

HABITAT CLASSIFICATION

within the EU/ICP Forests Biodiversity Test-Phase (ForestBIOTA)

Following a first draft proposal elaborated by Denmark, Ireland and Slovenia for the so-called „biosoil“ project (October 2004) to be carried out on Level I plots of the EU/ICP Forests monitoring programme, it is foreseen to classify the plots according to Annex I Habitats of the Habitat Directive (92/43/EEC).

In order to enable a full use of the ForestBIOTA results for future European biodiversity and nature conservation policies, the classification of ForestBIOTA plots into Annex I Habitats is carried out based on the official documents (Annex I of the Habitat Directive as well as the Interpretation Manual).

For each ForestBIOTA plot the four digit code for the applicable habitat must be reported. If the plot does not fall under a Habitat of the Annex I the code 9999 shall be used to indicate this.

ANNEX I

NATURAL HABITAT TYPES OF COMMUNITY INTEREST WHOSE CONSERVATION REQUIRES THE DESIGNATION OF SPECIAL AREAS OF CONSERVATION

Interpretation

Guidance on the interpretation of habitat types is given in the "Interpretation Manual of European Union Habitats" as approved by the committee set up under Article 20 ("Habitats Committee") and published by the European Commission ¹.

The code corresponds to the NATURA 2000 code.

The sign "*" indicates priority habitat types.

2. COASTAL SAND DUNES AND INLAND DUNES

- 21. Sea dunes of the Atlantic, North Sea and Baltic coasts**
2180 Wooded dunes of the Atlantic, Continental and Boreal region
- 22. Sea dunes of the Mediterranean coast**
2270 * Wooded dunes with *Pinus pinea* and/or *Pinus pinaster*

5. SCLEROPHYLLOUS SCRUB (MATORRAL)

- 52. Mediterranean arborescent matorral**
5210 Arborescent matorral with *Juniperus* spp.
5220 * Arborescent matorral with *Zyziphus*
5230 * Arborescent matorral with *Laurus nobilis*

6. NATURAL AND SEMI-NATURAL GRASSLAND FORMATIONS

- 65. Mesophile grasslands**
6530 * Fennoscandian wooded meadows

¹ "Interpretation Manual of European Union Habitats", version EUR 15/2" adopted by the Habitats Committee on 4 October 1999 and "Amendments to the "Interpretation Manual of European Union Habitats" with a view to EU enlargement" (Hab. 01/11b-rev. 1) adopted by the Habitats Committee on 24 April 2002 after written consultation, European Commission, DG ENV.

9. FORESTS

(Sub)natural woodland vegetation comprising native species forming forests of tall trees, with typical undergrowth, and meeting the following criteria: rare or residual, and/or hosting species of Community interest

90. Forests of Boreal Europe

- 9010 * Western Taïga
- 9020 * Fennoscandian hemiboreal natural old broad-leaved deciduous forests (*Quercus*, *Tilia*, *Acer*, *Fraxinus* or *Ulmus*) rich in epiphytes
- 9030 * Natural forests of primary succession stages of landupheaval coast
- 9040 Nordic subalpine/subarctic forests with *Betula pubescens* ssp. *czerepanovii*
- 9050 Fennoscandian herb-rich forests with *Picea abies*
- 9060 Coniferous forests on, or connected to, glaciofluvial eskers
- 9070 Fennoscandian wooded pastures
- 9080 * Fennoscandian deciduous swamp woods

91. Forests of Temperate Europe

- 9110 *Luzulo-Fagetum* beech forests
- 9120 Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*)
- 9130 *Asperulo-Fagetum* beech forests
- 9140 Medio-European subalpine beech woods with *Acer* and *Rumex arifolius*
- 9150 Medio-European limestone beech forests of the *Cephalanthero-Fagion*
- 9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*
- 9170 *Galio-Carpinetum* oak-hornbeam forests
- 9180 * *Tilio-Acerion* forests of slopes, screes and ravines
- 9190 Old acidophilous oak woods with *Quercus robur* on sandy plains
- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- 91B0 Thermophilous *Fraxinus angustifolia* woods

- 91C0 * Caledonian forest
- 91D0 * Bog woodland
- 91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- 91F0 Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*)
- 91G0 * Pannonic woods with *Quercus petraea* and *Carpinus betulus*
- 91H0 * Pannonian woods with *Quercus pubescens*
- 91I0 * Euro-Siberian steppic woods with *Quercus* spp.
- 91J0 * *Taxus baccata* woods of the British Isles
- 91K0 Illyrian *Fagus sylvatica* forests (*Aremonio-Fagion*)
- 91L0 Illyrian oak-hornbeam forests (*Erythronio-carpinion*)
- 91M0 Pannonian-Balkan turkey oak –sessile oak forests
- 91N0 * Pannonic inland sand dune thicket (*Junipero-Populetum albae*)
- 91P0 Holy Cross fir forest (*Abietetum polonicum*)
- 91Q0 Western Carpathian calcicolous *Pinus sylvestris* forests
- 91R0 Dinaric dolomite Scots pine forests (*Genisto januensis-Pinetum*)
- 91T0 Central European lichen Scots pine forests
- 91U0 Sarmatic steppe pine forest
- 91V0 Dacian Beech forests (*Symphyto-Fagion*)

92. Mediterranean deciduous forests

- 9210 * Apennine beech forests with *Taxus* and *Ilex*
- 9220 * Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*
- 9230 Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica*
- 9240 *Quercus faginea* and *Quercus canariensis* Iberian woods
- 9250 *Quercus trojana* woods
- 9260 *Castanea sativa* woods
- 9270 Hellenic beech forests with *Abies borisii-regis*
- 9280 *Quercus frainetto* woods

- 9290 *Cupressus* forests (*Acero-Cupression*)
- 92A0 *Salix alba* and *Populus alba* galleries
- 92B0 Riparian formations on intermittent Mediterranean water courses with *Rhododendron ponticum*, *Salix* and others
- 92C0 *Platanus orientalis* and *Liquidambar orientalis* woods (*Platanion orientalis*)
- 92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*)

93. Mediterranean sclerophyllous forests

- 9310 Aegean *Quercus brachyphylla* woods
- 9320 *Olea* and *Ceratonia* forests
- 9330 *Quercus suber* forests
- 9340 *Quercus ilex* and *Quercus rotundifolia* forests
- 9350 *Quercus macrolepis* forests
- 9360 * Macaronesian laurel forests (*Laurus*, *Ocotea*)
- 9370 * Palm groves of *Phoenix*
- 9380 Forests of *Ilex aquifolium*
- 9390 * Scrub and low forest vegetation with *Quercus alnifolia*
- 93A0 Woodlands with *Quercus infectoria* (*Anagyro foetidae-Quercetum infectoriae*)

94. Temperate mountainous coniferous forests

- 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*)
- 9420 Alpine *Larix decidua* and/or *Pinus cembra* forests
- 9430 Subalpine and montane *Pinus uncinata* forests (* if on gypsum or limestone)

95. Mediterranean and Macaronesian mountainous coniferous forests

- 9510 * Southern Apennine *Abies alba* forests
- 9520 *Abies pinsapo* forests
- 9530 * (Sub-) Mediterranean pine forests with endemic black pines
- 9540 Mediterranean pine forests with endemic Mesogean pines
- 9550 Canarian endemic pine forests

- 9560 * Endemic forests with *Juniperus* spp.
- 9570 * *Tetraclinis articulata* forests
- 9580 * Mediterranean *Taxus baccata* woods
- 9590 * *Cedrus brevifolia* forests (*Cedrosetum brevifoliae*)



**INTERPRETATION
MANUAL
OF
EUROPEAN UNION
HABITATS**

EUR 25

April 2003



EUROPEAN COMMISSION
DG ENVIRONMENT
Nature and biodiversity

- * The Interpretation Manual of European Union Habitats - EUR25 is a scientific reference document. It is based on the version for EUR15, which was adopted by the Habitats Committee on 4. October 1999 and consolidated with the new and amended habitat types for the 10 accession countries as adopted by the Habitats Committee on 14 March 2002.

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WHY THIS MANUAL?

Historical review

The "Habitats" Directive¹ is a Community legislative instrument in the field of nature conservation that establishes a common framework for the conservation of wild animal and plant species and natural habitats of Community importance; it provides for the creation of a network of special areas of conservation, called Natura 2000, to "maintain and restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest".

Animal and plant species names are clearly presented in the Directive and, despite minor misspellings or use of synonyms, no major additional work needs to be done to allow a correct interpretation of Annex II. In contrast, the development of a common agreed definition appeared to be essential for the different habitat types of Annex I.

Annex I lists today 218 European natural habitat types, including 71 priority (i.e. habitat types in danger of disappearance and whose natural range mainly falls within the territory of the European Union). Annex I is based on the hierarchical classification of European habitats developed by the CORINE Biotopes project² since that was the only existing classification at European level. A draft list of habitat types for Annex I was therefore drawn up on the basis of this classification by Professor A. Noirfalise and submitted to the national experts preparing the Directive as a working document in August 1989. Numerous discussions with the national experts then took place between 1989 and 1991, culminating in the version of Annex I published in the Official Journal in May 1992.

In December 1991, while the Directive was being adopted, a thorough revision of the CORINE classification was published³. This revision introduced numerous changes within codes and habitat types, in particular involving the division of the latter into sub-types. Definitions had been prepared for the various categories. Consequently, the Annex I codes no longer corresponded fully to the codes and descriptive content of the various categories of CORINE, resulting in considerable ambiguities in the interpretation of Annex I on the basis of the CORINE classification. The Task Force/European Environment Agency thus produced a paper establishing the correspondence between the habitat codes of Annex I and those of the 1991 version of the CORINE classification⁴. This paper also included the description proposed in the 1991 CORINE version for the various habitat types of Annex I.

¹ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, O.J. L206, 22.07.92

² CORINE Biotopes - Technical Handbook, volume 1, p. 73-109, Corine/Biotopes/89-2.2, 19 May 1988, partially updated 14 February 1989.

³ CORINE Biotopes manual, Habitats of the European Community. EUR 12587/3, Office for Official Publications of the European Communities, 1991.

⁴ Relation between the Directive 92/43/EEC Annex I habitats and the CORINE habitat list 1991 (EUR 12587/3). Version 1 - Draft, November 1992. CEC-DG XI, Task Force Agency (EEA-TF).

The manual

Having in mind all these difficulties of classification, the Scientific Working Group, set up by the Habitats Committee (established by Directive 92/43/EEC), expressed in May 1992 the need to prepare a manual for the interpretation of Annex I. Following a call for proposals the Commission charged Professor Thanghe from the Université Libre de Bruxelles to prepare a draft manual⁵.

Following several meetings of the Scientific Working Group, the Commission agreed the two following points with the national experts:

- (1) The interpretation work on Annex I should primarily focus on the priority habitat types.
- (2) The CORINE classification (1991 version) provides a basis for a description of the Annex I habitat types; where the experts feel that it is not suitable, an operational scientific description should be produced from the contributions of the national experts.

In September 1993 the Université Libre de Bruxelles finalised the study relating to the interpretation of Annex I priority habitat types. This study focused on the drafting of an eight field descriptive sheet drawn up on the basis of written and oral scientific contributions from the national experts. Each sheet gathers the information on national and regional particularities, as well as types of associated habitats. The manual for the interpretation of Annex I priority habitat types of the Council Directive 92/43/EEC was compiled by the Commission (DG XI), based on the study of the Université Libre de Bruxelles, the contributions of the national experts, and the CORINE classification (1991 version); this document was approved by the Habitats Committee in February 1994 (Doc. HABITATS 94/3 FINAL).

Following the adoption of the priority habitats manual, the experts identified a set of 36 non priority habitat types also causing interpretation problems. An interpretation document was drafted by the Université Libre de Bruxelles, discussed in a meeting of the Scientific Working Group (December 1994) and revised accordingly⁶.

On April 1995 the Habitats Committee approved the EUR12 version of the 'Interpretation Manual of European Union Habitats'⁷, which incorporated:

- i) the descriptive sheets for priority habitats⁸, which establish clear, operational scientific definitions of habitat types, using pragmatic descriptive elements (e.g. characteristic plants), and taking into consideration regional variation;
- ii) the descriptive sheets of 36 non priority habitats similar to those used for priority habitats;
- iii) the CORINE Biotopes definitions³ for the remaining non priority habitats; these definitions should be considered 'a minimal interpretation', not exclusive; some CORINE definitions do not take account of sub-types, regional varieties and/or do not cover all the geographical range of an habitat type - this fact should be recognised, thus allowing a certain flexibility in the interpretation of these Annex I habitat types.

The contents of the manual did not take into account the accession of Austria, Finland and Sweden, which has resulted in the inclusion of a new biogeographical region (the Boreal region) in the Directive. These new Member States have asked for the introduction in Annex I of several priority habitat types that are restricted or only apply to them. In order not to delay the distribution of the manual, the Commission has decided to publish

⁵ Étude relative au projet de manuel technique d'interprétation de l'Annexe I de la Directive habitats 92/43/CEE. Rapport final, September 1993. Université Libre de Bruxelles (contrat n° 4-3040(92)15504).

⁶ Étude relative au projet de manuel technique d'interprétation de l'Annexe I de la Directive habitats 92/43/CEE - Types d'habitats non prioritaires. Rapport final, Janvier 1995. Université Libre de Bruxelles (contrat n° B4-3040/94/000212/MAR/B2).

⁷ Also available in French under the title 'Manuel d'interprétation des habitat de l'Union européenne'

⁸ From Doc. HABITATS 94/3 FINAL

that first version (EUR12) and envisaged the preparation of a second version (EUR15) in order to incorporate new information (mainly on distribution and regional sub-types).

THE EUR15 VERSION

The prime objective of the EUR15 version was to update the old EUR12 version. Descriptive sheets were added for the 11 priority types attached to Annex I when Austria, Finland and Sweden joined the Union⁹; it further incorporates comments for other Annex I habitats occurring in those Member States, and corrects, or adds, newly acquired information.

The 1991 classification (Habitats of the European Community) was extended in 1993 to the whole Palaearctic region¹⁰, namely with the inclusion of the Nordic vegetation classification; this classification was supplemented in 1995 with text descriptions, phytosociological units and references; a computer database tool (PHYSIS¹¹) was developed to support this work. The EUR15 version updated the definitions of those habitat types for which the CORINE 1991 has been used, on the basis of the information contained in the PHYSIS database. Accordingly, the CORINE codes are also replaced by the 'Palaearctic codes'. In situations where ambiguities exist between the definitions contained in this manual and those of the Palaearctic habitats classification or PHYSIS data base, it is intended that the definitions of this manual should take precedence. This work was adopted by the Habitats Committee on 13.9.1996. The 2nd edition adopted on the 4th October 1999 included amendments for the Boreal biogeographical region to the Annex I¹² and the removal of the reference to the geographical distribution of habitats (which is included in the reference lists of the habitats types by biogeographic region).

THE EUR25 VERSION

The EUR25 version of the Interpretation Manual includes descriptions of new habitats and amendments to some existing habitats resulting from the expected addition of 10 new Member states in May 2004.

After extensive discussions among Member States, Accession Countries and the European Commission, 20 new habitat types were accepted to be added to Annex I, and respective descriptions of these new types were adopted by the Habitats Committee on 14 March 2002. Additionally several of the habitat types proposed have been agreed to be variations of existing habitats and therefore some amendments to existing habitats were necessary in order to reflect the habitats as found in the EU25 area. In the frame of the Accession Treaty 2003, signed in April 2003 in Athens, new consolidated annexes were prepared including the 20 new habitat types.

The descriptions of new habitats have been prepared by the European Topic Centre on Nature Protection and Biodiversity using the PHYSIS database as the main source. This description was then compared with the information given in the proposal from accession countries and if judged necessary amended. The lists of plants in particular are usually a composite of both sources. In a second step, comments from both Accession Countries and Member States were taken into account, which led to the new definitions enclosed.

The fact that many of the habitat types of Annex I are qualified by biogeographical terms such as Mediterranean, Alpine, Medio-European, etc., meaning that they have their main occurrence in a given biogeographical region, does not exclude the possibility of finding the same habitat types in other biogeographical regions. In fact, these often isolated occurrences have a major scientific and conservation

⁹ Accession Act of Austria, Finland and Sweden (OJ L1,1.1.1995, p.135)

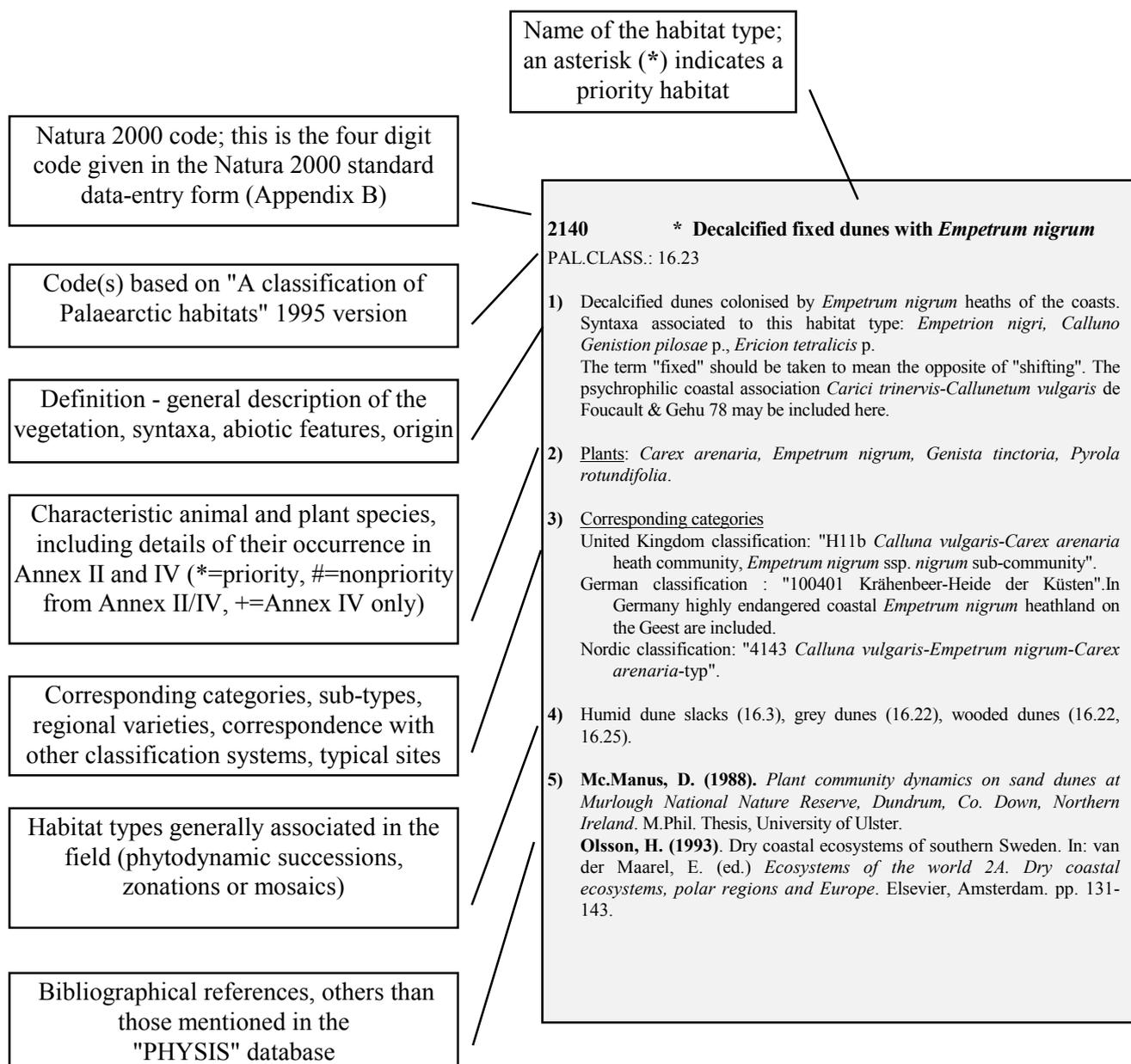
¹⁰ Devillers, P. & Devillers-Terschuren, J. (1993). A classification of Palaearctic habitats. Strasbourg: Council of Europe
¹¹ Institut Royal des Sciences Naturelles de Belgique

¹² Council Directive 97/62/EC of 27 October 1997 adapting to technical and scientific progress Directive 92/43/EC on the conservation of natural habitats and of wild fauna and flora, O.J. L305, 8.11.1997.

value. The users of the manual will need to employ a certain flexibility of interpretation, particularly in those areas where the habitat types are very fragmentary and influenced by human activities.

Explanatory Notes

The habitat types are grouped and sorted according to Annex I of the Directive.



COASTAL SAND DUNES AND INLAND DUNES

Sea dunes of the Atlantic, North Sea and Baltic coasts

2180 Wooded dunes of the Atlantic, Continental and Boreal region

PAL.CLASS.: 16.29

- 1) Natural or semi-natural forests (long established) of the Atlantic, Continental and Boreal region coastal dunes with a well developed woodland structure and an assemblage of characteristic woodland species. It corresponds to oak groves and beech-oak groves with birch (*Quercion robori-petraeae*) on acid soils, as well as forests of the *Quercetalia pubescenti-petraeae* order. Pioneer stages are open forests with *Betula* spp. and *Crataegus monogyna*, mixed forests with *Fraxinus excelsior*, *Quercus robur*, *Ulmus minor* and *Acer pseudoplatanus* or, in wet dune slacks, pioneer forests with *Salix alba* which develop into humid mixed forests or marsh forests. On southern atlantic coasts, it mainly corresponds to mixed *Pinus pinaster-Quercus ilex* forests, forests of *Quercus suber* and *Quercus robur* or forest stage with *Quercus robur* or *Quercus pubescens*. On Baltic coasts also pioneer forests of *Alnus* spp. or *Pinus sylvestris*.
- 2) Plant species are highly varied and depend on local site conditions
- 3) Corresponding categories
German classification: "430804 Buchenbuschwald (auf Ostseedünen)", "430801 Traubeneichen-Hainbuchenwald (küstennah, gischtbeeinflußt, F02)", "43080501 Eichen-Trockenwald lalkarmer Standorte (küstennah, gischtbeeinflußt, F02)", "440202 trockener Sandkiefernwald (küstennah, gischtbeeinflußt, F02)".
- 4) This habitat type include semi-natural forests with a typical undergrowth, spontaneously developed from old plantations. These forests are generally associated with dune scrubs (preforest stages-16.25), dune moors, grey dunes (16.22) and wet dune slacks (16.3).
- 5) **Kielland-Lund. J. (1967).** Zur Systematik der Kiefernwälder Fennoscandiensis. *Mitt. Flor.-Soz. Arbeitsgem.N.F.* 11/12:127-141.

Sea dunes of the Mediterranean coast

2270

*** Wooded dunes with *Pinus pinea* and/or *Pinus pinaster***

PAL.CLASS.: 16.29 x 42.8

- 1) Coastal dunes colonised by Mediterranean and Atlantic thermophilous pines, corresponding to the substitution facies or in some stations climax formations of evergreen oak of artificial origin (*Quercetalia ilicis* or *Ceratonia-Rhamnetalia*).
 - 2) Plants: *Pinus pinea*, *P. pinaster*, *P. halepensis*, *Juniperus macrocarpa*, *J. turbinata* ssp. *turbinata*.
 - 4 Long-established plantations of these pines, within their natural area of occurrence, and with an undergrowth basically similar to that of paraclimatic formations, are included in this habitat type
-

SCLEROPHYLLOUS SCRUB (MATORRAL)

Mediterranean arborescent matorral

5210

Arborescent matorral with *Juniperus* spp.

PAL.CLASS.: 32.131 to 32.136

- 1) Mediterranean and sub-Mediterranean evergreen sclerophyllous scrub organized around arborescent junipers. Mixed dominance can be indicated by combination of codes.

Sub-types

32.131 - *Juniperus oxycedrus* arborescent matorral

Arborescent matorral dominated by *Juniperus oxycedrus* s.l.

32.132 - *Juniperus phoenicea* arborescent matorral

Arborescent matorral dominated by *Juniperus phoenicea* s.l..

32.133 - *Juniperus excelsa* and *J. foetidissima* arborescent matorrals

Arborescent matorrals of Greece, Anatolia and the Near East, dominated by *Juniperus excelsa* or *J. foetidissima*.

32.134 - *Juniperus communis* arborescent matorral

Mediterranean formations dominated by *Juniperus communis*.

32.135 - *Juniperus drupacea* arborescent matorral

Formations derived from 42.A5¹⁶, limited to the Peloponnese and Asia Minor.

32.136 - *Juniperus thurifera* arborescent matorral

Formations derived from 42.A2¹⁷.

- 2) Plants: *Juniperus oxycedrus*, *J. phoenicea*, *J. foetidissima*, *J. excelsa*, *J. communis*, *J. drupacea*, *J. thurifera*.
-

5220

* Arborescent matorral with *Zyziphus*

PAL.CLASS.: 32.17

- 1) Pre-desert deciduous scrub of *Periploca laevigata*, *Lycium intricatum*, *Asparagus stipularis*, *A. albus*, *Withania frutescens* with tall *Zyziphus lotus*, confined to the arid Iberian South-west under a xerophytic thermo-Mediterranean bio-climate; corresponds to the mature phase or climax of climatophile and edapho-xero-psammophile vegetation series (*Periplocion angustifoliae*: *Ziziphetum loti*, *Zizipho-Maytenetum europaei*, *Mayteno-Periplocetum*).

- 2) Plants: *Asparagus albus*, *Calicotome intermedia*, *Chamaerops humilis*, *Maytenus senegalensis* ssp. *europaeus*, *Periploca laevigata* ssp. *angustifolia*, *Phlomis purpurea* ssp. *almeriensis*, *Rhamnus oleoides* ssp. *angustifolia*, *Withania frutescens*, *Zyziphus lotus*.

- 5) **Alcaraz, F., Díaz, T.E., Rivas-Martínez, S. & Sánchez Gómez, P. (1989).** Datos sobre la vegetación del sureste de España: provincia biogeográfica Murciano-Almeriense. *Itinera Geobot.* 2: 1 - 133.

Peinado, M., Alcaraz, F. & Martínez Parras, J.M. (1992). Vegetation of South-eastern Spain. *Flora et Vegetatio Mundi.* 10: 1 - 487.

¹⁶ 42.A5 - Syrian juniper woods : *Juniperus drupacea* woods of the northern slopes of Mount Parnon and of the Karlik mountain in Thrace, Greece. Part of the formation takes the appearance of an arborescent matorral, listed under 32.135.

¹⁷ 42.A2 - Spanish juniper woods (*Juniperion thuriferae*) : Forest formations dominated by *Juniperus thuriferae* of Spain, southern France and Corsica and North Africa. Many communities may be better described as arborescent matorrals, and listed under 32.136; geographical divisions can nevertheless be retained by appending the suffixes of 42.A2 to 32.136.

5230*** Arborescent matorral with *Laurus nobilis***

PAL.CLASS.: 32.18

- 1) Humid arborescent matorral with tall laurel (*Laurus nobilis*).
 - 2) Plants: *Arbutus unedo*, *Ceratonia siliqua*, *Fraxinus ornus*, *Laurus nobilis*, *Olea europaea* var. *sylvestris*, *Phillyrea latifolia*, *Quercus ilex*, *Rubia peregrina* ssp. *longifolia*, *Smilax aspera* var. *altissima*, *Viburnum tinus*.
 - 3) Corresponding categories
The syntaxa of the Spanish types are: *Quercetea ilicis*, *Querco-Oleion sylvestris*: *Viburno tini-Fraxinetum orni lauretosum nobilis* (southern mountains of Valencia); *Quercion ilicis*: *Lauro-Quercetum ilicis* facies of *Laurus nobilis* (from Asturias to the Basque Country).
-

NATURAL AND SEMI-NATURAL GRASSLAND FORMATIONS

Mesophile grasslands

6530

* Fennoscandian wooded meadows

PAL.CLASS.: -

- 1) A vegetation complex consisting of small copses of deciduous trees and shrubs and patches of open meadows. Ash (*Fraxinus excelsior*), birch (*Betula pendula*, *B. pubescens*) and *Quercus robur*, *Tilia cordata*, *Ulmus glabra* or *Alnus incana* are the common tree species. Nowadays very few areas are managed but traditionally these areas were managed by a combination of raking, hay-cutting, grazing of grassland and pollarding or lopping of trees. Species-rich vegetation complexes with rare and threatened meadow species and well developed epiphytic flora of mosses and lichens are characteristic. Many threatened species preferring old pollarded deciduous trees of semi-open habitats occur. The habitat type includes managed areas and overgrown areas with old pollarded or lopped deciduous trees. The type does not include abandoned meadows being invaded by trees.
- 2) Plants: (In addition to the above mentioned tree species), *Briza media*, *Corylus avellana*, *Cotoneaster scandinavicus*, *Crataegus* spp., *Cypripedium calceolus*, *Dactylorhiza fuchsii*, *D. Sambucina*, *Festuca ovina*, *Geranium sanguineum*, *Helianthemum nummularium*, *Listera ovata*, *Malus sylvestris*, *Orchis mascula*, *Plantago lanceolata*, *Polygala amarella*, *P. vulgaris*, *Primula farinosa*, *Primula veris*, *Ranunculus ficaria*, *Rosa* spp., *Sorbus hybrida*, *S. intermedia*
- 5) **Hägström, C.-A. (1983).**- Vegetation and soil of the wooded meadows in Nåtö, Åland. *Acta Bot. Fennica* ,120:1-66.
Hägström, C.-A. (1988).- Protection of wooded meadows in Åland - problems, methods and perspectives. *Oulanka Reports*, 8:88-95.

FORESTS

(Sub)natural woodland vegetation comprising native species forming forests of tall trees, with typical undergrowth, and meeting the following criteria: rare or residual, and / or hosting species of Community interest ²⁰

Forests of Boreal Europe

9010 * Western Taïga

PAL.CLASS.: 41.B8, 41.C3, 41.D5, 42.C

- 1) Natural old forests as well as those young forest stages naturally developing after fire. Natural old forests represent climax or late succession stages with slight human impact or without any human impact. Present natural old forests are only minor remnants of those originally occurring in Fennoscandia. With intensive forestry, which is carried out practically throughout this region, the main features of natural old forests disappear, i.e. the considerable amount of dead and rotten wood, the great variation in tree age and length and species composition, the trees from previous generations, the more stable microclimate. Old natural forests are habitats of many threatened species, especially bryophytes, lichens, fungi, and invertebrates (mostly beetles). Some of the present old natural forests have human impact, but in spite of that they maintain many characteristics of the natural forests.

Because of the important role of fire, burned forest areas, and their young succession stages, have been naturally common in the boreal region. Nowadays they are extremely rare because of efficient fire protection and forestry. Natural recently burned forest areas are very important habitats for many endangered species. Typical of natural burned areas is a great amount of dead burned wood and a varying density of living trees which greatly conditions the regeneration of the forest.

The character of the forests vary with the different boreal zones (hemi-, southern, middle, northern) and different site types.

The following sub-types are distinguished, according to the main tree species and site type variation:

- natural old spruce forests
- natural old pine forests
- natural old mixed forests
- natural old deciduous forests
- recently burnt areas
- younger forests naturally developed after fire

²⁰ For forest habitat types the following additional criteria were accepted by the Scientific Working Group (21-22 June 1993):

- forests of native species;
- forests with a high degree of naturalness;
- forests of tall trees and high forest;
- presence of old and dead trees;
- forests with a substantial area;
- forests having benefited from continuous sustainable management over a significant period.

- 2) **Plants:** Pine forests - *Pinus sylvestris*, *Vaccinium vitis-idaea*, *Calluna vulgaris*, *Empetrum nigrum*, *Pleurozium schreberi*, *Cladonia* spp.; Spruce and mixed forests - *Picea abies*, *Pinus sylvestris*, *Betula* spp., *Vaccinium myrtillus*, *Deschampsia flexuosa*, *Maianthemum bifolium*, *Oxalis acetosella*, *Trientalis europea*, *Dicranum* spp., *Pleurozium schreberi*, *Hylocomium splendens*; Deciduous forests - *Betula* spp., *Populus tremula*, *Deschampsia flexuosa*, *Vaccinium myrtillus*, *Agrostis capillaris*, *Equisetum sylvaticum*. Lichens - *Evernia divaricata*, *Lobaria pulmonaria*. Fungi - *Amylocystis lapponica*, *Gloiodon strigosum*, *Fomitopsis populicola*, *Skeletocutis odora*, *S. stellae*, *Phlebia centrifuga*, *Haploporus odoratus*, *Aporpium caryae*, *Gelatoporia pannocinata*, *Phellinus populicola*. **Animals:** Mammals - **Pteromys volans*, *Myopus schisticolor*, *Sorex minutus*; Birds - *Picoides tridactylus*, *Perisoreus infaustus*, *Dendrocopos leucotos*, *D. minor*; Beetles - *Tragosoma depsarium*, *Pytho kolwensis*, *P. abieticola*, #*Cucujus cinnaberinus*, *Peltis grossa*, **Osmoderma eremita*. Originally natural old forests were found in the whole boreal and hemiboreal zones, except in the oro-hemiarctic treeless zone. In Finland nowadays most of the natural old forests are found in eastern and northern parts, in southern and western parts of the country only remnants of these forests remain. In Sweden most of the old natural forests are in the north and only some of them in the south.
- 5) **Kalela, A. (1961).** Waldvegetationszonen Finnlands und ihre klimatischen paralleltypen. Arch. Soc. zool. bot. fenn. Vanamo 16 Suppl.:65-83.
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9020

*** Fennoscandian hemiboreal natural old broad-leaved deciduous forests (*Quercus*, *Tilia*, *Acer*, *Fraxinus* or *Ulmus*) rich in epiphytes**

PAL.CLASS.: 41.4151, 41.F2 (1997 version)

- 1) The hemiboreal natural old broad-leaved deciduous forest forms a transition between the Western Taiga and the nemoral forests. The most common tree species are *Quercus robur*, *Ulmus* spp., *Fraxinus excelsior*, *Tilia cordata* or *Acer platanoides*. There is typically a considerable amount of dead wood and a long continuity of woodland cover on the sites. The species-diversity of lichens, fungi, insects and soil-organisms is high. In many cases the forests have previously been used for grazing or mowing.
- 2) Plants : *Allium ursinum*, *Anemone nemorosa*, *Corylus avellana*, *Dentaria bulbifera*, *Hepatica nobilis*, *Lathyrus vernus*, *Mercurialis perennis*, *Milium effusum*, *Poa nemoralis*, *Polygonatum multiflorum*; Bryophytes- *Antitrichia curtipendula*, *Homalia trichomanoides*, *Orthotrichum* spp., *Porella platyphylla*, *Zygodon* spp.; Fungi- *Auricularia mesenterica*, *Ganoderma lipsiense*, *Eichomitus campestris*, *Mycena galericulata*, *Tricholoma album*, *T. sulphureum*; Lichens- *Arthonia vinosa*, *Biatorrella monasteriensis*, *Cliostomum corrugatum*, *Gyalecta flotowi*, *Lobaria pulmonaria*, *Phlyctis agelaea*
- 3) Corresponding categories
Nordic classification: “2233 *Ulmus glabra* –type” , “2234 *Fraxinus excelsior* –type” , “2235 *Tilia cordata* –type” and “2236 *Quercus robur-Ulmus glabra-Tilia cordata* –type”.
- 5) **Almgren, G. (1984).**- Ädellövskog - ekologi och skötsel. Skogsstyrelsen. Jönköping.
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9030

*** Natural forests of primary succession stages of landupheaval coast**

PAL.CLASS.: 31.8, 41.B8, 41.C3, 44.2 (1997 version)

- 1) This type includes different types of deciduous, coniferous and mixed natural thickets and forests developed on land upheaval coasts of the Baltic sea. Characteristic for these habitats are stages of primary succession from shore grassland vegetation to climax forests or various wetland types. Also soil horizons are poorly developed, although podsol soils are otherwise typical for boreal forest. The youngest pioneer forests near the sea are often low or tall herb deciduous forests, thickets or swamps. Vegetation succession can also proceed from willow swamps through forest swamps to mires. Alder and birch are dominant in the tree layer and willows are often common in the shrub layer. Grasses are abundant. Further inland the influence of the sea is weakened, the soils are often poor in nutrients and coniferous forests are typical. Pine, and often also spruce, dominates the tree layer and dwarf shrubs dominate in the field layer. In the ground layer mosses are common, but in many areas lichens are abundant.

- 3) Corresponding categories
 Nordic classification: “2215 *Betula pendula-Vaccinium myrtillus-Deschampsia flexuosa* –type”, “2216 *Betula pubescens-Molina caerulea-Sphagnum spp.* –type”, coastal variants, “7213 *Hippophaë rhamnoides*-type”. Many other units have unclassified and undescribed variants occurring in land upheaval areas.
- 5) **Havas, P. (1967).**- Zur ökologie der Laubwelder, insbesondere der Grauerlenwälder, an der Küste der Bottenwiek. *Aquilo, Ser. Bot.*, 6: 314-346.
Vartiainen, T. (1980).- Succession of island vegetation in the land uplift area of the northernmost Gulf of Bothnia, Finland. *Acta Botanica Fennica*, 115: 1-105
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9040 **Nordic subalpine/subarctic forests with *Betula pubescens* ssp. *czerepanovii***

PAL.CLASS.: 41.B72 (1997 version)

- 1) Forests dominated by *Betula pubescens* ssp. *czerepanovii* (mountain birch), occurring and often dominating the subalpine belt of the Scandinavian mountain (fell) chain (“Fjällen”). Occur also in isolated northern Fennoscandian fells and in gently sloping or flat subarctic (hemiarctic) uplands, particularly in N Finland. Due to different ecological characteristics, vegetation varies from lichen poor and dwarf shrub dominated types to those rich-in-tall-herbs.
- 2) Plants : Poor types; *Cladonia* spp., *Dicranum* spp., *Empetrum hermaphroditum*, *Hylocomium splendens*, *Linnea borealis*, *Pleurozium schreberi*, *Stereocaulon paschale*, *Trientalis europaea*, *Vaccinium myrtillus*; Rich types; *Aconitum lycoctonum*, *Cicerbita alpina*, *Cornus suecica*, *Geranium sylvaticum*, *Gymnocarpium dryopteris*, *Hierochloë odorata*, *Melica nutans*, *Rubus saxatilis*, *Trollius europaeus*
- 3) Corresponding categories
 Nordic classification: 2211 *Betula pubescens* ssp. *czerepanovii-Empetrum hermaphroditum-Cladonia* ssp.-type, 2212 *Betula pubescens* ssp. *czerepanovii-Vaccinium myrtillus-Deschampsia* -type, 2213 *Betula pubescens* ssp. *czerepanovii-Geranium sylvaticum-Rubus saxatilis* -type, 2214 *Betula pubescens* ssp. *czerepanovii-Geranium sylvaticum-Aconitum lycoctonum*-type .
- 5) **Aune, E.I. (1973).**- Forest vegetation in Hemne, Sør-Trøndelag, Western Central Norway. *K. norske Vidensk. Selsk. Miscellanea*, 12.
Hämet-Ahti, L. (1963).- Zonation of the mountain birch forests in northernmost Fennoscandia. *Ann. Bot. Zool. Fenn. Vanamo Tom*, 34 (4), 127 pp.
Oksanen, L. & Virtanen, R. (1995).- Topographic, altitudinal and regional patterns in continental and suboceanic heath vegetation of northern Fennoscandia. *Acta Bot. Fennica* 153: 1-80.
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9050 **Fennoscandian herb-rich forests with *Picea abies***

PAL.CLASS.: 42.C22, 42.C4, 42.C3 (1997 version)

- 1) This type occurs in areas of brown forest soils with mull, often in low-lying areas, ravines and slopes with fine sediment and a favourable water regime. The succession of this vegetation type normally leads to the dominance of spruce in the tree layer, although the broad-leaved trees often comprise a significant element. Tall herbs and ferns dominate, but the species composition varies greatly between northern, southern and western Fennoscandia. The forests are characterized by

distinct layers of vegetation. The bottom layer is covered unevenly by bryophytes, the field layer is dominated by herbs and grasses, the bush and tree layers are well developed including a variety of species. Several vegetation types have been described, the main groups being dry, mesic and moist grass-herb forests. Sometimes ground water is flowing near the ground surface, which give rise to a specific species rich "wet-forest" flora and invertebrate fauna.

- 2) Plants : *Actaea spicata*, *A. erythrocarpa*, *Botrychium virginianum*, *Calypso bulbosa*, *Carex remota*, *Cicerbita alpina*, *Crepis paludosa*, # *Cypripedium calceolus*, *Diplazium sibiricum*, *Epipogium aphyllum*, *Geranium sylvaticum*, *Impatiens noli-tangere*, *Matteuccia struthiopteris*, *Melica nutans*, *Milium effusum*, *Paris quadrifolia*, *Viola selkirkii*; Mosses- *Brachythecium* spp., *Cirriphyllum piliferum*, *Eurhynchium* spp., *Plagiomnium* spp.
- 3) Corresponding categories
Nordic classification: 2124 *Picea abies*-*Oxalis acetosella*-*Melica nutans* -type, 2125 *Picea abies*-*Dryopteris* spp.-type and 2126 *Picea abies*-*Geranium sylvaticum*-*Aconitum lycoctonum*-type .
- 5) **Mäkirinta, U. (1968).**- Haintypenuntersuchungen im mittleren Süd-Häme, Süd-Finnland. *Ann. ot. Fenn.*,5: 34-64.
Koponen, T. (1967).- On the dynamics of vegetation and flora in Karkali Nature Reserve, Southern Finland. *Ann. Bot. Fenn.*, 4:121-218.

9060

Coniferous forests on, or connected to, glaciofluvial eskers

PAL.CLASS.: -

- 1) This type includes Fennoscandian conifer forests found on or close to eskers. The top of an esker is often characterized by *Pinus sylvestris* and the slopes sometimes by *Picea abies*, although deciduous species may occur. Eskers are glaciofluvial gravel and sand formations which consist of relatively sorted material, often forming ridges over 20 meters high. In terms of ecological site factors they are more variable than the surrounding forest on flatter ground. In particular the microclimate differs notably between shaded and sunny slopes. Thus aspect and slope inclination, which reflect the effects of solar radiation and soil and air temperatures are important ecological factors. As a result of ecological characteristics, vegetation on sunny esker slopes is often relatively rich in species and particularly contains many leguminous plants as well as some eastern steppe plant species.
- 2) Plants : *Antennaria dioeca*, *Anthyllis vulneraria* subsp. *fennica*, *Astragalus alpinus*, *Brachypodium pinnatum*, *Calamagrostis arundinacea*, *Carex ericetorum*, *C. pediformis*, *Dianthus arenarius*, *Fragaria vesca*, *Hierochloë australis*, *Hypochoeris maculata*, *Juniperus communis*, *Lathyrus niger*, *L. vernus*, *Melica nutans*, *Oxytropis campestris*, *Pinus sylvestris*, *Polygonatum odoratum*, *Pulsatilla patens*, *P. vernalis*, *Pteridium aquilinum*, *Rubus saxatilis*, *Silene nutans*, *Thymus serpyllum*, *Vaccinium vitis-idaea* and *Viola rupestris* subsp. *rupestris*
- 3) Corresponding categories
Nordic classification: 2114b *Pinus sylvestris* - *Fragaria vesca* -variant, 2115 *Pinus sylvestris* - *Lathyrus* spp. - *Rubus saxatilis*-type .
- 4) Stands of esker forests on sunny slopes are often characterized by a relatively open tree structure and in addition the undergrowth often consists of species of warmer climate (e.g. *Carex pediformis*, *Pulsatilla patens*, *P. vernalis*, *Gypsophila fastigiata*) and some endangered butterfly species. About six different forest site types of eskers have been described, representing a gradient from xeric lichen rich forests to humid herb-rich forests.

- 5) **Heikkinen, R.K. (1991)** - Multivariate analysis of esker vegetation in southern Häme, S Finland. *Ann. Bot. Fenn.* 28: 201-224.
Jalas, J. (1961) - Besondere Züge der Vegetation und Flora auf der Osen. *Arch. Soc. Zool. Bot. Fenn. Vanamo*, 16 Suppl. 25-33.
Rajakorpi, A. (1987) - Topographic, microclimatic and edaphic control of the vegetation in the central part of the Hämeen kangas esker complex, western Finland. *Acta Bot. Fennica*, 134: 1-70.
Uotila, P. (1969) - Ecology and area of *Pulsatilla patens* (L.) Mill. in Finland. *Ann. Bot. Fenn.* 6:105-111.
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9070

Fennoscandian wooded pastures

PAL.CLASS.: -

- 1) A vegetation complex in which the tree layer varies from sparse forest to small copses of trees and shrubs and patches of open grassland. These habitats have a representative mosaic of copses of trees (usually deciduous trees) and grassland with a long continuity of grazing. The tree layer consists either of deciduous broad-leaved species such as *Quercus robur*, *Fraxinus excelsior*, *Tilia cordata*, *Betula* spp., *Alnus incana* or conifers (*Picea abies*, *Pinus sylvestris*). Particularly in Sweden there are pastures with old, large oaks. A rich assemblage of threatened lichens, fungi, and invertebrates are associated with the bark and dead or decaying wood. The type also includes (particularly in Finland) deciduous forests established after slash-and-burn cultivation, that was a characteristic feature of the former land use in Finland
 In Finland scattered in the whole of the country, mostly in Southern and Central Finland; very rare or extinct in northern boreal zone. In Sweden scattered over the whole country. Regional variation is considerable. Wooded pastures are usually dominated by birch, pine, alder (*Alnus incana*) or spruce (spruce-dominated are often degraded types); in hemiboreal zone there are also subtypes dominated by e.g. *Quercus*, *Fraxinus* and *Corylus*..
- 2) Plants : *Agrostis capillaris*, *Alnus incana*, *Antennaria dioica*, *Botrychium* spp., *Campanula persicifolia*, *Coeloglossum viride*, *Fragaria vesca*, *Geranium sylvaticum*, *Melampyrum cristatum*, *Prunella vulgaris*, *Ranunculus polyanthemus*, *Succisa pratensis*, *Veronica chamaedrys*, *V. officinalis*.
- 4) During recent decades the tree layer of wooded pastures has in many cases become thicker and the typical structure has then been obscured. In wooded pastures vegetation is dominated by grassland species with elements of grassland vegetation.
- 5) **Ekman, H. & Pettersson, B. (1987)**.- Ekarnas hagar. LT:s förlag.
Häggström, C.-A. (1987).- Den nordiska hagen. *Nordenskjölds Samfundets Tidskrift*, 47: 68-90.
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9080

*Fennoscandian deciduous swamp woods

PAL.CLASS.: 44.9112, 44.915, 44.A14 (1997 version)

- 1) Deciduous swamps are under permanent influence of surface water and usually flooded annually. They are moist or wet, wooded wetlands with some peat formation, but the peat layer is usually very thin. Ash (*Fraxinus excelsior*) in the hemiboreal zone and black alder (*Alnus glutinosa*) reaching the middle boreal zone are typical tree species. Gray alder (*Alnus incana*), silver birch (*Betula pubescens*) and willows (*Salix* spp.) are also common. A mosaic of patches with different water

level and vegetation is typical for the type. Around the tree stems are small hummocks, but wet flooded surfaces are dominant.

Deciduous swamp woods are most common in Finland in the southwestern archipelago and other coastal areas. On the mainland they are rare. In Sweden they are common throughout the whole region.

- 2) Plants : *Carex caespitosa*, *C. diandra*, *C. disperma*, *C. elongata*, *C. loliacea*, *C. rhynchospora*, *C. tenuiflora*, *Calamagrostis canescens*, *C. chalybea*, *C. stricta*, *Calla palustris*, *Glyceria lithuanica*, *Iris pseudacorus*, *Lycopus europaeus*, *Lysimachia thyrsiflora*, *Lythrum salicaria*, *Solanum dulcamara*, *Thelypteris palustris*; Mosses- *Calliergon cordifolium*, *Helodium blandowii*, *Pseudobryum cinclidioides*, *Spagnum squarrosum*, *S. teres*, *S. fimbriatum*, *S. riparium*
- 3) Corresponding categories
Nordic classification : 2241 *Alnus incana* -type, 2242 *Alnus glutinosa* - *Lycopus europaeus* - type, 2243 *Alnus* spp. - *Filipendula ulmaria* - *Carex elongata* -type, 3413 *Alnus* spp. - *Betula pubescens* - *Salix* spp. - *Filipendula ulmaria* -type.
- 4) Associated with the habitat type: Residual alluvial forests (91E0)
- 5) **Ruuhijärvi, R. (1983).**- The Finnish mire types and their regional distribution. In: Gore, A.J.P. (ed.) *Ecosystems of the World 4B. Mires: Swamp, bog, fen and moor. Regional studies*, 47-67. Elsevier, Amsterdam.
Eurola, S. & Kaakinen, E. (1984).- Key to Finnish mire types. In: Moore, P.D. (ed.). *European mires*, 11-117. Academic Press, London

Forests of temperate Europe

9110

Luzulo-Fagetum beech forests

PAL.CLASS.: 41.11

- 1) *Fagus sylvatica* and, in higher mountains, *Fagus sylvatica-Abies alba* or *Fagus sylvatica-Abies alba-Picea abies* forests developed on acid soils of the medio-European domain of central and northern Central Europe, with *Luzula luzuloides*, *Polytrichum formosum* and often *Deschampsia flexuosa*, *Calamagrostis villosa*, *Vaccinium myrtillus*, *Pteridium aquilinum*.
The following sub-types are included:
41.111 Medio-European collinar woodrush beech forests
Acidophilous *Fagus sylvatica* forests of the lesser Hercynian ranges and Lorraine, of the collinar level of the greater Hercynian ranges, the Jura and the Alpine periphery, of the western sub-Pannonic and the intra-Pannonic hills, not or little accompanied by self sown conifers, and generally with an admixture of *Quercus petraea*, or in some cases *Quercus robur*, in the canopy.
41.112 Medio-European montane woodrush beech forests
Acidophilous forests of *Fagus sylvatica*, *Fagus sylvatica* and *Abies alba* or *Fagus sylvatica*, *Abies alba* and *Picea abies* of the montane and high-montane levels of the greater Hercynian ranges, from the Vosges and the Black Forest to the Bohemian Quadrangle, the Jura, the Alps, the Carpathians and the Bavarian Plateau.
- 2) Plants: *Fagus sylvatica*, *Abies alba*, *Picea abies*, *Luzula luzuloides*, *Polytrichum formosum* and often *Deschampsia flexuosa*, *Calamagrostis villosa*, *Vaccinium myrtillus*, *Pteridium aquilinum*.
- 3) Corresponding categories

Nordic classification: "2221 *Fagus sylvatica-Deschampsia flexuosa-Vaccinium myrtillus*-typ"

- 5) **Lindgren, L. (1970).** Beech forest vegetation in Sweden - a survey. *Bot. Notiser* 123:401-421.
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9120 **Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercinion robori-petraeae* or *Ilici-Fagenion*)**

PAL.CLASS.: 41.12

- 1) Beech forests with *Ilex*, growing on acid soils, of the plain to montane levels under humid Atlantic climate. The acid substrate corresponds to alterations of acid rocks or to silt with flints more or less degraded or, to old alluvial deposits. The soils are of acid brown type, leaching or with an evolution towards podsol type. The humus is of moder to dysmoder type. These beech forests present different varieties:
 - a) subatlantic beech-oak forests of the plains and hill levels with *Ilex aquifolium*
 - b) hyper-Atlantic beech-oak forests of the plains and hill levels with *Ilex* and *Taxus*, rich in epiphytes
 - c) pure beech forests or acidophilous beech-fir forests of the montane level, with *Ilex aquifolium* in the field layer.
 - 2) Plants: *Ilex aquifolium*, *Taxus baccata*, *Ruscus aculeatus*, *Deschampsia flexuosa*, *Hieracium sabaudum*, *H. umbellatum*, *Pteridium aquilinum*, *Vaccinium myrtillus*, *Lonicera periclymenum*, *Melampyrum pratense*, *Teucrium scorodonia*, *Holcus mollis*.
 - 3) Corresponding categories
United Kingdom classification: "W14 *Fagus sylvatica-Rubus fruticosus* woodland" pp and "W15 *Fagus sylvatica-Deschampsia flexuosa* woodland p.p."
German classification: "43070502 bodensaurer Buchenwald der planaren Stufe".
 - 4) Oak may dominate in some of these forests due to the coppice-with-standards regime of the past centuries. If the intensity of the management decreases beech and also *Ilex* often regenerate spontaneously.
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9130 ***Asperulo-Fagetum* beech forests**

PAL.CLASS.: 41.13

- 1) *Fagus sylvatica* and, in higher mountains, *Fagus sylvatica-Abies alba* or *Fagus sylvatica-Abies alba-Picea abies* forests developed on neutral or near-neutral soils, with mild humus (mull), of the medio-European and Atlantic domains of Western Europe and of central and northern Central Europe, characterised by a strong representation of species belonging to the ecological groups of *Anemone nemorosa*, of *Lamiasstrum* (*Lamium*) *galeobdolon*, of *Galium odoratum* and *Melica uniflora* and, in mountains, various *Dentaria* spp., forming a richer and more abundant herb layer than in the forests of 9110 and 9120.
Sub-types :
 - 41.131 - Medio-European collinar neutrophilous beech forests
Neutrocline or basicline *Fagus sylvatica* and *Fagus sylvatica-Quercus petraea-Quercus robur* forests of hills, low mountains and plateaux of the Hercynian arc and its peripheral regions, of

the Jura, Lorraine, the Paris basin, Burgundy, the Alpine piedmont, the Carpathians and a few localities of the North Sea-Baltic plain.

41.132 - Atlantic neutrophile beech forests

Atlantic beech and beech-oak forests with *Hyacinthoides non-scripta*, of southern England, the Boulonnais, Picardy, the Oise, Lys and Schelde basins.

41.133 - Medio-European montane neutrophilous beech forests

Neutrophile forests of *Fagus sylvatica*, *Fagus sylvatica* and *Abies alba*, *Fagus sylvatica* and *Picea abies*, or *Fagus sylvatica*, *Abies alba* and *Picea abies* of the montane and high-montane levels of the Jura, the northern and eastern Alps, the western Carpathians and the great Hercynian ranges.

41.134 - Bohemian lime-beech forests

Fagus sylvatica or *Fagus sylvatica-Abies alba* forests rich in *Tilia* spp., of the Bohemian basin.

41.135 - Pannonic neutrophilous beech forests

Neutrophilous beech forests of medio-European affinities of the hills of the Pannonic plain and its western periphery.

- 2) Plants: *Fagus sylvatica*, *Abies alba*, *Picea abies*, *Anemone nemorosa*, *Lamium (Lamium) galeobdolon*, *Galium odoratum*, *Melica uniflora*, *Dentaria* spp.
 - 3) Corresponding categories
United Kingdom classification: "W12 *Fagus sylvatica-Mercurialis perennis* woodland p.p." and "W14 *Fagus sylvatica-Rubus fruticosus* woodland p.p."
Nordic classification: "2222 *Fagus sylvatica-Lamium galeobdolon-Melica uniflora*-typ" and "2223 *Fagus sylvatica-Mercurialis perennis-Allium ursinum*-typ".
 - 5) **Bergendorff, C., Larsson, A. & Nihlgård, B. (1979)**. *Sydliga lövskogsbestånd i Sverige. Statens naturvårdsverk*. Rapport. SNV PM 1278, Solna, 68 pp.
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9140

Medio-European subalpine beech woods with *Acer* and *Rumex arifolius*

PAL.CLASS.: 41.15

- 1) *Fagus sylvatica* woods usually composed of low, low-branching trees, with much sycamore (*Acer pseudoplatanus*), situated near the tree limit, mostly in low mountains with oceanic climate of Western Europe and of central and northern Central Europe. The herb layer is similar to that of the forests of 9130 or locally of 9110 and contain elements of the adjacent open grasslands.
 - 2) Plants: *Fagus sylvatica*, *Acer pseudoplatanus*, *Rumex arifolius*.
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9150

Medio-European limestone beech forests of the *Cephalanthero-Fagion*

PAL.CLASS.: 41.16

- 1) Xero-thermophile *Fagus sylvatica* forests developed on calcareous, often superficial, soils, usually of steep slopes, of the medio-European and Atlantic domains of Western Europe and of central and northern Central Europe, with a generally abundant herb and shrub undergrowth, characterized by sedges (*Carex digitata*, *Carex flacca*, *Carex montana*, *Carex alba*), grasses (*Sesleria albicans*, *Brachypodium pinnatum*), orchids (*Cephalanthera* spp., *Neottia nidus-avis*, *Epipactis leptochila*, *Epipactis microphylla*) and thermophile species, transgressive of the *Quercetalia pubescenti-*

petraeae. The bush-layer includes several calcicolous species (*Ligustrum vulgare*, *Berberis vulgaris*) and *Buxus sempervirens* can dominate.

Sub-types :

41.161 - Middle European dry-slope limestone beech forests

Middle European sedge and orchid beech woods of slopes with reduced water availability.

41.162 - North-western Iberian xerophile beech woods

Fagus sylvatica forests of relatively low precipitation zones of the southern ranges of the Pais Vasco and of superficially dry calcareous soils of the Cordillera Cantabrica, with *Brachypodium pinnatum* ssp. *rupestre*, *Sesleria argentea* ssp. *hispanica*, *Carex brevicollis*, *Carex ornithopoda*, *Carex sempervirens*, *Carex caudata*, *Cephalanthera damasonium*, *C. longifolia*, *Epipactis helleborine*, *Epipactis microphylla*, *Neottia nidus-avis*.

2) Plants: *Fagus sylvatica*, *Carex digitata*, *C. flacca*, *C. montana*, *C. alba*, *Sesleria albicans*, *Brachypodium pinnatum*, *Cephalanthera* spp., *Neottia nidus-avis*, *Epipactis leptochila*, *Epipactis microphylla*, *Buxus sempervirens*.

3) Corresponding categories

Nordic classification: "2223 *Fagus sylvatica*-*Mercurialis perennis*-*Allium ursinum* -typ".

9160

Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*

PAL.CLASS.: 41.24

1) Forests of *Quercus robur* (or *Quercus robur* and *Quercus petraea*) on hydromorphic soils or soils with high water table (bottoms of valleys, depressions or in the vicinity of riparian forests). The substrate corresponds to silts, clayey and silt-laden colluvions, as well as to silt-laden alterations or to siliceous rocks with a high degree of saturation. Forests of *Quercus robur* or natural mixed forests composed of *Quercus robur*, *Quercus petraea*, *Carpinus betulus* and *Tilia cordata*. *Endymion non-scriptus* is absent or rare.

2) Plants: *Quercus robur*, *Carpinus betulus*, *Acer campestre*, *Tilia cordata*, *Stellaria holostea*, *Carex brizoides*, *Poa chaixii*, *Potentilla sterilis*, *Dactylis polygama*, *Ranunculus nemorosus*, *Galium sylvaticum*.

3) Corresponding categories

German classification: "430703 Stieleichen-Hainbuchenwald feuchter bis frischer Standorte".

Nordic classification: "2223 *Fagus sylvatica*-*Mercurialis perennis*-*Allium ursinum*-typ".

4) Not to be confused with forests of *Quercus robur* arising from the management of beech-oak forests as coppice or coppice-with-standards on well drained soils.

5) **Diekmann, M. (1994).** Deciduous forest vegetation in Boreo-nemoral Scandinavia. *Acta Phytogeogr. Suec.* 80:1-112.

9170 *Galio-Carpinetum* oak-hornbeam forests

PAL.CLASS.: 41.261, 41.262

- 1) *Quercus petraea-Carpinus betulus* forests of regions with sub-continental climate within the central European range of *Fagus sylvatica*, dominated by *Quercus petraea* (41.261). Also included are related lime-oak forests of eastern and eastern-central European regions with a continental climate, east of the range of *F. sylvatica* (41.262).
- 2) Plants: 41.261 - *Quercus petraea*, *Carpinus betulus*, *Sorbus torminalis*, *S. domestica*, *Acer campestre*, *Ligustrum vulgare*, *Convallaria majalis*, *Carex montana*, *C. umbrosa*, *Festuca heterophylla*; 41.262 - *Quercus petraea*, *Quercus robur*, *Tilia cordata*, *Acer platanoides*, *Carpinus betulus*.
- 3) Corresponding category
Nordic classification: "2224 *Carpinus betulus*-typ".

9180 * *Tilio-Acerion* forests of slopes, screes and ravines

PAL.CLASS.: 41.4

- 1) Mixed forests of secondary species (*Acer pseudoplatanus*, *Fraxinus excelsior*, *Ulmus glabra*, *Tilia cordata*) of coarse scree, abrupt rocky slopes or coarse colluvions of slopes, particularly on calcareous, but also on siliceous, substrates (*Tilio-Acerion* Klika 55). A distinction can be made between one grouping which is typical of cool and humid environments (hygroscopic and shade tolerant forests), generally dominated by the sycamore maple (*Acer pseudoplatanus*) - sub-alliance *Lunario-Acerenion*, and another which is typical of dry, warm screes (xerothermophile forests), generally dominated by limes (*Tilia cordata*, *T. platyphyllos*) - sub-alliance *Tilio-Acerenion*.
The habitat types belonging to the *Carpinion* should not be included here.
- 2) Plants: *Lunario-Acerenion* - *Acer pseudoplatanus*, *Actaea spicata*, *Fraxinus excelsior*, *Helleborus viridis*, *Lunaria rediviva*, *Taxus baccata*, *Ulmus glabra*. *Tilio-Acerenion* - *Carpinus betulus*, *Corylus avellana*, *Quercus* sp., *Sesleria varia*, *Tilia cordata*, *T. platyphyllos*.
- 3) Corresponding categories
United Kingdom classification: "W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland" and "W9 *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* woodland".
German classification: "430604 Sommerlinden-Begulmen-Blockschuttwald", "430603 Ahorn-Linden-Hangschuttwald (wärmere Standorte)", "430602 Eschen-Ahorn-Schlucht- bzw. -Hangwald (fleucht-kühle Standorte)", "430601 Sommerlinden-Hainbuchen-Schuttwald".
Nordic classification: "2233 *Ulmus glabra* -typ", "2235 *Tilia cordata* -typ" and "2236 *Quercus robur-Ulmus glabra-Tilia cordata*-typ". In Boreal region corresponding species-poor communities often with *Anemone nemorosa*, *Corydalis* spp., *Primula veris*.
- 4) Slight changes in the conditions of the substrate (especially "consolidated" substrate) or humidity produce a transition towards beech forests (*Cephalanthero-Fagenion*, *Luzulo-Fagenion*) or towards thermophile oak forests.
- 5) **Bergendorff, C., Larsson, A. & Nihlgård, B. (1979).** *Sydliga lövskogsbestånd i Sverige. Statens naturvårdsverk. Rapport. SNV PM 1278, Solna, 68 pp.*

9190**Old acidophilous oak woods with *Quercus robur* on sandy plains**

PAL.CLASS.: 41.51 and 41.54

- 1) 41.51 - Acidophilous forests of the Baltic-North Sea plain, composed of *Quercus robur*, *Betula pendula* and *Betula pubescens*, often mixed with *Sorbus aucuparia* and *Populus tremula*, on very oligotrophic, often sandy (or moraine) and podsolized or hydromorphic soils; the bush layer, poorly developed, includes *Frangula alnus*; the herb layer is formed by *Deschampsia flexuosa* and other grasses and herbs of acid soils (sometimes includes *Molinia caerulea*), and is often invaded by bracken. Forests of this type often prevail in the northern European plain and occupy more limited edaphic enclaves. Syntaxa: *Querco-Betuletum*, *Molino-Quercetum*, *Trientalo-Quercetum roboris*.
41.54 - Forests of *Quercus robur* and, sporadically *Quercus pyrenaica* or hybrids, on podzols, with a herb layer formed by the group of *Deschampsia flexuosa*, with *Molinia caerulea* and *Peucedanum gallicum*. Syntaxa: *Peucedano-Quercetum roboris*.
- 2) Plants: *Quercus robur*, *Betula pendula*, *B. pubescens*, *Sorbus aucuparia*, *Populus tremula*.
- 3) Corresponding categories
Nordic classification: "2231 *Quercus petraea/robur-Melampyrum pratense-Deschampsia flexuosa*-typ" and "2232 *Quercus robur-Melica* spp.-typ".
- 5) **Rühling, Å. & Tyler, G. (1986)**. Vegetation i sydsvenska ekskogar-en regional jämförelse. *Sven. Bot. Tidskr.* 80:133-143.

91A0**Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**

PAL.CLASS.: 41.53

- 1) Acidophilous *Quercus petraea* woods, with low, low-branched, trees, with many ferns, mosses, lichens and evergreen bushes.
Sub-types :
41.531 - Irish sessile oak woods
Quercus petraea woods of Ireland, particularly rich in evergreen bushes, including *Arbutus unedo*.
41.532 - British sessile oak woods
Acidophilous *Quercus petraea* woods of western Britain, mostly found in Scotland, Wales, Northern England and South Western England.
- 2) Plants: *Quercus petraea*, *Ilex aquifolium*, *Blechnum* ssp.
- 3) Corresponding categories
United Kingdom classification: "W10 *Quercus* spp.-*Pteridium aquilinum-Rubus fruticosus* woodland p.p.", "W11 *Quercus petraea-Betula pubescens-Oxalis acetosella* woodland p.p." and "W17 *Quercus petraea-Betula pubescens-Dicranum majus* woodland p.p."

91B0

Thermophilous *Fraxinus angustifolia* woods

PAL.CLASS.: 41.86

- 1) Non-alluvial, non-ravine formations dominated by *Fraxinus angustifolia*, often mixed with *Quercus pubescens* or *Q. pyrenaica*.
Sub-types :
41.861 - Sicilian narrow-leaved ash woods
Fraxinus angustifolia woods of western Sicily.
41.862 - Iberian narrow-leaved ash woods
Fraxinus angustifolia woods of the Iberian peninsula.
 - 2) Plants: *Fraxinus angustifolia*.
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91C0

* Caledonian forest

PAL.CLASS.: 42.51

- 1) Relict, indigenous pine forests of *Pinus sylvestris* var. *scotica*, endemic in the central and north eastern Grampians and the northern and western Highlands of Scotland and associated *Betula* and *Juniperus* woodlands of northern character within this area. They are mostly open and have a ground layer rich in ericaceous species and bryophytes, in particular *Hylocomium splendens*, and often harbouring abundant *Deschampsia flexuosa*, *Goodyera repens*, *Listera cordata*, *Corallorhiza trifida*, *Linnaea borealis*, *Trientalis europaea*, *Pyrola minor*, *Moneses uniflora*, *Orthilia secunda*. The dominant trees are: *Sorbus aucuparia*, *Betula pubescens*, *B. pendula*, *Juniperus communis*, *Ilex aquifolium*, *Populus tremula*.
 - 2) Plants: *Corallorhiza trifida*, *Deschampsia flexuosa*, *Goodyera repens*, *Linnaea borealis*, *Listera cordata*, *Moneses uniflora*, *Orthilia secunda*, *Pinus sylvestris* var. *scotica*, *Pyrola minor*, *Trientalis europaea*. Bryophytes- *Hylocomium splendens*, *Pleurozium schreberi*.
 - 3) Corresponding categories
United Kingdom classification: the majority of Caledonian forests belong to "W18 *Pinus sylvestris*-*Hylocomium splendens* woodland"; however, not all of these forests are semi-natural. Stands dominated by *Juniperus* belong to the category "W19 *Juniperus communis* ssp. *communis*-*Oxalis acetosella* woodland".
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91D0

* Bog woodland

PAL.CLASS.: 44.A1 to 44.A4

- 1) Coniferous and broad-leaved forests on a humid to wet peaty substrate, with the water level permanently high and even higher than the surrounding water table. The water is always very poor in nutrients (raised bogs and acid fens). These communities are generally dominated by *Betula pubescens*, *Frangula alnus*, *Pinus sylvestris*, *Pinus rotundata* and *Picea abies*, with species specific to bogland or, more generally, to oligotrophic environments, such as *Vaccinium* spp., *Sphagnum* spp., *Carex* spp. [*Vaccinio-Piceetea*: *Piceo-Vaccinienion uliginosi* (*Betulion pubescentis*, *Ledo-Pinion*) i.a.]. In the Boreal region, also spruce swamp woods, which are minerotrophic mire sites along margins of different mire complexes, as well as in separate strips in valleys and along brooks.
Sub-types :
44.A1 - Sphagnum birch woods
44.A2 - Scots pine mire woods

44.A3 - Mountain pine bog woods

44.A4 - Mire spruce woods

In most of the Irish sites, these forests represent sub types of raised bogs, generally degraded and invaded by commercial forestry species; however, those stands dominated by *Betula pubescens* or *Pinus sylvestris* may be of interest. In Greece, formations with *Pinus sylvestris* are confined to the northern mountains, where forests of *Picea abies* on a sphagnum rich ground layer also occur.

- 2) Plants: *Agrostis canina*, *Betula pubescens*, *B. carpatica*, *Carex canescens*, *C. echinata*, *C. nigra*, *C. rostrata*, *Frangula alnus*, *Juncus acutiflorus*, *Molinia caerulea*, *Trientalis europaea*, *Picea abies*, *Pinus rotundata*, *P. sylvestris*, *Sphagnum* spp., *Vaccinium oxycoccus*, *V. uliginosum*, *Viola palustris*; in spruce swamp woods also: *Carex disperma*, *C. tenuiflora*, *Diplazium sibiricum*, *Hylocomium umbratum* and *Rhytidiadelphus triquetrus*.

3) Corresponding categories

United Kingdom classification : "W4 *Betula pubescens*-*Molinia caerulea* woodland".

German classification: "430101 Birken-Moorwald", "440104 Latschen-Moorwald", "440101 Fichten-Moorwald", "440103 Spirken-Moorwald", "440102 Waldkiefern-Moorwald".

Nordic classification: "311 Skogsmossevegetation", "321 Skogs-och krattkärrvegetation".

- 4) Forests on the edge of upland bogs or transition mires may form a transition towards swamp forests (*Alnetea glutinosa*, *Alno-Ulmion* pp.).
- 5) **Dierssen, B. & Dierssen, K. (1982)**. Kiefernreiche Phytocoenosen oligotropher Moore im mittleren und nordwestlichen Europa. Überlegungen zur Problematik ihrer Zuordnung zu höheren syn systematischen Einheiten. In: Dierschke, H. (ed.) *Struktur und Dynamic von Wäldern*. Ber. Intern. Symp. IVV 1982, pp. 299-331.

91E0

* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pandion*, *Alnion incanae*, *Salicion albae*)

PAL.CLASS.: 44.3, 44.2 and 44.13

- 1) Riparian forests of *Fraxinus excelsior* and *Alnus glutinosa*, of temperate and Boreal Europe lowland and hill watercourses (44.3: *Alno-Padion*); riparian woods of *Alnus incanae* of montane and sub-montane rivers of the Alps and the northern Apennines (44.2: *Alnion incanae*); arborescent galleries of tall *Salix alba*, *S. fragilis* and *Populus nigra*, along medio-European lowland, hill or sub-montane rivers (44.13: *Salicion albae*). All types occur on heavy soils (generally rich in alluvial deposits) periodically inundated by the annual rise of the river (or brook) level, but otherwise well-drained and aerated during low-water. The herbaceous layer invariably includes many large species (*Filipendula ulmaria*, *Angelica sylvestris*, *Cardamine* spp., *Rumex sanguineus*, *Carex* spp., *Cirsium oleraceum*) and various vernal geophytes can occur, such as *Ranunculus ficaria*, *Anemone nemorosa*, *A. ranunculoides*, *Corydalis solida*.
This habitat includes several sub-types: ash-alder woods of springs and their rivers (44.31 - *Carici remotae-Fraxinetum*); ash-alder woods of fast-flowing rivers (44.32 - *Stellario-Alnetum glutinosae*); ash-alder woods of slow-flowing rivers (44.33 - *Pruno-Fraxinetum*, *Ulmo-Fraxinetum*); montane grey alder galleries (44.21 - *Calamagrosti variaae-Alnetum incanae* Moor 58); sub-montane grey alder galleries (44.22 - *Equiseto hyemalis-Alnetum incanae* Moor 58); white willow gallery forests (44.13 - *Salicion albae*). The Spanish types belong to the alliance *Osmundo-Alnion* (Cantabric atlantic and southeast Iberia peninsula).
- 2) Plants: Tree layer - *Alnus glutinosa*, *Alnus incanae*, *Fraxinus excelsior*; *Populus nigra*, *Salix alba*, *S. fragilis*; *Betula pubescens*, *Ulmus glabra*; Herb layer - *Angelica sylvestris*, *Cardamine amara*, *C. pratensis*, *Carex acutiformis*, *C. pendula*, *C. remota*, *C. strigosa*, *C. sylvatica*, *Cirsium oleraceum*,

Equisetum telmateia, *Equisetum* spp., *Filipendula ulmaria*, *Geranium sylvaticum*, *Geum rivale*, *Lycopus europaeus*, *Lysimachia nemorum*, *Rumex sanguineus*, *Stellaria nemorum*, *Urtica dioica*.

3) Corresponding categories

United Kingdom classification: "W5 *Alnus glutinosa*-*Carex paniculata* woodland", "W6 *Alnus glutinosa*-*Urtica dioica* woodland" and "W7 *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland".

German classification: "43040401 Weichholzauenwald mit weitgehend ungetörter Überflutungsdynamik", "43040402 Weichholzauenwald ohne Überflutung", "430403 Schwarzerlenwald (an Fließgewässern)", "430402 Eschenwald (an Fließgewässern)", "430401 Grauerlenauenwald (montan, Alpenvorland, Alpen).

Nordic classification: "2234 *Fraxinus excelsior*-typ" and "224 Alskog".

4) Most of these forests are in contact with humid meadows or ravine forests (*Tilio-Acerion*). A succession towards *Carpinion* (*Primulo-Carpinetum*) can be observed.

5) **Brunet, J. (1991)**. Vegetation i Skånes alm- och askskogar. *Sven. Bot. Tidskr.* 85:377-384.

91F0 Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*)

PAL.CLASS.: 44.4

1) Forests of hardwood trees of the major part of the river bed, liable to flooding during regular rising of water level or, of low areas liable to flooding following the raising of the water table. These forests develop on recent alluvial deposits. The soil may be well drained between inundations or remain wet. Following the hydric regime, the woody dominated species belong to *Fraxinus*, *Ulmus* or *Quercus* genus. The undergrowth is well developed.

2) Plants: *Quercus robur*, *Ulmus laevis*, *U. minor*, *U. glabra*, *Fraxinus excelsior*, *Fraxinus angustifolia*, *Populus nigra*, *P. canescens*, *P. tremula*, *Alnus glutinosa*, *Prunus padus*, *Humulus lupulus*, *Vitis vinifera* ssp. *sylvestris*, *Tamus communis*, *Hedera helix*, *Phalaris arundinacea*, *Corydalis solida*, *Gagea lutea*, *Ribes rubrum*.

3) Corresponding categories

German classification: "43040501 Hartholzauenwald mit weitgehend ungestörter Überflutungsdynamik", "43040502 Hartholzauenwald ohne Überflutung".

Nordic classification: "2223 *Ulmus glabra*-typ", "2236 *Quercus robur*-*Ulmus glabra*-*Tilia cordata* typ".

4) These forests form mosaics with pioneer or stable forests of soft wood trees, in low areas of the river bed; they may develop also from alluvial forests of hard wood trees. This habitat type often occurs in conjunction with alder-ash woodlands (44.3).

91G0 * Pannonic woods with *Quercus petraea* and *Carpinus betulus*

PAL.CLASS.: 41.2B, 41.266, 41.267

- 1) Forests with *Quercus petraea* and *Carpinus betulus* of the plains and low hills of south eastern central Europe on varied soil types (both calcareous and siliceous substrates). The shrub- and herb layer are dominated by subcontinental and submediterranean plant species. They occur in shady, humid valleys and slopes, particularly on deep soils but also on hill tops with shallow, oligotrophic substrates. Syntaxa include, *Primulo veris-Carpinetum*, *Fraxino pannonici-Carpinetum*.
- 2) Plants: *Carex pilosa*, *Euphorbia amigdaloides*, *Symphytum tuberosum*, *Dentaria bulbifera*, *Glechoma hirsuta*, *Festuca heterophylla*, *Carpinus betulus*, *Quercus petrae*, *Q. robur*, *Tilia cordata*, *Euonymus verrucosa*, *Acer campestre*, *Sorbus torminalis*, *Galium sylvaticum*, *Viola mirabilis*, *Gagea spathacea*, *Acer tataricum*, *Galanthus nivalis*, *Galium schultesii*, *Helleborus dumetorum*, *H. purpurascens*, *Isopyrum thalictroides*, *Knautia drymeia*, *Quercus cerris*, *Scilla drunensis*, *Staphylea pinnata*, *Symphytum tuberosum*, *Vinca minor*
- 4) These habitats may form a transition towards xerophile oak woods (*Quercus petraeae-cerris* forests and *Quercus pubescens* woods).
- 5) **Borhidi, A. (1967)**. Die geobotanischen Verhältnisse der Eichen-Hainbuchenwälder Südosteuropas. *Feddes Repert.* 77: 296-316.
Borhidi, A. & Kevey, B. (1996). An annotated checklist of the Hungarian plant communities. II. The forest vegetation. In: Borhidi, A. (ed.): *Critical Revision of the Hungarian Plant Communities*. Janus Pannonius Univ. Pécs, 95-138.
Csapody, I. (1967). Eichen-Hainbuchenwälder Ungarns. *Feddes Repert.* 77: 245-269.
Mucina, L., Grabherr, G., Wallnöfer, S. (1993). Die Pflanzengesellschaften Österreichs. Teil III, S. 199.
Neuhäusl U. Neuhäuslova-Novotna (1968). Übersicht der Carpinion-Gesellschaften der Tschechoslowakei.

91H0 * Pannonian woods with *Quercus pubescens*

PAL.CLASS.: 41.7374

- 1) Xerophyle oak woods of the periphery and hills of the Pannonic plain dominated by *Quercus pubescens* on extremely dry, southern exposed locations on shallow, calcareous soils. Because of these extreme site conditions, the woods are often fragmentary and low-growing, sometimes only shrubby. The herb layer is rich in species and often contains xerothermic species from dry grasslands or forest fringes. Occasionally *Tilia platyphyllos* and *Fraxinus excelsior* can become dominant.
- 2) Plants: *Quercus pubescens*, *Q. cerris*, *Fraxinus ornus*, *Sorbus domestica*, *S. torminalis*, *Colutea arborescens*, *Cornus mas*, *Pyrus pyraster*, *Arabis pauciflora*, *A. turrita*, *Buglossoides purpurcaerulea*, *Campanula bononiensis*, *Carex michelii*, *Euphorbia polychroma*, *Lactuca quercina*, *Limodorum abortivum*, *Milittis melissophyllum*, *Orchis purpurea*, *Potentilla alba*, *P. micrantha*, *Pulmonaria mollis* ssp. *mollis*, *Tanacetum corymbosum*, *Viola suavis*, *Euphorbia angulata*.
- 4) White-oak woods often form mosaics with dry grasslands.

91I0

* Euro-Siberian steppic woods with *Quercus* spp.

PAL.CLASS.: 41.7A

- 1) Xero-thermophile oak woods of the plains of south-eastern Europe. The climate is very continental, with a large temperature range. The substrate consists of 'Loess' (Chernozem soils). *Quercus robur*, *Quercus cerris* and *Quercus pubescens* dominate in the treelayer of this habitat type, which is rich in continental stepic vegetation elements and geophytes of the *Aceri tatarici-Quercion* Zólyomi 1957.
 - 2) Plants: *Quercus cerris*, *Q. pubescens*, *Q. robur*, *Q. petraea*, *Acer campestre*, *Sorbus torminalis*, *Cornus sanguinea*, *Crataegus monogyna*, *Euonymus verrucosa*, *Ligustrum vulgare*, *Prunus spinosa*, *Pyrus pyraster*, *Rhamnus cathartica*, *Ulmus minor*, *Buglossoides purpurocaerulea*, *Carex michelii*, *Dactylis polygama*, *Geum urbanum*, *Lathyrus niger*, *Polygonatum latifolium*, *Pulmonaria mollis* spp. *mollis*, *Tanacetum corymbosum*, *Vincetoxicum hirundinaria*.
 - 4) This habitat type, which formed the natural vegetation of south-eastern Europe, is today very fragmented. In Austria they are often degraded by invasion of *Robinia*.
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91J0

* *Taxus baccata* woods of the British Isles

PAL.CLASS.: 42.A71

- 1) *Taxus baccata* woods with *Sorbus aria* or *Mercurialis perennis* of dry valleys and scarps of the chalk of south-east England, very locally of the Durham Magnesium limestone, Morecambe Bay and elsewhere. They also occur in the forest of Muckcross (Killarney, Ireland).
 - 2) Plants: *Buxus sempervirens*, *Ilex aquifolium*, *Mercurialis perennis*, *Sorbus aria*, *Taxus baccata*.
 - 3) Corresponding categories
United Kingdom classification: "W13 *Taxus baccata* woodland".
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91K0 Illyrian *Fagus sylvatica* forests (Aremonio-Fagion)

PAL.CLASS.: 41.1C

- 1) *Fagus sylvatica* forests of the Dinarides and of associated ranges and hills, with outliers and irradiations in the southeastern Alps and in the mid-Pannonic hills. In these areas they are in contact with, or interspersed among, medio-European beech forests such as 9130, 9140 and 9150. Species diversity is greater than in the Central European beech woods and the Aremonio-Fagion constitutes an important centre of species diversity.
- 2) Plants: *Fagus sylvatica*, *F. moesiaca*, *Acer obtusatum*, *Ostrya carpinifolia*, *Abies alba*, *Quercus cerris*, *Sorbus graeca*, *Tilia tomentosa*, *Anemone trifolia*, *Aremonia agrimonioides*, *Calamintha grandiflora*, *Cardamine trifolia*, *C. waldsteinii*, *Corylus colurna*, *Cotoneaster tomentosa*, *Cyclamen purpurascens*, *Dentaria eneaphyllos*, *Dentaria enneaphyllos*, *Dentaria trifolia*, *Doronicum austriacum*, *Epimedium alpinum*, *Euphorbia carniolica*, *Hacquetia epipactis*, *Helleborus niger* ssp. *niger*, *H. odoratus*, *Knautia drymeia*, *Lamiukm orvala*, *Lamium orvala*, *Lonicera nigra*, *Omphalodes verna*, *Pancicia serbica*, *Primula vulgaris*, *R. hypoglossum*, *Ruscus* spp. *Saxifraga lasiophylla*, *Scopolia carniolica*, *Scrophularia scopolii*, *Sesleria autumnalis*, *Vicia oroboides*

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-

91L0 Illyrian oak –hornbeam forests (*Erythronio-Carpinion*)

PAL.CLASS.: 41.2A

- 1) Forests of *Quercus robur* or *Q. petraea*, sometimes *Q. cerris*, and *Carpinus betulus* on both calcareous and siliceous bedrocks, mostly on deep neutral to slightly acidic brown forest soils, with mild humus in the SE-Alpine-Dinaric region, West- and Central Balkans extending northwards to Lake Balaton mostly in hilly and submontane regions, river valleys and the plains of the Drava and Sava. The climate is more continental than in sub-Mediterranean regions and warmer than in middle Europe; these forests are intermediate between oak-hornbeam woods (e.g. 9170) of central Europe and those of the Balkans and merge northwards into the Pannonic oak woods (91G0). They have a much higher species richness than the Central European oak woods. Outliers of these forests also occur in Frioul and the northern Apennines.
- 2) Plants: *Quercus robur*, *Q. petraea*, *Q. cerris*, *Carpinus betulus*, *Acer tataricum*, *Tilia tomentosa*, *Castanea sativa*, *Fraxinus angustifolia* subsp. *pannonica*, *Euonymus verrucosa*, *Lonicera caprifolium*, *Adoxa moschatellina*, *Cyclamen purpurascens*, *Dentaria pentaphyllos*, *Epimedium alpinum*, *Erythronium dens-canis*, *Knautia drymeia*, *Helleborus macranthus*, *H. dumetorum* ssp. *atrorubens*, *H. cyclophyllus*, *Asperula taurina*, *Lathyrus venetus*, *Potentilla micrantha*, *Dianthus barbatus*, *Luzula forsteri*, *Primula vulgaris*, *Pseudostellaria europaea*, *Ruscus aculeatus*, *Tamus communis*.
- 5) **Borhidi, A. (1967).** Die geobotanischen Verhältnisse der Eichen-Hainbuchenwälder Südosteuropas. *Feddes Repert.* **77**: 296-316.
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91M0 Pannonian-Balkan turkey oak- sessile oak forests

PAL.CLASS.: 41.769

- 1) Sub-continental thermo-xerophile *Quercus cerris*, *Q. petraea* or *Q. frainetto* forests of the Pannonic and northern Balcanic hilly regions and in lower mountains with the continental *Acer tataricum* and lacking typically sub-Mediterranean species such as *Carpinus orientalis* and *Ruscus aculeatus*. Distributed generally between 250 and 600 (800) m above sea level and developed on varied substrates: limestones, andesites, basalt, loess, clay, sand, etc., on slightly acidic, usually deep brown soils

- 2) Plants: *Quercus petraea* *Q. dalechampii*, *Q. polycarpa*, *Q. cerris*, *Q. frainetto*, *Acer tataricum*, *Ligustrum vulgare*, *Euonymus europaeus*, *Festuca heterophylla*, *Carex montana*, *Poa nemoralis*, *Potentilla alba*, *Potentilla micrantha*, *Tanacetum corymbosum*, *Campanula persicifolia*, *Digitalis grandiflora*, *Vicia cassubica*, *Viscaria vulgaris*, *Lychnis coronaria*, *Achillea distans*, *Achillea nobilis*, *Silene nutans*, *S. viridiflora*, *Hieracium racemosum*, *H. sabaudum*, *Galium schultesii*, *Lathyrus niger*, *Veratrum nigrum*, *Asphodelus albus*, *Peucedanum oreoselinum*, *Helleborus odorus*, *Luzula forsteri*, *Physospermum aquilegifolium*, *Molinia litoralis*
- 6) **Borhidi, A. (1996)**. A critical revision of the Hungarian plant communities. – Janus Pannonius University, Pécs, 138 pp.
Borhidi A. and Sánta A. (eds.) (1999). Vörös Könyv Magyarország növénytársulásairól. 1-2. kötet. (Red Book of Hungarian plant communities. Vol. 1-2.) - TermészetBÚVÁR Alapítvány Kiadó, Budapest. 768 pp. (in Hungarian).
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Simon, T. (1979). Vegetationsuntersuchungen im Zempléner Gebirge. - Akadémiai Kiadó, Budapest.

91N0 *Pannonic inland sand dune thicket (*Junipero-Populetum albae*)

PAL.CLASS.: 41.87

- 1) Xerophilous mosaic of open scrub or open woodlands with *Juniperus communis* and *Populus* species and open or closed sand steppe grasslands of sands, particularly sand dunes, of the Danube-Tisza confluence of the Pannonic plain. Woodland herbaceous species are lacking and the habitat in general more closely resembles semi-desert scrub than steppe woodland.
- 2) Plants: *Populus alba*, *P. canescens*, *P. nigra*, *Juniperus communis*, *Ligustrum vulgare*, *Rhamnus catharticus*, *Crataegus monogyna*, *Prunus spinosa*, *Prunus mahaleb*, *Rubus caesius*, *Euonymus verrucosus*, *Berberis vulgaris*, *Festuca vaginata*, *Syntrichia* spp., *Fumana procumbens*, *Euphorbia seguieriana*, *Polygonatum odoratum*, *Poa angustifolia*, *Koeleria glauca*, *Stipa joannis*, *Bromus tectorum*, *Epipactis bugacensis*, *E. atrorubens*, *Cephalanthera rubra*
- 5) **Altbacker, V. (1998)**. Növényevő emlősök és a vegetáció kapcsolatának vizsgálata homoki társulásokban. (A study of the relationship between herbivores and the vegetation in sand communities.) - pp. 125-143 in: Fekete, G. (ed.): A közösségi ökológia frontvonalai. (Frontiers in communities ecology). Scientia Kiadó, Budapest (in Hungarian).
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91P0 Holy Cross fir forests (*Abietetum polonicum*)

PAL.CLASS.: 42.134

- 1) Upland fir, or fir-dominated fir-spruce or fir-pine-oak forests developed on mesotrophic acid soils of Little-Poland, in particular of the Holy Cross mountains and of sub-Carpathic hills. They are rich in ferns, bryophytes and lowland forest species shared with deciduous forests of the *Tilio-Carpinetum*.
 - 2) Plants: *Abies alba*, *Fagus silvatica*, *Quercus robur*, *Quercus sessilis*, *Pinus silvestris*, *Betula verrucosa*, *Populus tremula*, *Picea excelsa*, *Alnus glutinosa*, *Sambucus racemosa*, *Rubus idaea*, *Dryopteris austriaca*, *Athyrium filix-femina*, *Phegopteris dryopteris*, *Phegopteris polypodioides*, *Lycopodium annotinum*, *Hylocomium splendens*, *Polytrichum formosum*, *Majanthemum bifolium*, *Rubus* cfr. *hirsutus*, *Galeobdolon luteum*, *Oxalis acetosella*, *Luzula pilosa*.
-

91Q0 Western Carpathian calcicolous *Pinus sylvestris* forests

PAL.CLASS.: 42.542

- 1) Isolated, calcicolous *Pinus sylvestris* forests of the western Carpathians limited to a few small enclaves in the Strazov mountains, the Velka Fatra, the Pienini, the inner-Carpathian basins and the Erzgebirge. *Erica herbacea* and *Polygala chamaebuxus* are absent and the undergrowth includes a number of species of continental distribution and xerothermic affinities including western Carpathian endemics.
 - 2) Plants: *Pinus sylvestris*, *Linum flavum*, *Carex humilis*, *Carex alba*, *Calamagrostis varia*, *Pulsatilla slavica*, *Thymus carpathicus*, *Primula auricula* ssp. *hungarica*, *Globularia aphyllanthes*, *Campanula carpatica*, *Festuca tatrae*, *Dianthus nitidus*, *D. praecox*, *Festuca tatrae*, *Cyanus triumfettii* ssp. *dominii*, *Minuartia langii*, *Soldanella carpatica*, *Campanula carpatica*, *C. serrata*, *Gentianella fatrae*, *G. lutescens* subsp. *carpatica*, *Koeleria tristis*, *Thymus pulcherrimus* ssp. *sudeticus*, *Iris aphylla* ssp. *hungarica*
-

91R0 Dinaric dolomite Scots pine forests (*Genisto januensis-Pinetum*)

PAL.CLASS.: 42.5C52

- 1) *Pinus sylvestris* woods of dolomites and dolomite rendzinas of the Dinarides. They are developed within the Illyrian beech forest zone (91K0) and often occupy somewhat higher elevations than the similar dolomite *Pinus nigra* woods of unit 42.6214.
 - 2) Plants: *Pinus sylvestris*, *Erica herbacea*, *E. carnea*, *Galium lucidum*, *Genista januensis*, *Aquilegia vulgaris*, *Bupthalmum salicifolium*, *Teucrium chamaedrys*, *Carex humilis*, *Anthericum ramosum*, *Cyclamen purpurascens*, *Polygala chamaebuxus*, *Hepatica nobilis*, *Geranium sanguineum*, *Helleborus niger* ssp. *macranthus*, *Epipactis atrorubens*, *Carex alba*.
-

91T0 Central European lichen pine forests

PAL.CLASS.: 42.52112, 61.15p

- 1) Natural lichen-rich acidophilous *Pinus sylvestris* forests belonging to the alliance *Dicrano-Pinion* occurring on inland nutrient poor sands of the north-eastern plains and hills of Central Europe and of

the nemoral belt of the middle and southern Sarmatic region. The trees are low growing as the soils are nutrient deficient and subject to drought stress

- 2) Plants: *Pinus sylvestris*, *Juniperus communis*, *Cladonia furcata*, *Cladonia gracilis*, *Cladonia silvatica*, *Ptilidium ciliare*
 - 4) These forests are often a characteristic stage of natural succession on inland dunes (61.15), stands of plantation origin should not be included. Similar woodlands on coastal sand dunes should be regarded as '2180 Wooded dunes of the Atlantic, Continental and Boreal region'.
-

91U0 Sarmatic steppe pine forests (*Cytiso-Pinetalia*)

PAL.CLASS.: 42.5232

- 1) Xerophilous Scots pine woods of the Sarmatic region of western Eurasia and of areas with an extremely continental micro climate in northeastern Central and Eastern Europe. Towards its western limit this habitat is restricted to well drained habitats such as inland dunes and cliffs. There are many relict species of continental origin. Syntaxa included are the *Anemono-Picetum sylvestris*, *Peucedano-Pinetum*, *Koelerio glaucae-Pinetum sylvestris*, *Caragano-Pinetum*, *Pyrolo-Pinetum sylvestris* (p.) & *Corynephoru-Pinetum sylvestris*.
 - 2) Plants: *Pinus sylvestris*, *Vaccinium myrtillus*, *Pyrola minor*, *Orthilia minor*, *Chimaphilla umbellata*, *Ophrys insectifera*, *Coronilla vaginalis*, *Globularia punctata*, *Brachypodium pinnatum*.
 - 3) Corresponding categories
Czech classification: L8.2 Lesostepní bory
-

91V0 Dacian Beech forests (*Symphyto-Fagion*)

PAL.CLASS.: 41.1D

- 1) *Fagus sylvatica*, or, locally, *F. orientalis*, *F. moesiaca* or *F. taurica* forests of the Romanian, Ukrainian and eastern Serbian Carpathians, east of the Uz and the Stry, and of the west Ukrainian pre-Carpathic hills and plateaux.
- 2) Plants: *Symphytum cordatum*, *Cardamine glanduligera* (syn *Dentaria glandulosa*), *Hepatica transsilvanica*, *Pulmonaria rubra*, *Leucanthemum waldsteinii*, *Silene heuffelii*, *Ranunculus carpaticus*, *Euphorbia carniolica*, *Aconitum moldavicum*, *Saxifraga rotundifolia* ssp. *heuffelii*, *Primula elatior* ssp. *leucophylla*, *Hieracium rotundatum*, *Galium kitaibelianum*, *Moehringia pendula*, *Festuca drymeja*
5. Coldea GH. (1991). Prodrome des associations vegetales des Carpates du sud-est (Carpates Roumaines). *Documents Phytosociologiques*, Camerino

Mediterranean deciduous forests

9210 * Apennine beech forests with *Taxus* and *Ilex*

PAL.CLASS.: 41.181, 41.185 and 41.186

- 1) Thermophilous beech forests, highly fragmented and harbouring many endemics, with *Taxus baccata* and *Ilex aquifolium* (*Geranio nodosi-Fagion*, *Geranio striati-Fagion*). This habitat type includes: Monte Gargano Foresta Umbra, rich in *Taxus baccata* (41.181); silicolous beech forests of the Aspromonte range of Calabria with *Taxus baccata*, *Populus tremula*, *Sorbus aucuparia* and *Betula pendula* (41.185); Relict beech forests of the Madonie, Nebrodi and, very locally, the monti Peloritani, with *Ilex aquifolium*, *Daphne laureola*, *Crataegus monogyna* and *Prunus spinosa* (41.186).
 - 2) Plants: *Fagus sylvaticus*, *Ilex aquifolium*, *Taxus baccata*.
-

9220 * Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*

PAL.CLASS.: 41.186 and 41.187

- 1) Beech forests of the hill level, on sites colder than those of 41.181, highly fragmented and harbouring many endemics, with *Abies alba* and *Abies nebrodensis* (*Geranio nodosi-Fagion*, *Geranio striati-Fagion*). Relict beech forests of the Madonie, Nebrodi and, very locally, the monti Peloritani, with *Ilex aquifolium*, *Daphne laureola*, *Crataegus monogyna* and *Prunus spinosa* (41.186); isolated beech forests of Mount Etna, at the southern limit of the range of the species (41.187).
 - 2) Plants: *Abies alba*, **A. nebrodensis*, *Fagus sylvatica*.
-

9230 Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica*

PAL.CLASS.: 41.6

- 1) *Quercus pyrenaica* -dominated forests (*Quercion robori-pyrenaicae*).
Sub-types :
 - 41.61 - Central Iberian *Quercus pyrenaica* forests
Supra- and sometimes meso-Mediterranean *Quercus pyrenaica* forests of western Iberia, the Leonese interior, the Cordillera Central, the Iberian Range, the Montes de Toledo and the Sierra Morena.
 - 41.62 - Cantabrian *Quercus pyrenaica* forests
Melampyro pratense-Quercetum pyrenaicae, *Linario triornithophorae-Quercetum pyrenaicae*
Quercus pyrenaica formations of medio-European character, of the collinar and montane levels of the Cantabrian chain and its satellite ranges west to the Sierra de Picos de Ancares in Galicia, characteristic of areas with comparatively low precipitation, in the rain shadow of the coastward ranges or the interior oro-Cantabrian hills.
 - 41.63 - Maestrazgan *Quercus pyrenaica* forests

- Cephalanthero rubrae-Quercetum pyrenaicae*
Quercus pyrenaica forests of the sub-Mediterranean siliceous enclaves of the Maestrazgo and eastern Catalanian ranges, reduced to a very few relicts in the Penagolosa and Prades massifs.
- 41.64 - Baetic *Quercus pyrenaica* forests
Adenocarpus decorticans-Quercetum pyrenaicae
Quercus pyrenaica forests of siliceous supra-Mediterranean areas with sub-humid climate of the western Sierra Nevada, the Sierra de Alfacar, the northern flanks of the Sierra de Cazulas and the Sierra Tejada; in more humid locations *Fraxinus angustifolius* and *Acer granatense* accompany *Q. pyrenaica*.
- 41.65 - French *Quercus pyrenaica* forests
Betulo-Quercetum pyrenaica i. a.
Quercus pyrenaica forests of south-western France north to the Sologne where they constitute relatively extensive formations on poor soils, with *Betula pendula*, *Lonicera periclymenum*, *Deschampsia flexuosa*, *Holcus mollis*, *Molinia caerulea*, *Teucrium scorodonia*.

- 2) Plants: *Quercus pyrenaica*, *Q. robur*.

9240

Quercus faginea and *Quercus canariensis* Iberian woods

PAL.CLASS.: 41.77

- 1) Forests and woods dominated by *Quercus faginea*, *Quercus canariensis* or *Quercus afares*. The humid formations of south-western Iberia (41.772 and 41.773) are forest types of unique character in Europe and of extreme biological importance.
- Sub-types :
- 41.771- Spanish *Quercus faginea* forests
Spiraea obovatae-Quercetum fagineae, *Cephalanthero longifoliae-Quercetum fagineae*, *Viola wilkommii-Quercetum fagineae*, *Daphno latifoliae-Aceretum granatensis*, *Fraxino ornithogalli-Quercetum fagineae*
Xero-mesophile *Quercus faginea* formations of slopes and plateaux of middle elevations of the Spanish Meseta and associated ranges.
- 41.772 - Portuguese *Quercus faginea* forests
Arisaro-Quercetum fagineae
Humid, epiphyte-clad, dense, relict *Quercus faginea* forests of Portugal, restricted to a very few isolated localities.
- 41.773 -Andalusian *Quercus canariensis* forests
Rusco hypophylli-Quercetum canariensis
Humid and hyper-humid, luxuriant *Quercus canariensis* forests of the sierras of extreme southern Spain, limited to the Aljibe and a very few localities in the Serrania de Ronda.
- 41.774 - Catalanian *Quercus canariensis* stands
Carici depressae-Quercetum canariensis
Formations of Catalonia rich in *Quercus canariensis*.
- 41.775 - Balearic *Quercus faginea* woods
Aceri-Quercetum fagineae p.
Relict formations of Mallorca dominated by, or rich in, *Quercus faginea*.
- 2) Plants: *Quercus faginea*, *Q. canariensis*.

9250***Quercus trojana* woods**

PAL.CLASS.: 41.78

- 1) Supra-Mediterranean, and occasionally meso-Mediterranean woods dominated by the semi-deciduous *Quercus trojana* or its allies (*Quercetum trojanae*).

Sub-types :

41.781 - Helleno-Balkan Trojan oak woods

Usually low formations dominated by *Quercus trojana*, often with junipers or maples, of Macedonia, Thrace and Thessaly, north to Herzegovina, Montenegro, Albania and the Vardar valley of Paeonia.

41.782 - Apulian Trojan oak woods

Relict woods, sometimes of considerable height, of *Quercus trojana* and *Q. pubescens*, often with an admixture of *Q. ilex* and its associated vegetation (Murge: e.g. bosco delle Pianelle, foresta Gaglione).

- 2) Plants: *Quercus trojana*.
-

9260***Castanea sativa* woods**

PAL.CLASS.: 41.9

- 1) Supra-Mediterranean and sub-Mediterranean *Castanea sativa*-dominated forests and old established plantations with semi-natural undergrowth.

- 2) Plants: *Castanea sativa*.
-

9270**Hellenic beech forests with *Abies borisii-regis***

PAL.CLASS.: 41.1A

- 1) *Fagus sylvatica* forests with reduced medio-European character and high endemism, characterised by the presence of *Abies borisii-regis*, *Doronicum caucasicum*, *Galium laconicum*, *Lathyrus venetus*, *Helleborus cyclophyllus* (*Fagion hellenicum*).

- 2) Plants: *Fagus sylvatica*, *Abies borisii-regis*.
-

9280***Quercus frainetto* woods**

PAL.CLASS.: 41.1B

- 1) *Fagus sylvatica* or *Fagus moesiaca* forests, more thermophile than those of 41.19 and 41.1A, occurring in the transition zone between the supra-Mediterranean and montane levels, characterised by the presence of numerous species of the *Quercion frainetto*.

- 2) Plants: *Fagus sylvatica*, *Quercus frainetto*.

9290***Cupressus* forests (*Acero-Cupression*)**

PAL.CLASS.: 42.A1

- 1) Montane forests of the Mediterranean basin, dominated by *Cupressus sempervirens*, *Cupressus atlantica* or *Cupressus dupreziana* (*Acero-Cupression*).
 - 2) Plants: *Cupressus sempervirens*.
-

92A0***Salix alba* and *Populus alba* galleries**

PAL.CLASS.: 44.141 and 44.6

- 1) Riparian forests of the Mediterranean basin dominated by *Salix alba*, *Salix fragilis* or their relatives (44.141). Mediterranean and Central Eurasian multi-layered riverine forests with *Populus* spp., *Ulmus* spp., *Salix* spp., *Alnus* spp., *Acer* spp., *Tamarix* spp., *Juglans regia*, lianas. Tall poplars, *Populus alba*, *Populus caspica*, *Populus euphratica* (*Populus diversifolia*), are usually dominant in height; they may be absent or sparse in some associations which are then dominated by species of the genera listed above (44.6).
 - 2) Plants: *Salix alba*, *Populus alba*.
-

92B0**Riparian formations on intermittent Mediterranean water courses with *Rhododendron ponticum*, *Salix* and others**

PAL.CLASS.: 44.52 and 44.54

- 1) Distinctive, relict thermo- and meso-Mediterranean alder galleries of deep, steep-sided valleys, with *Rhododendron ponticum* ssp. *baeticum*, *Frangula alnus* ssp. *baetica*, *Arisarum proboscideum* and a rich fern community including *Pteris incompleta*, *Diplazium caudatum*, *Culcita macrocarpa* (44.52).
Relict *Betula parvibracteata* riparian galleries. The dominant species, an extremely local endemic, is accompanied by *Myrica gale*, *Frangula alnus*, *Salix atrocinerea*, *Galium broterianum*, *Scilla ramburei* (44.54).
- 2) Plants: *Rhododendron ponticum* ssp. *baeticum*, *Frangula alnus* ssp. *baetica*, *Arisarum proboscideum*, *Betula parvibracteata*.
- 4) The *Rhododendron*-alder galleries are often in contact with humid to hyper-humid *Quercus canariensis* forests (41.773) and with *Salix pedicellata* formations (44.1271).

***Platanus orientalis* and *Liquidambar orientalis* woods
(*Plantanion orientalis*)**

PAL.CLASS.: 44.71 and 44.72

- 1) Forests and woods, for the most part riparian, dominated by *Platanus orientalis* (oriental plane) or *Liquidambar orientalis* (sweet gum), belonging to the *Plantanion orientalis* alliance.

Sub-types :

44.71 - Oriental plane woods (*Plantanion orientalis*)

Forests of *Platanus orientalis*.

44.711 - Helleno-Balkan riparian plane forests

Platanus orientalis gallery forests of Greek and southern Balkanic watercourses, temporary rivers and gorges; they are distributed throughout the mainland and archipelagos, colonising poorly stabilised alluvial deposits of large rivers, gravel or boulder deposits of permanent or temporary torrents, spring basins, and particularly, the bottom of steep, shady gorges, where they constitute species-rich communities. The accompanying flora may include *Salix alba*, *S. elaeagnos*, *S. purpurea*, *Alnus glutinosa*, *Cercis siliquastrum*, *Celtis australis*, *Populus alba*, *P. nigra*, *Juglans regia*, *Fraxinus ornus*, *Alnus glutinosa*, *Crataegus monogyna*, *Cornus sanguinea*, *Ruscus aculeatus*, *Vitex agnus-castus*, *Nerium oleander*, *Rubus* spp., *Rosa sempervirens*, *Hedera helix*, *Clematis vitalba*, *Vitis vinifera* ssp. *sylvestris*, *Ranunculus ficaria*, *Anemone blanda*, *Aristolochia rotunda*, *Saponaria officinalis*, *Symphytum bulbosum*, *Hypericum hircinum*, *Calamintha grandiflora*, *Melissa officinalis*, *Helleborus cyclophyllus*, *Cyclamen hederifolium*, *C. repandum*, *C. creticum*, *Galanthus nivalis* ssp. *reginae-olgae*, *Dracunculus vulgaris*, *Arum italicum*, *Biarum tenuifolium*, *Brachypodium sylvaticum*, *Dactylis glomerata* and may be rich in mosses, lichens and ferns, among which *Pteridium aquilinum* is often abundant. Various associations have been described, reflecting regional and ecological variation in the composition of the undergrowth. The plane tree galleries are particularly well represented along the Ionian coast and in the Pindus; other important local complexes exist in Macedonia, in Thrace, around the Olympus massif, in the Pelion, in the Peloponnese, particularly in the Taygetos, where luxuriant gorge forests reach 1300m, in Euboea and in Crete; local, distinctive, representatives occur in other Aegean islands, such as Rhodes, Samos, Samothrace, Thasos. Restriction to gorges is increasingly pronounced towards the south.

44.712 - Hellenic slope plane woods

Platanus orientalis woods on colluvions, detritus cones, ravine sides or other poorly stabilised substrates, of Greece.

44.713 - Sicilian plane tree canyons

Relict *Platanus orientalis*-dominated or *P. orientalis* -rich galleries of the Cassabile, the Anapo, the Irminio and the Carbo rivers, in the Iblei range of south-eastern Sicily, of the gorge of the Sirmeto, in the vicinity of the Nebrodi. Some of these formations, in particular, in the gorges of the Cassabile and of the Anapo, are true plane tree woods. Others, such as on the Sirmeto, are *Populus alba*, *Fraxinus angustifolia*, *Salix* spp. formations with *Platanus orientalis*; as they grade into each other, and because of the very isolated occurrence, and great biogeographical and historical interest of *Platanus orientalis* in Sicily, they are all listed here. Plane tree woods have had a much greater extension in Sicily and probably in Calabria. A large forest has, in particular, existed on the Alcantara, where the species is now extinct.

44.72 - Sweet gum woods

Riverine forests dominated by the Tertiary relict *Liquidambar orientalis*, with very limited range in south Asia Minor and Rhodes.

44.721 - Rhodian sweet gum woods

Liquidambar orientalis gallery forest of the Petaloudhes Valley, on Rhodes, with poorly developed undergrowth and a ground layer dominated by *Adiantum capillus-veneris* in damp areas. This forest constitutes the only European formation of this species and harbours the unique, concentrated aggregation of Jersey Tiger Moths, *Panaxia quadripunctaria*.

- 2) Plants: *Platanus orientalis*, *Liquidambar orientalis*.
-

92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*)

PAL.CLASS.: 44.81 to 44.84

- 1) Tamarisk, oleander, and chaste tree galleries and thickets and similar low ligneous formations of permanent or temporary streams and wetlands of the thermo-Mediterranean zone and south-western Iberia, and of the most hygromorphic locations within the Saharo-Mediterranean and Saharo-Sindian zones.
The formations with *Tamarix africana* should not be taken into account.
- 2) Plants: *Nerium oleander*, *Vitex agnus-castus*, *Tamarix* spp., *Securinega tinctoria*, *Prunus lusitanica*, *Viburnum tinus*.
-

Mediterranean sclerophyllous forests

9310 Aegean *Quercus brachyphylla* forests

PAL.CLASS.: 41.735

- 1) Stands of *Quercus brachyphylla*, often associated with *Quercus macrolepis* or *Q. ilex*.
- 2) Plants: *Quercus brachyphylla*.
-

9320 *Olea* and *Ceratonia* forests

PAL.CLASS.: 45.1

- 1) Thermo-Mediterranean or thermo-Canarian woodland dominated by arborescent *Olea europaea* ssp. *sylvestris*, *Ceratonia siliqua*, *Pistacia lentiscus*, *Myrtus communis* or, in the Canary Islands, by *Olea europaea* ssp. *cerasiformis* and *Pistacia atlantica*. Most formations will be listed as arborescent matorral (35.12), but a few stands may have a sufficiently tall, closed canopy to qualify for this unit.
Sub-types :
45.11 - Wild olive woodland
Olea europaea ssp. *sylvestris* - dominated formations. A climax olive forest, with *Ceratonia siliqua* and *Pistacia lentiscus* exists on the north flank of Djebel Ichkeul in northern Tunisia. Elsewhere, the communities most resembling olive forest are found in southern Andalusia (*Tamo communis-Oleetum sylvestris*: extinct?), in Menorca (*Prasio majoris-Oleetum sylvestris*), Sardinia, Sicily, Calabria, Crete.

45.12 - Carob woodland

Ceratonia siliqua - dominated formations, often with *Olea europaea* ssp. *sylvestris* and *Pistacia lentiscus*. The most developed examples, some truly forest-like, are to be found in Tunisia, on the slopes of the Djebel, where they constitute carob-dominated facies of the wild olive woodlands (45.11), in Mallorca (*Cneoro tricocci-Ceratonietum siliquae*), in eastern Sardinia, in south-eastern Sicily, in Puglia, in Crete.

45.13 - Canarian olive woodland

Olea europaea ssp. *cerasiformis* and *Pistacia atlantica* formations of the Canary Islands.

- 2) Plants: *Olea europaea* ssp. *sylvestris*, *Ceratonia siliqua*, *Pistacia lentiscus*, *Myrtus communis*, *Olea europaea* ssp. *cerasiformis*, *Pistacia atlantica*.
-

9330

Quercus suber forests

PAL.CLASS.: 45.2

- 1) West-Mediterranean silicicolous forests dominated by *Quercus suber*, usually more thermophile and hygrophile than 45.3.

Sub-types :

45.21 - Tyrrhenian cork-oak forests

Quercion suberis

Mostly meso-Mediterranean *Quercus suber* forests of Italy, Sicily, Sardinia, Corsica, France and north-eastern Spain. They are most often degraded to arborescent matorral (32.11).

45.22 - South-western Iberian cork-oak forests

Quercion fagineo-suberis

Quercus suber forests, often with *Q. faginea* or *Q. canariensis*, of the south-western quadrant of the Iberian peninsula.

45.23 -North-western Iberian cork-oak forests

Very local, exiguous *Quercus suber* enclaves in the *Q. pyrenaica* forest area of the valleys of the Sil and of the Mino (Galicia).

45.24 - Aquitanian cork-oak woodland

Isolated *Q. suber*-dominated stands occurring either as a facies of dunal pine-cork oak forests or in a very limited area of the eastern Landes.

- 2) Plants: *Quercus suber*.
-

9340

Quercus ilex and *Quercus rotundifolia* forests

PAL.CLASS.: 45.3

- 1) Forests dominated by *Quercus ilex* or *Q. rotundifolia*, often, but not necessarily, calcicolous.

Sub-types :

45.31 - Meso-Mediterranean holm-oak forests

Rich meso-Mediterranean formations, penetrating locally, mostly in ravines, into the thermo-Mediterranean zone. They are often degraded to arborescent matorral (32.11), and some of the types listed below no longer exist in the fully developed forest state relevant to category 45; they have nevertheless been included, both to provide appropriate codes for use in 32.11, and because restoration may be possible.

45.32 - Supra-Mediterranean holm-oak forests

Formations of the supra-Mediterranean levels, often mixed with deciduous oaks, *Acer* spp. or *Ostrya carpinifolia*.

45.33 - Aquitanian holm-oak woodland

Isolated *Quercus ilex*-dominated stands occurring as a facies of dunal pine-holm oak forests.

45.34 - *Quercus rotundifolia* woodland

Iberian forest communities formed by *Q. rotundifolia*. Generally, even in mature state, less tall, less luxuriant and drier than the fully developed forests that can be constituted by the closely related *Q. ilex*, they are, moreover, most often degraded into open woodland or even arborescent matorral. Species characteristic of the undergrowth are *Arbutus unedo*, *Phillyrea angustifolia*, *Rhamnus alaternus*, *Pistacia terebinthus*, *Rubia peregrina*, *Jasminum fruticans*, *Smilax aspera*, *Lonicera etrusca*, *L. implexa*.

- 2) Plants: *Quercus ilex*, *Q. rotundifolia*.
-

9350

Quercus macrolepis forests

PAL.CLASS.: 41.79

- 1) Woods dominated by the semi-deciduous *Quercus macrolepis*, often fairly open, mostly of the meso-Mediterranean zone.

Sub-types :

41.791 - Hellenic valonia oak woods

Quercus macrolepis formations of continental Greece and its archipelagos, as well as of adjacent Albania; well developed forests exist, in particular, in the Ionian islands and on Lesbos; more modified, grove-like, stands, exist on the maritime slopes of the low mountains bordering the gulf of Arta and in western Etolia, in the north-western Peloponnese, in Thessaly, in Attica, in Thrace.

41.792 - Apulian valonia oak woods

Relict *Quercus macrolepis* formations of Salento (Tricase).

- 2) Plants: *Quercus macrolepis*.
-

9360

* Macaronesian laurel forests (*Laurus*, *Ocotea*)

PAL.CLASS.: 45.61 to 45.63

- 1) Humid to hyper-humid, mist-bound, luxuriant, evergreen, lauriphyllous forests of the cloud belt of the Macaronesian islands, extremely rich in floral and faunal species, among which many are restricted to these communities (*Pruno-Lauretalia*). Genera such as *Picconia*, *Semele*, *Gesnouinia*, *Lactucosonchus*, *Ixanthus* are entirely endemic to these communities, while others, such as *Isoplexis*, *Visnea* and *Phyllis*, reach in them their maximum development; in addition, each of the formations of the various archipelagos harbours distinctive endemic species.

This habitat type includes:

- lauriphyllous forests of the Azores (45.61 *Ericetalia azorica* p.), where the humid forests of the coastal areas (*Myrico-Pittosporietum undulati* p.) have been totally or almost totally degraded, largely invaded by the introduced Australian *Pittosporum undulatum*; a better representation survives of the hyper-humid forests (*Culcito-Juniperion brevifoliae* p.) of higher elevations;

- lauriphyllous forests of Madeira (45.62 *Pruno-Lauretalia azorica*) still occupying a relatively large surface, of the order of 10,000 ha ;

- lauriphyllous forests of the Canary Islands (45.63 *Ixantho-Laurion azoricae*); the laurel forests of each island harbour a distinctive set of endemic plants and animals, as exemplified by the species of the composite genus *Pericallis*, the well-marked races of the chaffinch *Fringilla coelebs* or the carabid fauna.

- 2) Plants: *Apollonias barbujana*, *Ardisia bahamensis*, *Asparagus fallax*, *Canarina canariensis*, *Carex canariensis*, *C. eregrina*, *Clethra arborea*, *Convolvulus canariensis*, *Cryptotaenia elegans*, *Erica arborea*, *Euphorbia melifera*, #*E. stygiana*, #*Frangula azorica*, *Geranium canariensis*, *Heberdenia excelsa*, *Hedera canariensis*, *Ilex canariensis*, *I. perado* ssp. *azorica*, *I. perado* ssp. *perado*, *Isolexis canariensis*, *Ixanthus viscosus*, *Juniperus brevifolia*, *Laurus azorica*, *Myrica faya*, *Ocotea foetens*, *Persea indica*, #*Picconia azorica*, *P. excelsa*, **Pittosporum coriaceum*, *Pleiomeris canariensis* (= *Myrsine canariensis*), *Prunus lusitanica*, #*P. l.* ssp. *azorica*, *P. l.* ssp. *hixa*, *Rubia peregrina*, *Rubus bollei*, *Ruscus streptophyllus*, *Sambucus lanceolata*, **S. palmensis*, *Semele androgyna*, *Senecio auritus* (= *S. maderensis*), *Sideretis canariensis*, *S. macrostachys*, *Smilax aspera*, *S. canariensis*, *S. divaricata*, *Sonchus fruticosus*, *Tamus edulis*, *Teline maderensis* (= *Cytisus maderensis*), *Vaccinium cylindraceum*, *V. padifolium*, *Viburnum tinus* ssp. *subcordatum*, *Visnea mocanera*.
Animals: *Columba bollei*, *C. junionae*, *C. trocaz*, *Fringilla coelebs* ssp. *ombriosa*, *F. teydea*, *F. t.* ssp. *polatzeki*.
-

9370

* Palm groves of *Phoenix*

PAL.CLASS.: 45.7

- 1) Woods, often riparian, formed by the two endemic palm trees, *Phoenix theophrasti* and *Phoenix canariensis*.
The palm groves of Crete are restricted to damp sandy coastal valleys; they include the extensive forest of Vai, where the luxuriant palm growth is accompanied by a thick shrubby undergrowth rich of *Nerium oleander*, and about four other smaller coastal groves, notably on the south coast of the prefectorate of Rethimnon.
The Canarian palm groves are mostly characteristic of the bottom of barrancos and of alluvial soils, below 600 metres; particularly representative examples are found at Fragata, Maspalomas and Barranco de Tirajana in the Gran Canary, Valle Gran Rey in La Gomera, Masca in Ténériffe and Brena Alta in La Palma.
- 2) Plants: *Phoenix canariensis*, #*Phoenix theophrasti*.
-

9380

Forests of *Ilex aquifolium*

PAL.CLASS.: 45.8

- 1) Communities dominated by arborescent *Ilex aquifolium*, relict of various forests with a field layer rich in *Ilex* and sometimes with *Taxus* (42.A7), of the supra-Mediterranean level on various substrates. These woods correspond to the senescence stage of a forest with a undergrowth with *Taxus* and *Ilex* (belonging among others to the *Ilici-Quercetum ilicis*), after the fading of the tree layer. They generally form patches inside or outside forests.
-

9390

*Scrub & low forest vegetation with *Quercus alniflora*

PAL.CLASS.: 45.48

- 1) Arborescent *Quercus alnifolia*-dominated formations on basic eruptive substrates of the Troodos range, together with matorrals derived from these forests (32.1146).

- 2) Plants *Quercus alnifolia*, *Acer sempervirens*, *Teucrium kotschyana*, *Salvia cypria*, *Crepis fraasii*, *Sedum cyprium*
-

93A0 Woodlands with *Quercus infectoria* (*Anagyro foetidae*- *Quercetum infectoriae*)

PAL.CLASS.: 45.46 (p)

- 1) *Quercus infectoria* woods constitute the potential natural vegetation growing on limestones and chiefly marly limestone substrata of the Troodos Mountains between 600 – 700 to 1000 –1100 m. Degraded stages of these communities are associated with *Quercetalia ilicis* maquis (*Quercus coccifera* subsp. *pseudococcifera*) or with *Cistus creticus* phrygana.
 - 2) Plants *Quercus infectoria*, *Q. brachyphylla*, *Q. coccifera* ssp. *calliprinos*, *Arbutus andrachne*, *Acer syriacum*, *Fontanesia philliraeoides*, *Aristolochia altissima*, *Cyclamen persicum*, *Eryngium falcatum*, *Anagyris foetida*, *Styrax officinalis*, *Agropyron panormitanum*, *Glaucosciadium cordifolium*, *Crepis micrantha*: *Crataegus azarolus*, *Pinus brutia*, *Pistacia terebinthus*, *P. lentiscus*, *Arbutus andrachne*, *Calicotome villosa*, *Cistus creticus*, *Ptilostemon chamaepeuce* var. *cypria*, *Allium neapolitanum*, *Ferula communis*, *Geranium tuberosum*, *Scaligeria cretica*, *Scutellaria cypria* var. *cypria*, *Serratula cerinthifolia*.
 - 4) The *Anagyro foetidae*- *Quercetum infectoriae* association may become degraded to maquis (9320), or phrygana (5420).
-

Temperate mountainous coniferous forests

9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*)

PAL.CLASS.: 42.21 to 42.23, 42.25

- 1) Sub-alpine and alpine conifer forests (dominated by *Picea abies* and *Picea orientalis*).
Sub-types:
 - 42.21 - Alpine and Carpathian sub-alpine spruce forests. *Piceetum subalpinum*.
Picea abies forests of the lower sub-alpine level, and of anomalous stations in the montane level, of the outer, intermediate and inner Alps; in the latter, they are often in continuity with the montane spruce forests of 42.22. The spruces are often stunted or columnar; they are accompanied by an undergrowth of decidedly sub-alpine affinities. *Picea abies* forests of the lower sub-alpine level of the Carpathians.
 - 42.22 - Inner range montane spruce forests. *Piceetum montanum*.
Picea abies forests of the montane level of the inner Alps, characteristic of regions climatically unfavourable to both beech and fir. Analogous *Picea abies* forests of the montane and collinar levels of the inner basin of the Slovakian Carpathians subjected to a climate of high continentality.
 - 42.23 - Hercynian sub-alpine spruce forests

Sub-alpine *Picea abies* forests of high Hercynian ranges²¹.

42.25 - Peri-Alpine spruce forests

Spontaneous *Picea abies* formations occupying outlying altitudinal or edaphic enclaves within the range of more predominant vegetation types of the montane levels of the outer Alps, the Carpathians, the Dinarides, the Jura, the Hercynian ranges, the subalpine levels of the Jura, the western Hercynian ranges and the Dinarides

- 2) Plants: *Picea abies*, *Vaccinium* spp.
-

9420 Alpine *Larix decidua* and/or *Pinus cembra* forests

PAL.CLASS.: 42.31, 42.32 and 42.35

- 1) Forests of the sub-alpine and sometimes montane levels, dominated by *Larix decidua* or *Pinus cembra*; the two species may form either pure or mixed stands, and may be associated with *Picea abies* or *Pinus uncinata*.

Sub-types:

42.31 - Eastern Alpine siliceous larch and arolla forests. *Larici-Cembretum*.

Sub-alpine *Larix decidua*, *Pinus cembra*, or *Larix decidua-Pinus cembra* forests of the eastern and central Alps, mostly of the inner ranges, usually on siliceous substrates, with an often species-poor undergrowth comprising *Vaccinium myrtillus*, *Rhododendron ferrugineum*, *Calamagrostis villosa*, *Luzula albida*.

42.32 - Eastern Alpine calcicolous larch and arolla forests. *Laricetum*, *Larici-Cembretum*

Rhododendretosum hirsuti

Sub-alpine and montane *Larix decidua*, *Larix decidua - Picea abies*, *Pinus cembra* or *Larix decidua-Pinus cembra* forests of the eastern and central Alps, mostly of the outer ranges, on calcareous substrates, with a usually species-rich undergrowth including *Erica herbacea*, *Polygala chamaebuxus*, *Rhododendron hirsutum* or *Pinus mugo*.

42.35 - Carpathian larch and arolla forests

Uncommon *Larix decidua* or *Pinus cembra* formations of the Carpathians, each occurring as a single dominant, together as codominants, or mixed with *Picea abies*.

- 2) Plants: *Larix decidua*, *Pinus cembra*.
-

9430 Subalpine and montane *Pinus uncinata* forests (* if on gypsum or limestone)

PAL.CLASS.: 42.4

- 1) Mountain pine (*Pinus uncinata*) forests, usually open and with a very developed shrubby understory, of the subalpine and montane levels; on limestone, gypsum or siliceous substrate in a cool or thermophile situation depending on the region. Sometimes mixed with *Pinus sylvestris*, more rarely with *Larix-Pinus cembra*.

Two major types: 42.41 - mountain pine forests of the western outer Alps, the Jura and Pyrenean ubacs, developed on siliceous or decalcified soils of the subalpine level with a predominately ericaceous undergrowth comprising *Rhododendron ferrugineum* (*Rhododendro-Vaccinion* p.); 42.42 - xerocline mountain pine forests of the inner Alps, of the western outer Alps and the Jura, and of

²¹ Bayerischer Wald, Harz (above 750 m) and Erzgebirge.

- 42.63 - Salzmann's pine forests - *Pinus salzmannii* forests of Spain (Pyrenees, northern Iberian Range, sierra de Gredos, serrania de Cuenca, Maestrazgo, sierras de Cazorla, Segura and Alcaraz, calcareous periphery of the Sierra Nevada) and the Causses;
- 42.64 - Corsican laricio pine forests - *Pinus laricio* forests of the mountains of Corsica (1000 to 1800 m) on granitic soils;
- 42.65 - Calabrian laricio pine forests - *Pinus laricio* var. *calabrica* forests of the Sila (Sila Greca, Sila Grande, Sila Piccola), the Aspromonte and Etna;
- 42.66 - Pallas's pine forests - montane forests of *Pinus pallasiana* of Greece and the Balkan peninsula.

- 2) Plants: *Pinus laricio*, *Pinus nigra*, *Pinus pallasiana*, *Pinus salzmannii*.
Animals: *Sitta whiteheadi*.

9540 Mediterranean pine forests with endemic Mesogean pines

PAL.CLASS.: 42.8

- 1) Mediterranean and thermo-Atlantic woods of thermophilous pines, mostly appearing as substitution or paraclimactic stages of forests of the *Quercetalia ilicis* or *Ceratonio-Rhamnetalia*. Long-established plantations of these pines, within their natural area of occurrence, and with an undergrowth basically similar to that of paraclimactic formations, are included.

Sub-types :

42.81 - Maritime pine forests

Forests and plantations of *Pinus pinaster* ssp. *atlantica* of south-western France and the western Iberian peninsula.

42.82 - Mesogean pine forests

Forests of *Pinus pinaster* ssp. *pinaster* (= *Pinus mesogeensis*) of the western Mediterranean, mostly in siliceous meso-Mediterranean, upper meso-Mediterranean and supra-Mediterranean situations of Spain, Corsica, south-eastern France, north-western Italy, Sardinia and Pantelleria.

42.821 - Iberian mesogean pine forests

Pinus pinaster forests of the Iberian peninsula, appearing mostly as substitution communities of *Quercus rotundifolia*, *Q. pyrenaica* or, locally, *Q. suber*, *Q. faginea* woodlands.

42.822 - Corbières mesogean pine forests

Isolated *Pinus pinaster* - dominated woods of the Corbières.

42.823 - Franco-Italian mesogean pine forests

Pinus pinaster forests of siliceous lower meso-Mediterranean areas of Provence, of marls and limestones of the upper meso-Mediterranean level of the Maritime Alps and the Ligurian Alps, and of mostly siliceous or clayey soils of the hills of Liguria and Tuscany.

42.824 - Corsican mesogean pine forests

Pinetum pinastris, *Erico-Arbutetum* p., *Galio-Pinetum* p.

Pinus pinaster-dominated forests of the meso- and supra-Mediterranean levels of Corsica, mostly on granitic substrates; they are very developed, accompanied by a maquis-like understory, in the meso-Mediterranean zone, mostly in its upper levels; they occur locally within the supra-Mediterranean zone, on adrets and at lower altitudes, as facies of laricio pine forests.

42.825 - Sardinian mesogean pine forests

Pinus pinaster formations on granitic substrates of northern Sardinia, with *Arbutus unedo*, *Quercus ilex*, *Rosmarinus officinalis*, *Erica arborea*, *Genista corsica*, *Lavandula stoechas*, *Rubia peregrina*, *Calicotome spinosa*, *Pistacia lentiscus*, *Teucrium marum*.

42.826 - Pantellerian mesogean pine forests

Pinus pinaster woods of Pantelleria.

42.83 - Stone pine forests

Mediterranean forests and old naturalised plantations of *Pinus pinea*. Old introductions in many areas often makes the distinction between self sown forests and long-established formations of artificial origin difficult. These are thus included here, while recent, obviously artificial groves are not.

42.831 - Iberian stone pine forests

Pinus pinea forests of the Iberian peninsula, where they reach their greatest development.

42.832 - Balearic stone pine woods

Pinus pinea formations of the Balearic Islands, native only on Ibiza and Formentera.

42.833 - Provence stone pine woods

Pinus pinea formations of Provence, possibly spontaneous on coastal sands and in the Maures area.

42.834 - Corsican stone pine woods

Pinus pinea formations of the littoral of Corsica, some of which may be of natural origin, in particular on old dunes of the east coast.

42.835 - Sardinian stone pine forests

Pinus pinea formations of Sardinia.

42.836 - Sicilian stone pine forests

Pinus pinea formations of the Monti Peloritani, north-western Sicily, of probable native origin.

42.837 - Peninsular Italian stone pine forests

Large, ancient, *Pinus pinea* plantations of the Tyrennian, and locally, Adriatic coasts of the Italian peninsula, in Liguria, Tuscany, Latium, Campania, Emilia-Romana (Ravenna) and Friuli-Venetia Giulia (Grado).

42.838 - Greek stone pine forests

Pinus pinea woods of the littoral and coastal hills of the Peloponnese, Chalcidice, Crete and Aegean islands, rather local but probably in part, at least, spontaneous; a splendid example exists, in particular, on Skiathos.

42.84 - Aleppo pine forests

Woods of *Pinus halepensis*, a frequent colonist of thermo- and calcicolous meso-Mediterranean scrubs. The distinction between spontaneous forests and long-established formations of artificial origin is often difficult. The latter are thus included here, while recent, obviously artificial groves are not.

42.841 - Iberian Aleppo pine forests

Pinus halepensis forests of Spain, considered native for at least two-thirds of their considerable expanse; they are mostly restricted to eastern regions on the Mediterranean slope of the Catalanian mountains, the Maestrazgo, the pre-Baetic ranges of the upper Guadalquivir basin, the southern Andalusian mountains; they penetrate farther inland in the Ebro basin and around the headwaters of the Tagus and Guadalquivir systems.

42.842 - Balearic Aleppo pine forests

Pinus halepensis formations of the Balearics, present and probably native on all the major islands.

42.843 - Provenço-Ligurian Aleppo pine forests

Mostly lower meso-Mediterranean *Pinus halepensis* forests of Provence and of the lower slopes and coastlines of the Maritime and Ligurian Alps, extensive and undoubtedly native.

42.844 - Corsican Aleppo pine woods

Rare and local *Pinus halepensis* woods of the Corsican coasts, some, at least, possibly natural.

42.845 - Sardinian Aleppo pine woods

Pinus halepensis formations of Sardinia, where certainly native woods occur on Isola di San Pietro and the Sulcis coast of Iglesias.

42.846 - Sicilian Aleppo pine woods

Pinus halepensis formations of Sicily and peripheral islands (Egadi, Lampedusa, Pantelleria).

42.847 - Peninsular Italian Aleppo pine forests

Pinus halepensis formations of the Italian peninsula; extensive, probably at least partially native ones are individualised in the subdivisions below.

42.848 - Greek Aleppo pine forests

Pinus halepensis formations of Greece, where the species is relatively widespread, particularly in Attica, Thessaly, the coasts of the Peloponnese and of central continental Greece, the Ionian islands, Chalcidici, the northern Sporades, Euboea and Skiros.

42.85 - Aegean pine forests

Pinus brutia forests of Crete and eastern Aegean islands. Eastern vicariants of Aleppo pine forests (42.84), they comprise, however, taller, more luxuriant, and often extensive, formations. Disjunct formations of this pine or of related species, described from Crimea and the Caucasian region (*Pinus pityusa*, *Pinus stankewiczii*, *Pinus eldarica*) have been included..

42.851 - Aegean pine forests of Crete

Pinus brutia-dominated forests of Crete and its satellite islands Gavdos and Gaidaronisi, pure or mixed with *Cupressus sempervirens*; they are widespread in particular in the White Mountains, the Psiloriti range, the Dikti range and, locally, in the Sitia mountains and the Asterousia mountains.

42.852 - Aegean pine forests of Lesbos

Extensive *Pinus brutia* forests of Lesbos, occupying Mount Olympus and surrounding hills in the south-eastern quadrant of the island, as well as parts of the Kuratsonas range in the north-west; these forests harbour the only European population of the nuthatch *Sitta krueperi* and the most significant one of the orchid *Comperia comperiana*.

42.853 - Aegean pine forests of Samos

Pinus brutia forests covering large expanses of Samos, in particular in the Ambelos range, the Kerki mountains, the southern hills and the north-eastern peninsula.

42.854 - Aegean pine woods of Chios

Remnant forests of Chios with a composition and stratification similar to those of the forests of Samos.

42.855 - Aegean pine forests of Thasos

Broad *Pinus brutia* belt on the lower reaches of Thasos, up to about 400 to 500 metres, mixed with *Pinus pallasiana* in the higher areas.

42.856 - Aegean pine woods of Samothrace

Mostly sparse *Pinus brutia* formations of the lowlands of Samothrace.

42.857 - Aegean pine forests of Rhodes

Remnant *Pinus brutia* forests of Rhodes, still represented by some relatively natural formations with rich scrub undergrowth.

42.858 - Aegean pine forests of Karpathos

Fairly extensive *Pinus brutia* forests of Karpathos, distributed, in particular, in the northern coastal area, the southern interior and the middle elevation of Kali Limni.

42.859 - Aegean pine forests of the Dodecanese

Pinus brutia formations of the islands of Simi, Kos, Leros and Icaria.

- 2) Plants: *Pinus pinaster* ssp. *atlantica*, *Pinus pinaster* ssp. *pinaster* (= *Pinus mesogeensis*), *Pinus pinea*, *Pinus halepensis*, *Pinus brutia*, *Pinus mugo*, *Pinus leucodermis*.
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9550

Canarian endemic pine forests

PAL.CLASS.: 42.9

- 1) Forests of endemic *Pinus canariensis*, of the dry montane level at around 800 to 2000 metres (locally down to 500 and up to 2500 metres) in Tenerife, La Palma, Gran Canaria and Hierro, with *Chamaecytisus proliferus*, *Adenocarpus foliolosus*, *Cistus symphytifolius*, *Lotus campylocladus*, *L. hillebrandii*, *L. spartioides*, *Daphne gnidium*, *Juniperus cedrus*, *Micromeria* spp.; these forests, of

which well-preserved examples have become rare, are the only habitat of *Fringilla teydea*, *Dendrocopos major canariensis* and *D. m. thanneri*.

Sub-types :

42.91 Canary pine-rockrose forests

Climax *Pinus canariensis* forests within the main zone of altitudinal occurrence, with an undergrowth characterised and often dominated by *Cistus symphytifolius* and comprising *Chamaecytisus proliferus*, *Lotus campylocladus*, *L. hillebrandii*, *L. spartioides*, *Juniperus cedrus*, *Bystropogon origanifolius*, *Argyranthemum adauctum*.

42.92 Canary pine-dry scrub forests

Formations of dry, south-facing slopes in the lower part of the *Pinus canariensis* belt, transitional towards juniper formations and their degradation scrubs, with an undergrowth often formed by *Cistus monspeliensis*, *Euphorbia obtusifolia* ssp. *regis-jubae*, *Salvia canariensis*, *Micromeria hyssopifolia*, *Echium aculeatum*.

42.93 Canary pine-heath forests

Formations of humid, fogbound north- and north-west-facing slopes in the lower reaches of the *Pinus canariensis* belt, with an abundance of *Erica arborea* and *Myrica faya*, and occasionally with *Ilex canariensis* and *Arbutus canariensis*; epiphytic lichens are abundant, as are dense carpets of mosses, in particular, *Hypnum cupressiforme*. These woods are the main habitat of *Regulus teneriffae*.

42.94 Canary pine-broom woods

Formations of the highest altitudes of the *Pinus canariensis* belt, invaded by species of the supra-Canarian level, in particular *Adenocarpus viscosus*.

42.95 Canary pine-juniper woods

Junipero cedri-Pinetum canariensis

Pinus canariensis and *Juniperus cedrus* formations of steep, rocky slopes of high altitudes of Tenerife and La Palma.

- 2) Plants: *Pinus canariensis*, *Chamaecytisus proliferus*, *Adenocarpus foliolosus*, *Cistus symphytifolius*, *Lotus campylocladus*, *L. hillebrandii*, *L. spartioides*, *Daphne gnidium*, *Juniperus cedrus*, *Micromeria* spp.

9560

* Endemic forests with *Juniperus* spp.

PAL.CLASS.: 42.A2 to 42.A5 and 42.A8

- 1) Medium altitude forest formations dominated by *Juniperus* spp. The arborescent matorrals (32.13 and 31.3) should not be included.

Sub-types :

42.A2 - Spanish juniper woods (*Juniperon thuriferae*) - forest formations dominated by *Juniperus thuriferae* of Spain (calcareous substrates in the supra-Mediterranean levels of the Iberian Range and neighbouring plateaux, often with *Pinus sylvestris*, *P. salzmannii*, *Juniperus hemisphaerica* and *Berberis hispanica*; enclaves on the periphery of and within the Sierra de Guadarrama, occurring both on rare local limestone deposits and in a few siliceous stations; dry, warm, rocky, calcareous southern slopes of the Cordillera Cantabrica, between the Rio Pisuerga and the Rio Luna, with *Juniperus nana*, *J. sabina*, *Berberis vulgaris* ssp. *cantabrica*, *Rhamnus alpinus*, *Viburnum lantana*; gypsiferous soils of the Ebro basin, with *Rhamnus lycioides*; clay soils of the Campo de Montiel; Sierra Taibilla), southern France (Montagne de Rie); warm calcareous supra-Mediterranean slopes of the south-western Alps, in Drôme, Hautes-Alpes and Alpes-de-Haute-Provence, between 700 and 1200 metres; warm calcareous supra-Mediterranean slopes of the Isère valley, in the western Alps, between 300 and 500 metres; valleys in the interior of Corsica -Pinnera, Ruddy, Prunaccia - sometimes mixed with *Pinus laricio*;

- 42.A3 - Grecian juniper woods (*Juniperetum excelsae*) - forest formations dominated by *Juniperus excelsa*, of the *Ostryo-Carpinion* zone of the mountains of northern Greece (up to 900-1000m, around lake Prespa);
- 42.A4 - Stinking juniper woods - forest formations dominated by *Juniperus foetidissima* on adrets of the upper supra-Mediterranean level in Greece;
- 42.A5 - Syrian juniper woods - *Juniperus drupacea* woods of the northern slopes of Mount Parnon, Greece;
- 42.A8 - Macaronesian juniper woods - *Juniperus cedrus* formations of the high altitudes in Tenerife, La Palma, Gomera, Gran Canaria, restricted to steep rocky slopes; *Juniperus phoenicea* formations of Tenerife, La Palma, Hierro, Gran Canaria, La Gomera (*Maytenio-Juniperion phoeniceae* p.); endemic *Juniperus brevifolia* formations of the Azores (*Juniperion brevifoliae* p.).

- 2) Plants: *Juniperus brevifolia*, *J. cedrus*, *J. drupacea*, *J. excelsa*, *J. foetidissima*, *J. oxycedrus*, *J. phoenicea*, *J. thurifera*.
- 4) The arborescent matorrals of *Juniperus thurifera* (32.136), *Juniperus excelsa* and *J. foetidissima* (32.133), *Juniperus drupacea* (32.135) and the ericoid-dominated facies of the Macaronesian *Juniperus* formations (31.3) are generally associated in the field, but they should not be included in this habitat type.

9570

* *Tetraclinis articulata* forests

PAL.CLASS.: 42.A6

- 1) Xero-thermophile forests of Arbor-vitae (*Tetraclinis articulata*); *Periplocion angustifoliae*: *Arisaro-Tetraclinidetum articulatae*, *Mayteno-Periplocetum angustifoliae*. Scrub formed by *T. articulata* should also be considered a part of this habitat.
- 2) Plants: *Asparagus albus*, *A. stipularis*, *Arisarum vulgare*, *Brachypodium retusum*, *Chamaerops humilis*, *Lavandula dentata*, *Lithodora fruticosa*, *Periploca laevigata*, *Rhamnus lycioides*, *Tetraclinis articulata*, *Teucrium carthaginense*, *Thymus glandulosus*.

9580

* Mediterranean *Taxus baccata* woods

PAL.CLASS.: 42.A72 and 42.A73

- 1) Woods dominated by *Taxus baccata*, often with *Ilex aquifolium*, of very local occurrence. This habitat type may have two origins: senescent phase of a beech wood or beech-fir wood, made up of clusters of *Taxus* after the fall of the tall species, surrounded by layered stands of beech-yew; residual *Taxus* stand with disappearance of the tall species, both above and in the proximity of *Taxus*.
Habitat sub-types included:
42.A72 - Corsican yew woods - Formations of *Taxus baccata*, *Ilex aquifolium*, *Buxus sempervirens* restricted to cool, montane areas in the Tenda range, the San Pedrone range and the Cap Corse mountains;
42.A73 - Sardinian yew woods - *Taxus baccata* and *Ilex aquifolium* woods of the Catena del Marghine and the Mount Limbara system.
In the north and centre of Portugal there are *Taxus baccata* relicts, sometimes in small isolated formations (Serras do Gerês and Estrela), that may be included in this habitat type.
- 2) Plants: *Buxus sempervirens*, *Ilex aquifolium*, *Mercurialis perennis*, *Sorbus aria*, *Taxus baccata*.

9590

****Cedrus brevifolia* forests (*Cedrosetum brevifoliae*)**

PAL.CLASS.: 42.B2

- 1) Forests of *Cedrus brevifolia*, endemic to the western summits of the Troodos range
- 2) Plants *Cedrus brevifolia*, *Quercus alnifolia*, *Arrhenatherum album*, *Cephalorrhynchus cypricus*, *Galium peplidifolium*, *Stellaria media*, *Lindbergella sintensii*