750 m) | NE |

*Oreopanax integrifolius* Cuatrec. 1316, 1380 | EA (2200-2300 m) | LC |

*Oreopanax mutisianus* (Kunth) Decne. & Planch. 1292 | EA (2700-3700 m) | LC |

*Schefflera bejucosa* Cuatrec. 2224, 2142 | End, from Ant, Cau, Ris (1600-3350m) | NE |

**Asteraceae**

*Achyrocline satureioides* Lam. (DC.) 2189 | NA (1250-4000m) | NE |

*Ageratina boyacensis* R.M. King & H. Rob. 1614, 1655 | ECO (2200-3000 m) | NE |

*Ageratina elegans* (Kunth) R.M. King & H. Rob. 2018, 2079, 1702 | NA (2400-4000m) | NE |

*Ageratina glyptophlebia* (B.L. Rob.) R.M. King & H. Rob. 2164 | NA (1850-4050m) | NE |

*Ageratina pseudochilca* (Benth.) R.M. King & H. Rob. 2228, 2145 | NA (2600-3500m) | NE |

*Ageratina sp.* 1 1896, 2465, 2628 | - | - |

*Ageratina sp.* 2 2481 | - | - |

*Ageratina sp.* 3 2529 | - | - |

*Ageratina tinifolia* (Kunth) R.M. King & H. Rob. 1723, 1727, 1934, 2614, 1404, 1755 | NA (1350-3900m) | NE |

*Alloispermum pachensis* (Hieron.) H. Rob. 1578 | NA (1500-3100m) | NE |

*Alloispermum sp.* 2471 | - | - |

*Baccharis brachylaenoides* DC. 2230 | NA (500-3550m) | LC |

*Baccharis latifolia* (Ruiz & Pav.) Pers. 1634 | NA, Valle from Magdalena (1400-4000m) | LC |

*Critoniopsis sp.* 1 1295, 2661 | End. from Boy (2000-3500m) | - |
## Appendix: Continuation.

| Voucher P.A. Gil-Leguizamón | Status/Biogeographical Region | IUCN Red List Status |
|-----------------------------|------------------------------|----------------------|
| **Critoniopsis** sp. 2      | 2279                         | -                    |
| **Diplostephium** cf. *bicolor* S.F. Blake | 1390, 1605 | NA (2500-3900m) | NE |
| **Diplostephium** floribundum (Benth.) Wedd. | 2322, 1749 | EA (2580-4000 m) | NE |
| **Diplostephium** huertasii Cuatrec. | 2238 | ECO (2850-3450m) | NE |
| **Diplostephium** juajibiyoj Cuatrec. | 1311, 1519 | ECO (3530-3900m) | NE |
| **Diplostephium** oblongifolium Cuatrec. | 2286, 2322 | ECO from Nor San (2770 m) | EN |
| **Diplostephium** rosmarinifolium (Benth.) Wedd. | 2291, 2308, 2505 | NA (2000-3900m) | NE |
| **Espeletia** boyacensis Cuatrec. | 2571, 1822, 1917, 2347, 2577 | ECO (2345-3900 m) | LC |
| **Espeletia** murilloi Cuatrec. | 1764, 2602, 2348, 2666, 2671 | ECO (2700-3700 m) | LC |
| **Jungia** coarctata Hieron | 1514 | NA (2100-3600m) | NE |
| **Jungia** sp. | 2418 | - | - |
| **Mikania** aristel B.L. Rob. | 2033, 2122, 2197, 2250, 2379, 2448 | NA (1760-3500m) | NE |
| **Mikania** cf. *szyszylowiczii* Hieron | 2156, 1535 | NA (1800-3450m) | NE |
| **Mikania** sp. 1 | 2499, 2519 | - | - |
| **Mikania** sp. 2 | 2507 | - | - |
| **Munnozia** senecionidis Benth. | 2235, 2310, 2367, 2435, 2539 | NA (950-3820m) | NE |
| **Oritrophium** peruvianum (Lam.) Cuatrec. | 2668 | NA, from Ant, Ara, Cal, Boy, Cau, Ces, Cho, Cun, Gua, Hui, Mag, Met, Nar, Nor San, Qui, Ris, San, Tol, Val (2700-4630 m) | NE |
| **Pentacalia** cf. *tolimensis* (Sch. Bip. ex Wedd.) Cuatrec. | 1283, 2612, 2647, 2410 | NA (1750-4300 m) | NE |
| **Pentacalia** corymbosa (Benth.) Cuatrec. | 2502, 2023 | ECO (1800-4000 m) | NE |
| **Pentacalia** kleinoides (Kunth) Cuatrec. | 2159 | NA (1900-3500 m) | NE |
| **Pentacalia** pulchella (Kunth) Cuatrec. | 1307, 1608, 1880, 1968, 1922 | NA (1900-3850 m) | NE |
| **Pentacalia** sp. 1 | 1861 | - | - |
| **Pentacalia** sp. 2 | 2385 | - | - |
| **Pentacalia** sp. 3 | 2467 | - | - |
| **Pentacalia** sp. 4 | 2537 | - | - |
| **Pentacalia** theifolia (Benth.) Cuatrec. | 1528, 1969, 2166 | NA (1800-3500 m) | NE |
| **Pentacalia** trianae (Klatt) Cuatrec. | 2005 | NA (1200-3950 m) | NE |
| **Pentacalia** trichopus (Benth.) Cuatrec. | 1395, 1421, 1423, 1407 | NA (2800-3930 m) | LC |
| **Pentacalia** vaccinioides (Kunth) Cuatrec. | 1308 | NA (3000-3990 m) | NE |
### Appendix: Continuation.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| **Verbesina cf. pennelli** S.F. Blake | End, from Cho, Cund, Hui, Qui, Tol, Val (1300-2600 m) | NE |
| **Verbesina crassiramea** S.F. Blake | ECO (2000-3510 m) | NE |

**Begoniaceae**

**Begonia cornuta** L. B. Sm. & B. G. Schub.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1867, 2407 | NA (2200-3450 m) | NE |

**Begonia ferruginea** L. f.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1488, 1529, 1834, 2045, 2429, 2431, 1935, 2143 | NA (1000-4000 m) | NE |
| 1289, 1364, 1468, 1517, 1779, 1882, 2027 | NA (1600-4000 m) | LC |

**Berberidaceae**

**Berberis mucarum** L.A. Camargo

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1284, 1336, 1653 | EA (2780-3640 m) | NE |

**Boraginaceae**

**Varronia cylindrostachya** Ruiz R Pav.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1644 | NA (520-3400 m) | LC |

**Brunelliaceae**

**Brunellia cf. comocladifolia** Bonpl.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1442, 1465, 1800, 1835, 2035, 2104, 2325, 2551 | NA, SN San. Marta (800-3100 m) | LC |

**Brunellia propinqua** Kunth

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 2393, 2447; 1515, 2223, | ECO (1800-3850 m) | LC |

**Campanulaceae**

**Burmeistera globosa** E. Wimm

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1384, 2351, 2419 | ECO (2400-3400 m) | NE |

**Siphocampylus retrorsus** Vatke & E. Wimm.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1523, 2121, 2208, 2288, 2380, 2550, 1924, 1937 | ECO (1000-3500 m) | NE |

**Siphocampylus sp.**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 2192, 2493 | - | - |

**Caprifoliaceae**

**Valeriana clematitis** Kunth.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1309, 1352 | - | NE |

**Caryophyllaceae**

**Stellaria cuspidata** D.F.K. Schitdl.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1959, 2442 | NA (820-3820 m) | NE |

**Celastraceae**

**Maytenus prunifolia** C. Presl.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 2470 | NA (2290-3600 m) | NE |

**Clethraceae**

**Clethra fagifolia** (Kunth) Sleumer

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 2257, 2261 | NA, SN San. Marta (1500-3420 m) | NE |

**Clusiaceae**

**Clusia alata** Planch. & Triana

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 2365, 1322, 1356, 1420, 1482, 1657 | EA (1100-3500 m) | LC |
| 1331, 1379, 1383, 1429, 1455, 1505, 1533, 1599, 1832, 1972, 2046, 2087, 2446, 2490, 2515, 2024 | EA (2550-3600 m) | LC |

**Clusia elliptica** Kunth

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|-----------------------|
| 1868, 2047, 2514 | NA, Guayana, Macarena, Pacífico, SN San. Marta (80-3500 m) | LC |
## Appendix: Continuation.

| Family | Genus | Species | Voucher | Status/Biogeographical Region | IUCN Red List Status |
|--------|-------|---------|---------|------------------------------|----------------------|
| Cunoniaceae | Weinmannia | balbisiana Kunth | 1538, 1842, 2042, 2095, 2262, 2423, 2517 | NA (710-3050 m) | LC |
|         |         |         | 1559, 1597, 2307, 2520, 1812, 1410, 1916 | NA, SN San. Marta (2550-4000 m) | LC |
|         |         | reticulata Ruiz & Pav. | 1630, 1652, 1988, 2098, 2427, 2545, 1931, 1674, 1287, 1368, 1451, 1495, 2424, 1411, 1690 | NA (1800-3440 m) | LC |
|         |         | rollottii Killip | 1843, 2260, 2276, 2364, 2424, 1411, 1690 | NA (2250-3450 m) | LC |
|         |         | tomentosa L. f. | 1332, 2231, 2269, 2309, 1726, 1939 | NA (1700-3724 m) | LC |
| Elaeocarpaceae | Vallea | stipularis L. f. | 1563, 1648 | NA, SN San. Marta (1990-4300 m) | LC |
| Ericaceae | Bejaria | resinosa Mutis ex. L. f. | 2558, 1713, 1818, 1685 | NA (1750-3900 m) | LC |
|         | Cavendishia | bracteata (Ruiz & Pav. ex J.St. Hil.) Hoerold | 2229, 2290, 2437 | NA, SN San. Marta (1000-3820 m) | LC |
|         | Disterigma | alaternoides (Kunth) Nied. | 1286, 1369, 1857, 2116, 2264, 2416, 1938, 1739 | NA (1500-3600 m) | LC |
|         |         | crypocalyx A.C. Sm. | 1462, 2508 | NA (1000-2750 m) | NE |
|         |         | empetrifolium (Kunth) Drude | 1928, 1686, 1745, 1768, 2641 | NA (2500-4500 m) | LC |
|         |         | sp. 1 | 1347, 1594, 1784 | - | - |
|         |         | sp. 2 | 1493 | 1305, 1560, 1971, 2076, 2082, 2236, 2494, 2565, 1721, 1932, 2607, 1688, 1738 | NA, SN San. Marta (2500-4100 m) | NE |
|         | Gaultheria | anastomosans (L. f.) Kunth | 2082, 2236, 2494, 2565, 1721, 1932, 2607, 1688, 1738 | NA, SN San. Marta (2500-4100 m) | NE |
|         |         | buxifolia Willd. | 1950 | NA, SN San. Marta (2000-3200 m) | NE |
|         |         | erecta Vent. | 1301, 1889, 2187, 2301, 2343, 2360, 1941, 1406, 1767 | NA, SN San. Marta (2000-3700 m) | LC |
|         |         | rigida Kunth | 1498, 2478, 2568, 2639 | NA (2700-3500 m) | NE |
|         |         | strigosa Benth. | 1362, 1425, 1506, 1792, 2379, 2461, 1288, 1463, 1464, 1549, 1790, 1856, 2063, 2268, 2355, 2368, 2466, 1816, 1929, 1700 | NA (2400-3950 m) | NE |
|         | Macleania | rupestris (Kunth) A.C. Sm. | 1362, 1425, 1506, 1792, 2379, 2461, 1288, 1463, 1464, 1549, 1790, 1856, 2063, 2268, 2355, 2368, 2466, 1816, 1929, 1700 | NA, SN San. Marta (2000-4100 m) | LC |
### Appendix: Continuation.

| Voucher P.A. Gil-Leguizamón | Status/Biogeographical Region | IUCN Red List Status |
|-----------------------------|-------------------------------|----------------------|
| *Pernettya prostrata* (Cav.) DC. | 1294, 1335, 1810, 2609, 1401, 1912 | NA, SN San. Marta (2000-4525 m) | LC |
| *Plutarchia guascensis* (Cuatrec.) A.C. Sm. | 1664 | End. from Cun, Boy, San (2800-4180 m) | VU |
| *Psammisia cf. idalima* A.C. Sm. | 1471 | NA (2000-2500 m) | NE |
| *Sphyrospermum buxifolium* Poepp. & Endl. | 1796 | NA, SN San. Marta (1200-3200 m) | NE |
| *Sphyrospermum cordifolium* Benth. | 1952, 2054, 2258, 2303 | NA, Pacífico, SN San. Marta (100-3600 m) | NE |
| *Sphyrospermum* sp. 1 | 1592 | - | - |
| *Sphyrospermum* sp. 2 | 2151 | - | - |
| *Thibaudia floribunda* Kunth | 1543 | NA, Pacífico (200-4180 m) | LC |

### Escalloniaceae

*Escallonia myrtilloides* L. f. | 1334, 1363, 1424, 1785, 1914, 1980 | NA, SN San. Marta (2500-3900 m) | NE |

### Fabaceae

*Lupinus bogotensis* Benth. | 2349 | NA, from Ant, Boy, Cal, Cun, Met, Nor San (1700-3700 m) | LC |

### Fagaceae

*Quercus humboldtii* Bonpl. | 2277 | Native and cultivated Andean (1400-3300 m) | VU |

### Gentianaceae

*Halenia asclepiadea* (Kunth) G. Don | 1976, 1746 | EA (2700-4000 m) | NE |
| *Macrocarpaea macrophylla* (Kunth) Gilg | 2084, 1872, 2489, 2553 | NA (1250-3200 m) | LC |
| *Symbolanthus calygonus* (Ruiz & Pav.) Griseb. ex Gilg | 2083, 2113 | NA, from Ant, Bol, Boy, Cun, Met, Nor San, Tol (1050-3300 m) | NE |

### Geraniaceae

*Geranium cf. alonsoi* Aedo | 1313, 1911 | ECO (2900-3700 m) | NE |

### Gesneriaceae

*Columnnea strigosa* Benth. | 1484, 1526, 1598, 1881, 1953, 2052, 2215, 2243, 2341, 2344, 2373, 2417, 2345 | NA (1100-4350 m) | NE |
| *Glossoloma ichthyoderma* (Hanst.) J.L. Clark | 1862, 2118 | NA (1000-3900m) | NE |

### Gunneraceae

*Gunnera schultesii* L.E. Mora | 1567, 1949 | ECO (2840-3350 m) | NE |

### Hypericaceae

*Hypericum laricifolium* Juss. | 1774, 1908 | NA, SN San. Marta (2500-4300 m) | LC |
| *Hypericum lycopodioides* Triana & Planch. | 1297, 1892, 2162, 2357, 2564 o 2554, 1811, 1925, 1400, 1703 | ECO (2850-4100 m) | NE |
### Appendix: Continuation.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Hypericum sp.** | 1602 | - |

**Lamiaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Lepechinia conferta** (Benth.) Epling | 2190, 1978 | NA, SN San. Marta (2300-3350 m) | LC |

**Loranthaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Gaiadendron punctatum** (Ruiz & Pav.) G. Don | 1610, 2188, 2240, 2483, 2544, 2020 | NA, SN San. Marta (1330-3950 m) | LC |

**Melastomataceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Axinaea scutigera** Triana | 2090 | NA (1100-2970 m) | LC |
| **Bucquetia glutinosa** (L. f.) DC. | 1304, 1596, 2572, 1722, 1396 | EA (2100-4104 m) | LC |
| **Meriania brachycera** (Naudin) Mend. & Fern. Alonso | 2036, 2089, 2219, 2221 | NA (2000-3350 m) | NE |
| **Meriania cataractae** Triana | 1328, 1359, 1516, 1852, 1899, 1992, 2065, 2108, 2165, 2321, 2326, 2525, 1760 | NA (2500-3900 m) | NE |
| **Miconia cf. chionophila** Naudin | 1370 | NA (2880-4250 m) | NE |
| **Miconia cladonia** Gleason | 1422, 1791 | NA (2000-3300 m) | NE |
| **Miconia cleefii** L. Uribe | 1299 | ECO (3300-3900 m) | LC |
| **Miconia cundinamarcensis** Wurdack | 1325, 1415, 1445, 1448, 1591, 1624, 1870, 1888, 1993, 2132, 2154, 2352, 2406, 2524 | EA (960-3300 m) | LC |
| **Miconia denticulata** Naudin | 2130 | NA (2050-3400 m) | NE |
| **Miconia dolichopoda** Naudin | 1434, 1845, 1960, 1981, 2149 | NA, SN San. Marta (1600-2900 m) | LC |
| **Miconia jahnii** Pittier | 1572, 1636, 2397 | NA (1100-3700 m) | NE |
| **Miconia ligustrina** (Sm.) Triana | 1428, 1512, 1603, 1604, 1947, 2008, 2091, 2184, 1936, 1753 | NA, SN San. Marta (2050-3800 m) | NE |
| **Miconia myrtillifolia** Naudin | 2171, 2500 | NA (2000-3600 m) | NE |
| **Miconia plethorica** Naudin | 1858, 2384, 2449 | EA (2150-3000 m) | LC |
| **Miconia sp.** | 1472, 1568, 2604 | - | - |
| **Miconia squamulosa** Triana | 2469 | NA (2100-3600 m) | NE |
| **Miconia stipularis** Naudin | 1444, 1457, 1534, 1841, 1884, 2055, 2543 | EA (1320-3400 m) | LC |
| **Miconia theizans** (Bonpl.) Cogn. | 2404, 2441; 1590, 2401, 1678 | NA, Guayana, Macarena, Pacífico, SN San. Marta, Valle del Cuaca, Valle del Magdalena (230-3900 m) | NE |
| **Monochaetum meridense** Naudin | 2330, 2336 | NA (1250-3275 m) | NE |
| **Monochaetum myrtoideum** Naudin | 1638, 2167, 2569, 1814 | NA (1900-3900 m) | NE |
| **Monochaetum uribeii** Wurdack | 2203, 2272 | ECO (2300-3200 m) | NE |
### Appendix: Continuation.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Tibouchina grossa** (L. f.) Cogn. | 1393, 1494, 1793, 2434, 1412, 1693 | NA (1850-4500 m) NE |

**Myricaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Morella funckii** (Chev.) Parra-Os. | 1656, 2492 | NA, SN San. Marta (1990-3700 m) NE |
| **Morella parvifolia** (Benth.) Parra-Os. | 1521, 2284 | NA (1600-3800 m) NE |

**Primulaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Cybianthus iteoides** (Benth.) G.Agostini | 1443, 1466, 1532, 1555, 1588, 1853, 2213, 2251, 2253, 2305, 2374 | NA (1200-3725 m) NE |
| **Geissanthus andinus** Mez | 1509, 1525, 1584, 1998, 2155, 2370, 2540, 1725, 1933, 1689, 1945, 2146 | NA (1825-3700 m) NE |
| **Geissanthus quindiensis** Mez | 1789, 1833, 1848, 2048, 2153, 2487 | NA (2600-3700 m) NE |
| **Myrsine coriacea** (Sw.) R. Br. ex Roem. & Schult. | 1575, 2475 | NA, Caribe, Pacífico & Valle del Magdalena (820-3360 m) NE |
| **Myrsine dependens** (Ruiz & Pav.) Spreng. | 1351 | NA, SN San. Marta (2500-3800 m) LC |

**Myrtaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Myricanthes rhopaloides** (Kunth) McVaugh | 1637, 1649, 2006, 1569 | NA (1800-3200) LC |
| **Myricanthes sp.** | 2463 | - |
| **Ugni myricoides** (Kunth) O. Berg | 1897, 2561 | NA (2190-3500 m) LC |

**Onagraceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Fuchsia canescens** Benth. | 1951, 2610, 1759 | EA (2800-3400 m) NE |

**Oxalidaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Oxalis medicaginea** Kunth | 1391, 1799, 1955 | NA (1400-4000 m) LC |
| **Oxalis sp. 1** | 1306 | - |
| **Oxalis sp. 2** | 1849, 2432 | - |

**Passifloraceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Passiflora adulterina** L. f. | 1682 | End. from Boy, Cun, Qui (2600-3500 m) LC |
| **Passiflora bogotensis** Benth. | 2140 | NA, SN San. Marta, en Boy, Cal, Cun, Gua, Mag, San (2000-3000 m) LC |
| **Passiflora sp. 1** | 1846, 2031 | - |
| **Passiflora sp. 2** | 2452 | - |

**Pentaphylacaceae**

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|----------------------|
| **Freziera bonplandiana** Tul. | 1967, 2405 | NA, SN San. Marta (2500-3700 m) NE |
| **Ternstroemia cf. camelliifolia** Linden & Planch. | 2067, 2202, 2234, 2266, 2556, 2144 | NA (2800-3300 m) NE |
| **Ternstroemia sp.** | 2252 | - |
### Voucher

| Voucher                     | Status/Biogeographical Region | IUCN Red List Status |
|-----------------------------|-------------------------------|----------------------|
| P.A. Gil-Leguizamón         |                               |                      |

### Appendix: Continuation.

| Family                     | Genus                          | Species                  | Voucher          | Status/Biogeographical Region                  | IUCN Red List Status |
|---------------------------|--------------------------------|--------------------------|------------------|-----------------------------------------------|----------------------|
| Phyllanthaceae            | Hieronyma                      | rufa P. Franco           | 2109, 2297, 2320, 2350 | EA, from Ant, Boy, Cun, Cau, Vau (2300-3350 m) | NT                   |
| Phytolaccaceae            | Phytolacca bogotensis Kunth    |                          | 1961             | NA (1560-3600 m)                              | LC                   |
| Plantaginaceae            | Sibthoria repens (L.) Kuntze   |                          | 1354, 1956       | NA (3100-3900 m)                              | NE                   |
| Polygalaceae              | Monnina bracteata Chodat       |                          | 1440, 2246, 2247  | EA (1400-2400 m)                              | NE                   |
|                           | Monnina salicifolia Ruiz & Pav.|                          | 1650, 2012, 2509  | NA, SN San. Marta (1900-4150 m)               | NE                   |
| Polygonaceae              | Muehlenbeckia taminifolia (Kunth) Meisn. |                          | 1392, 1550, 2004, 1724 | NA, Valle del Magdalena (390-3900 m) | NE                   |
|                           | Polygonum nepalense Meisn.     |                          | 1675             | Nativ Asia, from Ant, Hui                     | NE                   |
| Rhamnaceae                | Frangula goudotiana (Triana & Planch.) Grubov |                          | 2194             | NA (2000-3700 m)                              | NE                   |
| Rosaceae                  | Hesperomeles obtusifolia (Pers.) Lindl. |                          | 1350, 2078, 2298, 2339, 1729, 1974, 2482, 2562 | NA (2200-3800 m) | LC                   |
|                           | Lachemilla pectinata (Kunth) Rothm. |                          | 1642             | NA (1800-3400 m)                              | NE                   |
|                           | Prunus opaca (Benth.) Walp.    |                          | 2299             | NA (1860-3300 m)                              | LC                   |
|                           | Rubus compactus Benth          |                          | 1601             | NA (2500-3600 m)                              | NE                   |
|                           | Rubus coriaceus Poir.          |                          | 2377             | NA (2800-4000 m)                              | NE                   |
|                           | Rubus gachetensis A. Berger    |                          | 2013             | EA (2300-3100 m)                              | NE                   |
|                           | Rubus guyanensis Focke         |                          | 1640             | NA (2000-3000 m)                              | NE                   |
|                           | Rubus nubigenus Kunth          |                          | 1531, 1851       | NA, SN San. Marta (2500-3600 m)               | NE                   |
| Rubiaceae                 | Arcythophyllum muticum (Wedd.) Standl. |                          | 2014             | NA, SN San. Marta (1700-4400 m)               | NE                   |
|                           | Arcythophyllum nitidum (Kunth) Schleidl. |                          | 1552, 1894, 2233, 2275, 2474, 2506, 2559, 1815, 1930, 1413, 1687, 1744 | NA, SN San. Marta (630-4500 m) | NE                   |
|                           | Galianthe cf. bogotensis (Kunth) E.L.Cabral & Bacigalupo |                          | 1579             | EA (2200-3575 m)                              | NE                   |
|                           | Galium hyparcum (L.) Endl. ex Griseb. |                          | 1300, 2460, 1813, 1927 | NA (700-4350 m) | LC                   |
|                           | Nertera granadensis (Mutis ex L. f.) Druce |                          | 1340, 1371, 1479, 2040, 2421, 1817, 1705 | NA (1300-4300 m) | LC                   |
|                           | Palicourea angustifolia Kunth  |                          | 1859, 2097, 2150, 2328, 2399 | NA, Guayana, Macarena, SN San. Marta, Valle del Magdalena (500-3600 m) | LC                   |
|                           | Palicourea aschersonianoides (Wernham) Steyerm. |                          | 1321, 1341, 1375, 1802, 1877, 2073, 2080, 2204, 2390 | NA, Valle del Magdalena (800-3750 m) | NE                   |
**Appendix:** Continuation.

| Voucher | Status/Biogeographical Region | IUCN Red List Status |
|---------|-------------------------------|---------------------|
| **Palicourea cf. amethystina** (Ruiz & Pav.) DC. | 2157, 1677 | NA, Valle del Magdalena (300-3800 m) | LC |
| **Palicourea demissa** Standl. | 1570, 2003 | NA, SN San. Marta, Valle del Magdalena (760-3750 m) | LC |
| **Palicourea gachetensis** M.C.G. Kirkbr. | 2106, 2391, 2420 | ECO (2000-2880 m) | NE |
| **Palicourea sp.** | 2120, 2217, 2255, 2501 | - | - |
| **Psychotria sp.** | 2333 | - | - |

**Rutaceae**

**Zanthoxylum cf. quinduense** Tul. | 2131 | NA (1000-3300 m) | NE |

**Salicaceae**

**Abatia parviflora** Ruiz & Pav. | 1564 | NA (1990-3382m) | LC |

**Santalaceae**

**Dendrophthora cf. costaricensis** Urb. | 2570 | NA (2300-3130 m) | NE |

**Dendrophthora cf. obliqua** (C. Presl) Wiens | 1593 | NA, Guayana, Macarena, SN San. Marta, Valle del Cauca, Valle del Magdalena (400-2915 m) | NE |

**Dendrophthora clavata** (Benth.) Urb. | 1585, 1643 | NA, SN San. Marta (1940-3900 m) | NE |

**Dendrophthora lindeniana** Tiegh. | 2088, 2302, 2304 | NA, SN San. Marta (1500-3350 m) | NE |

**Solanaceae**

**Cestrum humboldtii** Francey | 1565, 1654, 2002, 2440 | NA (1650-3200 m) | LC |

**Cestrum tubulosum** Sendtn. | 1839, 2300, 1679 | Guayana, Macarena, Orinoquia | NE |

**Deprea orinocensis** (Kunth.) Raf. | 2430 | NA (1385-3300 m) | NE |

**Dunalia trianaei** Dammer | 1576 | From Colombia, Ecuador | EN |

**Sessea cf. elliptica** Francey | 2400 | EA, from Ant, Nar, Put, Tol (1800-2880 m) | LC |

**Solanum laevigatum** Dunal | 2439 | NA, Valle del Cauca (920-3700 m) | NE |

**Solanum nudum** Dunal | 2115, 2214 | NA, Amazonia, Orinoquia, Pacífico, SN San. Marta, Valle del Cauca, Valle del Magdalena (0-2670 m) | LC |

**Symplocaceae**

**Symplocos sp. 1** | 2086 | - | - |

**Symplocos sp. 2** | 2259 | - | - |

**Symplocos theiformis** (L. f.) Oken | 1890, 2163, 2362, 2477, 2563, 1910 | End. from Colombia (2450-3724 m) | LC |

**Symplocos venulosa** Cuatrec. | 2068 | ECO (2200-2950 m) | VU |
### Appendix: Continuation.

| Family      | Species                  | Voucher | Status/Biogeographical Region                          | IUCN Red List Status |
|-------------|--------------------------|---------|-------------------------------------------------------|----------------------|
| Theaceae    | *Gordonia cf. fruticosa* (Schrad.) H. Keng | 2064, 2111 | NA, SN San. Marta (1000-3600 m) | LC                   |
| Tropaeolaceae | *Tropaeolum sp.*          | 1964    | -                                                     | -                    |
| Urticaceae  | *Pilea smithii* Killip    | 1346, 1540, 1863, 1983, 2331 | From Colombia in Boy, Cho, Cun | NE                   |
| Violaceae   | *Viola stipularis* Sw.    | 2278    | NA, SN San. Marta (1900-3240 m)                       | NE                   |
| Vitaceae    | *Cissus colombiensis* Lombardi | 2114    | NA (1000-1980 m)                                      | NE                   |