

Vascular Flora of Dry Scrub in Southern Ecuador

Flora Vasculare del Matorral seco del sur del Ecuador

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Abstract—This study lists dry scrub species that grow in western lowlands and interandean valleys in south Ecuador. Using material from field trips spanning over two years, we were able to identify 314 species belonging to 71 families and 221 genera. The most diverse families are Asteraceae (33 spp.), Fabaceae s.l. (27 spp.) and Poaceae (19 spp.). The most diverse genera are *Croton* (8 spp.), *Euphorbia* (6 spp.), *Oxalis* (5 spp.) and *Senna* (5 spp.). 7.01 % of the flora (22 spp.) is endemic to the study area, and 6.4 % (20 spp.) is adventive. The dominant life form is hemycryptophyte with 85 species (27.1 %). Epiphytes, with 6 species, are the life form with fewer species (1.9 %). The work contributes to the knowledge about plant diversity that is highly noticeable in southern Ecuador.

Keywords—Live forms, Loja, Andean valleys, Dry vegetation.

Resumen—Este estudio enumera las especies que conforman el matorral seco en las tierras bajas occidentales y los valles interandinos en el sur de Ecuador. En un lapso de más de dos años, identificamos 314 especies pertenecientes a 71 familias y 221 géneros. Las familias más diversas son Asteraceae (33 spp.), Fabaceae s.l. (27 spp.) y Poaceae (19 spp.). Los géneros más diversos son *Croton* (8 spp.), *Euphorbia* (6 spp.), *Oxalis* (5 spp.) y *Senna* (5 spp.). El 7,01 % de la flora (22 spp.) es endémica del área de estudio y el 6,4 % (20 spp.) es adventicia. La forma de vida dominante es la hemycryptophyte con 85 especies (27,1 %). Las epifitas, con 6 especies, son la forma de vida con menos especies (1,9 %). El trabajo aporta al conocimiento sobre la diversidad vegetal que es altamente notoria al sur del Ecuador.

Palabras clave—Formas vivas, Loja, Valles andinos, Vegetación seca.

INTRODUCTION

In continental America, there are different dry or seasonally dry plant formations that grow sporadically all over the region. According to Lopez et al. (2006), these formations contain high biological diversity, not only in species richness but also in endemism and life forms. Arid and semi-arid areas currently occupy almost two-fifths of the total global land surface area, and form the living space of more than one billion people (Reynolds, 2001). The arid and semi-arid ecosystems of the world are an ideal place to study ecological adaptations such as intrinsic characteristics: desertification, biodiversity loss, and climate change. These are all phenomena that affect particularly these ecosystems (Reynolds and Stafford Smith, 2002). Seasonally dry plant formations of the Equatorial Pacific region are located in the dry inter-valleys of northern Peru, Bolivia and Ecuador (Espinosa et al., 2012; Pennington et al., 2000). These valleys represent slightly less than 8 % of continental Ecuador, and occur mainly in its southern land, where the terrain is moun-

tainous. The vegetation is usually sparse, isolated, xerophytic, and spiny. It also presents columnar cacti as *Armatoce-reus cartwrightianus* (Britton & Rose) Backeb. ex A.W. Hill and plants with latex as *Croton wagneri* Müll. Arg., *Euphorbia laurifolia* Juss. ex Lam., *Jatropha nudicaulis* Benth., and *Ipomoea carnea* Jacq.

Few taxonomic studies have been conducted in areas within Ecuadorian arid and semi-arid ecosystems, where such vegetation develops. In the last five years, isolated efforts have been made to document the floristic diversity in the dry scrub of Loja and Azuay (the southern provinces), but there are additional studies on the phenology and the distribution of many key species, the breeding methods, and the current conservation status of species (Werner, 2009; Albuja, 2011). This lack of knowledge is accentuated by the conservation status of such areas. For example, dry high areas in the inter-Andean corridor, in general, have been subject to human impact since the pre-hispanic era and are mostly affected by human activities (Aguirre et al., 2006). The few remnants of natural vegetation have received little attention

from botanists and ecologists, thus making it difficult to assess their ecological importance. In addition, this vegetation has traditionally been considered to contain few species with low biodiversity and few plant life forms (La Torre-Cuadros & Linares Palomino, 2008).

Moreover, there is a lack of research on the floristic aspects of the dry scrubland of southern Ecuador. Although there are surveys of vegetation cover (Aguirre *et al.*, 2006; Lozano, 2002), there is a lack of data on the floristic and taxonomic groups that reflect the total species diversity of this ecosystem. On the other hand, shrub vegetation contributes to reducing erosion, which is highlighted in these environments (Gutierrez & Squeo, 2004). For example, the presence of species of dry scrub correlate the conservation status and diversity of the ecosystem with its functionality. Nevertheless, a global study of arid lands around the world has shown that species richness is the most important factor for ecosystems facing global climate change (Maestre *et al.*, 2012). To improve our understanding of plant diversity in southern Ecuador, our goal is to catalog all the existing species in the study areas of dry land scrub, using literature records and extensive field trips.

MATERIALS AND METHODS

Our list includes Pteridophytes, Gymnosperms, and Angiosperms. The collected field data set were: habitats; biotopes; vegetative and reproductive characters; flowers and fruit samples. The collection of all flowering and fruiting species was carried out in different seasons (dry season since May-September and rainy season since October- March) and allowed us to observe the evolution of annual species. Photographs were also taken of botanical specimens. The geographical coordinates of the collection points were recorded. All specimens were deposited in the UTPL Herbarium (HUTPL) and a complete set of the collections will be deposited in the LOJA Herbarium. In addition, the samples were numbered under the serial number of the collection (O. Cabrera, A. Prina *et al.*, 2012). We collected at least two samples of each species. For species with wide distribution, fertile samples were collected from various locations. Botanical specimens were collected through simple collections. The collection sites are shown in Fig.1, some photographs of the collection environment in the provinces of Azuay and Loja are shown in figures 2 – 3.

The identification of the collected samples was carried out at the LOJA Herbarium and the HUTPL Herbarium. This consisted of analyses of general floras, descriptions, monographs and data from online databases (Tropicos 2013; IPNI 2004 and Darwinion 2013) which provided information about synonyms and distribution. The Fabaceae s.l. includes the three subfamilies (Mimosoidea, Caesalpinoidea and Papilionoidea). Scientific names and authors were based on Brummitt and Powell (1992). Status of taxa was based on Jorgensen *et al.*, (1999). When a species was determined and was not cited for Ecuador according to Ulloa - Ulloa & Neill (2005) and Neill & Ulloa - Ulloa (2011), it was considered as a new taxonomic record. The taxa classification was carried out based on Cronquist (1968) and the updating names was carried out in the TROPICOS database, which is based on the APG IV system (APG 2016).

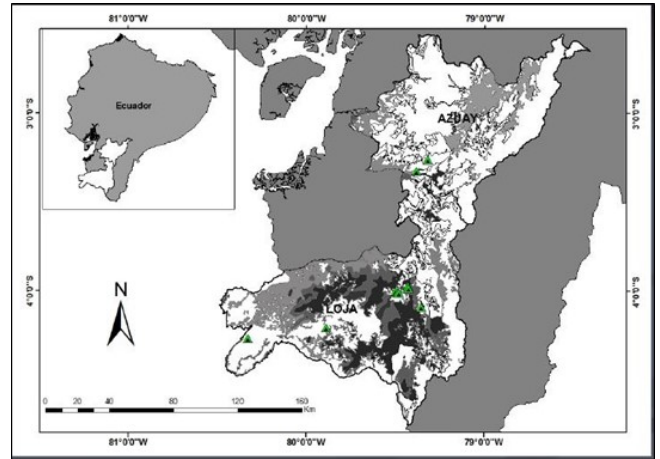


Fig. 1: Location of collection sites.



Fig. 2: León river sector, provincial border between Azuay and Loja.



Fig. 3: Plain dominated by *Croton* ssp. in the "Alamala" sector in the Catamayo canton of Loja province.

Additional life history consisted of the following parameters: A) Origin of the species: we considered three categories: native (Nat), introduced (Intr.) and endemic (End.). B) Taxonomic and nomenclatural remarks. For all species we did not use "synonyms", except in exceptional cases where there was some controversy and unresolved questions in the literature C) Life Forms according to Raunkiaer (1934), C1)

therophytes, C2) geophytes, C3) hemicryptophytes, C4) chamaephytes, C5) phanerophytes, C6) nanophanerophytes, C7) vines, C8) epiphytes.

RESULTS

We identified a total of 314 species belonging to 71 families and 221 genera. The most diverse botanical families are: Asteraceae (33 species), Fabaceae s.l. (26 species), Poaceae (19 species), Euphorbiaceae (18 species), Malvaceae (15 species), Convolvulaceae (13 species), Boraginaceae and Cactaceae (12 species), Verbenaceae (11 species), Amaranthaceae (8 species), Acanthaceae and Pteridaceae (7 species), Polygalaceae and Rubiaceae (6 species), Bignoniaceae, Lamiaceae, Nyctaginaceae, Oxalidaceae, Solanaceae and Sterculiaceae (5 species), Asclepiadaceae, Urticaceae and Orchidaceae (4 species), Bromeliaceae, Cappara-ceae, Caryophyllaceae, Iridaceae, Lythraceae, Onagraceae, Passifloraceae, Polygonaceae, Portulacaceae and Sapinda-ceae (3 species), Aizoaceae, Apiaceae, Apocynaceae, Carica-ceae, Commelinaceae, Cyperaceae, Piperaceae, Plantagina-ceae, Scrophulariaceae and Zygophyllaceae (2 species). The remaining families (28) each have a single species.

The most diverse genera is *Croton* (8 species); other diverse genera are: *Euphorbia* (6 species), *Oxalis* and *Senna* with 5 species, *Alternanthera*, *Ayenia*, *Heliotropium*, *Jacquemontia*, *Opuntia* and *Tournefortia* with 4 species. *Abutilon*, *Armatochloa*, *Convolvulus*, *Cordia*, *Evolvulus*, *Ipomoea*, *Lantana*, *Onoseris*, *Passiflora*, *Polygala*, *Salvia* and *Sida* with 3 species. *Aeschynomene*, *Aloysia*, *Amaranthus*, *Baccharis*, *Barnadesia*, *Boerhavia*, *Bothriochloa*, *Caesalpinia*, *Commelina*, *Cuphea*, *Eragrostis*, *Galium*, *Gaya*, *Malvastrum*, *Mirabilis*, *Monnina*, *Nicotiana*, *Oenothera*, *Paronychia*, *Pellaea*, *Peperomia*, *Phyllanthus*, *Pilea*, *Plantago*, *Rhynchosia*, *Sisyrinchium*, *Stachystarpheta*, *Talinum*, *Tecoma*, *Tillandsia*, *Vasconcellea*, with 2 species. The remaining 168 genera have only one species each (Table 1.)

Tabla 1: Species list from dry scrub of southern Ecuador.

FAMILY/SPECIES	LIFE-FORM	EXAMINED MATERIAL	Origen
LYCOPODIACEAE			
<i>Lycopodium thyoides</i> Humb. & Bonpl. ex. Willd.	Hemcryptophyte	O. Cabrera 1540 HUTPL	Native
PTERIDACEAE			
<i>Cheilanthes bonariensis</i> (Willd.) Proctor	Hemcryptophyte	O. Cabrera y A. Prina 538 HUTPL	Native
<i>Notholaena sulphurea</i> (Cav.) J. Sm.	Hemcryptophyte	O. Cabrera y A. Prina 45, 483, 722 HUTPL	Native
<i>Pellaea sagittata</i> (Cav.) Link	Hemcryptophyte	O. Cabrera y A. Prina 980 HUTPL	Native
<i>Pellaea ternifolia</i> (Cav.) Link.	Hemcryptophyte	O. Cabrera y A. Prina 211, 223 HUTPL	Native
<i>Pityrogramma calomelanos</i> (L.) Link	Hemcryptophyte	O. Cabrera y A. Prina 458 HUTPL	Native
<i>Pteris coriacea</i> Desv.	Hemcryptophyte	O. Cabrera y A. Prina 572 HUTPL	Native
<i>Trachypteris inducta</i> (Maxon) R.M. Tryon & A.F. Tryon	Hemcryptophyte	O. Cabrera y A. Prina 265, 755 HUTPL	Native
SCHIZAEACEAE			
<i>Anemia ferruginea</i> Kunth	Hemcryptophyte	O. Cabrera y A. Prina 213 HUTPL	Native
EPHEDRACEAE			
<i>Ephedra americana</i> Humb. & Bonpl. ex Willd	Nanophanerophyte	O. Cabrera y A. Prina 229 HUTPL	Native
ACANTHACEAE			
<i>Blechum pyramidatum</i> (Lam.) Urb.	Therophyte	O. Cabrera y A. Prina 780 HUTPL	Native
<i>Dicliptera pilosa</i> Kunth.	Therophyte	O. Cabrera y A. Prina 220, 314 HUTPL	Endemic
<i>Dyschoriste quitensis</i> (Kunth) Kuntze	Therophyte	O. Cabrera y A. Prina 10, 585, 673 HUTPL	Native
<i>Justicia carthaginensis</i> Jacq.	Chamaephyte	O. Cabrera y A. Prina 663, 669 HUTPL	Native
<i>Ruellia geminiflora</i> Kunth	Therophyte	O. Cabrera y A. Prina 639, 649, 733 HUTPL	Native
<i>Stenandrium dulce</i> (Cav.) Ness	Therophyte	O. Cabrera y A. Prina 1002 HUTPL	Native
<i>Tetramerium nervosum</i> Ness	Therophyte	O. Cabrera y A. Prina 360, 713 HUTPL	Native
AIZOACEAE			
<i>Aptenia cordifolia</i> (L. f.) Schwantes	Pterophyte	O. Cabrera y A. Prina 1051 HUTPL	Introduced
<i>Trianthema portulacastrum</i> L.	Pterophyte	O. Cabrera y A. Prina 574, 694 HUTPL	Native
AMARANTHACEAE			
<i>Achyranthes aspera</i> L.	Therophyte	O. Cabrera y A. Prina 178 HUTPL	Native
<i>Alternanthera brasiliiana</i> (L.) Kuntze	Therophyte	O. Cabrera y A. Prina 604 HUTPL	Native
<i>Alternanthera porrigens</i> (Jacq.) Kuntze var. <i>porrigens</i> (Jacq.) Kuntze	Therophyte	O. Cabrera y A. Prina 22, 71, 681 HUTPL	Native
<i>Alternanthera pubiflora</i> (Benth.) Kuntze	Therophyte	O. Cabrera y A. Prina 344 HUTPL	Native
<i>Alternanthera pungens</i> Kunth	Therophyte	O. Cabrera y A. Prina 439 HUTPL	Native
<i>Amaranthus hybridus</i> L.	Therophyte	O. Cabrera y A. Prina 170 HUTPL	Native
<i>Amaranthus viridis</i> L.	Therophyte	O. Cabrera y A. Prina 170 HUTPL	Native
<i>Iresine diffusa</i> Humb. & Bonpl. ex Willd	Therophyte	O. Cabrera y A. Prina 375 HUTPL	Native
AMARYLLIDACEAE			
<i>Phaedranassa cinerea</i> Ravenna	Geophyte	O. Cabrera y A. Prina 366 HUTPL	Endemic
ANACARDIACEAE			
<i>Loxopterygium huasango</i> Spruce ex Engl.	Phanerophyte	O. Cabrera y A. Prina 49 HUTPL	Native

APIACEAE			
<i>Arracacia equatorialis</i> Constance	Therophyte	O. Cabrera y A. Prina 157 HUTPL	Native
<i>Niphogeton ternata</i> (Willd. ex Schltr.) Matias & Constance	Therophyte	O. Cabrera y A. Prina 100 HUTPL	Native
APOCYNACEAE			
<i>Prestonia mollis</i> Kunth	Vine	O. Cabrera y A. Prina 61, 317, 716 HUTPL	Native
<i>Rauwolfia tetraphylla</i> L.	Nanophanerophyte	O. Cabrera y A. Prina 609 HUTPL	Native
ASCLEPIADACEAE			
<i>Ditassa endolueca</i> Schltr.	Vine	O. Cabrera y A. Prina 442, 446, 495, 500 HUTPL	Native
<i>Macroscelis hirsuta</i> (Vahl) Schltr.	Vine	O. Cabrera y A. Prina 382, HUTPL	Native
<i>Marsdenia cundurango</i> Rchb. f.	Vine	O. Cabrera y A. Prina 319, 358 HUTPL	Native
<i>Sarcostemma solanoides</i> (Kunth) Decne.	Vine	O. Cabrera y A. Prina 21, 36, 88, 411, 680 HUTPL	Native
ASTERACEAE			
<i>Baccharis salicifolia</i> (Ruiz & Pav.) Pers.	Chamaephyte	O. Cabrera 1506 HUTPL	Native
<i>Baccharis sternbergiana</i> Steud.	Chamaephyte	O. Cabrera y A. Prina 517 HUTPL	Native
<i>Barnadesia aculeata</i> (Benth.) I Chung	Nanophanerophyte	O. Cabrera y A. Prina 944 HUTPL	Endemic
<i>Barnadesia arborea</i> Kunth	Phanerophyte	O. Cabrera y A. Prina 662 HUTPL	Native
<i>Bidens pilosa</i> L.	Therophyte	O. Cabrera y A. Prina 152 HUTPL	Native
<i>Cacosmia rugosa</i> Kunth	Phanerophyte	O. Cabrera y A. Prina 110 HUTPL	Native
<i>Centratherum punctatum</i> Cass.	Therophyte	O. Cabrera y A. Prina 14 HUTPL	Native
<i>Chromolaena roseorum</i> (B.L. Rob.) R.M. King & H. Rob.	Chamaephyte	O. Cabrera y A. Prina 57 HUTPL	Native
<i>Cotula coronopifolia</i> L.	Therophyte	O. Cabrera y A. Prina 591 HUTPL	Introduced
<i>Delilia biflora</i> (L.) Kuntze	Chamaephyte	O. Cabrera y A. Prina 193 HUTPL	Native
<i>Emilia sonchifolia</i> (L.) DC.	Chamaephyte	O. Cabrera y A. Prina 428 HUTPL	Introduced
<i>Flaveria bidentis</i> (L.) Kuntze	Hemycryptophyte	O. Cabrera y A. Prina 963 HUTPL	Native
<i>Fulcaldea laurifolia</i> (Bonpl.) Poir. ex Less.	Phanerophyte	O. Cabrera y A. Prina 185 HUTPL	Endemic
<i>Galinsoga parviflora</i> Cav.	Hemycryptophyte	O. Cabrera y A. Prina 128 HUTPL	Native
<i>Gamochoa americana</i> (Mill.) Wedd.	Therophyte	O. Cabrera y A. Prina 536 HUTPL	Native
<i>Heterosperma diversifolium</i> Kunth	Therophyte	O. Cabrera y A. Prina 29, 202 HUTPL	Native
<i>Lagascea mollis</i> Cav.	Chamaephyte	O. Cabrera y A. Prina 208, 712 HUTPL	Native
<i>Onoseris albicans</i> (D. Don) Ferreyra	Hemycryptophyte	O. Cabrera y A. Prina 224 HUTPL	Native
<i>Onoseris salicifolia</i> Kunth	Therophyte	O. Cabrera y A. Prina 253, 579 HUTPL	Endemic
<i>Onoseris speciosa</i> Kunth	Therophyte	O. Cabrera y A. Prina 1007 HUTPL	Native
<i>Ophryosporus peruvianus</i> (J.G. Gmel.) R.M. King & H. Rob.	Nanophanerophyte	O. Cabrera y A. Prina 777 HUTPL	Native
<i>Parthenium hysterophorus</i> L.	Therophyte	O. Cabrera y A. Prina 77 HUTPL	Native
<i>Perymenium jelskii</i> (Hieron.) S. F. Blake	Hemycryptophyte	O. Cabrera y A. Prina 93 HUTPL	Native
<i>Porophyllum ruderale</i> (Jacq.) Cass.	Therophyte	O. Cabrera y A. Prina 54, 697 HUTPL	Native
<i>Schkuhria pinnata</i> (Lam.) Kuntze	Therophyte	O. Cabrera y A. Prina 18, 172 HUTPL	Native
<i>Stevia bertholdii</i> B. L. Rob.	Hemycryptophyte	O. Cabrera y A. Prina 260 HUTPL	Native
<i>Tessaria integrifolia</i> Ruiz & Pav.	Phanerophyte	O. Cabrera y A. Prina 440 HUTPL	Native
<i>Trichocline peruviana</i> Hieron.	Hemycryptophyte	O. Cabrera y A. Prina 212 HUTPL	Native

<i>Verbesina lloensis</i> Hieron.	Chamaephyte	O. Cabrera y A. Prina 2, 121, 643 HUTPL	Native
<i>Viguiera incana</i> (Pers.) S. F. Blake	Chamaephyte	O. Cabrera y A. Prina 6 HUTPL	Endemic
<i>Wedelia helianthoides</i> Kunth	Chamaephyte	O. Cabrera y A. Prina 217 HUTPL	Native
<i>Zinnia peruviana</i> (L.) L.	Therophyte	O. Cabrera y A. Prina 368 HUTPL	Native
BASELLACEAE			
<i>Anredera baselloides</i> (Kunth) Baill.	Vine	O. Cabrera y A. Prina 393 HUTPL	Native
BERBERIDACEAE			
<i>Berberis engleriana</i> C. K. Schneid.	Nanophanerophyte	O. Cabrera y A. Prina 540 HUTPL	Native
BIGNONIACEAE			
<i>Amphilophium paniculatum</i> (L.) Kunth	Vine	O. Cabrera y A. Prina 611 HUTPL	Native
<i>Delostoma integrifolium</i> D. Don	Nanophanerophyte	O. Cabrera y A. Prina 946 HUTPL	Native
<i>Mansoa hymenaea</i> (DC.) A. H. Gentry	Vine	O. Cabrera y A. Prina 361 HUTPL	Native
<i>Tecoma castaneifolia</i> (D. Don) Melch.	Nanophanerophyte	O. Cabrera y A. Prina 306 HUTPL	Native
<i>Tecoma stans</i> (L.) Juss. ex Kunth	Nanophanerophyte	O. Cabrera y A. Prina 367 HUTPL	Native
BORAGINACEAE			
<i>Cordia cylindrostachya</i> (Ruiz & Pav.) Roem & Schult.	Nanophanerophyte	O. Cabrera y A. Prina 899 HUTPL	Native
<i>Cordia lutea</i> Lam.	Nanophanerophyte	O. Cabrera y A. Prina 415 HUTPL	Native
<i>Cordia scaberrima</i> Kunth	Nanophanerophyte	O. Cabrera y A. Prina 569 HUTPL	Native
<i>Heliotropium angiospermum</i> Murray	Chamaephyte	O. Cabrera y A. Prina 566 HUTPL	Native
<i>Heliotropium argenteum</i> Lehm.	Chamaephyte	O. Cabrera y A. Prina 24, 696 HUTPL	Endemic
<i>Heliotropium indicum</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 65 HUTPL	Introduced
<i>Heliotropium rufipilum</i> (Benth.) I.M. Johnst.	Nanophanerophyte	O. Cabrera y A. Prina 97 HUTPL	Native
<i>Tournefortia chinchensis</i> Killip	Chamaephyte	O. Cabrera y A. Prina 368, 456 HUTPL	Native
<i>Tournefortia hirsutissima</i> L.	Nanophanerophyte	O. Cabrera y A. Prina 438 HUTPL	Native
<i>Tournefortia microcalyx</i> (Ruiz & Pav.) I.M. Johnst.	Nanophanerophyte	O. Cabrera y A. Prina 600 HUTPL	Native
<i>Tournefortia polystachia</i> Ruiz & Pav.	Nanophanerophyte	O. Cabrera y A. Prina 665 HUTPL	Native
<i>Varronia globosa</i> Jacq.	Nanophanerophyte	O. Cabrera y A. Prina 860 HUTPL	Native
BRASSICACEAE			
<i>Lepidium bipinnatifidum</i> Desv.	Therophyte	O. Cabrera y A. Prina 865 HUTPL	Native
BROMELIACEAE			
<i>Puya lanata</i> (Kunth) Schult. f.	Epiphyte	O. Cabrera y A. Prina 214 HUTPL	Native
<i>Tillandsia spiralipetala</i> Gouda	Epiphyte	O. Cabrera y A. Prina 59, 82 HUTPL	Native
<i>Tillandsia straminea</i> Kunth	Epiphyte	O. Cabrera y A. Prina 337 HUTPL	Native
BURSERACEAE			
<i>Bursera graveolens</i> (Kunth) Triana y Planch.	Phanerophyte	O. Cabrera y A. Prina 630 HUTPL	Native
CACTACEAE			
<i>Armatocereus brevispinus</i> Madsen	Nanophanerophyte	J.E. Madsen 75217, AAU, LOJA	Endemic
<i>Armatocereus cartwrightianus</i> (Britton & Rose) Backeb. ex A.W. Hill	Nanophanerophyte	J.E. Madsen 7343 AAU, LOJA	Native
<i>Armatocereus matucanensis</i> Backeb. ex. A.W. Hill	Nanophanerophyte	J.E. Madsen 86074 AAU, LOJA	Native
<i>Cleistocactus icosagonus</i> (Kunth) F.A.C. Weber	Chamaephyte	J.E. Madsen 50225 AAU, LOJA	Native

<i>Cylindropuntia tunicata</i> (Lehm.) F.M. Knuth	Nanophanerophyte	C.R. Loayza 99 HUTPL	Native
<i>Espostoa lanata</i> (Kunth) Britton & Rose	Nanophanerophyte	J. E. Madsen 36825 AAU, LOJA	Native
<i>Hylocereus polyrhizus</i> (F.A.C. Weber) Britton & Rose	Epiphyte	J. E. Madsen 61161 AAU; LOJA	Native
<i>Melocactus bellavistensis</i> Rauh & Backeb.	Chamaephyte	O. Cabrera 1549 HUTPL	Native
<i>Opuntia cylindrica</i> (Lam.) DC.	Chamaephyte	J.E. Madsen 36791, AAU, LOJA	Native
<i>Opuntia ficus-indica</i> (L.) Mill.	Nanophanerophyte	J. E. Madsen 36819 AAU, LOJA	Introduced
<i>Opuntia pubescens</i> J. C. Wendl. ex Pfeiff.	Chamaephyte	J. E. Madsen 36821, AAU, LOJA	Native
<i>Opuntia quitensis</i> F.A.C. Weber	Nanophanerophyte	J.E. Madsen 36820, AAU, LOJA	Native
CAPPARACEAE			
<i>Beautempsia avicennifolia</i> (Kunth) Gaudich	Nanophanerophyte	O. Cabrera y A. Prina 414 HUTPL	Native
<i>Colicodendron scabridum</i> (Kunt) Seem.	Phanerophyte	O. Cabrera y A. Prina 648 b HUTPL	Native
<i>Cynophalla mollis</i> (Kunth) J. Presl.	Phanerophyte	O. Cabrera y A. Prina 648 HUTPL	Native
CARICACEAE			
<i>Vasconcellea candicans</i> A. Gray	Nanophanerophyte	O. Cabrera y A. Prina 397 HUTPL	Native
<i>Vasconcellea parviflora</i> (A. DC.) Solms	Nanophanerophyte	O. Cabrera y A. Prina 53, 083, 106 HUTPL	Native
CARYOPHYLLACEAE			
<i>Paronychia communis</i> Cambess.	Hemycryptophyte	O. Cabrera y A. Prina 231B, 445, 529, 541 HUTPL	Native
<i>Paronychia communis</i> Cambess. var. subglabra Chodat et Hassl.	Hemycryptophyte	O. Cabrera y A. Prina 117 HUTPL	Native
<i>Stellaria media</i> (L.) Vill.	Therophyte	O. Cabrera y A. Prina 190 HUTPL	Native
CLUSIACEAE			
<i>Vismia lauriformis</i> (Lam.) Choisy	Phanerophyte	O. Cabrera y A. Prina 608 HUTPL	Native
COMMELINACEAE			
<i>Commelina difusa</i> Burm. f.	Hemycryptophyte	O. Cabrera y A. Prina 52, 112, 158, 381, 707 HUTPL	Native
<i>Commelina erecta</i> L.	Hemycryptophyte	O. Cabrera, A. Prina 513 HUTPL	Native
CONVOLVULACEAE			
<i>Convolvulus hermanniae</i> L'Herit	Hemycryptophyte	O. Cabrera y A. Prina 67 HUTPL	Native
<i>Convolvulus nodiflorus</i> Desr.	Hemycryptophyte	O. Cabrera y A. Prina 519 HUTPL	Native
<i>Convolvulus siculus</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 171 HUTPL	Introduced
<i>Evolvulus argyreus</i> Choisy	Hemycryptophyte	O. Cabrera y A. Prina 486, 515 HUTPL	Native
<i>Evolvulus convolvuloides</i> (Willd. ex Schult.) Stearn	Hemycryptophyte	O. Cabrera y A. Prina 432 HUTPL	Native
<i>Evolvulus sericeus</i> Sw.	Hemycryptophyte	O. Cabrera y A. Prina 3, 30, 31, 44, 410 670 HUTPL	Native
<i>Ipomoea carnea</i> Jacq.	Nanophanerophyte	B. Mac Bryde 317 MO, LOJA	Native
<i>Ipomoea nil</i> (L.) Roth	Vine	O. Cabrera y A. Prina 894 HUTPL	Native
<i>Ipomoea turbinata</i> Lag.	Vine	O. Cabrera y A. Prina 990 HUTPL	Native
<i>Jacquemontia elegans</i> Helwig	Vine	O. Cabrera y A. Prina 51, 72, 422, 718, 734 HUTPL	Native
<i>Jacquemontia floribunda</i> (Kunth) Hallier f.	Nanophanerophyte	O. Cabrera y A. Prina 878 HUTPL	Native
<i>Jacquemontia tamnifolia</i> (L.) Griseb.	Vine	O. Cabrera y A. Prina 91 HUTPL	Native
<i>Jacquemontia weberbaueri</i> Helwing	Vine	O. Cabrera y A. Prina 578 HUTPL	Native
CUCURBITACEAE			
<i>Cucumis dipsaceus</i> Ehrenb. ex Spach	Vine	O. Cabrera 1509 HUTPL	Introduced

CYPERACEAE			
<i>Cyperus aggregatus</i> (Willd.) Endl.	Hemycryptophyte	O. Cabrera y A. Prina 124, 453 HUTPL	Native
<i>Eleocharis acicularis</i> (L.) Roem. & Schult.	Hemycryptophyte	O. Cabrera y A. Prina 530 HUTPL	Native
EUPHORBIACEAE			
<i>Cnidosculus urens</i> (L.) Arthur	Chamaephyte	O. Cabrera y A. Prina 74, 315 HUTPL	Native
<i>Croton alnifolius</i> Lam.	Nanophanerophyte	O. Cabrera y A. Prina 646 HUTPL	Native
<i>Croton eggersii</i> Pax	Nanophanerophyte	O. Cabrera y A. Prina 615 HUTPL	Native
<i>Croton elegans</i> Kunth	Nanophanerophyte	O. Cabrera y A. Prina 576 HUTPL	Endemic
<i>Croton pycnanthus</i> Benth.	Nanophanerophyte	O. Cabrera y A. Prina 546 HUTPL	Endemic
<i>Croton rivinifolius</i> Kunth	Nanophanerophyte	O. Cabrera y A. Prina 321 HUTPL	Endemic
<i>Croton ruizianus</i> Müll. Arg.	Nanophanerophyte	O. Cabrera y A. Prina 218 HUTPL	Native
<i>Croton ruizianus</i> var. <i>podadenius</i> Müll. Arg.	Nanophanerophyte	O. Cabrera y A. Prina 847 HUTPL	Native
<i>Croton wagneri</i> Müll. Arg.	Nanophanerophyte	O. Cabrera 1527. O. Cabrera y A. Prina 75 HUTPL	Endemic
<i>Dalechampia scandens</i> L.	Vine	O. Cabrera y A. Prina 47, 109, 359 HUTPL	Native
<i>Euphorbia hirta</i> L.	Therophyte	O. Cabrera y A. Prina 206, 231, 377, 433 HUTPL	Native
<i>Euphorbia hypericifolia</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 17 HUTPL	Native
<i>Euphorbia lasiocarpa</i> (Klotzsch) Arthur	Hemycryptophyte	O. Cabrera y A. Prina 671 HUTPL	Native
<i>Euphorbia thymifolia</i> L.	Therophyte	O. Cabrera y A. Prina 43 HUTPL	Native
<i>Euphorbia weberbauerii</i> Mansf.	Chamaephyte	O. Cabrera y A. Prina 60, 81, 87, 496, 705 HUTPL	Native
<i>Jatropha nudicaulis</i> Benth.	Nanophanerophyte	O. Cabrera 1516. O. Cabrera y A. Prina 365 HUTPL	Endemic
<i>Tragia volubilis</i> L.	Vine	O. Cabrera y A. Prina 781 HUTPL	Native
FABACEAE s.l.			
<i>Acacia macracantha</i> Humb. & Bonpl. ex. Willd.	Phanerophyte	O. Cabrera y A. Prina 27 HUTPL	Native
<i>Aeschynomene scoparia</i> Kunth	Nanophanerophyte	O. Cabrera y A. Prina 62, 772 HUTPL	Native
<i>Aeschynomene villosa</i> Poir.	Nanophanerophyte	W. Lewis 2197, LOJA, MO	Native
<i>Bauhinia augusti</i> Harms	Nanophanerophyte	O. Cabrera y A. Prina 316 HUTPL	Native
<i>Caesalpinia glabrata</i> Kunth	Nanophanerophyte	O. Cabrera y A. Prina 631 HUTPL	Native
<i>Caesalpinia spinosa</i> (Molina) Kuntze	Phanerophyte	O. Cabrera y A. Prina 303 HUTPL	Native
<i>Calliandra taxifolia</i> (Kunth) Benth.	Nanophanerophyte	O. Cabrera y A. Prina 108 HUTPL	Native
<i>Centrosema virginianum</i> (L.) Benth.	Vine	O. Cabrera y A. Prina 785 HUTPL	Native
<i>Chamaechrista glandulosa</i> (L.) Greene	Nanophanerophyte	J. E. Madsen 7889 LOJA	Native
<i>Cercidium praecox</i> (Ruiz & Pav.) Harms	Nanophanerophyte	O. Cabrera y A. Prina 130 HUTPL	Native
<i>Clitoria ternatea</i> L.	Vine	O. Cabrera y A. Prina 708 HUTPL	Introduced
<i>Cyathostegia mathewsii</i> (Benth.) Schery	Nanophanerophyte	O. Cabrera 1514. O. Cabrera y A. Prina 339 HUTPL	Native
<i>Desmodium vargasianum</i> B.G. Schub.	Vine	O. Cabrera y A. Prina 941 HUTPL	Native
<i>Lupinus pubescens</i> Benth.	Nanophanerophyte	O. Cabrera y A. Prina 846 HUTPL	Native
<i>Macroptilium atropurpureum</i> DC. Urb.	Vine	O. Cabrera y A. Prina 915 HUTPL	Native
<i>Mimosa loxensis</i> Barneby	Nanophanerophyte	O. Cabrera 1503 HUTPL	Endemic
<i>Piptadenia flava</i> (Spreng. ex DC.) Benth.	Nanophanerophyte	O. Cabrera y A. Prina 779 HUTPL	Native
<i>Rhynchosia reticulata</i> (Sw.) DC.	Hemycryptophyte	O. Cabrera y A. Prina 537 HUTPL	Native

<i>Rhynchosia senna</i> Gillies ex Hook. & Arn.	Hemycryptophyte	O. Cabrera y A. Prina 284 HUTPL	Native
<i>Senna bicapsularis</i> (L.) Roxb.	Nanophanerophyte	O. Cabrera y A. Prina 704 HUTPL	Native
<i>Senna huancabambae</i> (Harms) H. S. Irwin & Barneby	Nanophanerophyte	O. Cabrera y A. Prina 553 HUTPL	Native
<i>Senna incarnata</i> (Pav. ex Benth.) H.S. Irwin & Barneby	Nanophanerophyte	O. Cabrera 1523 HUTPL	Native
<i>Senna mollissima</i> (Humb. & Bonpl. ex Willd.) H. S. Irwin & Barneby	Phanerophyte	O. Cabrera y A. Prina 706 HUTPL	Native
<i>Senna pistaciifolia</i> (Kunth) H.S. Irwin & Barneby	Nanophanerophyte	O. Cabrera y A. Prina 521, 747 HUTPL	Native
<i>Stylosanthes scabra</i> Voguel	Chamaephyte	O. Cabrera y A. Prina 7, 34, 448, 506 HUTPL	Native
<i>Vigna luteola</i> (Jacq.) Benth.	Vine	O. Cabrera y A. Prina 205 HUTPL	Native
<i>Zornia reticulata</i> Sm.	Therophyte	O. Cabrera y A. Prina 1046 HUTPL	Native
GENTIANACEAE			
<i>Cicendia quadrangularis</i> (Lam.) Griseb.	Therophyte	O. Cabrera y A. Prina 246 HUTPL	Native
GERANIACEAE			
<i>Erodium cicutarium</i> (L.) L'Her. ex Aiton	Therophyte	O. Cabrera y A. Prina 235 HUTPL	Introduced
GESNERIACEAE			
<i>Heppiella ulmifolia</i> (Kunth) Hanst.	Nanophanerophyte	O. Cabrera y A. Prina 162 HUTPL	Native
IRIDACEAE			
<i>Ennealophus foliosus</i> (Kunth) Ravenna	Geophyte	O. Cabrera y A. Prina 928 HUTPL	Native
<i>Sisyrinchium caespitificum</i> Kraenzl.	Geophyte	O. Cabrera y A. Prina 544 HUTPL	Native
<i>Sisyrinchium iridifolium</i> Kunth	Geophyte	O. Cabrera y A. Prina 539 HUTPL	Native
KRAMERIACEAE			
<i>Krameria lappacea</i> (Dombey) Burdet & B. B. Simpson	Chamaephyte	O. Cabrera y A. Prina 270, 490, 514 HUTPL	Native
LAMIACEAE			
<i>Hyptis eriocephala</i> Benth.	Chamaephyte	O. Cabrera y A. Prina 165, 690 HUTPL	Native
<i>Salvia coccinea</i> Buc'hoz ex. Etl.	Hemycryptophyte	O. Cabrera y A. Prina 721 HUTPL	Introduced
<i>Salvia squalens</i> H.B.K.	Hemycryptophyte	O. Cabrera y A. Prina 144, 258, 305 HUTPL	Native
<i>Salvia tiliifolia</i> Vahl	Hemycryptophyte	O. Cabrera y A. Prina 323 HUTPL	Introduced
<i>Scutellaria volubilis</i> Kunth	Hemycryptophyte	O. Cabrera y A. Prina 179 HUTPL	Native
LOASACEAE			
<i>Mentzelia fendleriana</i> Urb. & Gilg	Hemycryptophyte	O. Cabrera y A. Prina 719 HUTPL	Native
LORANTHACEAE			
<i>Struthanthus flexilis</i> (Rusby) Kuijt	Epyphyte	O. Cabrera y A. Prina 641 HUTPL	Native
LYTHRACEAE			
<i>Adenaria floribunda</i> Kunth	Nanophanerophyte	O. Cabrera y A. Prina 997 HUTPL	Native
<i>Cuphea ciliata</i> Ruiz & Pav.	Chamaephyte	O. Cabrera y A. Prina 236 HUTPL	Native
<i>Cuphea racemosa</i> (L.f.) Spreng.	Chamaephyte	O. Cabrera y A. Prina 374 HUTPL	Native
MALPIGHIACEAE			
<i>Heteropterys brachiata</i> (L.) DC.	Nanophanerophyte	O. Cabrera y A. Prina 188 HUTPL	Native
MALVACEAE			
<i>Abutilon pubistamineum</i> Ulbr.	Chamaephyte	O. Cabrera y A. Prina 1048 HUTPL	Native
<i>Abutilon umbellatum</i> (L.) Sweet	Chamaephyte	O. Cabrera y A. Prina 56 HUTPL	Native

<i>Abutilon virgatum</i> (Cav.) Sweet	Chamaephyte	O. Cabrera y A. Prina 196 HUTPL	Native
<i>Anoda cristata</i> (L.) Schldl.	Therophyte	O. Cabrera y A. Prina 1019, 1028 HUTPL	Native
<i>Gaya calyprata</i> (Cav.) Kunth ex Schum.	Chamaephyte	J. E. Madsen 75030 AAU; QCA, LOJA	Native
<i>Gaya gaudichaidiana</i> A. St. Hil	Chamaephyte	O. Cabrera y A. Prina 264 HUTPL	Native
<i>Herissantia crispa</i> (L.) Brizicky	Chamaephyte	O. Cabrera y A. Prina 692 HUTPL	Native
<i>Hibiscus escobariae</i> Fryxell	Nanophanerophyte	O. Cabrera y A. Prina 424 HUTPL	Endemic
<i>Malvastrum coromandelianum</i> (L.) Garcke	Chamaephyte	O. Cabrera y A. Prina 204 HUTPL	Native
<i>Malvastrum tomentosum</i> (L.) S.R.Hill	Chamaephyte	O. Cabrera 1518 HUTPL	Native
<i>Pavonia sepium</i> A. St.-Hil.	Chamaephyte	O. Cabrera y A. Prina 16, 39, 68, 96, 485, 674 HUTPL	Native
<i>Sida acuta</i> Burm f.	Chamaephyte	O. Cabrera y A. Prina 732 HUTPL	Native
<i>Sida cordifolia</i> L.	Chamaephyte	O. Cabrera y A. Prina 1032 HUTPL	Native
<i>Sida poeppigiana</i> (K. Schum.) Fryxell	Chamaephyte	O. Cabrera y A. Prina 324 HUTPL	Native
<i>Wissadula diffusa</i> R. E. Fr.	Nanophanerophyte	O. Cabrera y A. Prina 482 HUTPL	Endemic
MENISPERMACEAE			
<i>Cissampelos tropaeolifolia</i> DC.	Vine	O. Cabrera y A. Prina 809 HUTPL	
MOLLUGINACEAE			
<i>Mollugo verticillata</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 617 HUTPL	Native
NYCTAGINACEAE			
<i>Boerhavia diffusa</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 73, 475 HUTPL	Native
<i>Boerhavia erecta</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 616 HUTPL	Native
<i>Bougainvillea peruviana</i> Bonpl.	Vine	O. Cabrera y A. Prina 638 HUTPL	Introduced
<i>Mirabilis violacea</i> (L.) Heimerl.	Hemycryptophyte	O. Cabrera y A. Prina 28 HUTPL	Native
<i>Mirabilis viscosa</i> Cav.	Hemycryptophyte	O. Cabrera y A. Prina 102, 266, 556, 619 HUTPL	Native
ONAGRACEAE			
<i>Ludwigia peruviana</i> (L.) H. Hara	Hemycryptophyte	O. Cabrera y A. Prina 778 HUTPL	Native
<i>Oenothera pubescens</i> Willd. ex Spreng.	Hemycryptophyte	O. Cabrera y A. Prina 256, 557, 848 HUTPL	Native
<i>Oenotera rosea</i> L'Her. ex. Aiton	Hemycryptophyte	O. Cabrera y A. Prina 947 HUTPL	Native
ORCHYDACEAE			
<i>Encyclia aspera</i> (Lindl.) Schltr.	Epyphyte	O. Cabrera y A. Prina 832 HUTPL	Native
<i>Malaxis andicola</i> (Ridl.) Kuntze	Geophyte	O. Cabrera y A. Prina 551 HUTPL	Native
<i>Porphyrostachys pilifera</i> (Kunth) Rchb. f.	Geophyte	O. Cabrera y A. Prina 136, 710 HUTPL	Native
<i>Trichoceros onaensis</i> Christenson	Geophyte	O. Cabrera y A. Prina 982 HUTPL	Native
OXALIDACEAE			
<i>Oxalis articulata</i> Savigny	Geophyte	O. Cabrera y A. Prina 379 HUTPL	Native
<i>Oxalis elegans</i> Kunth	Geophyte	O. Cabrera y A. Prina 155, 176, 209 HUTPL	Native
<i>Oxalis microcarpa</i> Benth	Hemycryptophyte	O. Cabrera y A. Prina 588 HUTPL	Native
<i>Oxalis peduncularis</i> Kunth	Geophyte	O. Cabrera y A. Prina 498, 660 HUTPL	Native
<i>Oxalis psoraleoides</i> Kunth	Hemycryptophyte	O. Cabrera y A. Prina 156, 352, 463 HUTPL	Native
PASSIFLORACEAE			
<i>Passiflora capsularis</i> L.	Vine	O. Cabrera y A. Prina 895 HUTPL	Native

<i>Passiflora foetida</i> L.	Vine	O. Cabrera y A. Prina 363 HUTPL	Native
<i>Passiflora sanguinolenta</i> Mast. & Linden	Vine	O. Cabrera y A. Prina 907 HUTPL	Native
PHYTOLACCACEAE			
<i>Phytolacca dioica</i> L.	Nanophanerophyte	O. Cabrera y A. Prina 437 HUTPL	Native
PIPERACEAE			
<i>Peperomia galioides</i> Kunth	Geophyte	O. Cabrera y A. Prina 497 HUTPL	Native
<i>Peperomia peltigera</i> C.DC.	Geophyte	O. Cabrera y A. Prina 46,304, 717 HUTPL	Native
PLANTAGINACEAE			
<i>Plantago afra</i> L.	Therophyte	O. Cabrera y A. Prina 262 HUTPL	Introduced
<i>Plantago myosorus</i> Lam.	Hemycryptophyte	O. Cabrera y A. Prina 216 HUTPL	Introduced
PLUMBAGINACEAE			
<i>Plumbago scandens</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 874 HUTPL	Native
POACEAE			
<i>Aristida schiedeana</i> Trin. & Rupr.	Hemycryptophyte	O. Cabrera y A. Prina 543 HUTPL	Native
<i>Bothriochloa barbinodis</i> (Lag.) Herter	Hemycryptophyte	O. Cabrera y A. Prina 542 HUTPL	Native
<i>Bothriochloa saccharoides</i> (Sw.) Rydb.	Hemycryptophyte	O. Cabrera y A. Prina 251, 502 HUTPL	Native
<i>Bouteloua curtipendula</i> (Michx.) Torr.	Hemycryptophyte	O. Cabrera y A. Prina 122 HUTPL	Native
<i>Eragrostis mexicana</i> (Hornem.) Link	Therophyte	O. Cabrera y A. Prina 129, 174 HUTPL	Native
<i>Eragrostis nigricans</i> (Kunth) Steud	Therophyte	O. Cabrera y A. Prina 174b HUTPL	Native
<i>Homolepis aturensis</i> (Kunth) Chase	Hemycryptophyte	O. Cabrera y A. Prina 164 HUTPL	Native
<i>Microchloa kunthii</i> Desv.	Hemycryptophyte	O. Cabrera y A. Prina 550 HUTPL	Native
<i>Nasella mucronata</i> (Kunth) R. W. Pohl	Hemycryptophyte	O. Cabrera y A. Prina 175 HUTPL	Native
<i>Oplismenus hirtellus</i> (L.) P. Beauv.	Hemycryptophyte	O. Cabrera y A. Prina 160 HUTPL	Native
<i>Pappophorum pappiferum</i> (Lam.) Kuntze	Hemycryptophyte	O. Cabrera y A. Prina 325 HUTPL	Native
<i>Paspalum lividum</i> Trin ex. Schldtl.	Hemycryptophyte	O. Cabrera y A. Prina 241 HUTPL	Native
<i>Piptochaetium montevidense</i> (Spreng.) Parodi	Hemycryptophyte	O. Cabrera y A. Prina 243 HUTPL	Native
<i>Schizachyrium tenerum</i> Ness	Hemycryptophyte	O. Cabrera y A. Prina 242 HUTPL	Native
<i>Sporobolus purpurascens</i> (Sw.) Ham.	Hemycryptophyte	O. Cabrera y A. Prina 244, 248, 532 HUTPL	Native
<i>Trachipogon plumosus</i> (Humb. & Bonpl. ex Willd.) Nees	Hemycryptophyte	O. Cabrera 1521 HUTPL	Native
<i>Tragus berteronianus</i> Schult.	Hemycryptophyte	O. Cabrera y A. Prina 4, 38, 137, 294, 693 HUTPL	Introduced
<i>Trichloris pluriflora</i> E. Fourn.	Hemycryptophyte	O. Cabrera y A. Prina 163 HUTPL	Native
<i>Tripogon nicorae</i> Rugolo & A. S. Vega	Hemycryptophyte	O. Cabrera y A. Prina 247 HUTPL	Native
POLEMONIACEAE			
<i>Cantua quercifolia</i> Juss.	Chamaephyte	O. Cabrera y A. Prina 225 HUTPL	Native
POLYGALACEAE			
<i>Monnina celastroides</i> (Bonpl.) Chodat	Chamaephyte	O. Cabrera y A. Prina 450 HUTPL	Native
<i>Monnina sandemanii</i> Ferreyra	Chamaephyte	O. Cabrera y A. Prina 528 HUTPL	Native
<i>Polygala paniculata</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 167, 687 HUTPL	Native
<i>Polygala platycarpa</i> Benth.	Therophyte	O. Cabrera y A. Prina 1049 HUTPL	Native
<i>Polygala violacea</i> Aubl.	Therophyte	O. Cabrera y A. Prina 387, HUTPL	Native

<i>Pteromonnina leptostachya</i> (Benth.) B. Eriksen	Hemycryptophyte	O. Cabrera y A. Prina 1, 385 HUTPL	Native
POLYGONACEAE			
<i>Rumex pulcher</i> L.	Therophyte	O. Cabrera y A. Prina 228, HUTPL	Introduced
<i>Ruprechtia jamesonii</i> Meisn.	Phanerophyte	O. Cabrera y A. Prina 629, 645 HUTPL	Native
PORTULACACEAE			
<i>Portulacca oleraceae</i> L.	Therophyte	O. Cabrera y A. Prina 140, 622 HUTPL	Native
<i>Talinum fruticosum</i> (L.) A. Juss.	Hemycryptophyte	O. Cabrera y A. Prina 177 HUTPL	Native
<i>Talinum paniculatum</i> (Jacq.) Gaertn.	Hemycryptophyte	O. Cabrera y A. Prina 481 HUTPL	Native
PRIMULACEAE			
<i>Anagallis arvensis</i> L.	Therophyte	O. Cabrera y A. Prina 257, 280, 281 HUTPL	Native
RHAMNACEAE			
<i>Gouania lupuloides</i> (L.) Urb.	Nanophanerophyte	O. Cabrera y A. Prina 476 HUTPL	Native
RUBIACEAE			
<i>Arcytophyllum thymifolium</i> (Ruiz & Pav.) Standl.	Chamaephyte	O. Cabrera y A. Prina 139, 227 HUTPL	Native
<i>Borreria asurgens</i> (Ruiz & Pav.) Griseb.	Hemycryptophyte	O. Cabrera y A. Prina 116, 267, 555 HUTPL	Native
<i>Galium ecuadoricum</i> Dempster	Hemycryptophyte	O. Cabrera y A. Prina 143 HUTPL	Endemic
<i>Galium fosbergii</i> Dempster	Hemycryptophyte	O. Cabrera y A. Prina 488 HUTPL	Endemic
<i>Spermacoce postrata</i> Aubl.	Hemycryptophyte	O. Cabrera y A. Prina 443 HUTPL	Native
SAPINDACEAE			
<i>Dodonaea viscosa</i> Jacq.	Nanophanerophyte	O. Cabrera y A. Prina 226 HUTPL	Native
<i>Llagunoa nítida</i> Ruiz & Pav.	Nanophanerophyte	O. Cabrera y A. Prina 573 HUTPL	Native
<i>Serjania paniculata</i> Kunth	Liana	O. Cabrera y A. Prina 520 HUTPL	Native
SCROPHULARIACEAE			
<i>Alonsoa meridionalis</i> (L.f.) Kuntze	Therophyte	O. Cabrera y A. Prina 562 HUTPL	Native
<i>Stemmodia durantifolia</i> (L.) Sw.	Chamaephyte	O. Cabrera y A. Prina 132 HUTPL	Native
SOLANACEAE			
<i>Iochroma cyaneum</i> (Lindl.) G.H.M. Lawr. & J.M. Tucker	Nanophanerophyte	O. Cabrera y A. Prina 187 HUTPL	Native
<i>Lycianthes lycioides</i> (L.) Hassl.	Nanophanerophyte	O. Cabrera y A. Prina 9, 70, 525 HUTPL	Native
<i>Nicandra physalodes</i> (L.) Gaertn.	Nanophanerophyte	O. Cabrera y A. Prina 85, 287 HUTPL	Introduced
<i>Nicotiana glutinosa</i> L.	Therophyte	O. Cabrera y A. Prina 50, 308, 474 HUTPL	Native
<i>Nicotiana plumbaginifolia</i> Viv.	Therophyte	O. Cabrera y A. Prina 983 HUTPL	Native
STERCULIACEAE			
<i>Ayenia eliae</i> Cristobal	Hemycryptophyte	O. Cabrera y A. Prina 819,820 HUTPL	Native
<i>Ayenia erecta</i> Mart. ex K. Schum	Hemycryptophyte	O. Cabrera y A. Prina 150, 510, 732, 756 HUTPL	Native
<i>Ayenia jussieuii</i> Cristobal	Hemycryptophyte	O. Cabrera y A. Prina 19, 55, 581, 677, 971 HUTPL	Native
<i>Ayenia o´donell</i> Cristobal	Hemycryptophyte	F. Tinitana 1540 HUTPL	Native
<i>Bittneria aculeata</i> (Jacq.) Jacq.	Hemycryptophyte	O. Cabrera y A. Prina 691 HUTPL	Native
TURNERACEAE			
<i>Turnera scabra</i> Millsp.	Hemycryptophyte	O. Cabrera y A. Prina 1043 HUTPL	Native

ULMACEAE			
<i>Celtis iguanaea</i> (Jacq) Sarg.	Nanophanerophyte	O. Cabrera y A. Prina 603 HUTPL	Native
URTICACEAE			
<i>Pilea microphylla</i> (L.) Liebm.	Therophyte	O. Cabrera y A. Prina 494, 580, 715 HUTPL	Native
<i>Pilea serpyllacea</i> (Kunth) Liebm.	Therophyte	O. Cabrera y A. Prina 238, 245 HUTPL	Native
<i>Pouzolzia occidentalis</i> (Liebm.) Wedd.	Therophyte	O. Cabrera y A. Prina 245, 512 HUTPL	Native
<i>Urtica urens</i> L.	Hemycryptophyte	O. Cabrera y A. Prina 153 HUTPL	Introduced
VERBENACEAE			
<i>Aloysia leptophylla</i> Loes. & Moldenke	Nanophanerophyte	O. Cabrera y A. Prina 565 HUTPL	Native
<i>Aloysia scorodonioides</i> (Kunth) Cham.	Nanophanerophyte	O. Cabrera y A. Prina 152 HUTPL	Native
<i>Duranta dombeyana</i> Moldenke	Nanophanerophyte	O. Cabrera y A. Prina 656 HUTPL	Native
<i>Glandularia laciniata</i> (L.) Schnack & Covas	Chamaephyte	O. Cabrera y A. Prina 259 HUTPL	Native
<i>Lantana canescens</i> Kunth	Chamaephyte	O. Cabrera 1502. O. Cabrera y A. Prina 20 HUTPL	Native
<i>Lantana reptans</i> Hayek	Chamaephyte	O. Cabrera y A. Prina 125, 534, 632 HUTPL	Native
<i>Lantana velutina</i> M. Martens & Galeotti	Chamaephyte	O. Cabrera y A. Prina 667 HUTPL	Native
<i>Phyla betulaefolia</i> (Kunth) Greene	Hemycryptophyte	O. Cabrera y A. Prina 169 HUTPL	Native
<i>Phyla strigulosa</i> (M. Martens & Galeotti) Moldenke	Hemycryptophyte	O. Cabrera y A. Prina 610 HUTPL	Native
<i>Stachystarpheta steyermarkii</i> Moldenke	Hemycryptophyte	O. Cabrera y A. Prina 362 HUTPL	Endemic
<i>Stachystarpheta straminea</i> Moldenke	Hemycryptophyte	O. Cabrera y A. Prina 371, 606 HUTPL	Native
ZYGOPHYLLACEAE			
<i>Kallstroemia parviflora</i> Norton	Therophyte	O. Cabrera y A. Prina 408, 583, 621 HUTPL	Introduced
<i>Tribulus terrestris</i> L.	Therophyte	O. Cabrera y A. Prina 25, 63, 90, 201, HUTPL	Introduced

The dominant life form in areas of dry scrub is Hemycryptophyte with 85 species. Epiphyte is the life form with fewer species (6). The remaining species are included in determined life forms (Table 2).

Table 2: Life forms of dry scrub species in south Ecuador.

LIFE FORM	SPECIES
Hemycryptophyte	85
Nanophanerophyte	67
Therophyte	56
Chamaephyte	46
Vine	29
Phanerophyte	13
Geophyte	12
Epyphyte	6
Total	314

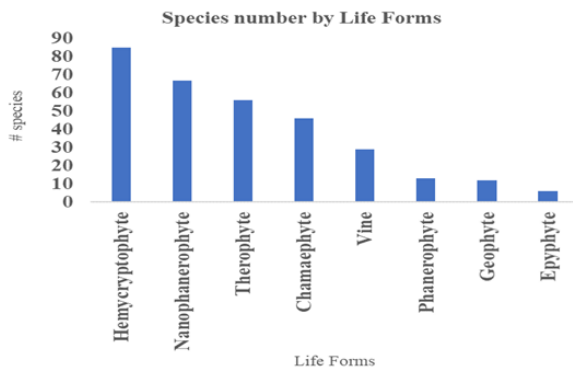


Fig. 4: Species for liveforms determined in dry scrub of Souther Ecuador.

Among the 314 species identified, 22 species are endemic; this represents 7.01% of the total. *Croton wagneri* Müll Arg., *Viguiera incana* (Pers.) S. F., *Wissadula diffusa* E. R. Fr. and *Phaedoranassa cinerea* Ravenna are endemic to Ecuador. *Dicliptera pilosa* Kunth, *Mimosa loxensis* Barneby, *Armatocereus brevispinus* Madsen and *Stachystarpheta steryermarkii* Moldenke, are endemic to Loja province. *Fulcaldea laurifolia* (Bonpl.) Poir. ex Less, *Croton eggersii* Pax, *Croton rivinifolius* Kunth and *Hibiscus escobariae* Fryxell are endemic to the Coast. *Croton elegans* Kunth, *Croton pycnanthus* Benth, *Galium ecuadoricum* Dempster, *Galium fosbergii* Dempster, *Heliotropium argenteum* Lehm, *Monnina celastroides* (Bonpl.) Chodat, *Onoseris salicifolia* Kunth and *Stevia bertholdii* B. L. Rob are endemic to the Andes in Ecuador. *Jatropha nudicaulis* Benth. was recorded as endemic to Azuay province, so it is a new record for Loja (Table 3). The remaining species are introduced and native (Table 4).

DISCUSSION

Seasonally dry scrub ecosystems have traditionally been considered as being degraded, containing low plant biodiversity, and being structurally homogeneous, nevertheless obtained results configure a different vision (La Torre-Cuadros & Linares-Palomino, 2008). The disparity in knowledge of the floras in different regions of the world implies that research has been exhaustive in selected places. On the other hand, in arid and semi-arid areas there is a lack of data with respect to

Table 3: Life forms of endemic species of dry scrub of Southern Ecuador.

Endemic species	Ch	G	H	N	P	T	V	Conservation Status
<i>Armatocereus brevispinus</i> Madsen				1				Critically Endangered
<i>Barnadesia aculeata</i> (Benth.) I Chung				1				Vulnerable
<i>Croton eggersii</i> Pax				1				Endangered
<i>Croton elegans</i> Kunth				1				Low Concern
<i>Croton pycnanthus</i> Benth.				1				Near Threatened
<i>Croton rivinifolius</i> Kunth				1				Endangered
<i>Croton wagneri</i> Mull. Arg.				1				Near Threatened
<i>Dicliptera pilosa</i> Kunth.						1		Vulnerable
<i>Fulcaldea laurifolia</i> (Bonpl.) Poir.						1		Low Concern
<i>Galium ecuadoricum</i> Dempster			1					Endangered
<i>Galium fosbergii</i> Dempster			1					Endangered
<i>Heliotropium argenteum</i> Lehm	1							Vulnerable
<i>Hibiscus escobariae</i> Fryxell			1					Near Threatened
<i>Jatropha nudicaulis</i> Benth.				1				Low Concern
<i>Mimosa loxensis</i> Barneby				1				Endangered
<i>Monnina celastroides</i> (Bonpl.) Chodat	1							Vulnerable
<i>Onoseris salicifolia</i> Kunth						1		Low Concern
<i>Phaedoranassa cinerea</i> Ravenna			1					Vulnerable
<i>Stachystarpheta steryermarkii</i> Moldenke	1							Vulnerable
<i>Stevia bertholdii</i> B. L. Rob.			1					Vulnerable
<i>Viguiera incana</i> (Pers.) S. F. Blake	1							Low Concern
<i>Wissadula diffusa</i> E.R. Fr.	1							Endangered

Ch= Chamaephyte, G= Geophyte, H= Hemycryptophyte, N= Nanophanerophyte, P= Phanerophyte, T= Therophyte, V= Vine.

Table 4: Life forms of introduced species of dry scrub of Southern Ecuador.

Introduced species	Ch	G	H	N	P	T	V
<i>Aptenia cordifolia</i> (L. f.) Schwantes							1
<i>Bougainvillea peruviana</i> Bonpl.							1
<i>Clitoria ternatea</i> L.							1
<i>Convolvulus sicutus</i> L.			1				
<i>Cotula coronopifolia</i> L.						1	
<i>Cucumis dipsaceus</i> Ehrenb. ex. Spach							1
<i>Emilia sonchifolia</i> (L.) DC.		1					
<i>Erodium cicutarium</i> (L.) L'Her. ex Aiton						1	
<i>Heliotropium indicum</i> L.			1				
<i>Kallstroemia parviflora</i> Norton							1
<i>Nicandra physalodes</i> (L.) Gaertn.				1			
<i>Opuntia ficus-indica</i> (L.) Mill.				1			
<i>Plantago afra</i> L.							1
<i>Plantago myosorus</i> Lam			1				
<i>Rumex pulcher</i> L.							1
<i>Salvia coccinea</i> Etl.			1				
<i>Salvia tiliifolia</i> Vahl			1				
<i>Tragus berteronianus</i> Schult.			1				
<i>Tribulus terrestris</i> L.							1
<i>Urtica urens</i> L.							1

Ch= Chamaephyte, G= Geophyte, H= Hemycryptophyte, N= Nanophanerophyte, P= Phanerophyte, T= Therophyte, V= Vine.

the floristic knowledge of species. Often, this bias is due to the false assumption that there exists “less biological diversity”, or that the “drylands are less susceptible to deterioration than tropical forests” (Prina & Alfonso, 2002). However, as our study indicates, this may not always necessarily be the case.

In Ecuador, the dry scrub occurs in valleys and along slopes where evergreen tree species, shrubs, herbs, and seasonal epiphytes grow. The seasonal plant group provides many species of the total flora in the scrub. Vegetation can be prickly but does not dominate the area. According to Sierra *et al.*, (1999) this vegetation type is found in the northern sub-region in the Andean valleys of Chota, Guayllabamba, Patate, Yunguilla-Jubones. The above cited authors propose as typical species *Opuntia pubescens* J. C. Wendl. ex. Pfeiff, *Dodonaea viscosa* Jacq., *Acacia macracantha* Humb. & Bonpl. ex. Willd., *Mimosa quitensis* Benth, *Croton wagneri* Mull. Arg., and *Caesalpinia spinosa* (Molina) Kunthze, among others, being the same species that characterize the dry scrub of our study site. In the south sub-region, dry

scrub is recorded for the valleys of Vilcabamba, Malacatos, and Catamayo. The characteristic species are *Opuntia* spp., *Colicodendron scabridum* (Kunth) Seem., *Cynophalla mollis* (Kunth) J. Presl, *Acacia macracantha* Humb & Bonpl. ex Willd., *Mimosa quitensis* Benth, *Croton wagneri* Müll. Arg. (most common bush) and *Dodonaea viscosa* Jacq.

Families and species found in this study correspond to arid ecosystems. Lopez (2003) indicates that in the Bolivian dry valleys, characteristic botanical families are: Asteraceae, Cactaceae, Poaceae, Fabaceae, Solanaceae, and Bromeliaceae. Asteraceae in southern Ecuador is also the most diverse, except for Solanaceae and Bromeliaceae the other families are also considered as the most diverse in our study. In the Andean arid place, Figueroa (2007) found 223 species of vascular plants; the most diverse families were Leguminosae, Poaceae, Euphorbiaceae and Asteraceae, which coincides with the most diverse families in the scrub of southern Ecuador. On the other hand, at genera and species levels there were floristic similarities found in Fabaceae sl. (Leguminosae), with *Stylosanthes* and *Rhynchosia* genera growing in Ecuador and Bolivia. In Poaceae, *Sporobolus* and *Tragus berteronianus* Schult., are growing in both countries. In Euphorbiaceae, *Croton*, *Cnidoscopus*, *Euphorbia* and *Jatropha*, grow in both countries, the same occur with Asteraceae species like *Lagascea mollis* Cav., *Tessaria integrifolia* Ruiz & Pav. and *Porophyllum ruderale* (Jacq.) Cass.

In dry scrub in northern Ecuador, Werner (2009) refers to 80 species among those that have similarities with the dry valleys of southern Ecuador: *Acacia macracantha* Humb y Bonpland ex. Willd., *Alternanthera porrigens* (Jacq.) Kuntze, *Anagallis arvensis* L., *Arcytophyllum thymifolium* (Ruiz & Pav.) Standl., *Caesalpinia spinosa* (Molina) Kuntze, *Cheilanthes bonariensis* (Willd.) Proctor, *Commelina erecta* L., *Croton elegans* Kunth, *Dodonaea viscosa* Jacq., *Ephedra americana* Willd., *Euphorbia hirta* (L.) Mill., *Iochroma cyaneum* (Lindl.) G.H.M. Lawr. & J.M. Tucker, *Lycianthes lycioides* (L.) Hassl., *Nicandra physalioides* (L.) Gaertn., *Oxalis peduncularis* Kunth, *Pavonia sepium* A. St.-Hil., *Portulacca oleracea* L., *Tecoma stans* (L.) Juss. ex Kunth, *Tesaria integrifolia*, *Tribulus terrestris* L.

Albuja (2011) analyzed the biodiversity of Interandean dry valleys of Ecuador. His work included four of the locations (Yunguilla, Ceibopamba, San Pedro and Nambacola); matching species are: *Acacia macracantha* Humb y Bonpland ex. Willd., *Caesalpinia spinosa* (Molina) Kuntze, *Ipomoea carnea* Jacq., *Colicodendron scabridum* (Kunth) Seem., *Croton wagneri* Mull. Arg., *Cyathostegia mathewsii* (Benth.) Schery, *Senna mollissima* (Humb. & Bonpl. ex Willd) H. S. Irwin & Barneby, *Opuntia ficus-indica* (L.) Mill.

Finally, *Euphorbia weberbaueri* Mansf. (Figure 5-6) is a new record for Ecuador (Cabrera-Cisneros & Prina, 2013), *Beauveria avicennifolia* (Kunth) Gaudich (Figure 7) according to Cornejo and Iltis (2009) is a genus resurrected for the flora of Ecuador. *Varronia globosa* Jacq. (Figure 8-9) according to Miller and Gottschling (2007) is a “resurrected” genus for Cordiaceae. The first two reported species were collected in the Catamayo canton, being floristic common elements in the environment and as they do not have known uses, they are not under any threatened level. The third species was collected in Calvas canton, also in a wild environment, its most immediate threats are fires and deforestation

for land use change.



Fig. 5: Floral branch of *Euphorbia weberbaueri* Mansf. (Euphorbiaceae).



Fig. 6: Adult individual of *Euphorbia weberbaueri* Mansf. (Euphorbiaceae).

CONCLUSIONS

After carrying out the floristic inventory of the arid valleys of Loja province, we can conclude the following:

The arid valleys were considered through years, ecosystems that shown low floristic diversity level, however, the data ob-



Fig. 7: Flower and buds of *Beautempesia avicennifolia* (Kunth) Gaudich (Cappariaceae).

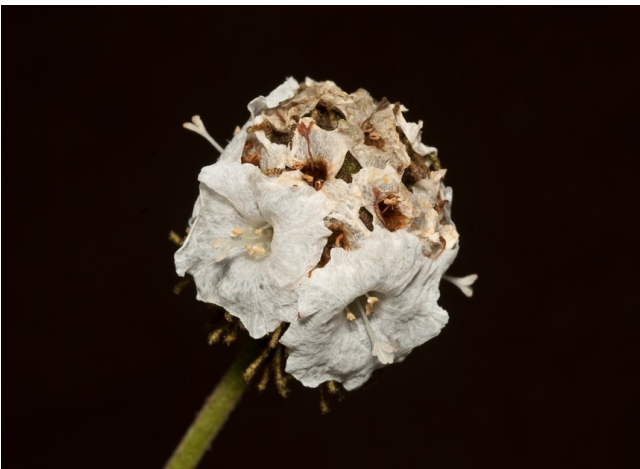


Fig. 8: Inflorescence of *Varronia globosa* Jacq. (Cordiaceae).



Fig. 9: Floral Branch and leaves of *Varronia globosa* Jacq. (Cordiaceae).

tained in this research show a highly diverse ecosystem that is potentially threatened by changes in land.

The various life forms of the species are considered an important factor when assessing overall diversity.

A combination of endemic, native and introduced species result in an ecosystem with unique floristic diversity and reinforces the view that southern Ecuador is one of the most

diverse regions of the country.

AUTHORS CONTRIBUTION

OC, FT, NC and AP designed the methodology, identified the collected specimens, analyzed the data and wrote the manuscript in its original form.

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