

Description of some new syntaxa from the Azores archipelago

José Antonio FERNÁNDEZ PRIETO ⁽¹⁾, Carlos AGUIAR ⁽²⁾ & Eduardo DIAS ⁽³⁾

(1) Área de Botánica. Departamento de Biología de Organismos y Sistemass. Universidad de Oviedo. C/ Catedrático Rodrigo Uría, s/n, 330071-Oviedo. España; jafp@uniovi.es

(2) CIMO-Centro de Investigação de Montanha. Instituto Politécnico de Bragança. 5301-855 Bragança. Portugal; cfaguiar@ipb.pt

(3) Departamento de Ciências Agrárias. Universidade dos Açores. Campus de Angra, Terra-Cha 9701-851 Angra do Heroísmo. Portugal; edias@angra.uac.pt

Abstract:

A new class *Tolpido azoricae-Holcetea rigidi* (non grazed perennial plant communities of rocky and earthy scarps, slope deposits and natural forest fringes); two new orders *Tolpido azoricae-Holcetalia rigidi* and *Frangulo azoricae-Lauretalia azoricae* (evergreen broad-leaved micro-mesoforest); four new alliances *Thelipterido pozoi-Woodwardion redicantis* (comophytic plant communities), *Ornithopo pinnati-gaudion coarctatae* (pioneer oligotrophic therophitic plant communities), *Tolpido succulentae-Agrostion congestiflorae* (perennial graminoid communities of cliffs and landslide scarps) and *Pericallion malvifoliae* (perennial herbs communities of semi-shaded of woodlands), and 14 news associations are described and typified for the Azores archipelago in this paper. Five associations and two alliances are lectotyped or proposed for the name correction respectively.

Key words: New syntaxa, Phytosociology, Azores.

Introduction

The Azores is probably the last European territory to require a high ranking formal syntaxonomy. In fact, the published phytosociological studies about the vegetation of Azores, following the methods and concepts of the Zurich-Montpellier school, and the rules of the International Code of Phytosociological Nomenclature (Weber et al. 2000), are limited to three publications by D. Lüpnitz in the 1970s (Lüpnitz, 1975a, b and Lüpnitz, 1976), and to the recent description of a noteworthy group of new syntaxa, mainly forests and tall shrublands, among them a new vegetation class, the *Lauro azoricae-Juniperetea brevifoliae*, by Rivas-Martínez et al. (in Rivas-Martínez et al. 2002a, b).

We recognize in this paper a new vegetation class, two new orders, four new alliances and thirteen new associations. At the same time, we have carried out a conceptual and nomenclatural revision of some less clear published syntaxa. In the description of the new associations, only the type relevé has been transcribed, and all the new syntaxa have been intentionally depicted in a minimal way. In a previous publication (Fernández Prieto et al., 2006) we presented many of the syntaxa here validated. A comprehensive revision of the vegetation of the Azores will be soon published in *Global Geobotany*.

Syntaxa numbers follow the same authors. All the described syntaxa, excepting the alliance *Thelipterido pozoi-Woodwardion radicanes*, are endemic to the Azores Archipelago.

Syntaxa description

13. SCHEUCHZERIO PALUSTRIS-CARICETEA NIGRAE Tüxen 1937 nom. mut. Rivas-Martínez & al. 2002

13b. CARICETALIA NIGRAE Koch 1926 em. Br.-Bl. 1948 nom. mut. Rivas-Martínez & al. 2002

13.3. Anagallido tenellae-Juncion bulbosi Br.-Bl. 1967

13.3.3. *Eleocharito multicaulis-Caricetum cedercreutzii* F. Prieto & Aguiar ass. nova hoc loco

Meso- and supratemperate minerotrophic peatlands, usually dominated by *Carex cedercreutzii* and *Eleocharis multicaulis*.

Typus associatio: S. Jorge: Serra do Topo, Pedra Vermelha. Altitude 775 m, orientation W, slope 20°, surface 3 m², cover 70%. Characteristic species: 1 *Carex cedercreutzii*, 2 *Eleocharis multicaulis*, 2 *Anagallis tenella*, + *Viola palustris* subsp. *juressii*; Companion species: 3 *Agrostis azorica*, 1 *Potentilla erecta*, + *Leontodon taraxacoides*, + *Carex pilulifera* subsp. *azorica*, + *Huperzia dentata*.

17. CRITHMO MARITIMI-LIMONIETEA Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 nom. mut. Rivas-Martínez & al. 2002

17b. CRITHMO-ARMERIETALIA Géhu 1968

17.6. Euphorbio azoricae-Festucion petraeae Lüpnitz 1975

Communities of the Azores sea cliffs.

Typus alliancia: *Festucetum petraeae* Lüpnitz 1976.

Characteristic species: *Azorina vidali*, *Daucus azoricus*, *Euphorbia azorica*, *Festuca petraea*, *Myosotis maritima*, *Solidago sempervirens* subsp. *azorica*, *Spergularia azorica*.

17.6.1. *Azorinetum vidalii* Lüpnitz 1976 nom. mut. [= *Campanuletum vidalii* Lüpnitz 1976]a

17.6.2. *Festucetum petraeae* Lüpnitz 1976

17.6.3. *Festuco petraeae-Juncetum acuti* F. Prieto & Aguiar ass nova hoc loco

Diagnosis: Communities of *Juncus acutus* and *Festuca petraea* inhabiting littoral lava bed depressions filled with coarse texture deposits, temporarily submerged by sea water; sometimes also in rocky seashores.

Typus associatio: Pico: Cachorro. Altitude 0 m, orientation -, slope -, surface 20 m², cover 50%. Characteristic species: 3 *Juncus acutus*, 1 *Festuca petraea*, + *Crithmum maritimum*; Companion species: + *Atriplex prostrata*, + *Cyrtomium falcatum*.

17.6.4. *Spergularietum azoricae* Lüpnitz 1976

26. ANOMODONTO VITICULOSAE-POLYPODIETEA CAMBRICI Rivas-Martínez 1975

26.a. ANOMODONTO VITICULOSAE-POLYPODIETALIA CAMBRICI O. Bolòs & Vives in O. Bolòs 1957

26.4. *Thelipterido pozzoi-Woodwardion radicans* F. Prieto & Aguiar all. nova hoc loco.

Comophytic communities of rocky or earthy slopes dominated by medium to large sized ferns, present on rainy temperate and Mediterranean hyperoceanic territories, in the Madeiran and Atlantic European provinces.

Typus alliancia: *Diplazio caudati -Woodwardietum radicans*, designated here.

Characteristic species: *Cystopteris diaphana*, *Diplazium caudatum*, *Stegnogramma pozoii*, *Selaginella azorica* and *Woodwardia radicans*.

26.4.2. *Diplazio caudati-Woodwardietum radicans* F. Prieto & Aguiar ass. nova hoc loco.

Diagnosis: Comophytic community dominated by *Woodwardia radicans*, with a meso- to supratemperate distribution in the Azorean Sector.

Typus associatio: Faial: Caldera of Faial, way down to the caldera. Altitude 580 m, orientation W, slope 90°, surface 4 m², cover 80%. Characteristic species: 4 *Woodwardia radicans*, 2 *Selaginella azorica*, + *Stegnogramma pozoii*, + *Diplazium caudatum*; Companion species: 1 *Athyrium filix-femina*, + *Blechnum spicant*, + *Carex guthnickiana*, + *Osmunda regalis*, 1 *Sibthorpia europaea*.

26.4.3. *Selaginello azoricae-Stegnogrammetum pozoii* F. Prieto & Aguiar ass. nova hoc loco

Diagnosis: Thermo- and mesotemperate comophytic community of rocky or earthy slopes, dominated by *Stegnogramma pozoii* and *Selaginella azorica*, frequently establishing vegetation mosaic with the *Diplazio-Woodwardietum radicans*, although favouring more shaded and disturbed habitats.

Typus associatio: Faial: Fajã Grande, earthy slopes nearby a rivulet. Altitude ca. 100 m, orientation N, slope 90°, surface 1 m², cover 50%. Characteristic

species: 3 *Stegnogramma pozoii*, 1 *Selaginella azorica*, + *Diplazium caudatum*, 2 *Cystopteris diaphana*.

40. TUBERARIETEA GUTTATAE (Br.-Bl. in Br.-Bl., Rous-sine & Nègre 1952) Rivas Goday & Rivas-Martínez 1963 em. Rivas-Martínez 1978 nom. mut. Rivas-Martínez & al. 2002

40a. *TUBERARIETALIA GUTTATI* Br.-Bl. in Br.-Bl., Molinier & Wagner 1940 em. Rivas-Martínez 1978 Rivas-Martínez & al. 2002

40.6. *Ornithopo pinnati-Gaudinion coarctatae* F. Prieto & Aguiar all. nova hoc loco

Pioneer, oligotrophic, spring and early summer ephemeral plant communities from the thermomediterranean and thermotemperate vegetation belts of the Azorean Islands. The annual oligotrophic grasslands of Azores are mainly constituted by introduced species, although there is a consistent group of endemic species of Azores, or of Azores and other Macaronesian archipelagos. These two arguments justify the proposal of this new alliance. The lack of basophilous therophytes explains the assignment of the *Ornithopo-Gaudinion coarctatae* to *Tuberarietalia guttatae*.

Typus alliancia: *Ornithopo pinnati-Gaudinietum coarctatae*, designated here.

Characteristic species: *Aichrysum villosum*, *Gaudinia coarctata*, *Lolium aristatum* and *Rostraria azorica*.

40.6.1. *Ornithopo pinnati-Gaudinietum coarctatae* F. Prieto & Aguiar ass. nova hoc loco

Diagnosis: Therophytic pioneer phytocoenosis dominated by the Azores endemic annual grass *Gaudinia coarctata*. It has a strong pioneer character and a manifest preference for recent lava flows ("mistérios").

Typus associatio: Pico: Madalena, Cais do Mourato. Altitude 5 m, orientation -, slope -, surface 3 m², cover 20%. Characteristic species: 3 *Gaudinia coarctata*, 3 *Ornithopus pinnatus*, 1 *Aira caryophyllea*, + *Lotus hispidus*, + *Silene gallica*, 1 *Lotus angustissimus*; Companion species: + *Leontodon taraxacoides*, 1 *Plantago coronopus*, 1 *Polycarpum tetraphyllum*.

48. TOLPIDO AZORICAE-HOLCETEA RIGIDI F. Prieto & Aguiar classis nova hoc loco

Non grazed perennial vascular plant communities of rocky and earthy scarps, slope deposits and natural forests fringes, dominated by endemic graminoids, hemi-cryptophytes and dwarf chamaephytic herbs. It is endemic of the thermomediterranean and thermo- to supratemperate belts of the Azorean biogeographic Province. The majority of the endemic vascular grasses and forbs of the Azores are characteristic of this vegetation class; it is plausible that almost all of the non-endemics found in its communities are allochthonous species. The thorough floristic dissimilarities between the *Tolpido-Holcetea rigidi* communities and their European and Madeiran counterparts render unattainable their assignment to other already described herbaceous vegetation classes.

Typus classis: *Tolpido azoricae-Holcetalia rigidi* F. Prieto & Aguiar, designated here.

Characteristic species: *Agrostis azorica*, *Brachypodium gaditanum*, *Carex guthnickiana*, *Carex vulcani*, *Centaureum scilloides*, *Holcus rigidus*, *Luzula purpureo-splendens*, *Lysimachia azorica*, *Scabiosa nitens* and *Tolpis azorica*.

48a. TOLPIDO AZORICAE-HOLCETALIA RIGIDI F. Prieto & Aguiar ordo novus hoc loco

Sole order of the class.

Typus ordo: *Festucion francoi* Lüpnitz 1976 corr. F. Prieto, Aguiar, J.C. Costa, Lousã & Rivas-Martínez corr., designated here.

Characteristic species: See class.

48.1. Festucion francoi Lüpnitz 1976 corr. F. Prieto, Aguiar, J.C. Costa, Lousã & Rivas-Martínez corr. hoc loco

[= *Festucion jubatae* Lüpnitz 1976, Beitr. Biol. Pflanzen 51: 223, original name]

Taxonomic correction: *Festuca jubata* sensu Lüpnitz 1976 et auct. non Lowe should be *Festuca francoi* Fern.Prieto, C.Aguiar, E.Dias & M.I.Gut. [Bot. J. Linn. Soc. 157(3): 497 (-498; fig. 1), 2008].

Meso-supratemperate, oligotrophic graminoid associations with scattered megaforbs in a matrix of endemic grasses, linked with habitats disturbed by soil and rock mass movements or gusting winds.

Typus alliancia: *Potentillo-Agrostietum azoricae* Lüpnitz 1975

Characteristic species: *Agrostis botelhoi*, *Agrostis congestiflora* subsp. *oreophila*, *Carex punctata*, *Festuca francoi*, *Deschampsia foliosa*, *Euphrasia azorica*, *Euphrasia grandiflora*, *Leontodon rigens*, *Leontodon filii*, *Myosotis azorica* and *Veronica dabneyi*.

48.1.1. Centaureio scilloides-Deschampsietum foliosae F. Prieto, Aguiar & Dias ass. nova hoc loco

Diagnosis: Meso- and supratemperate *Deschampsia foliosa* grasslands subjected to gusting winds.

Typus associatio: Flores: hill in front of Morro Alto. Altitude 850 m, orientation W, slope 20%, surface 4 m², cover 90%. Characteristic species: 5 *Deschampsia foliosa*, + *Centaureum scilloides*, 1 *Luzula purpureo-splendens*, + *Lysimachia azorica*, 1 *Agrostis azorica*, 2 *Festuca francoi*; Companion species: + *Blechnum spicant*, + *Erica azorica*, + *Huperzia dentata*, + *Juniperus brevifolia*, + *Carex echinata*, + *Rubia agostinhoi*.

Diagnosis: Meso- and supratemperate *Deschampsia foliosa* grasslands subjected to gusting winds.

Typus associatio: Flores: hill in front of Morro Alto. Altitude 850 m, orientation W, slope 20%, surface 4 m², cover 90%. Characteristic species: 5 *Deschampsia foliosa*, + *Centaureum scilloides*, 1 *Luzula purpureo-splendens*, + *Lysimachia azorica*, 1 *Agrostis azorica*, 2 *Festuca francoi*; Companion species: + *Blechnum spicant*, + *Erica azorica*, + *Huperzia dentata*, + *Juniperus brevifolia*, + *Carex echinata*, + *Rubia agostinhoi*.

48.1.2. Festucetum francoi Lüpnitz 1975 corr. Fernández-Prieto, Aguiar, J.C. Costa, Lousã & Rivas-Martínez corr. hoc loco

[= *Festucetum jubatae* Lüpnitz 1975]

Diagnosis: Steep earthy slopes communities of *Festuca francoi* and *Leontodon rigens*.

Lectotypus associatio [designated here (Art. 19a of the ICPN)]: table 16, rel. 6 (Lüpnitz 1976: 226).

Ilha das Flores: Morro Alto. 230 m, 100%, 10°, 12-15 m². Assoziations- und Verbandscharakterarten: 4 *Festuca francoi* (under *Festuca jubata*), + *Leontodon (Picris) rigens*. Ordnungs- und Klassencharakterarten: + *Potentilla erecta* (under *Potentilla recta*), 1 *Calluna vulgaris*, 1 *Thymus caespitius*. Blegleiter: 1 *Blechnum spicant*, + *Lysimachia azorica* (under *Lysimachia nemorum*), + *Luzula pur-*

pureo-splendens, 1 *Rubia agostinhoi* (under *Rubia peregrina*), + *Carex echinata*, + *Mentha pulegium*, + *Plantago coronopus*.as1

48.1.3. Lysimachio azoricae-Holcetum rigidi F.

Prieto, Aguiar & Dias ass. nova hoc loco

Diagnosis: Grasslands of slope deposits, frequently with peat formation, present in the meso- and supratemperate belts of the Azorean Sector.

Typus associatio: Flores: Lagoa Branca. *Holceta* with *Sphagnum* peat. Primary position. On the edge of a *Juniperus brevifolia* community. Altitude 200 m, orientation NE, slope 30%, surface 2 m², cover 80%. Characteristic species: 4 *Holcus rigidus*, + *Agrostis azorica*, + *Lysimachia azorica*, 1 *Potentilla erecta*, + *Luzula purpureo-splendens*, + *Festuca francoi*, 2 *Deschampsia foliosa*; Companion species: + *Blechnum spicant*, + *Lotus pedunculatus*, 1 *Rubia agostinhoi*, + *Vaccinium cylindraceum*, + *Sibthorpia europaea*, 2 *Sphagnum palustre*, 1 *Juncus effusus*.

48.1.4. Potentillo-Agrostietum azoricae Lüpnitz 1975

[= *Potentillo anglicae-Agrostietum azoricae* Lüpnitz 1975 corr. Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002]

Diagnosis: Pioneer meso-supratemperate grasslands of *Agrostis azorica*, particularly common on former ombrogenous blanket bogs removed by mass movements.

Lectotypus associatio [designated here (Art. 19a of the ICPN)]: table 3, rel. 10 (Lüpnitz 1975b: 164). Ilha do Pico: Pico. 800 m. Char. arten: *Agrostis azorica* (under *Agrostis castellana*) 3.3; Ordn. und Klass. Char. arten: *Potentilla* sp. (under *Potentilla recta*) +.1, *Polygala vulgaris* +.1, *Sieglingia decumbens* +.1. Begleiter: *Anthoxanthum odoratum* 1.1, *Blechnum spicant* 1.1, *Lysimachia nemorum* +.1, *Anagallis tenella* +.1, *Selaginella azorica* (under *Selaginella kraussiana*) 2.2, *Hydrocotyle vulgaris* +.1, *Eleocharis multicaulis* +.1, *Festuca francoi* (under *Festuca jubata*) 1.1.

48.1.5. Tolpidetum azoricae Lüpnitz 1976

[= *Tolpidetum azoricae typische Subassociation*, Lüpnitz 1976, Beitr. Biol. Pflanzen 51: 227; excl. *Subassociation von Lactuca watsoniana* Lüpnitz 1976, Beitr. Biol. Pflanzen, 51: 228]

Diagnosis: Steep earthy slopes communities of *Festuca francoi* and *Leontodon filii*.as

Lectotypus associatio [designated here (Art. 19a of the ICPN)]: table 17, rel. 2 (Lüpnitz 1976: 230). Faial: Rand der Caldeira. 850 m, 100%, Inklination in Grad 40°, 20-25 m². Charakterarten: 2 *Tolpis azorica*, + *Pericallis (Senecio) malvifolius*; Verbancharakterarten: 5 *Festuca francoi* (under *Festuca jubata*), 3 *Holcus rigidus*, + *Deschampsia foliosa*, + *Leontodon filii* (under *Picris rigens*). Ordnungs- und Klassencharakterarten: + *Calluna vulgaris*, + *Potentilla erecta*, + *Pteridium aquilinum*. Blegleiter: 1 *Blechnum spicant*, + *Luzula purpureo-splendens*, + *Lysimachia azorica* (sub *Lysimachia nemorum*), 1 *Selaginella azorica* (under *Selaginella kraussiana*), + *Athyrium filix-femina*, 1 *Lotus uliginosus*, + *Holcus lanatus*, + *Dryopteris aemula*, + *Agrostis azorica* (under *Agrostis castellana*).

48.2. *Tolpido succulentae-Agrostion congestiflorae*

Aguiar & F. Prieto all. nova hoc loco

Thermomediterranean, occasionally thermotemperate, perennial graminoid communities of cliffs and landslide scarps.

Typus aliancia: *Festuco petraeae-Agrostietum congestiflorae* Aguiar & F. Prieto, designated here.

Characteristic species: *Agrostis congestiflora* subsp. *congestiflora*, *Agrostis gracililaxa*, *Carex hochstetteriana* (dif.), *Daucus carota* subsp. *azorica*, *Euphorbia azorica* (dif.), *Festuca petraea* and *Tolpis succulenta*.

48.2.1. *Festuco petraeae-Agrostietum congestiflorae*

Aguiar & F. Prieto ass. nova hoc loco

Diagnosis: Thermomediterranean and thermotemperate open grassland of rock outcrops, dominated by *Agrostis congestiflora*, *Festuca petraea* and *Holcus rigidus*.

Typus associatio: S. Jorge: Fajã dos Bodes. Altitude 20 m, orientation S, slope 100%, surface 2 m², cover 40%. Characteristic species: 2 *Agrostis congestiflora* subsp. *congestiflora*, 1 *Festuca petraea*, 1 *Holcus rigidus*, + *Brachypodium gaditanum*; Companion species: 1 *Thymus caespitius*.

48.2.2. *Holco rigidi-Brachypodietum gaditanae*

Aguiar & F. Prieto ass. nova hoc loco

Diagnosis: Thermotemperate or thermomediterranean mesoxerophilous grassland of *Brachypodium gaditanum*, in less disturbed habitats co-dominated by *Holcus rigidus*. Its habitats are small platforms in rock outcrops with soil accumulations provided by solifluction and earth flows.

Typus associatio: S. Jorge: on the way to Fajã de S. João. Altitude 310 m, orientation S, slope 100%, surface 4 m², cover 60%. Characteristic species: 3 *Brachypodium gaditanum*, + *Agrostis congestiflora* subsp. *congestiflora*, 1 *Holcus rigidus*, + *Daucus carota* subsp. *azorica*; Companion species: + *Euphorbia azorica*, 1 *Clinopodium vulgare*, + *Carex hochstetteriana*, + *Plantago lanceolata*.

48.3. *Pericallion malvifoliae* F. Prieto, Dias & Aguiar all. nova hoc loco

Perennial herbs communities of semi-shaded well drained external fringes, of Azores endemic woodlands. Present in the thermomediterranean, meso- to supratemperate vegetation belts of the Azorean Sector.

Typus aliancia: *Festuco petraeae-Pericallietum malvifoliae* F. Prieto, Dias & Aguiar, designated here.

Characteristic species: *Ammi seubertianum*, *Ammi trifoliatum*, *Angelica lignescens*, *Chaerophyllum azoricum*, *Lactuca watsoniana*, *Pericallis malvifolia* and *Ranunculus cortusifolius*.

48.3.1. *Festuco petraeae-Pericallietum malvifoliae*

F. Prieto, Dias & Aguiar ass. nova hoc loco.

Diagnosis: Thermomediterranean and mesotemperate fringes, sometimes expanding away from forest habitats, of *Pericallis malvifolia* and *Festuca petraea*.

Typus associatio: S. Miguel: Nordeste, nearby the sanitary landfill; coastal escarpment; in the edge of

an *Ericeta azoricae*. Altitude 120 m, orientation N, slope 90%, surface 4 m², cover 80%. Characteristic species: 4 *Pericallis malvifolia*, 2 *Festuca petraea*, + *Ammi seubertianum*; Companion species: 1 *Cyrtanthium falcatum*, 1 *Myrica faya*, + *Petroselinum crispum*, + *Bromus catharticus*.

48.3.2. *Lactuco watsoniana-Tolpidetum azoricae*

(Lüpnitz 1976) F. Prieto, Dias & Aguiar stat. nov hoc loco

[=*Tolpidetum azoricae* Subassoziation von *Lactuca watsoniana* Lüpnitz 1976, Beitr. Biol. Pflanzen 51: 228]

Diagnosis: Mesotemperate fringes.

Lectotypus associatio [designated here (Art. 19a of the ICPN)]: table 17, rel. 7 (Lüpnitz 1975: 230). Açores, Pico: feuchte Schlucht am Cebeço da Cruz. 830 m, 100%, Exposition SW, Inklination in Grad 80°, 20-25 m². Charakterarten: 2 *Tolpis azorica*, + *Pericallis malvifolia* (sub *Senecio malvifolius*), + *Bellis azorica*; Verbancharakterarten: 2 *Festuca francoi* (under *Festuca jubata*), 3 *Holcus rigidus*, 1 *Sanicula azorica*. Ordnungs- und Klassencharakterarten: + *Potentilla erecta*, + *Polygala vulgaris*. Blegleiter: + *Blechnum spicant*, 1 *Luzula purpureosplendens*, + *Lysimachia azorica* (under *Lysimachia nemorum*), 2 *Selaginella azorica* (sub *Selaginella kraussiana*), + *Erica azorica*, 1 *Athyrium filix-femina*, + *Juncus effusus*, 1 *Woodwardia radicans*, + *Holcus lanatus*, + *Dryopteris aemula*, + *Huperzia selago*, + *Sibthorpia europaea*, + *Euphorbia stygiana*, r *Laurus azorica*, r *Cardamine caldeirarum*, + *Hymenophyllum tunbrigense*, r *Vaccinium cylindraceum*, r *Ranunculus cortusifolius*. Außerdem mit geringer Stetigkeit: *Viburnum trealeasi* (under *Viburnum tinus*), *Mentha pulegium*, *Fragaria vesca*. as1

48.3.3. *Agrostio azoricae-Angelicetum lignescens*

F. Prieto, Dias & Aguiar ass. nova hoc loco

Diagnosis: Mesotemperate community of *Angelica lignescens*, inhabiting small rivulets generally dripping from *Sphagnum* bogs.

Typus associatio: Terceira: Caldeira de St^a Bárbara, portal da Serra, ca. Lagoa Negra. Altitude 900 m, orientation -, slope -, surface 4 m², cover 90%. Characteristic species: 3 *Angelica lignescens*, + *Lysimachia azorica*, 2 *Agrostis azorica*, 1 *Tolpis azorica*, 1 *Holcus rigidus*; Companion species: 1 *Selaginella azorica*, 1 *Cardamine caldeirarum*, + *Sibthorpia europaea*, 2 *Dryopteris azorica*, + *Potentilla erecta*.

49. *CALLUNO VULGARIS-ULICETEA MINORIS* Br.-Bl. & Tüxen ex Klika & Hadač 1944**49a. *CALLUNO-ULICETALIA MINORIS*** Quantin ex Tüxen 1937**49.5. *Daboecion azoricae*** Lüpniz 1975

Heathlands of Azores.

Typus: *Daboecietum azoricae* Lüpniz 1975.

Characteristic species: *Daboecia azorica*, *Diphysastrum maderense*, *Huperzia dentata*, *Huperzia suberecta* and *Palhinhaea cernua*.

49.5.1. *Daboecietum azoricae* Lüpniz 1975

Diagnosis: Supratemperate heathlands usually dominated by *Daboecia azorica*.

Lectotypus associatio [designated here (Art. 19a of the ICPN)]: table 4, rel. 6 (Lüpnitz 1975b: 168). Ilha do Pico: Pico. 1950 m, 100%, SW, 45°, 2 m²: Char. arten: *Thymus caespititius* 4.3, *Daboecia azorica* 2.2. Diff.arten der typ. Subass.: *Silene vulgaris* +.1. Verb. char.arten.: *Agrostis congestiflora* subsp. *oreophila* (under *Agrostis castellana*) +.1. Ordn. und Klass.char.arten.: *Calluna vulgaris* 1.1, *Veronica officinalis* +.1. Begleiter: *Blechnum spicant* +.1.

49.5.2. *Huperzio dentatae-Callunetum vulgaris* F. Prieto, Dias & Aguiar ass. nova hoc loco

Diagnosis: Mesotemperate heathlands of *Calluna vulgaris* ("rapa").

Typus associatio: Terceira: on the way to Serra de Stª Bárbara. Slope with a mineral soil. Altitude 895 m, orientation S, slope 90°, surface 12 m², cover 80%. Characteristic species: 4 *Calluna vulgaris*, 1 *Huperzia dentata*, + *Palhinhaea cernua*. Companion species: + *Blechnum spicant*, + *Potentilla erecta*, 2 *Holcus rigidus*, 1 *Deschampsia foliosa*, 2 *Juniperus brevifolia*, + *Hypochaeris radicata*, + *Luzula purpureo-splendens*, + *Centaurium scilloides*, 1 *Tolpis azorica*, + *Carex pilulifera* subsp. *azorica*.

57. LAURO AZORICAE-JUNIPERETEA BREVIFOLIAE Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

Azorean evergreen broad-leaved micro-mesoforests, acicular-leaved nano-micro forests and seral tall (microphanerophytic) shrublands, with a hyperoceanic thermomediterranean and thermo- to supratemperate humid-ultrahyperhumid optimum, mostly inhabiting nutrient poor andosols, that in cold and rainy zones are covered by a thick acid horizon of organic matter or by a deep ombrogenous blanket bog.

Typus classis: *Ericetalia azoricae* Lüpnitz 1975

Characteristic species: *Arceuthobium azoricum*, *Athyrium filix-femina*, *Bellis azorica*, *Blechnum spicant*, *Cerastium vagans*, *Carex hochstetteriana*, *Carex vulcani*, *Calcita macrocarpa*, *Dryopteris aemula*, *Dryopteris azorica*, *Dryopteris crispifolia*, *Dryopteris filix-mas*, *Elaphoglossum semicylindricum*, *Hedera azorica*, *Juniperus brevifolia*, *Myrsine retusa*, *Platanthera micrantha*, *Smilax divaricata* and *Teucrium scorodonia*.

57a. ERICETALIA AZORICAE Lüpnitz 1975

Edaphophilous acicular-leaved nano-microforests on leptosols or deeper soils with an iron pan (placic horizon), at higher altitudes covered by a ombrogenous blanket bog, and seral tall shrublands.

Typus ordo: *Calcito macrocarpae-Juniperion brevifoliae* Sjögren ex Lüpnitz 1975.

Characteristic species: *Erica azorica*, *Grammitis marginella* subsp. *azorica*, *Hypericum foliosum*, *Oreopteris limbosperma*, *Pteridium aquilinum*, *Rubus hochstetterorum*, *R. ulmifolius*, and *Vaccinium cylindraceum*.

57.1. Calcito macrocarpae-Juniperion brevifoliae Sjögren ex Lüpnitz 1975

Sole alliance of the order.

Typus alliancia: *Daphno-Ericetum azoricae* Lüpnitz.

57.1a. Calcito macrocarpae-Juniperion brevifoliae Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

Meso- to supratemperate associations.

Typus suballiancia: *Daphno-Ericetum azoricae* Lüpnitz 1975.

Characteristic species: *Euphorbia stygiana*, *Viburnum treleasei*, *Deschampsia foliosa* (dif.), *Ilex azorica* (dif.), *Festuca francoi* (dif.).

57.1.1. *Cerastio vulgare-Juniperetum brevifoliae* Lüpnitz 1975 corr. Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

57.1.2. *Daphno-Ericetum azoricae* Lüpnitz 1975

57.1.3. *Euphrasio grandiflorae-Viburnetum treleasei* Lüpnitz 1975 corr. F. Prieto & Aguiar corr. hoc loco
[= *Euphrasio grandiflorae-Viburnetum tini* Lüpnitz 1976]

Taxonomic correction: *Viburnum tinus* sensu Lüpnitz 1976 non L. should be *Viburnum treleasei* Gandoger

Diagnosis: Tall shrublands of *Viburnum treleasei*.

57.1.4. *Picrido filii-Euphorbietum stygiana* Lüpnitz 1976

57.1b. Pteridio aquilini-Ericenion azoricae Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002 corr. F. Prieto, Dias & Aguiar hoc loco

[*Pteridio pubescentis-Ericenion azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002, *Itinera Geobot.* 15(1): 127, original name]

Thermomediterranean and thermotemperate associations, occasionally lower mesotemperate.

Typus suballiancia: *Pteridio pubescentis-Ericetum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

Characteristic species: *Corema azorica*, *Myrtus communis*, *Myrica faya* (dif.), *Carex hostetteriana* (dif.), *Festuca petraea* (dif.).

57.1.5. *Festuco petraeae-Coremetum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

57.1.6. *Pteridio aquilini-Ericetum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002 corr. F. Prieto, Dias & Aguiar hoc loco

[= *Pteridio pubescentis-Ericetum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002, *Itinera Geobot.* 15(1): 127, original name].

Taxonomic correction: according to Thomson (2000) only *Pteridium aquilinum* (L.) Kuhn var. *aquilinum* is present in the Azores archipelago.

57.b. FRANGULO AZORICAE-LAURETALIA AZORICAE F. Prieto, Dias & Aguiar ordo novus hoc loco

Azorean evergreen broad-leaved edaphoxerophilous, mesic or hygrophilous micro- and mesoforests.

Typus ordo: *Dryopterido azoricae-Laurion azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar, designated here.

Characteristic species: *Frangula azorica*, *Ilex azorica* and *Laurus azorica*.

57.2. *Dryopterido azoricae-Laurion azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

Meso-supratemperate hyperhumid to ultrahyperhumid hyperoceanic Azorean mesic or hygrophilous micro-mesoforests growing on developed andosols.

Typus alliancia: Dryopterido azoricae-Lauretum azoricae Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

Characteristic species: *Carex vulcani* (dif.), *Elaphoglossum semicylindricum* (dif.), *Prunus azorica*, *Sanicula azorica*.

57.2.1. *Culcito macrocarpae-Ilicetum azoricae* F. Prieto, Dias & Aguiar ass. nova hoc loco

Diagnosis: Meso- and supratemperate hyperhumid climatophyllous evergreen broad-leaved cloud mesoforests of *Ilex azorica*, growing on andosols without a placic pan.

Typus associatio: Pico: Boca do Inferno, Misterios de Prainha. Altitude 800 m, orientation -, slope -, surface 200 m², cover 90%. Characteristic species: 4 *Ilex azorica*, 2 *Juniperus brevifolia*, 2 *Myrsine retusa*, 1 *Hypericum foliosum*, 2 *Vaccinium cylindraceum*, + *Frangula azorica*, 2 *Erica azorica*, 1 *Hedera azorica*, 1 *Osmunda regalis*, 1 *Athyrium filix-femina*, 3 *Blechnum spicant*, 1 *Carex vulcani*, 2 *Culcita macrocarpa*, 1 *Dryopteris affinis*, 1 *Dryopteris azorica*, + *Dryopteris crispifolia*, 1 *Arceuthobium azoricum*; Companion species: + *Deschampsia foliosa*, + *Diplazium caudatum*, 1 *Cardamine caldeirarum*, + *Bellis azorica*, 1 *Fragaria vesca*, 1 *Hydrocotyle vulgaris*, 1 *Luzula purpureo-splendens*, 3 *Lysimachia azorica*, + *Potentilla azorica*, + *Prunella vulgaris*, 1 *Rubia agostinhoi*, 2 *Sibthorpia europaea*, 2 *Tolpis azorica*, + *Veronica officinalis*, + *Viola juresii*.

57.2.2. *Dryopterido azoricae-Lauretum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

57.2.3. *Woodwardio radicans-Prunetum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

57.3. *Myrico fayae-Pittosporion undulati* Lüpnitz 1976

Thermomediterranean or thermotemperate humid micro-mesoforests, frequently strongly disturbed by human activities and often enriched in synanthropic trees and other perennial exotic plants.

Typus alliancia: Myrico fayae-Pittosporium undulati Lüpnitz 1975 (Lüpnitz 1976: 271, tb. 24) [Art. 20 del ICPN]

Characteristic species: *Carex hochstetteriana* (dif.), *Myrica faya*, *Picconia azorica*.

57.3.1. *Carici hochstetterianae-Picconietum azoricae* Rivas-Martínez, Lousã, F. Prieto, J.C. Costa, Dias & Aguiar 2002

57.3.2. *Hedychio gardnerani-Pittosporium undulati* Lüpnitz 1976

[= *Myrico fayae-Pittosporium undulati* Lüpnitz 1976]

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