

7TH INTERNATIONAL CONFERENCE ON  
**SERPENTINE  
ECOLOGY**

**PROMOTING  
AWARENESS OF  
SERPENTINE  
BIODIVERSITY**

## **Flora and Vegetation of Iberian Ultramafics Excursion Guide**

**A. Asensi, C. Aguiar, D. Sánchez-Mata & T. Monteiro-Henriques (eds.)**

**7th International Conference on Serpentine Ecology,  
Coimbra (Portugal)**

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**Instituto Politécnico de Bragança**

**Universidade de Coimbra**

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# 7th International Conference on Serpentine Ecology

## **I. Mid-conference field trip: NE Portugal ultramafic outcrops**

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**Carlos Aguiar (coord.)**

## 6. Flora

(by Carlos Aguiar, Tiago Monteiro-Henriques, Xavier Pereira  
Coutinho & D. Sánchez-Mata)

### Vascular flora of the ultramafic rocks of northeastern Portugal

The invaluable commented checklist of the vascular flora of the ultramafic rocks of northeastern Portugal of Pinto da Silva (1970) has been recently reviewed by Aguiar and Monteiro-Henriques (ined.). These authors' accept 568 *taxa*, 29% of which (164 *taxa*) are new additions to the original catalogue of Pinto da Silva (1970). A subset of it with the most frequent and floristically relevant species is presented in Table 6. New additions have been highlighted with an asterisk (\*). The most noticeable neophytes have been included and marked with an open rhombus (◊). A few synonyms have been added to facilitate the reading of the list of Pinto da Silva (1970). Familiar circumscription and higher *taxa* are according, respectively, to APG III (2009) and Chase & Reveal (2009). The main sources of infrafamilial taxonomic information were the Flora Iberica (Castroviejo 1981+), Nova Flora de Portugal (Franco 1971; 1984; Franco & Rocha Afonso (1994; 1998), The Checklist of the Portuguese Vascular Flora (Sequeira *et al.* 2011) and, among others, the taxonomic revisions of Romero *et al.* (1988) (*Agrostis*), Díaz Lifante & Valdés (1996) (*Asphodelus*), La Guardia & Blanca (1987) (*Scorzonera*), Schippmann (1991) and Voght (1991) (*Leucanthe-mum*). We followed different taxonomic or nomenclatural criteria from *Flora Iberica* or *Nova Flora de Portugal* in *Armeria langei* subsp. *marizii*, *Anthyllis sampaioana*, *A. vulneraria* subsp. *lusitanica*, *Alyssum serpyllifolium* subsp. *lusitanicum*, *Asplenium adiantum-nigrum* subsp. *corunnense*, *Carlina hispanica*, *Centaurea langei*, *Festuca elegans* subsp. *merinoi*, *Helianthemum apenninum* subsp. *rothmaleri*, *Tuberaria gut-tata* and *Trifolium striatum* var. *brevidens*.

The preparation of a checklist of ultramafic vascular flora is a difficult task. First of all, flora checklists are unfinished assignments because plants come and go with time. On the other hand, the northeastern Portugal ophiolites lithology is heterogeneous and complex. Peridotites, and similar ultramafic rocks, appear in stretched outcrops dispersed among macromorphologically similar basic rocks. The soils that have covered the ultramafic rocks many times catch materials from nearby mafic and leucocratic rocks. Finally, deep soils, rich in organic matter, derived from ultramafic rocks, usually have a similar flora to other nearby lithologies. The serpentine effect is in practice impossible to spatialize and quantify; consequently an ultramafic vascular flora checklist brings together plants of rather diverse ecology, and is by itself of limited scientific value.

**Table 6.** Frequent or floristically relevant vascular plant flora of the northeastern Portugal ultramafic rocks

<b>[FERNIS]</b>	<i>A. billotii</i> F. W. Schultz
<b>POLYPODIIDAE</b>	<i>Asplenium ceterach</i> L.
<b>ASPLENIACEAE</b>	* <i>A. onopteris</i> L.
<i>Asplenium adiantum-nigrum</i> L. subsp.	<i>A. trichomanes</i> L. subsp. <i>quadri-valens</i> D. E.
<i>corunnense</i> (H. Christ) Rivas-Mart.	Meyer

**DENNSTAEDTIACEAE**

*Pteridium aquilinum* (L.) Kuhn

**POLYPODIACEAE**

\**Polypodium vulgare* L.

**PTERIDACEAE**

*Anogramma leptophylla* (L.) Link

*Cheilanthes tinaei* Tod.

*Notholaena marantae* (L.) Desv. subsp.  
*marantae*

**[GIMNOSPERMS]****PINIDAE****CUPRESSACEAE**

*Juniperus oxycedrus* L.

**MAGNOLIIDAE [ANGIOSPERMS]****MAGNOLIANAE [MAGNOLIIDS]****ARISTOLOCHIACEAE**

*Aristolochia paucinervis* Pomel

**LILIANAE [MONOCOTS]****AMARYLLIDACEAE (INC. ALLIACEAE)**

*Allium guttatum* Steven subsp. *sardoum*  
(Moris) Stearn

*A. paniculatum* L.

*A. sphaerocephalon* L.

**COLCHICACEAE**

*Merendera montana* (L.) Lange

**CYPERACEAE**

\**C. distachya* Desf.

*C. divisa* Huds.

\**C. divulsa* Stokes subsp. *divulsa*

\**C. elata* All. subsp. *reuteriana* (Boiss.)  
Luceño & Aedo

*C. hirta* L.

\**C. muricata* L. subsp. *lamprocarpa* Celak.

*Isolepis setacea* (L.) R. Br.

\**Schoenus nigricans* L.

*Scirpoides holoschoenus* (L.) Soják

**DIOSCORIACEAE**

\**Tamus communis* L.

**HYACINTHACEAE**

*Dipcadi serotinum* (L.) Medik.

*Ornithogalum broteroi* M. Laínz

*O. concinnum* Salisb.

*O. bourgaeum* Jord. & Fourr.

*Scilla autumnalis* L.

**IRIDACEAE**

*Crocus serotinus* Salisb. subsp. *salzmannii*  
(Gay) Mathew

*Gladiolus illyricus* Koch

♂\**Iris germanica* L.

*Romulea bulbocodium* (L.) Sebastiani &  
Mauri subsp. *bulbocodium*

**JUNCACEAE**

*Juncus acutiflorus* Hoffmanns.  
subsp. *acutiflorus*

\**J. articulatus* L.

*J. bufonius* L.

*J. capitatus* L.

\**J. effusus* L.

*J. tenageia* L. fil.

**LILIACEAE**

\**Gagea pratensis* (Pers.) Dumort.

*Tulipa sylvestris* L. subsp. *australis* (Link)  
Pamp.

**ORCHIDACEAE**

*Cephalanthera longifolia* (L.) Fritsch

\**Dactylorhiza elata* (Poirot) Soó  
subsp. *sesquipedalis* (Willd.) Soó

\**Epipactis lusitanica* D. Tyteca

\**Neotinea maculata* (Desf.) Stearn

\**Orchis langei* K. Richt.

\**Serapias parviflora* Parl.

*Spiranthes aestivalis* (Poir.) Rich.

**POACEAE**

*Aegilops geniculata* Roth

*A. triuncialis* L.

*Agrostis castellana* Boiss. & Reut.

*Aira caryophyllea* L. subsp. *caryophyllea*

*Anthoxanthum aristatum* Boiss.  
subsp. *aristatum*

*Arrhenatherum elatius* (L.) J. & K. Presl  
subsp. *bulbosum* (Willd.) Schübler &  
Martens

*Avena barbata* Link subsp. *lusitanica* (Tab. Morais) Romero Zarco  
 \**Avenula lusitanica* (Romero Zarco) J. Holub  
*A. sulcata* (Boiss.) Dumort. subsp. *sulcata*  
*Brachypodium distachyon* (L.) Beauv.  
*B. rupestre* (Host) Roemer & Schultes  
 \**Briza maxima* L.  
 \**B. minor* L.  
*Bromus diandrus* Roth  
*B. hordeaceus* L.  
 \**B. matritensis* L.  
*B. scoparius* L.  
*B. squarrosus* L.  
*B. tectorum* L.  
*Dactylis hispanica* Roth  
*Cynodon dactylon* (L.) Pers.  
 \**Cynosurus echinatus* L.  
*Ctenopsis delicatula* (Lag.) Paunero  
*Elymus hispidus* (Opiz) Melderis subsp. *barbulatus* (Schur) Melderis  
*Festuca ampla* Hackel subsp. *ampla*  
*F. brigantina* (Markgr.-Dann.) Markgr.-Dann. subsp. *brigantina*  
*F. durandii* Clauson subsp. *capillifolia* (Willk.) Rivas Ponce, Cebolla & M.B. Crespo var. *livida* (Hackel) Rivas Ponce, Cebolla & M.B. Crespo  
*F. elegans* Boiss. subsp. *merinoi* (Pau) Fuente & Ortúñez  
 \**F. iberica* (Hackel) K. Richter  
*F. trichophylla* (Gaudin) K. Richter subsp. *trichophylla*  
 \**Gastridium ventricosum* (Gouan) Schinz & Thell.  
*Hordeum geniculatum* All.  
 \**H. murinum* L. subsp. *leporinum* (Link) Arcangeli  
*Koeleria crassipes* Lange subsp. *crassipes*  
*Mibora minima* (L.) Desv.  
*Micropyrum tenellum* (L.) Link  
*Molineriella laevis* (Brot.) Rouy  
*Periballia involucrata* (Cav.) Janka  
*Phleum bertolonii* DC.  
 \**Poa annua* L.

*P. bulbosa* L.  
 \**Polypogon maritimus* Willd. subsp. *maritimus*  
*Psilurus incurvus* (Gouan) Schinz & Thell.  
*Taeniatherum caput-medusae* (L.) Nevski  
*Trisetaria ovata* (Cav.) Paunero  
*T. scabriuscula* (Lag.) Paunero  
*Vulpia bromoides* (L.) S.F. Gray  
*V. ciliata* Dumort. subsp. *ciliata*  
*V. muralis* (Kunth) Nees  
*V. myuros* (L.) C.C. Gmelin  
**XANTHORRHOACEAE**  
*Asphodelus macrocarpus* Parl. subsp. *macrocarpus* var. *arrondeaui* (Lloyd) Z. Díaz & Valdés  
*A. serotinus* Wolley-Dod

#### CERATOPHYLLANAE [EUDICOTS]

##### APIACEAE

*Bupleurum gerardi* All.  
 \**Conium maculatum* L.  
*Conopodium majus* (Gouan) Loret subsp. *marizianum* (Samp.) López Udias & G. Mateo  
 \**C. subcarneum* (Boiss. & Reuter) Boiss. & Reuter  
*Daucus carota* L. subsp. *carota*  
*Eryngium campestre* L.  
*E. tenue* Lam.  
*Margotia gummifera* (Desf.) Lange  
*Pimpinella villosa* Schousboe  
*Seseli montanum* L. subsp. *peixotoanum* (Samp.) Lainz  
 \**Thapsia minor* Hoffmanns. & Link  
*Th. villosa* L.

##### ARALIACEAE

*Hedera hibernica* (G. Kirchn.) Bean

##### ASTERACEAE

\**Andryala integrifolia* L.  
*Anthemis arvensis* L.  
*Bellis perennis* L.  
*Carduus carpetanus* Boiss. & Reut.  
 \**C. tenuiflorus* Curt.  
 \**C. pycnocephalus* L.

*Carlina hispanica* Lam.  
*Carthamus lanatus* L.  
 \**Centaurea langei* Nyman  
*C. ornata* Willd.  
*Chamaemelum nobile* (L.) All.  
*Chondrilla juncea* L.  
*Cirsium vulgare* (Savi) Ten.  
*Crepis capillaris* (L.) Wallr.  
*C. vesicaria* L. subsp. *taraxacifolia* (Thuill.) Thell.  
*Crupina vulgaris* Cass.  
*Filago lutescens* Jordan  
*F. pyramidata* L.  
 \**Galactites tomentosa* Moench  
*Helichrysum stoechas* (L.) Moench subsp. *stoechas*  
 \**Hypochaeris glabra* L.  
*H. radicata* L.  
*Jasonia tuberosa* (L.) DC.  
 \**Lapsana communis* L. subsp. *communis*  
*Lactuca serriola* L.  
*Leontodon longirostris* (Finch & P. D. Sell) Talavera  
*Logfia gallica* (L.) Coss. & Germ.  
*L. minima* (Sm.) Dumort.  
 \**Onopordum acanthium* L.  
*Phagnalon saxatile* (L.) Cass.  
*Santolina semidentata* Hoffmanns. & Link  
*Scolymus hispanicus* L.  
*Scorzonera angustifolia* L. var. *angustifolia*  
*S. hispanica* L. var. *asphodeloides* Wallr.  
 \**S. hispanica* L. var. *crispatula* DC.  
*S. laciniata* L. var. *laciniata*  
*Senecio jacobaea* L.  
 \**S. vulgaris* L.  
 \**Silybum marianum* (L.) Gaertn.  
 \**Sonchus asper* (L.) Hill subsp. *glaucescens* (Jordan) Ball  
 \**S. tenerrimus* L.  
*Tolpis barbata* (L.) Gaertn.  
*Tragopogon crocifolius* L. subsp. *crocifolius*  
**BETULACEAE**  
*Alnus glutinosa* (L.) Gaertn.

\**Corylus avellana* L.  
**BORAGINACEAE**  
*Cynoglossum cheirifolium* L.  
 \**Echium vulgare* L.  
*Myosotis discolor* Pers. subsp. *discolor*  
 \**Pentaglottis sempervirens* (L.) L. H. Bailey  
**BRASSICACEAE**  
 \**Alliaria petiolata* (M. Bieb.) Cavara & Grande  
*Alyssum granatense* Boiss. & Reuter  
*A. serpyllifolium* Desf. subsp. *lusitanicum* Dudley & P. Silva  
*Arabidopsis thaliana* (L.) Heynh.  
*Biscutella valentina* (L.) Heywood subsp. *valentina* var. *valentina*  
 \**Capsella bursa-pastoris* (L.) Medicus  
 \**Cardamine hirsuta* L.  
 \**Coincya monensis* (L.) Greuter & Burdet subsp. *cheiranthos* (Vill.) Aedo, Leadlay & Muñoz Garmendia var. *recurvata* (All.) Leadlay  
 \**Draba muralis* L.  
*Erysimum linifolium* (Pers.) J. Gay  
*Jonopsidium abulense* (Pau) Rothm.  
*Lepidium heterophyllum* Benth.  
 \**Matthiola fruticulosa* (L.) Maire subsp. *fruticulosa*  
 \**Sisymbrium officinale* (L.) Scop.  
**BUXACEAE**  
*Buxus sempervirens* L.  
**CAMPANULACEAE**  
 \**Campanula erinus* L.  
*C. lusitanica* L.  
*C. rapunculus* L.  
*Jasione crispa* (Pourret) Samp. subsp. *sessiliflora* (Boiss. & Reut.) Rivas Mart.  
*J. montana* L. var. *montana*  
**CARYOPHYLLACEAE**  
 \**Agrostemma githago* L.  
*Arenaria leptoclados* (Reichenb.) Guss.  
 \**A. montana* L. subsp. *montana*  
*A. querioides* Willk. subsp. *fontiqueri* (P. Silva) Rocha Afonso

*A. serpyllifolia* L.  
*Cerastium brachypetalum* Pers.  
     subsp. *brachypetalum*  
*C. diffusum* Pers. subsp. *diffusum*  
*C. fontanum* Baumg. subsp. *vulgare* (Hartman) Greuter & Burdet  
*C. glomeratum* Thuill.  
*Chaetonychia cymosa* (L.) Sweet  
*Corrigiola litoralis* L. subsp. *litoralis*  
 \**Dianthus laricifolius* Boiss. & Reut.  
     subsp. *marizii* (Samp.) Franco  
 \**D. laricifolius* Boiss. & Reut.  
     subsp. *laricifolius*  
 \**Herniaria lusitanica* Chaudhri  
     subsp. *lusitanica*  
*H. scabrida* Boiss. subsp. *scabrida*  
*Holosteum umbellatum* L.  
*Moenchia erecta* (L.) P. Gaertner, B. Meyer & Scherber subsp. *erecta*  
*Paronychia argentea* Lam.  
*Petrorhagia nanteuillii* (Burnat) P.W. Ball & Heywood  
*Polycarpon tetraphyllum* (L.) L.  
     subsp. *tetraphyllum*  
*Sagina apetala* Ard.  
 \**Scleranthus annuus* L.  
*S. polycarpus* L.  
 \**Sherardia arvensis* L.  
 \**Silene gallica* L.  
*S. inaperta* L. subsp. *inaperta*  
*S. legionensis* Lag.  
*S. nutans* L. subsp. *nutans*  
*S. portensis* L.  
*S. scabriflora* Brot. subsp. *scabriflora*  
*S. vulgaris* (Moench) Garcke subsp. *vulgaris*  
*Spergula arvensis* L.  
*S. morisonii* Boreau  
*Spergularia purpurea* (Pers.) G. Don fil.  
*S. segetalis* (L.) G. Don fil.  
*Velezia rigida* L.  
**CISTACEAE**  
*Cistus ladanifer* L. subsp. *ladanifer*  
*C. salviifolius* L.

*Fumana procumbens* (Dunal) Gren. & Godron  
*Halimium umbellatum* (L.) Spach.  
     subsp. *viscosum* (Willk.) O. Bolòs & Vigo  
 \**Helianthemum aegyptiacum* (L.) Mill.  
*H. apenninum* (L.) Miller subsp. *rothmaleri* (Rothm.) Mayor & Fdez. Benito  
*Tuberaria guttata* (L.) Fourr.  
**CONVOLVULACEAE**  
*Convolvulus arvensis* L.  
*Cuscuta approximata* Bab.  
     subsp. *approximata*  
*C. epithymum* (L.) L. subsp. *kotschyi* (Desmoulins) Arcangeli  
**CRASSULACEAE**  
 \**Crassula tillaea* Lester-Garland  
 \**Sedum album* L.  
*S. amplexicaule* DC. subsp. *amplexicaule*  
*S. andegavense* (DC.) Desv.  
*S. forsterianum* Sm.  
*S. hirsutum* All. subsp. *hirsutum*  
*S. maireanum* Sennen  
*Umbilicus rupestris* (Salisb.) Dandy  
**ERICACEAE**  
*Erica arborea* L.  
*E. scoparia* L. subsp. *scoparia*  
**EUPHORBIACEAE**  
*Euphorbia exigua* L. subsp. *merinoi* M. Lainz  
*E. falcata* L. subsp. *falcata* var. *acuminata* (Lam.) St.-Amans  
*E. segetalis* L. var. *segetalis*  
 \**Mercurialis ambigua* L. fil.  
**FABACEAE**  
*Anthyllis sampaioana* Rothm.  
*A. vulneraria* L. subsp. *lusitanica* (Cullen & P. Silva) Franco  
*Astragalus cymbaearpos* Brot.  
*A. incanus* L. subsp. *numularioides* (Desf.) Maire  
*A. pelecinus* (L.) Barneby subsp. *pelecinus*  
*Coronilla repanda* (Poiret) Guss. subsp. *dura* (Cav.) P. Cout.  
*Cytisus multiflorus* (L'Hér.) Sweet  
*C. scoparius* (L.) Link subsp. *scoparius*



*C. striatus* (Hill) Rothm.  
*Dorycnium pentaphyllum* Scop.  
\**Genista hystrix* Lange  
*Hymenocarpus lotoides* (L.) Vis.  
*Lathyrus angulatus* L.  
*L. sphaericus* Retz.  
*Lotus corniculatus* L. subsp. *carpetanus*  
(Lacaita) Rivas Mart.  
*L. glaber* Mill.  
\**L. pedunculatus* Cav.  
*Lupinus angustifolius* L.  
\**Medicago lupulina* L.  
\**M. minima* (L.) L. var. *minima*  
*M. polymorpha* L.  
\**M. rigidula* (L.) All.  
*Ononis spinosa* L. subsp. *spinosa*  
*Ornithopus compressus* L.  
*O. perpusillus* L.  
*Trifolium angustifolium* L.  
*T. arvense* L. var. *arvense*  
*T. bocconei* Savi  
*T. campestre* Schreber  
*T. cherleri* L.  
*T. dubium* Sibth.  
*T. gemellum* Willd.  
*T. glomeratum* L.  
*T. hirtum* All.  
*T. pratense* L. subsp. *pratense*  
*T. repens* L.  
*T. scabrum* L.  
*T. striatum* L. var. *brevidens* Lange  
\**T. striatum* L. var. *striatum*  
\**T. subterraneum* L. subsp. *subterraneum*  
*T. sylvaticum* Gérard  
*Vicia angustifolia* L..  
*V. disperma* DC.  
*V. hirsuta* (L.) Gray  
\**V. lathyroides* L.  
*V. lutea* L. subsp. *lutea*  
*V. parviflora* Cav.

*V. dasycarpa* Ten.

#### **FAGACEAE**

*Q. rotundifolia* Lam.

*Q. suber* L.

#### **GENTIANACEAE**

*Centaurium erythraea* Rafn.  
subsp. *erythraea*

#### **GERANIACEAE**

*Erodium cicutarium* (L.) L'Her.  
subsp. *cutarium*

\**Geranium dissectum* L.

\**G. lucidum* L.

\**G. molle* L.

\**G. purpureum* Vill.

#### **HYPERICACEAE**

*Hypericum humifusum* L.

*H. linarifolium* Vahl.

*H. perforatum* L.

#### **MALVACEAE**

*Malva sylvestris* L.

*M. tournefortiana* L.

#### **MYRSINACEAE**

*Asterolinon linum-stellatum* (L.) Duby

#### **LAMIACEAE**

*Clinopodium vulgare* L.

*Lavandula pedunculata* (Mill.) Cav.  
var. *pedunculata*

*Mentha pulegium* L.

\**Mentha suaveolens* Ehrh.

*Prunella laciniata* (L.) L.

*P. vulgaris* L. subsp. *vulgaris*

\**Stachys arvensis* (L.) L.

*Thymus mastichina* L. subsp. *mastichina*

*Th. zygis* L. subsp. *zygis*

#### **LINACEAE**

*Linum bienne* Mill.

*L. strictum* L.

*L. trigynum* L. subsp. *trigynum*

*Radiola linoides* Roth

#### **OLEACEAE**

*Fraxinus angustifolia* Vahl

*Phillyrea angustifolia* L.

#### **OROBANCHACEAE**

*Orobanche gracilis* Sm.

*Odontitella virgata* (Link) Rothm.

*Parentucellia latifolia* (L.) Caruel

#### **PAPAVERACEAE**

\**Fumaria officinalis* L. subsp. *officinalis*

\**F. reuteri* Boiss.

*Papaver dubium* L.

*P. rhoeas* L.

#### **PLANTAGINACEAE**

*Anarrhinum bellidifolium* (L.) Willd.

*Antirrhinum braun-blanquetii* Rothm.

*Digitalis purpurea* L. subsp. *purpurea*

*Linaria aeruginea* (Gouan) Cav.

*L. amethystea* (Lam.) Hoffmanns. & Link  
subsp. *amethystea*

*L. saxatilis* (L.) Chaz

*L. spartea* (L.) Chaz.

*Plantago coronopus* L.

*P. lagopus* L.

*P. lanceolata* L.

*P. holosteam* Scop.

#### **PLUMBAGINACEAE**

*Armeria eriophylla* Willk.

*A. langei* Boiss. subsp. *daveau* (Cout.) P.  
Silva

\**A. langei* Boiss. subsp. *marizii* (Daveau)  
C. Aguiar, Sánchez-Mata & Monteiro-  
Henriques

#### **POLYGONACEAE**

\**Rumex conglomeratus* Murray

*R. acetosella* L. subsp. *angiocarpus* (Murb.)  
Murb.

*R. bucephalophorus* L. subsp. *gallicus*  
(Steinh.) Rech. fil.

*R. crispus* L.

*R. induratus* Boiss. & Reut.

*Polygonum arenastrum* Bor.

#### **RANUNCULACEAE**

*Ranunculus bulbosus* L. subsp. *aleae* (Willk.)  
Rouy & Foucaud

\**R. ficaria* L.

\**R. gramineus* L.

\**R. ollisiponensis* Pers.  
subsp. *ollisiponensis*

*R. paludosus* Poirlet

*R. peltatus* Schrank

#### **RESEDACEAE**

*Reseda virgata* Boiss. & Reut.

*Sesamoides purpurascens* (L.) G. López

#### **ROSACEAE**

*Aphanes australis* Rydb.

*Filipendula vulgaris* Moench

\**Geum sylvaticum* Pourret

\**G. urbanum* L.

\**Prunus avium* L. var. *avium*

*Rosa micrantha* Sm.

\**R. pouzinii* Tratt.

*Sanguisorba verrucosa* (G. Don) Ces.

#### **RUBIACEAE**

*Asperula aristata* L. fil. subsp. *scabra* (J. & K.  
Presl) Nyman

*Crucianella angustifolia* L.

*Gallium glaucum* L. subsp. *australe* Franco

\**G. mollugo* L. subsp. *mollugo*

*G. parisiense* L.

*G. papillosum* Lapeyr. subsp. *papillosum*

*G. verum* L. subsp. *verum*

\**Rubia peregrina* L.

#### **RUTACEAE**

*Ruta montana* (L.) L.

#### **SALICACEAE**

*Salix atrocinerea* Brot.

\**S. salviifolia* Brot.

#### **SAXIFRAGACEAE**

\**Saxifraga dichotoma* Willd.

*S. fragosoi* Sennen

*S. granulata* L.

#### **THYMELAEACEAE**

*Daphne gnidium* L.

## Ultramafic rock endemics

The northeastern Portugal endemic serpentinophytes' checklist published by Pinto da Silva (1970) was updated by the same author two decades later, in 1992 (Sequeira & Pinto da Silva 1992) (Table 7).

**Table 7.** Endemic serpentinophytes accepted by Sequeira & Pinto da Silva (1992)

<i>Aegilops geniculata</i> Roth var. <i>hirsuta</i> (Eig) f. <i>nana</i> (P. Silva) P. Silva	<i>Festuca brigantina</i> (Markgr.-Dannenb.) Markgr.-Dannenb.
<i>Alyssum pintodasilvae</i> Dudley (= <i>A. serpyllifolium</i> Desf. subsp. <i>lusitanicum</i> Dudley & P. Silva)	<i>Gaudinia fragilis</i> (L.) P. Beauv. f. <i>violacea</i> P. Silva
<i>Allium gaditanum</i> P. Lara f. <i>exiguum</i> P. Silva	<i>Hordeum hystrix</i> Roth f. <i>decumbens</i> P. Silva
<i>Allium sphaerocephalon</i> L. var. <i>pallidum</i> P. Silva	<i>Iberis linifolia</i> Loefl. subsp. <i>linifolia</i> f. <i>serpentinicola</i> P. Silva
<i>Allium vineale</i> L. f. <i>minus</i> P. Silva	<i>Jasione crispa</i> (Pourret) Samp. subsp. <i>serpentinica</i> P. Silva
<i>Arenaria querioides</i> Willk. subsp. <i>fontiqueri</i> (P. Silva) Rocha Afonso	<i>Linaria aeruginea</i> (Gouan) Cav. var. <i>simplex</i> P. Silva
<i>Armeria eriophylla</i> Willk.	<i>Lotus tenuis</i> Waldst. & Kit. var. <i>serpentinicus</i> P. Silva
<i>Bucephalophora aculeata</i> (L.) Pau subsp. <i>hispanica</i> (Steinh.) Löve & Kapoor f. <i>plagiotropica</i> P. Silva	<i>Molineriella laevis</i> (Brot.) Hackel f. <i>violacea</i> P. Silva
<i>Carex muricata</i> L. subsp. <i>lamprocarpa</i> Celak f. <i>arcuata</i> P. Silva	<i>Podospermum tenuifolium</i> Hoffmanns. & Link
<i>Crucianella angustifolia</i> L. f. <i>plagiotropica</i> P. Silva	<i>Pteridium aquilinum</i> (L.) Kuhn f. <i>congesta</i> P. Silva
<i>Ctenopsis delicatula</i> (Lag.) Paunero f. <i>quinqueflora</i> P. Silva	<i>Scilla autumnalis</i> L. var. <i>deflexo-scaposa</i> P. Silva & Q. P. Silva
<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nym. var. <i>microstachya</i> (Webb) P. Cout. f. <i>glauca</i> P. Silva	<i>Seseli peixotoanum</i> Samp.
<i>D. glomerata</i> subsp. <i>hispanica</i> var. <i>microstachya</i> f. <i>violacea</i> P. Silva	<i>Spergularia purpurea</i> (Pers.) G. Don f. f. <i>congesta</i> P. Silva
<i>Dianthus marizii</i> (Samp.) Samp.	<i>Taeniatherum caput-medusae</i> (L.) Nevski subsp. <i>crinitum</i> (Schreb.) P. Silva var. <i>serpentinicola</i> P. Silva
<i>Eryngium tenue</i> Lam. f. <i>pumilum</i> P. Silva	<i>Umbilicus rupestris</i> f. <i>violaceus</i> P. Silva

The description of the majority of the endemic taxa acknowledged by Pinto da Silva was based on simple serpentinomorphosis, namely nanism, prostrateness, decumbency, branching pattern, microphyllly, macrorrhizy and purple or violaceous colour. These characters are repeatedly inconsistent among serpentine plant populations, or are recurrent in serpentine and non-serpentine populations (e.g. shallow schists). They are also difficult to observe in herbarium plants. Consequently, many of the taxa mentioned in Table 7 have been devaluated by recent Floras and taxonomical revisions. In Table 8 we offer a comprehensive and updated list of the regional obligate serpentinophytes complemented with other vascular plant species in Portugal exclusive, or almost exclusive, of the ultramafic outcrops of Trás-os-Montes. The species distributions between the two regional ultramafic outcrops – Morais and Bragança – and IUCN categories at risk at the national scale are also presented. The uneven plant species distribution in the two studied ultramafic massifs supports the biogeographical typology presented in Section 1.3.

**Table 8.** Endemic species and other rare plants of the ultramafic outcrops of northeastern Portugal (Trás-os-Montes)

	<b>Bragança massif</b>	<b>Morais massif</b>	<b>IUCN categories of threat (national scale)</b>
<b>Endemic serpentinophytes</b>			
<i>Anthyllis sampaioana</i> ( <i>Fabaceae</i> ) (Figure 14)	x	-	VU
<i>Arenaria querioides</i> subsp. <i>fontiqueri</i> ( <i>Caryophyllaceae</i> ) (Figure 12)	x	x	NT
<i>Armeria eriophylla</i> ( <i>Plumbaginaceae</i> ) (Figure 12)	x	-	NT
<i>Armeria langei</i> subsp. <i>marizii</i> ( <i>Plumbaginaceae</i> ) (Figure 13)	-	x	NT
<i>Avenula lusitanica</i> ( <i>Poaceae</i> ) (Figure 13)	x	x	VU
<i>Festuca brigantina</i> subsp. <i>brigantina</i> ( <i>Poaceae</i> ) (Figure 14)	x	-	EN
<b>Obligate serpentinophytes common to Galician and northeastern Portuguese ultramafic rocks</b>			
<i>Alyssum serpyllifolium</i> subsp. <i>lusitanicum</i> ( <i>Brassicaceae</i> ) (Figure 25)	x	x	LC
<b>Obligate serpentinophytes endemic of Iberian ultramafic rocks</b>			
<i>Asplenium adiantum-nigrum</i> subsp. <i>corunnense</i> ( <i>Aspleniaceae</i> ) (Figure 22)	x	x	NT
<b>Other species in Portugal exclusive of the ultramafic rocks of Trás-os-Montes</b>			
<i>Antirrhinum braun-blanquetii</i> ( <i>Plantaginaceae</i> )	x	x	CR
<i>Armeria langei</i> subsp. <i>daveaui</i> ( <i>Plumbaginaceae</i> ) (Figure 13)	x	x	NT

<i>Astragalus incanus</i> subsp. <i>nummularioides</i> ( <i>Fabaceae</i> )	x	-	VU
<i>Bromus squarrosus</i> ( <i>Poaceae</i> )	x	-	EN
<i>Dianthus laricifolius</i> subsp. <i>marizii</i> ( <i>Caryophyllaceae</i> )	x	x	LC
<i>Elymus hispidus</i> subsp. <i>barbulatus</i> ( <i>Poaceae</i> )	x	-	DD
<i>Gagea pratensis</i> ( <i>Liliaceae</i> )	x	-	EN
<i>Jasonia tuberosa</i> ( <i>Asteraceae</i> )	x	-	EN
<i>Notholaena marantae</i> subsp. <i>marantae</i> ( <i>Pteridaceae</i> ) (Figure 22)	x	x	VU
<i>Reseda virgata</i> ( <i>Resedaceae</i> ) (Figure 21)	x	x	LC
<i>Santolina semidentata</i> ( <i>Asteraceae</i> ) (Figure 24)	x	x	LC
<i>Saxifraga dichotoma</i> ( <i>Saxifragaceae</i> )	x	-	EN
<i>Seseli montanum</i> subsp. <i>peixotoanum</i> ( <i>Apiaceae</i> ) (Figure 21)	x	x	LC
<i>Silene legionensis</i> ( <i>Caryophyllaceae</i> )	x	-	VU
<i>Ventenata dubia</i> ( <i>Poaceae</i> )	x	-	DD

**IUCN categories of threat:** Extinct, EX; Critically Endangered, CR; Endangered, EN; Vulnerable, VU; Near Threatened, NT; Least Concern, LC; Data deficient, DD



**Figure 12.** *Arenaria querioides* subsp. *fontiqueri* (*Caryophyllaceae*) (left), *Armeria eriophylla* (*Plumbaginaceae*) (right)



**Figure 13.** *Armeria langei* subsp. *marizii* (Plumbaginaceae) (left), *Avenula lusitanica* (Poaceae) (right)



**Figure 14.** *Festuca brigantina* subsp. *brigantina* (Poaceae) (left), *Anthyllis sampaiiana* (Fabaceae) (right)

## 7. Vegetation

(by Carlos Aguiar, Tiago Monteiro-Henriques & D. Sánchez-Mata)

### Introduction

Due to their complexity, vegetation phenomena are not understandable without a consistent conceptual framework. A few indispensable concepts to explore the northeastern Portuguese ultramafic vegetation are set out in Tables 9 and 10.