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# EL NIÑO SOUTHERN OSCILLATION AND ITS EFFECT ON FOG OASES ALONG THE PERUVIAN AND CHILEAN COASTAL DESERTS

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# Summary

Fog oases, locally named *Lomas*, are distributed in a fragmented way along the western coast of Chile and Peru (South America) between ~6°S and 30°S following an altitudinal gradient determined by a fog layer. This fragmentation has been attributed to the hyper aridity of the desert. However, periodically climatic events influence the 'normal seasonality' of this ecosystem through a higher than average water input that triggers plant responses (e.g. primary productivity and phenology). The impact of the climatic oscillation may vary according to the season (wet/dry).

This thesis evaluates the potential effect of climate oscillations, such as El Niño Southern Oscillation (ENSO), through the analysis of vegetation of this ecosystem following different approaches:

Chapters two and three show the analysis of fog oasis along the Peruvian and Chilean deserts. The objectives are: 1) to explain the floristic connection of fog oases analysing their taxa composition differences and the phylogenetic affinities among them, 2) to explore the climate variables related to ENSO which likely affect fog production, and the responses of *Lomas* vegetation (composition, productivity, distribution) to climate patterns during ENSO events.

Chapters four and five describe a fog-oasis in southern Peru during the 2008-2010 period. The objectives are: 3) to describe and create a new vegetation map of the *Lomas* vegetation using remote sensing analysis supported by field survey data, and 4) to identify the vegetation change during the dry season.

The first part of our results show that: 1) there are three significantly different groups of *Lomas* (Northern Peru, Southern Peru, and Chile) with a significant phylogenetic divergence among them. The species composition reveals a latitudinal gradient of plant assemblages. The species origin, growth-forms typologies, and geographic position also reinforce the differences among groups. 2) Contradictory results have emerged from studies of low-cloud anomalies and the fog-collection during El Niño (EN). EN increases water availability in fog oases when fog should be less frequent due to the reduction of low-clouds amount and stratocumulus. Because a minor role of fog during EN is expected, it is likely that measurements of fog-water collection during EN are considering drizzle and fog at the same time. Although recent studies on fog oases have shown some relationship with the ENSO, responses of vegetation have been largely based on descriptive data, the absence of large temporal records limit the establishment of a direct relationship with climatic oscillations.

The second part of the results show that: 3) five different classes of different spectral values correspond to the main land cover of *Lomas* using a Vegetation Index (VI). The study case is characterised by shrubs and trees with variable cover (dense, semi-dense and open). A secondary area is covered by small shrubs where the dominant tree species is not present. The cacti area and the old terraces with open vegetation were not identified with the VI. Agriculture is present in the area. Finally, 4) contrary to the dry season of 2008 and 2009 years, a higher VI was obtained during the dry season of 2010. The VI increased up to three times their average value, showing a clear spectral signal change, which coincided with the ENSO event of that period.

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# Acknowledgements

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# 1 Introduction

## 1.1 Context

The stabilization of arid regions in the past five million years (Landrum, 2002) and the accelerated evolution in species that are reproductively isolated have combined to create a strong selective stress on the ancestral populations, producing unique plant assemblages. The fog oases found along the Peruvian and Atacama deserts may represent an exceptional example of such a combination.

The increase of warmer conditions, in part associated to the warmer sea surface temperatures (SST), augment the research attention to the potential effects of climatic oscillations on terrestrial ecosystems. Changes in the ecosystems, especially those highly dependent on climatic conditions are deeply concern with species adaptability. As a result, many studies to assess the impact of the ENSO event have increased in South America.

Experimental studies have demonstrated that higher than normal precipitations, such as ENSO, trigger a higher primary productivity (Manrique et al., 2007) in semi arid regions. Vegetation change, during this climatic event, has also been detected in the desert (Squeo et al., 2006). However, little is known about the effect of this event on fog oases, mainly due to the scarce information about this ecosystem, for example: little climatic monitoring, absence of vegetation data. Although *Lomas* has been considered rich in species diversity, few has been done to understand their relationship to the desert and its climatic conditions.

Currently the fog oases or *Lomas* are threatened by human activities (intensive agriculture, overgrazing, and mining). Many woody species have been used for fuelwood. It is not unusual to find large numbers of cattle, sheep, and goats in *Lomas* formations (e.g. in southern Peru). These events cause the introduction of a number of weed species common to Andean environments. Currently, many *Lomas* localities are in danger due to the urbanization caused by population growth in coastal cities. Besides human impact, it is also probable that recent climatic changes are influencing the fog distribution and its frequency (Johnstone & Dawson, 2010).

## 1.2 Hypothesis

In a large scale, selective environmental factors may have affected the plant composition and connectivity among fog oases.

It is likely that the warm and cold phases of the ENSO influence the fog oases in different ways: affecting seasonality, affecting primary productivity and finally, affecting plant distribution.

Changes in seasonal vegetation may respond to climatic oscillations. Vegetation cover and biomass may respond faster to positive climatic inputs during the dry season induced by climatic oscillations.

## 1.3 Objectives

The purpose of this work is to contribute with the fog oases knowledge, to understand their fragility and diversity, and to support land planning and monitoring. In pursuing these objectives, a number of different approaches were adopted, with an emphasis on the ENSO effect on this ecosystem:

First, we studied the plant diversity to understand about the richness of fog oasis and the similarities among them. Focusing on their phylogenetic differences we tried to understand their evolutive connection.

Second, we reviewed the data actually present on fog oases related to the ENSO, and what it is known about the effect of this climatic oscillation on fog oasis vegetation.

Third, we contributed with the land planning, mapping the vegetation and describing the land cover in a study case.

Finally, using remote sensing techniques, we analyzed vegetation of fog-oasis using three different dates corresponding to three different ENSO situations within the same season.

## 1.4 Research structure

This thesis is structured into four main chapters (Chapter 2 to 5):

Chapter 2 explores the plant diversity differences among the fog oases along the Peruvian and Chilean coastal deserts.

Chapter 3 address the effect of ENSO on fog-oases along the Peruvian and Chilean deserts.

Chapter 4 shows the land cover classes present in a study case and map the vegetation using both, satellite image and ground-based data.

Chapter 5 illustrates how vegetation changes within the same season under different ENSO situations.

# 2 Plant diversity of fog oases

## 2.1 Introduction

The fog oases, or *Lomas* as they are locally known (Reiche, 1938; Weberbauer, 1945; Ferreyra, 1953), are the arrangement of different plant assemblages with a high species richness, endemisms, and taxonomic diversity. Over 100 such localities have been identified from northern Peru to central Chile, distributed patchily to form “ecological islands” (Dillon et al., 2003) of variable size, topography, and distance between them. Moreover, it has been described as highly seasonal and dependent on climatic events (e.g. Oka and Ogawa 1984; Dillon, 1997; Muñoz-Schick et al., 2001; Cereceda et al. 2008).

Although the floristic variability among them has been described in various studies (Rauh, 1985; Dillon & Hoffmann, 1997; Rivas-Martinez et al., 1999; Pinto & Luebert, 2009), only few authors have attempted to explain their floristic divergence (e.g. Duncan and Dillon 1991), mainly due to the desert barrier found at ~18°-19°S (Dillon, 2005; Galán de Mera et al., 1997) and at ~14°S (Müller, 1985; Galán de Mera et al., 1997).

However, some remnant affinities remain along the Peruvian and Atacama deserts (Tago-Nakasawa & Dillon 1999; Pinto & Luebert, 2009), supplying some evidence of an ancestral connection among fog oases, which have led to the supposition (e.g.. Ono, 1986) of a continuous belt of vegetation along the desert in ancient times. The few species in common among Peruvian and Chilean Lomas (around 6% of native species, Dillon et al., 2003) still are not enough to support the past connection hypothesis of such communities.

The distribution and dispersal of species are related to their center of origin (Brown, 1984) and are limited geographically by environmental gradients (Whittaker, 1960) differentiating species abundance, which decrease when the distance between them increases. In this paper, the study subject sites offer a natural evidence of isolation, climate change, and plant adaptations, all maintained by a common climatic factor, which is fog. The fog occurrence is an important factor in the preservation of *Lomas* plant diversity, creating an optimal habitat for the association of many species.

To explore the main differences in the species composition of fog oases and their relationship with the phylogenetic relatedness of species. The present species composition was analyzed using the similarity analysis of floristic lists and phylogenetic distances among sites. Our hypothesis is that the present plant composition of fog oases are phylogenetically dissimilar as a result of different floristic relationships and selective environmental factors. These assemblages, which are taxonomically different, hotspots of plant diversity, may support the importance of fog oases as evidence of climate change, thus increasing their conservation value.

## 2.2 Materials and methods

### 2.2.1 Study area

In this study we compared the floras of thirteen *Lomas* located along the coast of Peru and Chile from 7°58’ to 26°15’ S (Fig. 2.1, Table 2.1 ). The local climate is characterized by low and highly variable precipitation (<10mm to 200 mm/year), a mean annual temperature of 18°C, and high relative air humidity (around 75%).

Vegetation covers small areas with different topographic features (small hills, coastal cliffs, and coastal terraces) from 100 to 1200 m elevation, where wind direction enables fog interception by plants, especially tall shrubs and trees. Although fog can have an irregular yearly occurrence (Cereceda *et al*., 2008) it is probably more effective from May to October, during the winter and at the beginning of the spring (austral hemisphere).

Vegetation types are characterized by a mixture of annual and short-lived herbs, shrubs, and trees. Some epiphytes and many succulents are also characteristic. Floristic richness include around 815 species for the Peruvian *Lomas* (Dillon *et al*., 2003) and around 433 species for the Chilean *Lomas* (Larrain, 2007)

Coastal areas have been occupied by indigenous people for over 5,000 years (Sandweiss et al. 2009). The main archaeological vestiges of pre-Hispanic civilizations dependent of *Lomas* natural resources are found in southern Peru (Linares-Málaga, 1991). Archaeologists have observed that in their original state, the *Lomas* provided essential sites for foraging and the periodic cultivation of crops.

Currently the fog oases or *Lomas* are threatened by human activities (intensive agriculture, overgrazing, and mining). Many woody species have been used for fuelwood. It is not unusual for farmers to move large numbers of cattle, sheep, and goats from the Andes to various *Lomas* formations (e.g. in southern Peru) during the driest periods. These events cause the introduction of a number of weed species common to Andean environments. Currently, many *Lomas* localities are in danger due to the urbanization caused by population growth in coastal cities. Besides human impact, it is also probable that recent climatic changes are influencing the fog distribution and its frequency (Johnstone & Dawson, 2010).

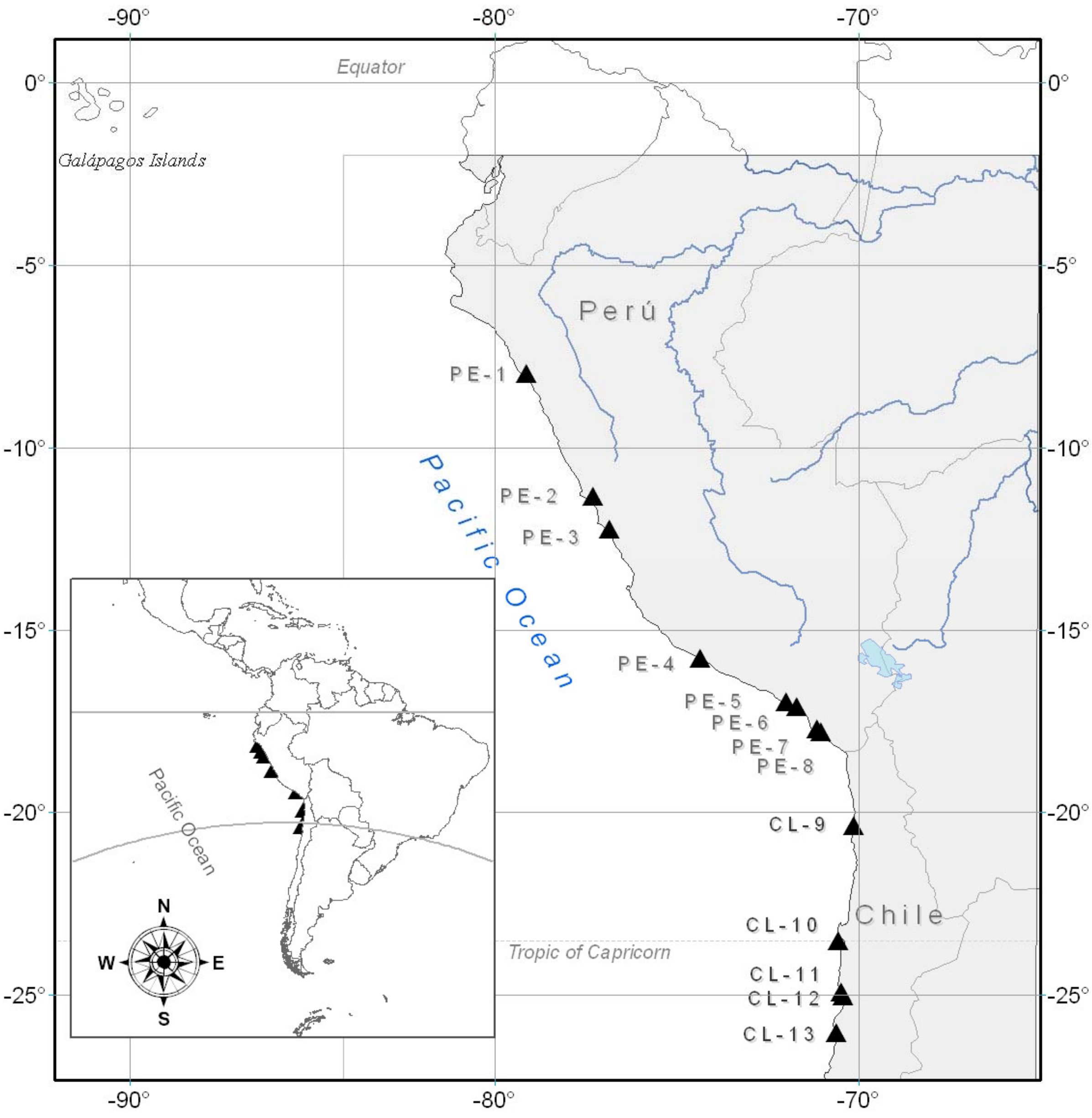
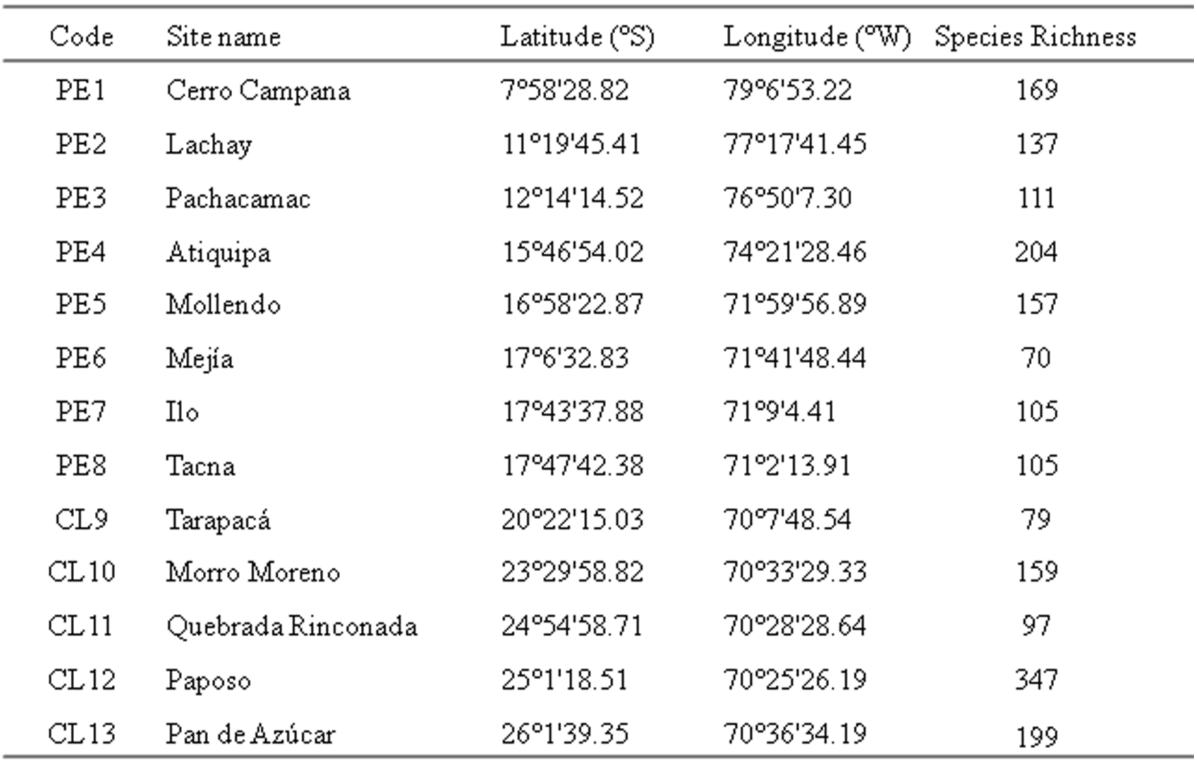


**Fig. 2.1. Geographic distribution of the thirteen *Lomas* selected for the analysis. Sites follow a latitudinal gradient from northern Peru to north-central Chile and are coded as in Table 2.1.**

**Table 2.1. List of *Lomas* selected for analysis. Geographic coordinates and species richness are also given. Sites are distributed along a latitudinal gradient from northern Peru (PE) to north-central Chile (CL).**



| Code | Site name | Latitude (°S) | Longitude (°W) | Species Richness |
|---|---|---|---|---|
| PE1 | Cerro Campana | 7°58'28.82 | 79°6'53.22 | 169 |
| PE2 | Lachay | 11°19'45.41 | 77°17'41.45 | 137 |
| PE3 | Pachacamac | 12°14'14.52 | 76°50'7.30 | 111 |
| PE4 | Atiquipa | 15°46'54.02 | 74°21'28.46 | 204 |
| PE5 | Mollendo | 16°58'22.87 | 71°59'56.89 | 157 |
| PE6 | Mejía | 17°6'32.83 | 71°41'48.44 | 70 |
| PE7 | Ilo | 17°43'37.88 | 71°9'4.41 | 105 |
| PE8 | Tacna | 17°47'42.38 | 71°2'13.91 | 105 |
| CL9 | Tarapacá | 20°22'15.03 | 70°7'48.54 | 79 |
| CL10 | Morro Moreno | 23°29'58.82 | 70°33'29.33 | 159 |
| CL11 | Quebrada Rinconada | 24°54'58.71 | 70°28'28.64 | 97 |
| CL12 | Paposo | 25°1'18.51 | 70°25'26.19 | 347 |
| CL13 | Pan de Azúcar | 26°1'39.35 | 70°36'34.19 | 199 |

### 2.2.2 Data collection

For the 13 *Lomas* (Table 2.1), we collected a data set of 1,004 species belonging to 388 genera and 99 families using different floristic lists (Puig *et al*. 2002; Arakaki & Cano, 2003; Jiménez, 2006; Larraín, 2007), as well as species lists available online (i.e. ‘LomaFlor’ database, http://www.sacha.org/). Synonymies and taxonomy were checked out, using relevant literature (Brako & Zarucchi, 1993; Marticorena *et al*. 1998, Squeo *et al*., 2008; APG, 2003) and specialist communication. The dataset obtained contains around 77% of the known native species of the region (Dillon, 1997; Dillon & Hoffmann, 1997; Tago-Nakasawa & Dillon, 1999).

For all species, information on their geographic origin and growth form was added to the data base. The geographic origin comprises three levels: native species (from North, Central and South America), endemic species (of coastal or Andean origin), and introduced species (from the old world, highly naturalized, or cosmopolitan). Growth forms are: trees, shrubs (tall shrubs), sub-shrubs (small shrubs), perennial herbs, annual herbs, and grasses. Information on both origin and growth forms was limited to general information, due to the scarcity of data for all species reported in our dataset (Appendix III).

### 2.2.3 Data analysis

Species data were analyzed with non-metric ordination (Non-Metric Multidimensional Scaling, NMDS) of the Jaccard dissimilarities obtained from the species-by-site matrix. All species singletons occurring only in one site were removed to exclude casual occurrences from the analysis and to emphasize similarities between sites. Information on the species growth forms and geographic origin were fitted as variables onto the ordination to obtain their correlation to the species distribution. The direction of the vectors show the direction of the gradient, and the length of the arrow is proportional to the correlation between the variable and the ordination. All multivariate analyses were done with the *Vegan* package in R 2.10 (R Development Core Team, 2010).

Besides NMDS of the species presence and absence data, a non-metric ordination of the phylogenetic dissimilarity matrix among sites was also performed. We constructed a hypothesized phylogenetic tree for all Angiosperm species in the database using the online software Phylomatic (http://www.phylodiversity.net/phylomatic; Webb & Donoghue, 2005). To construct the phylogenetic tree, Phylomatic uses the base tree of the Angiosperm Phylogeny Group (APG), available online (http://www.mobot.org/MOBOT/research/APweb;

Stevens, 2001), as the backbone in combination with numerous published molecular phylogenies. In the absence of detailed information on phylogenetic relationships within many of the families and genera in our data base, we assumed most families and genera were monophyletic and polytomous when placing them on the tree. Branch lengths were assigned to the phylogenetic tree based on aged nodes reported by Wikstrom et al. (2001) from fossil data. Nodes in the phylogenetic tree for which age estimates were available were fixed, while all remaining nodes were spaced evenly between dated nodes.

To calculate the pairwise phylogenetic dissimilarity between sites, we used the Phylocom software package (Webb et al., 2008), http://www.phylodiversity.net/phylocom. Given two sites, A and B, Phylocom calculates the average minimum phylogenetic distance (NNPD) between all species in A and B. That is, for each species in A the program finds the nearest phylogenetic neighbor in B (and vice versa), records these phylogenetic distances, and calculates their mean:

$$NNPD = \frac{\sum_i \min d_{iB} + \sum_j \min d_{jA}}{S_A + S_B} \qquad \textbf{( Eq. 1)}$$

where $d_{iB}$ is the minimum phylogenetic distance between species $i$ in $A$ and all species in $B$, and $d_{jA}$ is the minimum phylogenetic distance between species $j$ in $B$ and all species in $A$. $S_A$ and $S_B$ are the number of species in $A$ and $B$, respectively. The distance (Myr) between two species in the aged phylogenetic tree will be twice the time since divergence from the most recent common ancestor (branch length from species 1 to the most recent common ancestor plus branch length from the most recent common ancestor to species 2). The matrix of nearest neighbor phylogenetic distances among sites was then analyzed using ordinary NMDS.

Finally, the pairwise matrix of distances was tested for differences among groups obtained from NMDS using nonparametric Multivariate Analysis of Variance performed with PAST version 1.91 (Hammer et al. 2001) also freely available at: http://folk.uio.no/ohammer/past.

## 2.3 Results

The results of the non-metric ordination of the species presence and absence data revealed significant dissimilarities in plant composition among sites. The *Lomas* are grouped into three main clusters: North Peruvian (PE1, PE2, PE3), South Peruvian (PE4, PE5, PE6, PE7, PE8) and Chilean *Lomas* (CL9, CL10, CL11, CL12, CL13), hereinafter NP, SP, and CL groups, respectively (Fig. 2.2). Significant pairwise differences were detected among groups ($P<0.05$) using nonparametric Multivariate Analysis of Variance with 999 permutations and Bonferroni-uncorrected adjustment for p-values.

Similarly, the non-metric ordination of phylogenetic distances between sites (Fig. 2.3) showed the same pattern. That is, the floristic differences among NP, SP, and CL detected at the species level are also observed at higher phylogenetic levels, although in this case the borders between the three groups observed are less distant and fuzzier than for the species-only configuration. The matrix of phylogenetic dissimilarities was tested for pairwise differences between NP, SP, and CL with nonparametric Multivariate Analysis of Variance using 999 permutations and Bonferroni-Holm adjustment for p-values. In all cases, significant pairwise differences at $p<0.05$ were obtained.

The three groups of *Lomas* identified are characterized by the high variability in species composition (Table 2.2). The common attribute of the species distribution is the highly variable frequency of species: 56% of the total (1,004) are rare species (species found only once). The species not in common (no share species among sites) are equal to or greater than 90%, while very few species are exclusive (not present in other sites). Just 3% of the species are common among sites within SP (11 spp.) and CL (14 spp.) groups, while NP sites show more similarities (10% of species in common, 28 spp.).

We found a significant geographic gradient (Latitude and Longitude, P=0.001, respectively) and distribution of growth forms and endemic species with respect to the species presence-absence ordination (Fig. 2.4). In addition, the *Lomas* phylogenetic diversity tends to decrease from north to south, with the highest values of phylogenetic diversity in northern Peru and the lowest in Chile (data not shown here), while the species richness increase.

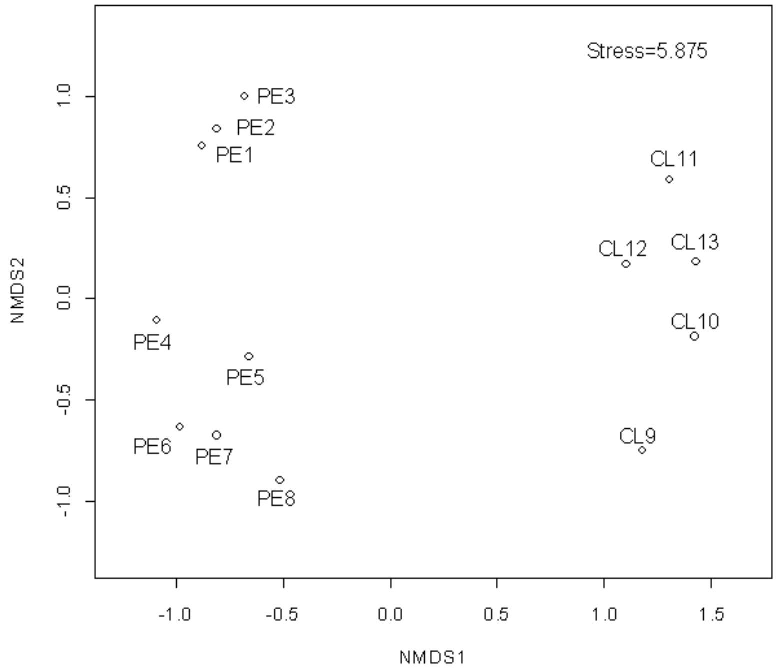


**Fig. 2.2. Non-metric multidimensional scaling of species presence and absence data using the Jaccard distance (excluding the species found only once). Three significantly different clusters are clearly identified in the ordination space (NP, SP and CL). The minimum stress configuration is given.**

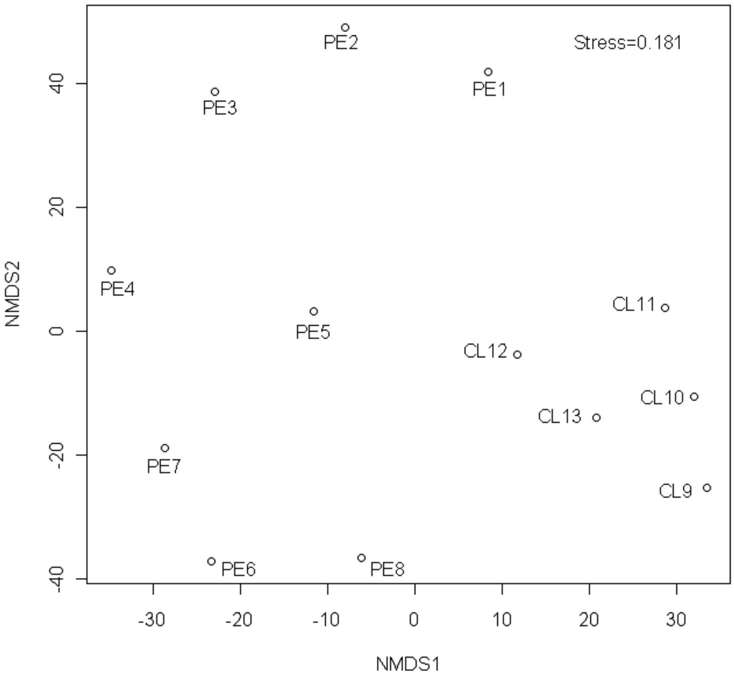


**Fig. 2.3. Non-metric multidimensional scaling of phylogenetic distance among sites using only the Angiosperms group.**

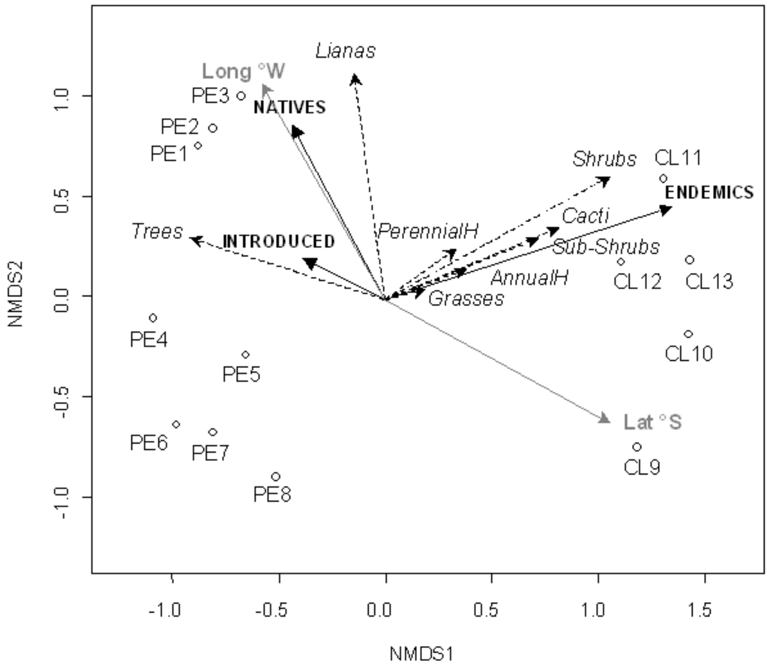
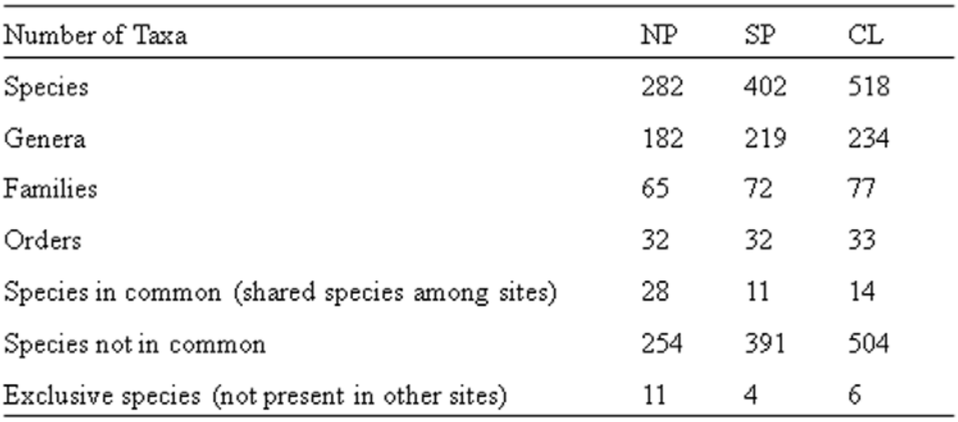


**Fig. 2.4. Ordination diagram of species occurrences showing the gradient and the correlation of the geographical position (continuous grey rows), growth forms (dashed), and origin (continuous black) with the ordination.**

**Table 2.2. Taxon richness within groups of *Lomas* resulting from the ordination analysis. Northern Peru (NP= 3 sites), Southern Peru (SP= 5 sites) and Chile (CL= 5 sites).**



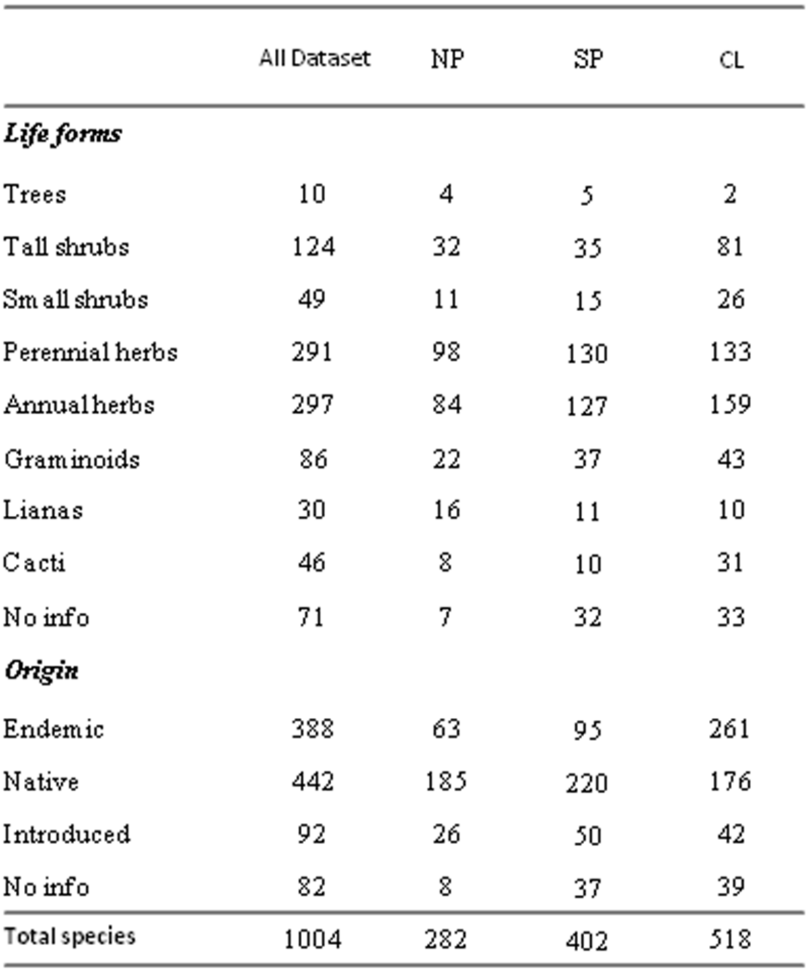
| Number of Taxa | NP | SP | CL |
|---|---|---|---|
| Species | 282 | 402 | 518 |
| Genera | 182 | 219 | 234 |
| Families | 65 | 72 | 77 |
| Orders | 32 | 32 | 33 |
| Species in common (shared species among sites) | 28 | 11 | 14 |
| Species not in common | 254 | 391 | 504 |
| Exclusive species (not present in other sites) | 11 | 4 | 6 |

### 2.3.1 Growth forms

There is a significant correlation between growth forms and the ordination of the species presence-absence (Fig. 2.4). Shrubs (P<0.01), lianas (P<0.05), and trees (P<0.1) distribution prove statistically significant, the p-value was detected with 999 permutations. Shrubs are richest in the CL area and contribute with 65% (tall shrubs) and 53% (small shrubs) of the total, whereas lianas are more characteristic in NP (53%) than the rest of sites, and trees seem to be more characteristic of Peruvian *Lomas* than of Chilean ones, considering the few species found in the total *Lomas* plant species composition. Herbs, annual or perennial, have no significant correlation to the plant distribution pattern, even though they contribute with 60% (588 spp.) of *Lomas* plant species composition (Table 2.3).

In *Lomas* the most frequent shrub genera are the *Encelia* (Asteraceae), *Frankenia* (Frankeniaceae), *Atriplex* (Chenopodiaceae), *Bahia* (Asteraceae), *Croton* (Euphobiaceea), *Heliotropium* (Boraginaceae), and *Nolana* (Solanaceae) species. The most common liana is *Sycios baderoana* (Cucurbitaceae), while the most abundant tree is *Caesalpinia spinosa* (Fabaceae). Many species found in each taxa are endemic.

**Table 2.3. Summarized differences of species growth forms and origin among groups. Table shows the total number of species in the dataset and within each group (NP, SP and CL).**



| | All Dataset | NP | SP | CL |
|---|---|---|---|---|
| ***Life forms*** | | | | |
| Trees | 10 | 4 | 5 | 2 |
| Tall shrubs | 124 | 32 | 35 | 81 |
| Small shrubs | 49 | 11 | 15 | 26 |
| Perennial herbs | 291 | 98 | 130 | 133 |
| Annual herbs | 297 | 84 | 127 | 159 |
| Graminoids | 86 | 22 | 37 | 43 |
| Lianas | 30 | 16 | 11 | 10 |
| Cacti | 46 | 8 | 10 | 31 |
| No info | 71 | 7 | 32 | 33 |
| ***Origin*** | | | | |
| Endemic | 388 | 63 | 95 | 261 |
| Native | 442 | 185 | 220 | 176 |
| Introduced | 92 | 26 | 50 | 42 |
| No info | 82 | 8 | 37 | 39 |
| Total species | 1004 | 282 | 402 | 518 |

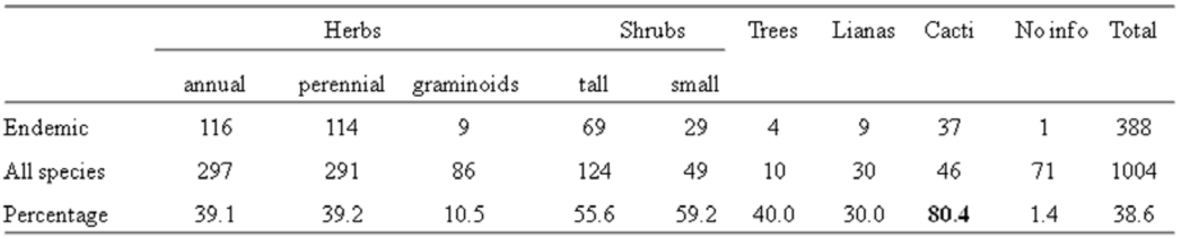
## 2.3.2 Species origin and Endemism

In our study, endemic species represent 38.6% of the total species. There is a significant correlation between endemic species and the ordination of the species presence-absence (*P*<0.05) (Fig. 2.4). The CL area is richest in endemic species (67% of total endemic species), while NP has the lowest percentage (only 16%) (Table 2.3).

The cactus is the growth form with the highest percentage of endemic species (80.4%), followed by small (59.2%) and tall (55.6%) shrubs (Table 2.4). The Cactaceae family has the highest percentage of endemism, followed by the Portulacaceae (57%), Solanaceae (54%), Boraginaceae (53%), Oxalidaceae (52%), and Fabaceae (50%), which are also rich in species numbers (Table 2.5).

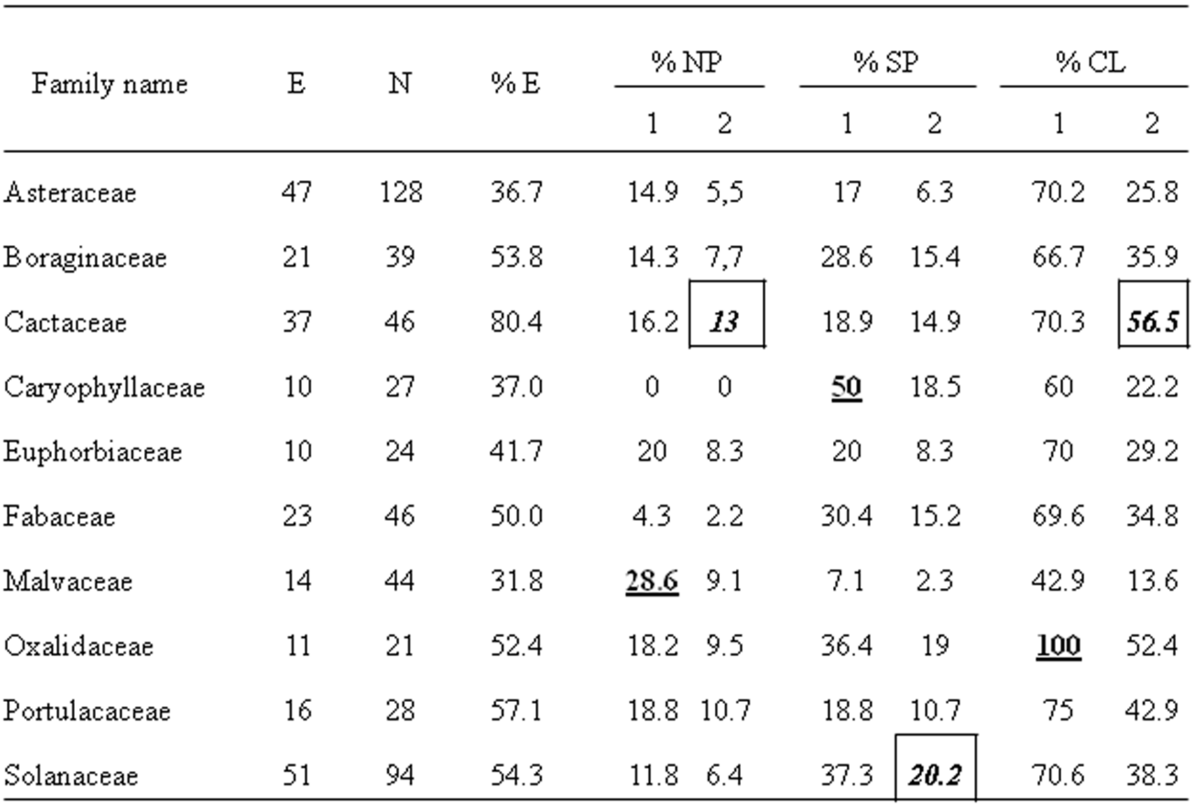
The percentage of the largest endemic families also differs among groups (NP, SP and CL). There is a decrease in species richness toward NP (Table 2.5). We found, considering just the endemic species (*S*) alone, that NP is rich in Malvaceae (28.6%), SP in Caryophyllaceae (50%), and CL in Oxalidaceae (100%). Considering, in turn, the total species number (*N*), in NP the Cactaceae (13%) species are the most abundant among the other families; SP is rich in Solanaceae (20%), and the CL group is absolutely richest in Cactaceae endemic species (56.5%) (Table 2.5). At the genus level, *Nolana* (Solanaceae) is the richest (45 spp.), with two species (*N. gracilis, N. lyciodes*) in common between Chile and Peru; the larger quantities of this species are found in CL (28 spp.), decreasing toward the north: SP (18 spp.) and NP (only 2 spp.), where the most frequent genus is *Solanum* (12 spp.). Other important genera from the first 10 most frequent families are: C*alceolaria, Tillandsia, Cristaria, Begonia, Fuertesimalva, Peperomia, Stellaria* (within NP); *Palaua, Eragrostis, Spergularia, Alternanthera, Chenopodium, Hoffmansegia* (within SP); *Copiapoa, Calandrinia, Cistanthe, Cryptantha, Atriplex* (within CL). In almost the entire coastal range *Heliotropium* (NP, SP, CL), *Oxalis* (NP and CL), and *Tetragonia* (SP and CL) are frequent.

**Table 2.4. Percentage of endemic species for each of the eight growth forms**



| | Herbs | | | Shrubs | | Trees | Lianas | Cacti | No info | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | annual | perennial | graminoids | tall | small | | | | | |
| Endemic | 116 | 114 | 9 | 69 | 29 | 4 | 9 | 37 | 1 | 388 |
| All species | 297 | 291 | 86 | 124 | 49 | 10 | 30 | 46 | 71 | 1004 |
| Percentage | 39.1 | 39.2 | 10.5 | 55.6 | 59.2 | 40.0 | 30.0 | **80.4** | 1.4 | 38.6 |

**Table 2.5. The ten families with the largest number of endemic species by group (NP, SP, and CL). The total endemic (E) and the total species number (N) by family are given. The families with the highest percentage of endemism are underlined and in boldface (column 1) and the percentage of endemism with respect to the total species number is found inside the box (column 2). Families are in alphabetical order.**



| Family name | E | N | % E | % NP | | % SP | | % CL | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 1 | 2 | 1 | 2 |
| Asteraceae | 47 | 128 | 36.7 | 14.9 | 5,5 | 17 | 6.3 | 70.2 | 25.8 |
| Boraginaceae | 21 | 39 | 53.8 | 14.3 | 7,7 | 28.6 | 15.4 | 66.7 | 35.9 |
| Cactaceae | 37 | 46 | 80.4 | 16.2 | $\boxed{\textbf{13}}$ | 18.9 | 14.9 | 70.3 | $\boxed{\textbf{56.5}}$ |
| Caryophyllaceae | 10 | 27 | 37.0 | 0 | 0 | **50** | 18.5 | 60 | 22.2 |
| Euphorbiaceae | 10 | 24 | 41.7 | 20 | 8.3 | 20 | 8.3 | 70 | 29.2 |
| Fabaceae | 23 | 46 | 50.0 | 4.3 | 2.2 | 30.4 | 15.2 | 69.6 | 34.8 |
| Malvaceae | 14 | 44 | 31.8 | **28.6** | 9.1 | 7.1 | 2.3 | 42.9 | 13.6 |
| Oxalidaceae | 11 | 21 | 52.4 | 18.2 | 9.5 | 36.4 | 19 | **100** | 52.4 |
| Portulacaceae | 16 | 28 | 57.1 | 18.8 | 10.7 | 18.8 | 10.7 | 75 | 42.9 |
| Solanaceae | 51 | 94 | 54.3 | 11.8 | 6.4 | 37.3 | $\boxed{\textbf{20.2}}$ | 70.6 | 38.3 |

## 2.4 Discussion

### 2.4.1 Plant composition and distribution divergence

Our results show three well defined clusters of *Lomas* that support the floristic variation along the Peruvian and Atacama Deserts, evidencing the disjoint attributes of the flora mentioned before by Duncan and Dillon (1991) and explained to some degree by Nakazawa and Dillon (1999). Some other studies have also pointed out the floristic divergence of Peruvian *Lomas* (Müller, 1985) related to the sectorialization of the Peruvian regional flora (Galán de Mera et al. 1997), while Pinto and Luebert (2009) showed the floristic dissimilarity between Chile and Peru.

A clear difference among groups (NP, SP and CL) was also shown by different *growth* form gradients. Differences among groups are significantly characterized by shrubs, lianas, and trees occurrence. Shrubs are characteristic of *Lomas* vegetation, and play an important role providing shade to avoid drought stress and refuge for annual plants and some small mammals. The CL area has a significantly diversity of shrubs. The strong ecological function of shrubs in the desert can determine the stability of this ecosystem acting as a "driver" growth form: the same role as a driver species according to Walker (1995). The same is true for trees, but in our case their presence seems to be restricted to certain areas. In some cases the presence or absence of trees is related to human activities since ancient times (Cordero et al., 2009). Lianas are present where there is more water availability and probably benefit from the existence of a gradient of rainfall that decreases from north (northern Peru) to south (Chile). Although annual herbs have no significant difference among groups, they are rich in species composition and respond better and opportunistically to water pulses. The annual plant-shrub interaction may be strong when increasing the arid conditions (for example in northern Chile). But positive interactions become less important when rainfall increases (for example in northern Peru); evidence of such interaction has been found in desert communities along a steep climatic gradient in Israel (Holzapfel et al., 2006). This prediction has not been tested in *Lomas*, and studies of such differences could support the divergence found at the community level.

Differences among groups are further accentuated by the increase in adaptation importance from the north (i.e. NP) to the south of *Lomas* distribution (i.e. CL), where extreme arid conditions prevail all year round. The CL area is rich in plant adaptations, considering the high species richness found here, for example: the CAM metabolism in the

Cactaceae family, depth roots in shrubs and trees, bulbs in geophytes, water-absorbing trichomes in epiphytes, and water collectors such as the rosette form of Bromeliaceae species. Growth forms are correlated to the species distribution and so indicate the area of major environmental stress.

Divergence in some species distribution is well represented, for instance, by the Cactaceae family. The most characteristic is the small aspheric endemic *Copiapoa* settled on the Chilean coastal plains (Rundel and Mahu 1976), reaching maximum density in Paposo and Pan de Azúcar at 100 m elevation (Rundel et al. 1980), where vegetation cover is very sparse. In contrast, the cactus composition in SP is different, the most important cactus cover is columnar and cacti are well distributed in the opposite fog-side of *Lomas* where arid conditions prevail, while in NP the cacti are less abundant and some species have Ecuadorian distribution. In general, we noticed two groups of cactus species along the *Lomas*: those clearly distributed along the lower elevations of the coast (e.g. *Haageocereous*, *Copiapoa*), and those with a wide altitudinal range (e.g. *Neoraimondia*, *Cleistocactus*, *Espostoa*, *Opuntia*). However, cactus associations in South America have not been studied in depth, and their biogeographical relationship is not well understood.

The families with the highest numbers of species, which also include higher numbers of endemics – such as Asteraceae, Boraginaceae, Cactaceae, Caryophyllaceae, Euphorbiaceae, Fabaceae, Malvaceae, Oxalidaceae, Portulacaceae, Solanaceae, Poaceae, and Chenopodiaceae – follow the same pattern of distribution given by the species, thus supporting the taxonomic differences among the three *Lomas* groups found in our study.

Furthermore, the current subsistence of allied species between the Peruvian and Chilean deserts (e.g. *Malesherbia*: Malesherbiaceae; *Nasa*: Loasaceae; *Solanum*: Solanaceae; *Lycopersicum*: Solanaceae; *Palaua*: Malvaceae; *Heliotropium*: Boraginaceae; *Polyachyrus*: Asteraceae) (Dillon 1997; Pinto and Luebert 2009) may suggest an ancestral connection of vegetation, which probably existed before the isolation processes that took place due to the increase in the arid climate and desert areas.

### 2.4.2 Biogeographical relationships and endemism as evidence of historical processes

The three well defined clusters (NP, SP and CL) are supported by the significant differences at the taxonomical level (see Fig. 2.3). The phylogenetic distance analysis among sites shows a marked latitudinal gradient from north to south. This result shows a different evolutive history related to natural processes in each geographic area.

The *Lomas* species gradient shows that species relatedness is associated to their geographical position. The main differences among areas are probably connected with the origin of *Lomas*; each of these three main areas was likely constrained by different processes, for example: the lift of the Andes, the Humboldt current development, wetter and drier geological periods, and the onset of El Niño Southern Oscillation, which limit the plant assemblages to a non-random species distribution.

The species of *Lomas* have different origins, including amphitropic disjuncts, semi-arid Ecuadorian, central Chilean species, montane Andean disjuncts, and many *Lomas* endemics (Dillon *et al*., 2003). The major source of plant migration and dispersion seems to be the Andes. For example, the Solanaceae family is enriched with the *Nolana* genus, previously considered a separate family (Nolanaceae). Our results show a decrease in *Nolana* species richness toward the north, while the first most important genus *Solanum* increases. *Nolana*'s dispersion is linked to its center of origin. It has been said that the *Nolana* species probably originated in the upper lands of the Chilean area (Dillon *et al*., 2007). Species are less abundant far away from their center of dispersion, while they are more abundant close to their center of origin (Brown, 1984).

Another example of species migration is given by ferns; in our study we report them within the perennial herbs group. León *et al*. (2002) considered the occurrence of *Lomas* ferns a link with the Andean forest. These authors hypothesized a colonization from the western Andes to the coast. We have found that NP and SP are richer than the CL group, and this may correspond to the water gradient and the distance to the Andes.

Adaptations because of species adjusting their behavior due to migration or dispersal and change of environmental conditions are also found in *Lomas*. The Bromeliaceae family includes genera of major adaptations, for example: *Tillandsia*, which we mentioned earlier, but also *Puya* and *Pitcairnia* are also related to Andean species (Rundel & Dillon, 1998). The species richness in this family decreases toward the south, where extreme arid conditions increase (Atacama Desert). Rundel & Dillon (1998) found that these species change their metabolism depending on water availability; the species of northern Peru (e.g. Cerro Campana) have a mix of CAM and C3 metabolism, while Chilean species show more CAM species.

The ten largest families we chose to describe differences among groups, which also correspond to the largest number of endemics (Table 2.5), tell us about the time a taxonomic group has existed in a place, so the bigger a group is, the older they are (Willis & Yule, 1922). They also tell us about the species dispersal from their center of origin, so many endemic species concentrated in a place provide us with evidence of their center of dispersion (Brown, 1984). For example, we show that the endemism of Caryophyllaceae is richest in CL and SP, while in NP it is totally absent; the Malvaceae family is richer in CL than the other groups but it represents the family with the highest endemism in NP; while the Oxalidaceae family, richest in the CL group, decreases toward the north.

These taxonomic differences may be reinforced by the boundary effect that creates floristic connections (Sarmiento, 1975). The *Lomas* formation may be influenced by three geographic areas: 1) the connection with northern dry formations (Ecuadorian, central South America, north Peruvian), 2) the semi-arid Mediterranean (central Chile), and 3) the Andes adjacent area.

The northern boundary of *Lomas* distribution is rich in tropical flora and is located near a relatively lower Andes elevation area which has allowed a flux of tropical species. We think there is also an influence from the seasonally dry tropical forest in northern Peru, because the most frequent families found in *Lomas* are also present in this area, considered a kind of "refuge" and probably a remnant of a more widespread seasonal woodland (Pennington *et al*., 2000; 2004).

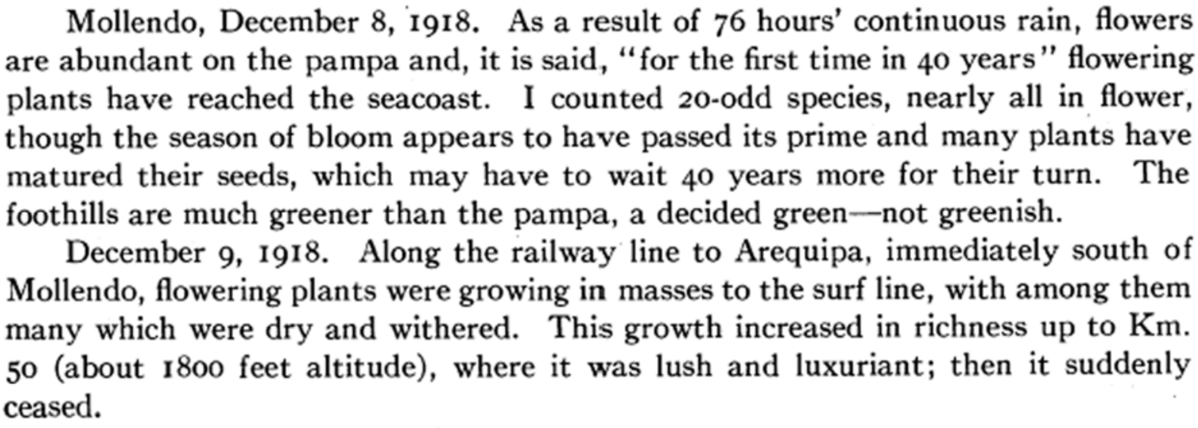
The same holds true for the southern part of the Atacama Desert, which has suffered changes in its southern boundaries through time (Betancourt *et al.,* 2000; Grosjean *et al*., 2003). This has probably permitted the introduction or migration of southern species from a more Mediterranean semi-arid climate, in addition to the species that have descended from the Andes in wetter periods. The current desert barrier between Chile and Peru has created an isolated area separating the Chilean from the southern Peru *Lomas* and promoting the increase of endemic species, as has been suggested by Dillon (2005).

Species native to the Andes expanded their distribution to the coast during more mesic periods (Rundel & Dillon, 1998). This is strongly supported by the evidence of the presence of species from upper levels in the desert (Latorre et al., 2002). The species from the Andes enriched the lowland areas, promoting their colonization (Arroyo et al., 1988; Rundel et al., 1991) especially during the late Pleistocene when more humid conditions occurred. The small distances in the altitudinal gradient may have been a bridge, but long distances may have emphasized the isolation.

The existence of altitudinal gradients of *Lomas* species distribution, especially the growth form changes with the altitudinal moisture gradient (Péfaur, 1982; Dillon *et al*., 2003), support the hypothesis that a fog oasis is a reservoir of genetic material from higher elevation environments but also from lower areas where drought and warmth situations force species to escape toward more mesic areas.

It is likely that even though the *Lomas* distribution shows a fragmented spatial pattern and phylogenetic divergence, an evolutive interconnection exists among sites. Considering the geographical distance between them and the isolation created by the desert, these groups of *Lomas* contain species that are not merely randomly associated. The analysis of phylogenetic distances demonstrated that allied species have more probabilities of creating an assemblage in such a situation, as has also been stated by Swenson et al. (2006). Thus, selective environmental factors may have promoted plant assemblages of closely related taxa. The increase of desertification and the consequent limited plant dispersion is still the main reason that may have limited interaction among sites and consequently among species, promoting their taxonomic divergence.

# 3 Ocean-atmospheric oscillations effect on fog-oases



Mollendo, December 8, 1918. As a result of 76 hours' continuous rain, flowers are abundant on the pampa and, it is said, "for the first time in 40 years" flowering plants have reached the seacoast. I counted 20-odd species, nearly all in flower, though the season of bloom appears to have passed its prime and many plants have matured their seeds, which may have to wait 40 years more for their turn. The foothills are much greener than the pampa, a decided green—not greenish.

December 9, 1918. Along the railway line to Arequipa, immediately south of Mollendo, flowering plants were growing in masses to the surf line, with among them many which were dry and withered. This growth increased in richness up to Km. 50 (about 1800 feet altitude), where it was lush and luxuriant; then it suddenly ceased.

From the notes of Dr. Frank Chapman
American Museum of Natural History.
Cushman, R. (1926) Geographycal Review, 16(1), 26-54
*The American Geographical Society*

## 3.1 Introduction

Fog oases, locally named *Lomas*, are considered "ecological islands" (Dillon et al., 2003) as they are distributed in a kind of fragmented or patchy way with a common climatic factor that is fog (Oka and Ogawa, 1984; Dillon, 1997; Muñoz-Schick, 2001). They are distributed along the western coast of Chile and Peru (South America) between ~6°S and 30°S following an altitudinal gradient determined by the fog layer. Vegetation is highly seasonal and it is structured by numerous ephemeral plants, xerophytic shrubs, and scattered trees, characterized by many adapted growth forms (epiphytes, geophytes, and succulents).

Although a floristic relationship was found between Peruvian and Chilean *Lomas* due to some species in common (Dillon et al., 2003; Pinto and Luebert, 2009), a floristic divergence exists (Müller 1985; Duncan and Dillon 1991). This has been attributed to the hyper-arid barrier (around 18-20°S) between Peru and Chile that may have promoted isolation and limited plant dispersion (Rundel et al., 1991). However, the development of the hyper-arid area (mid-to-late Tertiary) was characterized by drier and wetter periods.

The climate of *Lomas* is characterized by a long dry period (austral summer), with a short and variable humid period from May to October (austral winter) when fog is more frequent. This climatic pattern determines long periods of seed dormancy and short periods of growth regulating the entire plant life cycle. Recent studies on the direct effect of fog on coastal ecosystems (Garreaud et al., 2008; Johnstone and Dawson, 2010) have emphasized the negative impact of the diminution of fog frequency induced by ocean-atmospheric oscillations in the plant establishing and development of such habitats.

The ENSO event (El Niño and La Niña) produces significant climatic changes in South America, in particular along the coast. During El Niño (EN) there is a general pattern of warmer than average sea surface temperature (SST), weaker trade winds, reduced upwelling, and increase in precipitations, whereas during La Niña (LN) the general pattern is the opposite of EN (McPhaden et al., 2006). It has been shown that EN has a positive influence in the composition and productivity of desert flora (Dillon and Rundel 1990; Gutiérrez and Meserve 2003; Holmgren et al., 2006; Squeo et al., 2006), whereas LN effects on plant establishment and species richness have been less studied.

### 3.1.1 Historical ENSO influence

Permanent EN-like conditions in the past (3 Ma.) during the Pliocene (Molnar and Cane, 2007) have been detected. This may have contributed to establishing a fertile belt along the western coast of South America, which may explain the allied species found along the desert. Many studies support the profound effects of ENSO in the region since the Holocene with significant hydrological repercussions (e.g. Magilligan et al., 2008). Several studies have shown that some species have descended in elevation due to more water availability (Holmgren et al., 2001; Latorre et al., 2002), and it is not ruled out that when warmth and drought predominated along the coast some species took refuge in the fog belt.

Thus, we believed that continuous ENSO-like conditions may affect the *Lomas* vegetation, increasing their extension and connectivity, especially during rainy years. We reviewed two main aspects to support this: 1. The climate variables related to ENSO which likely affect fog production, and 2. The responses of *Lomas* vegetation (composition, productivity, distribution) to climate patterns during ENSO events.

## 3.2 Anomalies on fog seasonality

Anomalies in the fog season may be related to low-cloud anomalies associated to EN. A negative correlation has been demonstrated between the marine Sc (Stratocumulus) amount and the warm SST (Sea Surface Temperature) in the eastern Pacific (Park and Leovy, 2004) (Fig. 3.1). As a result, a smaller amount of Sc may reach the western coast of South America while precipitation increases because of more convective clouds, especially during the austral summer.

Thus, northern Peruvian sites receive more precipitation than southern ones because they are highly dominated by ENSO (Deser and Wallace, 1990) while the fog pattern is unknown. It is likely that fog has a negligible effect here during EN. Similarly, the coast of southern Peru receives more precipitation in the late spring and early summer due to an intense EN, while fog and drizzle increase in winter. Northern Chile has a pattern similar to that of southern Peru, but this changes south of around 25°S where the amount of low clouds is negatively (positively) correlated to EN (LN) (Garreaud, 2008) (Fig. 3.2). Thus, the higher cloud amount is related to EN in southern Peru and northern Chile, but to LN from central Chile to the south

However, the marine Sc region off the coast of Peru seems to be reinforced when unusually cool SST's are present (Oreopoulos and Davies, 1993). Also, colder SST and warmer air temperatures reinforce the temperature inversion and lead to a more persistent cloud deck and higher fog frequency at 30°S (Garreaud, 2008). Therefore, during EN years the fog frequency should decrease while during LN it should increase. But the highest records of fog and water collection obtained in both southern Peru (Jiménez et al., 1999) and northern Chile (Muñoz-Schick et al., 2001; Cereceda et al., 2008) during the exceptional EN 1997-98 demonstrated the contrary. After EN of this year, LN initiated almost instantaneously (McPhaden, 1999).

It is evident that controversies still exist on fog-water measurements during EN, perhaps due to the simultaneous presence of fog and drizzle, because it is not clear if the greater amount of water captured is due to the high amount of low-clouds (fog) or to more drizzle (*garúas*).

Apparently, the fog effect on coastal formations is higher during EN when the normal drizzle is intensified and low precipitations (during summer) may cause an impressive blooming of the desert due to the ephemeral plants establishment. Nevertheless, the coastal fog impact should be higher during the winter season when fog frequency reaches its maximum.

## 3.3 Biological effects on fog oases

Desert plants are strongly related to the rainfall availability (Vidiella et al., 1999), but some areas are also are influenced by fog (Cereceda et al. 2008) such as fog oases, locally known as *Lomas*. The more water availability triggered by EN (more precipitation in later spring and summer) in the warm season, produces extraordinary changes in the *Lomas* vegetation.

### 3.3.1 Primary productivity and diversity

During EN 1997-98, the primary productivity of *Lomas* of southern Peru reached thirteen times higher productivity (UNSA-PADOVA project report 1999, unpublished data) than the average value, around 1.4 g/m$^2$/day (Torres and López, 1982; Arias and Torres, 1990; Delgado, 2006) during the wet season, increasing plant density and cover. Similar situations occurred in other cases (Jiménez et al., 1999; Muñoz-Schick et al., 2001; Pinto et al., 2001; Squeo et al., 2006). Occasionally, species that have disappeared for a long period of time reappear (Aguero and Suni, 1999). Flowering and seed production increase (Ohga, 1992; Gutiérrez and Meserve, 2003), and so the life cycle and plant distribution are modified (Péfaur, 1982; Oka and Ogawa, 1984; Thompson et al., 2003), usually prolonging life cycle and increasing cover. Thus, a positive effect on diversity occurs during EN due to more fog-water, as has been shown by Muñoz-Schick et al. (2001) and Osses et al. (1998) for Chilean fog oases, whereas less plant richness has been observed during LN conditions by Pinto et al. (2001).

### 3.3.2 Plant distribution

It has been hypothesized that *Lomas* vegetation may have belonged to a continuous belt along the coast (Ono, 1986). However floristic analyses have highlighted three main groups (Duncan and Dillon, 1991) that we confirmed (Fig. 2.2) also through the phylogenetic difference among them (Fig. 2.3). This three areas are the northern Peru (PE1, PE2, PE3), southern Peru (PE4 to PE8), and Chile (CL9 to CL13). It is likely that isolation because of long dry periods during the desert evolution (Villagrán and Hinojosa, 2005) have produced such divergence.

The significant differences in the taxonomic relatedness among groups and the high number of endemic plants confirm the different evolutive history of the *Lomas* formation.

Multi-temporal analysis of satellite images may have possible to show how much the *Lomas* extension can change during extreme climatic episodes. For example, changes in primary productivity in the desert are more visible during wetter periods (Squeo et al., 2006). According to this evidences, it is likely that different precipitation (drizzle and fog) patterns influenced by ENSO periodic pulses may have determined plant dispersion and survival of *Lomas*.

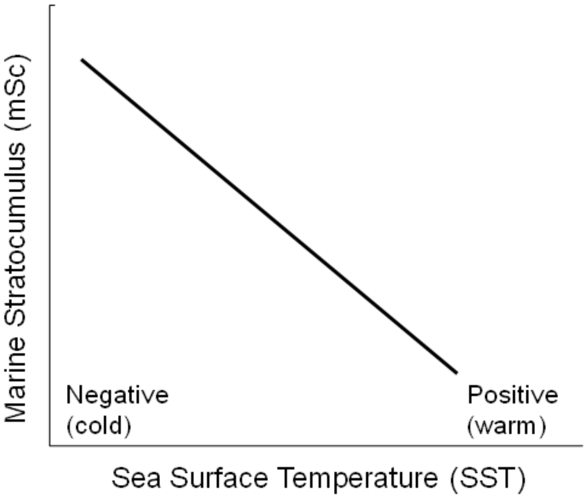


**Fig. 3.1. Correlation of marine low-cloud amount and sea surface temperature (adapted from Norris and Leovy 1994).**

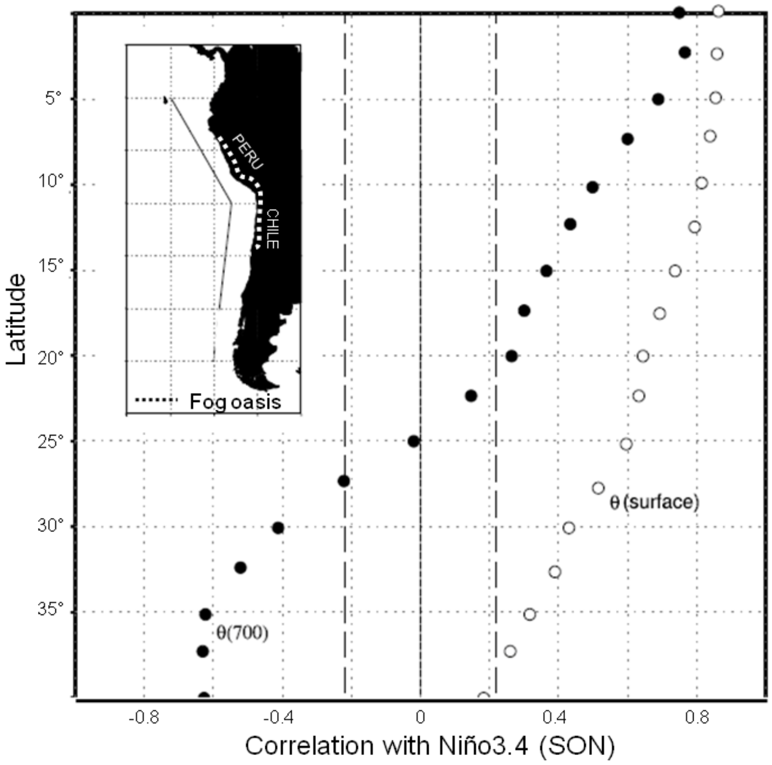


**Fig. 3.2. Correlation between spring (September-October-November) averages of El Niño3.4 index and the low-cloud amount in relation to fog oasis latitudinal gradient (adapted from Garreaud et al. 2008)**

## 3.4 Conclusions

Contradictory results have emerged from studies of low-cloud anomalies and the fog-collection during EN. EN increases water availability in fog oases when fog should be less frequent due to the reduction of low-clouds amount and Sc. Because a minor role of fog during EN is expected, especially in summer, it is likely that measurements of fog-water collection during EN are considering drizzle and fog at the same time. In turn, the reinforced winds in winter, particularly during LN, would increase coastal low-cloud frequency and, therefore, more fog occurrence and fog-water collection.

Establishing which factor (drizzle or fog) is more significant to the persistence of *Lomas* is beyond the scope of this document. However, we believe that the persistence of *Lomas* is linked to both, fog (during winter) and drizzle (during summer), particularly during ENSO. Even though a short-term response in primary productivity is more related to the increase of rainfall, we assume that, depending on how intense the effect on rainfall and fog production is, ENSO may modify the dynamics and plant distribution of *Lomas*.

Present fog-collection records are not temporally long and the latitudinal variability across the coast limits a correct interpretation of particular patterns observed in one specific site. The localized records may not have broad regional extent and may create some contradictions or unclear explanations. We believe that continuous monitoring in different points along the coast and new and appropriate equipment to record data will help us to clarify some climatic patterns.

Plant composition and distribution of *Lomas* have changed through time. Based on the allied species found and the higher quantity of endemics, it has been hypothesized that fog oases are fragments of a past continuous belt of vegetation. More paleobotanic and paleoclimatic studies are needed to clarify this and the real role of ENSO.

Two significant cases of vegetation fog-dependence show us the decline in fog frequency due to climatic anomalies related to ENSO: The Redwood forest (36°N-42°N) in California (Johnstone and Dawson, 2010) associated to the Pacific Decadal Oscillation (PDO), and the relict forest of Fray Jorge (30°S) in Chile (Garreaud et al., 2008). Thus, we infer that *Lomas* may be influenced by ENSO events (Fig. 3.3) in two possible ways: 1) facilitating species migration and gene flow during wetter periods, and 2) increasing genetic divergence because of the increasing isolation of plant populations during long dry periods.

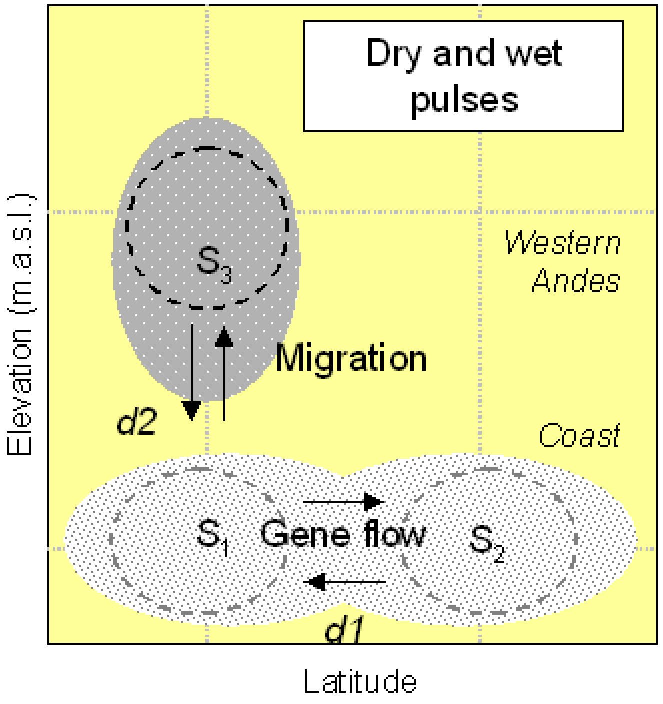


**Fig. 3.3. Variation of *Lomas* extent due to wet and dry pulses (Dashed circles correspond to dry periods). *S* is for species composition; *d* is for distance between sites.**

# 4 Mapping a fog oasis in Southern Peru: Lomas of Atiquipa

## 4.1 Introduction

It is well known that in arid and semi-arid regions the vegetation structure is related to soil-water deficiency (e.g. Noy-Meir, 1985). In the *Lomas* ecosystem water input is from drizzle and fog, especially during the wet period. The study area is found in the Atacama and Sechura Deserts Ecoregion as defined by the World Wide Fund For Nature (WWF). This ecoregion is formed by deserts and xeric shrublands and its conservation status has been considered vulnerable. The rain shadow of the Andes causes an inversion layer that gives origin to a semi-permanent fog-layer along the coast (Hartley and Chong, 2002) . This fog-layer creates semi-arid climatic conditions that benefit  the ecosystem know as *Lomas*. They are fog-dependent (Cereceda and Shemenauer, 1991; Rundel et al., 1997, Cereceda et al. 2008), as fog is the best water supply in this area. The aridity is most pronounced in the lower areas along the coast where fog is not intercepted by plants, whereas the areas covered by fog (between ca. 500-1000 m s.l.m) develop an exuberant vegetation particularly during wet and cold season.

In this area, botanical studies have described many species new to science, some of them endemics (Tu et al., 2008). Some wild ancestors of cultivated species, belonging to Solanaceae, Cucurbitaceae, Passifloraceae and Cannaceae still exist in the area. Plant diversity is high, especially during the growing period (wet season), when many annual plants contribute to the total plant richness. Arias and Torres (1990) identified 110 spp., Santa-Cruz (1999) 228 spp., Linares et al., (1999) 183 spp. Contrary to the wet period, plant richness and diversity during the dry period are low. However, the dry season can be affected periodically by unusual rains linked in some degree to the El Niño Southern Oscillation (ENSO). It has been described that El Niño event cause a wetter season and significantly increase the species richness especially due to the increase of ephemeral herbs and seeds that stayed dormant for many years. A detail study of floristic diversity by Linares et al. (1999), which corresponded to El Niño 1998-99, described eight types of vegetation, from open areas with occasional ephemeral herbs to a very dense forest formed by high shrubs and trees, and they prepared the first vegetation map of this area.

In the *Lomas* area, pre-Columbian sites older than 2,000 years B.C have been discovered (Linares, 1991). Human impact dates back to the first settlement in the area. Although pre-hispanic settlements have disappeared, new modern settlements have introduced agriculture and non-native livestock, influencing and damaging the residual natural ecosystem. Other activities are related to fuelwood collection, commercial plant collection, introduction of exotic species (for gardens and reforestation) mining and the increase of human settlements along the coast.

The *Lomas* of Atiquipa is one of the best preserve *Lomas* along the desert with an important cover of trees. In particular, the *Tara* tree (*Caesalpinia spinosa*: Fabaceae), which fruits and seeds are collected to be used for the extraction of tannins and food hydrocolloids. Recent studies have shown the possibility that this species were subject of a selection process in pre-hispanic times and discarded the natural species distribution (Balaguer et al. 2008).

Since 1996 an increase interest in this formation have promoted different studies with the purpose of protect the area and reinforce the local community in the use of their natural resources. Fog has been initiated to be monitored and water-fog collected for human activities and consumption. The forest area has been managed by the local associations in agreement with the University of San Agustin (Arequipa, Peru) and economical support from different projects has began since 2001. In 2003 initiated the reforestation activities and fences were built to limit livestock impact.

The aim of this study is to update the *Lomas* vegetation map using remote sensing analysis supported by field survey data, to create a new vegetation map based on species cover distribution and differences in the Vegetation Index (VI). Results will be useful for land use planning and monitoring.

## 4.2 Materials and methods

### 4.2.1 Study area

The study area is located in the coast of the Department of Arequipa (South Peru, Fig. 4.1), and includes two administrative districts: Atiquipa and Taimara. The average annual precipitation is highly variable, and is concentrated during the wet/cold period (from June to November) which is also characterized by a thick cover of low clouds (fog). The nearest meteorological station (Punta Atico) registered for the wet period ca. 35 mm (1966-1980), and an average temperature of ca. 15°C for the same period (Arias and Torres, 1990). The local climate is also periodically influenced by ENSO, which develops two phases: a warm/El Niño and a cold/La Niña phases. El Niño and La Niña typically result in above and below average precipitation in the region. However, the ENSO effect on drizzle and fog in the study area have not been well understood yet. The main source of fog is oceanic, which is transported to the coast by the wind. Local records of fog exist since 1995 but these are not continuous. The highest values of fog measured using standard fog collectors occur in the wet and cold period reaching about 67 litres/m$^2$/ day (Villegas et al. 2007).

*Lomas* vegetation develops predominantly from 200 m to about 1200 m (a.s.l.) on small hills. Previous floristic studies (Arias and Torres, 1990, Santa-Cruz, 1999, Linares et al., 1999) were done during the growing period to collect the most of the species. Plant composition in the dry period is of little interest because their poor richness and diversity. The vegetation cover differences between wet and dry seasons are mainly due to the annual plants. The spatial coverage of the perennials does not change from one season to the another, but their photosynthetic activity changes in response to water availability.

Historically, this area was used by pre-Hispanic populations, which modified the landscape: old terraces are visible still today but this are not longer used. Today, small areas of forest is managed by the local community. Since a recent management project have selected some areas to avoid grazing impact, the remnant ones have been selected for reforestation and manage of *Tara*, which is used for seeds collection. Changes due to this project will be visible in the future.

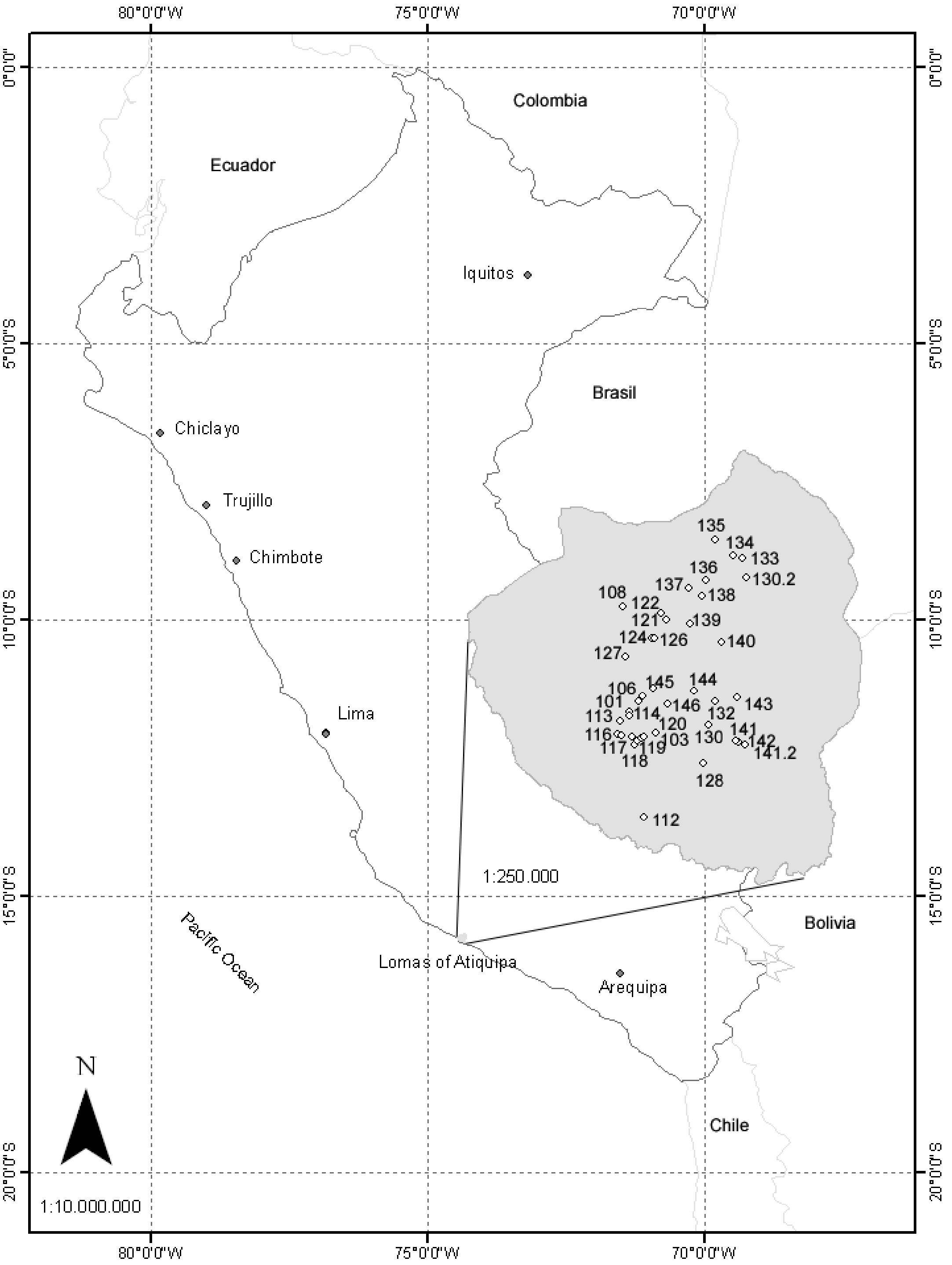
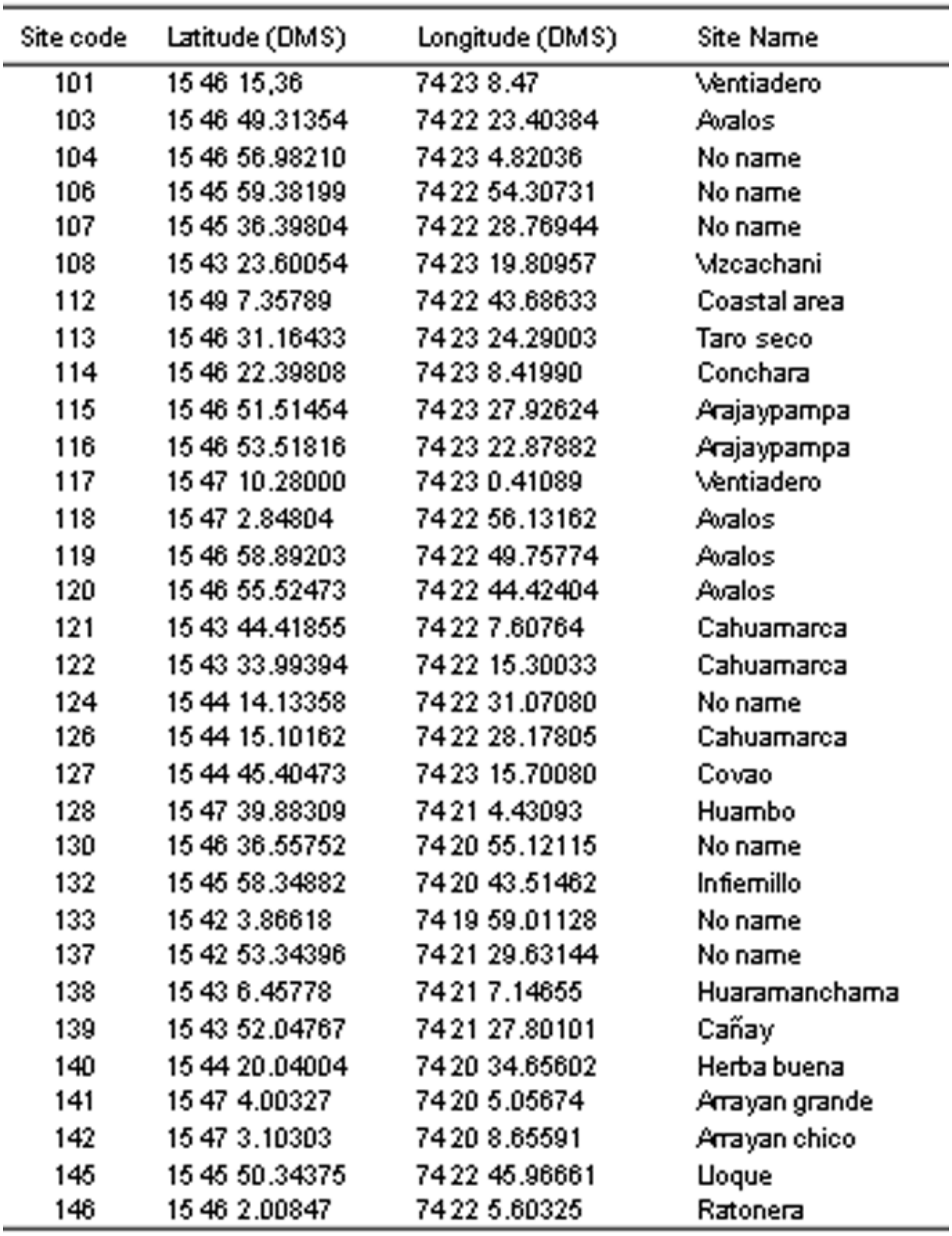


**Fig. 4.1. Study area showing the site of study and field survey with the ground- truth points.**

**Table 4.1. Site data ordering by site code. Coordinates are expressed in degrees, minutes and seconds (DMS).**



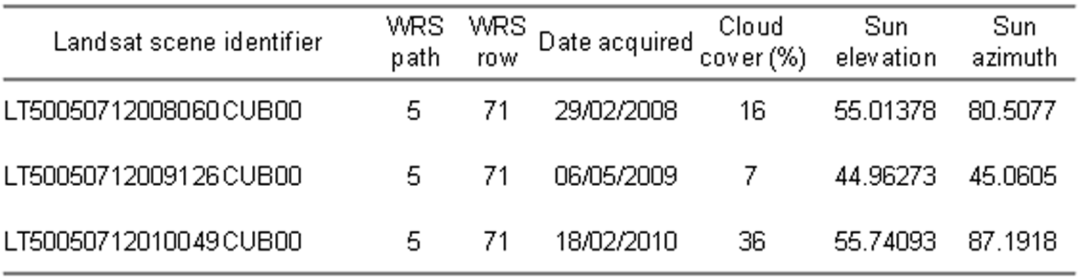
| Site code | Latitude (DMS) | Longitude (DMS) | Site Name |
|---|---|---|---|
| 101 | 15 46 15,36 | 74 23 8.47 | Ventiadero |
| 103 | 15 46 49.31354 | 74 22 23.40384 | Avalos |
| 104 | 15 46 56.98210 | 74 23 4.82036 | No name |
| 106 | 15 45 59.38199 | 74 22 54.30731 | No name |
| 107 | 15 45 36.39804 | 74 22 28.76944 | No name |
| 108 | 15 43 23.60054 | 74 23 19.80957 | Vizcachani |
| 112 | 15 49 7.35789 | 74 22 43.68633 | Coastal area |
| 113 | 15 46 31.16433 | 74 23 24.29003 | Taro seco |
| 114 | 15 46 22.39808 | 74 23 8.41990 | Conchara |
| 115 | 15 46 51.51454 | 74 23 27.92624 | Arajaypampa |
| 116 | 15 46 53.51816 | 74 23 22.87882 | Arajaypampa |
| 117 | 15 47 10.28000 | 74 23 0.41089 | Ventiadero |
| 118 | 15 47 2.84804 | 74 22 56.13162 | Avalos |
| 119 | 15 46 58.89203 | 74 22 49.75774 | Avalos |
| 120 | 15 46 55.52473 | 74 22 44.42404 | Avalos |
| 121 | 15 43 44.41855 | 74 22 7.60764 | Cahuamarca |
| 122 | 15 43 33.99394 | 74 22 15.30033 | Cahuamarca |
| 124 | 15 44 14.13358 | 74 22 31.07080 | No name |
| 126 | 15 44 15.10162 | 74 22 28.17805 | Cahuamarca |
| 127 | 15 44 45.40473 | 74 23 15.70080 | Covao |
| 128 | 15 47 39.88309 | 74 21 4.43093 | Huambo |
| 130 | 15 46 36.55752 | 74 20 55.12115 | No name |
| 132 | 15 45 58.34882 | 74 20 43.51462 | Infiernillo |
| 133 | 15 42 3.86618 | 74 19 59.01128 | No name |
| 137 | 15 42 53.34396 | 74 21 29.63144 | No name |
| 138 | 15 43 6.45778 | 74 21 7.14655 | Huaramanchama |
| 139 | 15 43 52.04767 | 74 21 27.80101 | Cañay |
| 140 | 15 44 20.04004 | 74 20 34.65602 | Herba buena |
| 141 | 15 47 4.00327 | 74 20 5.05674 | Arrayan grande |
| 142 | 15 47 3.10303 | 74 20 8.65591 | Arrayan chico |
| 145 | 15 45 50.34375 | 74 22 45.96661 | Lloque |
| 146 | 15 46 2.00847 | 74 22 5.60325 | Ratonera |

### 4.2.2 Data

A vegetation map (1:25.000) of Linares et al. (1999) was used to identified the Atiquipa's main cover classes. Selected sites were within the most representative patch of vegetation, A sampling plot of 20x10 m (200 m$^2$) was used. The vegetation sampling was performed in January 2009, which corresponded to the dry period and less frequency of fog. Coordinates, growth forms, species presence and cover were registered in each plot for a total of 32 relevés. These were use later as ground-truth points. Every site was pictured to support the vegetation types description.

For the remote sensing analysis we used Landsat 4-5 Thematic Mapper data (Table 4.2) that were freely downloaded from the USGS website (http://landsat.usgs.gov). The three images already geometrically and radiometrically corrected corresponded to the dry season when clouds cover is not present or is minimum.

**Table 4.2. Satellite imagery characteristics**



| Landsat scene identifier | WRS path | WRS row | Date acquired | Cloud cover (%) | Sun elevation | Sun azimuth |
|---|---|---|---|---|---|---|
| LT50050712008060CUB00 | 5 | 71 | 29/02/2008 | 16 | 55.01378 | 80.5077 |
| LT50050712009126CUB00 | 5 | 71 | 06/05/2009 | 7 | 44.96273 | 45.0605 |
| LT50050712010049CUB00 | 5 | 71 | 18/02/2010 | 36 | 55.74093 | 87.1918 |

## 4.2.3 Vegetation analysis

The vegetation analysis was done using growth forms and species cover. To identify the main groups of vegetation a cluster analysis was applied using the species cover. We used the Bray Curtis distance matrix and the Ward method. To do that we used the V*egan* package of R 2.10 (R Development Core Team, 2010).

To identify the spatial distribution of the main growth forms in relation to their cover we performed the Non metric Multidimensional scaling (NMDS) with plant cover and some environmental variables (elevation, slope, exposition, open soil, land use). The direction of the vector shows the direction of the gradient, and the length of the arrow is proportional to the correlation between the variable and the ordination. Distance among samples were calculated using Bray Curtis index of dissimilarity. Data was standardized using the square root transformation. Functions *meta MDS* and *envfit* were used to run the NMDS in R 2.10 (R Development Core Team, 2010). A test of goodness of fit was also performed to identify the significant relationship between species distribution, growth forms and environment variables (Table 4.3).

### 4.2.4 Environmental variables

We considered five macro scale variables (elevation, aspect, slope, open-soil, anthropic influence) to relate growth forms and their cover to the species distribution. Previous studies have found a vegetation gradient in relation to the altitude and the direction in which a slope faces (Péfaur, 1982; Ohga, 1992). The altitudinal range from the sea level to ca. 1200 m (a.s.l.) in few kilometres makes the slope degree an important variable. The study area comprises vegetated and non-vegetated areas, related in some degree with fog availability, which increase the relative humidity, those areas non-vegetated are water limited and so the open soil cover in contrast to plant cover is a direct indicator of less water availability (humidity indicator). Finally, the human activities have an important impact in the environment. The study area belongs to a rural community that survives with cattle, fishing, some agriculture and seeds collection activities.

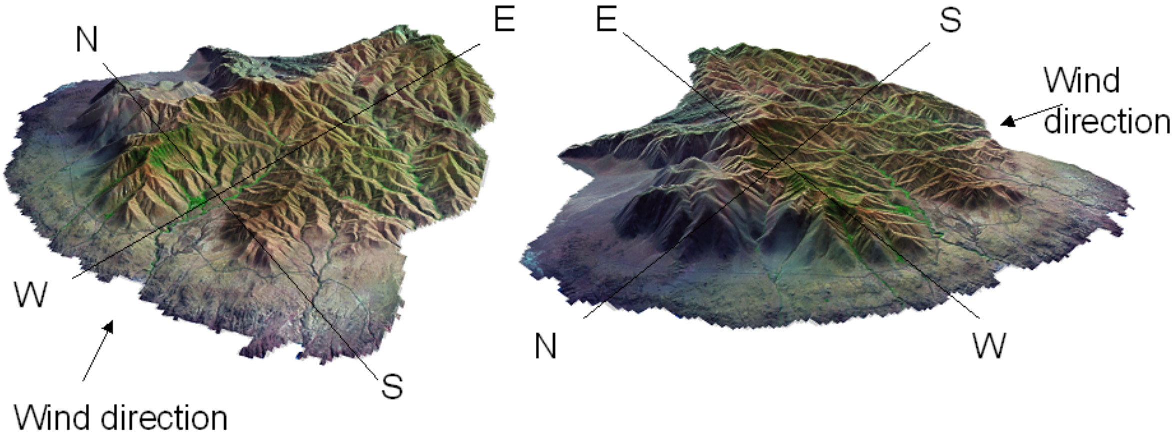
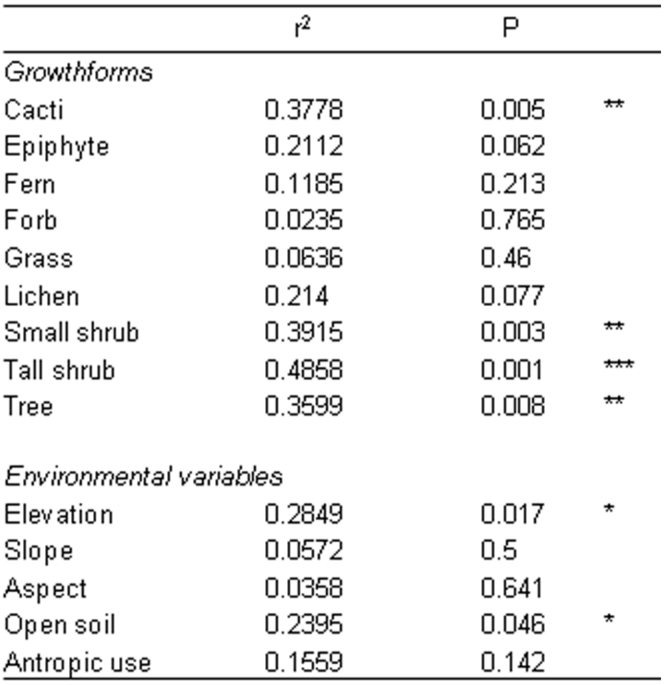


**Fig. 4.2. Study site from the digital elevation model STRM-90 m (USGS) indicating geomorphology, exposure, and wind direction.**

**Table 4.3. Goodness of fit of growth forms and environmental variables. P-value <0.001 is ***, <0.05 **, <0.1***



| | $r^2$ | P | |
|---|---|---|---|
| *Growthforms* | | | |
| Cacti | 0.3778 | 0.005 | ** |
| Epiphyte | 0.2112 | 0.062 | |
| Fern | 0.1185 | 0.213 | |
| Forb | 0.0235 | 0.765 | |
| Grass | 0.0636 | 0.46 | |
| Lichen | 0.214 | 0.077 | |
| Small shrub | 0.3915 | 0.003 | ** |
| Tall shrub | 0.4858 | 0.001 | *** |
| Tree | 0.3599 | 0.008 | ** |
| *Environmental variables* | | | |
| Elevation | 0.2849 | 0.017 | * |
| Slope | 0.0572 | 0.5 | |
| Aspect | 0.0358 | 0.641 | |
| Open soil | 0.2395 | 0.046 | * |
| Antropic use | 0.1559 | 0.142 | |

### 4.2.5 Vegetation index

The Ratio Vegetation Index (Jordan, 1969) was produced in ENVI4.5 for each of the three years derived from the 30m pixel Landsat 4-5TM. The data correspond to the dry season. The RVI was calculated using the NIR and the Red bands (NIR/Red). We preferred the use of this index to NDVI, which is the most known, because previous work has shown that NDVI of different vegetation types during the non-growing season do not provide clear separation of vegetation (Ramsey et al., 1995) and because RVI and NDVI are functionally equivalent and related to each other (Terrill, 1994). The equation is:

$$RVI = \frac{NIR}{red} \quad \textbf{(Eq. 2)}$$

Where NIR corresponds to band 4 (0.76-0.90 µm) while red is band 3 (0.63-0.69 µm ), with RVI ranging from 0 to infinite. The common range for green vegetation is 2 to 8 (ENVI 4.5, vegetation indices info).

The result of this process was a triplicate set of grey scale images representing the amount of vegetation present at each time. In these images, light areas represent regions of high vegetation, and conversely, dark areas show regions of low vegetation.

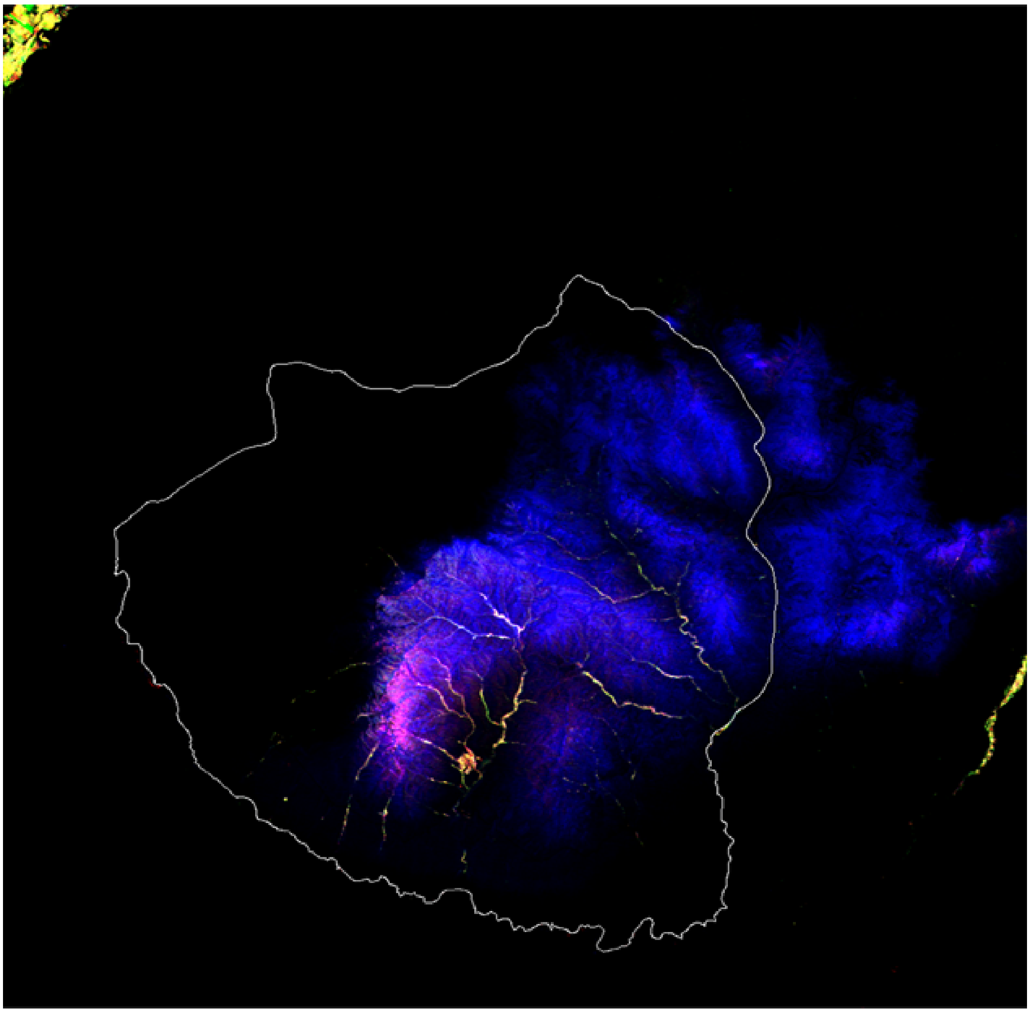


**Fig. 4.3. The three years RVI composite image used to detect the main vegetation cover types.**

### 4.2.6 Digital image processing and classification

We created a sub-area of each three year Landsat scenes (2008, 2009 and 2010). The single band obtained for each RVI belong to each data were assigned to an individual channel of an RGB composite image. The 2008 RVI was assigned to the R channel, 2009 to the G and 2010 to the B.

The three date composite image (Fig. 4.3) was used to select the training samples. Then, we applied the supervised Maximum Likelihood method. This classification algorithm, based on multivariate normal distribution theory, has found wide application in the field of remote sensing (Strahler, 1980). To judge the quality of the image classification we obtained the confusion matrix (accuracy assessment) that compare on a class by class basis the relationship between the ground truth (relevés) and the corresponding training data used for the classification (Table 4.4).

After image data classification we perform a sieve and a clump functions to generalize classification image. Sieve removes the isolated pixels and clump combines adjacent similar classified areas. Then, the image classification was converted in vector and finally into shape file.

Using ArcGis software we calculated the area of each class and edited the final classification map including two vectors that were not identified using the RVI (cactus area and old terraces). This vectors (polygons)were produced creating ROI's from ground-truth points.

## 4.3 Results

We recorded 72 plant species during January 2009, most woody dicotyledons. During this season, no annual herbs were present. The shrubland was dominated by shrubs some tree species, tall cactus, and epiphytes. Lichens, some perennial grasses and forbs also were found.

The cluster analysis (Fig. 4.4) put together areas where small shrubs and some spots of remnant tree species catalogued as vulnerable (i.e *Myrcianthes ferreyrae,* Fig. 4.4a) were found. The second cluster included the cactus area, old terraces and open areas almost non-vegetated (Fig. 4.4b). The third one included tall shrubs and trees, which comprises dense (Fig. 4.4d), semi-dense (Fig. 4.4c) and open (Fig. 4.4e) areas.

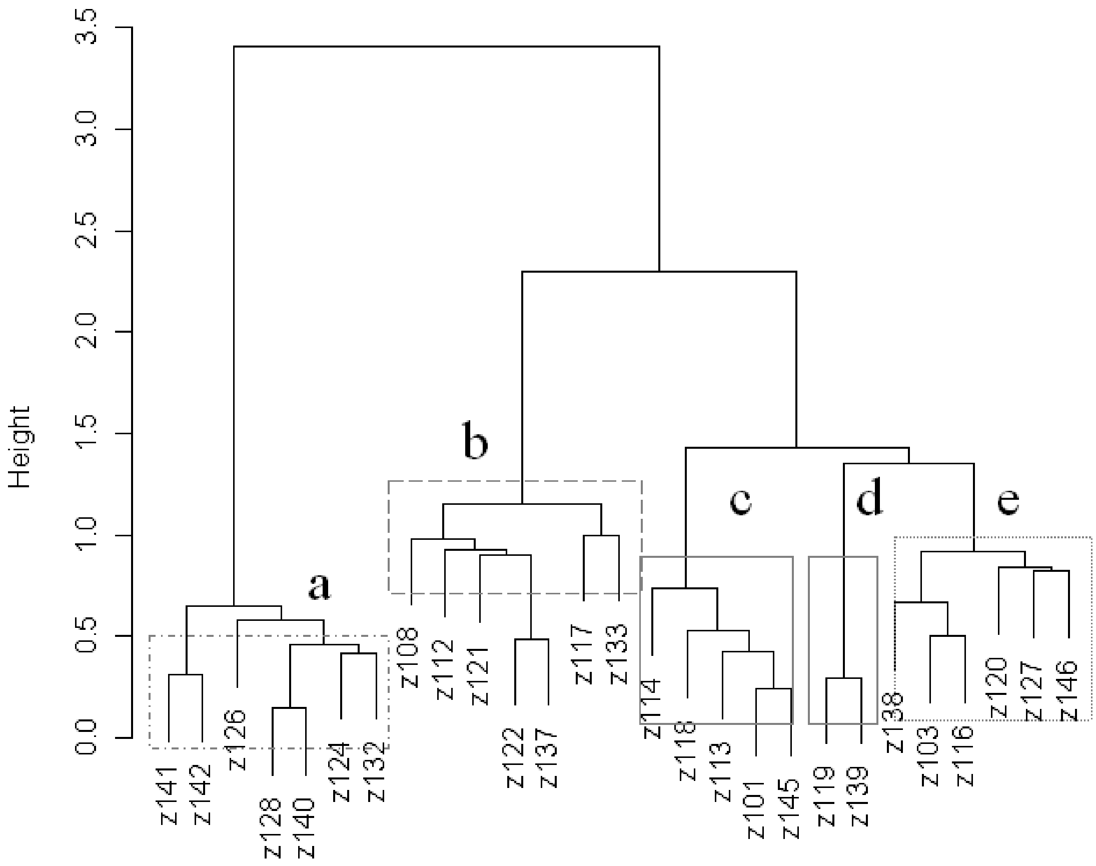


**Fig. 4.4. Cluster dendrogram of the vegetation cover types distinguished in the field during January 2009. (a) Sites with predominant open small shrubs, (b) Predominant non-vegetated areas and cactus area, (c, d and e) correspond to the semi-dense, dense and open shrubland areas.**

### 4.3.1 Vegetation gradients

The multivariate analysis using species cover, growth forms and environmental variables, put in evidence some patterns (Fig. 4.5). A higher plant diversity, with different growth forms (trees, shrubs, epiphytes, lichens, ferns) was related to elevation, exposition and slope. Green vegetation covered predominantly the south-facing slopes of the small hills (Fig. 4.2) that are the best places to intercept fog, which arrives with the wind from the ocean. The species cover ordination have a significant correlation with the elevation and humidity (open soils) (Table 4.3). Areas dominated by small shrubs and open areas corresponded to intensive human activities influencing the vegetation (e.g. cattle, mining, old terraces). The area dominated by cacti, in particular columnar cactus, was characterized by open soils and it was found in the opposite site of higher growth form diversity areas.

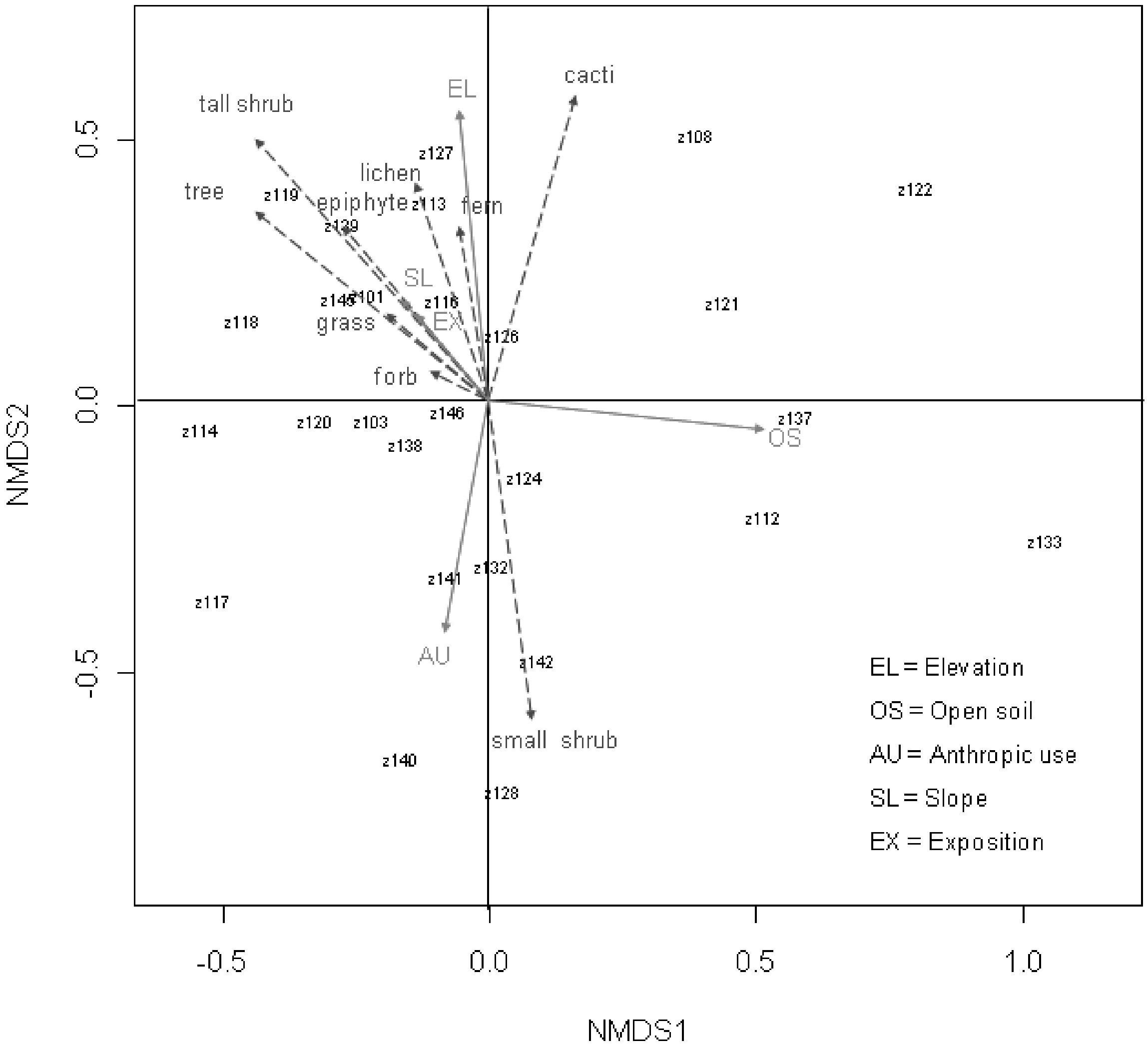


**Fig. 4.5. Non metric-Multidimensional analysis of species distribution. The ordination plot shows the growth forms distribution and some environmental variables (continuous arrow line).**

### 4.3.2 Vegetation cover

Five different classes of different spectral values that represented the main land cover of *Lomas* were identified using the RVI. The cacti area and the old terraces with open vegetation were not considered (Fig. 4.6). As a whole, the vegetated area included just 34% of the study area.

Open small shrubs and agricultural areas were identified with high accuracy (97-98%). On the contrary, the open shrubland was confused with the semi-dense shrubland (85%), in this case the user's accuracy (52%) was higher than the producer's accuracy (7%). A small part of semi dense shrubland was confused with dense shrubland (27%). The supervised classification shows an overall accuracy of 63.7% (Kappa coefficient=0.5294). The confusion matrix shows some degree of confusion identifying the main cover classes (Table 4.4). The classification accuracy, and the commission and omission errors of the classification are shown in Table 4.5.

The cacti area and the old terraces were added to the final map (Fig. 4.7), which gives a more complete idea of the study area landscape. Table 4.6, shows the total extent of each cover type and the class differences with the previous Linares et al (1999) classification. Description of the different vegetation classes is limited to 2009 cover values obtained by the field survey. This result corresponds to a normal dry period. Areal extent is related, in turn, to the RVI supervised classification. The yearly vegetation cover usually changes within the period considered, as we will discuss later on.

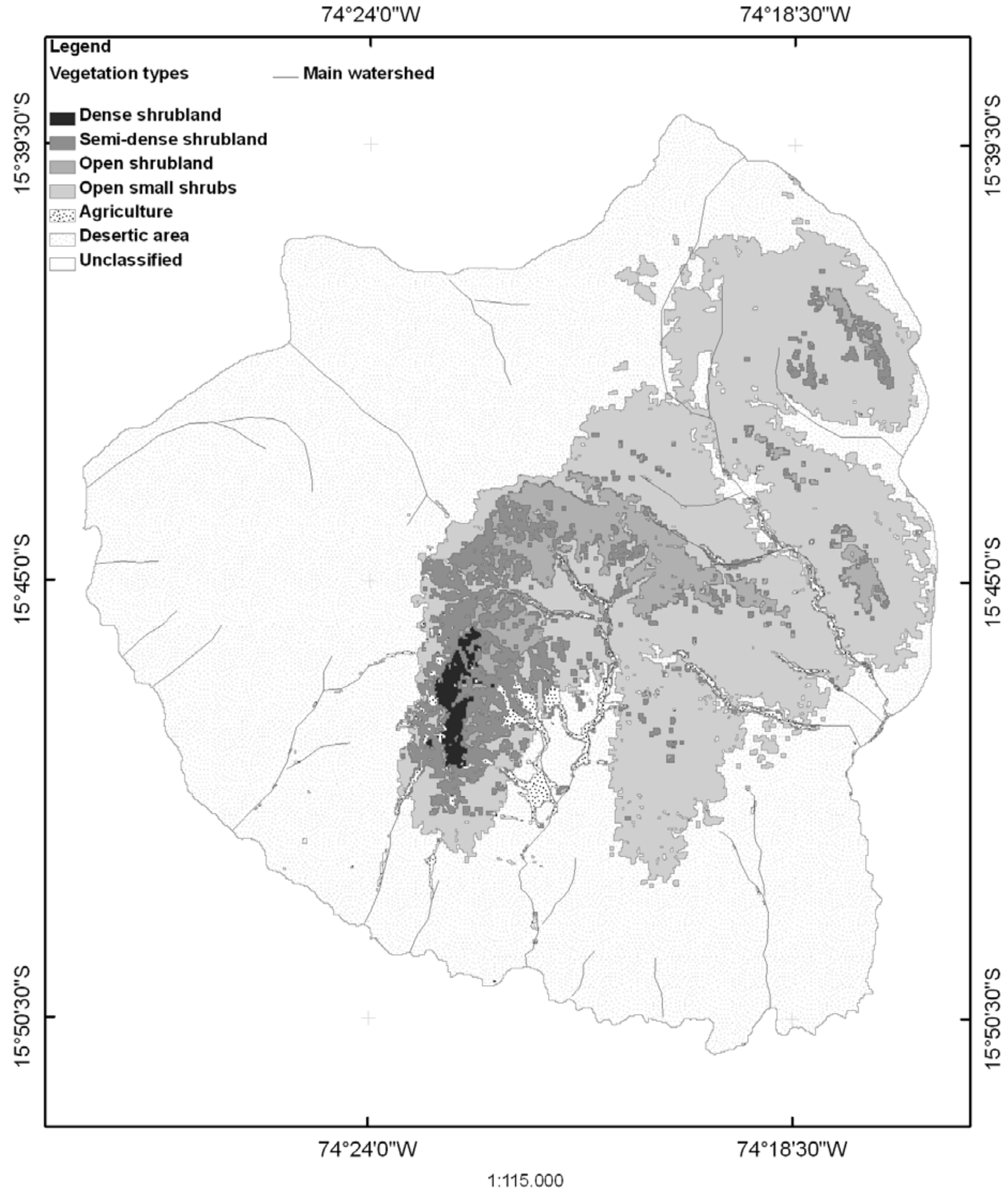
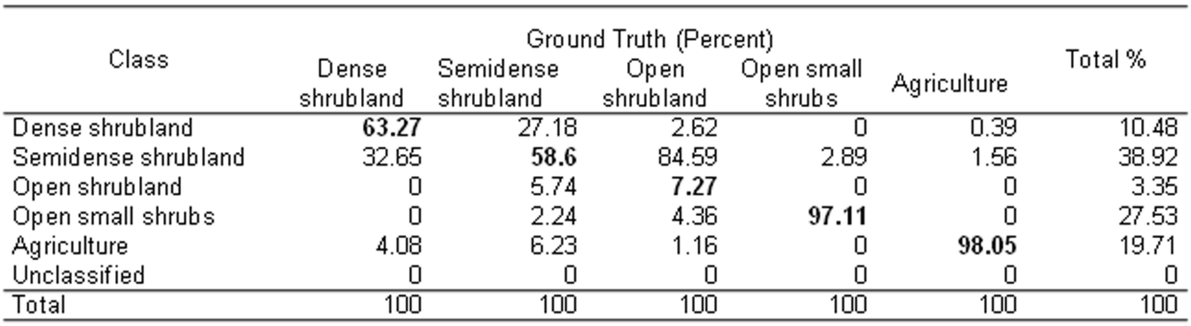


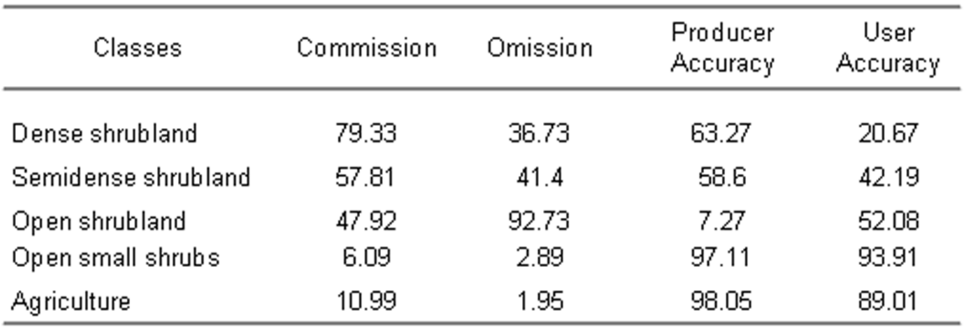
**Fig. 4.6. Vegetation map obtained from the RVI image that represents the main vegetation cover types for the study site.**

**Table 4.4. Confusion matrix of Maximum likelihood based supervised classification output against user selected ground truth regions.**



| Class | Ground Truth (Percent) | | | | | Total % |
|---|---|---|---|---|---|---|
| | Dense shrubland | Semidense shrubland | Open shrubland | Open small shrubs | Agriculture | |
| Dense shrubland | **63.27** | 27.18 | 2.62 | 0 | 0.39 | 10.48 |
| Semidense shrubland | 32.65 | **58.6** | 84.59 | 2.89 | 1.56 | 38.92 |
| Open shrubland | 0 | 5.74 | **7.27** | 0 | 0 | 3.35 |
| Open small shrubs | 0 | 2.24 | 4.36 | **97.11** | 0 | 27.53 |
| Agriculture | 4.08 | 6.23 | 1.16 | 0 | **98.05** | 19.71 |
| Unclassified | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

**Table 4.5. Accuracy of the classification and Commission/Omission errors. Values are in percent.**



| Classes | Commission | Omission | Producer Accuracy | User Accuracy |
|---|---|---|---|---|
| Dense shrubland | 79.33 | 36.73 | 63.27 | 20.67 |
| Semidense shrubland | 57.81 | 41.4 | 58.6 | 42.19 |
| Open shrubland | 47.92 | 92.73 | 7.27 | 52.08 |
| Open small shrubs | 6.09 | 2.89 | 97.11 | 93.91 |
| Agriculture | 10.99 | 1.95 | 98.05 | 89.01 |

### 4.3.2.1. Dense shrubland

Tall shrubs are predominant with a cover that reach 80% in few cases (Avalos and Cañay) while trees are scattered. In few cases trees cover can achieve 50% of cover (Cañay). This class contain the maximum concentration of *Tara* trees (*Caesalpinia spinosa*: Fabaceae) with tall shrubs (*Duranta armata*, *Citharexylum flexuosum*: Verbenaceae , *Croton ruizianus*: Euphorbiaceae, *Heliotropium lanceolatum*, *H. arborescens*: Boraginaceae) and some columnar cacti (*Echinopsis sp*). This vegetation cover comprises less than 1% of the Atiquipa’s *Lomas*.

### 4.3.2.2. Semi-dense shrubland

Tall shrubs (*Duranta armata*) and trees (*Caesalpinia spinosa*) predominate, shrubs average cover is 45%, and trees cover 10-20%. Some columnar cactus are also present (*Echinopsis chalaensis*). This class covers about 5% of the study area. Semi-dense area can be confused with open shrubland in driest periods, due to the cover and biomass diminution. In wetter conditions the presence of herbs may increase the biomass.

### 4.3.2.3. Open shrubland

Shrubs (tall and small) cover about 10-15%, while scattered trees reach a mean cover of 10% and just in one place the 20% (i.e. Arajaypampa). The dominant tree species is *Caesalpinia spinosa* (Fabaceae). The shrubs are *Duranta armata* (Verbenaceae), *Croton alnifolius:* Euphorbiaceae, *Grindelia glutinosa* (Asteraceae), *Citharexylum flexuosum* (Verbenaceae) and *Nicotiana paniculata* (Solanaceae), *Heliotropium sp* (Boraginaceae). A vulnerable tree species (*Myrcianthes ferreyrae*: Myrtaceae) is found also in this area (Avalos) with a cover of 15%. Open shrubland cover the 4% of the Atiquipa's *Lomas*. This class includes three categories that Linares et al (1999) considered separately: very open and open forest, and a small area of a remnant forest of *Arrayán* (*Myrcianthes ferreyrae*).

### 4.3.2.4. Open small shrubs

This class is characterised by the dominance of small shrubs and the absence of *Tara* trees. The mean cover is around 30% and the dominant species is *Grindelia glutinosa* (Asteraceae). In some cases small shrubs can reach about 60% of cover (i.e. Arrayán Chico). A vulnerable tree species (*Myrcianthes ferreyrae*: Myrtaceae) is found also in this area

(Arrayan Grande) with a cover of 20%. This class constitutes 25% of the study area but in driest periods this value can considerably decrease (e.g. May 2009). It includes the open and very open areas of small shrubs considered by Linares et al. (1999). There are two classes differentiated by the species dominance that were not possible to identify with the image analysis. These classes correspond to *Heliotropium krauseanum* areas and the *Grindelia glutinosa* areas.

#### 4.3.2.5. Cacti area

Columnar cactus species (*Weberbauerocereus weberbaueri, Eulychnia ritteri*, *Neoraimondia arequipensis*) is the most conspicuous growth form, but decumbent (*Haageocereus decumbens*, *Cleistocactus sextonianus*), and cushion cacti (*Cylindropuntia tunicata*, *Cumulopuntia sphaerica*, *Pygmaeocereus familiaris*) are also present. Some associated small shrubs are *H. krauseanum*, *Trixis cacaloides Ambrosia artemisioides* (Asteraceae). This area lies in the opposite fog-site of *Lomas*. It is a very open area with some xerophytic small shrubs and herbs. It is an area difficult to recognise from satellite imagery because scarcely vegetated. Studies on the *Lomas* cactus species have shown their high diversity (Laura-Quispe, 2007). This area was not previously recognised (Linares et al., 1999) as a separate typology and represents 11% of the study area. The cacti ecology in this area is little studied, signs of new cacti recruitment is rare, in particular columnar cacti.

#### 4.3.2.6. Old terraces area

This area corresponds to abandoned pre-hispanic terraces. Today is covered by a very open layer of herbs and some small shrubs. In general, cushion cactus species (*Islaya islayensis*) and small shrubs *Verbena litoralis* (Verbenaceae) and *Heliotropium krauseanum*

(Boraginaceae) are sparsely found. 13% of the study area correspond to this class. Linares et al. (1999) reported some dominant species: *Nolana inflata* (Solanaceae), *Spergularia congestifolia* (Caryophyllaceae), *Eragrostis sp* (Poaceae), *Tetragonia sp* (Aizoaceae) with a cover up to 25%. A more dense vegetation can be found along the small drainage channels, which are cover by shrubs and in some cases also trees.

#### 4.3.2.7. Agriculture

Around 2% of the study area is used for agricultural activities. Here we can find olive trees, different fruit trees, vegetables and some annual crops (e.g. potatoes, corn).

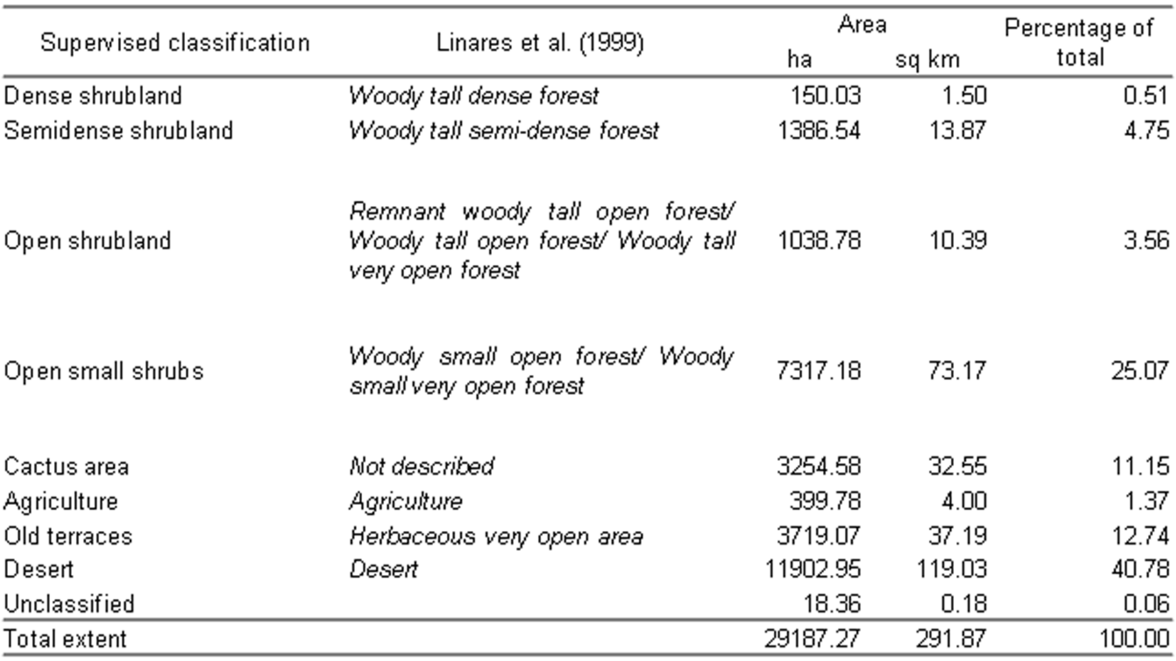
#### 4.3.2.8. Desert

The area without vegetation cover corresponds to 40% of the total area.

#### 4.3.2.9. Unclassified

This type includes a group of pixels in the image not belonging to any class (0.06%).

**Table 4.6. Land use classification table showing the extent of the main vegetation types of Atiquipa's *Lomas*.**



| Supervised classification | Linares et al. (1999) | Area | | Percentage of total |
|---|---|---|---|---|
| | | ha | sq km | |
| Dense shrubland | *Woody tall dense forest* | 150.03 | 1.50 | 0.51 |
| Semidense shrubland | *Woody tall semi-dense forest* | 1386.54 | 13.87 | 4.75 |
| Open shrubland | *Remnant woody tall open forest/ Woody tall open forest/ Woody tall very open forest* | 1038.78 | 10.39 | 3.56 |
| Open small shrubs | *Woody small open forest/ Woody small very open forest* | 7317.18 | 73.17 | 25.07 |
| Cactus area | *Not described* | 3254.58 | 32.55 | 11.15 |
| Agriculture | *Agriculture* | 399.78 | 4.00 | 1.37 |
| Old terraces | *Herbaceous very open area* | 3719.07 | 37.19 | 12.74 |
| Desert | *Desert* | 11902.95 | 119.03 | 40.78 |
| Unclassified | | 18.36 | 0.18 | 0.06 |
| Total extent | | 29187.27 | 291.87 | 100.00 |

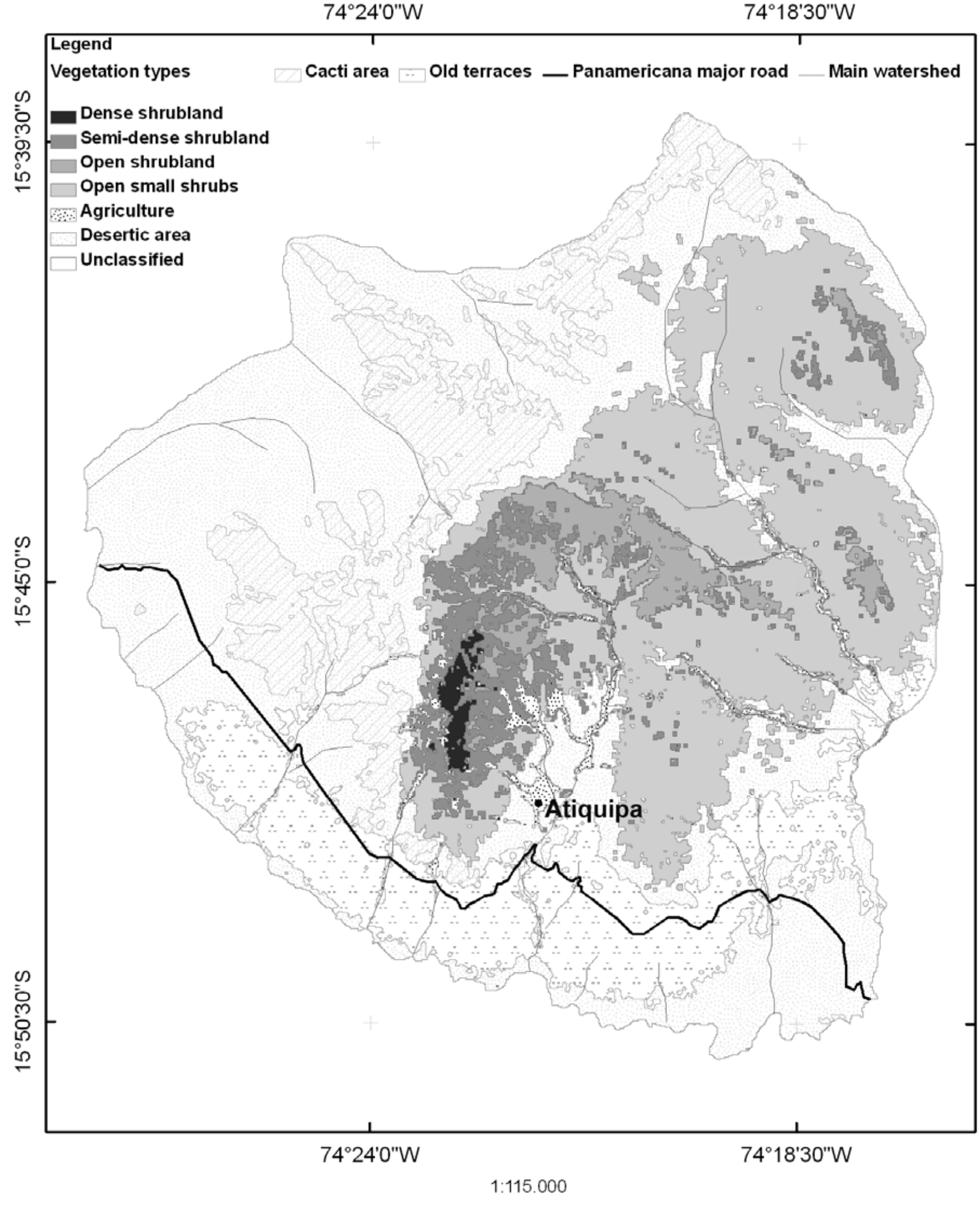


**Fig. 4.7. Final vegetation map including old terraces actually abandoned and the area of high probability of cacti occurrence from ground data.**

## 4.4 Discussion

The new vegetation map shows the distribution of the main land cover classes, and present a more realistic description of the plant landscape. Shrubs, during the dry period, play an important role in the maintenance of this ecosystem, together with trees is the main layer of land cover that is able to intercept fog. Unfortunately the areal extent is small, and trees are threat by deforestation. Their structural role is important for *Lomas* efficient dynamics. Annual plants, which are present during the wet period, increase the plant richness.

*Lomas* vegetation is essentially bimodal, it responds clearly to two periods related to the wet (growing season) and dry (dormant) season. But also the inter-annual variability is high, one year is different to another. The background soil effect during the dry season can disturb the spectral signal of sparse vegetation. This can limit the use of the VI to measure vegetation (cover, biomass).

Another limitation is the dense cloud cover over the entire wet period. Every year banks of low-stratocumulus clouds cover the coast during the growing season (June to November). Landsat imagery for this period are not useful for the interpretation.

Interpretation of vegetation classes can be confusing using remote sensing. For example, the border identification between semi-dense shrubs and open shrubs is complicated. On the other hand, in wetter periods the presence of herbs may contribute also with this problem because soil backscattering decrease. On the other hand, some plant associations are indistinguishable. For example, the cactus area is difficult to determine because found in areas where vegetation cover is very sparse and open soil and rocks are dominant.

In our study site, elevation and open soil significantly explain the plant distribution in *Lomas* of Atiquipa. On the highest elevations, where fog condenses and makes water available to soil there are different growth forms (trees, shrubs, epiphytes, lichens, ferns). Fog is the main water input in coastal habitats in the same way of Mediterranean climate regions (Corbin et al., 2005). Plants take advantage of the south and south-west slope aspect to catch fog as also was described by Ohga (1992) for the *Lomas* of central Peru.

This fact can affect plant diversity because the canopy of shrubs and trees promotes better conditions for grasses and forbs, which find more nutrients, water, shade and protection against herbivores. Many epiphytes, ferns and lichens can be found in this area on tall shrubs and trees. Péfaur (1982) studying the *Lomas* of southern Peru also showed that the altitudinal gradient of growth forms followed the water gradient.

Cacti and small shrubs are found in areas with contrasting climatic conditions. The large areas of open soil are directly related to herbaceous and cacti cover where fog cannot be trapped and in consequence arid conditions prevail.

Our results underline that multitemporal analysis is important to study the vegetation dynamics of arid ecosystems, contrary to Langley et al. (2001) that showed that multitemporal analysis does not imply a better interpretation in semiarid lands, we show that in deserts the high variability of vegetation land cover can influences the classification of one specific year and the interpretation of seasonality. The VI showed a clear vegetation cover variation within the dry period of different years. The fact that we sampled the vegetation cover in a neutral period (January 2009) give us just the information referred to that period. The 2008 and 2010 year show a completely different situation. This can support the low accuracy of our classification.

Also Puig et al. (1998) found classification problems mapping the Mejia's *Lomas*. They studied lomas vegetation during the strong EN 1997-98 event using SPOT images. Their classification hardly reached to recognize the shrubby and the herbaceous layer, while trees and cacti cover were difficult to identify due to the scattered distribution.

The development of vegetation indices from satellite images have facilitated the differentiation of vegetation that have significant values of biomass, canopy, density and diversity. But sparse vegetation vanishes or is considered under non-vegetated areas because their poor signal and the high spectral influence of soil. The information on the ground and local environmental variables become extremely useful for the interpretation of vegetation patterns using remote sensing in this area.

Seasonality is highly variable in deserts and in some degree is influenced by large-scale climatic oscillations that affect the study area (Fontugne et al., 1999, Holmgren et al., 2006). This climatic oscillations can have direct effects on vegetation (e.g. Johnston and Dawson, 2010). In the region, the warm phase of ENSO increases rainfall and so there is more probability to rain along the coast where usually there is no rain (e.g. in summer). This phase enables dormant seeds and ephemeral herbs to grow up in the middle of the desert. The plant biomass during the dry season can be altered after an intense warm period because more water availability. In this case, the open shrubs and trees areas increase their herbaceous layer. This fact has enormous implication for satellite interpretation of desert ecosystems especially in this area where ENSO have proof to have some influence.

# 5 Detecting changes in vegetation

## 5.1 Introduction

It is well known that wet periods, in arid and semiarid regions, trigger primary productivity (Vidiella et al., 1999) that leads to an increment in plant biomass (Lima et al., 1999) and the expansion of plants (Hereford et al., 2006). While it has been well demonstrated that primary productivity follows the patterns of precipitation (Woodward et al., 2008) and significantly increases during warm events of the El Niño Southern Oscillation (ENSO) (Squeo et al., 2006, Woodward et al., 2008), little is known about the effect on the dry season following an intense previous wet period in these regions characterized by a high seasonality that controls plant life cycle.

The coastal belt of western South America is characterized by the presence of fog oases distributed patchily near the coast. This environment is maintained by irregular intervals of rain and almost a constant presence of fog. A dense bank of clouds, responsible of fog (Garreaud et al., 2007), is found along the Peruvian-Chilean coasts almost the whole year with less frequency during the dry(warm) season. Some studies have shown that also fog can be influenced by climatic oscillations such as the ENSO (Garreaud et al., 2008) or Pacific Decadal Oscillations (PDO) (Johnstone and Dawson, 2010) concluding that the diminution of frequency and intensity of fog may damage the persistence of fog-dependent ecosystems. Recent studies on fog oases vegetation support the influence of the ENSO on vegetation dynamics (Muñoz-Schick et al., 2001, Pinto et al., 2001, Gutiérrez et al., 2008).

Satellite based identification of Vegetation Index (VI) is an useful tool for monitoring terrestrial ecosystems responses to climate oscillations (Myneni et al., 1996). Vegetation indices were developed to detect the vegetation signal. Vegetation signal in remote sensing is very dark in the visible (red) wave because of the high absorption of pigments, which occur in leaves, while in the near infra-red (NIR) spectral range plants are very bright because reflectance increases (Jackson and Huete, 1991). Rationing a near-infrared band to a visible band is the traditional approach (Tucker, 1979) to detect vegetation, and it is at the base of other more complex indices. It is based on the plants absorption of visible light (from 0.4 to 0.7 μm) for use in photosynthesis and the strong reflectance of near-infrared light (from 0.7 to 1.1 μm) because the cell structure of the leaves. Thus, the more leaves or biomass a plant has, the more these wavelengths of light are affected.

Several studies confirm that the large-scale tropical Pacific sea surface temperature (SST) variations on arid and semiarid continental rainfall patterns are increasing and support its effect on primary productivity (Myneni et al., 1996, Woodward et al., 2008). Studies on the Atacama desert, also showed that primary productivity is strongly affected by climatic oscillations ( Squeo et al., 2006), increasing when precipitation increases. However historical series reveal a decreasing trend of VI related to the diminution of precipitations (Baldi et al., 2008).

Although the detection of changes in primary productivity, along the Atacama desert in response to enhanced rainfall, has been demonstrated difficult using remote sensing (Woodward et al., 2008, Baldi et al., 2008) here we show that RVI may be useful to detect enough vegetation responses to identify changes during the dry season due to climate fluctuations.

# 5.2 Materials and methods

## 5.2.1 Site description

We choose the *Lomas* of Atiquipa, which was previously mapped, to detect vegetation changes during the same season in three different years. According to the life zones classification (ONERN, 1979) the area is a desertic Matorral. Arias and Torres (1990) have described the marked seasonality which can be divided in two periods, the wet (cold) season from June to November (austral winter and spring) and the dry (warm) season from December to May (austral summer and autumn). Maximum peak is in September-October (austral spring).

The nearest meteorological station (Punta Atico) registered for the wet season ca. 35 mm of rainfall (1966-1980), with an average temperature of ca. 15°C (Arias and Torres, 1990), whereas during the dry season rainfall is usually absent and temperature increases. The average annual precipitation is concentrated in the wet/cold season when also is present a thick cover of low clouds (fog).

Fog has been described as the main water resource for *Lomas* vegetation (Ohga, 1992). The main source of fog is oceanic transported to the coast by the wind. Local records of fog in the study area exist since 1995 but these are discontinuous and unpublished.

In the study area fog is recorded from the 2003-2005 by standard fog collectors Results of the fog collection shows asignificant input of water from fog all around the year, describing the double of water during the wet period (25 liters/$m^2$/ day) than during the dry season (12 liters/$m^2$/ day) (Villegas et al. 2007). Sotomayor and Jiménez (2008) reported for the year 2005 up to five times more water from fog in the wet season (41 liters/ $m^2$/ day) than in the dry (9 liters/$m^2$/ day), while total rainfall reached respectively 60 mm and 10mm. The first half of the dry season was likely influenced by the ENSO warm conditions that began in the previous year.

Variation of rainfall along the Peruvian coastal belt periodically occurs during the ENSO, which develops two phases: a warm/El Niño and a cold/La Niña phases, which affect in different degrees the coast and the Andes of Peru. Generally, El Niño and La Niña typically result in above and below average precipitation along the coast.

Although the effect of climatic oscillations have been supported in many studies in arid and semiarid ecosystems around the world (Holmgren et al., 2006) and also along the Peruvian and Atacama deserts (Squeo et al., 2006) the effect of the ENSO on drizzle and fog in the study area remain uncertain mainly due to the scarce information and data collection.

### 5.2.2 Land cover

Vegetation cover is variable depending on the season, the peak of the growing season is at the end of the winter and at the begin of the spring. The main vegetation type in this area is a xerophytic shrubland (Matorral) which is characterized by the dominance of shrubs (tall and small). Trees are present in different densities from disperse or scattering to dense or concentrated in specific areas. Dense areas of shrubs and trees can reach the 80% of cover. Semi-dense areas have a mean cover of 45% from which 10-20% (min-max) are trees cover. Open areas reach up to 10-15% with very scattered trees. Areas where small shrubs dominate and trees are not present have about 30% of plant cover. Herbaceous layer is predominantly annual. Old terraces are not longer used but remain as a trace of a past land use. This area is cover predominantly by ephemerals, some perennial small shrubs and some cacti.

### 5.2.3 The ENSO during the study period

The variability of the SST along the western coast of South America is correlated to ENSO events and also to global-scale interdecadal oscillations (Montecinos et al., 2003). Data about the ENSO situation over this period (2008-2010) was obtained from the Climate Prediction Center of the U.S National Weather Service (http://www.cpc.ncep.noaa.gov/ and http://www.nws.noaa.gov/).

The study period (dry season) corresponded to three different (Fig. 5.1) ENSO situations: a cold episode during 2008 year (colder SST than average), a neutral situation during 2009 and a warm episode during 2010 (warmer SST than average). The 2008 dry season showed a cold episode that began at the second half of the 2007 year, and continued until the half of the year (wet season) when initiated a neutral phase of the ENSO condition. The dry season of 2009 year showed the persistence of neutral conditions until the second half of the year when changed to a warm phase. The dry season of 2010 year showed the persistence of the warm phase until the end of this season.

The fog measured during the 2009-2010 dry season reached a mean of ca. 11 mm/day and a total rainfall of 100 mm (data unpublished), which is highly superior to the average precipitation value and probably linked to the warm episode during this dry season.

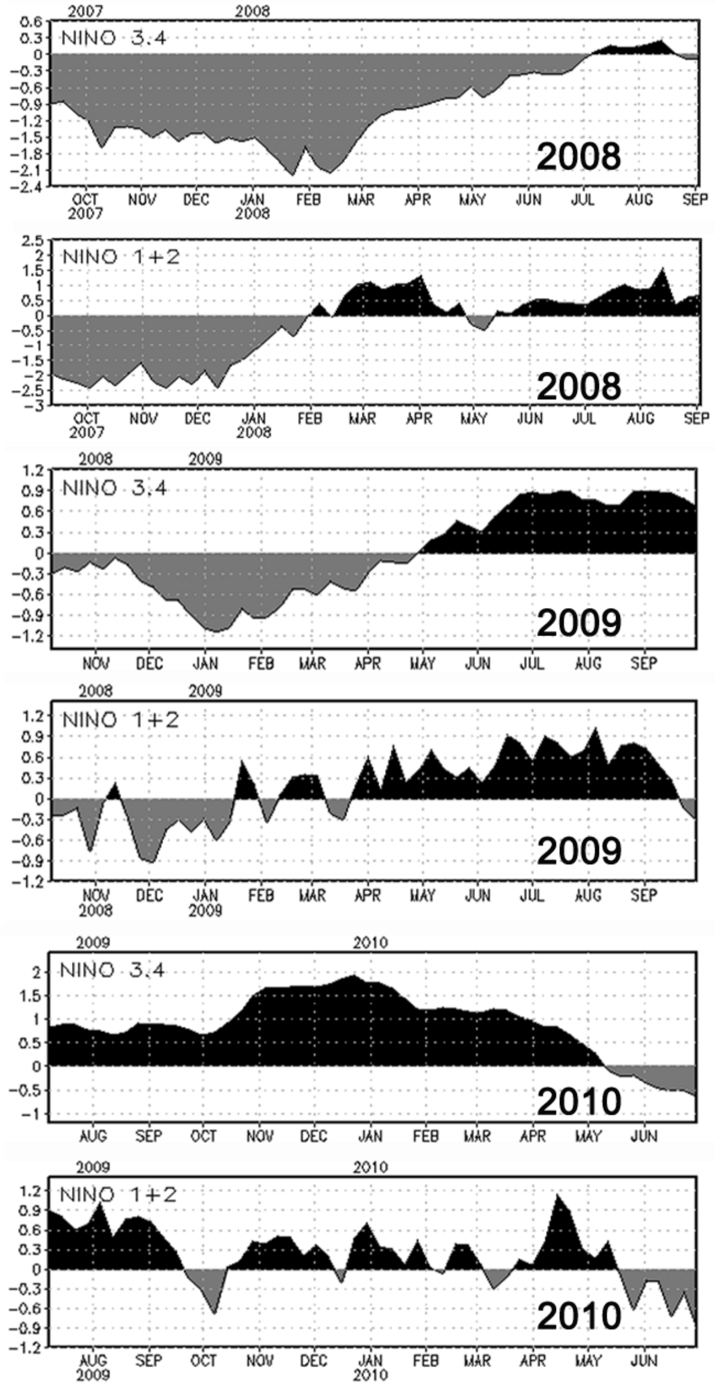


**Fig. 5.1. Time series of average SST anomalies in the Niño3.4 and Niño1+2 regions. SST anomalies are departures from the 1971-2000 base period weekly means (Xue et al. 2003, *J. Climate,* 16, 1601-1612). The warm phase is shown in black color and cold phase in gray (from U.S Climate Prediction Center/NCEP/NWS).**

### 5.2.4 Data analysis

A Ratio Vegetation Index (Jordan, 1969) was used to detect vegetation changes in the study area. Since vegetation has high NIR reflectance (as a result of leaf structure) and low red reflectance (because of absorption by chlorophyll) vegetated areas will have higher RVI values compared to non-vegetated areas. It was obtained dividing the NIR radiance by the red radiance (Eq. 2).

RVI was derived from Landsat 4-5TM images of three different dates (2008, 2009, 2010) Satellite images were obtained from the Earth Resources Observation and Science (EROS) of the U.S. Geological Survey (USGS, 2010) freely available on internet (http://landsat.usgs.gov; http://glovis.usgs.gov/), Datum WGS84, zone 18S. Images corresponded to the free-cloud period in the dry season (austral summer). Dates of image acquirement were February 29 (2008), May 6 (2009) and February 18 (2010). We ordered the fully processed (Level 1G) data products, to which both geometric and radiometric corrections were applied (Chander et al., 2007).

To detect changes in the vegetation, the existing polygons of six different vegetation cover classes were overlapped to each RVI image. The mean, standard deviation, maximum and minimum values of the RVI were extracted for each class. The RVI derivation was done using ENVI 4.5 software (ITT, 2008). A simple linear regression was applied to describe the relationship between the RVI values for a three year period, each data pair comparison was done with the complete RVI image. Regression analysis was done using GRASS GIS coupled with R 2.10 (R Development Core Team, 2010).

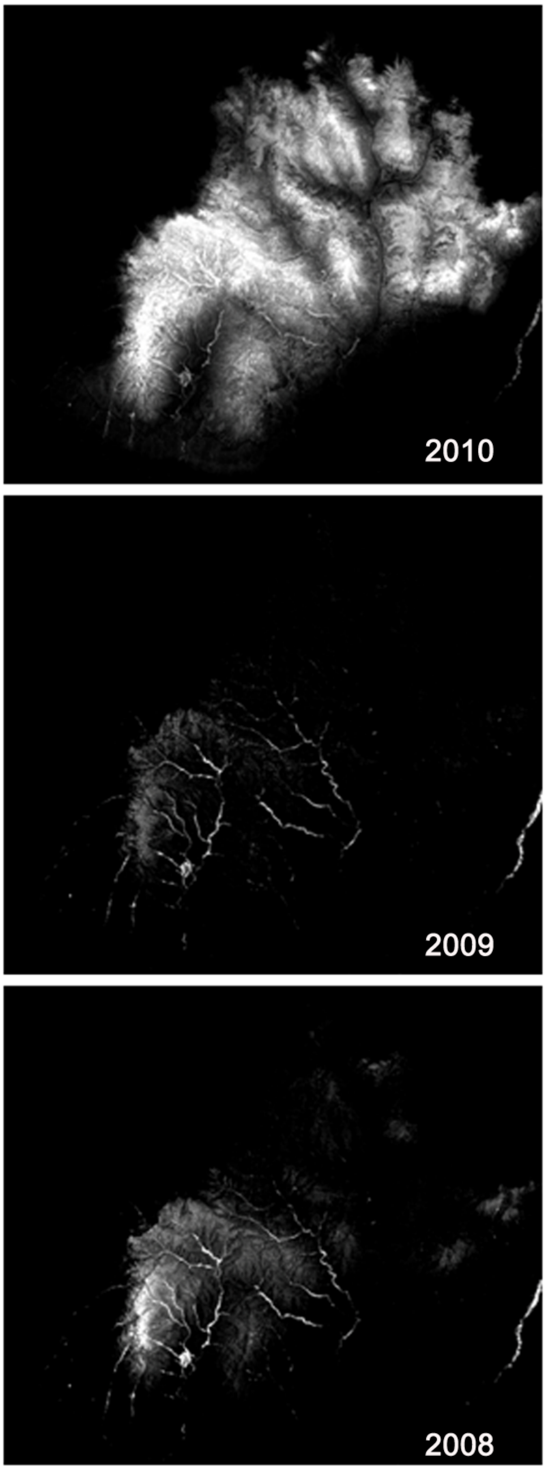


**Fig. 5.2. RVI images for each of the three years analysed during the dry period. February 2010, May 2009 and February 2008.**

## 5.3 Results

Fig. 5.2, shows the RVI image for each year: light areas represent areas of high VI, and conversely, dark areas show regions of low VI. The 2010 year shows the light areas clearly more intense than 2008 or 2009 years indicating a higher VI in that period.

The regression analysis (Fig. 5.3) showed that 2010 *vs* 2009 and 2010 *vs* 2008 had a significant vegetation change ($P<0.001$). There was an increment of three times in the RVI values in 2010 year with respect to 2008 (slope=2.86) and 2009 (slope=2.81) years (Fig. 5.3a, 5.3b). On the contrary, between 2009 and 2008 years the RVI change was minimum indicating a lower vegetation change in this period (slope=0.77) (Fig. 5.3c).

The variation in the spectrum of bare soil (Fig. 5.4) showed that 2008 and 2009 years had the vegetated areas near the soil line. The areas of high vegetation can be seen looking the area of low red reflectance and high NIR reflectance in the bi-spectral space, while the flat side of the triangular cap shaped represent bare soil (Kauth and Thomas, 1976). On the contrary, vegetated areas showed an increase in the NIR reflectance and consequently a high VI during February 2010.

The variation analysis of the RVI within each class (Table 12) showed that the 2010 year had the highest RVI values for all six classes (mean =1.92, max =6.32) while the 2008 (mean =1.08, max=2.63 ) and 2009 (mean=1.05 , max=2.62) years showed the smallest ones. Higher mean values in 2010 were found in dense shrubs and trees class (mean=2.59, max=6.32), whereas in 2008 (mean=1.17, max=2.63) and 2009 (mean=1.07, max=2.46) RVI values were almost three times lower than 2010. The other cover classes showed a two-fold increase in their mean RVI values in 2010, including the poorest area in vegetation cover, the old terraces area, which is difficult to recognise from remote sensing, also increased twice the RVI value in 2010.

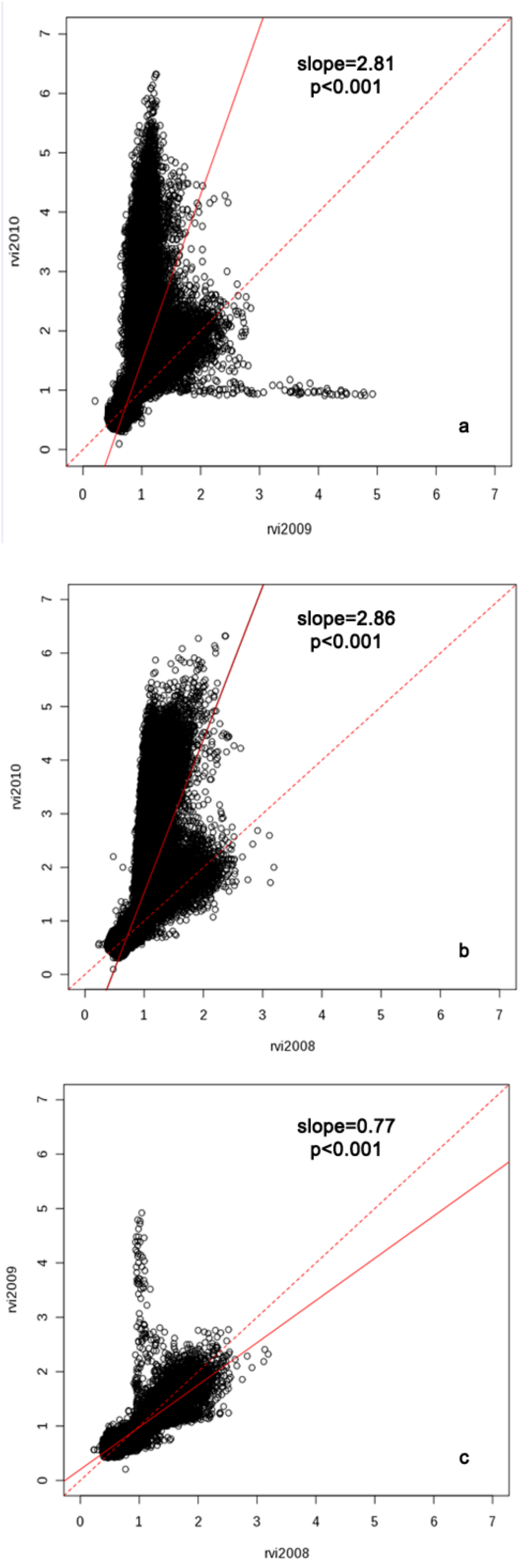


**Fig. 5.3. Regression plot of the RVI values for a three year period during the dry season. 2010 *vs* 2009 (a), 2010 *vs* 2008 (b) and 2009 *vs* 2008 (c).**

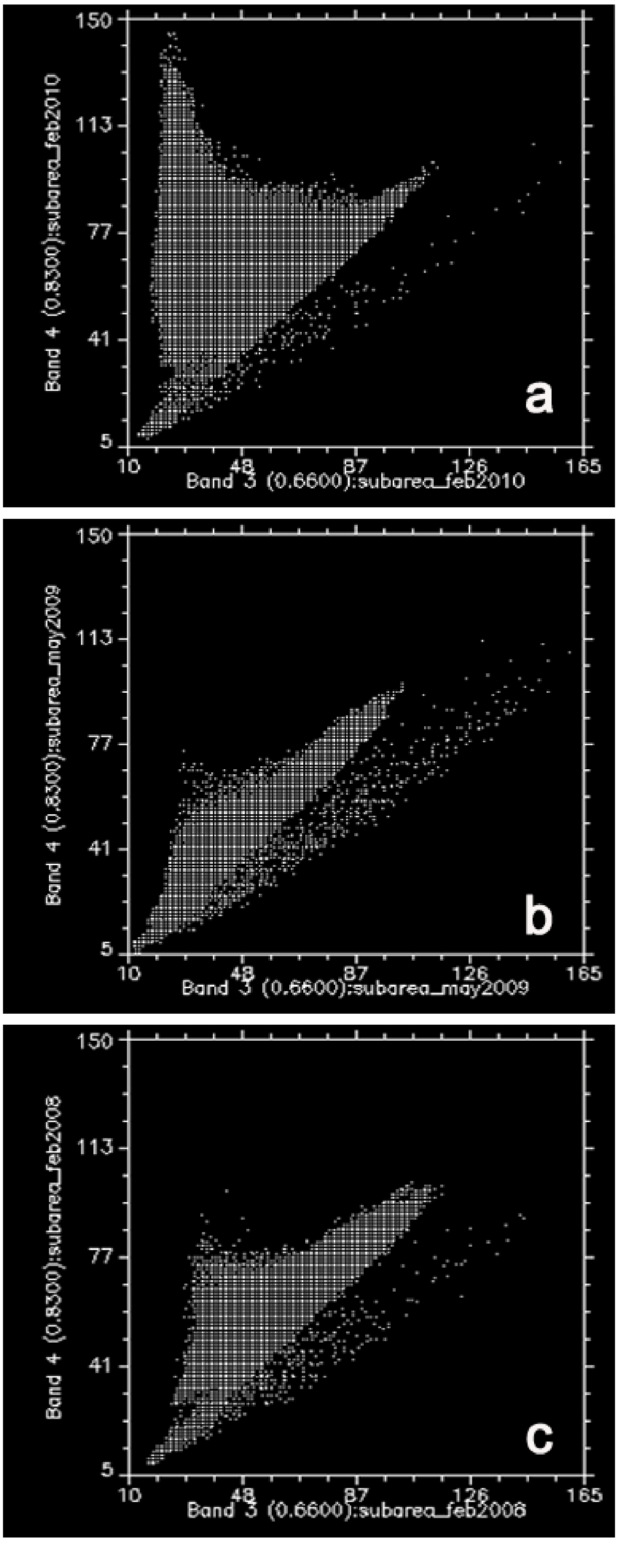
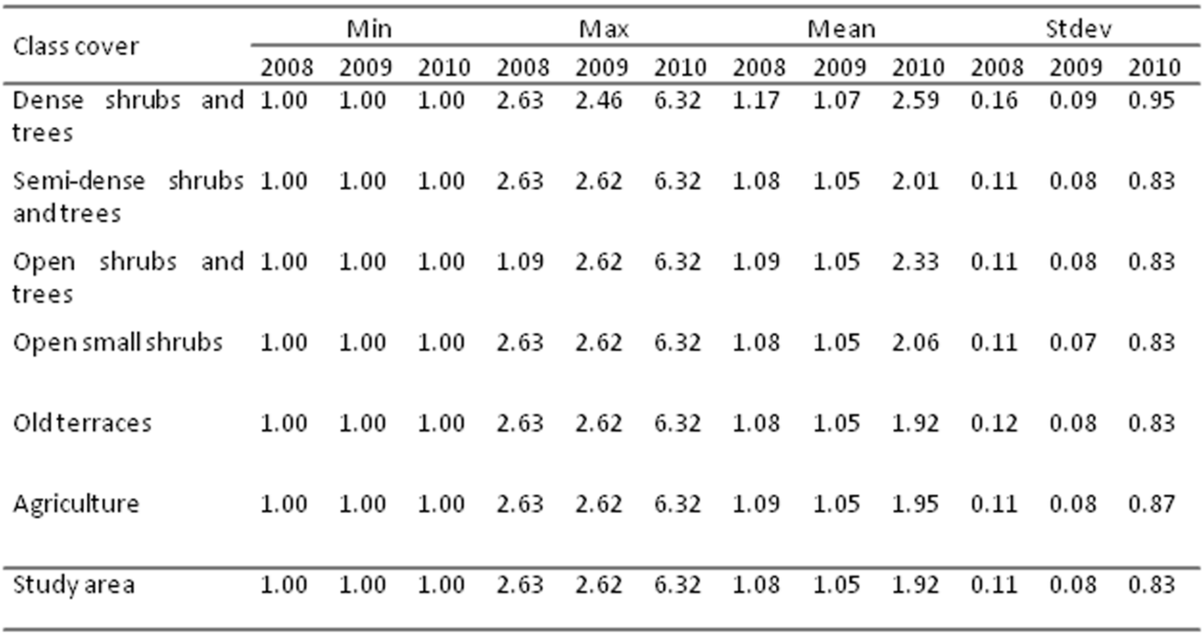


**Fig. 5.4. Scatter plot of the NIR and RED bi-spectral space.2008 (c), 2009 (b), 2010 (a).**

**Table 5.1. Some statistics for the RVI change in each class cover over the study area.**



| Class cover | Min | | | Max | | | Mean | | | Stdev | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| Dense shrubs and trees | 1.00 | 1.00 | 1.00 | 2.63 | 2.46 | 6.32 | 1.17 | 1.07 | 2.59 | 0.16 | 0.09 | 0.95 |
| Semi-dense shrubs and trees | 1.00 | 1.00 | 1.00 | 2.63 | 2.62 | 6.32 | 1.08 | 1.05 | 2.01 | 0.11 | 0.08 | 0.83 |
| Open shrubs and trees | 1.00 | 1.00 | 1.00 | 1.09 | 2.62 | 6.32 | 1.09 | 1.05 | 2.33 | 0.11 | 0.08 | 0.83 |
| Open small shrubs | 1.00 | 1.00 | 1.00 | 2.63 | 2.62 | 6.32 | 1.08 | 1.05 | 2.06 | 0.11 | 0.07 | 0.83 |
| Old terraces | 1.00 | 1.00 | 1.00 | 2.63 | 2.62 | 6.32 | 1.08 | 1.05 | 1.92 | 0.12 | 0.08 | 0.83 |
| Agriculture | 1.00 | 1.00 | 1.00 | 2.63 | 2.62 | 6.32 | 1.09 | 1.05 | 1.95 | 0.11 | 0.08 | 0.87 |
| Study area | 1.00 | 1.00 | 1.00 | 2.63 | 2.62 | 6.32 | 1.08 | 1.05 | 1.92 | 0.11 | 0.08 | 0.83 |

## 5.4 Discussion

The dry season of 2009-2010 (from December to May) was significantly different than the two previous years. The VI increased up to three times, affecting the plant life cycle during this period. The whole vegetation of the study area was affected. The dense area of shrubs and trees decrease considerably during dry seasons but during 2010 the plant cover increased more than “normal” (2009 year) or during cold La Niña (2008) periods. The sparse vegetation in very open areas, which is difficult to detect by remote sensing, increased its spectral signal and become more evident during the 2010 period likely because plant biomass increased.

In our study, the plant productivity and biomass was probably higher in February 2010 than a ‘normal’ dry season, due to more water availability trigger by the ocean-atmospheric conditions characterized by the ENSO, which was present in that period. Vegetation signal may have been influenced by wet soil but we believed that in this situation soil was cover by a dense layer of herbs and plant biomass produced during the wet precedent growing period in the spring of 2009.

As a result, this climatic event may modulate the primary productivity in deserts not only during the growing season (wet season), as has been described by many studies (e.g. Squeo et al 2006). But also may affect the dry season depending on the fluctuation intensity of the climatic oscillation and its temporal variability. This can have remarkable influence in *Lomas* vegetation or other plant communities along the coastal desert.

Puig, et al. (1998) experimented with different VI's (NDVI, PVI, TSAVI) to better retrieve vegetation in *Lomas* of Mejia. They found a mean NDVI value of 0.1, which may represent a high value considering that the evaluation was done during the growing season (wet season) influenced by the warm phase of ENSO 1997-98. They used SPOT images, acquired during September 1997, which showed unusually humid conditions.

One of the main problems of VI in arid and semi-arid ecosystems is the sensitivity of sparse vegetation due to the soil background effect. Huete (1988) developed a VI to adjust the soil-effect and minimize it (i.e. SAVI). However, the SAVI is much less sensitive than RVI to changes in background caused by soil colour or surface soil moisture content (Major et al., 1990). The colour and the wetness of soils alter the VI interpretation (Jackson and Huete, 1991). These factors affect the discrimination of vegetation from bare soil or early stages of plants growth and are significant in arid regions (Huete et al., 1984).

In the study area the cover of the sparse vegetation is significant. The RVI is not very sensitive when the vegetation cover is sparse (Jackson and Huete, 1991). This is the reason why many preferred to use NDVI. However, both VI's are equivalent and contain the same information. Perry and Lautenschlager (1984) showed that one index can be transformed into the other. Thus, we preferred to use a traditional approach that gave us the simplest ratio between NIR and red waveleghts.

Although several limitations due to the VI and sensor capabilities have been discussed above due to the complex conditions in arid and semi arid environments, our results showed a clear vegetation change during the dry season using the RVI. However, the study period was not enough to make strong conclusions, we believed that our results may encourage to continue observing and monitoring this environment. The clear signal change of plants in the dry period due to climatic oscillations in a small time-scale may reflect the terrestrial ecosystems sensibility and vulnerability to periodical climatic changes linked to ocean-atmospheric oscillations. But, we do not know what the answer of this ecosystem will be in a large temporal scale. Although the times series analysis suggest that diminution of precipitation is causing desertification (Montecinos et al., 2003), this kind of periodically oscillations may change this trend.

# 6 Discussion and conclusion

The increase of interest in *Lomas* or fog-oasis leads to direct our attention on what we know about their natural vegetation, why their natural resources are relevant for monitoring, and what have been done to support the conservation strategies. In the past, many botanical studies have referred to the exuberant vegetation found in the middle of the desert during exceptional wet periods. Some attempts for mapping vegetation were done. Projects on conservation and management have begun.

We hope that the new procedures and technologies, such as the digital image processing using satellite imagery, can now be applied to bring up to date past studies. Some significant changes in vegetation classification as well as in the extension of the different cover classes with respect to the first vegetation map of Lomas of Atiquipa (1999) demonstrated how different interpretations can be obtained associated to climate variability.

This changes cannot be understood entirely without the geographical and climatic context where fog oases are inserted. The Sechura and Atacama deserts have changed through time, fog oases are likely a remnant of this process, which are actually in progress, considering the present climatic situation.

## 6.1 Review of results and findings

### 6.1.1 Fog-oases diversity

Differences in the species composition of *Lomas* are supported by their phylogenetic relationship. The phylogenetic distance among groups support a different natural history of the main three areas recognized. The hypothesis of a past continuous coastal belt of vegetation remains unclear. In a context of extreme climatic conditions across the Peruvian and Atacama deserts, it is probable that vegetation areas in fog oases were strongly influenced by their northern and southern boundaries and their vicinity to the Andes. Consequently, plant assemblages created different floristic relationships in relation to their latitude.

### 6.1.2 ENSO effects on fog oases

The fog zone that is able to maintain the rich flora of Lomas, probably originated from a rain-shadow due to the Andes, and an inversion zone (Rutllant et al., 2003) at lower elevations (below 1000 m a.s.l.). The fog occurrence, however, may be influenced by the diminution of the lower cloud amount during the warm phase of ENSO (Park and Leovy 2004).

Present fog-collection records are not temporally long and the latitudinal variability across the coast limits a correct interpretation of particular patterns observed in *Lomas*. The localized records may not have broad regional extent and may create some contradictions or unclear explanations.

### 6.1.3 Mapping vegetation

Our results highlight the importance of multitemporal analysis to survey the vegetation dynamics of arid ecosystems. Variation in cover and expansion of plants, as has been reported, as an answer of climatic factors, should be monitored to understand the degree of the climatic impact on terrestrial ecosystems. Fog oases have demonstrated to be highly sensible to climate and represent a natural laboratory to study adaptability.

### 6.1.4 Vegetation change

This study has demonstrated overall that image-based indices derived from Landsat TM imagery can be used with field methods to asses and monitor vegetation cover, and thus land condition, in the coastal area of South Peru. RVI can be used to asses vegetation change and monitor its variation in areas where field-based methods cannot arrive. However ground-based data (field survey) should be used to validate satellite data and VI efficiency.

## 6.2 Implications of climate for Lomas conservation

In the region, the warm phase of ENSO increases rainfall and so there is more probability to rain along the coast where usually there is no rain (e.g. in summer). This phase enables dormant seeds and ephemeral herbs to grow up in the middle of the desert. The plant biomass during the dry season can be altered after an intense warm period because more water availability. In this case, the open shrubs and trees areas increase their herbaceous layer. This fact has enormous implication in lomas conservation. Since the life cycle is determined by seasonality, wetter periods determined a full replenish of genetic material to support seedlings, plant establishment, population growing and community stability.

It is believed that continuous ENSO conditions could have positively affected the extent of Lomas (Dillon & Rundel, 1990), increasing the biomass and plant cover due to more water availability in rainy years since the onset of El Niño during the Holocene (Sandweiss et al., 1996; Fontugne et al., 1999). This could support the hypothesis that more mesic conditions in the past may have fostered the growth of a continuous belt of vegetation along the Peruvian and Chilean coasts. However, the coastal vegetation has probably remained the same since 10-15 Ma (middle-Miocene) when climatic conditions were probably similar to those of the present day (Ghosh et al., 2006).

Currently, the ENSO-related climate variability has been demonstrated to have a direct (Dillon & Rundel, 1990; Vidiella et al., 1999; Gutiérrez et al., 2000; Muñoz-Schick et al., 2001; Squeo et al., 2006; Gutiérrez, 2008) and indirect (e.g. Jaksic, 2001) influence, causing changes in vegetation patterns and altering plant dynamics and species establishment. Therefore, depending on how frequent and intense the ENSO become, the Lomas vegetation is able to increase or decrease plant cover due to more or less water availability in the desert from either drizzle or fog, thus reducing or emphasizing patchy fragmentation and species divergence

## 6.3 Recommendations

Our results have shown that changes in seasonal vegetation of *Lomas* may respond to climatic oscillations. The intensity of the event should be constantly monitored by measuring rainfall, fog intensity, and vegetation cover and richness.

We believe that continuous monitoring in different points along the coast of Chile and Peru with appropriate equipment for data recording (e.g. replacing standard fog collectors to measuring fog) will help us to clarify some climatic patterns.

Our results also suggest further research using remote sensing techniques, which are able to monitor areas with difficult accessibility. Satellite data is more available than ever and represent less costs investment with satisfactory results.

The recognition of the importance of monitoring and increasing investment in field survey will led to a better understanding of this fragile ecosystem and in general about the fog oases evolution. We suggest that long-term ground-data collection may help to predict future scenarios. Insufficient divulgation of vegetation studies, and climate data recording in this area, limit our understanding of climate effect on fog oases.

Finally, there is an obvious need to set priorities of assessment. In arid regions monitor the vegetation change may play an important role to understand climate adaptability.

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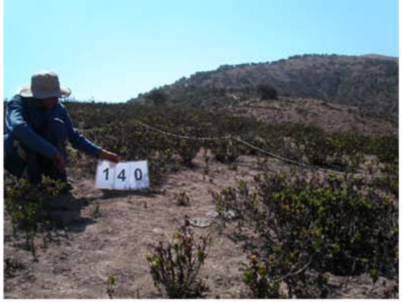
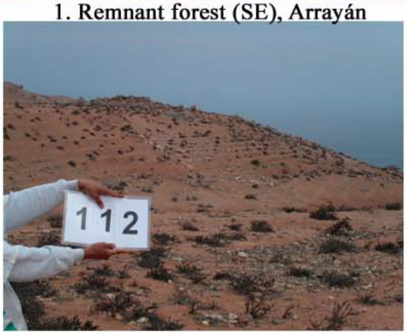
# Appendix I. Images from the sampled sites

(Main feature, slope aspect in parenthesis, and site name when available).

1. Remnant forest (SE), Arrayán



2. Open small shrubs (SW), Cañay



3. Terraces (NW), Coastal area

4. Drainage basin (NW),Infiernillo

5. Dense shrubland (SE), Lloque

6. Semidense shrubland (SW), Conchara

7. Fog

8. Open small shrubs (NW) Arrayán

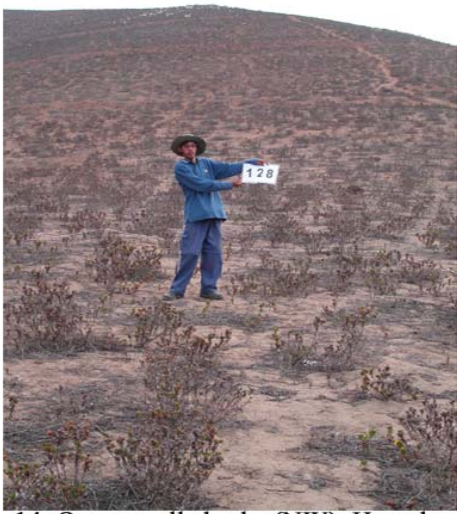
9. Goats

10. Open shrubland (S), Avalos

11. Dense Shrubland (E)

12. Slope NW, Infiernillo

13. Cactus area (S), Vizcachani



14. Open small shrubs (NW), Huambo

15. Drainage basin

16. Standard Fog Collectors

# Appendix II. List of species in the sampled sites of Lomas of Atiquipa during the dry season (January 2009)

| Family | Species | Growthform | Cover% | releve_num |
|---|---|---|---|---|
| FABACEAE | Caesalpinea spinosa | tree | 10 | 101 |
| EUPHORBIACEAE | Croton alnifolius | tall shrub | 1 | 101 |
| VERBENACEAE | Duranta armata | tall shrub | 50 | 101 |
| CACTACEAE | Echinopsis chalaensis | cactus | 5 | 101 |
| BROMELIACEAE | Tillandsia sp | epifita | 0 | 101 |
|  | Usnea sp | lichen | 0 | 101 |
| FABACEAE | Caesalpinia spinosa | tree | 5 | 103 |
| EUPHORBIACEAE | Croton alnifolius | tall shrub | 10 | 103 |
| VERBENACEAE | Duranta armata | tall shrub | 10 | 103 |
| LOASACEAE | Nasa urens | forb | 1 | 103 |
| SOLANACEAE | Nicotiana paniculata | forb | 4 | 103 |
| ASTERACEAE | Senecio sp | forb | 5 | 103 |
| CACTACEAE | Cumulopuntia sphaerica | cactus | 1 | 108 |
| CACTACEAE | Cylindropuntia tunicata | cactus | 1 | 108 |
| CACTACEAE | Echinopsis chalaensis | cactus | 1 | 108 |
| CACTACEAE | Echinopsis sp | cactus | 1 | 108 |
| CACTACEAE | Haageocereus sp | cactus | 5 | 108 |
| CACTACEAE | Weberbauerocereus weberbaueri | cactus | 30 | 108 |
| AMARANTHACEAE | Alternanthera pubiflora | forb | 1 | 112 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 0 | 112 |
| CACTACEAE | Haageocereus sp | cactus | 1 | 112 |
| BORAGINACEAE | Heliotropium krauseanum | small shrub | 50 | 112 |
| FABACEAE | Hoffmannsegia sp | small shrub | 1 | 112 |
| VERBENACEAE | Lippia nodiflora | forb | 0 | 112 |
| FABACEAE | Mimosa albida | forb | 0 | 112 |
| SOLANACEAE | Nolana inflata | forb | 0 | 112 |
| ASTERACEAE | Trixis divaricata | small shrub | 0 | 112 |
| POACEAE | Bromus sp | grass | 1 | 113 |
| CALICIACEAE | Buellia sp | lichen | 0 | 113 |
| FABACEAE | Caesalpinia spinosa | tree | 10 | 113 |
| PTERIDACEAE | Cheilanthes sp | fern | 1 | 113 |
| CONVOLVULACEAE | Dichondra microcalyx | forb | 0 | 113 |
| VERBENACEAE | Duranta armata | tall shrub | 35 | 113 |
| CACTACEAE | Echinopsis chalaensis | cactus | 20 | 113 |
|  | Flavoparmelia sp | lichen | 0 | 113 |
| MALVACEAE | Fuertesimalva sp | forb | 0 | 113 |
| RUBIACEAE | Galium hypocarpium | forb | 0 | 113 |
| BORAGINACEAE | Heliotropium krauseanum | small shrub | 1 | 113 |
| VERBENACEAE | Lippia nodiflora | forb | 1 | 113 |
| OXALIDACEAE | Oxalis sp | forb | 0 | 113 |
| PORTULACACEAE | Portulaca oleracea | forb | 0 | 113 |
| ASTERACEAE | Senecio sp | small shrub | 5 | 113 |
|  | Usnea sp | lichen | 1 | 113 |
| ASTERACEAE | Ageratina sternbergiana | forb | 0 | 114 |
| POACEAE | Bromus sp2 | grass | 50 | 114 |
| SCROPHULARIACEAE | Budleia sp | forb | 0 | 114 |
| FABACEAE | Caesalpinea spinosa | tree | 10 | 114 |
| EUPHORBIACEAE | Chamaesyce hypericifolia | forb | 1 | 114 |
| VERBENACEAE | Duranta armata | tall shrub | 40 | 114 |
| CACTACEAE | Echinopsis chalaensis | cactus | 1 | 114 |
| ASTERACEAE | Encelia canescens | small shrub | 1 | 114 |
| BORAGINACEAE | Heliotropium curasavicum | small shrub | 0 | 114 |
| VERBENACEAE | Lippia nodiflora | forb | 30 | 114 |
| FABACEAE | Mimosa albida | forb | 1 | 114 |
| LAMIACEAE | Mintostachys sp | forb | 1 | 114 |

| | | | | |
|---|---|---|---|---|
| SOLANACEAE | Nicotiana paniculata | forb | 1 | 114 |
| ASTERACEAE | Ophryosporus sp | small shrub | 10 | 114 |
| OXALIDACEAE | Oxalis sp | forb | 1 | 114 |
| POACEAE | Pennicetum clandestinum | grass | 0 | 114 |
| ASTERACEAE | Senecio mollendoensis | forb | 1 | 114 |
| CARYOPHYLLACEAE | Spergularia congestifolia | forb | 10 | 114 |
| BROMELIACEAE | Tillandsia sp | epifita | 5 | 114 |
| FABACEAE | Caesalpinia spinosa | tree | 20 | 116 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 10 | 116 |
| CACTACEAE | Cumulopuntia sphaerica | cactus | 5 | 116 |
| VERBENACEAE | Duranta armata | tall shrub | 5 | 116 |
| CACTACEAE | Echinopsis chalaensis | cactus | 1 | 116 |
| PORTULACACEAE | Portulaca oleracea | forb | 0 | 116 |
| BROMELIACEAE | Tillandsia sp | epifita | 0 | 116 |
| EUPHORBIACEAE | Chamaecyse hypericifolia | forb | 1 | 117 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 1 | 117 |
| VERBENACEAE | Lippia nodiflora | forb | 1 | 117 |
| SOLANACEAE | Nicotiana paniculata | forb | 1 | 117 |
| POACEAE | Pennicetum clandestinum | grass | 1 | 117 |
| ASTERACEAE | Senecio mollendoensis | forb | 1 | 117 |
| VERBENACEAE | Verbena litoralis | forb | 10 | 117 |
| FABACEAE | Caesalpinia spinosa | tree | 30 | 118 |
| EUPHORBIACEAE | Croton ruizianus | tall shrub | 1 | 118 |
| VERBENACEAE | Duranta armata | tall shrub | 40 | 118 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 1 | 118 |
| BORAGINACEAE | Heliotropium curassavicum | small shrub | 20 | 118 |
| LAMIACEAE | Mintostachys spicata | forb | 1 | 118 |
| POACEAE | Pennicetum clandestinum | grass | 5 | 118 |
| PORTULACACEAE | Portulaca oleracea | forb | 1 | 118 |
| ASTERACEAE | Senecio sp | forb | 1 | 118 |
| | Usnea sp | lichen | 0 | 118 |
| VERBENACEAE | Verbena litoralis | forb | 10 | 118 |
| FABACEAE | Caesalpinia spinosa | tree | 10 | 119 |
| EUPHORBIACEAE | Croton ruizianus | tall shrub | 80 | 119 |
| VERBENACEAE | Duranta armata | tall shrub | 5 | 119 |
| BROMELIACEAE | Tillandsia sp | epifita | 1 | 119 |
| | Usnea sp | lichen | 0 | 119 |
| FABACEAE | Caesalpinia spinosa | tree | 1 | 120 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 1 | 120 |
| VERBENACEAE | Duranta armata | tall shrub | 15 | 120 |
| CACTACEAE | Echinopsis chalaensis | cactus | 1 | 120 |
| BORAGINACEAE | Heliotropium sp | small shrub | 10 | 120 |
| MYRTACEAE | Myrcianthes ferreyrae | tree | 15 | 120 |
| SOLANACEAE | Nicotiana paniculata | forb | 1 | 120 |
| ASTERACEAE | Senecio mollendoensis | forb | 1 | 120 |
| ASTERACEAE | Artemisia sp | forb | 40 | 121 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 1 | 121 |
| CACTACEAE | Echinopsis chalaensis | cactus | 1 | 121 |
| AMARANTHACEAE | Gomphrena sp | forb | 1 | 121 |
| CACTACEAE | Haageocereus decumbens | cactus | 10 | 121 |
| BORAGINACEAE | Heliotropium arborescens | tall shrub | 1 | 121 |
| BORAGINACEAE | Heliotropium krauseanum | small shrub | 1 | 121 |
| FABACEAE | Hoffmansegia sp | forb | 1 | 121 |
| LAMIACEAE | Marrubium vulgare | forb | 1 | 121 |
| OXALIDACEAE | Oxalis sp | forb | 1 | 121 |
| AMARANTHACEAE | Alternthera sp | forb | 1 | 122 |
| ASTERACEAE | Artemisia sp | forb | 10 | 122 |
| CACTACEAE | Haageocereus decumbens | cactus | 1 | 122 |
| BORAGINACEAE | Heliotropium krauseanum | small shrub | 5 | 122 |
| | lichen saxicola | lichen | 0 | 122 |

| | | | | |
|---|---|---|---|---|
| CACTACEAE | Weberbauerocereus weberbaueri | cactus | 5 | 122 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 1 | 124 |
| VERBENACEAE | Duranta armata | tall shrub | 5 | 124 |
| CACTACEAE | Echinopsis chalaensis | cactus | 5 | 124 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 25 | 124 |
| FABACEAE | Hoffmansegia sp | forb | 1 | 124 |
| AMARANTHACEAE | Alternanthera sp | forb | 0 | 126 |
| FABACEAE | Caesalpinea spinosa | tree | 5 | 126 |
| VERBENACEAE | Citharexylum flexuosum | shrub | 0 | 126 |
| EUPHORBIACEAE | Croton sp | shrub | 5 | 126 |
| VERBENACEAE | Duranta armata | tall shrub | 30 | 126 |
| CACTACEAE | Echinopsis chalaensis | cactus | 5 | 126 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 40 | 126 |
| FABACEAE | Hoffmansegia sp | forb | 5 | 126 |
| POACEAE | Poa sp | grass | 0 | 126 |
| ASTERACEAE | Senecio sp | forb | 1 | 126 |
| CARYOPHYLLACEAE | Spergularia sp | forb | 0 | 126 |
| BROMELIACEAE | Tillandsia sp | epifita | 5 | 126 |
| ASPLENIACEAE | Asplenium praemorsum | fern | 0 | 127 |
| FABACEAE | Caesalpinea spinosa | tree | 10 | 127 |
| VERBENACEAE | Citharexylum flexuosum | small shrub | 15 | 127 |
| CONVOLVULACEAE | Dichondra microcalix | forb | 0 | 127 |
| CARYOPHYLLACEAE | Drymaria divaricata | forb | 0 | 127 |
| VERBENACEAE | Duranta armata | tall shrub | 10 | 127 |
| CACTACEAE | Echinopsis chalaensis | cactus | 5 | 127 |
| ASTERACEAE | Gamochaeta sp | forb | 0 | 127 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 0 | 127 |
| CLUSIACEAE | Hypericum silenoides | forb | 0 | 127 |
| FABACEAE | Mimosa albida | forb | 10 | 127 |
| POACEAE | Poa sp | grass | 60 | 127 |
| BROMELIACEAE | Tillandsia microphylla | epifita | 0 | 127 |
| BROMELIACEAE | Tillandsia sp | epifita | 0 | 127 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 40 | 128 |
| FABACEAE | Acacia macracantha | tree | 0 | 132 |
| FABACEAE | Caesalpinea spinosa | tree | 5 | 132 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 5 | 132 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 30 | 132 |
| FABACEAE | Mimosa albida | forb | 0 | 132 |
| LOASACEAE | Nasa urens | forb | 10 | 132 |
| ASTERACEAE | Onoseris sp | forb | 0 | 132 |
| PORTULACACEAE | Portulaca oleracea | forb | 0 | 132 |
| CHENOPODIACEAE | Atripplex rotundifolia | forb | 0 | 133 |
| SOLANACEAE | Nolana inflata | herb | 0 | 133 |
| ASTERACEAE | Trixis divaricata | small shrub | 10 | 133 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 0 | 137 |
| CACTACEAE | Haageocereus decumbens | cactus | 0 | 137 |
| BORAGINACEAE | Heliotropium krauseanum | small shrub | 10 | 137 |
| ASTERACEAE | Trixis divaricata | small shrub | 0 | 137 |
| CACTACEAE | Weberbauerocereus weberbaueri | cactus | 5 | 137 |
| FABACEAE | Caesalpinea spinosa | tree | 10 | 138 |
| VERBENACEAE | Citharexylum flexuosum | small shrub | 30 | 138 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 10 | 138 |
| CACTACEAE | Echinopsis chalaensis | cactus | 0 | 138 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 0 | 138 |
| BORAGINACEAE | Heliotropium lanceolatum | small shrub | 0 | 138 |
| ASTERACEAE | Senecio mollendoensis | forb | 0 | 138 |
|  | Usnea sp | lichen | 0 | 138 |
| FABACEAE | Caesalpinea spinosa | tree | 50 | 139 |
| EUPHORBIACEAE | Croton ruizianus | tall shrub | 80 | 139 |
| VERBENACEAE | Duranta armata | tall shrub | 20 | 139 |

| | | | | |
|---|---|---|---|---|
| CACTACEAE | Echinopsis chalaensis | cactus | 20 | 139 |
| BROMELIACEAE | Tillandsia microphylla | epifita | 5 | 139 |
| BROMELIACEAE | Tillandsia sp | epifita | 5 | 139 |
| | Usnea sp | lichen | 0 | 139 |
| ACANTHACEAE | Dicliptera ruiziana | forb | 0 | 140 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 30 | 140 |
| BORAGINACEAE | Heliotropium lanceolatum | small shrub | 5 | 140 |
| VERBENACEAE | Lippia nodiflora | forb | 0 | 140 |
| FABACEAE | Acacia macracantha | tree | 0 | 141 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 15 | 141 |
| VERBENACEAE | Duranta armata | tall shrub | 0 | 141 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 40 | 141 |
| BORAGINACEAE | Heliotropium sp | small shrub | 0 | 141 |
| LAMIACEAE | Marrubium vulgare | forb | 0 | 141 |
| FABACEAE | Mimosa albida | forb | 0 | 141 |
| MYRTACEAE | Myrcianthes ferreyrae | tree | 20 | 141 |
| SOLANACEAE | Nicotiana paniculata | forb | 0 | 141 |
| ASTERACEAE | Senecio mollendoensis | forb | 0 | 141 |
| FABACEAE | Acacia macracantha | tree | 0 | 142 |
| EUPHORBIACEAE | Croton alnifolius | small shrub | 20 | 142 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 60 | 142 |
| ASTERACEAE | Ageratina sternbergiana | small shrub | 0 | 145 |
| ALSTROEMERIACEAE | Bomarea edulis | epifita | 0 | 145 |
| POACEAE | Bromus sp | grass | 0 | 145 |
| FABACEAE | Caesalpinea spinosa | tree | 20 | 145 |
| EUPHORBIACEAE | Croton ruizianus | tall shrub | 5 | 145 |
| VERBENACEAE | Duranta armata | tall shrub | 60 | 145 |
| CACTACEAE | Echinopsis chalaensis | cactus | 10 | 145 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 0 | 145 |
| LAMIACEAE | Marrubium vulgare | forb | 0 | 145 |
| SOLANACEAE | Nicotiana paniculata | forb | 0 | 145 |
| PLUMBAGINACEAE | Plumbago coerulea | forb | 0 | 145 |
| ASTERACEAE | Proustia cuneifolia | small shrub | 0 | 145 |
| BROMELIACEAE | Tillandsia sp | epifita | 0 | 145 |
| BROMELIACEAE | Tillandsia sp | epifita | 0 | 145 |
| | Usnea sp | lichen | 0 | 145 |
| POACEAE | Bromus sp | grass | 80 | 146 |
| FABACEAE | Caesalpinia spinosa | tree | 10 | 146 |
| EUPHORBIACEAE | Croton ruizianus | tall shrub | 5 | 146 |
| VERBENACEAE | Duranta armata | tall shrub | 10 | 146 |
| CACTACEAE | Echinopsis chalaensis | cactus | 0 | 146 |
| ASTERACEAE | Grindelia glutinosa | small shrub | 10 | 146 |
| BORAGINACEAE | Heliotropium krauseanum | small shrub | 0 | 146 |
| BORAGINACEAE | Heliotropium lanceolatum | small shrub | 5 | 146 |
| VERBENACEAE | Lippia nodiflora | forb | 5 | 146 |
| LOASACEAE | Nasa urens | forb | 0 | 146 |
| SOLANACEAE | Nicotiana paniculata | forb | 5 | 146 |
| ASTERACEAE | Proustia cuneifolia | forb | 0 | 146 |
| ASTERACEAE | Senecio sp | forb | 0 | 146 |
| BROMELIACEAE | Tillandsia sp | epifita | 0 | 146 |
| ASTERACEAE | Trixis divaricata | small shrub | 0 | 146 |

# Appendix III. Lomas taxa included in the phylogenetic analysis

| group | order_APG | family | genus | species code | origin | growthform | Raunkier's lifeform | CAM | LAC | PAC | ATI | MOL | MEJ | ILO | TAC | TAR | MMO | QRIN | PAP | PAZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Fabales | FABACEAE | Acacia | Acachuar | Native | shrub | NP | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Rosales | ROSACEAE | Acaena | Acaetrif | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Lamiales | VERBENACEAE | Acantho | Acanpune | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Achyroc | Achyalat | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Acmella | Acmealba | Native | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Acmella | Acmeoler | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Acnistu | Acniarbo | Native | shrub | NP | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Adesmia | Adesatac | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Adesmia | Adeserem | Endemi | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Adesmia | Adesfili | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Adesmia | Adesmela | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Adesmia | Adesparv | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Adesmia | Adespusi | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Adesmia | Adestene | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Adesmia | Adesvisc | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Agerati | Agerarti | Native | subshrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Agerati | Agerster | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ageratu | Agercony | Native | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Allioni | Alliinca | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Alonsoa | Alonmeri | Native | perennial herb | P | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Altealbos | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Alteeupat | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Altealbot | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Altecarac | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Altehalim | Native | perennial herb | Ch | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Alteporri | Native | perennial herb | Ch | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Altepubif | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Alterna | Altevillo | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Amarant | Amardubi | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Amarant | Amarhybr | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Amarant | Amarspin | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Amarant | Amarviri | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Amarant | Amardefl | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Amblyop | Amblpusi | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Ambrosi | Ambrarte | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Ammi | Ammivisn | Introd | perennial herb | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Amsinck | Amsihisp | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ericales | PRIMULACEAE | Anagall | Anagalte | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Ericales | PRIMULACEAE | Anagall | Anagarve | Introd | annual herb | T | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ericales | PRIMULACEAE | Anagall | Anagcoer | Introd | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ericales | PRIMULACEAE | Anagall | Anagmini | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Andrach | Andrmicr | Endemi | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PHYTOLACACEAE | Anisome | Anislitt | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Caryophyllales | BASELLACEAE | Anreder | Anrediff | Native | liana | L | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Anthemi | Anthemco | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Rosales | ROSACEAE | Aphanes | Aphaarve | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Apium | Apiuchil | Endemi | annual herb | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Apium | Apiulept | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Apium | Apiupanu | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Cucurbitales | CUCURBITACEAE | Apodant | Apodferr | Endemi | liana | L | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ranunculales | PAPAVERACEAE | Argemon | Argehunn | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Ranunculales | PAPAVERACEAE | Argemon | Argemexi | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ranunculales | PAPAVERACEAE | Argemon | Argesubf | Native | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | BIGNONIACEAE | Argylia | Argyradi | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| DICOT | Malpighiales | EUPHORBIACEAE | Argytha | Argycane | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Malpighiales | EUPHORBIACEAE | Argytha | Argycrem | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Gentianales | ASCLEPIADACEAE | Asclepi | Asclcura | Native | liana | L | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | ASCLEPIADACEAE | Astepha | Astegemi | Endemi | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Astraga | Astrcach | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| DICOT | Fabales | FABACEAE | Astraga | Astrcoqu | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Fabales | FABACEAE | Astraga | Astrpapo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Astraga | Astrtrif | Native | annual herb | T | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Dipsacales | VALERIANACEAE | Astreph | Astrchaer | Native | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atricliv | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atrirotu | Endemi | subshrub | Ch | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atriatac | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atridese | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atriimbr | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atriperu | Native | shrub | NP | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atri | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atritalt | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atrinumm | Introd | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Atriple | Atrisemi | Introd | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Bacchar | Bacctalt | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| DICOT | Asterales | ASTERACEAE | Bacchar | Bacc1 | none | none | no | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bacchar | Bacc2 | none | none | no | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bacchar | Baccjunc | Native | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Bacchar | BaccSali | Native | shrub | NP | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bacchar | Bacc | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Bacopa | Baco | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Bacopa | Bacomonn | Native | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bahia a | Bahiambr | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | PLUMBAGINACEAE | Bakerol | Limoplum | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Geraniales | GERANIACEAE | Balbisi | Balbpedu | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Bastard | Bastbiva | Native | subshrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cucurbitales | BEGONIACEAE | Begonia | Begogera | Native | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cucurbitales | BEGONIACEAE | Begonia | Begoocto | Native | perennial herb | P | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ranunculales | BERBERIDACEAE | Berberi | Berbacti | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bide | none | none | no | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bideandi | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bideandi2 | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bidepilo2 | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bidepilo3 | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bide2 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Bidens | Bidepilo | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Boerhav | Boer | none | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Boerhav | Boercocc | Native | perennial herb | Ch | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Bowlesi | Bowlpapo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Bowlesi | Bowlpalm | Native | annual herb | T | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Bowlesi | Bowlsodi | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Brassic | Bras | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Caesalp | Caesspin | Endemi | tree | MiP | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Caesalp | Caesvisc | Native | tree | MiP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calaalba | Endemi | annual herb | T | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calacach | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calacaly | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calagran | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calalito | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calapauc | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calasiti | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calatalt | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calachry | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Calacili | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Cala | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Calandr | Cala2 | Native | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcbico | Endemi | shrub | NP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcglan | Endemi | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcking | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcpapo | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcrinc | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcutri | Endemi | annual herb | T | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcdich | Native | annual herb | T | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calcpinn | Native | annual herb | E | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calc | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Calceol | Calctenu | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Callian | Callexpa | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Callian | Callpros | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | CALLITRICHACEAE | Callitr | Callterr | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | CAPPARACEAE | Cappari | Cappcrot | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | CAPPARACEAE | Cappari | Capppris | Native | shrub | NP | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | CAPPARACEAE | Cappari | Cappscab | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Capsell | Capsburs | Introd | annual herb | T | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Cardion | Cardramo | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Sapindales | SAPINDACEAE | Cardios | Cardcori | Native | liana | L | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | CARICACEAE | Carica | Caricand | Endemi | shrub | NP | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Castill | Castarve | Native | annual herb | T | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Centaur | Centatac | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Centaur | Centcach | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Gentianales | GENTIANACEAE | Centaur | Centloma | Endemi | perennial herb | H | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Centaur | Centmeli | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Cerasti | Cera | none | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Cerasti | Cerahumi | none | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Cerasti | Ceraarve | Introd | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Cercidi | Cercprae | Introd | tree | MiP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Cestrum | Cestauri | Native | shrub | NP | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Chaetan | Chaeglab | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Chaetan | Chaeline | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Chaetan | Chaemoen | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chamaes | Chamhirt | Native | perennial herb | Ch | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chamaes | Chamhype | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chamaes | Chamlasi | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chamaes | Chammeye | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chamaes | Chamserp | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Chenambr | Native | annual herb | T/Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Cheninci | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Chenmacr | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Chenpeti | Native | perennial herb | Ch | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Chen | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Chenalbu | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Chenopo | Chenmura | Introd | annual herb | T | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Chionop | Chiobent | Native | subshrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chirope | Chircane | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chirope | Chircrem | Endemi | shrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Chirope | Chirgigo | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | POLYGONACEAE | Choriza | Chordese | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | POLYGONACEAE | Choriza | Chorcomm | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Chuquir | Chuqulic | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Chuquir | Chuq | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Gentianales | GENTIANACEAE | Cicendi | Cicequad | Native | annual herb | T | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Ciclosp | Cicllaci | Native | annual herb | T | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistamar | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistceph | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistcymo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistgran | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistling | Endemi | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistpani | Endemi | perennial herb | Ch | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistcaly | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistcelo | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistpachy | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Cistant | Cistsals | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Lamiales | VERBENACEAE | Cithare | Cithflex | native | shrub | NP | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cucurbitales | CUCURBITACEAE | Citrull | Citrlana | Introd | liana | L | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Cleisto | Cleiacan | Endemi | cacti | K | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | CAPPARACEAE | Cleome | Cleochil | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| DICOT | Caryophyllales | POLYGONACEAE | Coccolo | Coccgrac | Endemi | tree | MiP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Convolv | Convchil | Endemi | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Solanales | CONVOLVULACEAE | Convolv | Convarve | Introd | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Conyza | Cony | none | none | no | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Conyza | Cony1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Conyza | Conybona | Introd | annual herb | T/H | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copiboli | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copicinera | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copicinere | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copidese | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copigiga | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copihumi | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copikrai | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copilong | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copimarg | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copioliv | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copirari | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Copiapo | Copisept | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Cordia | Cordpoly | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Coreops | Core | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Coronop | Corodidy | Native | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Cotula | Cotuaust | Introd | annual herb | T | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Cotula | Cotucoro | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Saxifragales | CRASSULACEAE | Crassul | Crasclos | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Saxifragales | CRASSULACEAE | Crassul | Crasconn | Native | annual herb | T | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Cressa | Crestrux | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisfuen | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisgrac | Endemi | annual herb | T/Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisinte | Endemi | annual herb | T/Ch | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Cristar | Crismoli | Endemi | annual herb | T | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisovat | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisviri | Endemi | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisaspe | Native | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Cristar | Crisvarf | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Malvales | MALVACEAE | Cristar | Crismult | Native | annual herb | T | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Cristar | Cris | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Croton | Crotalni | Endemi | shrub | NP | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Croton | Crotchil | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Croton | Crotrivi | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Croton | Crotruiz | Native | shrub | NP | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Crucksh | Crucpumi | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Gentianales | RUBIACEAE | Crucksh | Cruchyme | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Cryparge | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Crypcaly | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Crypclan | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Crypfili | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Cryplime | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Cryptalt | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Crypfila | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Crypgran | Native | annual herb | T | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Cryp | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | CrypA | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Cryptan | Crypsuba | native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Cryptoc | Cryppyri | Native | subshrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cucurbitales | CUCURBITACEAE | Cucumis | Cucudips | Introd | liana | L | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Cumulop | Cumuspha | native | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| DICOT | Solanales | CONVOLVULACEAE | Cuscuta | Cuscpurp | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | CONVOLVULACEAE | Cuscuta | Cusc | none | none | no | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Cuscuta | Cuscchil | Native | annual herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Cuscuta | Cuscfoet | Native | liana | E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Cuscuta | Cuscgran | Native | liana | E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Cuscuta | Cuscodor | native | annual herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Cucurbitales | CUCURBITACEAE | Cyclant | Cyclmath | Endemi | liana | L | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | ASCLEPIADACEAE | Cynanch | Cynaatac | Endemi | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Gentianales | ASCLEPIADACEAE | Cynanch | Cynaboer | Endemi | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Gentianales | ASCLEPIADACEAE | Cynanch | Cynaviri | Endemi | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Dalea | Daleazur | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Dalea | Daleonob | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Dalea | Dalepenn | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Daucus | Daucmont | Native | perennial herb | H | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Descura | Desc | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | CONVOLVULACEAE | Dichond | Dichrepe | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Dichond | Dichseri | native | perennial herb | H | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Lamiales | ACANTHACEAE | Diclipt | Diclpap | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Lamiales | ACANTHACEAE | Diclipt | Diclmon | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | ACANTHACEAE | Diclipt | Diclperuv | Native | perennial herb | Ch | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | ACANTHACEAE | Diclipt | Diclrui | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Dictyop | Dictengl | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | MALPIGHIACEAE | Dineman | Dineeric | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Apiales | APIACEAE | Domeyko | Domeampl | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Domeyko | Domeoppo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Apiales | APIACEAE | Domeyko | Domepere | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| DICOT | Apiales | APIACEAE | Domeyko | Domesani | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Drymari | Drympapo2 | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Drymari | Drympapo3 | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Drymari | Drymcord | native | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Drymari | Drymdiva | native | annual herb | T/H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Drymari | Drympapo | native | perennial herb | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | VERBENACEAE | Duranta | Duraarma | Endemi | shrub | NP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Duranta | Duratria | Native | shrub | NP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | ACANTHACEAE | Dyschor | Dyscrep | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Echinop | Echiatac | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Echinop | Echiceph | Endemi | cacti | K | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Echinop | Echichal | Endemi | cacti | K | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Echinop | Echichil | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Echinop | Echidese | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Eclipta | Eclipros | Introd | annual herb | T/H | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Encelia | Encecane | Native | shrub | Ch | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Erechti | Ereclept | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Eremoch | Eremferr | Endemi | subshrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Eremoch | Eremfrut | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Apiales | APIACEAE | Eremoch | Eremlong | Endemi | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Erigero | Erigpapo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Erigero | Eriglept | Native | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eriosyc | Erioisla | Endemi | cacti | K | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eriosyc | Eriooccu | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eriosyc | Eriorode | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Eriosyc | Eriotalt | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Eriosyc | Erio | native | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Geraniales | GERANIACEAE | Erodium | Erodcicu | Introd | annual herb | T | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| DICOT | Geraniales | GERANIACEAE | Erodium | Erodmala | Introd | annual herb | T | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Geraniales | GERANIACEAE | Erodium | Erodmosc | Introd | annual herb | T | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Errazur | Erramult | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Esposto | Espomela | Endemi | cacti | K | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eulychn | Eulyaric | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eulychn | Eulyiqui | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Eulychn | Eulymorr | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eulychn | Eulyritt | Endemi | cacti | K | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Eulychn | Eulysain | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Eulychn | Eulyspin | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphcopi | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphlact | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphtacn | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphthin | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euph | none | none | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphhete | Native | perennial herb | Ch | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphviri | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphminu | Introd | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | EUPHORBIACEAE | Euphorb | Euphpepl | Introd | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Evolvul | Evolargy | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Evolvul | Evollans | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Evolvul | Evolvill | Native | annual herb | T | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Exodeco | Exodpros | Endemi | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Facelis | Faceretu | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Rosids | ZYGOPHYLLACEAE | Fagonia | Fagochil | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Flaveri | Flavbide | native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | FRANKENIACEAE | Franken | Franchil | Native | shrub | NP | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | FRANKENIACEAE | Franken | Fran | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AMARANTHACEAE | Froehli | Froeinte | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Fuertes | Urocmacr | Endemi | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Fuertes | Urocchil | Native | perennial herb | Ch | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Fuertes | Uroclime | Native | perennial herb | Ch | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Fuertes | Fuerperu | Native | annual herb | T | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Ranunculales | PAPAVERACEAE | Fumaria | Fumacapr | Introd | annual herb | T | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ranunculales | PAPAVERACEAE | Fumaria | Fumaparv | Introd | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Galinso | Galicali | Endemi | annual herb | T | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Galinso | Gali | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Galinso | Galiparv | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Galium | Galiareq | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Galium | Galicory | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Gentianales | RUBIACEAE | Galium | Galihypo | Native | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Gentianales | RUBIACEAE | Galium | Gali1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Galium | Galiapar | Introd | annual herb | T | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Galvezi | Galvfrut | Native | shrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Gamocha | Gamooreo | Endemi | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Gamocha | Gamopurp | Native | perennial herb | H | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Gamocha | Gamospha | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Gamocha | Gamoamer | native | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Gaya | Gayaferr | Endemi | no info | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Gaya | Gaya | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Gaya | Gayapilo | Native | no info | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Geraniales | GERANIACEAE | Geraniu | Geralima | Endemi | perennial herb | H | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Geraniales | GERANIACEAE | Geraniu | Gera | none | none | no | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Geraniales | GERANIACEAE | Geraniu | Gera2 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Ericales | POLEMONIACEAE | Gilia | Giliglut | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| DICOT | Ericales | POLEMONIACEAE | Gilia | Gililaci | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | VERBENACEAE | Glandul | Glanatac | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Lamiales | VERBENACEAE | Glandul | Glan | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Glandul | Verbsulp | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Asterales | ASTERACEAE | Gnaphal | Psgnap | none | none | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Gnaphal | Gnapdomb | Native | perennial herb | H | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Gossypi | Gossbarb | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Grabows | Grabboer | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Grindel | Gringlut | native | annual herb | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | GRISELINIACEAE | Griseli | Griscarl | Endemi | shrub | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Gutierr | Gutiespi | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Gutierr | Gutitalt | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Gymnoph | Gymnfoli | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Gypotha | Gypopini | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Haageoc | Haagdecu | Endemi | cacti | K | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Haageoc | Haaglime | Endemi | cacti | K | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Haageoc | Haagmult | Endemi | cacti | K | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Haageoc | Haagaust | Native | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Haplopa | Hapldese | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Haplopa | Haplrosu | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Heleniu | Heleatac | Endemi | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Heleniu | Heleurme | Endemi | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Heleniu | Helelito | Native | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helichen | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helierem | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heliferr | Endemi | subshrub | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heliinco | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helikrau | Endemi | annual herb | T/Ch | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helilina | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heliphil | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helipilo | Endemi | perennial herb | Ch | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helipycn | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heliscle | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helitalt | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heli | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heliangi | Native | perennial herb | Ch | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Heliarbo | Native | shrub | NP | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Heliotr | Helicura | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Heteros | Heteferr | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Heteros | Hetedive | Native | perennial herb | H | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Hoffman | Hoffhoff | Endemi | subshrub | H | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Hoffman | Hoffstip | Endemi | subshrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Hoffman | Hoffpros | Native | perennial herb | H | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Hoffman | Hofftern | Native | shrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Apiales | APIACEAE | Homaloc | Homainte | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Cornales | LOASACEAE | Huidobr | Huidchil | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Cornales | LOASACEAE | Huidobr | Huidfrut | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Hydroco | Hydrbona | Native | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | CLUSIACEAE | Hyperic | Hypepapo | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| DICOT | Malpighiales | CLUSIACEAE | Hyperic | Hypesile | native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | CLUSIACEAE | Hyperic | Hypeulig | Native | perennial herb | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Hypocha | Hypogran | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Hypocho | Hypo | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Hyptis | Hyptsidi | Native | annual herb | T | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Ipomoea | Ipom | none | none | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Ipomoea | Ipomdubi | Native | liana | L | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Ipomoea | Ipomdume | Native | liana | L | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Ipomoea | Ipomnati | Native | liana | L | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Ipomoea | Ipomopul | Native | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Jaltoma | Jaltumbe | Endemi | shrub | NP | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Junelli | Junejuni | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | ACANTHACEAE | Justici | Justcart | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Rosids | KRAMERIACEAE | Krameri | Kramlapp | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | LAMIACEAE | Lamium | Lamiampl | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | VERBENACEAE | Lantana | Lantscab | Endemi | shrub | NP | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Lepechi | Lepeflor | Introd | shrub | NP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Lepidiu | Lepispat | Endemi | biennial/perennial he | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Brassicales | BRASSICACEAE | Lepidiu | Lepijohn | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Lepidiu | Lepistri | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Lepidiu | Lepibona | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Leptogl | Leptdarc | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Leptogl | Leptloma | Endemi | annual herb | T | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Leucher | Leuccerb | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Leucher | Leuccumi | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Leucher | Leucmode | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Leucher | Leuc | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Linaria | Linacana | Native | perennial herb | H | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | LINACEAE | Linum | Linucrem | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Malpighiales | LINACEAE | Linum | Linupapo | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Malpighiales | LINACEAE | Linum | Linupros | Native | perennial herb | Ch | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Lamiales | VERBENACEAE | Lippia | Lippnodi | Native | perennial herb | P | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Sapindales | SAPINDACEAE | Llaguno | Llagglan | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Cornales | LOASACEAE | Loasa | Loasbert | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Cornales | LOASACEAE | Loasa | Loaselon | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Cornales | LOASACEAE | Loasa | Loassess | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Cornales | LOASACEAE | Loasa | Loasniti | Native | annual herb | T | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Cornales | LOASACEAE | Loasa | Loas | none | none | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cornales | LOASACEAE | Loasa | Loastric | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | CAMPANULACEAE | Lobelia | Lobedecu | native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Lotus | Lotusubp | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Myrtales | ONAGRACEAE | Ludwigi | Ludwoct | uncertain | perennial herb | Ch | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Lupinus | Lupimoll | Endemi | perennial herb | H | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Lupinus | Lupimicr | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lycidese | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lyciminu | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | SOLANACEAE | Lyciant | Lycilyci | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lycihumi | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lycileio | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lycinodo | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lyci | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Lycium | Lycisten | Native | shrub | NP | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Myrtales | LYTHRACEAE | Lythrum | Lyth | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Myrtales | LYTHRACEAE | Lythrum | Lythmari | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Malpighiales | MALESHERBIACEAE | Maleshe | Maleareq | Endemi | subshrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | MALESHERBIACEAE | Maleshe | Malehumi | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Malpighiales | MALESHERBIACEAE | Maleshe | Malemult | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | MALESHERBIACEAE | Maleshe | Maletalt | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Malvast | Malv | Native | none | no | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Malvell | Malvlepr | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Malva | Malvparv | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | LAMIACEAE | Marrubi | Marrvulg | Introd | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Gentianales | ASCLEPIADACEAE | Matelea | Matealic | Endemi | liana | L | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Mathews | Mathinca | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Matrica | Matr | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Matrica | Matrrecu | Introd | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Eurosids I | CELASTRACEAE | Maytenu | Maytocto | Native | shrub | NP | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Medicag | Medilupu | Introd | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Medicag | Medipoly | Introd | annual herb | T/H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Melilot | Meliindi | Introd | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Melilot | Melioffi | Introd | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Sapindales | MELIACEAE | Melia a | Meliazed | Introd | tree | MiP | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Melocac | Meloperu | Native | cacti | K | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | STERCULIACEAE | Melochi | Meloch | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Brassicales | BRASSICACEAE | Menonvi | Menoorbi | Endemi | biennial/perennial he | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Menonvi | Menoparv | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Cornales | LOASACEAE | Mentzel | Mentchil | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Cornales | LOASACEAE | Mentzel | Mentcord | Native | shrub | NP | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cornales | LOASACEAE | Mentzel | Mentigne | Native | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | CONVOLVULACEAE | Merremi | Merrtube | Introd | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | AIZOACEAE | Mesembr | Mesecrys | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Microph | Micrlito | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Asterales | ASTERACEAE | Microse | Micrpygm | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Mimosa | Mimoalb | uncertain | tree | MiP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Mimulus | Mimuglab | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Mirabil | Miraacut | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Mirabil | Miraeleg | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Mirabil | Miraexpa | Native | perennial herb | G | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Mirabil | Mirainte | Native | perennial herb | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | NYCTAGINACEAE | Mirabil | Mirapros | Native | perennial herb | P | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Fabales | POLYGALACEAE | Monnina | Monnmacr | Endemi | annual herb | T | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | POLYGALACEAE | Monnina | Monnherb | Native | annual herb | T | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Montiop | Monttrif | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Monttea | Montchil | Endemi | tree | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Moschar | Moscpinn | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Brassicales | BRASSICACEAE | Mostaci | Sisysagi | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Myrtales | MYRTACEAE | Myrcian | Myrcferr | Endemi | tree | NP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | HYDROPHYLLACEAE | Nama di | Namadich | Native | perennial herb | H | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Cornales | LOASACEAE | Nasa | Loasfulv | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cornales | LOASACEAE | Nasa | Nasauren | Native | annual herb | T | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Neoport | Neopisla | Endemi | cacti | K | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Neoport | Neopesme | Native | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Neoport | Neopinte | Native | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CACTACEAE | Neoport | Neopjuss | Native | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Neoraim | Neorareq | Endemi | cacti | K | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Nicandr | Nicaphys | Native | annual herb | T | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Nicotia | Nicoknig | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Nicotia | Nicopani | Endemi | perennial herb | P | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Nicotia | Nicosola | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Solanales | SOLANACEAE | Nicotia | Nicomont | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Nicotia | Nicoglau | Introd | shrub | NP | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaacum | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaaeni | Endemi | annual herb | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaaplo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaaren | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaareq | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaatic | Endemi | shrub | NP | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolacerr | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolachan | Endemi | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolacliv | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaconf | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolacras | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Noladiff | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Noladiva | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaeleg | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaflac | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolagrac | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolainca | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolainco | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolainfl | Endemi | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolainto | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaivan | Endemi | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolajaff | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolajohn | Endemi | biennial/perennial he | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolalati | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolalept | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaline | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolamoll | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolapall | Endemi | annual herb | T/Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolapara | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaperu | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolapilo | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaramo | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolarost | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolarupi | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolasals | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolasedi | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaspat | Endemi | annual herb | T | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolasten | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolathin | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolavill | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nola | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolaadan | Native | shrub | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolahumi | Native | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nolalyci | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | NOLANACEAE | Nolana | Nola1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Myrtales | ONAGRACEAE | Oenothe | Oenoareq | Endemi | annual herb | T | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Myrtales | ONAGRACEAE | Oenothe | Oenocoqu | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Myrtales | ONAGRACEAE | Oenothe | Oenolaci | Native | annual herb | T/H | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Myrtales | ONAGRACEAE | Oenothe | Oenorose | Native | perennial herb | H | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | OLEACEAE | Olea eu | Oleaeuro | Introd | tree | MiP | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Onoseri | Onoshumb | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Onoseri | Onosodor | Native | annual herb | T | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophrgali | Endemi | subshrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophrhopi | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophrtria | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophrbipi | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophrflor | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophrperu | Native | shrub | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Ophryos | Ophr | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Opuntia | Opunquit | Native | cacti | K | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Opuntia | Opuntuni | Introd | cacti | K | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Lamiales | OROBANCHACEAE | Orobanc | Orobwebe | Native | liana | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalarbu | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalatac | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalbrea | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalbulbi | Endemi | perennial herb | G | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalbulbo | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalcaes | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalgiga | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalloma | Endemi | annual herb | G | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalmore | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalorna | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalorni | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalpapo | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalthyr | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalbuch | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalcorne | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxallati | Native | perennial herb | H | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxallaxa | Native | annual herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalmega | Native | perennial herb | H | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxalpach | Native | perennial herb | H | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Oxalidales | OXALIDACEAE | Oxalis | Oxal | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Asterales | ASTERACEAE | Oxyphyl | Oxypulic | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Malvales | MALVACEAE | Palaua | Palaconc | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palaguen | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palamode | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palatome | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palatris | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palavelu | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Pala1 | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Pala2 | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Paladiss | Native | annual herb | T | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palainco | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palamalv | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palamoll | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palamosc | Native | perennial herb | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palapusi | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palarhom | Native | annual herb | T | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Palaua | Palawebe | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Rosales | URTICACEAE | Parieta | Paridebi | Native | annual herb | T | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Paronyc | Parojohn | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Paronyc | Parochil | native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | PASSIFLORACEAE | Passifl | Passsube | Native | liana | L | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Pectoca | Pectdimo | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Pectoca | Pectlate | Endemi | annual herb | T | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepecrys | Endemi | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepedoel | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepeatoc | Native | subshrub | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepedola | native | subshrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepegali | Native | subshrub | E | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepehill | Native | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Piperales | PIPERACEAE | Peperom | Pepeperu | Native | subshrub | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Perityl | Peridisc | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Asterales | ASTERACEAE | Perityl | Periemor | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Philogl | Philperu | Endemi | perennial herb | Ch | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Philogl | Philpurp | Endemi | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Picrosi | Picrlong | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Rosales | URTICACEAE | Pilea | Pileniti | Endemi | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Rosales | URTICACEAE | Pilea | Pilemicr | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Pitraea | Pitrcune | Native | perennial herb | no | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Plandese | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planhisp | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planlime | Endemi | perennial herb | H | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planlito | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planranc | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planpach | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Plan | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planlanc | Introd | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | PLANTAGINACEAE | Plantag | Planmajo | Introd | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Myrtales | LYTHRACEAE | Pleurop | Pleupung | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Pluchea | Plucchin | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PLUMBAGINACEAE | Plumbag | Plumcoer | Native | perennial herb | Ch | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Polyach | Polycine | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Polyach | Polypoep | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Polyach | Polyaspha | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Polyach | Polyannu | native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Polyach | Polyfusc | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Portula | Portnive | Endemi | annual herb | T/Ch | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Portula | Port | none | none | no | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Portula | Portpere | native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | PORTULACACEAE | Portula | Portphil | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | PORTULACACEAE | Portula | Portoler | Introd | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cornales | LOASACEAE | Preslio | Loasinca | native | shrub | NP | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Prousti | Proucune | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Pseudog | Pseuhete | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Fabales | POLYGALACEAE | Pteromo | Pterpter | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Pyrrhoc | Pyrroccu | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Pyrrhoc | Pyrrreco | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Pyrrhoc | Pyrr | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Santalales | SANTALACEAE | Quincha | Quincarn | Endemi | annual herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Santalales | SANTALACEAE | Quincha | Quinloma | Endemi | annual herb | E | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Santalales | SANTALACEAE | Quincha | Quinchil | Native | perennial herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Santalales | SANTALACEAE | Quincha | Quinproc | native | annual herb | E | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Santalales | SANTALACEAE | Quincha | Quin | none | annual herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Santalales | SANTALACEAE | Quincha | Quinthes | Native | annual herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Gentianales | RUBIACEAE | Randia | Randrotu | Native | shrub | NP | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Ranunculales | RANUNCULACEAE | Ranuncu | Ranucymb | Native | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Reyesia | Reyechil | Endemi | biennial/perennial he | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Rhysole | Rhysdill | endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Richard | Richlome | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Roripa | Rorinast | Introd | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | POLYGONACEAE | Rumex | Rumecong | Introd | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Sagina | Sagiapet | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Salvia | Salvpapo | Native | annual herb | T | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | LAMIACEAE | Salvia | Salvrhom | Native | annual herb | T | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Salvia | Salvtubi | Native | perennial herb | H | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Lamiales | LAMIACEAE | Salvia | Salvgill | Introd | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Gentianales | ASCLEPIADACEAE | Sarcost | Sarcsola | Native | liana | L | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Arthtoc | Sarcfrut | Introd | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Solanales | SOLANACEAE | Schizan | Schicand | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Schizan | Schilact | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Schizan | Schilaet | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| DICOT | Solanales | SOLANACEAE | Schizan | Schilito | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Sapindales | ANACARDIACEAE | Schinus | Schi mol | Native | tree | MiP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senealme | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Seneanto | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senecach | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senelomi | Endemi | shrub | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senemoll | Endemi | shrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senemyri | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senepapo | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senephil | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senetrux | Endemi | shrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Sene | none | none | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Seneabad | Native | shrub | Ch | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Senepseu | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Senecio | Sene1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Senna | Senncumi | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Senna | Sennpapo | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Senna | Sennbir | uncertain | shrub | P | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Senna | Sennbro | uncertain | shrub | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AIZOACEAE | Sesuviu | Sesuport | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Cucurbitales | CUCURBITACEAE | Sicyos | Sicybade | Native | liana | L | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Cucurbitales | CUCURBITACEAE | Sicyos | Sicykunt | Native | liana | L | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Sida | Sidadeca | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Sida | Sidaolig | Native | no info | no | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Sida | Sidasecc | Native | no info | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Siegesb | Siegflos | Native | perennial herb | H | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Siegesb | Siegjoru | Native | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Silene | Silegall | Introd | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Gentianales | APOCYNACEAE | Skytant | Skytacut | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DICOT | Solanales | SOLANACEAE | Solanum | Solabrach | Endemi | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solapinn | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solaremy | Endemi | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solawitt | Endemi | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Sola | none | none | no | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solaagri | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solaamer | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Lycochil | Native | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solafrag | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Lycohirs | Native | shrub | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solaimmi | Native | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Lycoscul | native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solamoch | Native | annual herb | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solamonta | Native | perennial herb | H | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solamult | Native | annual herb | T | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solanigr | Native | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solaonag | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Lycopenn | Native | perennial herb | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Lycoperu | Native | subshrub | Ch | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Lycopimp | Native | annual herb | T/H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Solaradi | Native | shrub | H | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Solanales | SOLANACEAE | Solanum | Sola1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Sonchus | Soncoler | introd | annual herb | T | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Sonchus | Sonctene | introd | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| DICOT | Apiales | APIACEAE | Spanant | Spanpani | Native | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergarbu | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergcollina | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergconge | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergcrem | Endemi | annual herb | T/H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergdent | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergsten | Endemi | annual herb | T/Ch | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Sperg | none | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Spergfasc | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Spergul | Sperg1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Spermac | Sperm | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | RUBIACEAE | Spermac | Spermtenu | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Stachys | Stacerem | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | LAMIACEAE | Stachys | Stacgran | Endemi | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Lamiales | LAMIACEAE | Stachys | Stacpann | Endemi | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Lamiales | LAMIACEAE | Stachys | Stacperu | Endemi | perennial herb | H | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Stachys | Stacherr | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Stachys | Stacarve | Introd | annual herb | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Stellar | Stelcusp | Native | perennial herb | Ch | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Stellar | Stelmicr | native | perennial herb | Ch | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Stellar | Stelovat | Native | perennial herb | Ch | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CARYOPHYLLACEAE | Stellar | Stelmedi | Introd | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Stevia | Stevmeli | Endemi | annual herb | T | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Stevia | Stevphil | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Stevia | Stevhyss | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Asterales | ASTERACEAE | Stevia | Stevovat | Native | subshrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Suaeda | Suae | none | none | no | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Suaeda | Suaediva | native | shrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| DICOT | Caryophyllales | CHENOPODIACEAE | Suaeda | Suaefoli | Native | shrub | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Tarasa | Taraoper | Native | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malvales | MALVACEAE | Tarasa | Tararahm | Native | annual herb | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrangu | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrcopi | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrmari | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrcrys | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrmacr | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrmicr | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrovat | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrpedu | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | AIZOACEAE | Tetrago | Tetrvest | Native | annual herb | T | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | LAMIACEAE | Teucriu | Teucnudi | Endemi | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiqusimu | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiqutacn | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiqu | none | none | no | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiqucons | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiqulito | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiquparo | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tiquili | Tiqua | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Euasterids I | BORAGINACEAE | Tournef | Tourmicr | Native | liana | L | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | BIGNONIACEAE | Tourret | Tourlapp | Native | liana | L | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Caryophyllales | CACTACEAE | Trichoc | Triccoqu | Endemi | cacti | K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Trifoli | Trifpoly | Introd | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| DICOT | Fabales | FABACEAE | Trifoli | Trifrepe | Introd | perennial herb | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | CAMPANULACEAE | Triodan | Triobifl | native | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | CAMPANULACEAE | Triodan | Trioperf | Native | annual herb | T | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Asterales | ASTERACEAE | Trixis | Trixcaca | Native | shrub | NP | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | TROPAEOLACEAE | Tropaeo | Tropazur | Endemi | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | TROPAEOLACEAE | Tropaeo | Troptric | Endemi | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| DICOT | Brassicales | TROPAEOLACEAE | Tropaeo | Tropbeut | Native | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Brassicales | TROPAEOLACEAE | Tropaeo | Tropmaju | Native | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | TROPAEOLACEAE | Tropaeo | Tropminu | Native | annual herb | L | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | TROPAEOLACEAE | Tropaeo | Troppelt | Native | annual herb | L | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Gentianales | ASCLEPIADACEAE | Tweedia | Tweebiro | Endemi | liana | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malvales | MALVACEAE | Urocarp | Uroc | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Rosales | URTICACEAE | Urtica | Urtiuren | Introd | annual herb | T | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| DICOT | Dipsacales | VALERIANACEAE | Valeria | Valeatac | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| DICOT | Dipsacales | VALERIANACEAE | Valeria | Valepinn | Endemi | perennial herb | H | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Vasquez | Vasqoppo | Native | annual herb | T | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Verbena | Verbclav | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Verbena | Verbferr | Endemi | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Verbena | Verblito | Native | perennial herb | Ch | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | VERBENACEAE | Verbena | Verb | none | none | no | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Verbesi | Verbsaub | Native | subshrub | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Lamiales | SCROPHULARIACEAE | Veronic | Veropers | Introd | annual herb | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Vicia | Vicimode | Endemi | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Vicia | Vicipapo | Endemi | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Vicia | Vicivici | Endemi | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Fabales | FABACEAE | Vicia | Vicilome | Native | annual herb | L | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Vigna | Vignlute | Introd | annual herb | L | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Viguier | Viguwebe | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Viguier | Vigu | none | none | no | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Malpighiales | VIOLACEAE | Viola | Violpoly | Endemi | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| DICOT | Malpighiales | VIOLACEAE | Viola | Violtalt | Endemi | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | VIOLACEAE | Viola | Viollito | Native | perennial herb | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DICOT | Malpighiales | VIOLACEAE | Viola | Violwebe | Native | annual herb | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Fabales | FABACEAE | Weberba | Webebron | Endemi | shrub | Ch | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Asterales | ASTERACEAE | Wedelia | Wedelati | native | perennial herb | H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DICOT | Brassicales | BRASSICACEAE | Werderm | Werdanet | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| DICOT | Asterales | ASTERACEAE | Zinnia | Zinnperu | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Adiantu | Adiachil | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Adiantu | Adiadigi | Native | perennial herb | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Adiantu | Adiasubv | Native | perennial herb | Ch | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Anogram | Anoglept | Introd | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | ASPLENIACEAE | Aspleni | Asplfrag | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| FERN | Polypodiales | ASPLENIACEAE | Aspleni | Aspllore | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FERN | Salviniales | AZOLLACEAE | Azolla | Azolmexi | native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | BLECHNACEAE | Blechnu | Blecocci | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Cheilan | Cheiperu | Endemi | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Cheilan | Cheimoll | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| FERN | Polypodiales | WOODSIACEAE | Cystopt | Cystfrag | Native | perennial herb | Ch | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | DRYOPTERIDACEAE | Dryopte | Dryosaff | Native | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | LOMARIOPSIDACEAE | Elaphog | Elapminu | Introd | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Ophioglossales | OPHIOGLOSSACEAE | Ophiogl | Ophilusi | Native | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Ophioglossales | OPHIOGLOSSACEAE | Ophiogl | Ophireti | Native | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | PTERIDACEAE | Pityrog | Pitytrif | Native | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | POLYPODIACEAE | Pleopel | Pleomacr | Introd | perennial herb | Ch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | POLYPODIACEAE | Polypod | Polypespi | Endemi | perennial herb | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| FERN | Polypodiales | POLYPODIACEAE | Polypod | Polylasi | Endemi | perennial herb | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | POLYPODIACEAE | Polypod | Polypycn | Native | perennial herb | Ch | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FERN | Polypodiales | DENNSTAEDTIACEAE | Pteridi | Pteraqui | Native | perennial herb | Ch | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GYMNO | Gnetales | EPHEDRACEAE | Ephedra | Ephe | none | subshrub | Ch | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GYMNO | Gnetales | EPHEDRACEAE | Ephedra | Epheamer | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| GYMNO | Gnetales | EPHEDRACEAE | Ephedra | Ephebrea | Native | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| GYMNO | Gnetales | EPHEDRACEAE | Ephedra | Ephe1 | none | subshrub | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Aira ca | Airacary | Introd | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Alstroe | Alstgram | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Asparagales | AMARYLLIDACEAE | Alstroe | Alstlute | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Alstroe | Alstpaup | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| MONOC | Asparagales | AMARYLLIDACEAE | Alstroe | Alstpele | Native | perennial herb | G | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Alstroe | Alst | none | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Alstroe | Alstviol | Native | perennial herb | G | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Liliales | LILIACEAE | Antheri | Antherecc | Native | annual herb | G | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Aristid | Arisadsc | Introd | graminoid | T | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Avena | Avenbarb | Introd | graminoid | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Avena | Avenfatu | Introd | graminoid | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Avena | Avenster | Introd | graminoid | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Liliales | LILIACEAE | Bomarea | Bomaovat | Native | liana | L | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Bothrio | Both | none | graminoid | no | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Bromus | Bromstri | Endemi | graminoid | T | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Bromus | Brombert | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Bromus | Bromhaen | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Bromus | Bromcath | Introd | graminoid | H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Cenchru | Cenctrib | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Cenchru | Cencince | Introd | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Chlidan | Chlifrag | Native | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | ORCHIDACEAE | Chlorae | Chloundu | Native | perennial herb | Ch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Chloris | Chloradi | Introd | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Chloris | Chlovirg | Introd | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinales | COMMELINACEAE | Commeli | Commdiff | Native | perennial herb | H | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinales | COMMELINACEAE | Commeli | Commfasc | Native | perennial herb | H | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | TECOPHILAEACEAE | Conanth | Conacamp | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| MONOC | Poales | POACEAE | Cynodon | Cynodact | Introd | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Cyperus | Cypeerag | Native | graminoid | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Cyperus | Cypeherm | Native | graminoid | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Cyperus | Cypelaev | Native | graminoid | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | CYPERACEAE | Cyperus | Cypeochr | Native | graminoid | P | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Cyperus | Cypesqua | Native | graminoid | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Deutero | Deutchry | Endemi | perennial herb | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| MONOC | Dioscoreales | DIOSCOREACEAE | Dioscor | Dios | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Dioscoreales | DIOSCOREACEAE | Dioscor | Diostene | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| MONOC | Poales | POACEAE | Distich | Distscop | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Distich | Distspic | Native | graminoid | H | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Echinoc | Echicolo | Introd | graminoid | T | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Eleocha | Eleoalbi | Native | graminoid | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MONOC | Poales | POACEAE | Eleusin | Eleutris | Introd | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Elymus | Elympapo | Endemi | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Elymus | Elymagro | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Dioscoreales | DIOSCOREACEAE | Epipetr | Epipbilo | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Eragros | Eragatte | Endemi | graminoid | H | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Eragros | Eragperu | Endemi | graminoid | T | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Eragros | Eragmexi | Native | graminoid | T | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Eragros | Eragnigr | Native | graminoid | T | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Eragros | Eragwebe | Native | graminoid | H | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Eragros | Eragcili | Introd | graminoid | T | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Eriochl | Eriochpa | Native | graminoid | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Festuca | Festmore | Endemi | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Festuca | Fest | none | graminoid | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Festuca | FestA | none | graminoid | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MONOC | Liliales | LILIACEAE | Fortuna | Fortbifl | Native | perennial herb | G | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| MONOC | Asparagales | AMARYLLIDACEAE | Furcrae | Furcocci | Endemi | perennial herb | G | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Alismatales | ARACEAE | Gorgoni | Gorgvarg | Endemi | perennial herb | G | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Hippeas | Hipplaet | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| MONOC | Asparagales | AMARYLLIDACEAE | Ismene | Ismeaman | Endemi | perennial herb | G | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Jarava | Jaraplum | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | JUNCACEAE | Juncus | Juncacut | Native | graminoid | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MONOC | Poales | JUNCACEAE | Juncus | Juncbufo | Native | graminoid | T | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | JUNCACEAE | Juncus | Juncmicr | Native | graminoid | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Leptoch | Leptunin | Introd | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Liliales | LILIACEAE | Leucoco | Leucappe | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| MONOC | Liliales | LILIACEAE | Leucoco | Leucnarc | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Nassell | Nasspung | Endemi | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| MONOC | Poales | POACEAE | Nassell | Nassmucr | Native | graminoid | H | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Nassell | Nassnard | Native | graminoid | H | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Liliales | LILIACEAE | Nothosc | Nothandi | Native | perennial herb | G | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | IRIDACEAE | Olsyniu | Olsyscir | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Liliales | LILIACEAE | Pasithe | Pasicoer | Native | perennial herb | G | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Paspalu | Paspcand | Native | graminoid | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Paspalu | Paspflav | Native | graminoid | T | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Paspalu | Pasppeni | Native | graminoid | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Paspalu | Pasppygm | Native | graminoid | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Paspalu | Pasprace | Native | graminoid | T | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Paspalu | Paspvagi | Introd | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Asparagales | ORCHIDACEAE | Pelexia | Pelematu | Native | perennial herb | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Pennise | Pennclan | Introd | graminoid | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Phalari | Phalcana | Introd | graminoid | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Piptoch | Piptmont | Native | graminoid | H | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Pitcair | Pitclope | Endemi | annual herb | NP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Poa | Poa bona | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Poa | Poa | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Poa | Poa annu | Introd | graminoid | T | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Polypog | Polypogaust | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Polypog | Polychil | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Polypog | Polyinte | Native | graminoid | H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Polypog | Polyline | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Polypog | Polylitt | Introd | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MONOC | Commelinoids | BROMELIACEAE | Puya | Puyaboli | Endemi | shrub | NP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| MONOC | Commelinoids | BROMELIACEAE | Puya | Puyaferr | Native | perennial herb | NP | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Raimund | Raimtrac | Native | graminoid | T | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| MONOC | Asparagales | AMARYLLIDACEAE | Rhodoph | Rhodprat | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Alismatales | POTAMOGETONACEAE | Ruppia | Ruppmari | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MONOC | Poales | CYPERACEAE | Scirpus | Scir | none | graminoid | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Scirpus | Sciramer | Native | graminoid | P | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | CYPERACEAE | Scirpus | Sciraspe | Native | graminoid | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | CYPERACEAE | Scirpus | Scircern | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONOC | Poales | POACEAE | Setaria | Setavert | Introd | graminoid | T | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | IRIDACEAE | Sisyrhi | Sisy | none | none | no | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | IRIDACEAE | Sisyrin | Sisyraren | Native | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Asparagales | IRIDACEAE | Sisyrin | Sisygram | Native | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| MONOC | Asparagales | IRIDACEAE | Sisyrin | Sisymicr | Native | annual herb | T | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | IRIDACEAE | Sisyrin | Sisyr1 | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Stenome | Stencocc | Endemi | perennial herb | G | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Stenome | Stenflav | Endemi | perennial herb | G | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Stenome | Steninca | Native | perennial herb | G | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Stipa | Stippach | Endemi | graminoid | H | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Stipa | Stiptort | Endemi | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Stipa | Stipannu | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Stipa | Stipichu | Native | graminoid | H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Stipa | Stipplum | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| MONOC | Poales | POACEAE | Stipa | Stipspec | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Stipa | Stipvagi | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| MONOC | Asparagales | IRIDACEAE | Tigridi | Tigrphil | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| MONOC | Asparagales | IRIDACEAE | Tigridi | Tigrgran | Native | perennial herb | G | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillgeis | Endemi | perennial herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillland | Endemi | annual herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tilltrag | Endemi | perennial herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillwerd | Endemi | perennial herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillcapi | Native | perennial herb | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tilldist | Native | perennial herb | E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillflor | Native | perennial herb | E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tilllati | Native | perennial herb | E | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillmult | Native | perennial herb | E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillpurp | Native | perennial herb | E | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillrecu | Native | perennial herb | E | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Till | none | perennial herb | E | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinoids | BROMELIACEAE | Tilland | Tillusne | Native | perennial herb | E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Commelinales | COMMELINACEAE | Tinanti | Tinaerec | Native | annual herb | T | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | CYPERACEAE | Torulin | Toruodor | Native | graminoid | P | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Tragus | Tragbert | Introd | graminoid | T | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Tragus | Tragrace | Introd | graminoid | T | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Liliales | LILIACEAE | Trichop | Trichplum | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Alismatales | JUNCAGINACEAE | Trigloc | Trigpalu | Native | graminoid | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MONOC | Alismatales | JUNCAGINACEAE | Trigloc | Trigstri | Native | graminoid | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Trisetu | Trisecaud | Native | graminoid | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Liliales | LILIACEAE | Tristag | Trist | none | none | no | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Urochlo | Urocmuti | Introd | graminoid | P | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MONOC | Poales | POACEAE | Vulpia | Vulpanto | Endemi | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Vulpia | Vulpaust | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Poales | POACEAE | Vulpia | Vulperio | Native | graminoid | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Poales | POACEAE | Vulpia | Vulpmyur | Native | graminoid | T | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| MONOC | Alismatales | POTAMOGETONACEAE | Zannich | Zannpalu | Native | perennial herb | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| MONOC | Asparagales | TECOPHILAEACEAE | Zephyra | Zepheleg | Endemi | perennial herb | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| MONOC | Asparagales | AMARYLLIDACEAE | Zephyra | Zalbicans | Native | perennial herb | G | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total species number | | | | | | | | 169 | 137 | 111 | 204 | 157 | 70 | 105 | 105 | 79 | 159 | 97 | 347 | 199 |