

**Table 1** - *Isoplexido sceptri-Euphorbietum melliferae*

# of relevé	1	2	3
m.s.m. (1=10m)	102	102	.
Area (m <sup>2</sup> )	400	400	300
Aspect	NW	NW	NE
<b>Characteristic combination</b>			
<i>Euphorbia mellifera</i>	2	3	3
<i>Isoplexis sceptrum</i>	1	2	1
<i>Sonchus fruticosus</i>	3	2	1
<i>Erysimum bicolor</i>	1	1	1
<i>Melanoselinum decipiens</i>	2	1	.
<i>Musschia wollastonii</i>	1	2	.
<b>Characteristic of higher syntaxa</b>			
<i>Clethra arborea</i>	.	1	+
<i>Teline maderensis</i>	+	.	.
<i>Erica maderinicola</i>	+	+	.
<i>Rubus bollei</i>	+	.	.
<i>Rubia agostinhoi</i>	+	.	.
<i>Vaccinium padifolium</i>	.	+	+
<i>Phyllis nobla</i>	1	2	2
<i>Sibthorpia peregrina</i>	.	.	1
<i>Rosa mandonii</i>	.	+	.
<i>Ocotea foetens - pl.</i>	.	.	1
<i>Succisa pratensis</i>	+	1	.
<i>Origanum virens</i>	.	+	.
<i>Geranium palmatum</i>	1	2	1
<i>Pericallis aurita</i>	+	.	+
<i>Bystropogon punctatus</i>	+	1	+
<i>Dactylorhiza foliosa</i>	+	.	.
<i>Ageratina adenophora</i>	1	.	.
<i>Rubus bollei</i>	.	+	+
<i>Argyranthemum pinnatifidum</i>	+	+	.
<i>Erigeron karvinskianus</i>	+	1	+
<i>Hypochaeris radicata</i>	.	+	.
<i>Festuca donax</i>	+	1	.
<i>Pteris incompleta</i>	.	+	1
<i>Cirsium latifolium</i>	.	+	+
<i>Tolpis macrorhiza</i>	.	1	.
<i>Cedronella canariensis</i>	+	.	.
<i>Stegnogramma pozoi</i>	.	+	+
<i>Arachniodes webbiana</i>	.	+	.
<i>Aichryson divaricatum</i>	+	.	+
<i>Ranunculus cortusifolius</i>	.	+	+
<i>Carex peregrina</i>	.	+	.
<i>Blechnum spicant</i>	.	+	.
<i>Carex lowei</i>	.	+	+
<i>Dryopteris aitoniana</i>	.	+	.
<i>Davallia canariensis</i>	.	+	.
<i>Brachypodium sylvaticum</i>	.	1	+
<i>Doodia caudata</i>	.	+	.

**Sites:** 1,2 Folhadal; 3: Fajã da Nogueira.

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**XXXV: The vegetation of Madeira: III - *Diplazio caudati-Perseetum indicum* ass. nova and *Rhamno glandulosi-Sambucetum lanceolati* ass. nova: two new hygrophillic forest associations from Madeira Island .**

Descriptions of forest vegetation of Madeira Island included, so far, two types of climatophylous broadleaf forest vegetation – *Clethro arboreae-Ocoteetum foetentis* and *Semele androgynae-Apollonietum barbujanae* – with an arboreal *stratum* respectively dominated by two *Lauraceae* trees: *Ocotea foetens* [til] and *Apollonia barbujana* [barbusano]. Recently, we discovered that the other *Lauraceae* Madeira's tree – *Persea indica* [vinhático] – is the dominant tree in a third type of broadleaf forest - *Diplazio caudati-Perseetum indicum* ass. nova. This is an edaphohygrophylous forest, proper of middle and lower-course permanent streams, over fairly thick colluvial (rarely alluvial) substrata. It ranges from the termomediterranean sub-humid stage to the mesomediterranean humid stage. Its characteristic combination involves: *Persea indica*, *Dryopteris aitoniana*, *Woodwardia radicans*, *Diplazium caudatum*, *Pteris incompleta*, etc. Nowadays, the *Diplazio-Perseetum indicum* is a rare phytocoenosis because *Persea indica* is a source of noble wood and many of its

habitats were also suitable for agriculture. The prickly scrub communities of the *Rubio agostinhoi-Rubetum bollei* were identified as the subseral stage of the *Diplazio-Perseetum indici*. It is also possible that at least some *Salix canariensis* communities (*Scrophulario hirtae-Salicetum canariensis*), occupied today former *Persea indica* forests biotopes. Its geovicarious edaphohygrophylous community in the western Canary Islands (*Ixantho-Laurion*) is a mixed wood of *Persea indica* and *Ocotea foetens* (*Diplazio caudati-Ocoteetum foetentis*, vd. RIVAS-MARTÍNEZ *et al.* (1993), *Itin. Geobot.* 7 : 169-364 ).

In turn, in steep torrential upper-course stream riffles, with coarse stony substrata, in the scope of the *Clethro-Ocoteetum foetentis* climatophyllous stage, the *Diplazio caudati-Perseetum indici* is substituted by an yet undescribed nanophanerophytic phytocoenosis – *Rhamno glandulosi-Sambucetum lanceolati* ass. nova – dominated by *Sambucus lanceolata* and *Rhamnus glandulosa*. Due to partial *habitat* similarity (clearings in the canopy) *Euphorbia mellifera* sometimes tends to co-dominate the community as is the less specialized caulirosetted element. Nevertheless, the presence in the *Rhmano-Sambucetum lanceolati* of a wealth of escio-hygrophilous ferns [e.g. *Woodwardia radicans*, *Diplazium caudatum*, *Stegnogramma pozoii*], supports its syntaxonomical differentiation from the mesophytic *caulirosetulati* communities of the *Isoplexido sceptri-Euphorbietum melliferae*. In the opposite direction, the absence of other caulirosetted plants [*Isoplexis sceptrum*, *Musschia wollastonii*, *Melanoselinum decipiens*] allows also to distinguish both communities.

Both associations are affiliated to the *Sibthorpio peregrinae-Clethrion arboreae* Capelo, J.C. Costa, Lousã, Fontinha, Jardim, Sequeira & Rivas-Martínez 2000; *Pruno hixae-Lauretalia novocanariensis* Oberdorfer ex Rivas-Martínez *et al.* 1977 corr. Rivas-Martínez *et al.* 2002; *PRUNO HIXAE-LAURETEA NOVOCANARIENSIS* Oberdorfer 1965 corr. Rivas-Martínez *et al.* 2002.

1 - ***Rhamno glandulosi - Sambucetum lanceolati*** Rivas-Martínez, Capelo, J.C. Costa, Jardim, Sequeira, Aguiar, & Lousã associatio nova hoc loco

[*typus*: table 1 , relevé #1].

[=*Clethro arboreae-Ocoteetum foetentis* variante de *Isoplexis sceptrum* sensu CAPELO *et al.* (1999) *Veget. Madeira I. Silva Lusit.* 7(2) : 263, 264 & tab. 4: inv. 8, 9 e 10].

2 - ***Diplazio caudati-Perseetum indici*** Jardim, Sequeira, Capelo, J.C. Costa, Aguiar & Lousã associatio nova hoc loco

[*typus*: table 2, relevé #2].

[Scale: Br.-Bl. Modified by Reichelt & Wilmanns (1973) – *Vegetationsgeographie* - in class 2, it adds: 2m= less than 5%; 2a= 5-15%; 2b=15-25%].

[taxonomical nomenclature follows: PRESS & SHORT (1994) *Flora of Madeira*. BM. London; and also the checklist of taxa of RIVAS-MARTÍNEZ, DÍAZ, F. DEZ-GONZÁLEZ, IZCO, LOIDI, LOUSA & PENAS (2002) - *Itinera Geobotanica* 15(2) : 697-813. Sometimes names are shortened to the last infra-specific rank].

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**Table 1** - *Rhamno glandulosi-Sambucetum lanceolati*

# of relevé	1	2	3	4	5
m.s.m. (1=10m)	100	90	110	65	103
Area (m <sup>2</sup> )	100	100	60	50	45
Aspect	N	NE	NW	N	N
<b>Characteristic combination</b>					
<i>Sambucus lanceolata</i>	3	1	3	2	+
<i>Rhamnus glandulosa</i>	1	3	1	+	3
<i>Euphorbia mellifera</i>	+	+	1	1	1
<i>Diplazium caudatum</i>	2	+	1	3	.
<i>Festuca donax</i>	2	2	1	1	+
<i>Sibthorpia peregrina</i>	+	+	1	1	1
<i>Pteris incompleta</i>	+	+	+	3	.
<i>Clethra arborea</i>	.	1	1	+	2
<i>Sonchus fruticosus</i>	.	1	2	.	1
<i>Phyllis nobla</i>	.	1	+	1	1
<i>Isoplexis spectrum</i>	.	+	+	.	.
<i>Hypericum grandifolium</i>	.	2	.	+	.
<i>Rubia agostinhoi</i>	.	.	+	+	1
<i>Rosa mandonii</i>	1	.	.	.	.
<i>Salix canariensis</i>	.	+	1	+	.
<i>Laurus novocanariensis</i>	.	.	+	1	+
<i>Cystopteris diaphana</i>	1	+	.	.	.
<i>Athyrium filix-foemina</i>	1	2	.	.	1
<i>Rubus grandifolius</i>	.	1	.	+	.
<i>Cirsium latifolium</i>	.	.	+	.	+
<i>Ocotea foetens</i>	.	.	.	+	.
<i>Rubus bollei</i>	.	.	.	1	.
<i>Urtica morifolia</i>	.	.	.	1	.
<i>Hedera maderensis</i>	.	.	.	+	.
<i>Cedronella canariensis</i>	.	.	.	+	.
<i>Argyranthemum</i>	.	.	+	+	.
<i>Ilex perado</i>	.	.	.	1	.
<i>Dryopteris aitoniana</i>	.	.	+	.	.
<i>Dryopteris maderensis</i>	.	+	.	.	.
<i>Erica maderinicola</i>	.	.	.	.	+
<i>Vaccinium padifolium</i>	.	.	.	.	+
<b>Companions</b>					
<i>Oenanthe divaricata</i>	2	1	1	2	1
<i>Woodwardia radicans</i>	.	2	3	+	3
<i>Deschampsia argentea</i>	1	2	1	+	.
<i>Ranunculus cortusifolius</i>	+	+	+	.	.
<i>Aichrysum divaricatum</i>	+	.	+	+	.
<i>Ageratina adenophora</i>	.	1	.	+	.
<i>Tamnobryum alopecurum</i>	2	.	.	.	.
<i>Echinodium spinosum</i>	2	.	.	.	1
<i>Asterella africana</i>	1	.	.	.	1
<i>Porella inaequalis</i>	1	.	.	.	.
<i>Doodia caudata</i>	.	.	.	1	.
<i>Stegnogramma pozoi</i>	.	.	.	.	+
<i>Dactylorhiza foliosa</i>	+	.	.	.	.
<i>Chelidonium majus</i>	.	.	.	+	.
<i>Pteridium aquilinum</i>	.	.	.	+	.
<i>Stellaria alsine</i>	.	.	+	.	.
<i>Peucedanum lowei</i>	.	.	.	+	.
<i>Erigeron karvinskianus</i>	.	.	.	.	+

**Sites:** 1, 3, 5 Folhadal; 2 Levada do Caldeirão Verde, 4 Chão de Louros

**Table 2** - *Diplazio caudati-Perseetum indicii*

# of relevé	1	2	3	4	5	6
m.s.m.	772	.	929	930	866	865
Aspect	S	S	.	.	W	W
Area	100	100	100	150	200	150
<b>Characteristic combination</b>						
<i>Persea indica</i>	5	4	4	2	3	4
<i>Clethra arborea</i>	2a	2	.	1	.	+
<i>Laurus novocanariensis</i>	1	2	3	4	4	2
<i>Rubus gr. bollei</i>	1	(+)	+	+	+	1
<i>Phyllis nobla</i>	1	+	+	+	.	1
<i>Sibthorpia peregrina</i>	2a	3	1	2	1	1
<i>Diplazium caudatum</i>	3	2	+	4	2a	3
<i>Athyrium felix-foemina</i>	1	+	+	.	1	1
<i>Pteris incompleta</i>	+	+	.	.	.	.
<i>Cystopteris diaphana</i>	1	+	+	+	+	.
<i>Polystichium setiferum</i>	+	+	.	.	.	.
<i>Festuca donax</i>	2a	.	3	1	2a	1
<i>Asplenium onopteris</i>	+	+	.	.	.	.
<i>Asplenium trichomanes</i>	+	+	.	.	.	.
<i>Selaginella denticulata</i>	1	+	+	+	.	.
<i>Pericallis aurita</i>	+	.	.	.	+	+
<i>Vaccinium padifolium</i>	+	.	.	.	.	.
<i>Bystropogon punctatus</i>	1	(+)	.	.	.	.
<i>Sonchus fruticosus</i>	(+)	(+)	1	.	+	.
<i>Scrophularia hirta</i>	(+)	.	.	.	.	.
<i>Hypericum grandifolium</i>	(+)	.	+	+	+	+
<i>Hypericum glandulosum</i>	(+)	(+)	(+)	+	.	.
<i>Hedera maderensis</i>	+	.	2	.	.	.
<i>Brachypodium sylvaticum</i>	.	1	.	.	.	.
<i>Argyranthemum</i>	.	+	.	.	.	.
<i>Erica maderinicola</i>	.	1	+	.	.	.
<i>Euphorbia mellifera</i>	2a	.	+	1	.	.
<i>Lonicera etrusca</i>	+	.	+	.	.	.
<i>Rosa mandonii</i>	1	.	.	.	.	.
<i>Cedronella canariensis</i>	.	+	.	.	1	+
<i>Dryopteris aitoniana</i>	.	+	+	.	.	.
<i>Rubia agostinhoi</i>	.	.	1	.	+	+
<i>Salix canariensis</i>	.	.	+	.	.	.
<i>Myrica faya</i>	.	.	+	.	.	.
<i>Semele androgyna</i>	.	.	+	.	.	.
<i>Carex peregrina</i>	.	.	.	.	+	.
<i>Carex lowei</i>	.	.	.	1	.	.
<i>Asplenium monanthes</i>	.	.	.	.	1	.
<i>Asplenium onopteris</i>	.	.	.	1	+	.
<i>Asplenium anceps</i>	.	.	.	.	+	.
<i>Athyrium felix-femina</i>	.	.	.	.	1	+
<i>Prunella vulgaris</i>	.	.	.	.	.	+
<i>Selaginella denticulata</i>	.	.	.	.	.	+
<b>Companions</b>						
<i>Woodwardia radicans</i>	.	2	3	1	1	1
<i>Deschampsia argentea</i>	+	.	(+)	(+)	+	+
<i>Polypodium</i>	+	.	.	.	.	.
<i>Ageratina adenophora</i>	+	.	.	.	+	1
<i>Stegnogramma pozoi</i>	+	+	.	.	.	.
<i>Umbilicus rupestris</i>	.	.	.	.	.	.
<i>Erigeron karvinskianus</i>	.	.	.	.	+	1
<i>Aichryson divaricatum</i>	.	.	.	.	+	+
<i>Succisa pratensis</i>	.	.	.	.	.	1
<i>Oenanthe divaricata</i>	.	.	.	.	.	+
<i>Huperzia selago</i>	.	.	.	.	.	+
<i>Epilobium tetragonum</i>	.	.	.	.	.	+
<i>Dactylorhiza foliosa</i>	.	.	.	.	.	+
<i>Sagina procumbens</i>	.	.	.	.	.	+

**Sites:** 1; Ribeira da Madalena ca. Loreto; 2,3,4: between Paúl and Loreto; 5: stream south of Pico Ferreiro; 6: south of Pico Tapeiro

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#### XXXVI: The vegetation of Madeira: IV - Coastal Vegetation of Porto Santo Island (Archipelag of Madeira)

The littoral geomorphology of the Porto Santo Island is of paramount importance in the coastal phytocoenosis assemblage: the southern part of the island has an 8 km long sand beach with littoral sandstone platforms in its eastern extreme; sandstone or volcanic (mostly trachits) sea cliffs predominate in the rest of the island; in the northern part of the island, near the airport, there is an elevated dune (more than 150 m above sea level), related to an ancient island tilt. In the Porto Santo's beach and cliff ecosystems, we found four new associations. All of them are finicolous associations in the context of their alliances, with low floristic diversity and presided by small area endemics.

**1. *Senecio incrassati-Mesembryanthemum crystallini*** Jardim, Sequeira, Capelo, Aguiar, J.C. Costa, Espírito-Santo & Lousã associatio nova hoc loco [*typus*: table 1, relevé #3] –

it is a halonitrophylous succulent annual prostrate plant community associated with dune systems disturbed by trampling or by the input of nitrogen compounds, either of natural or artificial origin. It is very similar to the canarian *Mesembryanthemum cristalinum* and is characterized by the two nominal plants together with *M. nodiflorum* and *Beta procumbens*. The *Senecio incrassati - Mesembryanthemum cristalinum* is not exclusive of mobile substrata: was also observed in Ponta de S. Lourenço (Madeira) in compact soils (variant with *Aizoon canariensis*).

**Table 1** – *Senecio incrassati - Mesembryanthemum crystallini*

# of relevé	3	4	6	7
m.s.m.	ca. 2	ca.2	ca.3	ca.5
Area	4	4	16	12
Cover	60	60	90	70
<b>Characteristic combination</b>				
<i>Mesembryanthemum crystallinum</i>	4	4	3	2
<i>Senecio incrassatus</i>	1	1	2	+
<i>Beta procumbens</i>	1	2	3	1
<i>Mesembryanthemum nodiflorum</i>	.	.	.	4
<b>Characteristic of higher syntaxa</b>				
<i>Brachypodium distachyon</i>	.	.	+	.
<i>Bromus rigidus</i>	.	.	1	.
<i>Chenopodium murale</i>	.	.	+	.
<i>Asphodelus fistulosus</i>	.	.	1	.
<i>Emex spinosa</i>	.	.	1	1
<i>Euphorbia terracina</i>	.	.	+	.
<i>Lavatera cretica</i>	.	.	1	+
<i>Lolium rigidum</i>	.	.	2	.
<i>Medicago polymorpha</i>	.	.	1	.
<i>Scorpiurus muricatus</i>	.	.	.	+
<i>Sonchus tenerrimus</i>	.	.	+	.
<i>Spergularia marina</i>	.	.	+	.
<b>Companions</b>				
<i>Salsola kali</i>	+	+	.	.
<i>Hedypnois cretica</i>	.	.	1	.
<i>Cynodon dactylon</i>	.	.	+	.
<i>Cyperus rotundus</i>	.	.	+	.