INTRODUCTION

Nanotherophytic formations are widespread and diverse in Central Italy. Recently, an impulse to the study of this somewhat neglected vegetation has been given by the EU Habitat Directive. Habitat, that recognized as prioritary the habitat 6220 (*Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea*), including the different types of herbaceous dry vegetation of the Mediterranean. This vegetation is widespread on rocks rich in carbonates (limestone, but also clays, gravels, sands), but usually in small stands, often not larger than a few dm², along paths, roads, or dispersed between the tufts of the tall monocots *Ampelodesmos mauritanicus, Asphodelus microcarpus, Hyparrhenia birta*. Nanotherophytic basiphilous vegetation occurs also frequently in heavily grazed pastures, usually in mosaic with dry grasslands (frequently referable to *Festuco-Brometalia* Br.-Bl. et Tx. 1943 ex Klika et Hadac 1944), or in garigues and shrublands. Nanotherophytic communities occur on very thin, poor, not shuffled soils; on richer soils more demanding species rapidly predominate (*Euphorbia peplus, Sonchus oleraceus, Carduus pycnocephalus* etc., referable to *Hordeion leporini* Br.-Bl. (1931) 1947), whereas on shuffled soils the spreading of species referable to *Brometalia rubent-tectorum* Rivas Martinez et Izco 1977 (*Aegilops geniculata, Tordylium apulum, Lotus ornithopodioides*) is observed. Nanotherophytic vegetation is dominated by small winter annuals not taller than 20-30 cm. They appear in winter, but usually bloom relatively late, in...
May or early June. There is a large year to year variability in the development of these communities: when rains are not abundant or drought begins earlier they become often not-apparent, whereas they bloom richly when spring rains are abundant. The floristic composition of nanotherophytic vegetation is often extremely rich and characteristic. Leguminosae are dominant, together with Rubiaceae and Compositae, rarely Umbelliferae, whereas Gramineae are rare.

The syntaxonomical and nomenclatural history of this vegetation is complicated. Braun-Blanquet et al. (1952) described a class Thero-Brachypodietea Br.-Bl. ex A. Bolos & Bolos in A. Bolos 1950 for herbaceous vegetation on basic soils, while communities of therophytes on acid soils were attributed to Cisto-Lavanduletia Br.-Bl. 1940, in the order Helianthmetalia Br.-Bl. in Br.-Bl., Molin. & H. Wagner 1940. Helianthmetalia were later erected to the class level, whereas Thero-Brachypodietea were emended and restricted to the nanoterophytic vegetation (Rivas-Martinez, 1977). A few authors (Rivas-Martinez, 1977) merge the classes Helianthmetea (Br.-Bl. ex Rivas-Goday, 1958) Rivas-Goday & Rivas-Martinez 1963 ad Thero-Brachypodietea in a single class Helianthmetea guttatae s.l., whereas other (De Foucault, 1999; Brullo et al. 2001) maintain them as distinct. Unfortunately, the name Thero-Brachypodietea has been applied both to the nanotherophytic and the perennial grassland vegetation resulting in great confusion. We prefer therefore to employ the names Stipo-Trachynietea distachyae Brullo 2001 and Trachynion distachyae Rivas-Martinez 1977 (Rodwell et al., 2002).

The synoptic table in De Foucault (1999) shows that among Stipo-Trachynietea a clear phytogeographical distinction between Western and Central Mediterranean communities exists, related to higher rainfall in Central Mediterranean. De Foucault (1999) separates a group of communities centered in Southern France in the order Brachypodietalia distachyae Rivas-Martinez 1978, whereas more southern communities are referred to the order Stipo-Bupleuretalia semicompositi Brullo 2001. Trachynion is split into an alliance Sideritidi romanae-Hypochoeridion achyrophori De Foucault 1999, referred to Stipo-Bupleuretalia, and Sideritidi romanae-Brachypodion distachyae De Foucault 1999 = Trachynion distachyae s.s. in Brachypodietalia distachyae. Stipo-Trachynietea are relatively underexplored in Central and Eastern Mediterranean; it is therefore not possible here to discuss in detail the higher-level syntaxonomy of the class, and we will simply refer to Trachynion distachyae (=Thero-Brachypodion) as distinct from other alliances (Onobrychido-Ptilostemion Brullo 2001, Plantagino-Catapodion Brullo 1985, Stipion retortae Br.-Bl. In Br.-Bl. & O Bolos 1954, Omphalodion brassicifolia Rivas-Martinez, Izco & Costa 1973 etc.) typical of warmer and drier conditions. In Apulia a vegetation slightly deviating from typical Trachynion has been described, referred to the suballiance Ononinedion ornithopodioidis Biondi & Guerra 2008, differentiated by a few thermophilous species (Biondi & Guerra, 2008).

In this paper we present the results of our investigation of Trachynion distachyae in Central Italy, where vegetation referred to this alliance is very diverse and more widespread than in the Western Mediterranean. Surprisingly, this large variability has not been generally recognized, and Central Italian Trachynion has been referred to a single association Trifolio scabri-Hypochoeridetum achyrophori Lapraz 1984 nom. inval. The question is if this variability is sufficient to distinguish different associations or not.

MATERIALS AND METHODS

In the years 1987-2007 112 relevés have been carried out in order to study the nanotherophytic vegetation on basic soils in Central Italy (Fig. 1). The study area encompasses in particular Latium, with emphasis on the Province of Rome, but relevés have been carried out also in other areas of Central and Southern Italy and in Western Greece as outgroups. To this set of relevés 58 relevés taken from the literature have been added, from Tuscany, Marche, Umbria and Latium, encompassing all published relevés from Italy referred to this vegetation known to us in the year 2008.
The environment of the study area is very diverse. Generally speaking, the climate is Mediterranean but with good rains in winter and spring and a summer drought usually not very strong. Rocks are very diverse; Trachynion occurs on limestone, gravels, sands, clays, and sometimes also on pyroclastites; in fact, volcanic rocks in Central Italy are rich in cations.

Relevés have been subjected to multivariate analysis with TWINSPLAN program (Hill, 1997), and thereafter rearranged manually. An ordination has been carried out on the relevés by means of Detrended Correspondence Analysis with the package CANOCO, an ordination method where axes are constrained to be linear combination of species.

Average Ellenberg’s indicator values (Ellenberg et al., 1992) have been calculated on the species groups resulting from the classification, not considering the very numerous companions, and relying on a database of values for the species in central Italy (Fanelli et al., 2006, 2007a). Here we define the ecological signature as the list of the six average indicator values (L T K F R N S) for a given species, group of species, relevé or community, and ecograph a diagram of two ecological indicator showing the relative position of two samples with respect of the ecological space.


RESULTS

Table of relevés comprises 623 species (Tab. enclosed). Many species are representative of Festuco-Brometalia or Rosmarinietalia officinalis Rivas-Martínez, Diaz, Prieto, Loidi, Penas 1991, or belong to Koelerio-Corynephoretea or Stellarietae; only a subset of the species are true basophilous nanotherophytes. A number of relevés from the tables in Biondi et al. (1997), referred to Trifolio scabri-Hypochoeridetum, fall in a fully different group from the bulk of Trachynion distachyae, closer to Koelerio-Corynephoretea communities, and is not presented in Table 1.

When attention is concentrated only on species typical of Stipo-Trachynetea distachyae, different groups of species (A-E) appear.

Group A is represented by Medicago truncatula, Hymenocarpus circinnatus, Medicago rigidula, Trifolium cherleri, Plantago lagopus, Melilotus sulcatus, Lotus edulis and Medicago littoralis. Trifolium cherleri and Plantago lagopus occur also in many other communities, but here they reach their optimum. This group can be split in group A1 (Melilotus sulcatus, Medicago truncatula, Lotus edulis), and group A2 (Plantago lagopus, Hymenocarpus circinnatus, Medicago rigidula, Trifolium cherleri, Medicago truncatula, Trifolium lappaceum). Group A1 is more thermophilous and requires richer, more humid soils. This group of species occurs in warm areas along the coasts of Latium and southern Tuscany, in particular in the surroundings of Rome, but extends also inside on dry slopes. It occurs at 0-500 m. a.s.l. mainly on sands and clays of alluvial origin and on pockets of clays deriving from weathering of limestone.

Group B is represented by Hedypnois rhagadioloides, Helianthemum salicifolium, Plantago bellardi, Euphorbia

Fig. 1. Study area and the six groups of relevés identified. circles: group A., squares: group B; triangles: group C; stars: group D; crosses group E.
falcate, Euphorbia exigua, Ononis reclinata, Galium parisiense, Xeranthemum inapertum, Asterolinon linum-stellatum. These species prefer drier and colder conditions than group B. Onobrychis caput-galli occurs only in the relevés from the southern part of the area occupied by the community, whereas Hippocrepis ciliata (occurring also in group D) is represented only in the northern part of the area. This community occurs in southern Tuscany, Umbria, northern and central Latium, at 200-400 (800) m. a.s.l.. It occurs in an inner belt with respect to the community characterized by group A.

Group C is represented only by Polygala monspeliaca, Althaea hirsuta and Hippocrepis unisiliquosa. The community characterized by this group of species occurs in the Apennines (Umbria, Abruzzi, Latium) and in Southern Latium at 200-700 m. a.s.l..

Group D is represented by Minuartia hybrida, Trigonella gladiata, Ononis pusilla. This group of species occurs in the Apennines at quotes higher than group C (700-900 m), and in Southern Italy.

Group E is represented only by Crucianella latifolia. Sites of relevés diagnosed by this group are from Western Greece, and from Latium (Sabina on warm, southern slopes and Circeo), at 100-600 m. a.s.l.. It represents the warmest community.

A group of species (TB) is common to the whole table, although locally these species are more or less frequent: Coronilla scorpioides, Scorpiurus muricatus, Trifolium stellatum, Crepis neglecta, Plantago afra, Trifolium scabrum, Hypochaeris acaule, Sideritis romana, Medicago minima, Brachypodium distachyum, Linum strictum s.l, Blackstonia perfoliata. This set of species can be considered typical of Trachynion distachyae, although many of these species are rare in other parts of the Mediterranean. Crepis neglecta, for instance, is endemic to Italy and former Yougoslavia. This group almost perfectly overlaps with the character-species of Stipo-Trachyetea distachyae after the revision of De Foucault (1999). Many fragmentary relevés in the table present only this group of species, and lack differential character-species.

Among the companions, there are many transgressives of communities occurring in mosaic with Trachynteon distachyae, mainly Festuco-Brometea (Bromus erectus, Eryngium amethystinum, Petrorhagia saxifraga etc.) or Lygeo-Stipetea Rivas-Martinez 1978. Abundant are the transgressives from Brometalia rubenti-tectorum (Tordylium apulum, Medicago orbicularis, Catapodium rigidum, Agilops geniculata etc.), Species of Helianthemetoia are sparsely frequent in the table, pointing to the close relationship between Stipo-Trachyetea and Helianthemetoia (Rivas-Martinez, 1977).

Ordination

The first 3 axes of DCA explain 74% of variance of the dataset. Axis I suggests a successional gradient, whereas Axis II a gradient of acidity (Fig. 2), with less basic soils on the right and more basic soils on the left. Axis III (Fig. 3) follows a gradient of drought and temperature, with sites closer to the dryer northern coast of Latium on the negative side of the axis, and sites on hills and low mountains, with reduced summer drought and lower temperatures, on the positive side. The most interesting ordination is represented by axes II and III. On this plane, the five groups of relevés retrieved by structuring of the table are relatively well distinguished, although some overlap is detectable, in particular between group B and group C. Sites are ordered in skew belts that correspond with a gradient of summer drought. Group A, occurring on the northern coast of Latium, where rains are about 600-700 mm/year, is the driest; groups E and D are moister, occurring in Southern Latium, where summer drought are pronounced but annual precipitation are about 1200 mm/year).

Ellenberg’s indicators

We calculated average indicator values only for the species of groups A-E and TB, because the large number of companions would confuse the pattern. The six groups of species are overall similar, although the ecological signature is different for each
group of relevés in at least an indicator. Two eco-
graphs are particularly interesting, F-T and R-N. The
ecograph F-T (Fig. 4) suggests a gradient from rela-
tively wet, relatively cold conditions up to dry, warm
conditions. The groups A, B, C, E follows this gra-
dient; therefore, the communities here defined are
distinct in particular along a climatic gradient.
Group D is displaced and more xerophilous with re-
spect to the other communities. The ecograph R-N
(Fig. 5) shows TB in a central position, surrounded
by the other groups of species. Ellenberg’s indica-
tors show that groups A and B are neutrophilous
and grow on relatively rich soils, group D is slightly
but distinctively basic, and grows on very poor soils,
groups C and E are strongly basic and grow on poor
soils. Interestingly, this latter ecograph allows, in
woodlands, to distinguish humus forms (Ellenberg
et al., 1992).

DISCUSSION
In Central Italy, therophytic basiphilous communi-
ties have been generally referred to *Trifolio scabri-Hy-

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Fig. 2. DCA of axes II and III. Symbols as in Fig. 1.

Fig. 3. DCA of axes III and IV. Symbols as in Fig. 1.

Fig. 4. Ecograph of Ellenberg’s indicators F-T (humidity vs
temperature). Symbols as in Fig. 1.

Fig. 5. Ecograph of Ellenberg’s indicators N-R (nutrients vs
reaction). Symbols as in Fig. 1.
when legumes are abundant, or to *Saxifrago tridactylitis*-Hornungietum petraeae Izco 1974 and *Saxifrago tridactylitis*-Hypochoeridetum achyrophori Biondi et al. 1997, when *Saxifraga tridactylites*, *Erophila verna* etc. are dominant (Scoppola, 2000; Scoppola & Angiolini 2001; Biondi et al. 1997; Blasi et al., 1990). The latter are in our opinion better referred to *Koelerio-Corynephoretea* (Fanelli, 2007), although Mediterranean authors usually exclude therophytic communities from *Koelerio-Corynephoretea* (De Foucault, 1999; Rivas-Martínez et al., 1997). The former case is more complex. *Trifolio-Hypochoeridetum* was described only with a synoptic table (Lapraz, 1984), and is therefore not validly published. It was after validly published on the base of Italian relevés characterized by species of group B (Biondi et al., 1997). It is distinguished mainly by the abundance of group TB of table 1 (at the end of vol).

The question arises, if the five groups of species detected in this study differentiate sub-association of a very large *Trifolio-Hypochoeridetum*, or represent the character-species of distinct associations. Both approaches are tenable. Nonetheless, if we restrict to the nanotherophytic component, relevés from different groups of columns show little similarity (about 30%), suggesting that an analytical treatment should be preferred. Moreover, the associations occupy different geographical ranges. We therefore suggest to consider the different parts of Tab. 1 as distinct associations. Further study in the poorly explored Southern Apennines should be rewarding. A drawback of a more analytical treatment is the fact that impoverished stands, lacking diagnostic species of groups A-E but well furnished with species of group TB should be treated as fragmentary stands, whereas they would be encompassed in a more comprehensive *Trifolio-Hypochoeridetum* s.l.. This can be annoying for cartography, but is useful in conservation, since it allows to distinguish typical stands with a saturated floristic composition, that occur only in relatively undisturbed condition and that should be the object of special conservation measures, from impoverished stands that should be also preserved, but whose conservation is less urgent. The latter are often very frequent and mistakenly rich in overall floristic composition, but can be detected because they lack the species of group A-E.

**Medicagini rigidulæ-Trifolietum scabri** ass. nova hoc loco (group A)

(Typus Rel. 15)

This community, characterized by group A (Tab 1., rel. 1-19), is the most closely related to *Trifolio-Hypochoeridetum* of Southern France. Many species are in common (*Medicago truncatula*, *Medicago littoralis*, *Plantago lagopus*, *Medicago rigidula*), but *Hymenocarpus circinnatus* is lacking in Southern France and *Picris sprenglerana* and *Allium acutiflorum* are lacking in Italy (Lapraz, 1984).

The “Ass. ad Asphodelus ramosus e Hymenocarpus circinnatus” described from Rome (Fanelli, 2002) clearly belongs here.

The first few relevés (rel. 1-6) of Table 1 are characterized by subgroup A1 and the lack of *Medicago rigidula* and *Trifolium cherleri*, whereas *Melilotus sulcatus* is very frequent. They possibly represent a distinct community, typical of richer soil, but further research is needed on this topic.

This association occurs in Southern Tuscany and Latium in a coastal belt.

**Trifolio scabri-Hypochoeridetum achyrophori**

Biondi, Izco. Ballelli & Formica 1997 (group B)

Relevés from Umbria, Marche, Tuscany, Northern Latium, present a rich group of differential species (*Helianthemum salicifolium*, *Galium parisium*, etc.), belonging to group B. In Tivoli, near Rome, there is some overlap among this community and *Medicagini-Trifolietum*. Among the species of group TB a few (*Scorpiurus muricatus*, *Trifolium stellatum*) are frequent in *Medicagini-Trifolietum* but rare in *Trifolio-Hypochoeri-detum*, whereas *Blackstonia perfoliata*, relatively rare in other communities, is frequent in *Trifolio-Hypochoeri-
It should be stressed that many species of group B are often considered as class and alliance characterspecies in the treatment of *Stipa-Trachynietea* of authors from Spain and France (e.g. Bolos, 1962). These species are eurieious in Southern France and Spain, but in Central Italy they are restricted to this association.

The association is widespread in the provinces of Siena, Viterbo, Rieti, in the northern and central Province of Rome, and reaches Umbria.

Nowak (1987) presents a table doubtfully referred to this association for Eastern Ligury. This vegetation is very impoverished, and represents probably fragmentary disturbed stands that cannot be referred to any of the five associations presented here.

**Hippocrepido siliquosae-Brachypodietum distachyi** ad interim (Group C)

This community is characterized by the few species of group C. *Plantago lagopus*, transgressive from group A is relatively frequent. Species of group TB show here the strongest development. *Hippocrepis unisiliquosa*, although present in other communities of the Mediterranean, in Latium is very distinctive of warm, relatively humid conditions in spring. Nonetheless, we hesitate to describe this community as new, because it is possibly a subassociation of the following. Larger sampling of this and the following community, in particular in Campania and Basilicata is needed. The community is restricted to the Apennines in the supramediterranean belt.

**Trigonello gladiatae-Brachypodietum distachyi** nova hoc loco (Group D)

(Typus rel 108 in Tab. 1r, from Blasi et al., 1990, Tab 2 rel. 8)

This community is characterized by *Trigonella gladiata*, *Minuartia hybrida*, *Ononis pusilla* (group D) and is therefore well distinct. Among species of group TB, *Crepis neglecta* and *Trifolium stellatum* are frequent in this community, and otherwise rare or not frequent in the others. Species from groups A, B, C are lacking, whereas species from group TB are well represented. This community is restricted to relatively higher altitudes in the Subappennines and seems widespread on the Tyrrenian side in Southern Italy. It deserves a closer look, because in Campania and Basilicata it is probably better developed than in Latium. Relevés 3 and 4 in tab. 13 in Maiorca & Spampinato (1999), from northern Calabria, should probably be referred here.

**Crucianello latifoliae-Hypochoeridetum achyrophori** Flesi, Blasi, Di Marzio 1996. (Group E)

This community is characterized only by *Crucianella latifolia*, and also species of group TB are poorly represented. This community has been retrieved in Southern Latium and in Western Greece, and seems an oriental community. It shows in fact some similarity in overall floristic composition with the Croatian *Trifolio-Brachypodietum rupestris* Horvatic 1958 (Horvatic 1958; Hecimovic 1984). Relevés from Aouns mountains have been referred to this community (Di Pietro & Blasi, 2002). The table in this paper is floristically poor, and a clearcut classification is difficult. *Crucianella latifolia* is present only in rel.9.

**Basal communities**

Relevés 134-173 in Table 1 are rich in species from group TB but lack character-species of groups A-E. They are better treated, therefore, as basal communities (Kopecký & Hejný, 1978); a possible name is *Hypochoeris achyrophorus* (*Trachynion distachyi*) community. Rarely a dominant species appears, and in this case the namings *Medicago minima* (*Trachinion distachyi*) community, *Crepis neglecta* (*Trachinion distachyi*) community are possible.

**CONCLUSIONS**

Approximately at Nice the dry climate of Western Mediterranean is replaced by the wetter climate of Central Mediterranean, with more seasonal rains (Bolos, 1970). Moreover, limestones and generally basic soils are much more widespread eastwards. A
sharp floristic change occurs at this boundary, with the disappearance or rarefaction of many species, and the spread of species such as Hypochoeris achyrophi,
or Linum strictum, many Trifolium and Medicago species. The alliance Trachynion distachyae diversifies and becomes very common. In fact, the analysis of a large number of original and literature relevés from Central Italy allows to split the very variable association Trifolio scabri-Hypochoeridetum achyrophori into several well defined communities. These communities are floristically, geographically and ecologically distinct. Medicagini rigidae-Trifolietum scabri is the coldest and wettest community, with a preference for not very basic soils relatively rich in nutrients. It occurs along the coasts of Latium and Tuscany. Trifolio-Hypochoeridetum is more dry and warmer than the former, but occurs on similar soils. It is widespread in Tuscany, Umbria, Northern Latium, in a belt far from the sea. Hippocrepido unisiliquose-Brachypodietum distachyi occurs in dry and warm conditions, on poor, distinctively basic soils. It occurs in the Apennines and in the southern part of Latium in an inner belt. Trigonello gladiate-Brachypodietum distachyi occurs in dry and warm conditions, on very poor basic soils. It is widespread in the Apennines at higher quotes than Hippocrepido-Brachypodietum and is probably widespread in the Southern Apennines. Impoverished Crucianello latifoliae-Hypochoeridetum achyrophori occurs in very warm conditions in Southern Latium and Western Greece. Interestingly, the distribution of these five associations in Central Italy follows broadly NW-SE belts, closely reflecting the pattern of other vegetation types in the Province of Rome (Fanelli et al., 2007). Many stands, representing fragmentary Trachynion vegetation, cannot be referred to a definite association and are treated as basal communities.

In summary, the Trachynion distachyae is very diverse in Central Italy, with five co-occurring associations; this means that probably Central Italy represents a diversification centre of this vegetation in the whole Mediterranean, in part because of climate reasons, in part because limestone outcrop extensively in this region. Therefore, particular measures of protection should be addressed in this area to this and related vegetation types, taking care to preserve in particular the floristically saturated stands.

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Appendix 1: Sites of relevés and bibliographic references

R 1 : Tivoli (RM), olive grove, 3/6/99; R 2 : Platiri (Igoumenitsa), 11/5/02; R 3 : Rome, among Hyparrhenia hirta, 0/6/89; R 4 : Magliana (Rome), among Hyparrhenia hirta, 20/6/89 R 5 : Magliana (Rome), among Hyparrhenia hirta, 4/6/89; R 6 : Rome, among Hyparrhenia hirta, 4/6/89; R 7 : Agosta (RM), 3/6/93; R 8 : Castel di Guido (Rome); 29/5/93; R 9 : M.te Tuscolo (RM), 10/6/93; R 10 : Pte Mammolo (Rome), on tuff, 2/5/92; R 11 : Fonte S. Stefano (Terracina, LT), 26/5/99; R 12 : Riserva Capalbio (Rome); 29/5/93; R 13 : Aurelia, near Cerveteri (RM), 8/6/93; R 14 : S. Severa (RM), 8/6/93; R 15 : Rome, Cristoforo Colombo, 3/6/91; R 16 : Vittinia (Rome), among Hyparrhenia hirta, 8/6/91; R 17 : Malagrutta (Rome) 27/5792; R 18 : Mt. Ausoni (LT), 12/5/90; R 19 : Campo Soriano, M.te. Cetarella (LT), 12/6/90; R 20 : Close to Koutsochera (Greece), 5/5/02; R 21 : Riserva Caparbio (GR), 31/5/92; R 22 : Tivoli (RM), M.te Catillo, 30/5/05; R 23 : Tivoli (RM), M.te Catillo, 30/5/05; R 24 : Tivoli (RM), C.le Vescovo, 30/5/05; R 25 : Tivoli (RM), C.le Vescovo, 30/5/05; R 26 : Castel di Guido (Rome), 14/5/87; R 27...
Appendix 2: Sporadic species

R. 1: Trifolium resupinatum, Sinapis arvensis, Silybum marianum; R. 2: Cistus creticus subsp. creticus (r), Verbascum thapsus, Ulmus minor, Malope malacoides, Juniperus oxycedrus, Bellis perennis; R. 3: Herniaria hirsuta (r), Poa trivialis subsp. trivialis, Medicago murex, Linum viscosum, Eupomum europaeum (pl), Diplotaxis tenuifolia, Cuscuta scandens subsp. cesatiana, Borago officinalis, Arum italicum; R. 4: Diplotaxis tenuifolia, Borago officinalis, Vicia villosa subsp. ambiguia, Daphne gnidium; R. 5: Arum italicum, Medicago sativa, Ferula communis, Campanula rapunculus; R. 6: Epipodium tetratum (r), Chrysanthemum segetum, Arum italicum, Poa trivialis subsp. trivialis, Vicia hybrida, Picros pauciflora, Ophrys apifera, Avena fatua, Agrostis utopia; R. 7: Stachys cretica subsp. salviifolia, Conyza sumatrensisis, Arabis irsuta, Alpecocus myosoroides; R. 8: Centaurea napifolia, Andryala integrifolia; R. 9: Anthoxanthum odoratum (r), Andryala integrifolia, Trifolium incarnatum subsp. molineri (r), Prunus spinosa, Knautia integrifolia, Jasione montana, Festuca arundinacea, Echium italicum, Carex distans; R. 10: Verbascum thapsus, Trifolium subfloccatum, Toplis virgata, Senecio vulgaris, Reseda phytceum, Anobanche minor, Lotus parviflorus, Hypochoera radicata, Dactylis glomerata; R. 12: Sonchus asper, Cistus monspeliensis; R. 13: Ulmus minor (pl), Hedysarum coronarium, Allium ampeloprasum; R. 14: Malope malacoides, Ornithogalum narbonense, Hainardia cilindrica; R. 15: Silene conica; R. 16: Vicia hybrida, Diplotaxis tenuifolia, Borago officinalis, Malcolmia graeca subsp. bicolor, Erica multiflora; R. 17: Vicia hybrida (r), Chrysanthemum segetum (r), Phleum triticeum (r), Borago officinalis, Ulmus minor (pl), Fernula communis, Ziziphora capitata; R. 18: Dactylis glomerata, Romulae columnae, Prunus spinosa (pl), Daucus carota; R. 19: Dactylis glomerata, Daucus carota, Silene italic subsp. nemoralis, Scandix pecten-veneris, Saxifraga triacanthites, Satureja vulgaris; R. 20: Tortula muralis, Silene colorata subsp. canescens, Lagurus ovatus, Cerastium illyricum, Asphodelus cera-sifer; R. 21: Scorpiurus vermiculatus, Centaurea tenuiflorum, Allium subhirsutum; R. 22: Centaurea deusta; R. 23: Polycarpon tetraphyllum subsp. tetraphyllum, Hedypnois tubaeformis; R. 26: Salvia multiflora, Parapholis incurva; R. 28: Parapholis incurva; R. 29: Hypochoera radicata (r), Aphanes pupilla (r), Trifolium fragiferum, Convolvulus arvensis; R. 30: Allium ampeloprasum, Crepis apifera, Alkanna tinctoria; R. 31: Parapholis incurva; R. 32: Urginea maritima, Trifolium striatum, Plantago serraria, Medicago discolour, Cynodon dactylon; R. 33: Centaurea deusta (r), Satureja montana (r), Thesium tum, Plantago serraria, Medicago disciformis, Cynodon dactylon; Parapholis incurva; R. 34: Thesium divaricatum; R. 35: Tube-raria guttata; R. 36: Melica ciliata, Cynodon dactylon, Valeriana eriocarpa, Seseli viarum, Selaginella denticulata, Lathyrus cicera, Hypericum hirsutum, Cuscuta epithymum; R. 37: Selaginella denticulata, Hypericum hirsutum, Ornithogalum nar-bonense, Phagnalon rupestre, Fumana laevipes, Cistus salvi-folius; R. 38: Cynodon dactylon, Polycarpon tetraphyllum subsp. tetraphyllum, Lolium rigidum; R. 64: Tortula intermedia (r), Centaurea deusta, Torilis nodosa, Selanthes annuus, Erodium aculea; R. 66: Silene conica; R. 67: Tortella nitida (r), Erodium aculea; R. 68: Rhagadiolus stellatus; R. 69: Orchis coriophora subsp. fragrans (r), Lathy-rus aphaca, Daucus broterii; R. 70: Stachys cretica subsp. sal-viifolia (r), Dorycnium pentaphyllum subsp. suffrutoscum (r); Cerastium glomeratum (r), Centaurea napifolia, Cuscuta scan-dens subsp. cesatiana, Orobanche ramosa; R. 71: Orobanche crenata (r); R. 73: Sedum tenuifolium (r), Trifolium strictum, Muscare neglectum, Horminga petraia, Bromus tectorum, Bromus squarrosum; R. 74: Allium subhirsutum, Teucrum fru-ticans, Globularia alpyrum; R. 75: Phlomis fruticosa (r), Sider-tis syriaca (r), Valerianella eriocarpa, Dactylis glomerata, Rhagadiolus edulis, Prunus spinosa, Phleum bertoloni, Lathy-rus sphaericus, Cerastium tomentosum; R. 76: Fumana laevi-pes, Centaurea tenuiflorum, Daucus carota, Cistus monspeliensis, Veronica anagallis-aquatica, Pulicaria odor, Ononis viscosa var. breviflora, Euphorbia sarracan, Dorycnium hirsutum, Crucia laevipes, Anemone hortensis; R. 77: Cus-cuta epithymum, Pinus pinea (pl); R. 78: Cistus salviifolius, Vicia hirsuta, Theligonum cynocrambe, Erica arborea, Carex hallerana; R. 79: Theligonum cynocrambe, Carex hallerana, Valerianella eriocarpa, Silene italic subsp. nemoralis, Lens ervoi-des; R. 80: Erica arborea, Anemone hortensis, Allium subhirsutum, Melica ciliata, Daphne gnidium, Thymus vulga-ris, Smilax aspera, Pistacia lentiscus, Phleum subalatum, Phil-lyrea latifolia, Ononis brevifolia, Oenante pimpanellioide; Myrtus communis, Hypericum perforatum, Clematis flaman-mula; R. 81: Scandix pecten-veneris, Sonchus asper; R. 101: Galium murale, Bryum bicolore, Barbula unguiculata; R. 106: Polygala nicaeensis (r), Leonotodon hispidus, Dorycnium pen-taphyllum subsp. suffrutoscum, Globularia puntata, Serapis vormeracea, Pteridium aquilinum, Prunella laciniata, Lotus gla-bre; R. 110: Juniperus oxycedrus (r), Rhamnus alaternus, Olea europea; R. 111: Juniperus oxycedrus, Olea europea, Cematis vitalba, Dianthus balbisii subsp. balbisi; R. 112: Crepis lacera (r), Erica arborea, Juncus fontanesii; R. 113: Olea europea (r), Rhamnus alaternus (r), Sonchus asper (r), Selaginella denticulata (r), Orchis coriophora subsp. fragrans, Crepis bursifolia; R. 114: Lathyrus setifolius; R. 115: Prunus spinosa, Plantago serraria, Fumana arabica; R. 116: Plantago serraria; R. 117: Thesium divaricatum, Arisarum vulgare; R. 118: Crepis lacera (r), Erica arborea, Juncus fontanesii; R. 119: Daphne gnidium, Thymus vulgaris, Smilax aspera, Pistacia lentiscus, Phleum subalatum, Phil-lyrea latifolia, Ononis brevifolia, Oenante pimpanellioide; Myrtus communis, Hypericum perforatum, Clematis flammula; R. 81: Scandix pecten-veneris, Sonchus asper; R. 101: Galium murale, Bryum bicolore, Barbula unguiculata; R. 106: Polygala nicaeensis (r), Leonotodon hispidus, Dorycnium pen-taphyllum subsp. suffrutoscum, Globularia puntata, Serapis vormeracea, Pteridium aquilinum, Prunella laciniata, Lotus gla-bre; R. 110: Juniperus oxycedrus (r), Rhamnus alaternus, Olea europea; R. 111: Juniperus oxycedrus, Olea europea, Cematis vitalba, Dianthus balbisii subsp. balbisi; R. 112: Crepis lacera (r), Erica arborea, Juncus fontanesii; R. 113: Olea europea (r), Rhamnus alaternus (r), Sonchus asper (r), Selaginella denticulata (r), Orchis coriophora subsp. fragrans, Crepis bursifolia; R. 114: Lathyrus setifolius; R. 115: Prunus spinosa, Plantago serraria, Fumana arabica; R. 116: Plantago serraria; R. 117: Thesium divaricatum, Arisarum vulgare; R. 118: Daphne gnidium (r), Minuartia glomerata, Euphrasia tricuspidata, Carлина greca; R. 119: Juncus fontanesii, Orobanche crenata; R. 120: Orobanche crenata (r), Plantago serraria, Rhamnus alaternus, Verbascum thapsus, Valerianella discoidea, Cardopatum corymbosum; R. 121: Smilax aspera; R. 124: Selaginella denticulata, Vicia disperma; R. 125: Silene alba (r), Allium tenuiflorum ...