



THE CLASS QUERCO-FAGETEA SYLVATICAE IN SICILY: AN EXAMPLE OF BOREO-TEMPERATE VEGETATION IN THE CENTRAL MEDITERRANEAN REGION

BRULLO C.¹, BRULLO S.^{1*}, GIUSSO DEL GALDO G.¹, GUARINO R.²,
SIRACUSA G.¹, SCIANDRELLO S.¹

¹Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Università di Catania, via A. Longo 19, 95125 Catania, Italy

²Dipartimento di Scienze Botaniche, Università di Palermo, via Archirafi 38, 90123 Palermo, Italy

*Corresponding author: Telephone: +39-095-430901; e-mail: salvo.brullo@gmail.com

(RECEIVED 14 DECEMBER 2011; RECEIVED IN REVISED FORM 20 MARCH 2012; ACCEPTED 27 MARCH 2012)

RUNNING HEAD: QUERCO-FAGETEA IN SICILY

ABSTRACT – A syntaxonomical revision of the class *Querco-Fagetea sylvaticae* in Sicily, based on literature data and unpublished relevés, is presented. This class groups the mesophilous woods characterized by the dominance of deciduous trees (e.g. *Fagus sylvatica*, *Quercus* sp. pl., *Acer* sp. pl.), and more rarely by conifers (*Taxus baccata*, *Pinus nigra* subsp. *calabrica*), as well as by other broadleaved trees, such as *Betula aetnensis*, *Populus tremula*, *Castanea sativa*. In Sicily, these woody communities are widespread in the northern and north-eastern districts of the island, chiefly on the highest peaks (Madonie, Nebrodi, Peloritani, and Etna). This class is represented in Sicily by two, both floristically and ecologically well differentiated orders: *Fagetalia sylvaticae*, with the sole alliance *Geranio versicoloris-Fagion sylvaticae*, and *Quercetalia pubescenti-petraeae*, with the endemic alliance *Pino calabricae-Quercion congestae*. On the whole, 22 associations have been recognized within the class *Querco-Fagetea* and for each of them nomenclature, floristic assessment, ecology, syndinamic relationships, and chorology are examined.

KEYWORDS: SICILY, MESOPHILOUS WOODLANDS, PHYTOSOCIOLOGY, QUERCO-FAGETEA SYLVATICAE

INTRODUCTION

In the frame of phytosociological investigations on the woody vegetation of Sicily, the mesophilous plant communities belonging to the *Querco-Fagetea* class are examined. This vegetation represents in Sicily an outstanding example of boreo-temperate vegetation, which is floristically characterized not only by the occurrence of a rich pool of Euro-Siberian taxa, but also by some endemic species, whose distribution range is circumscribed to the central-southern Apennines and Sicily. The Temperate floristic elements reached the southernmost Mediterranean territories during the late glacial period, thus getting in contact with the Mediterranean flora which was already established in such areas. In particular, *Fagus sylvatica*, together with other mesophilous species, colonized those environments which originally hosted conifer-dominated woodlands (Bertolani-Marchetti & Cita 1975, Bocquet et al., 1978,

Bertolani-Marchetti, 1985, Brullo et al., 2001). Some remarkable relic examples of these Tertiary woody vegetation are still surviving on the highest mountain tops of southern Spain, northern Africa, Sardinia, Peloponnisos, Crete, Cyprus, southern Anatolia, and Lebanon.

Due to the co-existence of these two floristic elements, whose origin is completely different, the Sicilian woody vegetation belonging to the *Querco-Fagetea* class is represented by several peculiar plant communities, mostly endemic to the island. Actually, these mesophilous woodlands are only found on the Madonie, Nebrodi, Peloritani, and Etna, and they are belonging to two different orders: *Fagetalia sylvaticae* and *Quercetalia pubescenti-petraeae*. The first order is represented by the sole alliance *Geranio versicoloris-Fagion sylvaticae*, which chiefly groups beech woods or, more rarely, *Taxus baccata*, *Quercus petraea* subsp. *austrotyrrhenica* and *Quercus cerris* woods. The second order is represented by the alliance

Pino-Quercion congestae, including deciduous oak, chestnut, aspen, pine, and birch woods, which are typically less mesophilous than the previous ones.

MATERIALS AND METHODS

This syntaxonomical survey is based on 207 phytosociological relevés (37 unpublished and 170 from literature). Altogether, 22 associations have been recognized in Sicily, 6 of which are new for science. For the identification of the newly described associations, besides of the structural and floristic homogeneity, particular care was paid to the dominant species, which, especially for this kind of vegetation, are reliable indicators of the edaphic or microclimatic conditions of the sites. Each association has been coded

(CBC) according to the Corine Biotopes System. The structure of the entries mostly follows the proposal of Dengler et al. (2003), as well as the recommendations of the International Code of Phytosociological Nomenclature (Weber et al., 2000). The bioclimatic classification follows Rivas-Martínez et al. (2004a, 2004b), while for the vascular plant nomenclature the checklist of Giardina et al. (2007) was followed.

RESULTS

The Sicilian plant communities clearly belonging to the class *Quercio-Fagetea sylvaticae* are confined to the northern and north-eastern districts of the island, where the highest mountain ranges occur (Fig.1).

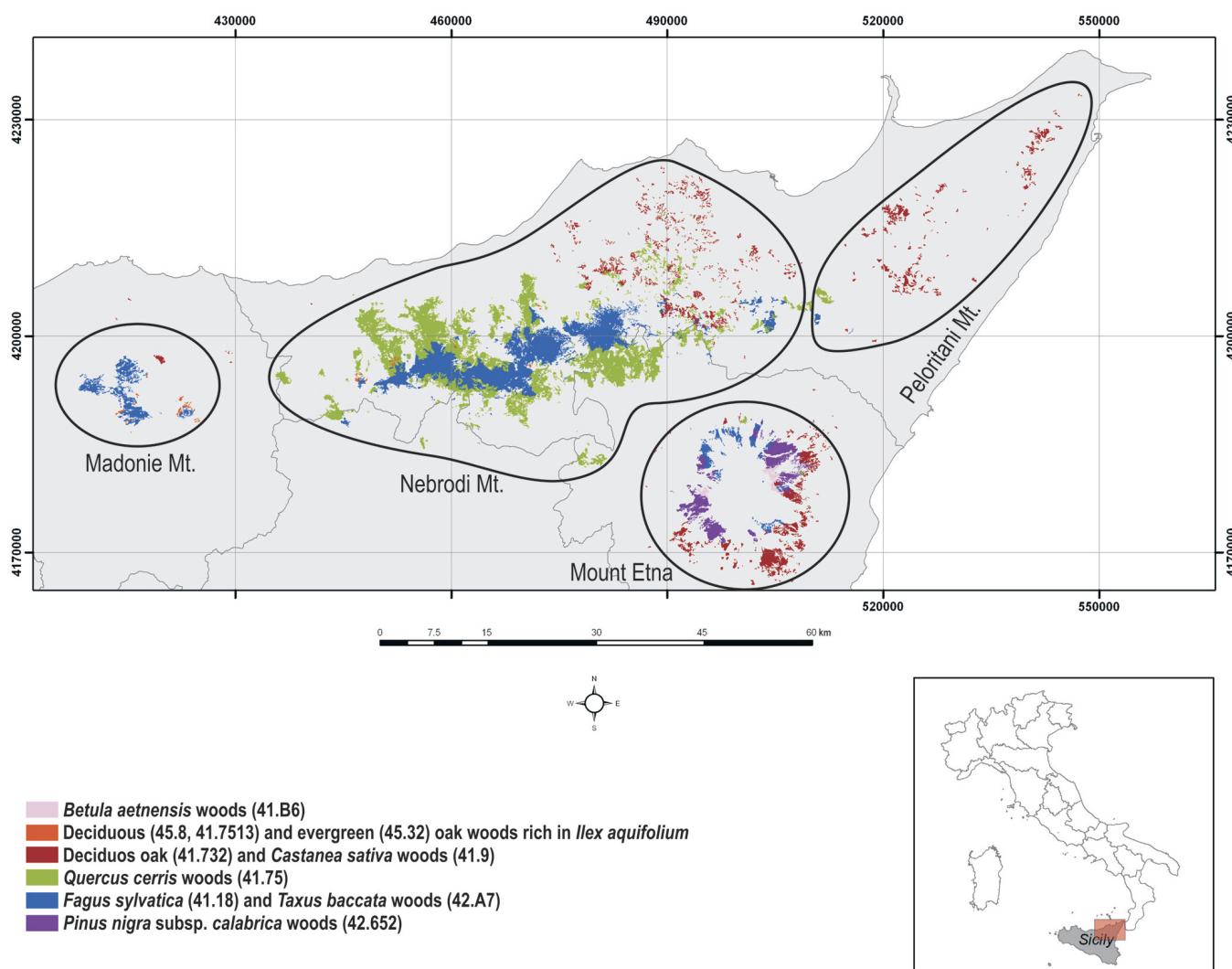


Figure 1. Ranges of selected forest communities with corresponding Corine Biotopes System codes.

According to our survey (Tab.1), the vegetation at issue can be ascribed to two different orders, each represented by one alliance. In Sicily, both these syntaxa are well differentiated from the floristic, physiognomic and ecological viewpoint.

Table 1. Synthetic table of *Quercus-Fagetea sylvaticae* in Sicily.

Association number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Number of the relevé	12	7	10	6	3	5	6	12	21	16	8	6	9	18	5	6	23	7	2	8	7	10

Char. Association

<i>Quercus petraea</i> subsp. <i>austrothyrrhenica</i>	V	III	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Aquilegia vulgaris</i> var. <i>sicula</i>	III	.	II	.	.	.	.	.	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.
<i>Galium odoratum</i>	.	IV	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Myosotis gussonei</i>	II	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Polygonatum multiflorum</i>	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Peonia mascula</i> subsp. <i>russoi</i>	.	.	IV	II	.	.	.	.	I	II	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Cephalanthera damasonium</i>	.	.	.	V	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Cephalanthera rubra</i>	.	.	.	V	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hieracium madoniense</i>	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hieracium pignatitanum</i>	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Physospermum verticillatum</i>	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Amelanchier ovalis</i>	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Adenostylis hybrida</i>	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Taxus baccata</i>	.	.	.	.	.	V	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Galanthus vernalis</i>	.	.	.	.	.	IV	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Platanthera chlorantha</i>	.	.	.	.	.	V	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ulmus glabra</i>	.	.	.	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Arrhenaterum nebrodensis</i>	.	.	.	.	.	.	.	V	II	I	.	.	IV	.	.	.	.	.	.	.	.	.	.
<i>Aristolochia clusii</i>	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.
<i>Aristolochia sicula</i>	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Euonymus europaeus</i>	I	.	.	.	.	.	.	.	V	II	I	.	.	.	.	.	.	.	.	.	.	.	.
<i>Scutellaria rubicunda</i>	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Prunus mahaleb</i>	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Quercus leptobalnos</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Erica arborea</i>	.	.	.	.	.	.	.	.	.	I	.	V	.	.	.	.	.	.	.	.	.	.	.
<i>Sorbus graeca</i>	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Prunus cupaniana</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	III	.	.	.	.	.	.	.	.
<i>Sorbus torminalis</i>	.	.	.	.	.	.	.	.	.	I	I	.	III	III	.	.	.	.	.	.	.	.	.
<i>Lamium flexuosum</i> subsp. <i>pubescens</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	II	.	.	.	.
<i>Epipactis meridionalis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Vicia cassubica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	V	.	.	II	.	I	.
<i>Silene viridiflora</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.
<i>Cnidium silaifolium</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.
<i>Lathyrus grandiflorus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.
<i>Dryopteris pallida</i>	.	.	.	.	.	.	I	.	.	I	.	I	.	.	.	.	.	.	.	2	.	.	.
<i>Hieracium crinitum</i>	.	.	.	.	.	.	.	.	I	.	.	.	.	I	.	.	.	.	.	2	.	.	I
<i>Populus tremula</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	V	.	.
<i>Cephalanthera longifolia</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	V
<i>Adenocarpus bivonae</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V

Char. All. (GERANIO VERSICOLORIS-FAGION SYLVATICAE)

<i>Doronicum orientale</i>	I	V	IV	V	3	III	V	V	I	.	II	II	.	.	.	.	III	V	.	I	.	.	.
<i>Cyclamen repandum</i>	I	V	.	III	.	II	V	V	I	V	IV	V	III	.	.	.	.	.	2	.	I	.	.
<i>Euphorbia meuselii</i>	II	III	V	V	3	V	III	IV	II	IV	I	III	.	.	.	.	.	.	.	.	.	.	.
<i>Lamium flexuosum</i>	V	V	IV	V	3	V	V	IV	III	IV	IV	I	.	.	.	.	.	.	.	.	.	.	.
<i>Geranium versicolor</i>	V	I	V	.	3	V	III	IV	V	III	IV	III	.	.	.	.	.	.	.	.	.	.	.
<i>Allium pendulinum</i>	I	III	II	.	1	.	V	.	.	III	II	II	.	.	.	.	.	.	.	.	.	.	.
<i>Anemone apennina</i>	II	V	II	V	.	.	V	.	.	II	IV	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ranunculus umbrosus</i>	I	III	.	.	1	.	V	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ranunculus velutinum</i>	.	.	I	.	IV	IV	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Symphytum gussonei</i>	.	.	IV	.	.	.	V	.	II	IV	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Epipactis helleborine</i>	.	III	IV	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Arum cylindraceum</i>	.	.	I	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Polygonatum gussonei</i>	.	.	.	.	.	.	.	.	II	.	.	I	.	.	.	.	.	.	.	.	.	.	.
<i>Galium rotundifolium</i> subsp. <i>scabrum</i>	.	II	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Association number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Number of the relevé	12	7	10	6	3	5	6	12	21	16	8	6	9	18	5	6	23	7	2	8	7	10

Char. Ord. (FAGETALIA SYLVATICAE)

<i>Polystichum setiferum</i>	V	II	IV	I	2	V	I	III	IV	III	IV	II	III	.	.	.	.	.	.	.	.	.	.
<i>Ilex aquifolium</i>	V	V	III	.	3	V	V	.	V	V	V	III	I	I	.	.	.	.	.	.	.	.	.
<i>Acer campestre</i>	II	.	II	.	V	III	III	V	III	II	.	III	.	.	.	.	.	.	.	.	.	.	.
<i>Hedera helix</i>	II	.	V	.	.	.	V	.	IV	V	V	I	V	.	.	.	.	I	.	.	.	.	.
<i>Malus sylvestris</i>	I	.	.	.	.	.	III	II	IV	II	I	III	I	.	.	.	.	.	.	.	.	.	.
<i>Melica uniflora</i>	V	I	V	V	.	IV	.	.	IV	IV	IV	.	.	.	.	.	.	.	.	.	.	.	.
<i>Rubus canescens</i>	V	III	.	.	.	V	I	IV	IV	.	I	.	III	.	.	.	.	.	.	.	.	.	.
<i>Tamus communis</i>	III	.	IV	.	.	.	V	.	III	IV	V	I	V	.	.	.	.	.	.	.	.	.	.
<i>Geranium robertianum</i>	III	.	III	.	1	.	.	III	III	IV	II	II	.	.	.	.	.	.	.	.	.	.	.
<i>Acer pseudoplatanus</i>	.	.	II	III	3	V	.	.	I	.	.	.	V	.	.	.	.	.	.	.	.	.	.
<i>Anthriscus nemorosa</i>	.	.	I	.	3	.	.	.	II	II	III	.	V	.	.	.	.	.	.	.	.	.	.
<i>Conopodium capillifolium</i>	.	.	III	III	.	.	.	V	.	.	.	V	.	.	.	.	III	.	.	.	.	.	.
<i>Melittis albida</i>	.	.	V	.	.	.	.	V	II	IV	V	.	.	.	.	.	.	.	.	.	.	.	.
<i>Potentilla micrantha</i>	III	.	.	.	.	.	.	II	.	IV	III	I	.	.	.	.	.	.	.	.	.	.	.
<i>Rubus hirtus</i>	.	.	V	IV	.	.	.	.	I	III	IV	.	.	.	.	.	.	.	.	.	.	.	.
<i>Milium effusum</i>	I	IV	III	.	.	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Scilla bifolia</i>	.	II	.	.	.	.	.	III	.	I	.	.	III	.	.	.	.	.	.	.	.	.	.
<i>Allium ursinum</i>	.	.	.	.	.	V	.	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.	.
<i>Saxifraga rotundifolia</i>	.	.	IV	.	.	.	.	.	I	.	.	I	.	.	.	.	.	.	.	.	.	.	.
<i>Monotropa hypopithys</i>	.	.	I	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Corydalis solida</i>	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Luzula sieberi</i>	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Orthilia secunda</i>	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Char. All. (PINO-QUERCION CONGESTAE)

<i>Quercus dalechampii</i>	.	.	.	.	.	.	.	IV	I	.	V	.	.	.	IV	V	V	V	2	IV	IV	II	II
<i>Quercus congesta</i>	.	.	.	.	.	.	.	.	IV	V	V	V	.	II	IV	V	V	IV	.	IV	II	III	III
<i>Pinus nigra</i> subsp. <i>calabrica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	I	III	IV	IV	I	2	V	V	V	V
<i>Acer obtusatum</i> subsp. <i>aetnense</i>	.	.	IV	.	.	.	.	.	.	I	.	I	.	I	V	.	.	.	2	.	.	.	.
<i>Rubus aetnicus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	I	V	IV	.	.	2	.	II	.	.
<i>Betula aetnensis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	II	.	V	V

Char. Ord. (QUERCETALIA PUBESCENTI-PETRAEAE)

<i>Agropyron panormitanum</i>	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	II	.	V	V	2	V	V	II	II
<i>Castanea sativa</i>	.	.	.	.	.	.	.	.	.	I	.	II	.	.	.	II	V	2	II	V	.	.	.
<i>Lonicera etrusca</i>	I	.	.	.	.	.	.	.	I	I	II	I	.	.	.	V	.	.	.	.	.	.	.
<i>Limodorum abortivum</i>	.	.	IV	I	.	.	.	.	.	I	.	.	.	.	.	II	III	.	.	.	.	.	.
<i>Ostrya carpinifolia</i>	.	.	.	.	.	.	II	.	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.
<i>Teucrium siculum</i>	III	.	.	.	.	.	.	.	.	II	.	.	.	.	.	III	.	.	.	.	.	.	.
<i>Acer monspessulanum</i>	.	.	.	.	.	.	.	.	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.

Char. Cl. (QUERCO-FAGETEA SYLVATICAE)

<i>Brachypodium sylvaticum</i>	II	.	II	II	3	V	V	V	III	I	II	IV	.	IV	V	.	V	V	2	V	V	I	I
<i>Daphne laureola</i>	V	III	V	.	3	V	V	V	V	III	IV	.	IV	I	.	.	V	IV	2	IV	V	.	.
<i>Lathyrus venetus</i>	IV	III	V	II	3	V	II	V	IV	IV	IV	.	.	III	V	.	III	.	1	II	II	.	.
<i>Viola reichenbachiana</i>	II	II	III	V	3	IV	IV	III	IV	II	.	V	.	II	V	.	III	I	1	.	III	.	.
<i>Crepis leontodontoides</i>	.	IV	I	IV	3	.	.	V	.	IV	I	IV	.	III	.	V	V	IV	2	IV	V	V	V
<i>Luzula sicula</i>	I	III	III	V	3	.	.	IV	III	I	IV	I	.	.	.	IV	III	III	2	.	V	.	.
<i>Festuca heterophylla</i>	.	.	III	V	3	.	.	II	.	I	.	III	.	V	V	.	IV	V	2	IV	V	.	.
<i>Poa sylvicola</i>	.	.	II	.	1	IV	.	V	III	III	IV	III	V	I	.	.	IV	.	.	IV	II	.	.
<i>Galium rotundifolium</i>	III	.	II	V	.	V	I	.	I	II	II	IV	.	.	.	III	2	.	V	.	.	.	.
<i>Lathyrus pratensis</i>	.	.	I	.	.	IV	.	III	.	.	.	.	.	III	III	V	V	V	2	V	V	II	II
<i>Fagus sylvatica</i>	III	V	V	V	3	V	.	.	I	I	.	.	.	V	V	.	.	.	.	II	.	.	.
<i>Geum urbanum</i>	II	.	II	.	.	III	I	III	III	I	II	V	III	.	I	.	.	.	.	.	.	.	.
<i>Aremonia agrimonoides</i>	II	.	IV	II	.	.	III	IV	II	IV	III	V	.	II	.	.	I	.	.	.	.	.	.
<i>Primula vulgaris</i>	III	.	.	II	.	V	IV	V	I	II	III	I	I	.	.	.	.	.	.	.	.	.	.
<i>Clinopodium vulgare</i> subsp. <i>orientale</i>	III	II	.	.	.	.	.	IV	II	III	II	V	II	I	.	.	.	III	.	.	.	.	.

Association number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Number of the relevé	12	7	10	6	3	5	6	12	21	16	8	6	9	18	5	6	23	7	2	8	7	10
<i>Rosa canina</i>	V	III	I	.	.	.	.	V	.	II	II	.	V	II	.	.	.	IV	.	III	.	.
<i>Luzula forsteri</i>	V	III	.	.	.	.	.	V	.	IV	I	V	.	IV	.	.	.	V	.	IV	.	.
<i>Quercus cerris</i>	.	.	II	.	.	.	.	V	V	III	.	.	.	.	V	V	.	.	.	II	I	II
<i>Mycelis muralis</i>	I	IV	III	.	2	III	I	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
<i>Clematis vitalba</i>	I	.	I	.	2	.	IV	.	III	I	.	.	.	V	.	.	.	.	.	.	.	.
<i>Rubus glandulosus</i>	.	.	.	.	3	.	.	.	.	.	.	.	.	.	III	.	.	II	.	2	II	V
<i>Sanicula europaea</i>	.	.	V	.	2	V	.	.	I	I	II	.	.	.	.	.	.	.	.	.	.	.
<i>Festuca exaltata</i>	.	.	III	.	.	.	.	.	IV	I	.	.	IV	.	.	III	.	.	.	II	.	.
<i>Neottia nidus-avis</i>	.	.	II	V	.	I	.	.	.	I	III	.	.	IV	.	.	.	.	.	.	.	.
<i>Epipactis microphylla</i>	.	.	II	V	.	.	.	.	.	.	.	.	.	.	.	.	II	IV	.	.	.	.
<i>Mercurialis perennis</i>	.	.	.	.	V	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Milium vernale</i> subsp. <i>montianum</i>	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.
<i>Lathraea squamaria</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.

Char. QUERCETEA ILICIS

<i>Quercus ilex</i>	II	.	.	.	.	.	.	V	.	II	V	V	III	.	.	.	.	III	.	I	.	.
<i>Ruscus aculeatus</i>	IV	.	II	.	.	.	.	V	.	V	IV	V	.	.	.	.	.	II	.	.	.	.
<i>Viola alba</i> subsp. <i>dehnhardtii</i>	.	.	III	.	.	.	.	V	V	II	V	V	V	.	.	.	.	.	.	.	.	.
<i>Fraxinus ornus</i>	.	.	.	.	.	.	.	V	.	I	II	I	II	V	.	.	II	.	.	.	.	.
<i>Asplenium onopteris</i>	II	.	.	.	.	.	II	.	I	II	.	.	.	.	.	IV	.	.	.	.	.	.
<i>Cyclamen hederifolium</i>	III	.	I	.	.	.	.	.	I	III	.	I	.	.	.	.	.	.	.	.	.	.
<i>Cytisus villosus</i>	.	.	.	.	.	II	.	.	.	I	.	II	.	.	.	III	.	IV	.	.	.	.
<i>Rubia peregrina</i>	.	.	.	.	.	.	II	.	II	III	V	.	.	.	.	.	III	.	.	.	.	.
<i>Carex distachya</i>	.	.	.	.	.	.	.	.	.	II	I	.	.	.	.	V	III	.	.	.	.	.
<i>Asparagus acutifolius</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	II	.	.	.	.
<i>Rosa sempervirens</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	II	.
<i>Rhamnus alaternus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.

Other species

<i>Pteridium aquilinum</i>	III	II	IV	.	.	.	.	III	V	III	V	V	.	V	V	V	V	V	2	V	V	V
<i>Trifolium pratense</i> subsp. <i>semipurpureum</i>	III	IV	I	.	.	.	.	III	II	II	III	V	.	IV	III	II	V	V	.	I	IV	II
<i>Silene sicula</i>	II	I	I	V	.	.	.	IV	II	V	.	V	.	III	IV	V	V	.	.	IV	III	V
<i>Hypochoeris laevigata</i>	I	IV	.	V	2	.	.	V	.	III	.	V	.	II	II	.	II	.	2	.	V	.
<i>Fragaria vesca</i>	.	.	II	.	.	.	II	IV	II	II	.	.	.	II	.	.	.	.	1	.	II	.
<i>Crataegus monogyna</i>	I	.	I	.	.	.	.	IV	V	III	II	V	.	.	.	.	II	.	.	.	.	.
<i>Festuca circummediterranea</i>	.	IV	.	.	.	.	.	III	.	.	.	.	III	III	.	V	IV	.	.	II	V	.
<i>Sanguisorba minor</i>	.	.	V	V	3	V	V	V	I	.	.	.	.	.	.	V	.	.	.	.	.	.
<i>Asperula laevigata</i>	I	III	.	.	.	V	.	.	II	III	II	II	.	.	.	.	.	.	.	.	.	.
<i>Bellis perennis</i>	I	IV	.	.	.	.	.	IV	.	IV	.	.	.	.	.	.	IV	V	.	.	II	.
<i>Dactylis hispanica</i>	I	.	I	IV	.	.	.	III	II	II	.	III	.	.	.	.	.	.	.	.	.	.
<i>Anthoxanthum odoratum</i>	.	.	.	.	.	.	.	V	I	II	.	.	.	.	.	IV	IV	.	.	III	.	.
<i>Dactylis glomerata</i>	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	III	V	.	1	IV	I	.
<i>Silene vulgaris</i> subsp. <i>angustifolia</i>	.	.	.	IV	.	.	.	IV	I	.	.	.	.	.	.	II	V	.	.	.	I	.
<i>Thapsia garganica</i>	.	.	.	.	.	.	.	.	II	I	.	II	.	.	.	III	II	V	.	.	.	.
<i>Achillea ligustica</i>	.	.	.	.	.	.	.	.	I	.	.	.	.	I	.	.	II	.	II	.	.	V
<i>Festuca rubra</i>	.	.	.	.	.	.	.	V	.	.	.	.	.	I	.	.	III	.	II	.	III	.
<i>Genista aetnensis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	V	II	.	.	II	.	V
<i>Juniperus hemisphaerica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	IV	II	.	.	I	II	.
<i>Prunus spinosa</i>	II	.	.	.	.	.	II	III	IV	.	II	.	.	.	.	.	.	.	.	.	.	.
<i>Rubus ulmifolius</i>	.	.	.	.	.	.	.	.	II	II	.	.	V	.	.	.	IV	.	III	.	.	.
<i>Asphodelus ramosus</i>	.	.	.	.	.	.	.	III	.	II	.	II	.	.	.	III	.	.	.	.	.	.
<i>Calamagrostis epigejos</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	I	.	.	II	III	.
<i>Chaerophyllum temulum</i>	I	.	III	I	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
<i>Daucus carota</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	III	1	I	.	.
<i>Oenanthe pimpinelloides</i>	.	.	.	.	.	.	.	III	IV	II	III	.	.	.	.	.	.	.	.	.	.	.
<i>Secale strictum</i>	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	V	III	.	.	.	.	III
<i>Sedum tenuifolium</i>	.	I	.	.	.	.	.	III	.	.	.	III	.	.	.	III	.	.	.	.	.	.
<i>Thalictrum calabricum</i>	.	.	.	.	.	.	.	III	.	II	V	V	.	.	.	.	.	.	.	.	.	.
<i>Arisarum vulgare</i>	.	.	.	.	.	III	.	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.
<i>Arum italicum</i>	.	.	.	.	.	.	.	.	I	I	.	II	.	.	.	.	.	.	.	.	.	.

Association number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Number of the relevé	12	7	10	6	3	5	6	12	21	16	8	6	9	18	5	6	23	7	2	8	7	10	
<i>Cachrys ferulacea</i>	.	II	.	.	.	.	.	.	.	.	II	.	.	.	.	.	I	.	.	.	.	.	.
<i>Galium aparine</i>	IV	.	.	.	.	II	III	.	.	.	.	.
<i>Genista aristata</i>	V	I	I	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Linaria purpurea</i>	III	.	II	.	III
<i>Ranunculus bulbosus</i> subsp. <i>aleae</i>	II	III	V	.	.	.	.	.	.	.	.	.	.	.
<i>Silene latifolia</i>	.	II	.	.	.	.	.	.	.	.	.	II	.	.	.	.	II	.	.	.	.	.	.
<i>Stellaria media</i>	III	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	2	.	.	.	.
<i>Leopoldia comosa</i>	II	V	.	.	.	.	.
<i>Thalictrum minus</i>	III	.	.	.	II	.	.	.
<i>Astragalus siculus</i>	IV

Source of the relevés:

- 1 - *Ilici aquifolii-Quercetum austrothyrrhenicae* Brullo & Marcenò in Brullo 1984 *corr.* (from Brullo 1984, tab.22)
- 2 - *Anemone apenninae-Fagetum sylvaticae* (Gentile 1969) Brullo 1984 (from Brullo 1984, tab.21)
- 3 - *Melitto albidae-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa, Spampinato 1999 (from Brullo et al. 1999, tab.1, rel.11-20)
- 4 - *Luzulo siculae-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa, Spampinato 1999 (from Brullo et al. 1999, tab.1, rel.21-26)
- 5 - *Hieracio madoniensis-Fagetum sylvaticae* ass. nov. (from Tab.2)
- 6 - *Ilici aquifolii-Taxetum baccatae* Brullo, Minissale, Signorello & Spampinato 1996 (from Brullo et al. 1996, tab.1)
- 7 - *Ilici aquifolii-Taxetum baccatae ruscetosum aculeati* Gianguzzi & La Mantia 2004 (from Gianguzzi & La Mantia 2004, tab.1)
- 8 - *Arrhenathero nebrodensis-Quercetum cerridis* Brullo, Minissale, Signorello & Spampinato 1996 (from Brullo et al. 1996, tab.2)
- 9 - *Ilici aquifolii-Quercetum cerridis* Raimondo, Schicchi & Bazan 2009 (from Raimondo et al. 2009, tab.1)
- 10 - *Geranio versicoloris-Quercetum ilicis* Maniscalco & Raimondo 2003 (from Maniscalco & Raimondo 2003, tab.2)
- 11 - *Ilici aquifolii-Quercetum leptobalani* Maniscalco & Raimondo 2009 (from Maniscalco & Raimondo 2009, tab.1)
- 12 - *Conopodio capillifolii-Quercetum congestae* Maniscalco & Raimondo 2009 (from Maniscalco & Raimondo 2009, tab.2)
- 13 - *Sorbo graecae-Aceretum pseudoplatani* Gianguzzi & La Mantia 2004 (from Gianguzzi & La Mantia 2004, tab.3)
- 14 - *Epipactido meridionalis-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa, Spampinato 1999 (from Brullo et al. 1999, tab.1, rel.27-31)
- 15 - *Rubo aetnici-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa & Spampinato 1999 (from Brullo et al. 1999, tab.1, rel.32-36)
- 16 - *Vicio cassubicae-Quercetum cerridis* Brullo & Marcenò 1985 (from Brullo & Marcenò 1985, tab.17)
- 17 - *Agropyro panormitani-Quercetum congestae* Brullo, Scelsi, Siracusa & Spampinato 1999 (ril. ined.)
- 18 - *Doronico orientalis-Castanetum sativae* ass. nov. (from Tab.3, rel.1-7)
- 19 - *Hieracio criniti-Aceretum aetnensis* ass. nov. (from Tab.3, rel.8-9)
- 20 - *Agropyro panormitani-Populetum tremulae* (from Tab.3, rel.10-17)
- 21 - *Daphno laureolo-Pinetum calabrica* ass. nov. (from Tab.4, rel.1-7)
- 22 - *Cephalanthero longifoliae-Betuletum aetnensis* ass. nov. (from Tab.3, rel.8-17)

The orders are the followings:

A) *Fagetalia sylvaticae* Pawlowski in Pawlowski et al. 1928 – Order widespread in the Euro-Siberian territories, and well represented in central and eastern Europe. In these areas, *Fagetalia sylvaticae* is also occurring at low altitudes, where nemoral species are much more abundant. In addition, many alliances and associations have been here recognized within this order. Conversely, in the fringe areas, like Sicily, it is possible to notice a considerable reduction of the alliances and associations, as well as of the character species. In fact, the order *Fagetalia sylvaticae* is represented in Sicily by only one alliance (*Geranio versicoloris-Fagion sylvaticae*), including 12 associations. Generally speaking, the pool of the characteristic species is quite scarce, and really few occur in each association. As concerns the syndinamic relationships of the plant communities belonging to this order, they usually are in spatial contact with the thermophilous woodlands of the *Quercetalia ilicis*. Specifically on Mt. Etna they are chiefly in contact with communities of *Quercetalia*

pubescenti-petraeae. The alliance *Geranio versicoloris-Fagion sylvaticae*, represented in Sicily by the suballiance *Doronico orientalis-Fagion sylvaticae* (Di Pietro et al., 2004), includes some mesophilous beech woods, as well as woods characterized by the dominance of *Taxus baccata*, *Quercus petraea* subsp. *austrotyrrhenica* and *Quercus cerris*, occurring only in the mountain areas of the northern part of the island.

B) *Quercetalia pubescenti-petraeae* Klika 1933 – This order is widespread in the Mediterranean and central European territories, where it is represented by several alliances. The communities of this order have their optimum within the Temperate bioclimate, but they are also frequently recorded within the meso- and supramediterranean bioclimatic belts. In Sicily, this order is found only on Mt. Etna, where it is represented by the alliance *Pino-Quercion congestae*, which occurs between the mesophilous woods of *Fagetalia sylvaticae* and the thermophilous ones of *Quercetalia ilicis* along the topographical gradient. In particular, the alliance

Pino-Quercion congestae groups remarkable mesophilous plant communities, floristically very rich in *Quercio-Fagetea* species, while are scarcely represented those ones of the *Quercetea ilicis* class. To the already known two Sicilian associations ranked by Brullo et al. (1999) into this alliance, other seven associations are here added, all endemic of Mt. Etna, and some of which are here described for the first time. Blasi et al. (2004) recognized within this syntaxon two suballiances: *Pino-Quercenion congestae* and *Quercenion virgilianae*. The first one finds favourable conditions on siliceous mountain areas, thus corresponding to the *Pino-Quercion congestae s. str.*, while the second having more xeric requirements, as shown by the occurrence of species of *Pistacio-Rhamnetalia alaterni*. As proposed by many authors (see Brullo et al., 2009), the associations falling within this suballiance should be ranked into *Quercetalia ilicis*, particularly the *Quercion ilicis* or *Erico-Quercion ilicis*, since the mesophilous species of *Quercio-Fagetea*, and lower syntaxa, are almost lacking.

The syntaxa recognised in Sicily are the following:

1. QUERCO ROBORIS-FAGETEA SYLVATICAE

Br.-Bl. & Vlieger in Vlieger 1937

SYN.: *Quercetea robori-sessiliflorae* Br.-Bl. & R. Tx. ex Br.-Bl. 1950; *Quercetea robori-petraeae* Br.-Bl. & R. Tx. ex Oberd. 1957; *Quercetea pubescentis* Doing ex Scamoni & Passarge 1959; *Quercetea pubescenti-petraeae* Jakucs 1960; *Fraxino-Fagetea* Moor 1975.

CHARACTER AND DIFFERENTIAL SPECIES IN SICILY: *Aremonia agrimonoides*, *Brachypodium sylvaticum*, *Clematis vitalba*, *Clinopodium vulgare* subsp. *orientale*, *Crepis leontodontoides*, *Daphne laureola*, *Epipactis microphylla*, *Fagus sylvatica*, *Festuca exaltata*, *Festuca heterophylla*, *Geum urbanum*, *Hedera helix*, *Ilex aquifolium*, *Lathraea squamaria*, *Lathyrus venetus*, *Lathyrus pratensis*, *Lathyrus sylvestris*, *Luzula forsteri*, *Luzula sicala*, *Mercurialis perennis*, *Milium vernale* subsp. *montanum*, *Mycelis muralis*, *Oxalis acetosella*, *Poa sylvicola*, *Polystichum aculeatum*, *Primula vulgaris*, *Rosa canina*, *Rubus glandulosus*, *Sanicula europaea*, *Taxus baccata*, *Viola reichenbachiana*.

DISTRIBUTION – Euro-Siberian and Mediterranean regions.

STRUCTURE AND ECOLOGY – Deciduous mesophilous woods having their optimum within the infra-orotemperate, and meso-supramediterranean subhumid-hyperhumid bioclimate.

1.1. FAGETALIA SYLVATICAE Pawlowski in Pawlowski et al. 1928

SYN.: *Carpino-Fagetalia* Scamoni & Passarge 1959; *Luzulo-Fagetalia* Scamoni & Passarge 1959; *Tilietalia platyphylli* Moor 1973.

CHARACTER AND DIFFERENTIAL SPECIES IN SICILY: *Acer campestre*, *Acer pseudoplatanus*, *Allium ursinum*, *Anthriscus nemorosa*, *Aquilegia vulgaris*, *Arum cylindraceum*, *Conopodium capillifolium*, *Corydalis solida*, *Dryopteris filix-mas*, *Epilobium montanum*, *Epipactis helleborine*, *Galanthus vernalis*, *Galium odoratum*, *Geranium robertianum*, *Ilex aquifolium*, *Malus sylvestris*, *Melica uniflora*, *Melittis albida*, *Milium effusum*, *Monotropa hypopitys*, *Moehringia trinervia*, *Neottia nidus-avis*, *Orthilia secunda*, *Platanthera chlorantha*, *Polygonatum multiflorum*, *Polystichum setiferum*, *Potentilla micrantha*, *Quercus cerris*, *Rubus canescens*, *Rubus hirtus*, *Saxifraga rotundifolia*, *Scilla bifolia*, *Tamus communis*, *Ulmus glabra*, *Veronica officinalis*.

DISTRIBUTION – Atlantic and central Europe (up to the Caucasian region), and northern Mediterranean region.

STRUCTURE AND ECOLOGY – Mesophilous woods with broadleaved trees or conifers. They are usually represented by climatophilous, or sometimes edaphophilous, plant communities. From the bioclimatic viewpoint, the phytocoenoses of this order are found within the thermo-orotemperate and the supramediterranean bioclimatic belts.

1.1.1. GERANIO VERSICOLORIS-FAGION SYLVATICAE Gentile 1970

SYN.: *Geranio striati-Fagion sylvaticae* Gentile 1970 p.p.; *Aquifolio-Fagion* Corbetta & Ubaldi in Ubaldi et al. 1986; *Doronicio orientalis-Fagion sylvaticae* Ubaldi et al. 1990 ex Ubaldi 1995.

CHARACTER AND DIFFERENTIAL SPECIES: *Allium pendulinum*, *Anemone apennina*, *Galium odoratum* subsp. *scabrum*, *Geranium versicolor*, *Euphorbia meuselii*, *Lamium flexuosum*, *Polygonatum gussonei*, *Ranunculus velutinus*.

DISTRIBUTION – Southern Italy and Sicily.

STRUCTURE AND ECOLOGY – Mountain woods with a remarkable Mediterranean character. They occur at an altitude between 1000 and 2000 m, in territories with a bioclimate supratemperate submediterranean or supramediterranean with ombrotypes humid-hyperhumid. In Sicily, this alliance includes mesophilous *Fagus sylvatica* woods, *Taxus baccata* woods, deciduous oak woods, and more rarely *Q. ilex* woods.

1.1.1.1. *Anemone apenninae-Fagetum sylvaticae* (Gentile 1970) Brullo 1984

SYN.: *Anthriscus siculae-Fagetum* Hofmann 1960, nom. inv.; *Aquifolio-Fagetum* Gentile 1970, nom. illeg.

LECTOTYPUS: Rel. 9, Tab. 3, Gentile (1970).

CHARACTER AND DIFFERENTIAL SPECIES: *Anemone apennina*, *Anthriscus nemorosa*, *Ilex aquifolium*, *Ranunculus umbrosus*.

DISTRIBUTION – Northern Sicily (Madonie and Nebrodi), and southern Italy.

STRUCTURE AND ECOLOGY – Acidophilous beech forests growing on siliceous substrata linked to supramediterranean and supratemperate submediterranean bioclimatic belts. In Sicily it is scattered in the mountain belt at 1400-1800 m of altitude. Floristically, it is characterized by the occurrence of *Ilex aquifolium*, which emphasizes the oceanicity of this association. In fact, this community is localized on stands subject to foggy regime due to the condensation of humid streams coming from the Tyrrhenian Sea. CBC: 41.186.

SYNDYNAMICS – Due to degradation processes, this beech forest is normally replaced on schistose substrata by mesophilous meadows belonging to the alliance *Plantaginion cupanii* (*Molinio-Arrhenateretea*). Under more xeric conditions, such as on quartz sandstones, this woodland is in contact with the pulvinate orophilous communities of *Armerion nebrodensis*, an acidophilic alliance of *Rumici-Astragaletea siculi*.

1.1.1.2. *Melitto albidae-Fagetum sylvaticae* Ubaldi et al. ex Ubaldi 1995

SYN.: *Melitto albidae-Fagetum* Ubaldi et al. 1990, nom. inval.; *Anemone apenninae-Fagetum melittetosum albidae* (Ubaldi 1995) Brullo et al. 1999; *Aquifolio-Fagetum* Ronsisvalle & Signorello 1977 non Gentile 1970.

LECTOTYPUS: Rel. 19, Tab.1, Ronsisvalle & Signorello (1977)

CHARACTER AND DIFFERENTIAL SPECIES: *Acer obtusatum* subsp. *aetnense*, *Melittis albida*, *Polygonatum multiflorum*, *Saxifraga rotundifolia*, *Symphytum gussonei*, *Saxifraga rotundifolia*.

DISTRIBUTION – This association is localized in the Malabotta area, near Roccella Valdemone (NW Peloritani).

STRUCTURE AND ECOLOGY – This type of beech forest occurs on siliceous substrata of the submontane belt, at 1000-1300

m of altitude under the supramediterranean subhumid bioclimatic conditions. It can be considered an extrazonal community linked to the remarkably humid microclimatic conditions of the north-facing slopes of the valleys. Actually, on sunny and exposed stands this association is replaced by the *Arrhenathero nebrodensis-Quercetum cerridis*, a widespread type of woodland within this altitudinal belt. CBC: 41.186.

SYNDYNAMICS – Due to degradation processes, the association at issue is usually substituted by the mesophilous meadows of the *Plantaginion cupanii*.

1.1.1.3. *Luzulo siculae-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa, Spampinato 1999

SYN.: *Fagetum s.l.* Raimondo (1980).

HOLOTYPUS: Rel. 22, Tab. 1, Brullo et al. (1999)

CHARACTER AND DIFFERENTIAL SPECIES: *Cephalanthera damasonium*, *Cephalanthera rubra*, *Luzula sicula*.

DISTRIBUTION – This association is restricted to the massif of Madonie (N Sicily).

STRUCTURE AND ECOLOGY – This is a basiphilous beech forest occurring on dolomites and limestone within the montane belt, at an altitude of 1500-1900 m, limited to an area characterized by a supramediterranean humid bioclimate. This beech wood is floristically and ecologically closely related to the *Carici albae-Fagetum* Moor 1952 (= *Cephalanthero-Fagetum* Oberd. 1957), which is a calcicolous association widely spread in central Europe. CBC: 41.186.

SYNDYNAMICS – The association is in contact with the *Aceri campestris-Quercetum ilicis* at lower altitudes, while after disturbance, it is replaced by orophilous shrubby plant communities of *Cerastio-Astragalion nebrodensis*.

1.1.1.4. *Hieracio madoniensis-Fagetum sylvaticae*

C. Brullo, Brullo, Giusso & Sciandrello ass. nov. (Tab. 2)

HOLOTYPUS: Rel. 1, Tab. 2, hoc loco

CHARACTER AND DIFFERENTIAL SPECIES: *Adenostylis hybrida*, *Hieracium madoniense*, *Hieracium pignattianum*, *Physospermum verticillatum*, *Sorbus graeca*.

DISTRIBUTION – The association occurs on the massif of Madonie (N Sicily), where it is quite rare.

Table 2. *Hieracio madoniensis-Fagetum sylvaticae*

Relevé	1*	2	3
Altitude (mt. a.s.l.)	1380	1400	1400
Plot size (sq. m.)	100	100	100
Cover (%)	100	100	100
Slope (°)	NE	SE	NE
Exposure	50	70	60

Char. Association

<i>Sorbus graeca</i>	2	2	2
<i>Hieracium pignattianum</i>	2	2	1
<i>Hieracium madoniense</i>	2	1	2
<i>Physospermum verticillatum</i>	2	3	2
<i>Amelanchier ovalis</i>	1	1	+
<i>Adenostylis hybrida</i>	.	+	.

Char. All. (DORONICO-FAGION SYLVATICAE)

<i>Geranium versicolor</i>	1	+	1
<i>Doronicum orientale</i>	1	1	2
<i>Euphorbia meuselii</i>	+	1	+
<i>Allium pendulinum</i>	.	+	.
<i>Galium rotundifolium subsp. Scabrum</i>	.	+	.
<i>Ranunculus umbrosus</i>	.	+	.

Char. Ord. (FAGETALIA SYLVATICAE)

<i>Ilex aquifolium</i>	2	2	2
<i>Acer pseudoplatanus</i>	2	2	1
<i>Anthriscus nemorosa</i>	1	+	1
<i>Polysticum setiferum</i>	.	1	+
<i>Geranium robertianum</i>	.	.	+

Char. Cl. (QUERCO-FAGETEA SYLVATICAE)

<i>Fagus sylvatica</i>	5	5	5
<i>Daphne laureola</i>	1	1	1
<i>Rubus glandulosus</i>	1	1	2
<i>Festuca heterophylla</i>	+	1	2
<i>Brachypodium sylvaticum</i>	2	2	2
<i>Lathyrus venetus</i>	+	+	+
<i>Luzula sicula</i>	2	1	2
<i>Viola reichenbachiana</i>	1	2	1
<i>Crepis leonthodontoides</i>	+	1	+
<i>Lamium flexuosum</i>	+	+	+
<i>Clematis vitalba</i>	1	1	.
<i>Sanicula europaea</i>	.	1	1
<i>Mycelis muralis</i>	.	+	+
<i>Poa sylvicola</i>	.	.	+

Other species

<i>Sesleria sicula</i>	1	1	+
<i>Odontites bocconeii</i>	+	+	+
<i>Sorbus aucuparia</i>	1	.	+
<i>Hypochoeris laevigata</i>	.	+	1
<i>Laserpitium siculum</i>	+	.	.
<i>Coronilla emerus</i>	+	.	.

Rel. 1 Passo della Botte (Madonie) 08-07-2009

Rel. 2-3 Passo della Botte (Madonie) 24-06-2008

STRUCTURE AND ECOLOGY – This beech forest is ecologically vicariant of *Luzulo siculae-Fagetum sylvaticae*, since it is

only found in narrow gorges of the montane belt, with a microclimate characterized by a high degree of atmospheric moisture. This association grows on dolomites of north-facing steep slopes at an altitude of 1350-1500. CBC: 41.186.

SYNDYNAMICS – On rupestrian habitats, this association is replaced by chasmophytic plant communities belonging to *Saxifragion australis* (*Potentilletalia caulescentis*).

1.1.1.5. *Ilici aquifolii-Taxetum baccatae* Brullo, Minissale, Signorello & Spampinato 1996

HOLOTYPUS: Rel. 5, Tab. 1, Brullo et al. (1996)

CHARACTER AND DIFFERENTIAL SPECIES: *Fraxinus excelsior* subsp. *siciliensis*, *Ilex aquifolium*, *Taxus baccata*.

DISTRIBUTION – It occurs on the northern slopes of the Nebrodi ridge, where it is very rare and covers very small areas. It has been also reported from southern Calabria (Brullo et al., 2001).

STRUCTURE AND ECOLOGY – Forests of *Taxus baccata* are extremely rare in Sicily, and they replace the beech forests of the *Anemono apenninae-Fagetum sylvaticae* in stands characterized by colder and more humid microclimatic conditions. In fact, these areas are exposed most of the year to a foggy regime, determining oceanic conditions. The association is clearly acidophilous, since it occurs on siliceous substrata, represented mainly by schists, granites and gneiss, at an altitude of about 1400 m a.s.l. CBC: 42.A7.

SYNDYNAMICS – This association is in contact with *Anemono apenninae-Fagetum sylvaticae*, as shown in the sample plots by the occurrence of several individuals of *Fagus sylvatica* along with *Taxus baccata*.

1.1.1.6. *Arrhenathero nebrodensis-Quercetum cerridis* Brullo, Minissale, Signorello & Spampinato 1996

HOLOTYPUS: Rel. 1, Tab. 2, Brullo et al. (1996)

CHARACTER AND DIFFERENTIAL SPECIES: *Aristolochia clusii*, *A. sicula*, *Arrhenatherum nebrodensis*, *Conopodium capillifolium*.

DISTRIBUTION – It is widespread on the Nebrodi, especially along the northern slopes.

STRUCTURE AND ECOLOGY – Forests of *Quercus cerris* occurring in northern Sicily occupy a belt between the beech forests and the deciduous thermophilic oak forests. It is

found at 1100-1400 m of altitude, on siliceous bedrock rich in clay, and can be considered a southern vicariant of other *Q. cerris* forests described from various districts of southern Apennines (Ubaldi et al. 1990). CBC: 41.75.

SYNDYNAMICS – The association comes in spatial contact along the altitudinal gradient with *Anemone apenninae-Fagetum sylvaticae* at elevations higher than 1400 m. a.s.l., while at lower altitudes it is replaced by thermophilic woods of the *Erico-Quercion ilicis*. Degradation processes usually lead to the replacement of these phytocoenoses with meadows of the *Plantaginion cupanii*.

1.1.1.7. *Ilici aquifolii-Quercetum cerridis* Raimondo, Schicchi & Bazan 2009

HOLOTYPUS: Rel. 4, Tab. 1, Raimondo et al. (2009).

CHARACTER AND DIFFERENTIAL SPECIES: *Euonymus europaeus*, *Ilex aquifolium*, *Scutellaria rubicunda*.

DISTRIBUTION – It is scattered on the north-facing slopes of Mts. Nebrodi.

STRUCTURE AND ECOLOGY – This association is found between 800 and 1300 m of altitude, within the meso- and the supramediterranean bioclimatic belts. This forest of *Q. cerris* is characterized by the occurrence of *Ilex aquifolium*, usually reaching very high cover values. The abundance of this tree species shows the oceanic character of this acidophilic association, mainly growing on flysch. CBC: 45.8.

SYNDYNAMICS – This edaphophilous association is comes in contact with *Arrhenathero nebrodensis-Quercetum cerridis*, which replaces it under more xeric environmental conditions. A lower level of disturbance of this plant community leads to the establishment of the shrubby vegetation of *Pruno-Rubion ulmifolii*, while heavier human-induced disturbance leads to mesophilous meadows of *Plantaginion cupanii*.

1.1.1.8. *Ilici aquifolii-Quercetum austrothyrrhenicae* Brullo & Marcenò in Brullo 1984 corr. Brullo et al. 2002

SYN: *Ilici aquifolii-Quercetum petraea* Brullo & Marcenò in Brullo 1984

HOLOTYPUS: Rel. 7, Tab. 22, Brullo (1984).

CHARACTER AND DIFFERENTIAL SPECIES: *Quercus petraea* subsp. *austrothyrrhenica*, *Ilex aquifolium*, *Aquilegia vulgaris* var. *sicula*.

DISTRIBUTION – It occurs on the massif of Madonie (Pomieri), and more rarely on the Nebrodi Mts., near Portella dell'Obolo (Capizzi).

STRUCTURE AND ECOLOGY – In Sicily, *Quercus petraea* subsp. *austrothyrrhenica* grows at an altitude of 1400-1600 m a.s.l., under supramediterranean humid bioclimatic conditions. It normally forms thick and complex extrazonal stands on quartz sandstones and flysch, chiefly localized on deep valleys under oceanic microclimatic conditions. CBC: 41.7513.

SYNDYNAMICS – This association develops within the climatophilous belt of *Anemone apenninae-Fagetum sylvaticae*, where these beech forests are common on open and sunny sites. Degradation processes lead to the replacement of this phytocoenosis by the shrubby vegetation of *Pruno-Rubion ulmifolii*.

1.1.1.9. *Ilici aquifolii-Quercetum leptobalani* Maniscalco & Raimondo 2009

HOLOTYPUS: Rel. 4, Tab. 1, Maniscalco & Raimondo (2009).

CHARACTER AND DIFFERENTIAL SPECIES: *Ilex aquifolium*, *Quercus leptobalanos*.

DISTRIBUTION – It is endemic on the massif of Madonie.

STRUCTURE AND ECOLOGY – This association occurs on gently slopes at an altitude between 900 m and 1200 m a.s.l., within the lower supramediterranean bioclimatic belt. It is found on flyschiod substrates, and its physiognomy is given by the occurrence of many different oak species, such as *Quercus leptobalanos*, *Q. congesta*, *Q. dalechampii*, and sometimes *Q. ilex*. The understorey is chiefly dominated by *Ilex aquifolium*, usually attaining high cover values. CBC: 41.732.

SYNDYNAMICS – Human-induced alteration of this type of forest leads to the establishment of secondary plant communities of *Pruno-Rubion ulmifolii*. Further degradation may favour the development of mesophilous meadows of *Plantaginion cupanii*.

1.1.1.10. *Conopodio capillifolii-Quercetum congestae* Maniscalco & Raimondo 2009

HOLOTYPUS: Rel. 1, Tab. 2, Maniscalco & Raimondo (2009).

CHARACTER AND DIFFERENTIAL SPECIES: *Conopodium capillifolium*, *Quercus congesta*.

DISTRIBUTION – It is endemic of the Mts. Peloritani (NW Sicily).

STRUCTURE AND ECOLOGY – This association is found between 1000-1150 m of altitude, on metamorphic bedrock, within the supramediterranean humid bioclimatic belt. The tree layer is definitely dominated by *Quercus congesta*, while in the understorey acidophilous species, as *Erica arborea*, are rather abundant. The occurrence of *Pteridium aquilinum*, suggests a lower level of disturbance chiefly due to overgrazing. This association was earlier ranked into the alliance *Pino-Quercion congestae*, as the previous one, but we deem that its floristic settlement and ecology suggest its inclusion into *Geranio versicoloris-Fagion*. CBC: 41.732.

SYNDYNAMICS – High levels of disturbance may lead to the replacement of this oak wood by secondary acidophilic, shrubby communities with *Erica arborea* and *Cytisus villosus*, usually with species of *Pruno-Rubion ulmifolii*.

1.1.1.11. *Geranio versicoloris-Quercetum ilicis* Maniscalco & Raimondo 2003

HOLOTYPE: Rel. 10, Tab. 2, Maniscalco & Raimondo (2003).

CHARACTER AND DIFFERENTIAL SPECIES: *Aremonia agrimonoides*, *Ilex aquifolium*, *Melittis albida*, *Quercus ilex*, *Silene sicula*, *Thalictrum calabricum*.

DISTRIBUTION – This plant community is widespread in the mountain ridges of northern Sicily (Madonie, Nebrodi and Peloritani).

STRUCTURE AND ECOLOGY – Mesophilous forests of *Q. ilex* growing on flysch of the lower supramediterranean humid bioclimatic belt, scattered at an altitude of 900-1200 m. This plant community, linked to slightly acidic and well humified soils, is floristically characterized by the dominance of *Quercus ilex*, growing together with *Ilex aquifolium*, which is very abundant in the understorey. This association was ranked by Maniscalco & Raimondo (2003) into *Pino-Quercion congestae*. CBC: 45.32

SYNDYNAMICS – Human disturbance of this *Q. ilex* forest inevitably leads to the establishment of shrubby communities of *Pruno-Rubion ulmifolii*.

1.1.1.12. *Sorbo graecae-Aceretum pseudoplatani* Gianguzzi & La Mantia 2004

HOLOTYPE: Rel. 4, Tab. 3, Gianguzzi & La Mantia (2004).

CHARACTER AND DIFFERENTIAL SPECIES: *Acer pseudoplatanus*,

Agropyron panormitanum, *Prunus cupaniana*, *Sorbus graeca*.

DISTRIBUTION – Plant community occurring on the Madonie and Rocca Busambra.

STRUCTURE AND ECOLOGY – This association is found on stable screes at the bottom of north-facing rocky walls. It grows on carbonate substrates (limestones and dolomitic rocks) between 1000 m and 1500 m a.s.l., within the lower supramediterranean bioclimatic belt. From the floristic viewpoint, it is characterized by the abundance of *Acer pseudoplatanus* and *Fraxinus ornus*. This association has been ranked by Gianguzzi & La Mantia (2004) into *Quercetalia pubescenti-petraeae*, while we consider it floristically and ecologically belonging to the *Fagetalia sylvaticae*. CBC: 41.4.

SYNDYNAMICS – This edapho-xerophilous plant community is scattered within the area potentially occupied by *Aceri campestris-Quercetum ilicis*, which has its optimum on more suitable edaphic conditions. It is dynamically connected with the shrubby vegetation of *Pruno-Rubion ulmifolii*, and with the scree communities of *Scrophulario-Helichrysetea italici*.

1.2. QUERCETALIA PUBESCENTI-PETRAEAE

Klika 1933

SYN: *Quercetalia pubescenti-petraeae* Br.-Bl. 1931, n. n.; *Quercetalia pubescenti-sessiliflorae* Quantin 1935; *Orno-Ostryetalia* Jakucs 1959; *Lathyro nigri-Quercetalia cerridis* Ubaldi 1988, nom. inval.; *Lathyro veneti-Carpinetalia* Ubaldi et al. 1990.

CHARACTER AND DIFFERENTIAL SPECIES IN SICILY: *Acer monspessulanum*, *Agropyron panormitanum*, *Buglossoides purpureocaerulea*, *Castanea sativa*, *Cephalanthera longifolia*, *Cnidium silaifolium*, *Limodorum abortivum*, *Lonicera etrusca*, *Ostrya carpinifolia*, *Populus tremula*, *Teucrium siculum*, *Vicia cassubica*.

DISTRIBUTION – Euro-Siberian and Mediterranean regions.

STRUCTURE AND ECOLOGY – This order groups mesophilous woods dominated by deciduous trees belonging to the genera *Quercus*, *Acer*, *Fraxinus*, and *Ostrya*, or more rarely by conifers. These communities are found on both carbonate and siliceous substrates, in areas characterized by thermo-supratemperate and meso-supramediterranean bioclimates.

1.2.1. PINO CALABRICAE-QUERCION CONGESTAE

Brullo Scelsi, Siracusa & Spampinato 1999

CHARACTER AND DIFFERENTIAL SPECIES: *Acer obtusatum* subsp. *aetnense*, *Betula aetnensis*, *Epipactis meridionalis*, *Pinus nigra* subsp. *calabrica*, *Quercus congesta*, *Q. dalechampii*, *Rubus aetnicus*.

DISTRIBUTION – Southern Calabria and Sicily, where it seems to be restricted to Mt. Etna. This alliance has been recently recorded by Bacchetta et al. (2004) also in Sardinia, where they recognize a special suballiance (*Paeonio morisii-Quercenion ichnusae*), grouping the Sardinian associations. However, it is preferable to raise this suballiance to the rank of alliance, and therefore to name it *Paeonio morisii-Quercenion ichnusae* (Bacchetta et al., 2004) stat. nov.

STRUCTURE AND ECOLOGY – This alliance includes deciduous woods growing on siliceous substrates, and within the supramediterranean bioclimatic belt. These communities are physiognomically characterized by the dominance of southern oaks, as *Quercus congesta* and *Q. dalechampii*, or by other endemic trees, *Pinus nigra* subsp. *calabrica*, *Betula aetnensis*, and *Acer obtusatum* subsp. *aetnense*.

1.2.1.1. *Epipactido meridionalis-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa & Spampinato 1999

HOLOTYPUS: Rel, 27, Tab. 1, Brullo et al. (1999).

CHARACTERISTIC AND DIFFERENTIAL SPECIES: *Epipactis meridionalis* and *Cephalanthera longifolia*.

DISTRIBUTION – This association is endemic of Mt. Etna.

STRUCTURE AND ECOLOGY – Beach woods of Mt. Etna usually occurring between 1400 m and 2000 m a.s.l., within the upper supramediterranean humid bioclimatic belt. It is a climatophilous association bound to deep and humified soils, with a quite deep layer of organic matter. Due to the frequent volcanic activity, this association does not form a continuous belt all around the volcano, as it could potentially do. The dominant species is *Fagus sylvatica*, while two orchids, *Epipactis meridionalis* and *Cephalanthera longifolia*, give a peculiar floristic connotation to this association. This plant community is floristically very poor, since it occurs on very xeric volcanic substrates. Previously, this association was referred by Brullo et al. (1999) to the alliance *Doronico-Fagion*. CBC: 41.187.

SYNDYNAMICS – This association is replaced, on compact rocky substrates without humified soil, by the orophilous pine woods represented by *Junipero hemisphaericae-Pinetum calabricae*, while on sandy volcanic soils the

Cephalanthero longifoliae-Betuletum aetnensis usually occurs. At higher altitudes, the *Epipactido meridionalis-Fagetum sylvaticae* comes in contact with orophilous pulvinate shrubby communities, chiefly represented by *Bellardiochloa aetnensis-Juniperetum hemisphaericae* or *Astragaletum siculi*.

1.2.1.2. *Rubo aetnici-Fagetum sylvaticae* Brullo, Guarino, Minissale, Siracusa & Spampinato 1999

HOLOTYPUS: Rel. 32, Tab. 1, Brullo et al. (1999).

CHARACTER AND DIFFERENTIAL SPECIES: *Rubus aetnicus*, *Vicia cassubica*.

DISTRIBUTION – This association occurs only on the eastern slopes of Mt. Etna

STRUCTURE AND ECOLOGY – In the sheltered and shady valleys, this peculiar beech wood is to be found. Actually, this plant community seems to be linked to more mesic conditions in comparison with the previous association. In fact, it can only be found in very small valleys characterized by damp soils and misty air. It has its optimum within the lower supramediterranean subhumid bioclimatic belt, between 1200-1600 m of altitude. Floristically, this beech wood is characterized by the occurrence of two endemics, *Rubus aetnicus* and *Acer obtusatum* subsp. *aetnense*, whose mesophilous requirements confirm the ecological role played by this association. CBC: 41.187.

SYNDYNAMICS – This association has to be considered as an heterotopic, extrazonal community, being localized within the *Q. cerris* belt (*Vicio cassubicae-Quercetum cerridis*) and the pine woods with *Pinus nigra* subsp. *calabrica*. The *Rubo aetnici-Fagetum sylvaticae* and *Epipactido meridionalis-Fagetum sylvaticae*, have been formerly ascribed by Brullo et al. (1999) to *Doronico-Fagion*. Its ecology, along with a relevant abundance of species of *Pino-Quercenion congestae*, support the inclusion into this alliance .

1.2.1.3. *Hieracio criniti-Aceretum aetnensis* Brullo & Siracusa ass. nov. (Tab. 3)

HOLOTYPUS: Rel. 8, Tab. 3, hoc loco.

CHARACTER AND DIFFERENTIAL SPECIES: *Acer obtusatum* subsp. *aetnense*, *Hieracium crinitum*.

DISTRIBUTION - This association is endemic of Mt. Etna.

STRUCTURE AND ECOLOGY – On the north-eastern slopes of Mt. Etna, above 1200 m of altitude, in an area characterized

by a supramediterranean humid bioclimate, a peculiar woodland occurs. This association is floristically characterized by the dominance of *Acer obtusatum* subsp. *aetnense*, and it is localized on narrow impluvia. In such habitats there are particular environmental conditions, represented mainly by damp soils and elevated atmospheric moisture affected by seasonal running off phenomena. Such ecological conditions are quite unusual for Mt. Etna. The occurrence of several nemoral species, such as *Luzula sicula*, *Hieracium crinitum*

Brachypodium sylvaticum, *Lathyrus pratense*, and *Viola reichenbachiana* shows the mesophilous character of this association. CBC: 41.4.

SYNDYNAMICS – For its ecological requirements, this woodland can be considered an orophilous vicariant of the *Aceri obtusati-Ostryetum carpinifoliae*, community of *Quercetia ilicis* which finds its optimal conditions at lower altitudes (usually below 1000 m).

Table 3. *Doronico orientalis-Castanetum sativae* (Rel. 1-7); *Hieracio criniti-Aceretum aetnensis* (Rel. 8-9); *Agropyro panormitani-Populetum tremulae* (Rel. 10-17)

Relevé	1	2	3*	4	5	6	7	8*	9	10*	11	12	13	14	15	16	17
Altitude (mt. a.s.l.)	1200	1000	1000	1000	1000	1000	1450	1400	1400	1300	1300	1300	1300	1300	1600	1600	1600
Plot size (sq. m.)	200	150	200	100	100	150	100	100	100	100	100	100	100	100	100	100	100
Cover (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Char. Association

<i>Castanea sativa</i>	5	5	5	5	5	5	5	2	3	+	.	+	.	+	.	.	.
<i>Doronico orientale</i>	3	3	2	2	3	2	1	.	.	.	.	.	.	1	.	.	.
<i>Lathyrus grandiflorus</i>	.	.	+	+	2	1	.	.	.	.	.	.	.	.	.	.	.
<i>Acer obtusatum</i> subsp. <i>aetnense</i>	.	.	.	.	.	.	.	4	3	.	.	.	.	.	.	.	.
<i>Hieracium crinitum</i>	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.
<i>Dryopteris pallida</i>	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.
<i>Populus tremula</i>	.	.	.	2	1	+	.	.	.	5	5	5	5	5	4	5	5

Char. All. (PINO-QUERCION CONGESTAE)

<i>Quercus dalechampii</i>	2	1	1	1	1	1	1	2	1	+	+	1	+	+	.	.	.
<i>Quercus congesta</i>	1	1	1	.	.	1	1	.	.	1	1	1	.	.	1	+	1
<i>Pinus nigra</i> subsp. <i>calabrica</i>	.	.	.	.	.	.	1	1	1	1	1	1	1	1	.	1	+
<i>Betula aetnensis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	+
<i>Rubus aetnicus</i>	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.

Char. Ord. (QUERCETALIA PUBESCENTI-PETRAEAE)

<i>Agropyron panormitanum</i>	1	1	.	1	1	1	2	2	2	2	1	1	1	2	1	2	1
<i>Limodorum abortivum</i>	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Vicia cassubica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2

Char. Cl. (QUERCO-FAGETEA SYLVATICAE)

<i>Brachypodium sylvaticum</i>	1	1	1	2	2	.	1	2	3	3	2	2	3	1	3	2
<i>Lathyrus pratensis</i>	+	.	1	3	2	1	1	2	1	2	1	3	2	3	.	2
<i>Festuca heterophylla</i>	.	2	2	2	2	2	2	2	2	+	+	.	.	1	1	1
<i>Daphne laureola</i>	.	1	+	.	1	1	1	3	2	+	2	1	1	1	.	1
<i>Crepis leontodontoides</i>	2	.	1	.	1	2	+	+	+	1	.	+	+	+	.	2
<i>Luzula forsteri</i>	.	+	+	1	1	+	+	.	.	+	+	+	+	+	.	+
<i>Rosa canina</i>	.	.	+	2	1	2	1	.	.	.	+	+	+	.	.	.
<i>Luzula sicula</i>	1	1	1	.	.	.	1	2	2	.	.	.	.	.	.	.
<i>Epipactis microphylla</i>	+	.	.	+	+	1	+	.	.	.	.	.	.	.	.	.
<i>Rubus glandulosus</i>	.	.	.	.	.	.	.	1	2	1	2	+	.	.	.	.
<i>Poa sylvicola</i>	.	.	.	.	.	.	.	.	.	2	1	1	1	+	.	.
<i>Lathyrus venetus</i>	.	.	.	.	.	.	.	.	+	.	.	.	1	1	1	.
<i>Clinopodium vulgare</i> subsp. <i>arundanum</i>	.	.	.	2	1	1	.	.	.	.	.	.	.	.	.	.
<i>Quercus cerris</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
<i>Festuca exaltata</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
<i>Viola reichenbachiana</i>	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.
<i>Galium rotundifolium</i> subsp. <i>rotundifolium</i>	.	.	.	.	.	.	.	3	2	.	.	.	.	.	.	.

Relevé	1	2	3*	4	5	6	7	8*	9	10*	11	12	13	14	15	16	17
Altitude (mt. a.s.l.)	1200	1000	1000	1000	1000	1000	1450	1400	1400	1300	1300	1300	1300	1300	1600	1600	1600
Plot size (sq. m.)	200	150	200	100	100	150	100	100	100	100	100	100	100	100	100	100	100
Cover (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<i>Fagus sylvatica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
<i>Hedera helix</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other species																	
<i>Pteridium aquilinum</i>	+	2	+	2	2	+	2	2	2	2	1	1	2	2	2	1	2
<i>Rubus ulmifolius</i>	+	2	2	3	.	.	1	.	.	1	+	1	1	.	.	.	.
<i>Trifolium semipurpureum</i>	1	1	+	1	1	1	2	.	.	.	.	.	+	.	.	.	.
<i>Leopoldia comosa</i>	+	+	+	1	+	+	+	.	.	.	.	.	.	.	.	.	.
<i>Lolium rigidum</i>	+	1	1	+	+	+	2	.	.	.	.	.	.	.	.	.	.
<i>Silene vulgaris</i> subsp. <i>angustifolia</i>	1	2	2	+	1	1	1	.	.	.	.	.	.	.	.	.	.
<i>Linaria purpurea</i>	.	.	.	1	+	+	+	.	.	+	.	.	+	+	.	.	.
<i>Dactylis glomerata</i>	.	.	.	.	.	.	.	1	.	.	+	+	1	1	+	+	.
<i>Bellis perennis</i>	2	+	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.
<i>Thapsia garganica</i>	+	1	2	2	3	1	.	.	.	.	.	.	.	.	.	.	.
<i>Daucus carota</i>	.	.	1	1	2	2	.	+	.	.	.	.	+	.	.	.	.
<i>Cytisus villosus</i>	.	+	1	1	2	1	.	.	.	.	.	.	.	.	.	.	.
<i>Silene sicula</i>	.	.	.	.	.	.	.	.	.	.	.	+	+	.	1	1	1
<i>Rubia peregrina</i>	.	.	2	+	+	1	.	.	.	.	.	.	.	.	.	.	.
<i>Hermodactylis tuberosus</i>	.	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.
<i>Quercus ilex</i>	.	.	+	.	1	+	.	.	.	.	.	.	.	.	.	.	1
<i>Teucrium chamaedrys</i>	.	.	.	.	.	.	.	.	.	+	1	+	1	.	.	.	.
<i>Allium vineale</i>	.	.	.	.	.	.	.	.	.	+	1	+	+	.	.	.	.
<i>Achillea ligustica</i>	.	2	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.
<i>Hypericum perforatum</i>	.	1	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
<i>Galium aparine</i>	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
<i>Epilobium angustifolium</i>	.	.	.	.	.	.	.	.	.	.	.	+	3	2	.	.	.
<i>Genista aetnensis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+
<i>Orobanche rapum-genistae</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+
<i>Ranunculus neapolitanus</i>	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Asparagus acutifolius</i>	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ruscus aculeatus</i>	.	.	+	2	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Crataegus monogyna</i>	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Aristolochia clusii</i>	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.
<i>Lamium flexuosum</i> subsp. <i>pubescens</i>	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Cyclamen repandum</i>	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.
<i>Hypochoeris laevigata</i>	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.
<i>Stellaria media</i>	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.
<i>Thalictrum minus</i>	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	.	.
<i>Festuca rubra</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+
<i>Lamium bifidum</i>	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Vicia disperma</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
<i>Fragaria vesca</i>	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
<i>Hypochoeris hispida</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.

Rel. 1 - Etna, Salto del Cane, 14.6.1994.

Rel. 2-3 - Etna, Contr. Ronzini, 3.5.1994.

Rel. 4-6 - Etna, Tarderìa, 3.5.1994.

Rel. 7 - Etna, Monte Manfrè, 28.6.1995.

Rel. 8-9 - Etna, Monte Corruccio, 3.6.1995.

Rel. 10-14 - Etna, Piani di Mirio, 13.7.1994.

Rel. 15-17 - Etna, Rifugio Citelli, 9.7.1994.

1.2.1.4. *Vicia cassubicae-Quercetum cerridis* Brullo & Marcenò 1985

CHARACTER AND DIFFERENTIAL SPECIES: *Quercus cerris*, *Vicia cassubica*.

HOLOTYPE: Rel. 4, Tab. 16, Brullo & Marceno (1985).

DISTRIBUTION – Eastern slopes of Mt. Etna.

STRUCTURE AND ECOLOGY – This association, dominated by *Quercus cerris*, is localized between 1200 and 1500 m of altitude. This type of *Q. cerris* wood grows within the lower supramediterranean humid bioclimatic belt, on deep and loamy volcanic soils. The tree layer is well structured and floristically quite reach, since many other deciduous trees occur (e.g. *Quercus congesta*, *Q. dalechampii*, *Fraxinus ornus*, *Castanea sativa*, *Acer obtusatum* subsp. *aetnense*, etc.). The ecological behaviour of the *Q. cerris* woods from Mt. Etna is rather different from the one of *Arrhenathero nebrodensis-Quercetum cerridis* from Nebrodi, since the latter association has its optimum on clayey soils with a high water capacity, and further it is definitely richer of nemoral species. CBC: 41.75.

SYNDYNAMICS – The association comes in contact with pine woods and birch woods at higher altitudes, while it is replaced by chestnut woods or deciduous oak woods with *Quercus congesta* at lower altitudes.

1.2.1.5. *Agropyro panormitani-Quercetum congestae*
Brullo, Scelsi, Siracusa & Spampinato 1999

HOLOTYPUS: Rel. pag. 24, Brullo et al. (1999)

CHARACTER AND DIFFERENTIAL SPECIES: *Agropyrum panormitanum*, *Quercus congesta*.

DISTRIBUTION – It is localized on the north-eastern slopes of Mt. Etna.

STRUCTURE AND ECOLOGY – This association represents a really mesophilous plant community, being *Quercus congesta* a deciduous oak strictly linked to humid and cold environments. Actually, the most typical sites where this phytocoenosis has its optimum are represented by NE-facing slopes, whose soils are well developed and with a fairly good accumulation of organic matter. From the bioclimatic point of view, it lies within the lower supramediterranean humid belt, and occupies an altitudinal range between 1000 m and 1500 m a.s.l. Thermophilous species are absolutely lacking, thus making this plant community floristically and ecologically well differentiated from the thermophilous oak woods dominated by *Q. congesta* occurring elsewhere on Etna. CBC: 41.732.

SYNDYNAMICS – The association is in contact with the beech woods of the *Epipactido meridionalis-Fagetum sylvaticae* or, on more xeric conditions, with the pine woods with *Pinus nigra* subsp. *calabrica*, whereas it is replaced at lower altitudes by the thermophilous deciduous of *Erico-Quercion ilicis*.

1.2.1.6. *Doronico orientalis-Castanetum sativae* Brullo & Siracusa ass. nov. (Tab. 3)

HOLOTYPUS: Rel. 3, Tab. 3, hoc loco.

CHARACTER AND DIFFERENTIAL SPECIES: *Castanea sativa*, *Doronicum orientale*.

DISTRIBUTION – Mt. Etna.

STRUCTURE AND ECOLOGY – Chestnut woods are widespread above 1000 m a.s.l., especially on the southern and eastern slopes of Mt. Etna. As in many other Mediterranean areas, the chestnut has been widely cultivated and managed, but most of the Etnean chestnut woods appear floristically and ecologically quite natural. Furthermore, the occurrence of several old individuals of *Castanea sativa* (more than 2000 years old) would confirm the native state of this species on Mt. Etna. Chestnut woods are widespread all around the volcano, usually growing on deeper soils, and forming woods with an almost monophytic tree layer (*C. sativa*), and an understorey characterized by many nemoral species, such as *Doronicum orientale*, *Lathyrus pratensis*, *Daphne laureola*, *Lamium flexuosum*, *Viola reichenbachiana*, etc. CBC: 41.9.

SYNDYNAMICS – This association comes in contact at lower altitudes with the thermophilous woods of *Erico-Quercion ilicis*, while at higher altitudes it is replaced by more mesophilous woodlands, as those dominated by *Quercus cerris* or *Q. congesta*.

1.2.1.7. *Agropyro panormitani-Populetum tremulae* Brullo & Siracusa ass. nov. (Tab. 3)

HOLOTYPUS: Rel. 10, Tab. 3, hoc loco.

CHARACTER AND DIFFERENTIAL SPECIES: *Agropyrum panormitanum*, *Populus tremula*.

DISTRIBUTION – Mt. Etna

STRUCTURE AND ECOLOGY – A peculiar tree vegetation with *Populus tremula* is rather common above 900 m of altitudes. These mesophilous woods usually do not occupy wide areas, being chiefly localized on small and narrow valleys characterized by a fairly good water availability. Aspen is an Euro-Asiatic species, but in Sicily it occurs only on Mt. Etna, where it has its core area between 1200 m and 1600 a.s.l., within the supramediterranean subhumid-humid bioclimatic belt. The occurrence of a rich pool of mesophilous taxa allows to ascribe this tree community to *Quercetalia pubescentis*, and in particular to *Pino calabricae-Quercion congestae*. CBC: 41.732.

SYNDYNAMICS – This association is chiefly localized within the mesophilous deciduous oak woods belonging to *Agropyro panormitani-Quercetum congestae*, but at higher altitudes it comes in contact with the beech woods of *Epipactido meridionalis-Fagetum sylvaticae*.

1.2.1.8. *Daphno laureolae-Pinetum calabricae* Brullo & Siracusa ass. nov. (Tab.4)

HOLOTYPUS: Rel. 5, Tab. 4, hoc loco

CHARACTER AND DIFFERENTIAL SPECIES: *Daphne laureola*, *Pinus nigra* subsp. *calabrica*.

DISTRIBUTION - It is endemic of Mt. Etna.

STRUCTURE AND ECOLOGY - A really interesting pine wood is localized on the north-eastern slopes of Mt. Etna. Actually, the tree layer of this plant community is always dominated by *Pinus nigra* subsp. *calabrica*, which reaches high cover values, but the lack of other species, such as *Juniperus*

hemisphaerica and *Berberis aetnensis*, allows to ascribe this vegetation to a particular association, ecologically and floristically well differentiated from other Etnean pine woods (*Junipero hemisphaericae-Pinetum calabricae*), belonging to the class *Pino-Juniperetea*. It grows on rather flattened sites, usually with deep soils, rich in humus and fine particles. These edaphic conditions, along with a remarkably oceanic mesoclimate, are mirrored in the floristic assessment of this association which is particularly rich in mesophilous nemoral taxa, such as *Daphne laureola*, *Poa sylvicola*, *Rubus aetnensis*, *Cephalanthera longifolia*, etc. The *Daphno laureolae-Pinetum calabricae* grows between 1400 and 1600 m of altitude, within the supramediterranean humid bioclimatic belt. It can be considered as a geographic vicariant of *Hypochaerido laevigatae-Pinetum calabricae* occurring in Calabria (see Brullo et al. 2001). CBC: 45.652.

SYNDYNAMICS – This association has its optimum within the deciduous oak woods of the *Agropyro panormitani-Quercetum congestae*, but on rocky substrates it is replaced by the edapho-xerophilous vegetation of *Junipero hemisphaericae-Pinetum calabricae*.

Table 4. *Daphno laureolae-Pinetum calabricae* (Rel. 1-7); *Cephalanthero longifoliae-Betuletum aetnensis* (Rel. 8-17)

Relevé	1	2	3	4	5*	6	7	8	9	10	11	12	13*	14	15	16	17
Altitude (mt. a.s.l.)	1500	1500	1500	1500	1500	1500	1500	1450	1450	1450	1450	1450	1450	1450	1450	1560	1560
Plot size (sq. m.)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	100	100
Cover (%)	100	100	100	100	100	100	100	80	80	80	80	90	80	80	90	80	80

Char. Association

<i>Daphne laureola</i>	2	3	2	2	4	2	3	.	.	.	.	.	.	.	.	.	.
<i>Betula aetnensis</i>	.	.	.	.	.	.	.	4	3	3	4	3	5	4	5	2	4
<i>Cephalanthera longifolia</i>	.	.	.	.	.	.	.	1	+	+	1	1	1	1	1	+	+
<i>Adenocarpus bivonae</i>	.	.	.	.	.	.	.	1	1	1	3	3	1	+	1	3	3

Char. All. (PINO-QUERCION CONGESTAE)

<i>Pinus nigra</i> subsp. <i>calabrica</i>	5	5	5	4	5	5	4	1	1	.	1	1	1	1	1	+	1
<i>Quercus dalechampii</i>	2	1	1	2	2	.	.	.	.	.	.	.	1	2	1	.	.
<i>Quercus congesta</i>	.	.	.	.	.	1	1	.	1	+	.	.	1	1	.	1	1
<i>Rubus aetnensis</i>	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.

Char. Ord. (QUERCETALIA PUBESCENTI-PETRAEAE)

<i>Agropyron panormitanum</i>	1	3	3	3	3	+	1	.	.	.	+	.	.	1	+	.	.
<i>Castanea sativa</i>	1	.	+	2	1	1	1	.	.	.	.	.	.	.	.	.	.
<i>Vicia cassubica</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.

Char. Cl. (QUERCO-FAGETEA SYLVATICAE)

<i>Crepis leontodontoides</i>	1	+	1	1	+	1	+	1	+	+	2	+	1	+	1	+	+
<i>Lathyrus pratensis</i>	3	3	2	3	3	2	2	.	+	.	+	+	.	+	.	.	.
<i>Brachypodium sylvaticum</i>	3	3	1	3	2	1	1	.	.	.	.	.	.	3	2	.	.
<i>Festuca heterophylla</i>	3	2	2	3	2	1	1	.	.	.	.	.	.	.	.	.	.
<i>Luzula sicula</i>	+	1	1	2	2	+	1	.	.	.	.	.	.	.	.	.	.
<i>Rubus glandulosus</i>	1	+	+	1	1	+	1	.	.	.	.	.	.	.	.	.	.

Relevé	1	2	3	4	5*	6	7	8	9	10	11	12	13*	14	15	16	17
Altitude (mt. a.s.l.)	1500	1500	1500	1500	1500	1500	1500	1450	1450	1450	1450	1450	1450	1450	1450	1560	1560
Plot size (sq. m.)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	100	100
Cover (%)	100	100	100	100	100	100	100	80	80	80	80	90	80	80	90	80	80
<i>Galium rotundifolium</i> subsp. <i>rotundifolium</i>	2	2	1	2	2	+	1	.	.	.	.	.	.	.	.	.	.
<i>Quercus cerris</i>	.	+	1	1	1	.	.
<i>Viola reichenbachiana</i>	.	.	.	3	+	.	1	.	.	.	.	.	.	.	.	.	.
<i>Rosa canina</i>	2	+	.	.	.	.	.	.	.	.	.	.
<i>Lathyrus venetus</i>	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.
<i>Poa sylvicola</i>	1	1	.	.	.	.	.	.	.	.	.	.
Other species																	
<i>Pteridium aquilinum</i>	2	4	1	4	2	2	2	1	+	2	1	2	+	2	2	2	2
<i>Silene sicula</i>	+	1	+	.	+	1	+	+	+	1	1	+	+
<i>Festuca circummediterranea</i>	1	1	1	+	1	1	3	2	2	2	2	2
<i>Achillea ligustica</i>	2	1	1	2	1	1	1	1	1	+
<i>Genista aetnensis</i>	+	+	.	1	1	1	1	1	2	1
<i>Trifolium semipurpureum</i>	.	.	2	1	1	+	+	.	.	.	.	.	+	+	+	.	.
<i>Hypochoeris laevigata</i>	2	1	4	1	+	2	+	.	.	.	.	.	.	.	.	.	.
<i>Calamagrostis epigejos</i>	3	3	.	.	+	.	.	.	1	2	1	+
<i>Astragalus siculus</i>	+	1	2	2	3	.	.	.	1	2
<i>Tanacetum siculum</i>	1	1	1	2	2	.	.	.	+	+
<i>Carlina nebrodensis</i>	+	.	+	+	+	+	1	+
<i>Secale strictum</i>	1	1	+	1	.	.	.	.	2	1
<i>Erysimum etnense</i>	+	+	.	+	.	.	+	.	+	+
<i>Centaurea giardinae</i>	+	+	.	+	.	+	+	+
<i>Linaria purpurea</i>	+	+	+	.	.	+	1
<i>Festuca rubra</i>	2	2	2	2	2	.	.	.	.	.
<i>Juniperus hemisphaerica</i>	1	.	+	.	.	.	1	.	1	.	1
<i>Jasione montana</i>	+	+	+	.	.	.	+	+
<i>Chondrilla juncea</i>	+	+	+	+	+
<i>Anthoxanthum odoratum</i>	+	1	+	.	.	.	.	.	.	.	.	.	.
<i>Berberis aetnensis</i>	+	+	1	.	.	.	.
<i>Silene vulgaris</i> subsp. <i>angustifolia</i>	+	+
<i>Bellis perennis</i>	1	+	.	.	.	.	.	.	.	.	.	.	.
<i>Fragaria vesca</i>	+	+
<i>Dactylorhiza sambucina</i>	.	+	.	.	.	+
<i>Rumex multifidus</i>	+	+
<i>Scrophularia bicolor</i>	2	1
<i>Hieracium crinitum</i>	.	.	.	+
<i>Cyclamen repandum</i>	+
<i>Dactylis glomerata</i>	2	.	.	.	.	.	.	.	.	.	.	.	.
<i>Epilobium angustifolium</i>	.	.	.	+
<i>Senecio aetnensis</i>	+	.

Rel. 1-5 - Etna, Monte Corruccio, 3.6.1995.

Rel. 6-7 - Etna, Milia, 29.6.1995.

Rel. 8-12 - Etna, West Rifugio Citelli, 9.7.1994.

Rel. 13-15 - Etna, Monte Crisimo, 9.7.1994.

Rel. 16-17 - Etna, Monte Frumento delle Concazze, 8.7.1995.

1.2.1.9. *Cephalanthero longifoliae*-*Betuletum aetnensis*

Brullo & Siracusa ass. nov. (Tab.4)

HOLOTYPE: Rel. 13, Tab. 4, hoc loco.

CHARACTER AND DIFFERENTIAL SPECIES: *Adenocarpus bivonae*, *Betula aetnensis*, *Cephalanthera longifolia*.

DISTRIBUTION – It is exclusive of Mt. Etna.

STRUCTURE AND ECOLOGY – The montane landscape of Etna is characterized by the occurrence of an extremely interesting tree vegetation, floristically and physiognomically dominated by an Etnean narrow endemic, *Betula aetnensis*. This plant community is usually represented by open woods,

growing on volcanic scoriae, where the soil evolution is definitely hampered by the severe climatic conditions and by the frequent volcanic events, such as ash rains. This association is floristically poor; it ranges between 1400 and 2000 m a.s.l., chiefly on the north-eastern slopes. It has its optimum within the upper supramediterranean humid-hyperhumid bioclimatic belt, with penetrations towards the oromediterranean belt. CBC: 41.B6.

SYNDYNAMICS – This association represents an edapho-xerophilous vegetation type, with a remarkable pioneer character, occurring within the area potentially occupied by *Epipactido meridionalis-Fagetum sylvaticae*. Above 1800 m a.s.l., this vegetation is in contact and interspersed with *Astragaletum siculi*, thus forming a patchy vegetation pattern.

SYNTAXONOMICAL SCHEME

QUERCO ROBORIS-FAGETEA SYLVATICAE Br.-Bl. & Vlieger in Vlieger 1937

FAGETALIA SYLVATICAE Pawlowski in Pawlowski et al. 1928

GERANIO VERSICOLORIS-FAGION SYLVATICAE Gentile 1970

Anemone apenninae-Fagetum sylvaticae (Gentile 1970) Brullo 1984

Melitto albidae-Fagetum sylvaticae Ubaldi et al. ex Ubaldi 1995

Luzulo siculae-Fagetum sylvaticae Brullo, Guarino, Minissale, Siracusa, Spampinato 1999

Hieracio madoniensis-Fagetum sylvaticae ass. nova

Ilici aquifolii-Taxetum baccatae Brullo, Minissale, Signorello & Spampinato 1996

Arrhenathero nebrodensis-Quercetum cerridis Brullo, Minissale, Signorello & Spampinato 1996

Ilici aquifolii-Quercetum cerridis Raimondo, Schicchi & Bazan 2009

Ilici aquifolii-Quercetum austrothyrrhenicae Brullo & Marcenò in Brullo 1984 *corr.*

Ilici aquifolii-Quercetum leptobalani Maniscalco & Raimondo 2009

Conopodio capillifolii-Quercetum congestae Maniscalco & Raimondo 2009

Geranio versicoloris-Quercetum ilicis Maniscalco & Raimondo 2003

Sorbo graecae-Aceretum pseudoplatani Gianguzzi & La Mantia 2004

QUERCETALIA PUBESCENTI-PETRAEAE Klika 1933

PINO CALABRICAE-QUERCION CONGESTAE Brullo Scelsi, Siracusa & Spampinato 1999

Epipactido meridionalis-Fagetum sylvaticae Brullo, Guarino, Minissale, Siracusa, Spampinato 1999

Rubo aetnici-Fagetum sylvaticae Brullo et al. 1999

Hieracio criniti-Aceretum aetnensis ass. nov.

Vicio cassubicae-Quercetum cerridis Brullo & Marcenò 1985

Agropyro panormitani-Quercetum congestae Brullo Scelsi, Siracusa & Spampinato 1999

Doronico orientalis-Castanetum sativae ass. nov.

Agropyro panormitani-Populetum tremulae ass. nov.

Daphno laureolae-Pinetum calabrica ass. nov.

Cephalanthero longifoliae-Betuletum aetnensis ass. nov.

List of syntaxa quoted in the text

Aceri obtusati-Ostryetum carpiniifoliae Brullo & Marcenò 1985

Armerion nebrodensis Brullo 1984

Astragaletum siculi (Frei 1940) Gilli 1943

Bellardiochloo aetnensis-Juniperetum hemisphaericae Brullo & Siracusa in Brullo et al. 2001

Cerastio-Astragalion nebrodensis Pignatti & Nimis ex Brullo 1984

Erico-Quercion ilicis Brullo, Di Martino & Marcenò 1977

Hypochaerido laevigatae-Pinetum calabrica Bonin ex Brullo, Scelsi & Spampinato 2001

Junipero hemisphaericae-Pinetum calabrica Brullo & Siracusa in Brullo et al. 2001

Molinio-Arrhenateretea R.Tx. 1937

Paeonio morisii-Quercenion ichnusae Bacch., Biondi, Farris, Filigheddu & Mossa 2004

Pino-Juniperetea Rivas-Martinez 1964

Pistacio-Rhamnetalia alaterni Rivas-Martinez 1975

Plantaginion cupanii Brullo & Grillo 1978

Potentilletalia caulescentis Br.-Bl. in Br.-Bl. & Jenny 1926

Pruno-Rubion ulmifolii O. Bolòs 1954

Quercenion virgiliana Blasi, Di Pietro & Filesi 2004

Quercetalia ilicis Br.-Bl. ex Molinier 1934

Quercetea ilicis Br.-Bl. ex O. Bolòs 1947

Quercion ilicis Br.-Bl. ex Molinier 1934

Rumici-Astragaletea siculi Pignatti & Nimis in Pignatti et al. 1980

Saxifragion autralis Pedrotti ex Brullo 1984

Scrophulario-Helichrysetea italici Brullo, Scelsi & Spampinato 1998

REFERENCES

- BACCHETTA G., BIONDI E., FARRIS E., FILIGHEDDU R., MOSSA L., 2004. A phytosociological study of the deciduous oak woods of Sardinia (Italy). *Fitosociologia* 41 (1), 53-65.
- BERTOLANI-MARCHETTI D., 1985. Pollen paleoclimatology in the Mediterranean since Messinian time. In: STANLEY D.J. and WEZEL F.C. (eds.). *Geological evolution of the Mediterranean basin*, 525-543. New York.
- BERTOLANI-MARCHETTI D. and CITA M.B., 1975. Studi sul Pliocene e sugli strati di passaggio dal Miocene al Pliocene. *Rivista Paleontologica Italiana* 81, 281-308.
- BLASI C., DI PIETRO R., FILESI L., 2004. Syntaxonomical revision of *Quercetalia pubescenti-petraeae* in the Italian Peninsula. *Fitosociologia* 41(1), 87-164.
- BOCQUET G., WIDLER B., KIEFER H. 1978. The Messinian model - A new outlook for the floristic and systematics of the Mediterranean area. *Candollea* 33, 269-287.
- BRULLO S., 1984. Contributo alla conoscenza della vegetazione delle Madonie (Sicilia settentrionale). *Bollettino dell'Accademia Gioenia di Scienze Naturali Catania*, 16(322), 351-420.
- BRULLO S., GIANGUZZI L., LA MANTIA A., SIRACUSA G., 2009. La classe *Quercetea ilicis* in Sicilia. *Bollettino dell'Accademia Gioenia di Scienze Naturali* 41(369), 1-77.
- BRULLO S., GIUSSO DEL GALDO G., GUARINO R. 2001. The orophilous communities of *Pino-Juniperetea* class in central and eastern Mediterranean area. *Feddes Repertorium* 112, 261-308.
- BRULLO S., GUARINO R., MINISSALE P., SIRACUSA G., SPAMPINATO G., 1999. Syntaxonomical analysis of the beech forests from Sicily. *Annali di Botanica* 57, 121-132.
- BRULLO S. and MARCENÒ C., 1985. Contributo alla conoscenza della classe *Quercetea ilicis* in Sicilia. *Notiziario di Fitosociologia* 19(1), 183-229.
- BRULLO S., MINISSALE P., SIGNORELLO P., SPAMPINATO G., 1996. Contributo alla conoscenza della vegetazione forestale della Sicilia. *Colloques Phytosociologiques* 24, 635-647.
- BRULLO S., SCELSE F., SIRACUSA G., SPAMPINATO G., 1999. Considerazioni sintassonomiche e corologiche sui querceti caducifogli della Sicilia e della Calabria. *Monti e Boschi* 50(1), 16-29.
- BRULLO S., SCELSE F., SPAMPINATO G., 2001. La vegetazione dell'Aspromonte. *Studio fitosociologico*. Laruffa, Reggio Calabria, pp. 1-368.
- DENGLER J., BERG C., EISENBERG M., ISERMANN M., JANSEN F., KOSKA I., LÖBEL S., MANTHEY M., PÄZOLT J., SPANGENBERG A., TIMMERMANN T., WOLLERT H., 2003. New descriptions and typifications of syntaxa within the project 'Plant communities of Mecklenburg-Vorpommern and their vulnerability'. *Feddes Repertorium* 114, 587-631.
- DI PIETRO R., IZCO J., BLASI C., 2004. Contribute to the nomenclatural knowledge of the beech-woodland communities of southern Italy. *Plant Biosystems* 138 (1), 27-52
- GENTILE S., 1970. Sui faggeti dell'Italia meridionale (Beech woodlands of southern Apennines). *Atti dell'Istituto Botanico dell'Università di Pavia ser. 6*, 5, 207-306.
- GIANGUZZI L. and LA MANTIA A., 2004. Le serie di vegetazione della Riserva "Bosco Ficuzza, Rocca Busambra, Bosco del Cappelliere e Gorgo del Drago" (Provincia di Palermo). *Naturalista Siciliano*, n.s., 28(1), 265-326.
- GIARDINA G., RAIMONDO F.M., SPADARO V., 2007. A catalogue of plant growing in Sicily. *Bocconea* 20, 3-582.
- MANISCALCO M. and RAIMONDO F.M., 2003. Ecology and optimal and heterotopical distribution of *Ilex aquifolium* (*Aquifoliaceae*) in Sicily. *Bocconea* 16(2), 905-917.
- MANISCALCO M. and RAIMONDO F.M., 2009. Phytosociological study of the acidophilous deciduous oak woods with *Ilex aquifolium* of Sicily. *Fitosociologia* 46(2), 67-80.
- MANISCALCO M., SCHICCHI R., RAIMONDO F.M., 2008. Studio fitosociologico dei querceti acidofili a roverella ed agrifoglio della Sicilia. *Riassunti 44° Congresso Società Italiana Scienza della Vegetazione*. Ravenna, 27-29 febbraio, 30.
- RAIMONDO F.M., SCHICCHI R., BAZAN G., 2009. Studio fitosociologico dei cerreti con agrifoglio dei Monti Nebrodi. *Naturalista Siciliano* s.IV, 33(3-4), 373-388.
- RIVAS-MARTÍNEZ S., PENAS A., DÍAZ TE., 2004a. Bioclimatic Map of Europe, Bioclimates: Cartographic Service. University of León, Spain. (<http://www.globalbioclimatics.org/form/maps.htm>)
- RIVAS-MARTÍNEZ S., PENAS A., DÍAZ TE., 2004b. Bioclimatic Map of Europe, Thermoclimatic Belts: Cartographic Service. University of León, Spain. (<http://www.globalbioclimatics.org/form/maps.htm>)
- RONSISVALLE G.A. and SIGNORELLO P., 1977. Interesse naturalistico e fitosociologico della faggeta del bosco di Malabotta (Montalbano Elicona – Monti Peloritani). *Bollettino dell'Accademia Gioenia di Scienze Naturali* 13(1-2), 62-71
- WEBER H.E., MORAVEC J., THEURILLAT J.P., 2000. *International*

code of phytosociological nomenclature. 3rd ed. *Journal of Vegetation Science* 11, 739-768.

UBALDI D., ZANOTTI A.L., PUPPI G., SPERANZA M., CORBETTA F., 1990. Sintassonomia dei boschi caducifogli mesofili dell'Italia peninsulare. *Notiziario Fitosociologico* 23, 31-62.