

A PHYTOSOCIOLOGICAL ANALYSIS OF THE VEGETATION OF THE CENTRAL ADRIATIC SECTOR OF THE ITALIAN PENINSULA

Marina ALLEGREZZA*, Edoardo BIONDI* & Silvia FELICI*

Abstract

We present here a phytosociological study of the vegetation of a sub-coastal hill in the Central Adriatic sector (southern Marche region) of the Italian peninsula.

This analysis has revealed the great biogeographical value of the territory under study, as seen by the vegetation typologies, among which we propose the following new associations: *Coronillo emeroidis-Pinetum halepensis*, *Fraxino orn-Lauretum nobilis*, *Rubio peregrinae-Aceretum campestris*, *Lauro nobilis-Populetum canescens*, *Rubo ulmifolii-Salicetum albae*, *Lonicero etruscae-Coronilletum emeroidis*, *Asperulo aristatae-Cistetum eriocephali*, *Cistetum eriocephali-salvifolii*, *Scabioso maritimae-Cymbopogonetum hirti*, *Agropyro repentis-Oryzopsietum miliaceae* and *Ononido reclinatae-Plantaginetum bellardii*. These are accompanied by numerous newly proposed subassociations, along with variants of previously described syntaxa.

Key words: central Adriatic, biodiversity, biogeography, phytosociology, Italy, syntaxonomy, vegetation.

Izveček

V članku je predstavljena fitocenološka študija vegetacije obalnega gričevja v osrednjem jadranskem sektorju (južna regija Marche) na italijanskem polotoku.

Analiza je pokazala veliko biogeografsko vrednost raziskovanega območja glede vegetacijske tipologije. Predlagamo naslednje nove asociacije: *Coronillo emeroidis-Pinetum halepensis*, *Fraxino orn-Lauretum nobilis*, *Rubio peregrinae-Aceretum campestris*, *Lauro nobilis-Populetum canescens*, *Rubo ulmifolii-Salicetum albae*, *Lonicero etruscae-Coronilletum emeroidis*, *Asperulo aristatae-Cistetum eriocephali*, *Cistetum eriocephali-salvifolii*, *Scabioso maritimae-Cymbopogonetum hirti*, *Agropyro repentis-Oryzopsietum miliaceae* in *Ononido reclinatae-Plantaginetum bellardii*. Obenem so opisani sintaksoni členjeni na številne subasociacije in variante.

Ključne besede: biodiverziteteta, biogeografija, fitocenologija, Italija, sintaksonomija, vegetacija.

1. INTRODUCTION

The aim of the present study is the phytosociological analysis of the vegetation in a sub-coastal hill sector in the Central Adriatic area, that is delineated by the Aso and Tesino river basins, in southern Marche, in the Province of Ascoli Piceno (Fig. 1).

The study area is characterised by a low-hill landscape that extends inland from the coast for around 30 km, following the lines of the hills up to an altitude of around 500 m above sea level, where there are the small towns of Ripatransone, Monte-

fiore dell'Aso and Monterubbiano. The area sees the emergence of geologically young terrain that arises from a marine Plio-Pleistocene series, that, in turn, is in angular disparity with the underlying Laga formation (Cantalamessa & al. 1986). For its climatic characteristics, and based upon the bioclimatic classification of Rivas-Martinez & al. (2001), the study area presents in part a mesoMediterranean bioclimatic belt of the mediterranean macrobioclimate, and in part a submediterranean variant of the oceanic temperate macrobioclimate (Fig. 2).

* Dipartimento di Scienze Ambientali e delle Produzioni Vegetali, Università Politecnica delle Marche, 60131 Ancona

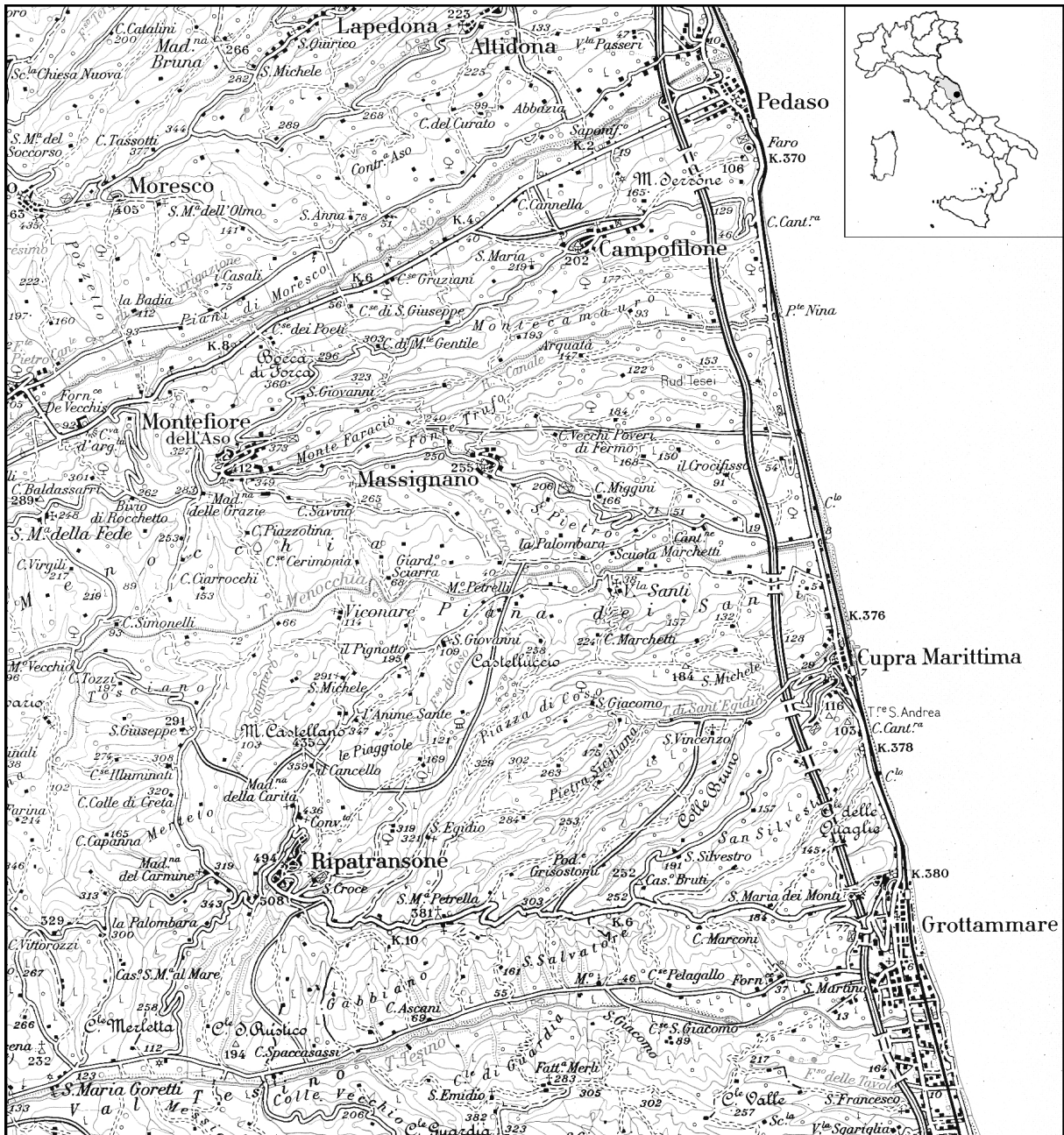


Figure 1: The map of the study area.
 Slika 1: Raziskovano območje.

The main feature of the landscape is agricultural, with quality production that has been historically and culturally recognised, such as that of grapes and olives. The remains of the forest vegetation are of noted biodiversity interest in that they have been recognised as “aree floristiche protette” (areas of protected flora), as given by Legge Regionale number 52 of 1974, and as a “Site of Community Importance” (SCI).

The study area was previously the object of floristic and vegetational investigations, although these were exclusively concerned with the forest and shrub formations (Manzi 1991, 2004). The present study was thus aimed at gaining a more complete understanding of the vegetational characteristics of the area, as a basis for synphytosociological and geosynphytosociological studies.

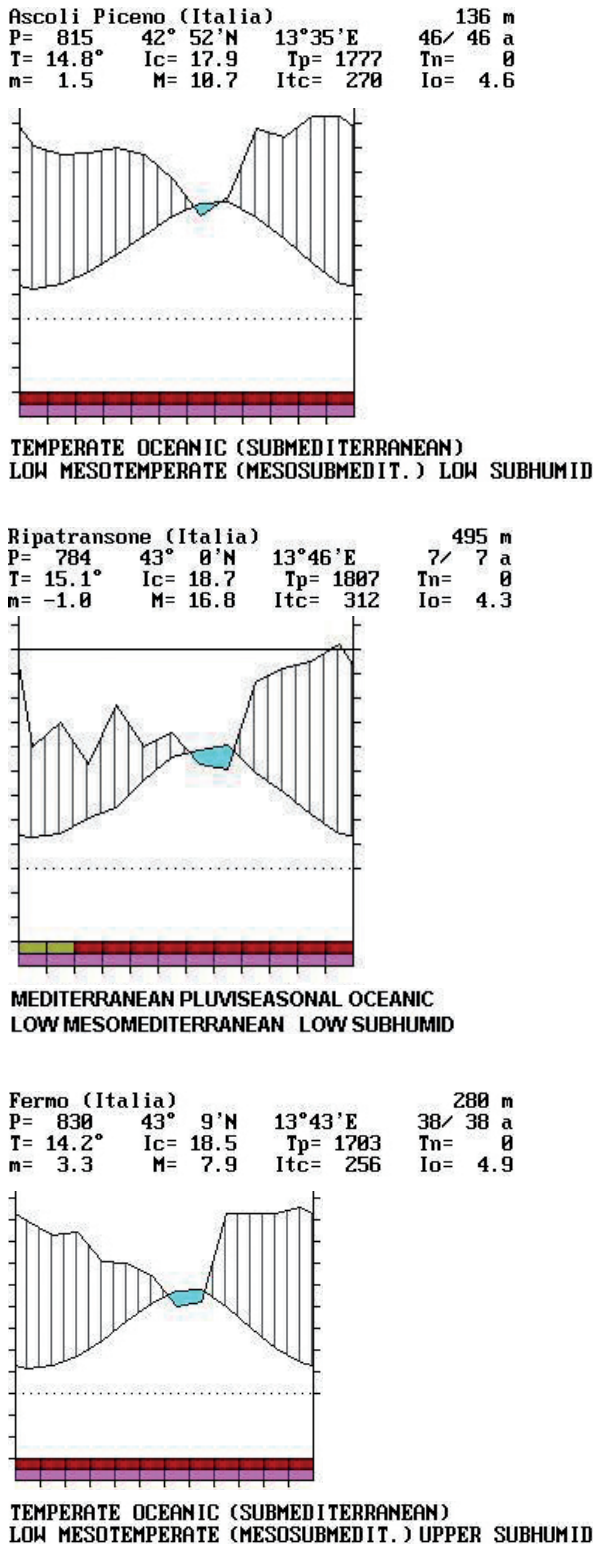


Figure 2: Bioclimatic diagrams and bioclimatic classification of Rivas-Martinez & al. (2001).

Slika 2: Bioklimatski diagrami in bioklimatska členitev po Rivas-Martinez & al. (2001).

2. MATERIALS AND METHODS

The vegetational study here presented was carried out according to the classical Braun-Blanquet method (Braun-Blanquet 1964) and the latter development of the plant landscape and sinphytosociological methodologies (Géhu & Rivas-Martinez 1981; Biondi 1994). The sampling was undertaken in a precise manner, paying specific attention to the variations in the geological and geomorphological characteristics of the soils. For the determination of the species and of their chorological and biological characterisation, the following texts were used: Flora d'Italia (Pignatti 1982) and Flora Europea (Tutin & al. 1964–1980). The classification of the relevés relative to the forest typologies was carried out using the multivariate analysis package of ARCVeG2 (Burba & al. 1992). The methods used were those of complete linkage (Anderberg 1973) on the similarity ratio matrix between the relevés. The ordering of the relevés followed the method proposed by Feoli & Zuccarello (1986, 1988), based on the description of groups of relevés as fuzzy sets (Zadeh 1965) and on their use as ordering axes.

3. RESULTS AND DISCUSSION

3.1 The forest vegetation

Ten Mediterranean and subMediterranean forest typologies were recognized in the study area. The typically Mediterranean forest coenoses are represented by Aleppo pine woods, of the order *Pistacio-Rhamnetalia alaterni*, and by ilex woods and laurel woods, of the alliance *Fraxino ornio-Quercion ilicis*, mainly spread through the sub-coastal sector. The deciduous woods comprise hornbeam and flowering ash woods and subMediterranean oak woods of the suballiance *Lauro nobilis-Quercenion pubescentis*, which in the more internal hill sectors become communities similar to those of the Apennines, of the suballiance *Laburno-Ostryenion carpinifoliae*. Finally, the mesohygrophilous and hygrophilous woods of the river channels are of alder, maple, poplar and willow that can be attributed to the orders *Populetales albae* and *Salicetales purpureae*.

The dendrogram of the relevés given in Figure 3 shows two main groups according to the geomorphological characteristics of the substrata, which in turn determine the water availability for the vegetation. The first group includes the relevés of the Mediterranean and subMediterranean xerophilous

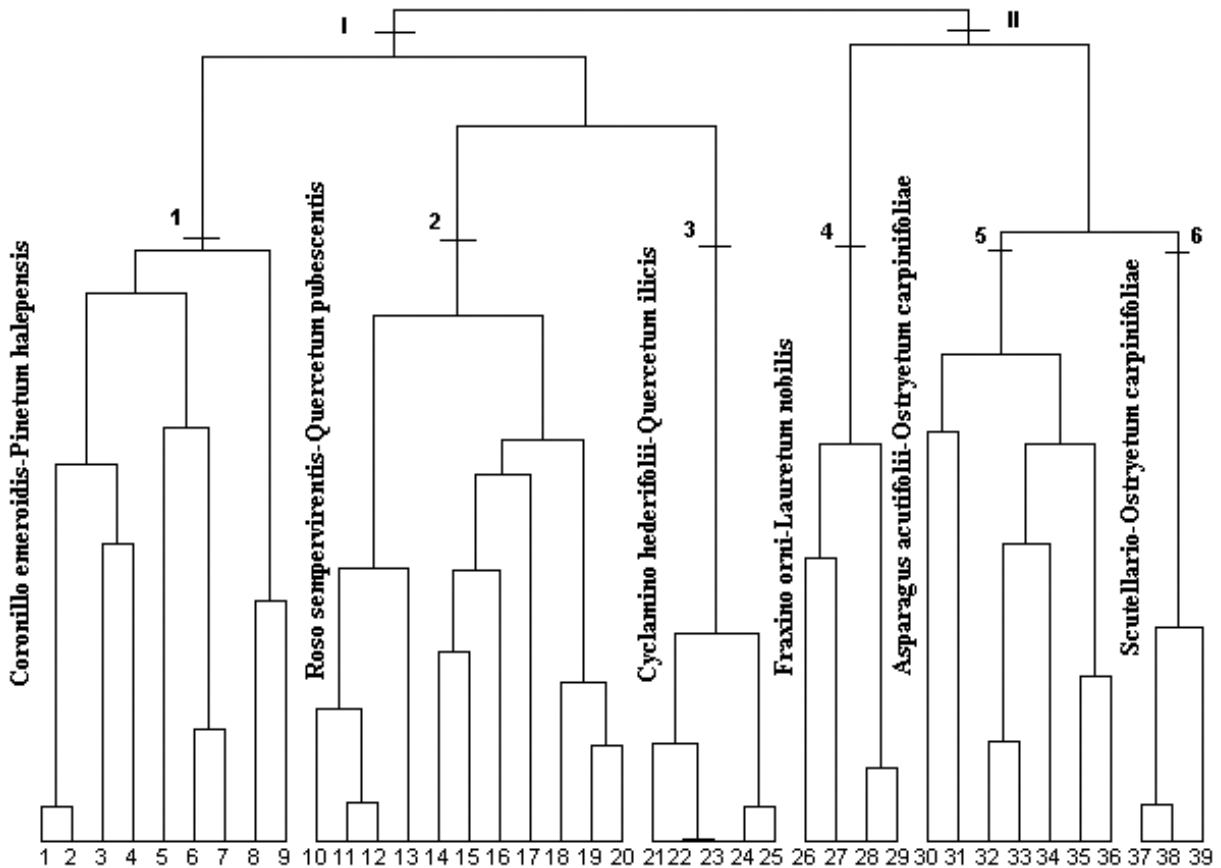


Figure 3: Dendrogram and classification of the forest relevés.
 Slika 3: Dendrogram in klasifikacija popisov gozdne vegetacije.

phytocoenoses, which are typical of the sub-coastal sector with well-drained soils: *Coronillo emeroidis-Pinetum halepensis*, *Roso sempervirentis-Quercetum pubescentis* and *Cyclamino hederifolii-Quercetum ilicis*, which are found on substrata with mainly sandy (arenites and sand, gravel and sand; sandy-lime colluvial deposits) or calcareous (conglomerates) components. The second group of relevés includes instead relatively mesoxerophilous, subMediterranean and pre-Apennine forest typologies that are spread through the more internal hill sector: *Asparagus acutifolii-Ostryetum carpinifoliae* and *Scutellario-Ostryetum carpinifoliae*, which are found on substrata with mainly pelitic components (sandy-lime colluvial deposits, pelitic-arenaceous formations) and consequently on soils with a good water-retention ability. This second group also includes the Mediterranean ravine vegetation of the association *Fraxino ornii-Lauretum nobilis*.

The ordering of the phytocoenoses on the basis of the floristic data along the fuzzy sets reveals the thermal gradient that reaches its maximum with

the forest phytocoenoses of the alliance *Oleo-Cerantonion* (Fig. 4).

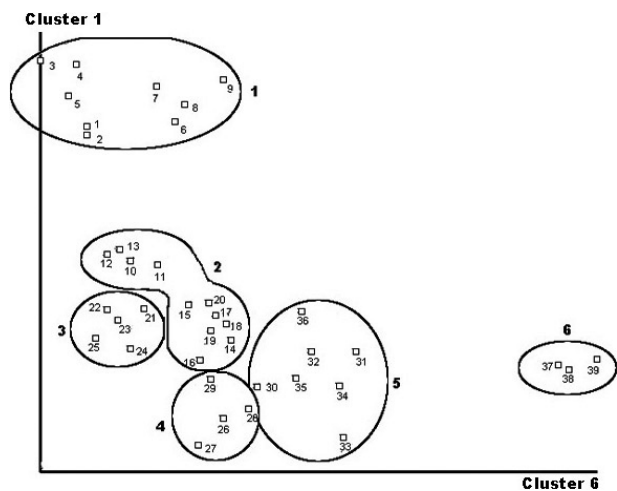


Figure 4: Ordination of the forest associations on the basis of the cluster 1 and 6 fuzzy sets.
 Slika 4: Ordinacija gozdnih asociacij na osnovi klastrov 1 in 6.

Coronillo emeroidis-Pinetum halepensis ass. nova

- *pinetosum halepensis* subass. nova (rel. numbers 1–5 of Table 1; typus rel. number 1 of Table 1)
- *viburnetosum tini* subass. nova (rel. numbers 6–9 of Table 1; typus rel. number 9 of Table 1)

The pine wood of *Pinus halepensis* is frequently found on the sea-facing sandstone paleoclimbs of the sub-coastal sector under study, on arenite and sand in various states of compaction. The structure is that typical of a natural pine wood, with a thin and completely non-coeval tree coverage. In the tree layer, as well as pine, there are also rare examples of *Quercus virgiliana*; in the vine and shrub layer, *Rhamnus alaternus*, *Laurus nobilis*, *Coronilla emeroides* ssp. *emeroides*, *Lonicera etrusca*, *Rubia peregrina*, *Smilax aspera*, etc. are frequently found; while in the herbaceous layer, there is always *Asparagus acutifolius*, as well as *Ampelodesmos mauritanicus*. Table 1 shows the phytosociological relevés carried out in the Marche sub-coastal sector (rel. 1–3), to which have been added those from the Abruzzo sub-hilly sector (rel. 4–9, taken from Pirone 1985). The elaboration of the table reveals the floristic analogy between the defined coenoses, and recognises a new vegetal association that we have named *Coronillo emeroidis-Pinetum halepensis*. The characteristic and differential species of this new association are: *Pinus halepensis*, *Coronilla emeroides* ssp. *emeroides*, *Lonicera etrusca* and *Ampelodesmos mauritanicus*. As well as the typical silicole aspect indicated by the subassociation *pinetosum halepensis*, Table 1 shows the new subassociation *viburnetosum tini* that is differentiated by *Viburnum tinus*, *Fraxinus ornus*, *Carex flacca* and *Stipa bromoides*. This indicates the mesoxerophilous aspect of the association, which is found on substrata in which the sandy component is associated with a certain level of lime and clay. The new association *Coronillo emeroidis-Pinetum halepensis* represents the mesoMediterranean vicariant of the association *Pistacio lentisci-Pinetum halepensis* (De Marco & Caneva 1985) and the siliceous geovicariant of the association *Junipero oxycedri-Pinetum halepensis* described for the coastal sector of Liguria (Vagge 2000).

Roso sempervirentis-Quercetum pubescentis Biondi 1986

- *ampelodesmetosum mauritanici* subass. nova (rel. numbers 1–4; typus rel. number 4 of Table 2)
- *lauretosum nobilis* Biondi & Allegrezza 2004 (rel. numbers 5–11)

In the study area, the oak wood of the association *Roso sempervirentis-Quercetum pubescentis* is found in two main aspects (Table 2). The xerophilous one

of the new subassociation *ampelodesmetosum mauritanici*, differentiated by *Ampelodesmos mauritanicus*, is found at the top of the heights, on lightly compacted to loose gravel and sand or on conglomerates, although in this case it is exclusively on the more level morphologies that allow the conservation of the soil. The mesoxerophilous aspect of the oak wood, referred to the sub-association *lauretosum nobilis*, is instead found on the aspects that are characterised by the presence of sandy-lime colluvial deposits in which the fine component and the lower solar irradiation, which is due to the mainly northern exposure, favour the constant presence of a discrete edaphic humidity.

Cyclamino hederifolii-Quercetum ilicis Biondi, Casavecchia & Gigante 2003

- variant with *Erica arborea* (rel. numbers 2–5 of Table 3)

The holm-oak wood is found on the steep slopes of selective erosion that have caused the emergence of the upper greatly compacted conglomerates. The wood is referred to the association *Cyclamino hederifolii-Quercetum ilicis* (Biondi & al. 2003), which includes ilex woods that are widely spread throughout the coastal areas of the Mediterranean region, and locally in the Apennine areas. The study area includes a silicole variant with *Erica arborea*, differentiated by *Erica arborea* and *Arbutus unedo*, belonging to this association.

Fraxino orni-Lauretum nobilis ass. nova (typus rel. number 3 of Table 4)

Along the ravines that cut perpendicularly across the sandstone paleoclimbs, on damp sandy-lime-colluvial deposits, and in connection with the oak woods and the hornbeam and flowering ash woods of the slopes, there are dense, poor-in-species, high-shrub formations of *Laurus nobilis* accompanied by a high number of vine species characteristic of the alliance *Fraxino orni-Quercion ilicis* (Table 4). *Laurus nobilis* is a species that in the Mediterranean environment prefers microclimatic conditions of high humidity, as are found, indeed, in the ravines and along the narrow valley-like cuts. For these forest communities we propose the new association *Fraxino orni-Lauretum nobilis*, for which the characteristic and differential species are: *Laurus nobilis*, *Fraxinus ornus*, *Rubia peregrina*, *Hedera helix* and *Smilax aspera*. This association is part of the alliance *Fraxino orni-Quercion ilicis* and represents the central-eastern mesomediterranean vicariant of the association *Hedero helicis-Lauretum*

nobilis described for the Cantabrian coast (Bueno Sanchez & Fernandez Prieto 1991).

Asparago acutifolii-Ostryetum carpiniifoliae Biondi 1982
– variant with *Arbutus unedo* (rel. number 7 of Table 5)

The hornbeam and flowering ash wood of the association *Asparago acutifolii-Ostryetum carpiniifoliae* (Table 5) is found at the base of the slopes of the heights in the internal hill sector, on sandy-lime colluvial deposits with a high edaphic humidity. This is a typical submediterranean wood, with a mix of deciduous and evergreen species that is differentiated locally from the typical association by the presence of strictly Mediterranean species, such as *Arbutus unedo*, *Quercus ilex* and *Myrtus communis*. The variant with *Arbutus unedo* (rel. 7 of Table 5) is found on sandy patches.

Scutellario columnae-Ostryetum carpiniifoliae Pedrotti, Ballelli & Biondi ex Pedrotti *et al.* 1980

– *viburnetosum tini* subass. nova (typus rel. number 1 of Table 6)

In the innermost hill sector, in correspondence with the narrow valleys in conditions of high edaphic humidity and on deep and well-structured soils, the hornbeam and flowering ash woods of the association *Asparago-Ostryetum carpiniifoliae* are substituted by those of the association *Scutellario-Ostryetum carpiniifoliae*, here present in the new subassociation *viburnetosum tini* (Table 6). The new subassociation indicates the connection between the Apennine hornbeam and flowering ash woods of the suballiance *Laburno-Ostryenion carpiniifoliae* with those submediterranean of the suballiance *Lauro-Quercenion pubescentis*. The differential species of the new subassociation are considered to be: *Viburnum tinus*, *Rubia peregrina*, *Laurus nobilis*, *Rosa sempervirens* and *Asparagus acutifolius*.

Rubio peregrinae-Aceretum campestris ass. nova (typus rel. number 1 of Table 7)

The forest communities with a dominance of *Acer campestre* (Table 7) is found on the more stable sides of the small valleys cut by seasonal river and water courses, on deep and damp soils and in catenal connection with the poplar wood of *Populus canescens*, of the association *Lauro nobilis-Populetum canescentis*. This is a relatively mesophilous wood with a dominance of *Acer campestre* with *Ulmus minor*, *Quercus virgiliana* and locally with *Populus canescens* and *Salix alba*. In the shrub layer there are: *Rubia peregrina*, *Laurus nobilis*, *Asparagus acutifolius*,

Cornus sanguinea, *Hedera helix*, etc., while in the herbaceous layer, there are: *Brachypodium rupestre*, *Clematis vitalba*, *Carex flacca*, etc. We propose the new association *Rubio peregrinae-Aceretum campestris* of which the characteristic species are considered to be: *Ulmus minor*, *Rubia peregrina*, *Cornus sanguinea* and *Laurus nobilis*.

This new association is considered as a geographic vicariant of *Lithospermo-Ulmetum carpiniifoliae* O. Bolos 1956, described for the Province of Barcelona (Bolos 1956). It is differentiated from the latter by the abundance of *Acer campestre*, *Asparagus acutifolius* and *Quercus virgiliana*, which are considered to be differential species of the new association.

Lauro nobilis-Populetum canescentis ass. nova (typus rel. number 1 of Table 8)

– variant with *Sambucus nigra* (rel. numbers 5–7)

The mesohygrophilous riparian woods with a dominance of *Populus canescens* are found on the recent alluvial terraces of the river beds, on soils characterised by a high edaphic humidity. *Populus canescens*, a hybrid between *Populus alba* and *Populus tremula*, has a typically Eurasiatic distribution; in Italy, the southern limits of its distribution coincide with the most humid areas of Marche and Umbria, up to 600 m. As well as *Populus canescens*, the tree layer of the forest formation includes *Populus nigra*, *Salix alba*, *Salix apennina*, *Ulmus minor*, *Acer campestre*, etc. In the shrub and vine layer, there are: *Laurus nobilis*, *Rubia peregrina*, *Hedera helix*, *Rubus ulmifolius*, *Cornus sanguinea*, *Clematis vitalba*, etc., while the herbaceous layer includes: *Brachypodium sylvaticum*, *Ajuga reptans*, *Stachys sylvatica*, etc. The characteristic and differential species of the new association are considered to be: *Populus canescens*, *Clematis vitalba*, *Laurus nobilis*, *Rubia peregrina*, *Rubus ulmifolius* and *Salix apennina* (Table 8). This association also has a variant with *Sambucus nigra* (rel. 5–7), which is associated with a greater organic matter content of the soils.

Rubo ulmifolii-Salicetum albae ass. nova (typus rel. number 13 of Table 9)

In the beds of the main water courses and in the wide and deep cuts at the base of the badlands, in conditions of constantly wet substratum, there is a riparian forest vegetation with a dominance of *Salix alba* (Table 9). The tree layer of the willow wood is covered by a thick tangle of vines, which includes: *Clematis vitalba*, *Vitis riparia* x *berlandieri*, *Hedera helix*, *Rosa sempervirens* and *Rubia peregrina* ssp. *longi-*

folia. In the shrub layer there are: *Rubus ulmifolius*, *Rubus caesius*, *Ulmus minor*, *Sambucus nigra*, *Cornus sanguinea*, *Salix apennina*, *Acer campestre*, etc., and in the herbaceous layer, there are: *Carex pendula*, *Stachys sylvatica*, *Arum italicum*, *Galium aparine*, etc.

The willow woods with *Salix alba* that are found on the Italian peninsula have been referred to the association *Salicetum albae* Issler 1926, described for the water courses that cross the central European plains, with the exception of those in the meso-mediterranean sectors of Calabria and Sicily, that have been included in the associations *Salicetum albae-brutiae* and *Salicetum albae-pedicellatae*, respectively. The willow woods with *Salix alba* of central Italy, however, do not have the same floristic composition as those of central Europe, in that they are relatively disturbed phytocoenoses in which there are found species with a mainly Mediterranean and Euromediterranean distribution, which allow them to be attributed to a distinct association named *Rubo ulmifolii-Salicetum albae*. Table 9 shows the relevés carried out on the willow woods of some of the rivers of the Adriatic aspect of the Italian peninsula (Pirone 1991; Pirone & al. 1997; Baldoni & Biondi 1993; Allegrezza 2003) that we have attributed to this new association, for which the characteristic species are: *Salix alba*, *Rubus ulmifolius*, *Clematis vitalba* and *Vitis berlandieri x riparia*. Moreover, there are other species that can be considered differential with respect to *Salicetum albae* Issler 1926: *Hedera helix*, *Rubia peregrina* ssp. *longifolia*, *Arum italicum*, *Salix apennina*, *Laurus nobilis*, *Rosa sempervirens* and *Fraxinus oxycarpa*.

This new association, which has been included in the alliance *Salicion albae*, represents the geographic vicariant of the association *Salicetum albae* Issler 1926 of central Europe and of the associations *Salicetum albae-brutiae* and *Salicetum albae-pedicellatae* described for Calabria and Sicily, for the areas with a Mediterranean (mesomediterranean bioclimatic belt) and temperate (submediterranean variant) bioclimate of central Italy.

Lauro-Alnetum glutinosae Brullo & Guarino 1998 (The table is in Manzi 2004: table n. 5)

This association has been described for the surroundings of the Garda Lake, and was that to which Manzi (Table 5 in Manzi 2004) referred the alder woods found in the study area, and those also found by the same author in the Abruzzo coastal sector, delineated by the Moro and Sangro rivers. The riparian wood of *Laurus nobilis* and *Alnus glutinosa* is found locally at the bottom of the valleys

formed by the perennial, although modest, water courses. The association represents the submediterranean vicariant of *Aro italicum-Alnetum glutinosae*, spread throughout the Apennine and pre-Apennine sector of northern-central Italy (Pedrotti & Gafta 1996).

3.2 The pre-forest and shrub vegetation

The numerous associations of pre-forest and shrub vegetation found in the study area belong to four main groups, which are defined on the basis of their floristic and ecological characteristics, and to which various syntaxonomic classifications correspond: *Oleo-Ceratonion*, *Cytisium sessilifolii*, *Pruno-Rubion ulmifolii* and *Salicion eleagni*.

The associations of the first group belong to the alliance *Oleo-Ceratonion*: *Coronillo emeroidis-Ericetum multiflorae* and *Coronillo valentinae-Ampelodesmetum mauritanici*, are found in strictly Mediterranean conditions. In particular, *Coronillo emeroidis-Ericetum multiflorae*, which is differentiated by *Erica multiflora* and *Myrtus communis*, has a specific biogeographical interest, in that these species find here the limit of their northern distribution along the western coast of the Adriatic Sea.

The second group of associations, referred to the alliance *Cytisium sessilifolii*: *Asparago acutifolii-Osyridetum albae* and *Lonicero etruscae-Coronilletum emeroidis*, are found in typically submediterranean conditions, while the third and fourth groups, in which are included the associations *Lonicero etruscae-Cornetum sanguineae* and *Ulmo minoris-Salicetum apenninae*, of the alliances *Pruno-Rubion ulmifolii* and *Salicion eleagni*, respectively, refer to the edaphomesophilous and edaphohygrophilous vegetation of the narrow valleys.

Coronillo emeroidis-Ericetum multiflorae Allegrezza, Biondi, Ballelli & Formica 1997

- *ericetosum arboreae* subass. nova (rel. numbers 1–11; typus rel. number 6 of Table 10)
- variant with *Colutea arborescens* (rel. 1–3 of Table 10)
- variant with *Myrtus communis* (rel. 8–11 of Table 10)

This shrub vegetation is in dynamic connection with the ilex woods of the association *Cyclamino herifolii-Quercetum ilicis*. It is constituted by: *Coronilla emeroides* ssp. *emeroides*, *Spartium junceum*, *Juniperus oxycedrus*, *Pistacia lentiscus*, *Erica arborea* and *Erica multiflora*, with a strong presence of *Ampelodesmos*

mauritanicus. The association has been described for the Valle del Serra in Umbria (Allegrezza & al. 1997), and in the study area it is included in the new subassociation *ericetosum arboreae*, with a silicole character, in that it develops on the upper conglomerates and sands. The species that are considered to be differential of the new subassociation are: *Erica arborea*, *Ampelodesmos mauritanicus* and *Cistus salvifolius*. Two variants of this are given in Table 10, which demonstrate the structural succession of the vegetation: the variants with *Colutea arborescens* and with *Myrtus communis*. The former represents the pioneering aspect of the association, and it is characterised by a strong presence of hemicryptophytes, among which there is *Ampelodesmos mauritanicus*. The latter variant, with *Myrtus communis*, highlights the more mature aspect of the phytocoenosis, which has in this case a high-shrub physiognomy. This more mature aspect was included by Manzi (2004) in the association *Myrto-Ericetum multiflorae* described for Lucania (Fascetti 1997). The comparison between the phytosociological tables reveals, however, that the Lucania vegetation has a greater thermophilous and Mediterranean quality, as indicated by a group of species with a thermo-Mediterranean distribution, including: *Arisarum vulgare*, *Olea europaea* var. *sylvestris* and *Prasium majus*, which were not seen in the present study area. We therefore conclude that this above-mentioned feature can be included in the variant with *Myrtus communis* of the association indicated above.

Coronillo valentinae-Ampelodesmetum mauritanici Biondi 1986

- *ampelodesmetosum mauritanici* subass. nova (rel. numbers 1–2 of Table 11; typus rel. number 5 of Table 8 in Biondi, 1986 – subass. typus)
- *pinetosum halepensis* subass. nova (rel. numbers 3–4 of Table 11; typus rel. number 4 of Table 11)

The vegetation belonging to this association has been described for Monte Conero (Biondi 1986), and in the study area it is found on the south-facing sandstone paleocliffs, on sandy and well-drained soils, as well as in conditions of greater humidity due to patches of lime and clay, which are present on the sea-facing slopes. In the first of these conditions, even if it is impoverished by the absence of *Coronilla valentina*, the vegetation has a typical feature (rel. 1–2) that is referred, in this paper, to the new subassociation *ampelodesmetosum mauritanici*. On conditions characterized by greater humidity, the subassociation *pinetosum halepensis* is found, differentiated by: *Pinus halepensis*, *Quercus virgiliana*, *Arundo plini-*

ana and *Pulicaria odora*. The *pinetosum halepensis* subassociation corresponds to permanent vegetation, in that the continuing erosive phenomena actually impede its evolution towards the forest vegetation.

Asparago acutifolii-Osyridetum albae Allegrezza, Biondi, Ballelli & Formica 1997

In contact with the thermoxerophilous oak wood of the association *Roso sempervirentis-Quercetum pubescentis* subassociation *ampelodesmetosum mauritanici*, there is locally a pre-mantle of *Osyris alba* of the association *Asparago acutifolii-Osyridetum albae* (Table 12), of the alliance *Cytision sessilifolii*.

Lonicero etruscae-Coronilletum emeroidis ass. nova (typus rel. number 4 of Table 13)

The mesoxerophilous vegetation mantle with *Coronilla emerus* ssp. *emeroides* of the association that is proposed is found in contact with the oak woods of the association *Roso sempervirentis-Quercetum pubescentis* subass. *lauretosum nobilis* and the hornbeam and flowering ash woods of the association *Asparago acutifolii-Ostryetum carpiniifoliae*. This association dominated by *Coronilla emerus* ssp. *emeroides*, represents the submediterranean vicariant of the association *Spartio juncei-Cytisetum sessilifolii*. The characteristic and differential species of the association are: *Lonicera etrusca*, *Rubia peregrina* and *Smilax aspera*.

Lonicero etruscae-Cornetum sanguineae Biondi, Bagella, Casavecchia & Pinzi 2002

This association has been described for the dense phytocoenoses of *Cornus sanguinea* that are found on the marl-arenaceous cliffs of Monte Conero (Biondi & al. 2002), and in the study area it is found mainly on the damp, clayey substrata of the steeper slopes that are suffering from erosive phenomena. With respect to its analogous phytocoenosis of Monte Conero, this association is differentiated by the presence of *Populus canescens*, *Populus tremula* and *Salix apennina*, which indicate the high water content of the substratum (Table 14).

Ulmo minoris-Salicetum apenninae Biondi & Vagge 2004

In contact with the poplar wood of the association *Lauro nobilis-Populetum canescentis* and locally with the willow wood of the association *Rubio ulmi-folii-Salicetum albae*, there is a high-shrub, pre-forest formation of *Salix apennina* and *Ulmus minor* with: *Rubus caesius*, *Cornus sanguinea*, etc. This can be referred to the association *Ulmo minoris-Salicetum apenninae* (Table 15), which has been described for

the analogous phytocoenoses of the San Marino territory (Biondi & Vagge 2004). *Salix apennina*, endemic in the Apennines, is mainly found along the water courses of the supra-temperate bioclimatic belt, where two associations have been described: *Salicetum apenninae* Pedrotti, Spada & Conti 1996 for the Abruzzo sector, and *Lonicero xylostei-Salicetum apenninae* Biondi & Casavecchia 2002 for the Marche-Tuscany sector.

3.3 The garigue

The garigue associations identified in the study area have been included in the alliance *Cisto eriocephali-Ericion multiflorae* that groups together the nanophanerophytic and chamaephytic vegetations present along the central-southern coasts of the Italian peninsula and on the main islands, in the thermomediterranean and mesomediterranean bioclimatic belts (Biondi 2000).

Asperulo aristatae-Fumanetum thymifoliae Allegrezza, Biondi, Ballelli & Formica 1997

– variant with *Cistus creticus* ssp. *eriocephalus* (rel. numbers 2–4 of Table 16)

In correspondence with the emergence of the heavily compacted upper conglomerates and arenites, there is the dense, small, chamaephytic vegetation of *Fumana thymifolia* and *Micromeria graeca* that is referred to the association *Asperulo aristatae-Fumanetum thymifoliae* (Table 16). In the conditions of a sandy substratum that is relatively loose, the association is present in the variant with *Cistus creticus* ssp. *eriocephalus* (rel. numbers 2–4).

Asperulo aristatae-Cistetum eriocephali ass. nova (typus rel. number 2 of Table 17)

The low-shrub garigue of *Cistus creticus* ssp. *eriocephalus* (Table 17) is present in the summit sectors of the hills, on substratum constituted by gravel and lightly compacted sand, and in dynamic connection with the xerophilous oak woods of the association *Roso sempervirentis-Quercetum pubescentis* subass. *ampelodesmetosum mauritanici*. This new association, for which the characteristic and differential species are considered to be: *Cistus creticus* ssp. *eriocephalus*, *Asperula aristata* and *Spartium junceum*, represents the Mediterranean vicariant on siliceous substrata of the association *Saturejo montanae-Cistetum eriocephali*, which has been described for the Marche heights of Monte San Vincino (Allegrezza 2003).

Cistetum eriocephali-salvifolii ass. nova (typus rel. number 3 of Table 18)

– variant with *Agropyron pungens* (rel. numbers 1–3 of Table 18)

On the summits of the sandstone paleocliffs and in correspondence with loose sandy deposits, a low-shrub garigue of *Cistus salvifolius* and *Cistus creticus* ssp. *eriocephalus* is found, which is referred to the new association *Cistetum eriocephali-salvifolii* (Table 18), for which these same species are considered as characteristic. Within this association, the alophilous variant with *Agropyron pungens* has been identified (rel. 1–3), in the relevés from the Abruzzo coast (rel. 1–3 of Table 3 from Tammaro & Pirone 1981). The dynamic connection of the garigue with the pine wood of the association *Coronillo emeroidis-Pinetum halepensis* is indicated by the constant presence of *Pinus halepensis* in the shrub layer.

3.4 Perennial herbaceous vegetation

Among the perennial herbaceous phytocoenoses present in the sub-coastal Mediterranean sector of the study area, the vegetation of *Cymbopogon hirtus* and the sub-nitrophilous, post-cultivation vegetation of *Oryzopsis miliacea* are of particular biogeographical interest. These are two species that are widely spread in the thermomediterranean and mesomediterranean regions of southern Italy and of the islands, and they both have particularly nitrophilic characters and are considered characteristic of the alliances *Hypparrention hirtae* and *Bromo-Oryzopsision miliaceae*, respectively. In the study area, as the same species are at the margins of their distribution area along the Italian Adriatic coast, they belong to the submediterranean alliance *Inulo viscosae-Agropyron repentis*.

Scabioso maritimae-Cymbopogonetum hirti ass. nova (typus rel. number 3 of Table 19)

On the slopes of the sub-coastal sandstone paleocliffs, in the areas not occupied by the pine wood of the association *Coronillo emeroidis-Pinetum halepensis*, there is a steppe grassland of *Cymbopogon hirtus* (Table 18) that is rare in the Marche, where it is localised to the southern sector. We propose the new association *Scabioso maritimae-Cymbopogonetum hirti*, for which the characteristic species are considered to be: *Cymbopogon hirtus*, *Scabiosa maritima* and *Silene vulgaris* ssp. *angustifolia*, with that differential being *Micromeria graeca*.

Agropyro repentis-Oryzopsietum miliaceae ass. nova (typus rel. number 1 of Table 20)

The post-cultivation grassland of *Oryzopsis miliacea* and *Agropyron repens* that is found on mainly sandy-lime soils is referred to this new association.

The characteristic and differential species of the proposed new association are considered to be: *Oryzopsis miliacea*, *Agropyron repens*, *Calamintha nepeta*, *Pallenis spinosa* and *Foeniculum vulgare* ssp. *pipperitum*. This grassland is of noted biogeographical interest along the Italian Adriatic aspect, in that it indicates the change from the coenoses of the sub-Mediterranean alliance *Inulo viscosae-Agropyron repentis*, to which this vegetation is referred, to those coenoses of the alliance *Bromo-Oryzopsion miliaceae*, which are widely spread through the Mediterranean region of central-southern Italy.

Agropyro-Asteretum linosyris Ferrari 1971

In the study area, this association is found in the higher and more eroded sectors of the sides of the badlands that are widely spread throughout the innermost hill sector. This is a perennial pioneering vegetation consisting of few species, which includes: *Podospermum laciniatum*, *Elytrigia atherica* and *Aster linosyris*, which are considered the characteristic and differential species of the association and of the suballiance *Podospermo laciniati-Elytrigenion athericae* (Table 21).

Epilobio tetragoni-Elymetum pycnanthi Biondi, Ballelli, Allegrezza & Manzi 1990

This association has been described for the badlands of Gessopalena in Abruzzo (Biondi & al. 1990), and in the study area, it is found in the more stable or less eroded parts at the base of the badlands along the fall lines where the lime-clayey slides are collected. In these conditions the vegetation consists of rather dense and continuous grasslands with a dominance of *Elytrigia atherica*, with the constant presence of *Inula viscosa*, *Pulicaria dysenterica*, *Senecio erucifolius* and *Aster linosyris* (Table 22).

3.5 The therophitic vegetation

Ononido reclinatae-Plantaginetum bellardii ass. nova (Typus rel. number 2 of Table 23)

In the openings of the garigue of *Cistus creticus* ssp. *eriocephalus* and *Cistus salvifolius*, on the loose sands, there is a therophitic spring-flowering Mediterranean vegetation with a dominance of *Plantago bellardii* with *Vulpia ciliata*, *Ononis reclinata*, *Lagu-*

rus ovatus, *Medicago coronata* and *Hippocrepis ciliata*, which are considered the characteristic and differential species of the new association *Ononido reclinatae-Plantaginetum bellardii* (Table 23). This new association represents the geographic vicariant of the associations: *Trifolio cherleri-Plantaginetum bellardii* Rivas Goday 1958 and *Helianthemo-Plantaginetum bellardii*, which are widely spread throughout the Iberian peninsula and Mediterranean France, respectively.

The vegetation of *Plantago bellardii* in the study area is in part substituted in the summer-autumn period by another therophitic vegetation with few species, of *Tragus racemosus*.

3.6 Syntaxonomic scheme

Artemisietea vulgaris Lohmeyer, Preising & Tuxen in Tuxen 1950

Agropyretalia repentis Oberdorfer, Muller & Gors in Oberdorfer, Gors, Korneck, Lohmeyer, Muller, Philippi & Seibert 1967

Inulo viscosae-Agropyron repentis Biondi & Allegrezza 1996

Inulo viscosae-Agropyrenion repentis Biondi & Pesaresi 2004

Agropyro repentis-Oryzopsietum miliaceae ass. nova

Scabioso maritimae-Cymbopogonetum hirti ass. nova

Epilobio tetragoni-Elymetum pycnanthi Biondi, Ballelli, Allegrezza & Manzi 1990

Podospermo laciniati-Elytrigenion athericae (Pirone 1995) Biondi & Pesaresi 2004

Agropyro-Asteretum linosyris Ferrari 1971

Helianthemetea guttati (Br.-Bl. in Br.-Bl., Roussine & Nègre 1952) Rivas Goday & Rivas-Martínez 1963 em. Rivas-Martínez 1978

Helianthemetalia guttati Br.-Bl. in Br.-Bl., Molinier & Wagner 1940

Helianthemion guttati Br.-Bl., in Br.-Bl., Molinier & Wagner 1940

Ononido reclinatae-Plantaginetum bellardii ass. nova

Rosmarinetea officinalis Rivas-Martínez, Diaz, Prieto, Loidi & Penas 1991

Rosmarinetalia officinalis Br.-Bl. ex Molinier 1934

Cisto-Ericion multiflorae Biondi 2000

Asperulo aristatae-Fumanetum thymifoliae

- Allegrezza, Biondi, Formica & Ballelli 1997
Cistus creticus ssp. *eriocephalus* variant
Asperulo aristatae-Cistetum eriocephali ass. nova
Cistetum eriocephali-salvifolii ass. nova
- Rhamno-Prunetea* Riv.-Goday & Borja ex Tx. 1962
Prunetalia spinosae R. Tx. 1952
Cytisium sessilifolii Biondi 1988
Asparago acutifolii-Osyridetum albae Allegrezza, Biondi, Formica & Ballelli 1997
Lonicero etruscae-Coronilletum emeroidis ass. nova
Berberidion vulgaris Br. Bl. 1950
Pruno-Rubion ulmifolii O. Bolos 1954
Lonicero etruscae-Cornetum sanguineae Biondi, Bagella, Casavecchia & Pinzi 2002
- Salici purpureae-Populetea nigrae* (Rivas-Martínez & Cantó ex Rivas-Martínez, Bascónes, T. E. Díaz, Fernández-González & Loidi) Rivas-Martínez, Fernández-González, Loidi, Lousa & Penas 2001
Populetalia albae Br.-Bl. ex Tchou 1948
Alno-Quercion roboris Horvat 1950
Lauro nobilis-Alnetum glutinosae Brullo & Guarino 1998
Populion albae Br.-Bl. ex Tchou 1948
Lauro nobilis-Populetum canescentis ass. nova
Salicetalia purpureae Moor 1958
Salicion albae Soo 1930
Rubo ulmifolii-Salicetum albae ass. nova
Salicion eleagni Aichinger 1933
Ulmo minoris-Salicetum apenninae Biondi & Vagge 2004
- Quercetea ilicis* Br.-Bl. ex A. & O. Bolòs 1950
Quercetalia ilicis Br.-Bl. ex Molinier 1934
Fraxino orni-Quercion ilicis Biondi Casavecchia & Gigante 2003
Cyclamino hederifolii-Quercetum ilicis Biondi, Casavecchia & Gigante 2003
Erica arborea variant
Fraxino orni-Lauretum nobilis ass. nova
Pistacio lentisci-Rhamnetalia alaterni Riv.-Mart. 1975
Oleo-Ceratonion Br.-Bl. 1936 em. Riv.-Mart. 1975
- Coronillo emeroidis-Pinetum halepensis* ass. nova
Coronillo emeroidis-Ericetum multiflorae Allegrezza, Biondi, Formica & Ballelli 1997
ericetosum arboreae subass. nova
Colutea arborescens variant
Myrtus communis variant
Coronillo valentinae-Ampelodesmetum mauritanici Biondi 1986
ampelodesmetosum mauritanici subass. nova
pinetosum halepensis subass. nova
- Quercio-Fagetea* Br.-Bl. & Vlieger in Vlieger 1937
Quercetalia pubescentis-petraeae (Klika 1933) corr. Blasi, Di Pietro & Filesi 2004
Carpinion orientalis Horvat 1958
Lauro nobilis-Quercion pubescentis Ubaldi 1995
Roso sempervirentis-Quercetum pubescentis Biondi 1986
ampelodesmetosum mauritanici subass. nova
lauretosum nobilis Biondi & Allegrezza 2004
Asparago acutifolii-Ostryetum carpinifoliae Biondi 1982
Arbutus unedo variant
Rubio peregrinae-Aceretum campestris ass. nova
Laburno-Ostryenion carpinifoliae (Ubaldi 1981) Blasi, Di Pietro & Filesi 2004
Scutellario columnae-Ostryetum carpinifoliae Pedrotti, Ballelli & Biondi ex Pedrotti *et al.* 1980
viburnetosum tini subass. nova

4. CONCLUSIONS

This phytosociological analysis has revealed the great phytocoenotic diversity and the high biogeographical value of the study area, which is positioned at the border between Mediterranean and temperate bioclimatic regions, and which is characterised by geomorphological conditions of great variability. In these conditions, this phytosociological analysis has revealed the local variations within each lithological unit, confirming the close relationship between vegetation and substratum and the great value of vegetal associations as bio-indicators (Biondi *et al.*, 1999; Zuccarello *et al.*, 1999).

5. SUMMARY

A phytosociological analysis of the vegetation of the central adriatic sector of the italian peninsula

The aim of the present study is the phytosociological analysis of the vegetation in a sub-coastal hill sector that is delineated by the Aso and Tesino river basins, in southern Marche, in the Province of Ascoli Piceno, as a basis for synphytosociological and geosynphytosociological studies. This phytosociological analysis has revealed the great phytocoenotic diversity and the high biogeographical value of the study area, which is positioned at the border between Mediterranean and temperate bioclimatic regions, and which is characterised by geomorphological conditions of great variability.

Ten Mediterranean and subMediterranean forest typologies were revealed in the study area, among which we propose the following new associations: *Coronillo emeroidis-Pinetum halepensis*, *Fraxino ornii-Lauretum nobilis*, *Rubio peregrinae-Aceretum campestris*, *Lauro nobilis-Populetum canescentis*, *Rubio ulmifolii-Salicetum albae*. The typically Mediterranean forest coenoses are represented by Aleppo pine woods, of the order *Pistacio-Rhamnetalia alaterni*, and by ilex woods and laurel woods, of the alliance *Fraxino ornii-Quercion ilicis*, mainly spread through the sub-coastal sector. The deciduous woods comprise hornbeam and flowering ash woods and sub-mediterranean oak woods of the suballiance *Lauro nobilis-Quercenion pubescentis*, which in the more internal hill sectors become communities similar to those of the Apennines, of the suballiance *Laburno-Ostryenion carpinifoliae*. Finally, the mesohygrophilous and hygrophilous woods of the river channels are of alder, maple, poplar and willow that can be attributed to the orders *Populetalia albae* and *Salicetalia purpureae*.

The numerous associations of pre-forest and shrub vegetation found in the study area belong to four alliance: *Oleo-Ceratonion*, *Cytision sessilifolii*, *Pruno-Rubion ulmifolii* and *Salicion eleagni*. In particular, *Coronillo emeroidis-Ericetum multiflorae*, which is differentiated by *Erica multiflora* and *Myrtus communis*, is of specific biogeographical interest, in that these species find here the limit of their northern distribution along the western coast of the Adriatic Sea.

The garigue associations identified in the study area have been included in the alliance *Cisto eriocephali-Ericion multiflorae*, among which we propose the following new associations: *Asperulo aristatae-Cistetum eriocephali* and *Cistetum eriocephali-salvifolii*.

Among the perennial herbaceous phytocoenoses present in the sub-coastal Mediterranean sector of the study area, the vegetation of *Cymbopogon hirtus* and the sub-nitrophilic, post-cultivation vegetation of *Oryzopsis miliacea* are of particular biogeographical interest. In the study area, as the same species are at the margins of their distribution area along the Italian Adriatic coast, they are a part of the vegetation of the submediterranean alliance *Inulo viscosae-Agrophyron repentis*, among which we propose the following new associations: *Scabioso maritimae-Cymbopogonetum hirti* and *Agropyro repentis-Oryzopsietum miliaceae*. Finally, for the therophitic spring-flowering Mediterranean vegetation that is present in the openings of the garigue of *Cistus creticus* ssp. *eriocephalus* and *Cistus salvifolius*, on the loose sands, are proposed the new association *Ononido reclinatae-Plantaginietum bellardii*.

6. LOCALITIES AND SPORADIC SPECIES

Tab. 1 – *Coronillo emeroidis-Pinetum halepensis*

Localities: rel. 1–3: San Basso hill 5/07/04; rel. 4–9: hill-side near to Pescara, da Pirone (1985).

Sporadic species: rel. 1: *Arundo pliniana* Turra +; rel. 2: *Agropyron repens* (L.) Beauv. 1.2; rel. 3: *Cistus creticus* L. subsp. *eriocephalus* (Viv.) Greuter & Burdet +.2; rel. 4: *Cornus sanguinea* L. +, *Hedera helix* L. 2.3, *Lonicera japonica* Thunb +.2, *Ailanthus altissima* (Miller) Swingle +, *Ficus carica* L. +; rel. 5: *Teucrium chamaedrys* L. +.2, *Buxus sempervirens* L. +, *Prunus avium* L. 1.2, *Lonicera japonica* Thunb 1.2, *Ailanthus altissima* (Miller) Swingle +, *Brachypodium rupestre* (Host) R. et S. +.2, *Torylis arvensis* (Hudson) Link +; rel. 6: *Brachypodium rupestre* (Host) R. et S. 1.2; rel. 7: *Osyris alba* L. 1.2, *Dorycnium hirsutum* (L.) Ser. +.2; rel. 8: *Ligustrum vulgare* L. 1.2; rel. 9: *Ligustrum vulgare* L. +.2, *Clematis vitalba* L. +.2.

Tab. 2 – *Roso sempervirentis-Quercetum pubescentis*

Localities: rel. 1: At the top of the sandstone paleocliffs on the hydrographic left of the Riganello creek (12/09/04), rel. 2: San Basso hill (12/09/04), rel. 3–4: At the top of the sandstone paleocliffs from Montefiore Aso to Cupramarittima (10/09/02), rel. 4: San Basso hill (08/09/04), rel. 6: sandstone paleocliffs near Cupramarittima (12/09/04), rel. 7–9: Ripatranzone (30/07/02), rel. 10: S. Maria Petrella (30/07/02); rel. 11: Ripatranzone (24/07/02).

Sporadic species: rel. 1: *Pinus halepensis* Miller 1.2, *Myrtus communis* L. 3.4, *Cistus creticus* L. subsp. *eriocephalus* (Viv.) Greuter & Burdet +, *Agropyron repens* (L.) Beauv. 1.2, *Spartium junceum* L. +, *Teucrium chamaedrys* L. 1, 2, *Arundo pliniana* Turra 2.2; rel. 2: *Inula conyza* DC. +, *Brachypodium rupestre* (Host) R. et S. +, *Smyrniolum olusatrum* L. +; rel. 4: *Erica arborea* L. +.2, *Robinia pseudoacacia* +.2; rel. 5: *Limodorum abortivum* (L.) Swartz +, *Ailanthus altissima* (Miller) Swingle +; rel. 6: *Prunus spinosa* L. +, *Malus sylvestris* Miller +.2; rel. 7: *Arundo pliniana* Turra 4.5, *Cistus salviifolius* L. +.2, *Spartium junceum* +; rel. 8: *Sambucus nigra* L. +; rel. 10 – *Brachypodium sylvaticum* (Hudson) Beauv. +.2, *Sambucus nigra* L. +.2, *Inula conyza* DC. +, *Osyris alba* L. +.2, *Glechoma hederacea* L. +; rel. 11: *Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker +, *Prunus avium* L. +, *Quercus dalechampii* Ten. 2.2, *Lilium bulbiferum* L. ssp. *croceum* (Chaix) Baker +, *Prunus spinosa* L. 1.2, *Cytisus sessilifolius* L. (+.2), *Erica arborea* L. +, *Carex hallerana* Asso +, *Carex flacca* Schreber +.

Tab. 3 – *Cyclamino hederifolii-Quercetum ilicis*

Localities: rel. 1–2: Pietrasciliana (23/07/02); rel. 3: San Vincenzo (24/07/02); rel. 4: Pietrasciliana (23/07/02); rel. 5: Pietrasciliana (30/07/02).

Tab. 4 – *Fraxino orni-Lauretum nobilis*

Localities: rel. 1–2: San Basso hill (08/09/04); rel. 3: San Basso hill (12/09/04); rel. 4: right hydrographic side of the Riganello creek (12/09/04). Sporadic species: rel. 1: *Arum italicum* Miller 1.2, *Euonymus europaeus* L. +; rel. 2: *Salix purpurea* L. +.2; rel. 3: *Arum italicum* Miller +, *Acer campestre* L. +.2, *Cornus sanguinea* L. 1.2, *Clematis vitalba* L. 2.3, *Ostrya carpinifolia* Scop. +.2, *Ligustrum vulgare* L. +, *Crataegus monogyna* Jacq. 1.2, *Solanum nigrum* L. +; rel. 4: *Ulmus minor* Miller 2.2, *Prunus avium* L. +, *Acer campestre* L. +, *Cornus sanguinea* L. 2.3, *Clematis vitalba* L. 1.2, *Ballota nigra* L. +, *Arundo pliniana* Turra +.2, *Inula conyza* DC. +.

Tab. 5 – *Asparago-Ostryetum carpinifoliae*

Localities: rel. 1: Santa Maria Petrella (20/07/04), rel. 2–5: From Ripatranzone to the sea (18/07/04), rel. 6: San Basso hill (08/09/04), rel. 7: From left hydrographic side of the Sant'Egidio torrent to Ripatranzone (03/10/02). Sporadic species: rel. 1: *Erica arborea* +.2, *Juniperus oxycedrus* +.2, *Cephalanthera longifolia* +, *Prunus spinosa* L. +, *Carex flacca* Schreber ssp. *flacca* 1.2, *Ampelodesmos mauritanicus* (Poiret) Dur. et Sch. 1.2, *Solidago virgaurea* L. +, *Crataegus monogyna* Jacq. +.2,

Chamaecytisus hirsutus (L.) Link +; rel. 2: *Pyracantha coccinea* M. J. Roemer 1.2, *Carex flacca* Schreber ssp. *flacca* +.2, *Ampelodesmos mauritanicus* (Poiret) Dur. et Sch. 1.2; rel. 3: *Brachypodium sylvaticum* (Hudson) Beauv. +.2, *Pyracantha coccinea* M. J. Roemer 1.1, *Helleborus foetidus* L. +, *Osyris alba* L. +; rel. 4: *Clematis vitalba* L. +; rel. 5: *Dactylis glomerata* L. +; rel. 6: *Brachypodium sylvaticum* (Hudson) Beauv. +.2, *Quercus cerris* L. 1.2; rel. 7: *Prunus spinosa* L. +, *Melittis melissophyllum* L. +, *Cornus mas* L. +, *Ruscus aculeatus* L. 1.2, *Carex digitata* L. 1.2, *Ajuga reptans* L. +, *Acer obtusatum* W. et K. 2.3.

Tab. 6 – *Scutellario-Ostryetum carpinifoliae*

Localities: rel. 1–3: The Frati wood (Ripatranzone) (15/10/02).

Sporadic species: rel. 1: *Cornus sanguinea* L. +.2, *Lonicera etrusca* Santi +, *Clematis vitalba* L. +.2, *Fragaria vesca* L. +.2, *Geum urbanum* L. +, *Carex flacca* Schreber ssp. *flacca* 1.2, *Arabis turrata* L. +, *Stachys officinalis* (L.) Trevisan +.2, *Chamaecytisus hirsutus* (L.) Link +, *Cytisus sessilifolius* L. +, *Ornithogalum sphaerocarpon* Kerner +, *Smilax aspera* L. 1.2, *Quercus ilex* L. +, *Ulmus minor* Miller +.2, *Primula vulgaris* Hudson 1.2, *Tamus communis* L. +.2, *Castanea sativa* Miller 1.1; rel. 2: *Cornus sanguinea* L. 1.2, *Lonicera etrusca* Santi 1.2, *Clematis vitalba* L. 1.2, *Fragaria vesca* L. +, *Geum urbanum* L. 1.1, *Carex flacca* Schreber ssp. *flacca* +.2, *Arabis turrata* L. +.2, *Stachys officinalis* (L.) Trevisan +, *Asplenium adiantum-nigrum* L. 1.2, *Bromus ramosus* Hudson 1.1, *Campanula trachelium* L. +.2, *Inula conyza* DC. +, *Agrimonia eupatoria* L. +, *Ajuga reptans* L. +.2, *Ptilostemon strictus* (Ten.) Greuter +, *Serratula tinctoria* L. +, *Vinca minor* L. 1.3; rel. 3: *Asplenium adiantum-nigrum* L. 1.1.

Tab. 7 – *Rubio peregrinae-Aceretum campestre*

Localities: rel. 1: Sant'Imero (04/07/03), rel. 2–4: Sant'Imero (28/10/03), rel. 5: Sant'Imero (04/07/03), rel. 6: Ripatranzone (13/06/03). Sporadic species: rel. 1: *Ajuga reptans* L. +.2, *Dactylis glomerata* L. +.2, *Geum urbanum* L. +, *Lonicera caprifolium* L. 2.3, *Malus sylvestris* Miller +; rel. 2: *Pyrus pyraeaster* Burgsd. +.2, *Lathyrus aphaca* L. +; rel. 3: *Sambucus nigra* L. +; rel. 4: *Senecio erucifolius* L. +; rel. 5: *Crataegus monogyna* Jacq. +; rel. 6: *Arundo pliniana* Turra +.2, *Pallenis spinosa* (L.) Cass. +, *Quercus ilex* L. 1.2, *Spartium junceum* L. +, *Viburnum tinus* +.2.

Tab. 8 – *Lauro nobilis-Populetum canescentis*

Localities: rel. 1: Sant'Imero (15/10/02), rel. 2–3: Sant'Imero (04/07/03), rel. 4: Santa Maria

Petrella (20/07/04), rel. 5–7: Sant’Imero creek (20/07/04).

Sporadic species: rel. 1: *Prunus avium* L. +, *Crataegus monogyna* Jacq. 1.2, *Sorbus domestica* L. 1.2, *Calystegia sepium* (L.) R. Br. +; rel. 2: *Crataegus monogyna* Jacq. +, *Ligustrum vulgare* L. +2, *Lonicera xylosteum* L. +2, *Juglans regia* L. +, *Corylus avellana* L. +, *Rubus corylifolius* +2, *Ajuga reptans* L. 1.2, *Prunus spinosa* L. 1.1, *Stachys sylvatica* L. +2, *Geum urbanum* L. +; rel. 3: *Prunus avium* L. 2.3, +, *Ligustrum vulgare* L. 1.2, *Lonicera xylosteum* L. 1.2, *Juglans regia* L. +, *Pyracantha coccinea* M. J. Roemer +2, *Lonicera caprifolium* L. +, *Polystichum setiferum* (Forsskal) Woyнар +, *Phragmites australis* (Cav.) Trin. +2; rel. 4: *Franinus ornus* L. +2, *Malus sylvestris* Miller +, *Lonicera etrusca* Santi +2, *Ampelodesmos mauritanicus* (Poiret) Dur. Et Sch. +2; rel. 5: *Stellaria media* (L.) Vill. +, *Rubus corylifolius* Sm. +2, *Prunus spinosa* L. +, *Urtica dioica* L. 1.2, *Poa trivialis* L. +2, *Lamium maculatum* L. +, *Chelidonium majus* L. +; rel. 6: *Stellaria media* (L.) Vill. +; rel. 7: *Corylus avellana* L. +2, *Prunus spinosa* L. +, *Poa trivialis* L. +.

Tab. 9 – *Rubus ulmifolii-Salicetum albae*

Localities: rel. 1–2: Pescara river, da Tab. 30 in Pirone, Frattaroli & Corbetta (1997); rel. 3–5: Saline river, da Tab. 15 in Pirone (1991), rel. 6: Campante creek, da Allegrezza (2003), rel. 7–9: Esino river, rel. 1, 4, 5 da Tab. 34 in Biondi & Baldoni (1992), rel. 10–12: “Fosso della Selva” creek, rel. 1–3 da Tab. 5 in Biondi & Allegrezza (2004), rel. 13–16: Sant’Imero creek, ined. (04/07/03).

Sporadic species: rel. 1: *Euonymus europaeus* L. +, *Pastinaca sativa* L. ssp. *urens* (Req.) Celak +, *Brachypodium sylvaticum* (Hudson) Beauv. 1.2, *Carex acutiformis* Ehrh. 1.2, *Cirsium creticum* (Lam.) D’Urv. ssp. *triunfetti* (Lacaita) Werner +; rel. 2: *Pastinaca sativa* L. ssp. *urens* (Req.) Celak +, *Brachypodium sylvaticum* (Hudson) Beauv. +2, *Cirsium creticum* (Lam.) D’Urv. ssp. *triunfetti* (Lacaita) Werner 1.2; rel. 3: *Equisetum palustre* L. 1, *Arundo pliniana* Turra 2; rel. 4: *Amorpha fruticosa* L. 1, rel. 5: *Amorpha fruticosa* L. 1, *Equisetum palustre* L. +, *Arundo pliniana* Turra 2; rel. 7: *Crataegus monogyna* Jacq. ssp. *monogyna* 1.2, *Arctium minus* (Hill) Bernh. +2; rel. 8: *Galium mollugo* L. +; rel. 9: *Ranunculus repens* L. +, *Arctium minus* (Hill) Bernh. +; rel. 10: *Euonymus europaeus* L. +2, *Crataegus monogyna* Jacq. ssp. *monogyna* +2, *Corylus avellana* L. +2, *Solanum nigrum* L. +2, *Arundo donax* L. +2; rel. 11: *Ruscus aculeatus* L. +2; rel. 12: *Ranunculus repens* L. 1.2, *Poa trivialis* L. +, *Glechoma hirsuta* W. et K. 2.2, *Rumex obtusifolium* L. +, *Lamium maculatum* L. +, *Symphytum bulbosum* Schimper 1.1;

rel. 13 – *Arctium minus* (Hill) Bernh. +, *Tamus communis* L. +; rel. 15: *Pulicaria dysenterica* (L.) Bernh. +2, *Epilobium tetragonum* L. +, *Tussilago farfara* L. +2, *Trifolium pratense* L. +.

Tab. 10 – *Coronillo emeroidis-Ericetum multiflorae*

Localities: rel. 1–2: San Vincenzo (15/07/97), rel. 3: Pietrasiciliana (23/07/02), rel. 4: San Vincenzo (23/07/02), rel. 5–8: Pietrasiciliana (23/07/02). Sporadic species: rel. 1: *Fraxinus ornus* L. +2; rel. 2: *Cytisus sessilifolius* L. +; rel. 3: *Micromeria graeca* (L.) Bentham +; rel. 4: *Clematis vitalba* L. +2; rel. 6: *Convolvulus cantabrica* L. +2, *Fumana thymifolia* (L.) Spach +2, *Teucrium polium* L. ssp. *capitatum* (L.) Arcang. +2; rel. 7: *Fraxinus ornus* L. +, *Teucrium flavum* L. +; rel. 8: *Silene alba* (Miller) Krause +, *Osyris alba* L. +2.

Tab. 11 – *Coronillo valentinae-Ampelodesmetum mauritanici*

Localities: rel. 1–2: sandstone paleocliffs near Cupramarittima (23/07/02), rel. 3: Pietrasiciliana (23/07/02), rel. 4–6: sandstone paleocliffs near Cupramarittima (30/07/02), rel. 7–8: sandstone paleocliffs near Cupramarittima (23/07/02). Sporadic species: rel. 1: *Inula viscosa* (L.) Aiton +, *Reseda alba* L. +, *Urospermum picroides* (L.) Schmidt +; rel. 2: *Anthyllis tetraphylla* L. 1.2, *Fumana thymifolia* (L.) Spach +, *Dactylis glomerata* L. +, *Hippocrepis comosa* L. +2, *Lotus ornithopodioides* L. +, *Pallenis spinosa* (L.) Cass. +, *Scorpiurus vermiculatus* L. +2, rel. 3: *Odontites lutea* (L.) Clairv. +, *Teucrium flavum* L. +; rel. 4: *Lonicera caprifolium* L. +2, *Pteridium aquilinum* (L.) Kuhn +; rel. 5: *Vitis vinifera* L. +2, *Linum strictum* L. ssp. *corymbulosum* (Rchb.) Rouy +2; rel. 6: *Picris hieracioides* L. +, *Astragalus monspessulanus* L. +; rel. 7: *Micromeria graeca* (L.) Bentham +.

Tab. 12 – *Asparago-Osyridetum albae*

Localities: rel. 1–2: San Vincenzo (30/07/02)

Tab. 13 – *Lonicero etruscae-Coronilletum emeroidis*

Localities: rel. 1–3: From Ripatranzone to the sea (18/07/04), rel. 4: San Basso hill (20/04/04). Sporadic species: rel. 1: *Clinopodium vulgare* L. +, *Prunus avium* L. +2; rel. 2: *Origanum vulgare* L. +2, *Pteridium aquilinum* (L.) Kuhn +, *Peucedanum cervaria* (L.) Lapeyr. +2, *Viola alba* L. ssp. *dehnhardtii* (Ten.) W. Becker +2; rel. 3: *Cistus creticus* L. subsp. *eriocephalus* (Viv.) Greuter & Burdet +2, *Erica arborea* L. +2, *Lonicera implexa* Aiton +2, *Dactylis glomerata* L. +2, *Rosa sempervirens* L. +2, *Euphorbia cyparissias* L. +2, *Lathyrus sylvestris* L. +; rel. 4: Ori-

ganum vulgare L. +2, *Olea europaea* L. +2, *Bromus erectus* Hudson +.

Tab. 14 – *Lonicero etruscae-Cornetum sanguineae*

Localities: rel. 1–3: Sant’Imero (04/07/03).

Sporadic species: rel. 1: *Anthemis tinctoria* L. +, *Coryza canadensis* (L.) Cronq. +; rel. 2: *Arundo donax* L. 1.2, *Juglans regia* L. +, *Clinopodium vulgare* L. 1.1, *Prunus avium* L. +, *Pulicaria dysenterica* (L.) Bernh. +, *Salix apennina* Skvortsov +2; rel. 3: *Populus tremula* L. 2.2, *Rosa sempervirens* L. 1.2, *Euphorbia cyparissias* L. +, *Hedera helix* L. +, *Arundo pliniana* Turra 1.2, *Malus sylvestris* Miller +, *Origanum vulgare* L. +, *Odontites rubra* (Baumg.) Opiz +, *Laurus nobilis* L. +, *Sorbus domestica* L. +.

Tab. 15 – *Ulmo-Salicetum apenninae*

Localities: rel. 1: Sant’Imero (04/07/03).

Tab. 16 – *Asperulo purpureae-Fumanetum thymifoliae*

Localities: rel. 1–2: Pietrasiciliana (03/10/02); rel. 3: sandstone paleoclimbs near Massignano (22/07/04); rel. 4: Pietrasiciliana (03/10/02).

Sporadic species: rel. 1: *Hippocrepis ciliata* Willd. 1.2; rel. 2: *Juniperus oxycedrus* L. +2, *Centaurea deusta* Ten. +, *Crupina vulgaris* Cass. +, *Erica multiflora* L. (+2), *Linum strictum* L. ssp. *corymbulosum* (Rchb.) Rouy 1.1; rel. 3: *Verbascum sinuatum* L. +, *Lotus corniculatus* L. +, *Anthriscinum orontium* L. +, *Brachypodium distachyum* (L.) Beauv. +; rel. 4: *Silene vulgaris* (Moench) Garcke +, *Dactylis glomerata* L. +, *Pinus halepensis* Miller +2, *Anthyllis tetraphylla* L. +, *Hippocrepis comosa* L. +2.

Tab. 17 – *Asperulo aristatae-Cistetum eriocephali*

Localities: rel. 1: From Cupramarittima to Ripatranzone (10/07/01), rel. 2: Pietrasiciliana (03/10/02); rel. 3, 4: From Cupramarittima to Ripatranzone (10/07/01).

Sporadic species: rel. 1: *Quercus ilex* L. +, *Inula viscosa* (L.) Aiton +, *Erica multiflora* L. 1.2; rel. 2: *Helianthemum nummularium* (L.) Miller ssp. *obscurum* (Celak.) Holub 2.2, *Petrorhagia saxifraga* (L.) Link +2, *Stachys recta* L. +, *Pinus halepensis* Miller +, *Hypericum perforatum* L. +, *Linum tenuifolium* L. 1.1, *Pimpinella saxifraga* L. +2, *Plantago lanceolata* L. +, *Psoralea bituminosa* L. +, *Reichardia picroides* (L.) Roth +, *Teucrium chamaedrys* L. +, *Brachypodium rupestre* (Host) R. et S. 1.2, *Centaurea deusta* Ten. 1.1, *Euphorbia cyparissias* L. +2; rel. 3: *Aster linosyris* (L.) Bernh. 1.1, *Bromus erectus* Hudson 2.3, *Eryngium amethystinum* L. +; rel. 4: *Coronilla emerus* L. ssp. *emeroides* (Boiss. et Spruner) Hayek 1.2, *Rubia peregrina* L. +.

Tab. 18 – *Cistetum eriocephali-salvifolii*

Localities: rel. 1–3: San Basso hill (16/07/03), rel. 4–6: near Pescara (rel. 1–3 da Tab. 3 in Tammaro & Pirone (1981))

Sporadic species: rel. 1: *Helianthemum nummularium* (L.) Miller ssp. *obscurum* (Celak.) Holub +, *Lonicera implexa* Aiton +2, *Agropyron repens* (L.) Beauv. 1.2; rel. 2: *Spartium junceum* L. +2, *Foeniculum piperitum* +; rel. 3: *Quercus ilex* L. +, *Dactylis glomerata* L. 1.1, *Coronilla emerus* L. ssp. *emeroides* (Boiss. et Spruner) Hayek +, *Bromus erectus* Hudson 1.2, *Stachys recta* L. +; rel. 4: *Smilax aspera* L. +, *Petrorhagia saxifraga* (L.) Link +, *Myrtus communis* L. +2, *Bromus rigidus* Roth +2, *Koeleria splendens* Presl +, *Catapodium rigidum* (L.) Hubbard +; rel. 5: *Vulpia membranacea* (L.) Link +2, *Calamagrostis epigejos* (L.) Roth 1.2, *Cynodon dactylon* (L.) Pers. +; rel. 6: *Rubia peregrina* L. +, *Rubus ulmifolius* Schott +, *Lonicera japonica* Thunb. +, *Equisetum ramosissimum* Desf. +.

Tab. 19 – *Scabioso maritimae-Cymbopogonetum hirti*

Localities: rel. 1–4: sandstone paleoclimbs near Massignano (18/07/04).

Sporadic species: rel. 1: *Leopoldia comosa* (L.) Parl. +, *Plantago bellardi* All. +2, *Trifolium stellatum* L. +2, *Tragus racemosus* (L.) All. +2, *Lagurus ovatus* L. 1.1, *Cistus creticus* L. subsp. *eriocephalus* (Viv.) Greuter & Burdet +2; rel. 2: *Spartium junceum* L. +, *Cerastium semidecandrum* L. +2, *Sinapis alba* L. +, *Reichardia picroides* (L.) Roth +2; rel. 3: *Ailanthus altissima* (Miller) Swingle +, *Hypochoeris achyrophorus* L. +2, *Asperula aristata* L. +, *Teucrium polium* L. ssp. *capitatum* (L.) Arcang. +2, *Ampelodesmos mauritanicus* (Poiret) Dur. et Sch. +2; rel. 4: *Allium roseum* L. +, *Centaurea deusta* Ten. +, *Centaurea bracteata* Scop. +.

Tab. 20 – *Agropyro repentis-Oryzopsietum miliaceae*

Localities: rel. 1–3: San Basso hill (20/07/05), rel. 4: sandstone paleoclimbs near Massignano (18/07/04), rel. 5: San Basso hill (20/07/05).

Sporadic species: rel. 1: *Hordeum leporinum* Link +, *Bromus gussonei* Parl. +2, *Melilotus altissima* Thuill. +, *Cynosurus echinatus* L. +; rel. 2: *Rubia peregrina* L. 1.1, *Smilax aspera* L. 1.1, *Sanguisorba minor* Scop. +2, *Crepis sancta* (L.) Bab. +, *Leopoldia comosa* (L.) Parl. +, *Brachypodium rupestre* (Host) R. et S. +2; rel. 3: *Quercus virgiliana* (Ten.) Ten. +, *Centaurea deusta* Ten. 1.2; rel. 4: *Centaurea bracteata* Scop. +, *Helichrysum italicum* (Roth) Don +, *Sinapis alba* L. +, *Centaurea deusta* Ten. 1.2; rel. 5: – *Cistus salvifolius* L. +, *Lotus corniculatus* L. +, *Allium sphaerocephalon* L. +, *Cynosurus echinatus* L. 1.2.

Tab. 21 – *Agropyro-Asteretum linosyris*

Localities: rel. 1–3: badland near Ripatranzone (4/07/2003)

Tab. 22 – *Epilobio tetragoni-Elymetum pycnanthi*

Localities: rel. 1–3: badland near Ripatranzone (4/07/2003)

Sporadic species: rel. 1: *Centaureum erythraea* Rafn +, *Linum strictum* L. ssp. *corymbulosum* (Rchb.) Rouy 1.1, *Rosa canina* L. sensu Bouleng. +, *Acer campestre* L. +, *Pallenis spinosa* (L.) Cass. +; rel. 2: *Anthemis tinctoria* L. 1.2, *Foeniculum vulgare* Miller +, *Artemisia vulgaris* L. +.2, *Silene vulgaris* (Moench) Garcke +, *Verbena officinalis* L. +, *Scabiosa maritima* L. +, *Rumex crispus* L. +.2, *Vicia sativa* L. +.2, *Phalaris brachystachys* Link +.2, *Cirsium arvense* (L.) Scop. +, *Malva sylvestris* L. +.2, *Parietaria officinalis* L. +.2, *Bromus madritensis* L. +; rel. 3: *Sonchus arvensis* L. ssp. *arvensis* +, *Lotus tenuis* W. et K. +, *Beta vulgaris* L. +.

Tab. 23 – *Ononido reclinatae-Plantaginetum bellardii*

Localities: rel. 1–4: San Basso hill (4/06/2005)

7. REFERENCES

- Allegrezza, M. (2003): La vegetazione e il paesaggio vegetale della dorsale del Monte San Vicino (Appennino centrale). *Fitosociologia* 40(1): 1–118.
- Allegrezza, M., Biondi, E., Formica, E. & Ballelli, S. (1997): Vegetazione dei settori rupestri calcarei dell'Italia centrale. *Fitosociologia* 32: 91–120.
- Anderberger, M. R. (1973): *Cluster Analysis for Application*. Academic Press, New York.
- Baldoni, M. & Biondi, E. (1993): La vegetazione del medio e basso corso del Fiume Esino (Marche, Italia centrale). *Studia Botanica* 11: 209–257.
- Biondi, E. (1986): La vegetazione del Monte Conero (con carta della vegetazione alla scala 1:10.000). Regione Marche, Ancona, 95 p.p.
- Biondi, E. (1994): The phytosociological approach to landscape study. *Ann. Bot. Ital.* 52: 135–141.
- Biondi, E. (2000): Syntaxonomy of the mediterranean chamaephytic and nanophanerophytic vegetation in Italy. *Coll. Phytosoc.*, XXVII: 123–145.
- Biondi, E., Ballelli, S., Allegrezza, M. & Manzi, A. (1990): La vegetazione dei badlands di Gessopalena (Abruzzo meridionale). *Doc. Phytosoc.* 12: 257–263.
- Biondi, E., Ballelli, S., Allegrezza, M., Taffetani, F., Frattaroli, A. R., Guitan, J. & Zuccarello, V. (1999): La vegetazione di Campo Imperatore (Gran Sasso d'Italia). *Braun-Blanquetia* 16: 53–116.
- Biondi, E., Casavecchia, S. & Gigante D. (2003): Contribution to the syntaxonomic knowledge of the *Quercus ilex* L. woods of the Central European Mediterranean Basin. *Fitosociologia* 40(1): 129–156.
- Biondi, E., Casavecchia S., Pinzi, M., Bagella, S. & Calandra R. (2002): Excursion to the Conero Regional Natural Park. *Fitosociologia* 39(1): 5–32.
- Biondi, E. & Vagge, I. (2004): The forest-edge vegetation of the alliance *Trifolion medii* Muller 1962 in the Northern Apennines (Italy). *Fitosociologia* 41 (2): 21–30.
- Bolòs, O. de (1956): De Vegetatione Notulae II. *Collect. Bot. (Barcelona)* 5 (1): 195–268.
- Braun-Blanquet, J. (1964): *Pflanzensoziologie. Grudzüge der Vegetationskunde*. 3. Aufl. Springer Verlag, Wien, 865 pp.
- Bueno Sanchez, A. & Fernández Prieto, J. A. (1991): Acebuchales y lauredales de la costa cantábrica. *Lazaroa* 12: 273–301.
- Burba, N., Feoli E., Malaroda, M. & Zuccarello, V. (1992): Un Sistema Informativo per la Vegetazione. Manuale di utilizzo del Package. Collana Quaderni CETA N. 2, Udine.
- Cantalamessa, G., Centamore, E., Chiocchini, U., Colalongo, M. L., Micarelli, A., Nanni, T., Pasini, G., Potetti, M. & Ricci Lucchi, F. (1986): Il plio-pleistocene delle Marche. In “La geologia delle Marche” a cura di Centamore E. & Deiana G. *Studi Geologici Camerti*. Numero speciale: 61–81
- De Marco, G. & Caneva, G. (1985): Analisi sintassonomica fitogeografica comparata di alcune significative cenosi a *Pinus halepensis* Mill. In Italia. *Not. Fitosoc.* 19(1): 155–176.
- Fascetti, S. (1997): I cespuglieti ad *Erica multiflora* L. della Basilicata. *Fitosociologia* 32: 135–144.
- Feoli, E. & Zuccarello, V. (1986): Ordination based on classification: yet another solution?. *Abstracta Botanica* 10: 203–219.
- Feoli, E. & Zuccarello, V. (1988): Syntaxonomy: a source of useful fuzzy sets for environmental analysis? *Coenoses* 3: 141–147.
- Gafta, D. & Pedrotti, F. (1995): Tipificazione di due nuove associazioni forestali riparali per la penisola italiana. *Doc. Phytosoc.* 15: 413–415.
- Géhu, J. M. & Rivas-Martinez, S. (1981): Notions fondamentales de Phytosociologie. Reprint from: *Berinchte der Internationalen Symposien*

- der Internationalen Verinigung fur Vegetation- skunde. Syntaxonomie (Rinteln 31. 3.-3. 4. 1980). p.p. 1-33. J. Cramer, FL-9490 Vaduz.
- Manzi, A. (1998): Il patrimonio vegetale di Cupramarittima – Laboratorio didattico di ecologia del Quaternario di Cupramarittima 1: 1-88.
- Manzi, A. (2004): Le formazioni boschive dei vallo- ni costieri piceni. AA. VV. Ambiente Naturale Piceno studi e ricerche dei Centri di Educazio- ne Ambientale, Quaderni 3: 87-107.
- Pedrotti, F. & Gafta, D. (1996): Ecologia delle fore- ste riparali e paludose dell'Italia. L'uomo e l'ambiente 23, Camerino
- Pignatti, S. (1982): Flora d'Italia. I-II-III. Edagricole, Bologna.
- Pirone, G. (1985): Le pinete a Pino d'Aleppo (*Pinus halepensis* Miller) del pescarese (Abruzzo): aspetti fitosociologici. Monti e Boschi 5: 37-42.
- Pirone, G. (1991): Flora e vegetazione del Fiume Saline (Abruzzo). Micologia e Vegetazione Mediterranea 6(1): 45-76.
- Pirone, G., Frattaroli, A. R. & Corbetta, F. (1997): Vegetazione, Cartografia vegetazionale e lineamenti floristici della riserva naturale "sorgenti del Pescara" (Abruzzo – Italia). Università degli Studi dell'Aquila, Dipartimento di Scienze Ambientali. Comune di Popoli, "Centro Stampa" (Roma).
- Rivas-Martinez, S., Penas, A. & Diaz, T. E (2001): Bioclimatic map of the Europe termoclimatic belts scale 1:16.000.000. Cartographic Service. University of Leòn, Spain.
- Tammaro, F. & Pirone, G. (1981): La vegetazione della pineta dannunziana (Pescara). Giorn. Bot. Ital. 115: 299-309.
- Tutin, T. G., Heywood, V. H., Burghes, N. A., Moore, D. M., Valentie, D. H., Walters, S. M. & Webb, D. A. (1964-1980): Flora Europea. I-V. Cambridge, University Press.
- Vagge, I. (2002): Alcune associazioni di mantello dell'Appennino ligure. Fitosociologia 39(1): 57-63.
- Zadeh, L. A. (1965): Fuzzy sets. Infrom. Control. 8: 338-353.
- Zuccarello, V., Allegrezza, M., Biondi, E. & Calandra, R. (1999): Valenza ecologica di specie e di associazioni prative e modelli di distribuzione lungo gradienti sulla base della teoria degli insiemi sfocati (Fuzzy Set Theory). Braun-Blanquetia 16: 121-225.

Recieved 20. 12. 2005

Revision recieved 15. 7. 2006

Accepted 16. 9. 2006

Table 1 (Tabela 1): *Coronillo emeroidis-Pinetum halepensis* ass. Nova

– *pinetosum halepensis* subass. nova (rel. n. 1-5; typus rel. n. 1)

– *viburnetosum tini* subass. nova (rel. n. 6-9; typus rel. n. 9)

	Rel. n.	1*	2	3	4	5	6	7	8	9+	P
	Altitude (m)	90	100	90	110	125	150	170	120	100	r
Life	Exposure	ENE	NE	E	E	ONO	O	ONO	O	O	e
form	Slope (°)	30	5	40	20	15	35	20	30	25	s.
	Coverage (%)	90	90	85	80	80	75	80	80	80	
	Area (m2)	250	150	200	300	400	200	400	300	400	
Charact. and diff. species of the ass.											
P scap	<i>Pinus halepensis</i> Miller	5.5	3.4	3.3	3.4	2.2	2.2	3.3	2.2	3.4	10
NP	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	1.2	1.2	+	.	.	1.2	1.2	1.2	1.2	8
P lian	<i>Lonicera etrusca</i> Santi	1.2	1.2	.	.	+2	.	+	.	+	6
H caesp	<i>Ampelodesmos mauritanicus</i> (Poirot) Dur. et Sch.	5.5	4.5	+2	1.2	3.3	.	.	.	.	5
Diff. species of the <i>viburnetosum tini</i> subass.											
P caesp	<i>Viburnum tinus</i> L.	.	.	.	.	+	1.2	+2	3.3	2.2	6
P scap	<i>Fraxinus ornus</i> L.	.	+2	.	.	.	2.2	3.3	1.2	1.2	5
G rhiz	<i>Carex flacca</i> Schreber ssp. <i>serrulata</i> (Biv.) Greuter	.	.	.	.	.	+2	.	1.2	+2	4
H caesp	<i>Stipa bromoides</i> (L.) Dorfl.	.	.	.	.	.	1.2	1.2	1.2	+2	4
Charact. species of the <i>Oleo-Ceratonion</i> all., the <i>Pistacio-Rhamnetalia</i> ord. and the <i>Quercetea ilicis</i> class											
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	1.1	3.3	+	+	1.2	1.2	+2	+2	10
P caesp	<i>Rhamnus alaternus</i> L.	2.2	+2	2.3	1.1	2.1	1.2	1.2	2.2	1.1	10
NP	<i>Smilax aspera</i> L.	2.3	3.4	1.2	1.2	.	2.2	1.2	1.2	1.2	8
P lian	<i>Rubia peregrina</i> L.	2.2	1.2	.	1.2	+2	+2	+2	1.2	1.2	8
P lian	<i>Clematis flammula</i> L.	.	.	.	+2	.	.	.	1.2	+2	4
P caesp	<i>Laurus nobilis</i> L.	1.2	1.2	.	+	+	.	.	.	.	4
P caesp	<i>Pistacia lentiscus</i> L.	.	.	1.2	.	.	+2	+2	.	.	3
P caesp	<i>Arbutus unedo</i> L.	.	.	.	.	.	.	.	+	+2	2
NP	<i>Rosa sempervirens</i> L.	.	.	.	.	.	.	.	.	+	1
P caesp	<i>Phillyrea angustifolia</i> L.	.	.	.	.	.	+2	.	.	.	1
P caesp	<i>Phillyrea latifolia</i> L.	.	.	.	.	.	.	.	.	+	1
Other species											
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	1.2	1.1	+2	+2	1.1	2.2	1.2	1.1	+	6
NP	<i>Rubus ulmifolius</i> Schott	.	.	.	1.2	+2	.	.	1.2	+2	5
P caesp	<i>Crataegus monogyna</i> Jacq.	.	+	.	+	+	.	+	.	+	5
P scap	<i>Sorbus domestica</i> L.	.	.	.	+	+	.	.	+	+	5
P caesp	<i>Prunus spinosa</i> L.	.	.	.	+	+	.	.	+2	.	4
P caesp	<i>Robinia pseudoacacia</i> L.	.	+2	.	1.1	+	.	.	.	.	3
H caesp	<i>Brachypodium sylvaticum</i> (Hudson) Beauv.	.	.	.	1.2	.	1.2	.	.	1.2	3
	Accidental species	1	1	1	5	7	2	2	1	2	

Table 2 (Tabela 2): *Roso sempervirentis-Quercetum pubescentis* Biondi 1986
 – *ampelodesmetosum mauritanici* subass. nova (rel. n. 1-4; typus rel. n. 4)
 – *lauretosum nobilis* Biondi & Allegrezza 2003 (rel. n. 5-11)

	Rel. n.	1	2	3	4*	5	6	7	8	9	10	11	
Life form	Altitude (m)	110	100	250	260	50	45	60	80	75	70	400	P
	Exposure	SE	ENE	N	N	NE	N	SE	N	N	N	N	r
	Slope (°)	40	40	10	20	20	40	30	30	40	30	30	e
	Coverage (%)	100	80	90	80	100	95	100	100	100	100	100	s.
	Area (m ²)	80	80	100	150	200	80	100	150	120	200	300	
Charact. and diff. species of the ass.													
P lian	<i>Rubia peregrina</i> L.	2.2	2.3	3.3	2.3	1.2	1.2	1.2	2.2	+2	2.2	2.2	11
NP	<i>Smilax aspera</i> L.	1.2	.	3.4	2.3	4.4	2.3	2.3	2.2	1.2	2.2	.	9
NP	<i>Rosa sempervirens</i>	.	.	+2	1.2	2.2	+2	.	.	.	1.2	.	5
P lian	<i>Clematis flammula</i> L.	.	.	.	.	.	.	.	1.2	1.2	1.2	.	3
Diff. species of the <i>ampelodesmetosum mauritanici</i> subass.													
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	3.3	1.2	2.3	3.4	+	.	+2	.	.	.	.	6
Diff. species of the <i>lauretosum nobilis</i> subass.													
P lian	<i>Hedera helix</i> L.	.	+2	+2	.	1.2	3.4	2.2	2.3	2.2	2.3	3.4	9
P caesp	<i>Laurus nobilis</i> L.	.	.	+2	+2	3.3	4.5	1.1	4.4	2.2	1.2	3.4	9
NP	<i>Rubus ulmifolius</i> Schott	.	+2	.	.	.	+2	1.2	+	.	1.1	1.2	6
P caesp	<i>Crataegus monogyna</i> Jacq.	.	.	.	.	+2	+2	+	1.1	.	+2	.	5
P caesp	<i>Cornus sanguinea</i> L.	.	.	.	+2	+2	+2	2.3	.	.	.	+2	5
G rhiz	<i>Arum italicum</i> Miller	.	.	.	.	+2	.	.	1.1	+	1.2	.	4
P caesp	<i>Ulmus minor</i> Miller	.	.	.	.	1.2	+2	.	.	.	.	.	2
Charact. and diff. species of the <i>Lauro nobilis-Quercenion pubescentis</i> suball. and the <i>Carpinion orientalis</i> all.													
G rhiz	<i>Asparagus acutifolius</i> L.	2.3	2.3	+	1.2	2.2	1.1	1.2	1.2	1.2	2.2	1.2	11
P caesp	<i>Rhamnus alaternus</i> L.	+	2.3	3.3	2.3	1.2	+2	.	2.2	1.2	1.2	.	9
P caesp	<i>Viburnum tinus</i> L.	.	.	.	.	.	.	.	+2	+2	1.2	1.2	4
G rhiz	<i>Ruscus aculeatus</i> L.	.	.	.	.	.	.	.	1.1	+2	.	+	3
P scap	<i>Quercus ilex</i> L.	.	.	.	.	.	.	.	1.1	+	.	.	2
G bulb	<i>Cyclamen hederifolium</i> Aiton	.	.	.	.	2.2	.	.	1.2	.	.	.	2
P caesp	<i>Ostrya carpinifolia</i> Scop.	.	.	.	.	.	+2	.	.	.	.	+	2
Charact. species of the <i>Quercetalia pubescenti-petraeae</i> ord. and the <i>Quercio-Fagetea</i> class													
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	5.5	5.5	4.4	3.4	5.5	3.4	5.5	4.5	4.5	4.5	3.4	11
P scap	<i>Sorbus domestica</i> L.	.	2.2	+2	1.2	+	1.2	.	1.2	4.4	3.3	.	8
P scap	<i>Fraxinus ornus</i> L.	.	.	.	+	.	.	1.1	+2	.	1.2	2.3	5
P scap	<i>Acer campestre</i> L.	.	.	.	.	1.1	.	.	.	.	.	1.2	2
Other species													
NP	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i>	1.2	2.2	+2	+2	2.2	+2	1.2	.	.	.	.	7
P lian	<i>Lonicera etrusca</i> Santi	1.2	2.2	1.2	1.2	2.3	1.2	.	.	.	.	.	6
G rhiz	<i>Pteridium aquilinum</i> (L.) Kuhn	.	.	+2	+2	.	.	+	.	+	.	.	4
P lian	<i>Clematis vitalba</i> L.	.	.	.	.	+	.	.	.	1.2	1.2	.	3
Accidental species													
		7	3	–	2	–	2	3	1	–	5	9	

Table 3 (Tabela 3): *Cyclamino hederifolii-Quercetum ilicis* Biondi, Casavecchia & Gigante 2003

– *Erica arborea* variant (rel. n. 1-5)

	Rel. n.	1	2	3	4	5	
Life	Altitude (m)	135	150	185	130	135	P
form	Exposure	SE	S	NNO	SE	NO	r
	Slope (°)	45	20	40	45	40	e
	Coverage (%)	100	95	100	100	95	s.
	Area (m2)	300	100	300	40	60	
Charact. and diff. species of the ass.							
P caesp	<i>Myrtus communis</i> L.	1.2	1.2	2.2	3.3	3.4	5
P caesp	<i>Pistacia lentiscus</i> L.	1.2	1.2	1.2	2.2	1.2	5
P lian	<i>Lonicera implexa</i> Aiton	1.2	1.2	1.2	1.1	1.2	5
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	.	1.2	+2	.	.	2
Diff. species of the <i>Erica arborea</i> variant							
P caesp	<i>Erica arborea</i> L.	.	1.2	+	2.3	2.3	4
P caesp	<i>Arbutus unedo</i> L.	.	+	+2	+2	+2	4
Charact. and diff. species of the <i>Fraxino orni-Quercion ilicis</i> all., the <i>Quercetalia ilicis</i> ord. and the <i>Quercetea ilicis</i> class							
P scap	<i>Quercus ilex</i> L.	5.5	5.5	5.5	4.5	4.5	5
P scap	<i>Fraxinus ornus</i> L.	2.2	1.2	1.2	1.2	1.2	5
P lian	<i>Rubia peregrina</i> L.	2.3	2.3	3.3	1.2	1.2	5
NP	<i>Smilax aspera</i> L.	4.4	3.4	3.3	2.3	2.2	5
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	1.2	1.2	1.2	+2	5
NP	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	1.2	+	1.2	.	+	4
P caesp	<i>Laurus nobilis</i> L.	1.2	.	.	.	+2	2
Other species							
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	1.2	1.2	.	2.2	1.2	4
P scap	<i>Sorbus domestica</i> L.	1.2	.	+	+2	.	3
P scap	<i>Quercus dalechampii</i> Ten.	.	+	1.2	.	.	2
P lian	<i>Hedera helix</i> L.	+	.	.	1.2	.	2
G rhiz	<i>Arundo pliniana</i> Turra	+2	.	.	.	.	1
P lian	<i>Clematis vitalba</i> L.	.	.	+	.	.	1
P caesp	<i>Colutea arborescens</i> L.	.	.	.	+2	.	1
NP	<i>Rosmarinus officinalis</i> L.	.	.	.	+2	.	1
NP	<i>Erica multiflora</i> L.	.	.	.	+2	.	1
P caesp	<i>Juniperus oxycedrus</i> L.	.	.	+	.	.	1

Table 4 (Tabela 4): *Fraxino orni-Lauretum nobilis* ass. nova (typus rel. n. 3)

	Rel. n.	1	2	3*	4	
	Altitude (m)	40	80	70	60	P
Life	Exposure	NE	NE	NE	SE	r
form	Slope (°)	35	30	35	40	e
	Coverage (%)	100	100	100	100	s.
	Area (m ²)	60	50	60	70	
Charact. and diff. species of the ass.						
P caesp	<i>Laurus nobilis</i> L.	5.5	5.5	5.5	5.5	4
P lian	<i>Hedera helix</i> L.	2.3	1.2	4.5	2.2	4
P lian	<i>Rubia peregrina</i> L.	2.2	+2	2.2	2.2	4
NP	<i>Smilax aspera</i> L.	1.2	.	+2	1.2	3
P scap	<i>Fraxinus ornus</i> L.	.	+2	2.3	+	3
Charact. and diff. species of the <i>Fraxino orni-Quercion ilicis</i> all., the <i>Quercetalia ilicis</i> ord. and the <i>Quercetea ilicis</i> class						
G rhiz	<i>Asparagus acutifolius</i> L.	.	+	+	2.2	4
NP	<i>Rosa sempervirens</i>	.	.	+2	+	2
G bulb	<i>Cyclamen hederifolium</i> Aiton	2.2	.	.	.	1
Other species						
NP	<i>Rubus ulmifolius</i> Schott	+2	+2	2.2	2.3	4
P caesp	<i>Sambucus nigra</i> L.	2.2	1.2	1.2	1.2	4
P caesp	<i>Robinia pseudoacacia</i> L.	1.2	+2	.	+	3
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	.	+2	+	1.2	3
	Accidental species	2	1	8	8	

Table 5 (Tabela 5): *Asparago acutifolii-Ostryetum carpinifoliae* Biondi 1982
 – *Arbutus unedo* variant (rel. n. 7)

	Rel. n.	1	2	3	4	5	6	7	
	Altitude (m)	250	240	220	240	230	230	250	P
Life	Exposure	N	N	N	N	N	N	NNO	r
form	Slope (°)	8	20	5	15	20	40	35	e
	Coverage (%)	100	90	100	100	100	100	100	s.
	Area (m2)	100	100	100	100	100	60	300	
Charact. and diff. species of the ass.									
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	+	1.1	1.1	+	1.1	1.2	7
P lian	<i>Rubia peregrina</i> L.	2.3	2.3	+2	2.3	1.2	1.2	3.4	7
NP	<i>Smilax aspera</i> L.	.	+	.	.	1.2	3.3	4.4	4
Diff. species of the <i>Arbutus unedo</i> variant									
P caesp	<i>Arbutus unedo</i> L.	.	.	.	.	.	.	1.2	1
P scap	<i>Quercus ilex</i> L.	.	.	.	.	.	.	1.2	1
P caesp	<i>Myrtus communis</i> L.	.	.	.	.	.	.	+2	1
Charact and diff. species of the <i>Lauro nobilis-Quercenion pubescentis</i> suball. and the <i>Carpinion orientalis</i> all.									
P caesp	<i>Ostrya carpinifolia</i> Scop.	4.4	4.5	5.5	4.5	4.5	4.5	5.5	7
P scap	<i>Fraxinus ornus</i> L.	3.3	2.3	1.2	1.2	2.2	+2	2.3	7
P caesp	<i>Laurus nobilis</i> L.	1.1	+	2.3	1.2	2.3	4.4	.	7
H caesp	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	+2	+2	.	+	.	+2	+	5
NP	<i>Rosa sempervirens</i> L.	1.2	.	.	.	.	.	.	1
P caesp	<i>Viburnum tinus</i> L.	.	.	.	.	.	.	3.3	1
Charact. species of the <i>Quercetalia pubescenti-petraeae</i> ord. and the <i>Quercu-Fagetea</i> class									
P scap	<i>Acer campestre</i> L.	+	+	1.2	+2	+2	.	+	6
P lian	<i>Hedera helix</i> L.	1.2	1.2	2.3	.	.	3.4	1.2	5
H ros	<i>Viola alba</i> Besser ssp. <i>dehnhardtii</i> (Ten.) W. Becker	1.2	1.2	1.2	.	+2	.	1.2	5
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	1.2	+	.	+2	.	.	.	3
P scap	<i>Prunus avium</i> L.	+	.	.	+2	.	+2	.	3
P scap	<i>Sorbus domestica</i> L.	.	.	+2	.	.	+2	.	2
P scap	<i>Malus sylvestris</i> Miller	.	.	+2	.	.	.	.	1
Other species									
P caesp	<i>Cornus sanguinea</i> L.	+2	+2	+2	2.3	+2	.	.	5
H scap	<i>Lonicera etrusca</i> Santi	+	+2	.	.	.	+2	.	3
NP	<i>Rubus ulmifolius</i> Schott	.	.	+	+2	+2	.	.	3
P caesp	<i>Robinia pseudoacacia</i> L.	.	.	+2	.	+2	1.2	.	3
Accidental species									
		9	3	4	1	1	2	7	

Table 6 (Tabela 6): *Scutellario columnae-Ostryetum carpinifoliae* Ballelli, Biondi & Pedrotti ex Pedrotti et al. 1980 – *viburnetosum tini* subass. nova (rel. n. 1-3; typus rel. n. 1)

	Rel. n.	1*	2	3	
	Altitude (m)	480	480	470	P
Life form	Exposure	ONO	NO	NO	r
	Slope (°)	30	35	30	e
	Coverage (%)	100	100	100	s.
	Area (m2)	300	500	200	
Charact. and diff. species of the ass.					
H scap	Melittis melissophyllum L.	1.2	+	+	3
P caesp	Cornus mas L.	2.2	1.2	2.2	3
Ch suffr	Melica uniflora Retz.	1.2	1.2	1.2	3
H caesp	Brachypodium sylvaticum (Hudson) Beauv.	2.2	1.2	+	3
H scap	Euphorbia amygdaloides L.	1.2	1.2	.	2
G rhiz	Scutellaria columnae All.	1.2	1.2	.	2
Diff. species of the <i>viburnetosum tini</i> subass.					
NP	Rosa sempervirens L.	1.2	2.2	2.2	3
G rhiz	Asparagus acutifolius L.	1.2	1.2	+2	3
P lian	Rubia peregrina L.	2.2	2.2	2.3	3
P caesp	Laurus nobilis L.	2.2	2.3	1.2	3
P caesp	Viburnum tinus L.	2.2	2.3	2.3	3
Charact. and diff. species of the <i>Laburno anagyroidis-Ostryenion carpinifoliae</i> suball. and the <i>Carpinion orientalis</i> all.					
P caesp	Ostrya carpinifolia Scop.	5.5	5.5	3.3	3
P scap	Fraxinus ornus L.	2.2	2.2	3.3	3
H caesp	Coronilla emerus L. ssp. emeroides (Boiss. et Spruner) Hayek	1.2	1.2	1.2	3
H scap	Lathyrus venetus (Miller) Wohlf.	1.2	1.2	1.2	3
G bulb	Cyclamen hederifolium Aiton	1.2	2.2	2.3	3
NP	Carex digitata L.	1.2	+2	.	2
H caesp	Sanicula europaea L.	+2	1.2	.	2
P caesp	Daphne laureola L.	1.2	+	.	2
H scap	Viola reichenbachiana Jordan ex Boreau	+2	+	.	2
P caesp	Carpinus orientalis Miller	.	3.3	4.5	2
Charact. species of the <i>Quercetalia pubescenti-petraeae</i> ord. and the <i>Quercu-Fagetea</i> class					
H ros	Viola alba Besser ssp. dehnhardtii (Ten.) W. Becker	1.2	1.2	1.2	3
P lian	Hedera helix L.	3.3	3.3	2.3	3
H scap	Buglossoides purpureoacerulea (L.) Johnston	+2	+2	+2	3
P scap	Quercus virgiliana (Ten.) Ten.	1.2	2.2	1.2	3
P scap	Prunus avium L.	1.2	+	+	3
P caesp	Hieracium racemosum W. et K.	+2	1.2	+	3
P caesp	Corylus avellana L.	+2	1.2	.	2
H scap	Solidago virgaurea L.	+2	+	.	2
P scap	Sorbus domestica L.	1.2	+	.	2
P scap	Malus sylvestris Miller	+	+	.	2
P scap	Acer campestre L.	+2	.	+2	2
Other species					
H rept	Crataegus monogyna Jacq.	1.2	+2	+2	3
P lian	Euonymus europaeus L.	1.2	+	+	3
P caesp	Ligustrum vulgare L.	1.2	1.2	1.2	3
G rhiz	Ruscus aculeatus L.	2.3	2.3	2.2	3
P caesp	Lonicera caprifolium L.	1.2	+	1.2	3
Accidental species					
		17	17	2	

Table 7 (Tabela 7): *Rubio peregrinae-Aceretum campestris* ass.nova (typus rel. n. 1)

	Rel. n.	1*	2	3	4	5	6	
Life form	Altitude (m)	165	170	155	155	160	350	p
	Exposure	ONO	O	NO	NO	NNE	NO	r
	Slope (°)	30	35	20	20	30	20	e
	Coverage (%)	100	100	100	100	100	100	s.
	Area (m ²)	200	100	100	100	200	100	
Charact. and diff. species of the ass., the <i>Lauro-Quercenion pubescentis</i> suball. and the <i>Carpinion orientalis</i> all.								
P scap	<i>Acer campestre</i> L.	4.5	5.5	3.3	1.2	3.3	1.1	6
P caesp	<i>Ulmus minor</i> Miller	1.2	+2	4.5	4.5	4.5	5.5	6
P lian	<i>Rubia peregrina</i> L.	2.2	2.2	1.1	1.1	1.2	1.2	6
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	2.2	+2	+	+	1.1	.	5
P caesp	<i>Cornus sanguinea</i> L.	2.3	1.1	2.3	1.2	.	.	4
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	+2	.	+	.	1.1	4
P caesp	<i>Laurus nobilis</i> L.	2.2	+2	+2	.	.	.	3
Charact. species of the <i>Quercetalia pubescenti-petraeae</i> ord. and the <i>Quercio-Fagetea</i> class								
H caesp	<i>Brachypodium sylvaticum</i> (Hudson) Beauv.	1.2	+2	+2	1.1	.	.	4
P lian	<i>Hedera helix</i> L.	2.3	.	1.2	5.5	.	.	3
P scap	<i>Prunus avium</i> L.	1.2	1.2	.	.	.	+2	3
P caesp	<i>Lonicera xylosteum</i> L.	+	.	.	+	.	.	2
P scap	<i>Malus sylvestris</i> Miller	+	.	.	.	.	.	1
Other species								
P caesp	<i>Prunus spinosa</i> L.	+	+2	+	+	1.2	.	5
NP	<i>Ligustrum vulgare</i> L.	1.1	+2	.	+2	.	.	3
NP	<i>Rubus ulmifolius</i> Schott	1.2	1.1	.	.	1.2	.	3
G rhiz	<i>Carex flacca</i> Schreber	.	+2	+2	+	.	.	3
P lian	<i>Clematis vitalba</i> L.	.	.	+2	.	1.2	.	2
H bienn	<i>Inula conyza</i> DC.	.	+	.	+	.	.	2
P scap	<i>Juglans regia</i> L.	+	.	.	.	+	.	2
P lian	<i>Lonicera etrusca</i> Santi	.	+2	.	+	.	.	2
NP	<i>Rosa canina</i> L. sensu Bouleng.	.	+2	.	+	.	.	2
P scap	<i>Salix alba</i> L.	.	.	+2	+	.	.	2
He	<i>Carex pendula</i> Hudson	.	.	1.2	+	.	.	2
	Accidental species	5	2	1	1	1	5	

Table 8 (Tabela 8): *Lauro nobilis*-*Populetum canescentis* ass. nova (typus rel. n. 1)
– *Sambucus nigra* variant (rel. n. 5-7)

	Rel. n.	1*	2	3	4	5	6	7	
	Altitude (m)	320	160	160	150	140	150	160	P
Life	Exposure	NO	N	ONO	N	NO	N	NO	r
form	Slope (°)	25	-	40	30	30	30	30	e
	Coverage (%)	100	100	100	100	100	100	100	s.
	Area (m ²)	500	200	250	250	200	200	200	
Charact. and diff. species of the ass.									
P scap	<i>Populus canescens</i> (Aiton) Sm.	5.5	1.2	4.5	4.4	4.5	5.5	4.5	7
P lian	<i>Clematis vitalba</i> L.	1.2	1.2	+	1.2	+2	+2	+2	7
P caesp	<i>Laurus nobilis</i> L.	1.2	2.3	2.2	1.2	1.2	1.1	4.4	7
P lian	<i>Rubia peregrina</i> L.	2.2	2.3	3.3	1.1	1.1	+2	+	7
NP	<i>Rubus ulmifolius</i> Schott	2.2	1.2	+2	1.2	+2	+2	+	7
NP	<i>Salix apennina</i> Skvortsov	1.2	.	.	.	.	.	.	1
Diff. species of the <i>Sambucus nigra</i> variant									
P caesp	<i>Sambucus nigra</i> L.	.	.	+	.	2.2	1.2	+2	4
G rhiz	<i>Arum italicum</i> Miller	.	.	.	.	1.1	1.1	+2	3
G rhiz	<i>Symphytum tuberosum</i> L.	.	.	.	.	2.2	+2	+	3
Charact. species of the <i>Populion albae</i> all., the <i>Populetalia albae</i> ord. and the <i>Salici-Populetea nigrae</i> class									
P caesp	<i>Ulmus minor</i> Miller	2.2	4.4	2.2	.	.	.	.	3
He	<i>Carex pendula</i> Hudson	.	.	.	.	+2	.	+2	2
P scap	<i>Salix alba</i> L.	1.2	.	.	.	.	.	.	1
P scap	<i>Populus nigra</i> L.	.	4.5	.	.	.	.	.	1
P scap	<i>Fraxinus oxycarpa</i> Bieb.	.	.	.	1.2	.	.	.	1
P lian	<i>Vitis riparia</i> x <i>berlandieri</i>	.	.	.	2.3	.	.	.	1
Other species									
P lian	<i>Hedera helix</i> L.	2.3	4.5	3.4	+2	+2	4.4	4.4	7
P scap	<i>Acer campestre</i> L.	+	2.2	3.3	1.2	1.2	2.2	2.3	7
P caesp	<i>Cornus sanguinea</i> L.	+	3.3	2.2	1.2	.	+2	+2	6
G rad	<i>Tamus communis</i> L.	.	1.1	+2	.	+	.	+2	5
P caesp	<i>Robinia pseudoacacia</i> L.	+	.	+2	.	+2	.	.	3
NP	<i>Rosa canina</i> L. sensu Bouleng.	1.2	+	.	+2	.	.	.	3
H caesp	<i>Brachypodium sylvaticum</i> (Hudson) Beauv.	+2	2.3	.	.	.	.	+2	3
G rhiz	<i>Asparagus acutifolius</i> L.	.	+	1.1	+	.	.	.	3
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	.	+	+	+	.	.	.	3
	Accidental species	4	10	8	4	7	1	3	

Table 9 (Tabela 9): *Rubo ulmifolii-Salicetum albae* ass. nova (typus rel. n. 13) rel. 7-9 (Esino river, rel. 1, 4, 5 from Tab. 34 in Biondi & Baldoni, 1992)
 rel. 1-2 (Pescara river, from Tab. 30 in Pirone, Frattaroli & Corbetta (1997) rel. 10-12 ("Fosso della Selva" creek, rel. 1-3 from Tab. 5 in Biondi & Allegranza,
 rel. 3-5 (Saline river, rel. 1, 3, 4 from Tab. 15 in Pirone, 1991) 2004)
 rel. 6 - (Campamante creek, in Allegranza, 2003) rel. 13-16 (Sant'Imero creek, Tesino river, ined.)

Chorotypes	Life form	Rel. n.	1	2	3	4	5	6	7	8	9	10	11	12	13*	14	15	16	P		
		Coverage (%)	90	80	60	80	50	90	100	100	100	100	100	100	100	100	100	100	100	e	
		Area (m2)	100	150	80	120	150	80	50	100	40	90	100	100	200	80	90	80	80	s.	
Charact. and diff. species of the ass.																					
PALEOTEMP.	P scap	Salix alba L.	5.5	4.4	3	3	3	4.5	5.5	4.4	3.4	4.5	4.5	3.3	4.5	5.5	4.4	4.5	16		
EURIMEDIT.	NP	Rubus ulmifolius Schott	1.2	1.2	1	1	2	1.2	1.1	2.3	2.2	2.3	2.3	1.1	2.3	3.3	+2	3.3	16		
EUROP.-CAUC.	P lian	Clematis vitalba L.	.	1.2	.	.	.	1.2	.	3.3	1.1	1.2	1.2	.	1.2	1.2	1.2	1.2	10		
EURIMEDIT.	P lian	Vitis berlandieri Planchon X riparia Michx	.	.	.	.	.	2.3	1.2	.	.	1.2	3.3	.	2.2	2.3	1.2	.	7	
STENOMEDIT.	G rhiz	Hedera helix L.	2.2	+	.	.	.	.	.	.	1.1	.	.	.	.	+	.	2.2	1.2	6
STENOMEDIT.	P lian	Arum italicum Miller	.	.	.	.	.	.	.	1.1	1.2	1.2	.	1.1	+	.	.	.	5	
ENDEM.	NP	Rubia perigrina L. ssp. longifolia Poiret	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	+	2	
STENOMEDIT.	P scap	Salix apennina Skvortsov	.	.	.	.	.	.	.	.	.	1.2	.	.	.	.	.	1.2	1	
S-EUROP.-SUDSIB.	NP	Laurus nobilis L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	
STENOMEDIT.	NP	Fraxinus oxycarpa Bieb.	.	.	.	.	.	.	.	.	.	.	1.2	.	.	.	.	.	1	
		Rosa sempervirens L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.4	1
Charact. species of the <i>Salicion albae</i> all., the <i>Salicetalia purpureae</i> ord. and the <i>Salici purpureae-Populetea nigrae</i> class																					
PALEOTEMP.	P scap	Populus nigra L.	.	.	1	1	1	1.2	+	3.3	1.2	1.2	.	1.1	1.2	.	.	.	10		
EURASIAT.	He	Carex pendula Hudson	1.2	.	.	.	.	1.2	.	+	.	.	1.2	4.4	+	2.2	1.2	.	8	
EUROP.-CAUC.	P caesp	Ulmus minor Miller	.	.	.	.	.	1.2	.	.	1.2	2.2	1.2	.	1.2	.	1.2	1.2	7	
CIRCUMBOR.	G rhiz	Equisetum telmateja Ehrh.	1.2	2.3	.	+	.	1.2	.	.	.	.	.	2.2	.	.	.	.	5	
EURASIAT.	P scap	Salix purpurea L.	.	.	1	+	.	1.1	.	+	.	.	.	.	.	.	.	.	4	
PALEOTEMP.	P scap	Populus alba L.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	2	
EUROP.-CAUC.	P lian	Populus canadensis Moench	1.1	1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	
EUROP.-CAUC.	H scap	Humulus lupulus L.	.	.	.	.	.	.	.	1.2	1.2	.	.	.	.	.	.	.	2	
EUROSIB.	P caesp	Lysimachia nummularia L.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	
	P scap	Salix triandra L.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	
	P scap	Populus italica (Duroi) Moench	.	.	.	.	.	1.2	.	.	.	.	.	.	.	.	.	.	1	
Charact. species of the <i>Rhamno-Prunetea</i> class																					
EURASIAT.	P caesp	Cornus sanguinea L.	1.2	2.2	+	.	.	.	.	2.3	+2	1.2	.	.	.	+	2.2	1.2	+2	10
EUROP.-CAUC.	NP	Sambucus nigra L.	2.2	1.2	.	.	.	1.2	.	1.2	2.2	1.2	1.2	2.2	2.2	1.2	.	.	10		
EUROP.-CAUC.	P caesp	Ligustrum vulgare L.	1.2	+2	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	.	3
EUROP.-CAUC.	P caesp	Prunus spinosa L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1.1	.	2

SUBCOSMOP.	H scap	Other species	1.2	1.2	.	.	.	.	2.3	2.2	2.3	+	1.2	1.1	4.4	1.1	1.2	.	.	11
EURASIAT.	NP	<i>Urtica dioica</i> L.	1.2	+2	2	1	1	.	.	.	.	.	.	1.2	2.2	1.2	2.2	1.2	2.2	9
AVV.	P caesp	<i>Rubus caesius</i> L.	.	.	.	.	.	1.2	.	1.2	1.2	.	.	1.2	.	.	1.2	.	+	5
PALEOTEMP.	H scand	<i>Robinia pseudoacacia</i> L.	.	.	.	.	1	.	.	.	+	1.2	.	1.2	1.2	.	.	+2	.	5
EURASIAT.	T scap	<i>Calystegia sepium</i> (L.) R.Br.	.	.	.	.	.	.	.	.	.	.	.	1.2	1.1	+	.	+	.	4
SUBCOSMOP.		<i>Galium aparine</i> L.	.	2.3	1	1	+	.	.	.	.	.	.	.	.	.	.	.	.	4
PALEOTEMP.	NP	<i>Phragmites australis</i> (Cav.) Trin.	.	1.2	.	.	.	.	.	.	1.2	+	.	.	.	.	.	.	.	3
	P scap	<i>Solanum dulcamara</i> L.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1.1	+	.	3
EUROSIB.	H scap	<i>Juglans regia</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.3	2.2	.	3
EUROP.-CAUC.	P scap	<i>Stachys sylvatica</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	.	.	+2	2.3	3
		<i>Acer campestre</i> L.	3
		Accidental species	5	3	2	1	3	–	2	1	2	5	1	6	2	–	–	–	–	4	

Table 10 (Tabela 10): *Coronillo emeroidis-Ericetum multiflorae* Allegrezza, Biondi, Ballelli & Formica 1997 *ericetosum arboreae* subass. nova (typus rel. n. 6)

- *Colutea arborescens* variant (rel. n. 1-3)
- *Myrtus communis* variant (rel. n. 8-11)

	Rel. n.	1	2	3	4	5	6*	7	8	9	10	11	
	Altitude (m)	100	60	70	160	110	100	200	100	160	130	150	P
Life form	Exposure	SE	ONO	SO	S	ENE	ENE	SE	SE	E	NO	NO	r
	Slope (°)	15	10	10	5	5	5	20	40	40	20	10	e
	Coverage (%)	95	100	100	100	95	100	90	100	100	90	90	s.
	Area (m2)	200	20	20	100	300	100	60	50	100	10	8	
Charact. and diff. species of the ass.													
NP	<i>Erica multiflora</i> L.	1.2	1.2	1.2	1.2	4.4	1.2	4.4	3.3	3.4	2.3	2.3	11
P caesp	<i>Juniperus oxycedrus</i> L.	+	1.2	.	1.2	1.2	3.4	1.2	1.2	4.4	1.2	+2	10
NP	<i>Coronilla emeroides</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	+	1.2	+2	+	1.2	+	2.2	+	1.2	.	.	9
P caesp	<i>Spartium junceum</i> L.	2.3	+2	1.2	1.2	2.3	1.2	2.2	.	1.2	.	.	8
Diff. species of the <i>ericetosum arboreae</i> subass.													
H caesp	<i>Ampelodesmos mauritanicus</i> (Poirot) Dur. et Sch.	5.5	3.4	4.4	5.5	4.5	1.2	+2	2.3	2.3	1.2	+2	11
NP	<i>Cistus salvifolius</i> L.	1.2	1.2	+2	1.2	+	1.2	1.2	1.1	1.2	.	.	9
P caesp	<i>Erica arborea</i> L.	+	.	.	1.2	+2	2.2	.	1.1	.	1.2	1.2	7
Diff. species of the <i>Colutea arborescens</i> variant													
P caesp	<i>Colutea arborescens</i> L.	1.2	2.2	1.2	.	.	.	+2	+	.	.	.	5
P scap	<i>Fraxinus ornus</i> L.	+	1.2	+2	.	.	.	.	.	.	.	.	3
Diff. species of the <i>Myrtus communis</i> variant													
P caesp	<i>Myrtus communis</i> L.	.	.	.	.	.	.	.	4.5	1.2	3.4	4.4	4
Charact. species of the <i>Oleo-Ceratonion</i> all., the <i>Pistacio-Rhamnetalia</i> ord. and the <i>Quercetea ilicis</i> class													
P scap	<i>Quercus ilex</i> L.	+	+2	+2	1.2	+	+2	1.2	+	+	1.1	+2	11
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	.	1.2	+	1.2	+	+2	+	+2	+	.	9
P caesp	<i>Pistacia lentiscus</i> L.	+	.	.	1.2	+	3.3	1.2	1.2	2.2	+2	.	8
P lian	<i>Rubia peregrina</i> L.	.	+	.	1.2	.	1.2	+2	+	1.2	+2	.	7
P lian	<i>Lonicera implexa</i> Aiton	.	.	.	.	+2	+	+2	+2	1.2	+	1.1	7
NP	<i>Smilax aspera</i> L.	.	.	.	+	.	1.2	+2	+2	1.2	1.1	.	6
00	<i>Arbutus unedo</i> L.	.	.	.	.	.	+2	1.2	.	2.2	.	.	3
P caesp	<i>Phillyrea latifolia</i> L.	.	.	+2	.	.	.	+2	.	.	.	.	2
P scap	<i>Pinus halepensis</i> Miller	.	.	.	.	.	.	+2	.	1.2	.	.	2
Other species													
NP	<i>Cistus creticus</i> L. <i>eriocephalus</i> (Viv.) Greuter & Burdet	2.3	+2	1.2	+	+	+2	+2	1.2	.	.	.	8
P caesp	<i>Quercus virgiliana</i> (Ten.) Ten.	.	.	.	+	.	+	1.2	.	.	+2	.	4
P lian	<i>Lonicera etrusca</i> Santi	.	.	.	2.2	.	.	.	.	1.2	.	.	2
Accidental species													
		2	2	2	2	2	–	3	1	1	1	1	

Table 11 (Tabela 11): *Coronillo valentinae-Ampelodesmetum mauritanici* Biondi 1986

- *ampelodesmetosum mauritanici* (Biondi 1986) subass. nova (rill. n. 1-2; typus rel. n. 5 di Tab. 8 in Biondi (1986))
 – *pinetosum halepensis* subass. nova (rill. n. 3-4; typus ril. n. 4)

	Rel. n.	1	2	3	4*	P
	Altitude (m)	80	90	50	90	r
Life form	Exposure	SE	S	E	E	e
	Slope (°)	35	30	40	40	s.
	Coverage (%)	100	100	100	100	
	Area (m ²)	50	40	50	50	
Charact. and diff. species of the ass.						
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	5.5	4.5	5.5	4.4	7
P caesp	<i>Spartium junceum</i> L.	1.2	+2	2.2	3.3	6
NP	<i>Cistus creticus</i> L. <i>eriocephalus</i> (Viv.) Greuter & Burdet	.	2.3	2.3	1.2	6
Diff. species of the <i>pinetosum halepensis</i> subass.						
P scap	<i>Pinus halepensis</i> Miller	.	.	1.2	3.3	2
P caesp	<i>Quercus virgiliana</i> (Ten.) Ten.	.	.	+2	1.2	2
H scap	<i>Pulicaria odora</i> (L.) Rchb.	.	.	.	2.3	1
G rhiz	<i>Arundo pliniana</i> Turra	.	+2	2.3	.	2
Charact. species of the <i>Oleo-Ceratonion</i> all., the <i>Pistacio-Rhamnetalia</i> ord. and the <i>Quercetea ilicis</i> class						
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	1.2	2.3	2.3	6
P caesp	<i>Rhamnus alaternus</i> L.	.	.	.	+2	1
Other species						
H bienn	<i>Silene alba</i> (Miller) Krause	+	+2	.	.	2
Ch suffr	<i>Helichrysum italicum</i> (Roth) Don	+	+	.	.	2
H scand	<i>Convolvulus elegantissimus</i> Miller	+	+	.	.	2
H bienn	<i>Galactites tomentosa</i> Moench	+	+2	.	.	2
H bienn	<i>Scabiosa maritima</i> L.	+	+	.	.	2
H scap	<i>Reichardia picroides</i> (L.) Roth	+	.	+	.	2
NP	<i>Rubus ulmifolius</i> Schott	+	.	1.2	.	2
Ch suffr	<i>Dorycnium hirsutum</i> (L.) Ser.	.	.	+2	+	2
Accidental species						
		3	7	2	2	

Table 12 (Tabela 12): *Asparago-Osyridetum albae* Allegrezza, Biondi, Ballelli & Formica 1997

	Rel. n.	1	2	
	Altitude (m)	270	250	P
Life	Exposure	NO	N	r
form	Slope (°)	5	10	e
	Coverage (%)	100	100	s.
	Area (m ²)	10	5	
Charact. species of the ass.				
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	+2	2
NP	<i>Osyris alba</i> L.	4.4	5.5	2
Charact. species of the <i>Cytision sessilifolii</i> all., the <i>Prunetalia spinosae</i> ord. and the <i>Rhamno-Prunetea</i> class				
NP	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	1.2	1.2	2
P caesp	<i>Juniperus oxycedrus</i> L.	+2	.	1
Other species				
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	+2	+2	2
P caesp	<i>Quercus virgiliana</i> (Ten.) Ten.	1.1	+2	2
NP	<i>Smilax aspera</i> L.	1.2	1.2	2
P scap	<i>Fraxinus ornus</i> L.	+2	+2	2
P lian	<i>Lonicera implexa</i> Aiton	+2	+2	2
NP	<i>Cistus creticus</i> L. <i>eriocephalus</i> (Viv.) Greuter & Burdet	.	+2	1
P caesp	<i>Erica arborea</i> L.	1.2	.	1
P lian	<i>Rubia peregrina</i> L.	+2	.	1
NP	<i>Rosa sempervirens</i> L.	.	+2	1
H scap	<i>Euphorbia cyparissias</i> L.	.	+	1
NP	<i>Erica multiflora</i> L.	+2	.	1
P caesp	<i>Viburnum tinus</i> L.	.	+2	1

Table 13 (Tabela 13): *Lonicera etruscae*-*Coronilletum emeroidis* ass. nova (typus rel. n. 4)

	Rel. n.	1	2	3	4*	P
	Altitude (m)	220	230	150	80	r
Life form	Exposure	N	NO	ESE	NO	e
	Slope (°)	5	5	10	10	s.
	Coverage (%)	100	100	90	100	
	Area (m ²)	10	10	8	10	
Charact. and diff. species of the ass.						
NP	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	4.4	3.4	3.4	4.5	4
P lian	<i>Lonicera etrusca</i> Santi	+	+	.	+	3
P lian	<i>Rubia peregrina</i> L.	.	1.1	+2	1.1	3
NP	<i>Smilax aspera</i> L.	.	.	3.4	1.2	2
Charact. species of the <i>Cytisium sessilifolii</i> all., the <i>Prunetalia spinosae</i> ord. and the <i>Rhamno-Prunetea</i> class						
P lian	<i>Clematis vitalba</i> L.	+	1.2	+2	+2	4
P caesp	<i>Cytisium sessilifolium</i> L.	1.2	4.4	1.2	.	3
P caesp	<i>Cornus sanguinea</i> L.	.	1.2	.	1.2	2
Ch suffr	<i>Chamaecytisus hirsutus</i> (L.) Link	1.2	.	.	.	1
P caesp	<i>Colutea arborescens</i> L.	.	+2	.	.	1
P caesp	<i>Pyracantha coccinea</i> M. J. Roemer	.	+2	.	.	1
P caesp	<i>Spartium junceum</i> L.	.	.	+2	.	1
NP	<i>Rubus ulmifolius</i> Schott	.	.	.	+2	1
Other species						
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	+2	+2	1.2	+2	4
P caesp	<i>Ostrya carpinifolia</i> Scop.	+2	+2	+2	.	3
P scap	<i>Fraxinus ornus</i> L.	+2	+2	1.2	.	3
P lian	<i>Hedera helix</i> L.	+2	1.1	.	3.4	3
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	.	+2	+2	+2	3
G rhiz	<i>Asparagus acutifolius</i> L.	.	+	+	+	3
	Accidental species	2	4	7	3	

Table 14 (Tabela 14): *Lonicera etruscae*-*Cornetum sanguineae* Biondi, Bagella, Casavecchia & Pinzi 2002

Rel. n.	1	2	3		
Altitude (m)	170	320	320	P	
Life form	N	N	NE	r	
Slope (°)	20	30	20	e	
Coverage (%)	100	100	100	s	
Area (m ²)	100	300	40		
Charact. species of the ass.					
P caesp	<i>Cornus sanguinea</i> L.	4.5	4.5	3.4	3
P lian	<i>Lonicera etrusca</i> Santi	1.1	3.3	1.2	3
Charact. species of the <i>Cytisium sessilifolii</i> all., the <i>Prunetalia spinosae</i> ord. and the <i>Rhamno-Prunetea</i> class					
P lian	<i>Rubia peregrina</i> L.	1.1	2.2	1.2	3
NP	<i>Ligustrum vulgare</i> L.	1.2	+2	.	2
NP	<i>Rosa canina</i> L. sensu Bouleng.	+2	1.2	.	2
NP	<i>Rubus ulmifolius</i> Schott	+2	1.2	.	2
NP	<i>Coronilla emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spruner) Hayek	.	.	+2	1
P lian	<i>Clematis vitalba</i> L.	.	+	.	1
P caesp	<i>Prunus spinosa</i> L.	1.2	.	.	1
P caesp	<i>Pyracantha coccinea</i> M. J. Roemer	.	.	+2	1
Other species					
P scap	<i>Acer campestre</i> L.	+2	1.2	1.2	3
H caesp	<i>Brachypodium sylvaticum</i> (Hudson) Beauv.	+	1.2	1.2	3
P scap	<i>Populus canescens</i> (Aiton) Sm.	.	1.2	+	2
H scap	<i>Dorycnium pentaphyllum</i> Scop. ssp. <i>herbaceum</i> (Vill.) Rouy	.	+	1.2	2
P scap	<i>Quercus virgiliana</i> (Ten.) Ten.	.	+	+	2
G rhiz	<i>Asparagus acutifolius</i> L.	+	.	+	2
P scap	<i>Fraxinus ornus</i> L.	.	+	1.2	2
H caesp	<i>Dactylis glomerata</i> L.	+	.	1.2	2
P caesp	<i>Ulmus minor</i> Miller	1.1	1.2	.	2
Accidental species					
		2	6	10	

Table 15 (Tabela 15): *Ulmo-Salicetum apenninae* Biondi & Vagge 2004

	Rel. n.	1
	Altitude (m)	160
Life form	Exposure	ENE
	Slope (°)	40
	Coverage (%)	100
	Area (m ²)	80
Charact. and diff. species of the ass.		
NP	<i>Salix apennina</i> Skvortsov	4.5
P caesp	<i>Ulmus minor</i> Miller	1.2
P caesp	<i>Cornus sanguinea</i> L.	2.2
Charact. species of the <i>Salicion eleagni</i> all., the <i>Salicetalia purpureae</i> ord. and the <i>Salici purpureae-Populetea nigrae</i> class		
P scap	<i>Populus canescens</i> (Aiton) Sm.	2.2
Charact. species of the <i>Rhamno-Prunetea</i> class		
NP	<i>Rubus caesius</i> L.	3.3
P lian	<i>Clematis vitalba</i> L.	2.3
NP	<i>Rubus ulmifolius</i> Schott	2.2
P caesp	<i>Prunus spinosa</i> L.	+2
Other species		
P lian	<i>Rubia peregrina</i> L. <i>longifolia</i>	+2
H scap	<i>Pulicaria dysenterica</i> (L.) Bernh.	+
H scap	<i>Epilobium tetragonum</i> L.	+
G rhiz	<i>Tussilago farfara</i> L.	+
G rhiz	<i>Arundo pliniana</i> Turra	+2
G rad	<i>Cirsium arvense</i> (L.) Scop.	+
T scap	<i>Picris echioides</i> L.	+

Table 16 (Tabela 16): *Asperulo aristatae-Fumanetum thymifoliae* Allegrezza, Biondi, Ballelli & Formica 1997
 – *Cistus creticus* ssp. *eriocephalus* variant (rel. n. 2-4)

	Rel. n.	1	2	3	4	
	Altitude (m)	200	150	150	170	P
Life	Exposure	SE	SO	SSO	S	r
form	Slope (°)	20	25	30	35	e
	Coverage (%)	80	100	80	85	s.
	Area (m ²)	10	10	50	60	
Charact. and diff. species of the ass.						
Ch suffr	<i>Micromeria graeca</i> (L.) Bentham	1.2	1.2	1.2	2.2	4
Ch suffr	<i>Fumana thymifolia</i> (L.) Spach	4.4	4.5	5.5	3.3	4
Diff. species of the <i>Cistus creticus</i> ssp. <i>eriocephalus</i> variant						
NP	<i>Cistus creticus</i> L. ssp. <i>eriocephalus</i> (Viv.) Greuter & Burdet	.	+2	+2	3.4	3
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	.	(+2)	+	1.2	3
Charact. species of the <i>Cisto-Ericion</i> all., the <i>Rosmarinetalia officinalis</i> ord. and the <i>Rosmarinetea officinalis</i> class						
Ch suffr	<i>Fumana procumbens</i> (Dunal) G. et G.	1.2	1.2	.	2.2	3
Ch suffr	<i>Helichrysum italicum</i> (Roth) Don	.	1.2	+	.	2
NP	<i>Cistus salvifolius</i> L.	1.2	.	+2	.	2
Ch suffr	<i>Teucrium polium</i> L. ssp. <i>capitatum</i> (L.) Arcang.	1.2	1.2	2.2	.	2
Ch suffr	<i>Argyrobium zanonii</i> (Turra) P. W. Ball	+2	.	.	.	1
H scap	<i>Convolvulus cantabrica</i> L.	1.2	.	.	.	1
H scap	<i>Ononis pusilla</i> L.	.	.	.	1.1	1
Other species						
H scap	<i>Stachys recta</i> L.	+2	.	+	1.1	3
G rhiz	<i>Asparagus acutifolius</i> L.	.	.	+	1.2	2
H scap	<i>Inula viscosa</i> (L.) Aiton	.	+	.	+2	2
H bienn	<i>Scabiosa maritima</i> L.	.	.	+2	1.2	2
H scap	<i>Reichardia picroides</i> (L.) Roth	.	.	+	+	2
H caesp	<i>Cymbopogon hirtus</i> (L.) Janchen	.	.	2.2	1.1	2
	Accidental species	1	5	4	5	

Table 17 (Tabela 17): *Asperulo aristatae-Cistetum eriocephali* ass. nova (typus rel. n. 2)

	Rel. n.	1	2*	3	4	P
	Altitude (m)	250	260	260	270	r
Life	Exposure	S	SSO	N	SE	e
form	Slope (°)	5	15	15	5	s.
	Coverage (%)	100	90	100	90	
	Area (m ²)	10	20	20	10	
Charact. and diff. species of the ass.						
NP	<i>Cistus creticus</i> L. ssp. <i>eriocephalus</i> (Viv.) Greuter & Burdet	4.4	5.5	4.5	4.4	4
H scap	<i>Asperula aristata</i> L. fil.	1.2	1.2	1.2	.	3
P caesp	<i>Spartium junceum</i> L.	+	1.1	.	+2	3
Charact. species of the <i>Cisto-Ericion</i> all., the <i>Rosmarinetalia officinalis</i> ord. and the <i>Rosmarinetea officinalis</i> class						
Ch suffr	<i>Micromeria graeca</i> (L.) Bentham	+	+2	+	.	3
Ch suffr	<i>Helichrysum italicum</i> (Roth) Don	+2	+	2.3	.	3
Ch suffr	<i>Teucrium polium</i> L. ssp. <i>capitatum</i> (L.) Arcang.	1.1	+2	1.2	.	3
Ch suffr	<i>Fumana thymifolia</i> (L.) Spach	+2	+2	.	.	2
Ch frut	<i>Teucrium flavum</i> L.	+	1.2	.	.	2
H scap	<i>Ononis pusilla</i> L.	+2	+	.	.	2
Ch suffr	<i>Dorycnium hirsutum</i> (L.) Ser.	.	2.2	+	.	2
Ch suffr	<i>Teucrium chamaedrys</i> L.	.	+	+2	.	2
NP	<i>Cistus salvifolius</i> L.	1.2	.	.	.	1
Ch suffr	<i>Argyrobium zanonii</i> (Turra) P. W. Ball	.	.	+	.	1
Other species						
H caesp	<i>Ampelodesmos mauritanicus</i> (Poiret) Dur. et Sch.	1.1	1.2	2.2	1.2	4
G rhiz	<i>Asparagus acutifolius</i> L.	+	+	.	+	3
H scap	<i>Silene vulgaris</i> (Moench) Garcke	+	+	.	.	2
H bienn	<i>Scabiosa maritima</i> L.	+	1.1	.	.	2
T scap	<i>Odontites lutea</i> (L.) Clairv.	1.2	.	+	.	2
P caesp	<i>Pistacia lentiscus</i> L.	+	.	.	+	2
P caesp	<i>Quercus virgiliana</i> (Ten.) Ten.	+	.	.	+2	2
H scap	<i>Carlina corymbosa</i> L.	.	1.1	+	.	2
H scap	<i>Silene vulgaris</i> (Moench) Garcke	.	+	+	.	2
H caesp	<i>Dactylis glomerata</i> L.	.	+	1.2	.	2
NP	<i>Osyris alba</i> L.	.	.	+	+2	2
Accidental species						
		3	15	5	2	

Table 18 (Tabela 18): *Cistetum eriocephali-salvifolii* ass. nova (typus rel. n. 3)

– *Agrypron pungens* variant (rel. n. 4-6)

Rel. n.		1	2	3*	4	5	6	
Life form	Altitude (m)	90	110	100				P
	Exposure	NNO	SSO	N				r
	Slope (°)	10	20	10				e
	Coverage (%)	90	100	90	50	90	90	s.
	Area (m2)	60	70	60	20	10	15	
Charact. and diff. species of the ass.								
NP	<i>Cistus salvifolius</i> L.	5.5	4.5	4.4	2.3	5.5	4.4	6
NP	<i>Cistus creticus</i> L. ssp. <i>eriocephalus</i>	2.3	1.2	3.4	.	1.2	1.2	5
Diff. species of the <i>Agrypron pungens</i> variant								
G rhiz	<i>Agropyron pungens</i> (Pers.) R. et S.	.	.	.	+2	+2	+2	3
H scap	<i>Urospermum dalechampii</i> (L.) Schmidt	.	.	.	+	+	+	3
Charact. species of the <i>Cisto-Ericion</i> all., the <i>Rosmarinetales officinalis</i> ord. and the <i>Rosmarinetea officinalis</i> class								
Ch suffr	<i>Micromeria graeca</i> (L.) Benth	1.1	1.2	1.1	.	.	.	3
Ch suffr	<i>Teucrium polium</i> L. ssp. <i>capitatum</i> (L.) Arcang.	.	1.2	+2	1.3	.	.	3
Ch suffr	<i>Helichrysum italicum</i> (Roth) Don	+	.	+2	.	.	.	2
Ch suffr	<i>Fumana thymifolia</i> (L.) Spach	.	.	1.2	.	+	.	2
H scap	<i>Asperula aristata</i> L. fil.	.	.	+	.	.	.	1
Ch suffr	<i>Dorycnium hirsutum</i> (L.) Ser.	.	.	.	.	.	1.1	1
Other species								
P scap	<i>Pinus halepensis</i> Miller	2.2	1.2	1.2	2.3	+	+	6
G rhiz	<i>Asparagus acutifolius</i> L.	1.2	1.1	1.2	.	+	+	5
H scap	<i>Silene vulgaris</i> (Moench) Garcke	.	.	.	+	+2	+	3
H bienn	<i>Scabiosa maritima</i> L.	+	.	.	.	+	.	2
H scap	<i>Inula viscosa</i> (L.) Aiton	.	+	.	.	.	+	2
H scap	<i>Aster linosyris</i> (L.) Bernh.	+	.	1.2	.	.	.	2
H caesp	<i>Bothriochloa ischaemon</i> (L.) Keng	+	.	+2	.	.	.	2
T scap	<i>Lagurus ovatus</i> L.	.	.	1.1	.	+2	.	2
G bulb	<i>Allium sphaerocephalon</i> L.	+	.	+	.	.	.	2
T scap	<i>Avena barbata</i> Potter	+	.	+	.	.	.	2
H caesp	<i>Ampelodesmos mauritanicus</i> (Poir) Dur. et Sch.	.	2.2	1.2	.	.	.	2
P caesp	<i>Colutea arborescens</i> L.	.	1.2	+	.	.	.	2
H caesp	<i>Cymbopogon hirtus</i> (L.) Janchen	.	1.1	+	.	.	.	2
H scap	<i>Anchusa italica</i> Retz.	.	.	.	+	+	.	2
H bienn	<i>Verbascum niveum</i> Ten.	.	.	.	+	+	.	2
H scap	<i>Salvia verbenaca</i> L.	.	.	.	+	+	.	2
Accidental species		4	2	5	6	4	4	

Table 19 (Tabela 19): *Scabioso maritimae-Cymbopogonetum hirti* ass. nova (typus rel. n. 3)

Rel. n.		1	2	3*	4	
	Altitude (m)	110	120	120	80	P
Life	Exposure	SO	S	SSE	SSO	r
form	Slope (°)	10	35	25	25	e
	Coverage (%)	70	90	90	100	s.
	Area (m ²)	30	100	70	150	
Charact. and diff. species of the ass.						
H caesp	<i>Cymbopogon hirtus</i> (L.) Janchen	3.4	4.5	4.4	5.5	4
Ch suffr	<i>Micromeria graeca</i> (L.) Bentham	1.2	1.2	2.3	.	3
H bienn	<i>Scabiosa maritima</i> L.	.	1.1	1.2	1.2	3
H scap	<i>Silene vulgaris</i> (Moench) Garcke ssp. <i>angustifolia</i> (Miller) Hayek	.	1.1	1.1	+	3
Charact. species of the <i>Inulo-Agrophyron repentis</i> all., the <i>Agropyretalia repentis</i> ord. and the <i>Artemisietea vulgaris</i> class						
H scap	<i>Inula viscosa</i> (L.) Aiton	.	+2	+	+	3
H caesp	<i>Dactylis glomerata</i> L.	.	.	+2	1.2	2
H scap	<i>Calamintha nepeta</i> (L.) Savi	.	+2	1.2	.	2
H bienn	<i>Verbascum sinuatum</i> L.	.	+	1.1	.	2
H scap	<i>Aster linosyris</i> (L.) Bernh.	+	.	.	.	1
H caesp	<i>Bothriochloa ischaemon</i> (L.) Keng	1.2	.	.	.	1
H scap	<i>Stachys recta</i> L.	+	.	.	.	1
G rhiz	<i>Agropyron repens</i> (L.) Beauv.	.	.	+2	.	1
H scap	<i>Hypericum perforatum</i> L.	.	.	+	.	1
Other species						
T scap	<i>Avena barbata</i> Potter	+	1.1	+2	1.1	4
T scap	<i>Brachypodium distachyum</i> (L.) Beauv.	+2	+2	.	.	2
G rhiz	<i>Asparagus acutifolius</i> L.	+	+2	.	.	2
T scap	<i>Bromus madritensis</i> L.	.	1.2	1.1	.	2
T scap	<i>Bromus rigidus</i> Roth	.	+2	+2	.	2
T scap	<i>Briza maxima</i> L.	.	+2	+2	.	2
NP	<i>Cistus salvifolius</i> L.	.	+2	.	+	2
Ch suffr	<i>Fumana thymifolia</i> (L.) Spach	.	+2	+2	.	2
H caesp	<i>Petrohragia saxifraga</i> (L.) Link	.	.	+2	+	2
G bulb	<i>Allium sphaerocephalon</i> L.	1.1	.	+	.	2
H scap	<i>Euphorbia cyparissias</i> L.	.	.	+2	+2	2
Accidental species						
		7	4	5	3	

Table 20 (Tabela 20): *Agropyro repentis-Oryzopsietum miliaceae* ass. nova (typus rel. n. 1)

	Rel. n.	1*	2	3	4	5	P
	Altitude (m)	100	90	100	100	90	r
Life	Exposure	-	-	-	SE	NNO	e
form	Slope (°)	-	-	-	20	5	s.
	Coverage (%)	100	100	100	100	100	
	Area (m ²)	30	20	20	50	20	
Charact. and diff. species of the ass.							
H caesp	<i>Oryzopsis miliacea</i> (L.) Asch. et Schweinf.	5.5	4.4	5.5	5.5	5.5	5
G rhiz	<i>Agropyron repens</i> (L.) Beauv.	+2	+2	1.2	1.2	+2	5
H bienn	<i>Scabiosa maritima</i> L.	1.2	+2	+	+	+2	5
H scap	<i>Calamintha nepeta</i> (L.) Savi	+2	+2	+2	+2	.	4
T scap	<i>Pallenis spinosa</i> (L.) Cass.	+	.	1.1	+	+	4
H scap	<i>Foeniculum vulgare</i> Miller ssp. <i>piperitum</i> (Ucria) Coutinho	+2	.	.	+	.	2
Charact. species of the <i>Inulo-Agropyron repentis</i> all., the <i>Agropyretalia repentis</i> ord. and the <i>Artemisietea vulgaris</i> class							
H caesp	<i>Dactylis glomerata</i> L.	+	1.2	+2	1.1	1.2	5
H scap	<i>Silene vulgaris</i> (Moench) Garcke ssp. <i>angustifolia</i> (Miller) Hayek	1.1	1.1	+2	+	+	5
H scap	<i>Stachys recta</i> L.	2.3	+2	1.1	1.2	.	4
H scap	<i>Urospermum dalechampii</i> (L.) Schmidt	1.2	+	+	.	.	3
T scap	<i>Galium aparine</i> L.	+	+2	.	.	.	2
H scap	<i>Aster linosyris</i> (L.) Bernh.	1.1	+	.	.	.	2
H scap	<i>Inula viscosa</i> (L.) Aiton	.	.	+2	+	.	2
G rhiz	<i>Convolvulus arvensis</i> L.	.	.	+2	.	.	1
H bienn	<i>Pastinaca sativa</i> L. ssp. <i>urens</i> (Req.) Celak	.	1.1	.	.	.	1
H bienn	<i>Anthemis tinctoria</i> L.	.	+2	.	.	.	1
H scap	<i>Picris hieracioides</i> L.	+2	.	.	.	.	1
H scap	<i>Reseda lutea</i> L.	+2	.	.	.	.	1
H scap	<i>Malva sylvestris</i> L.	+2	.	.	.	.	1
T scap	<i>Picris echioides</i> L.	.	.	+2	.	.	1
H scand	<i>Lathyrus sylvestris</i> L.	.	.	.	+	.	1
G bulb	<i>Allium roseum</i> L.	.	.	.	+	.	1
H caesp	<i>Bothriochloa ischaemon</i> (L.) Keng	.	.	.	.	+2	1
G rhiz	<i>Cynodon dactylon</i> (L.) Pers.	.	.	.	.	+	1
Other species							
T scap	<i>Avena barbata</i> Potter	1.1	+2	+2	1.1	+	5
G rhiz	<i>Asparagus acutifolius</i> L.	+2	+2	1.2	+	+	5
G rhiz	<i>Arundo pliniana</i> Turra	+2	1.1	.	.	1.1	3
Accidental species							
		4	7	2	4	4	

Table 21 (Tabela 21): *Agropyro-Asteretum linosyris* Ferrari 1971

	Rel. n.	1	2	3	
	Altitude (m)	340	330	340	
	Exposure	S	N	N	P
Life form	Slope (°)	40	40	45	r
	Coverage (%)	40	30	30	e
	Area (m ²)	5	30	2	s.
Charact. and diff. species of the ass. and the <i>Podospermo laciniati-Elythrigenion athericae</i> suball.					
H bienn	<i>Podospermum laciniatum</i> (L.) DC.	1.1	1.2	1.2	3
G rhiz	<i>Agropyron pungens</i> (Pers.) R. et S.	+2	+2	.	2
H scap	<i>Aster linosyris</i> (L.) Bernh.	.	.	+	1
Charact. species of the <i>Inulo-Agropyron repentis</i> all., the <i>Agropyretalia repentis</i> ord. and the <i>Artemisietea vulgaris</i> class					
H bienn	<i>Daucus carota</i> L.	1.1	+	2.2	3
H scap	<i>Sonchus arvensis</i> L. ssp. <i>arvensis</i>	+2	.	+	2
H scap	<i>Inula viscosa</i> (L.) Aiton	.	+	.	1
H bienn	<i>Melilotus officinalis</i> (L.) Pallas	+	.	.	1
G rhiz	<i>Convolvulus arvensis</i> L.	1.2	.	.	1
H scap	<i>Beta vulgaris</i> L.	+	.	.	1
Other species					
P caesp	<i>Robinia pseudoacacia</i> L.	+	1.1	+	3
H caesp	<i>Dactylis glomerata</i> L.	+	.	+	2
T scap	<i>Avena barbata</i> Potter	+	.	+	2
T scap	<i>Bromus madritensis</i> L.	+	.	+2	2
H scap	<i>Reichardia picroides</i> (L.) Roth	.	+2	1.1	2

Table 22 (Tabela 22): *Epilobio tetragoni-Elymetum pycnanthi* Biondi, Ballelli, Allegrizza & Manzi 1990

	Rel. n.	1	2	3	
	Altitude (m)	310	350	310	P
Life form	Exposure	SW	W	W	r
	Slope (°)	35	25	30	e
	Coverage (%)	95	90	80	s.
	Area (m ²)	20	20	20	
Charact. and diff. species of the ass. and the <i>Inulo-Agropyrion repentis</i> all.					
G rhiz	<i>Agropyron pungens</i> (Pers.) R. et S.	1.2	3.4	3.4	3
H scap	<i>Hedysarum coronarium</i> L.	+2	1.1	+2	3
H scap	<i>Inula viscosa</i> (L.) Aiton	+2	+2	1.2	3
H bienn	<i>Daucus carota</i> L.	1.1	+	+	3
H scap	<i>Pulicaria dysenterica</i> (L.) Bernh.	+	+	+	3
H scap	<i>Aster linosyris</i> (L.) Bernh.	1.1	+2	.	2
H scap	<i>Senecio erucifolius</i> L.	1.1	.	+	2
T scap	<i>Blackstonia perfoliata</i> (L.) Hudson	1.2	.	+	2
T scap	<i>Picris echioides</i> L.	.	+	+	2
H scap	<i>Reichardia picroides</i> (L.) Roth	1.1	.	+	2
T scap	<i>Atriplex latifolia</i> Wahlenb.	.	+	+	2
Charact. species of the <i>Agropyretalia repentis</i> ord. and the <i>Artemisietea vulgaris</i> class					
G rhiz	<i>Agropyron repens</i> (L.) Beauv.	+3	2.3	1.2	3
G rhiz	<i>Convolvulus arvensis</i> L.	+	+2	+	3
H bienn	<i>Melilotus officinalis</i> (L.) Pallas	1.1	1.1	1.1	3
H scap	<i>Picris hieracioides</i> L.	+	+2	+	3
H bienn	<i>Anthemis tinctoria</i> L.	+	.	+2	2
Other species					
H caesp	<i>Dactylis glomerata</i> L.	4.4	1.2	+2	3
T scap	<i>Avena barbata</i> Potter	+2	1.2	+2	3
G bulb	<i>Allium roseum</i> L.	+	+	+	3
P caesp	<i>Robinia pseudoacacia</i> L.	+2	+2	+2	3
P caesp	<i>Spartium junceum</i> L.	+2	+2	.	2
P scap	<i>Quercus ilex</i> L. Pl.	+	.	+	2
	Accidental species	5	13	3	

Table 23 (Tabela 23): *Ononido reclinatae-Plantaginietum bellardii* (typus ril. 2)

	Rel. n.	1	2*	3	4	
	Altitude (m)	90	110	110	90	P
Life	Exposure	E	-	E	-	r
form	Slope (°)	5	-	5	-	e
	Coverage (%)	100	100	90	100	s.
	Area (m ²)	60	80	70	50	
Charact. species of the ass., the <i>Tuberarion guttatae</i> all. and the <i>Tuberarietalia guttatae</i> ord.						
T scap	<i>Plantago bellardi</i> All.	4.5	5.5	5.5	4.5	4
T caesp	<i>Vulpia ciliata</i> (Danth.) Link	2.3	1.1	+	1.1	4
T scap	<i>Ononis reclinata</i> L.	1.1	1.2	+2	+2	4
T scap	<i>Lagurus ovatus</i> L.	+2	1.2	+2	+2	4
T scap	<i>Medicago coronata</i> (L.) Bartal.	+2	+	+	1.1	4
T scap	<i>Hippocrepis ciliata</i> Willd.	+	+	.	.	2
Charact. species of the <i>Tuberarietea guttatae</i> class						
T scap	<i>Brachypodium distachyum</i> (L.) Beauv.	+2	+	+2	+2	4
T scap	<i>Cerastium semidecandrum</i> L.	1.1	+	+	+	4
T rept	<i>Trifolium scabrum</i> L.	1.1	+2	+	.	3
T scap	<i>Tragus racemosus</i> (L.) All.	.	+2	+2	+2	3
T scap	<i>Medicago minima</i> (L.) Bartal.	+2	+2	.	.	2
T scap	<i>Linum strictum</i> L. ssp. <i>corymbulosum</i> (Rchb.) Rouy	+	+	.	.	2
T scap	<i>Hypochoeris achyrophorus</i> L.	+	.	.	.	1
T scap	<i>Trifolium stellatum</i> L.	.	.	+	.	1
T scap	<i>Catapodium rigidum</i> (L.) Hubbard	.	.	.	+2	1
Other species						
T scap	<i>Bromus madritensis</i> L.	1.2	+	1.1	+2	4
T scap	<i>Avena barbata</i> Potter	+	+2	.	.	2
NP	<i>Cistus creticus</i> ssp. <i>eriocephalus</i>	+2	.	.	.	1
Ch suffr	<i>Fumana thymifolia</i> (L.) Spach	+2	.	.	.	1
Ch suffr	<i>Micromeria graeca</i> (L.) Benth	.	+2	.	.	1
H scap	<i>Sanguisorba minor</i> Scop.	.	+	.	.	1
T scap	<i>Pallenis spinosa</i> (L.) Cass.	.	+	.	.	1
G bulb	<i>Leopoldia comosa</i> (L.) Parl.	.	.	+	.	1
H caesp	<i>Cymbopogon hirtus</i> (L.) Janchen	.	.	+2	.	1
T scap	<i>Crepis sancta</i> (L.) Babc.	.	.	+	.	1