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Floristic richness and phytogeography of the "Torrente Trasubbie" nature reserve (S-Tuscany, Italy)

Abstract

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The results of a floristic survey carried out in the "Torrente Trasubbie" nature reserve in Southern Tuscany (Grosseto province) are reported and briefly discussed. Firstly, a brief description of the geomorphology, climatic and vegetation of the area is given. Secondly, the list of the vascular flora is reported, which was based on field researches and herbarium material. This list includes 684 species belonging to 85 families and to 358 genera; 662 taxa are native or naturalized, whereas 28 are introduced species. The biological spectrum shows a comparable proportion of therophytes (238, 36.4%) and hemicryptophytes (240 species, 36.6%) suggesting a transition between the flora of coastal areas of southern Tuscany and that of inner mountain systems. However, the chorological analysis reveals the dominance of Mediterranean species. There are 11 endemics and a number of taxa of phytogeographical relevance at the regional and national level. The data indicate that the Torrente Trasubbie is an important area for the conservation of a complex environmental mosaic which contains a fairly high level of floristic biodiversity.

Key words: Flora, Geomorphology, Biological forms, Vegetation.

Introduction

The "Torrente Trasubbie" Site of Regional Interest (S.I.R.) lies in the Grosseto province, Scansano municipality (Central Italy), and was established by the Tuscan Regional Law 56/2000 to safeguard the vast watercourse and the areas along its banks of a particular natural area in the Tuscan Maremma.

This was done in view of the bioecological and conservation importance of the different habitats existing in this biotope, which considerably outweighs their incidence on the national territory in terms of surface. The S.I.R. analysed here comprises a fine mosaic of riparian brushwoods, shrublands, garrigues and grasslands, to which are linked numerous ecotonal areas of great importance for animal life too. Recent vegetation surveys (Angiolini & al. 2005a) revealed the presence of particular types of plant communities and habitats, some of which are of communitarian interest according to the Directive EEC

92/43. This is the case, for example, of the meadows of graminoid and annual grasses (*Thero-Brachypodietea*, *Helianthemetea*), the phytocoenoses of suffrutices with predominance of *Santolina etrusca* and *Helichrysum italicum* (*Rosmarinetea*), the hygrophilous communities of *Nanocyperion* and the riparian woodlands of *Alnus glutinosa*.

From the floristic viewpoint, however, the Trasubbie area has still to be analysed in detail like most of the inner parts of the Tuscan Maremma (Angiolini & al. 2005b). The first botanical information on the Scansano territory dates back to the late 18th century, when Santi (1798), during his second trip to Mount Amiata, drew up a short list of the species in the area. More recently, detailed vegetation studies were carried out on the S.I.R., and these provided additional floristic information which underscored the botanical relevance of the biotope (Scoppola & Angiolini 1997a, b; Angiolini 1998; Angiolini & De Dominicis 2001; Angiolini & al. 2004a, b). A synthetic description of the site has also appeared in a recent survey on natural biotopes in the Grosseto province (Selvi & Stefanini 2005). Such preliminary data encouraged us to undertake a more detailed census of the floristic diversity, to provide a basis for conservation actions which may ensure in time the safeguard of this peculiar stretch of Tuscany's natural landscape.

Study area

The Torrente Trasubbie originates in the area between Poggio le Sassaie (1,080 m a.s.l.) and Mount Buceto (1,152 m), within the "Monte Labbro-Alta valle dell'Albegna" Site of Communitarian Importance in the central-eastern part of the Grosseto province, southern Tuscany (Fig. 1). It is about 24 km long, runs E/NE-W and joins the river Ombrone at an altitude of 18 m above sea level. Its main tributary is the torrent Trasubbino which, after its confluence with the Fosso Senna, runs leftwards through the alluvial plain. The total surface of the S.I.R. is about 1,381 ha and includes the beds of the three main streams Trasubbie, Trasubbino and Senna from a maximum altitude of 330 m to a minimum of 35 m. The outer edge of the area under consideration corresponds to the outer part of the riparian strip; therefore, the entire site takes the form of narrow, long strips, parallel to the watercourses.

The Trasubbie biotope is characterized by the same aspect of Calabrian, Sicilian and eastern Alpine "fiumaras". Its main bed reaches the remarkbale width of c. 800 m and is marked by a network of shallow streams with clean water. These are almost completely dry during the summer but experience sudden, violent floods in early spring and autumn. This kind of bed with braided streams is characterized by severe erosion in its upper part, whereas in the lower part the load of detritus is higher than that the torrent can carry. The excess material accumulates along the wide bed, thus leading to the sedimentation of large amounts of gravelly and pebbly material and to a process known as "aggradation" (Castiglioni 1991). Transport and sedimentation dynamics lead to the rapid growing of rises and fluvial bars which progressively increase in volume to form more stable and mature levels referred to as river terraces. These tend to change, to grow rapidly or even to be eroded by the stream current. The morphology of the fluvial bed is therefore subject to a severe dynamics over time, accounting for the variability of bed's edges, surface and shape. This explains why the administrative boundaries indicated here could change in a not-too-distant future.

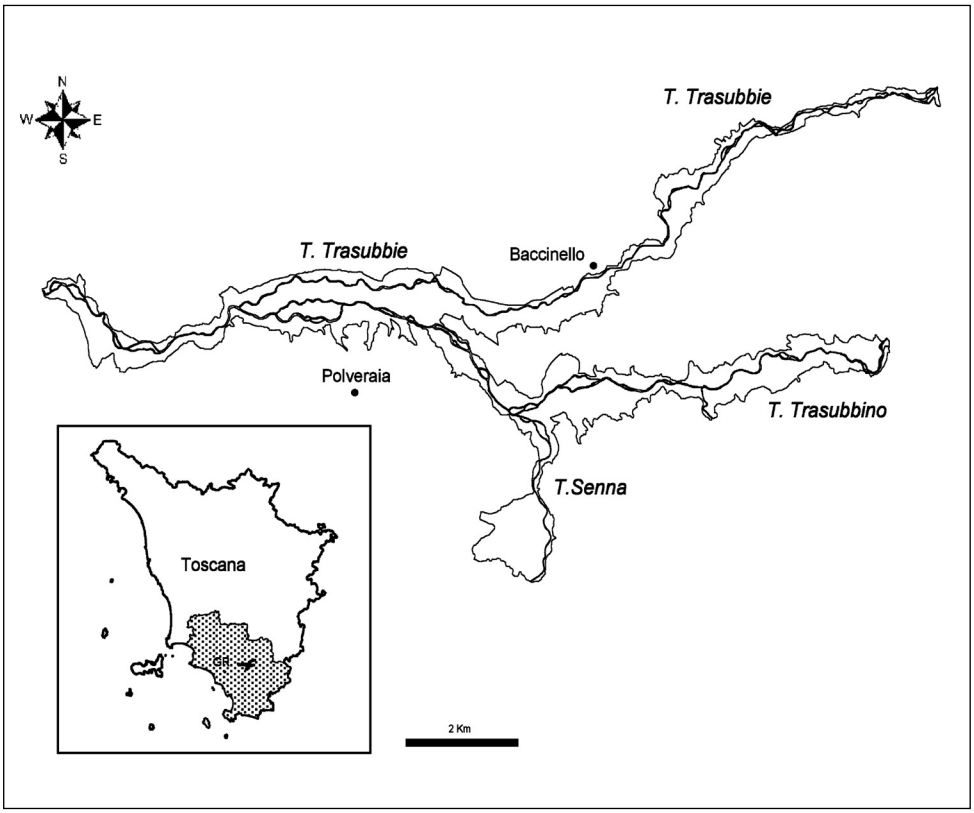

Fig.1. The study area in (Tuscany, Central Italy).

Geological outline

In the S.I.R. area the following lithotypes can be found (Italian Geological Service 1969, Sheet 128, Grosseto):

Present and recent alluvia – Pebbly, sandy and clayey sediments are by far the predominant typology. These sediments come into contact with sandy lacustrine marls and clays. Alluvial deposits are located in the vast downstream torrent bed up to the escarpments of the higher and older terraces.

Conglomerates – These are either loose or weakly cemented by a sandy-clayey matrix.

Sands and clays – Marine and deltaic Pliocene sediments represented by sands, sandstones and marly sands. They are located in the upstream part of the site and are in contact with the alluvia, but they cover a limited area.

Sandstones – They are mainly represented by arenaceous shales and clayey-arenaceous shales (Tuscan Series) with clayey, siliceous sometimes calcitic cement.

Calcareous-marly-arenaceous flysch – Light marly limestones, marly shales, slates associated with compact, arenaceous limestones, in contact with the alluvia; limited covering.

Climatic features

The thermo-pluviometric data refer to the 1951-1980 period (Barazzuoli & al. 1993) for the Granaione, Cinigiano and Cana climate stations which are nearest to the biotope (Table 1). The climate is generally mesothermic but there is a main east-west gradient of change occurs in terms of increasing aridity, from humid with moderate aridity in the summer to subarid with high aridity in the summer (Thornthwaite 1948). The lower part of the biotope area is included in the mesomediterranean belt (climacic vegetation referable to *Quercion ilicis*) whereas the upstream area is included in the hilly/oceanic belt (climax vegetation referable to *Lonicero-Quercion pubescentis*) (Biondi & Baldoni 1994).

Vegetation

The vegetation along the watercourse is mainly composed of a mosaic of hygrophilous and xerophilous phytocoenoses strongly differing in ecological, physionomical and floristic terms. Native grasses and shrubs colonizing the pebbly banks cover around 28% of the area. The slow-flow bed is characterized by perennial, pioneer herbaceous formations especially *Dittrichia viscosa* referable to *Agropyretalia intermedii-repentis*, by small therophytic meadows with *Brometalia rubenti-tectorum* species, as well as by a more or less continuous belt of willow shrubs referable to *Salicetalia purpureae.*

The floodplain's most stable terraces are colonised by glareicolous garrigues with dominance of *Santolina etrusca* and *Helichrysum italicum* (such aspects are referable to *Rosmarinetalia*), which represent the most typical habitat of the S.I.R. In contact with these garrigues there are "savannoid" steppes with dominance of *Ampelodesmos mauritanicus* and mediterranean sclerophyllic formations referable to the *Pistacio-Rhamnetalia alaterni* order. *Paliurus spina-christi* scrubs, referable to *Prunetalia spinosae*, are fairly

Table 1. Temperature and rainfall.

Average monthly and annual temperature (°C)														
Climate stations	**Altitude**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Granaione	84	7.2	8.0	9.7	12.4	16.5	20.3	23.1	23.2	20.4	16.1	11.6	8.3	14.7
Cinigiano	324	5.8	6.6	8.7	11.8	15.9	19.7	22.7	22.6	19.4	14.8	10.1	6.8	13.8
Cana	502	5.2	6.3	7.9	10.8	14.8	18.4	21.7	21.7	18.4	14.4	9.7	6.5	13.0
Average monthly and annual rainfall (mm)														
Climate stations	**Altitude**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Granaione	84	66.8	59.4	57.4	58.3	54.5	45.5	23.5	30.8	66.7	83.5	99.6	85.4	731.4
Cinigiano	324	60.2	77.1	52.9	58.1	47.0	40.3	25.0	35.5	59.5	81.6	97.6	76.8	711.6
Cana	502	111.3	111.3	93.7	89.7	73.0	56.5	33.7	55.7	81.8	117.5	152.0	116.5	1092.7

frequent. Deciduous, broad-leaved woods cover 32% of the area and are more represented in the upper part of the Trasubbino valley. On the outer, flat terraces where soil is more developed and deep there are small, scattered, hygrophilous woods of *Populetalia albae*.

The potential, woody, slope vegetation is characterized by formations referable to *Quercetalia pubescenti-petraeae*; here there is a dominance, to a different extent, of *Quercus pubescens*, *Quercus cerris* and *Ostrya carpinifolia*, while evergreen woods of *Quercetea ilicis* can be found in the downstream area on south-facing slopes. Of great interest are hygrophilous, riparian woods on the outer alluvial terraces with predominance of *Fraxinus angustifolia* subsp. *oxycarpa* and badland (calanchi) formations made of Pliocene clays (Angiolini & al. 2004a, b).

The flora

The floristic list is based on information from the recent vegetation surveys mentioned above and on field collections carried out during the years 2000-2005. The *exsiccata*, deposited in the *Herbarium Universitatis Senensis* (SIENA), the *Herbarium Centrale Italicum* (FI) and the *Herb*. *Selvi*, were studied using the main national and European standard Floras (Fiori 1923-29; Pignatti 1982; Tutin & al. 1964-1980, 1993) as well as monographic works and revisions of single groups, when available. The systematic ordering of the floristic list follows Pichi Sermolli (1977) for *Pteridophyta*, Cronquist (1981) for *Magnoliopsida* and Dahlgren & al. (1985) for *Liliopsida*; congeneric species are listed in alphabetically. Nomenclature is in accordance with the International Code of Botanical Nomenclature (Greuter & al. 2000). *Med-Checklist* (Greuter & al. 1984-89), *Flora Europaea* (Tutin & al. 1968-80, 1993) and *Flora d'Italia* (Pignatti 1982) were used as references, whereas Rossi (2002) was followed for *Orchidaceae*. Authors' names are abbreviated according to Brummitt & Powell (1992).

Sub-specific categories were reported only when different from the nominal subspecies. Each taxon is followed by: life-form, chorological type, habitat and frequency in the area. Life-forms, verified in nature and on the specimens, are expressed using Pignatti's acronyms (Pignatti 1982), based on Raunkiaer's classification (Raunkiaer 1934). Chorological types are those proposed by Pignatti (1982). Non-native taxa are marked by "+"; they are divided into adventitious i.e. naturalised plants after accidental introduction and cultivated, i.e. plants deliberatly introduced but not capable of spread without human assistance (Viegi & al. 1974); both types are excluded from the biological and chorological spectra. Preferential vegetation habitat type is expressed as follows: **PT** small therophytic meadows, **PA** small hemicryptophytic meadows of the torrent bed, **Q** deciduous oak-woods and mixed woods of deciduous, broad-leaved trees, **I** hygrophilous woods and scrubs, **M** evergreen maquis and *Quercus ilex* woods, **G** open garrigues and river terraces, **R** rocky sites, **AU** humid sites, **S** synanthropic environments.

Floristic List

PTERIDOPHYTA

Selaginellaceae

Selaginella denticulata (L.) Spring - Ch rept - Steno-Medit - M, Q, R

Equisetaceae

Equisetum arvense L. - G rhiz - Circumbor - AU
Equisetum ramosissimum Desf. - G rhiz - Circumbor - G, I
Equisetum telmateja Ehrh. - G rhiz - Circumbor - AU

Adiantaceae

Adiantum capillus-veneris L. - G rhiz - Pantrop - R

Aspleniaceae

Asplenium onopteris L. - H ros - Subtrop - M, Q, R
Asplenium trichomanes L. - H ros - Cosmop - Q, R

PINOPHYTA

Cupressaceae

Juniperus communis L. - P caesp - Circumbor - M, Q
Juniperus oxycedrus L. - P caesp - Euri-Medit - G, Q

MAGNOLIOPHYTA-MAGNOLIOPSIDA

Aristolochiaceae

Aristolochia rotunda L. - G bulb - Euri-Medit - G, M, Q

Ranunculaceae

Ranunculus arvensis L. - T scap - Paleotemp - PT
Ranunculus bulbosus subsp. *aleae* (Willk.) Rouy & Foucaud in Rouy - H scap - Europ - S
Ranunculus bulbosus L. subsp. *bulbosus*- H scap - Eurasiat - G, M, Q
Ranunculus ficaria L. - G bulb - Eurasiat - AU, PA, Q, S
Ranunculus paludosus Poir. [= *R. flabellatus* Desf.] - H scap - Steno-Medit-Turan - AU, I
Ranunculus lanuginosus L. - H scap - Europ-Caucas - I
Ranunculus millefoliatus Vahl - H scap - N Medit - Q, M
Ranunculus muricatus L. - T scap - Euri-Medit - AU
Ranunculus peltatus Schrank - I rad - Europ - AU
Ranunculus sardous Crantz - T scap - Euri-Medit - AU, G
Ranunculus velutinus Ten. - H scap - N Medit - Q
Helleborus bocconei Ten. - G rhiz - Endem - Q, M
Helleborus foetidus L. - Ch suffr - Subatl - M, PA, Q
Eranthis hyemalis (L.) Salisb. - G rhiz - S Europ - M

Nigella damascena L. - T scap - Euri-Medit - G, I, M, PA, PT
Consolida ajacis (L.) Schur - T scap - Euri-Medit - PA
Consolida regalis Gray - T scap - Euri-Medit - M
Anemone apennina L. - G rhiz - SE Europ - Q
Anemone hortensis L. - G bulb - N Medit - G, M, S
Clematis flammula L. - P lian - Euri-Medit - G, M
Clematis vitalba L. - P lian - Europ-Caucas - AU, G, Q, I, M, PA
Adonis annua L. - T scap - Medit - PA, M

Papaveraceae

Papaver hybridum L. - T scap - Medit-Turan - PA
Papaver rhoeas L. - T scap - Sinantropica - G, M, PA, PT
Glaucium flavum Crantz - H scap - Euri-Medit - PT

Fumariaceae

Fumaria bastardii Boreau - T scap - Subatl - G
Fumaria capreolata L. - T scap - Euri-Medit - M, S
Fumaria officinalis L. - T scap - Subcosmop - S

Cannabaceae

Humulus lupulus L. - P lian - Europ-Caucas - M

Ulmaceae

Ulmus minor Miller - P scap - Europ-Caucas - M, Q

Moraceae

Ficus carica L. - P scap - Medit-Turan - M, Q

Urticaceae

Urtica dioica L. - H scap - Subcosmop, Holarctic - S

Fagaceae

Quercus cerris L. - P scap - N Euri-Medit, - Q
Quercus ilex L. - P caesp - Steno-Medit, - M, Q
Quercus pubescens Willd. - P scap - SE Europ, - M, Q

Betulaceae

Alnus glutinosa (L.) Gaertner - P scap - Paleotemp, - I, Q
Carpinus betulus L. - P scap - Centroeurop-Caucas, - I, Q
Ostrya carpinifolia Scop. - P scap - Circumbor, - G, M, Q
Corylus avellana L. - P caesp - Europ-Caucas, - I, M, Q

Cactaceae

+ *Opuntia tuna* (L.) Mill. - P succ - Adventitious

Chenopodiaceae

Chenopodium album L. - T scap - Subcosmop, - G, PA, S
Beta vulgaris L. - T scap - Adventitious
Atriplex patula L. - T scap - Circumbor, - M, PT, S

Amaranthaceae

Amaranthus graecizans L. - T scap - Paleo-Subtrop - G

Caryophyllaceae

Arenaria leptoclados (Rchb.) Guss. - T scap - Paleotemp - PT
Arenaria serpyllifolia L. - T scap - Subcosmop - PT
Moehringia trinervia (L.) Clairv. - T scap - Eurasiat - G, PT
Minuartia hybrida (Vill.) Schischkin - T scap - Paleotemp - G, M
Stellaria media (L.) Vill. - T rept, Cosmop - AU, M, S
Cerastium brachypetalum Pers. - T scap - Euri-Medit - PA
Cerastium fontanum subsp. *vulgare* (Host.) Greuter & Burdet - H scap - Circumbor - PA
Cerastium glomeratum Thuill. - T scap - Subcosmop - PT
Cerastium glutinosum Fries - T scap - Euri-Medit - PT
Cerastium pumilum Curtis - T scap - Euri-Medit - G, PT
Scleranthus annuus L. - T scap - Paleotemp - PT
Herniaria hirsuta L. - T scap - Paleotemp - PA, PT
Polycarpon tetraphyllum (L.) L. - T scap - Euri-Medit - PA
Spergularia rubra Presl - Ch suffr - Subcosmop-Temp - PT
Silene gallica L. - T scap - Subcosmop - PT
Silene italica subsp. *nemoralis* (Waldst. & Kit.) Nyman - H ros - Euri-Medit - G, Q
Silene latifolia subsp. *alba* (Mill.) Greuter & Burdet - H scap - Paleotemp - M, PA
Silene nocturna L. - T scap - S Medit-Mac - PT
Silene paradoxa L. - H ros - N Medit-Mont, - G
Silene vulgaris (Moench) Garcke - H scap - Subcosmop - G
Saponaria officinalis L. - H scap - Eurosiber - I
Petrorhagia prolifera (L.) P.W. Ball & Heywood - T scap - Euri-Medit - G, PT
Petrorhagia saxifraga (L.) Link - H caesp - Euri-Medit - G
Dianthus armeria L. - H scap - Europ-Caucas - G
Dianthus carthusianorum L. - H scap - C S Europ - G, M
Dianthus sylvestris subsp. *longicaulis* (Ten.) Greuter & Burdet - H scap - Medit-Mont - G, M
Velezia rigida L. - T scap - Medit-Turan - PA, G

Polygonaceae

Polygonum aviculare L. - T rept - Cosmop - G, S, PA
Polygonum convolvulus L. [= *Fallopia convolvulus* (L.) Holub] - T scap - Circumbor - G, S
Polygonum lapathifolium L. - T scap - Cosmop - AU
Polygonum bellardii All. - T scap - Euri-Medit - PA
Rumex acetosella L. - H scap - Subcosmop - G, S
Rumex conglomeratus Murray - H scap - CW Eurasiat - I, Q
Rumex crispus L. - H scap - Subcosmopolitan - G, S

Rumex obtusifolius L. - H scap - Cosmop - PA
Rumex pulcher L. - H scap - Euri-Medit - PA

Clusiaceae

Hypericum androsaemum L. - NP - W Euri-Medit - Q
Hypericum humifusum L. - H scap - Subcosmop - Q
Hypericum perforatum L. - H scap - Subcosmop - G, S, M, PT

Malvaceae

Malva sylvestris L. - H scap - Subcosmop - S
Malope malacoides L. - H scap - Steno-Medit - M
Lavatera punctata All. - T scap - Steno-Medit - G, PA
Althaea hirsuta L. - T scap - Euri-Medit - G, S, PA, PT

Cistaceae

Cistus creticus subsp. *eriocephalus* (Viv.) Greuter & Burdet - NP - C Medit - G, M
Cistus salvifolius L. - NP - Steno-Medit - G
Helianthemum nummularium subsp. *obscurum* (Celak.) Holub - Ch suffr - Europ-Caucas - G, PA, Q
Fumana ericoides (Cav.) Gandog. - Ch suffr - Steno-Medit - G, PA
Fumana procumbens (Dunal) G. & G. - Ch suffr - Euri-Medit-Pont - G
Fumana thymifolia (L.) Spach - Ch suffr - Steno-Medit - G

Violaceae

Viola alba subsp. *dehnhardtii* (Ten.) W. Becker - H ros - Euri-Medit - M, Q
Viola arvensis Murray - T scap - Eurasiat - G, I, PT
Viola reichenbachiana Jordan ex Boreau - H scap - Eurosib - Q
Viola tricolor L. - H scap - Europ - M, PT

Tamaricaceae

Tamarix gallica L. - P scap - W Medit - M

Cucurbitaceae

Bryonia dioica Jacq. - H scand - Euri-Medit - M, PA

Salicaceae

Salix alba L. - P scap - Paleotemp - I
+ *Salix babylonica* L. - P caesp - Cultivated
Salix cinerea L. - P caesp - Paleotemp - I
Salix elaeagnos Scop. - P caesp - Orof-S Europ - AU, G, I, M, PA
Salix purpurea L. - P scap - Euras-Temp - AU, G, I
Populus alba L. - P scap - Paleotemp - I
Populus nigra L. - P caesp - Paleotemp - G, I, PA

Capparaceae

+ *Polanisia trachysperma* Torr. & A. Gray - T scap - Adventitious

Brassicaceae

+ *Brassica napus* L. - H scap - Adventitious
Brassica nigra (L.) Koch - T scap - Medit - S
Calepina irregularis (Asso) Thell. - T scap - Medit-Turan - PA
Raphanus raphanistrum L. - T scap - Circumbor - I, M, PA. PT
Sisymbrium officinale (L.) Scop. - T scap - Subcosmop - PA
Alliaria petiolata (M. Bieb.) Cavara & Grande - H bienn - Paleotemp - I, Q, S
Myagrum perfoliatum L. - T scap - SW Asiat - AU, G
Bunias erucago L. - T scap - N Medit - G, S
Erysimum pseudorhaeticum Polatschek - H scap - Endem - M
Barbarea verna (Miller) Asch. - H scap - W Europ - PT
Barbarea vulgaris R. Br. - H scap - Cosmop - G, S, PA
Nasturtium officinale R. Br. - H scap - Cosmop - AU
Cardamine hirsuta L. - T scap - Cosmop - PT, S
Arabis collina Ten. - H scap - Orof-Medit - G
Arabis hirsuta (L.) Scop. - H bienn - Europ - G
Arabis turrita L. - H scap - S Europ - Q
Lunaria annua L. - H scap - SE Europ - M, S
Alyssum montanum L. - Ch suffr - Pontico-Centroeurop - PT
Capsella bursa-pastoris (L.) Medicus - H bienn - Cosmop - S
Capsella rubella Reuter - T scap - Euri-Medit - PT
Thlaspi perfoliatum L. - T scap - Paleotemp - G
Lepidium campestre (L.) R. Br. - T scap - Europ-Caucas - G

Resedaceae

Reseda luteola L. - H scap - Circumbor - G, PA
Reseda phyteuma L. - T scap - Euri-Medit - PA

Ericaceae

Erica arborea L. - P caesp - Steno-Medit - Q
Erica scoparia L. - P caesp - W Medit - G, M
Arbutus unedo L. - P caesp - Steno-Medit - M, Q

Primulaceae

Primula acaulis (L.) L. [= *P. vulgaris* Hudson] - H ros - Europ-Caucas - Q
Cyclamen repandum S. & S. - G bulb - N Medit - M, Q
Anagallis arvensis L. - T rept - Subcosmop - G, PA, PT
Anagallis foemina Miller - T rept - Subcosmop - PA
Samolus valerandi L. - H scap - Subcosmop - AU

Crassulaceae

Sedum acre L. - Ch succ - Europ-Caucas - G

Sedum album L. - Ch succ - Euri-Medit - G
Sedum rubens L. - T scap - Euri-Medit-Subatl - R
Sedum rupestre L. - Ch succ - W Centroeurop - G, PA, Q
Sedum sexangulare L. - Ch succ - Centroeurop - G

Rosaceae

Rosa agrestis Savi - NP - Euri-Medit - M
Rosa arvensis Hudson - NP - Submedit-Subatl - M
Rosa canina L. s.s. - NP - Paleotemp - G, PA, PT
Rosa pouzinii Tratt. - NP - W Medit-Mont - M
Rosa sempervirens L. - NP - Submedit-Subatl - I, G, M, PA, Q
Rubus caesius L. - NP - Eurasiat - AU, Q
Rubus canescens DC. - NP - N Medit - M
Rubus hirtus Waldst. & Kit. - NP - Europ - Q
Rubus ulmifolius Schott. - NP - Euri-Medit - G, M, PA, Q
Filipendula vulgaris Moench - H scap - C. Europ-S Siber - G, PT
Sanguisorba minor Scop. - H scap - Paleotemp - G, PA
Geum urbanum L. - H scap - Circumbor - Q
Potentilla recta L. - H scap - NE Medit-Pont - G
Potentilla reptans L. - H rept - Subcosmop - G, S
Fragaria vesca L. - H rept - Cosmop - Q, S
Aphanes arvensis L. - T scap - Subcosmop - PA
+ *Pyrus communis* L. - P scap - Cultivated
Pyrus pyraster Burgsd. - P scap - Eurasiat - M, Q
Pyrus spinosa Forssk. [= *P. amygdaliformis* Vill.] - P caesp - Steno-Medit - M
Malus sylvestris (L.) Mill. - P scap - Centroeurop-Caucas - Q
Sorbus domestica L. - P scap - Paleotemp - Q
Sorbus torminalis (L.) Crantz. - Pscap - Paleotemp - Q
Pyracantha coccinea M.J. Roemer - P caesp - Steno-Medit - G, M, Q
Crataegus monogyna Jacq. - P caesp - Paleotemp - M, Q
Prunus avium L. - P scap - Pontico - Q, M
+ *Prunus persica* (L.) Batsch - P scap - Cultivated
Prunus spinosa L. - P caesp - Europ-Caucas - M, PT, Q

Fabaceae

Cytisophyllum sessilifolium (L.) O. F. Lang - P caesp - SW Europ - G, Q
Cytisus scoparius (L.) Link - P caesp - Europ-Atl - M
Genista germanica L. - Ch suffr - Centroeurop - Q
Spartium junceum L. - P caesp - Euri-Medit - G, M, PA, PT
+ *Robinia pseudoacacia* L. - P scap - Adventitious
Galega officinalis L. - H scap - E Europ-Pont - PA
Astragalus glycyphyllos L. - H rept - Europ-S Siber - Q
Astragalus hamosus L. - T scap - Medit-Turan - PA
Astragalus monspessulanum L. - H ros - Euri-Medit - G
Lathyrus aphaca L. - T scap - Euri-Medit - G, PA, PT

Lathyrus articulatus L. - T scap - Steno-Medit - PA
Lathyrus cicera L. - T scap - Euri-Medit - PA
Lathyrus clymenum L. - T scap - Steno-Medit - PT
Lathyrus latifolius L. - H scand - S Europ - PT
Lathyrus ochrus (L.) DC. - T scap - Steno-Medit - M, PT
Lathyrus sphaericus Retz. - T scap - Euri-Medit - PT
Lathyrus sylvestris L. - H scand - Europ-Caucas - G, Q
+ *Vicia faba* L. - T scap - Adventitious
Vicia bithynica (L.) L. - T scap - Euri-Medit - G
Vicia cracca L. - H scap - Circumbor - G, PA
Vicia hirsuta (L.) S.F. Gray - T scap - Subcosmop - G
Vicia hybrida L. - T scap - Euri-Medit - S
Vicia lathyroides L. - T scap - Euri-Medit - G
Vicia lutea L. - T scap - Euri-Medit - PA
Vicia peregrina L. - T scap - Medit-Turan - G
Vicia sativa subsp. *angustifolia* (Grufb.) Gaudin - T scap - Subcosmop - PT
Vicia sativa L. - T scap - Subcosmop - G, PA, PT
Vicia sepium L. - H scap - Eurosib - I
Vicia tenuissima (Bieb.) Schinz. & Thell. - T scap - Euri-Medit - PA
Vicia tetrasperma Schreb. - T scap - Cosmop - S
Vicia villosa subsp. *varia* (Host.) Corb. - T scap - Euri-Medit - PA
Pisum sativum subsp. *elatius* (Bieb.) Aesch. & Graebn. - T scap - Steno-Medit-Turan - M
Ononis pusilla L. - H scap - Euri-Medit - G
Ononis viscosa subsp. *breviflora* (DC.) Nyman - T scap - CW Medit - G, PA
Melilotus alba Medicus - T scap - Subcosmop - PT
Melilotus altissima Thuill. - G rhiz - Eurosib - G, M
Melilotus neapolitana Ten. - T scap - Steno-Medit - G, S, PA, PT
Melilotus officinalis (L.) Pall. - H bienn - Subcosmop - G, S
Melilotus sulcatus Desf. - T scap - S Medit - G
Medicago lupulina L. - T scap - Paleotemp - PA
Medicago minima (L.) Bartal. - T scap - Euri-Medit-C Asiat - G, PA
Medicago orbicularis (L.) Bartal. - T scap - Euri-Medit - G, S, PA
Medicago polymorpha L. - T scap - Subcosmop - PA, PT
Medicago sativa L. - H scap - Persia - G
Trigonella corniculata (L.) L. - T scap - N Medit - G
Trifolium angustifolium L. - T scap - Euri-Medit - G, PT
Trifolium arvense - T scap - Paleotemp - PA, PT
Trifolium campestre Schreber - T scap - W Paleotemp - G, S, PA, PT
Trifolium cherleri L. - T scap - Euri-Medit - PT
Trifolium echinatum Bieb. - T scap - SE Europ-Turan - PT
Trifolium incarnatum L. - T scap - Euri-Medit - PA
Trifolium lappaceum L. - T scap - Euri-Medit - PT
Trifolium michelianum Savi - T scap - W Medit - PT
Trifolium ochroleucum Hudson - H caesp - Euri-Medit-Pont - PA
Trifolium pratense L. subsp. *pratense* - H scap - Subcosmop - M

Trifolium pratense subsp. *semipurpureum* (Strobl) Pignatti - H scap - Subcosmop - G
Trifolium repens L. - H scap - Subcosmop - S
Trifolium resupinatum L. - H rept - Paleotemp - G, S
Trifolium scabrum L. - T rept - Euri-Medit - PA, PT
Trifolium squarrosum L. - T scap - Euri-Medit - PT
Trifolium stellatum L. - T scap - Euri-Medit - G, M, PA
Trifolium strictum L. - T scap - Euri-Medit - PT
Trifolium subterraneum L. - T rept - Euri-Medit - PT
Trifolium tomentosum L. - T rept - Paleotemp - G, M, PA, PT
Hymenocarpus circinnatus (L.) Savi - H scap - Steno-Medit - PA
Dorycnium herbaceum Vill. - H scap - S Europ-Pont - G
Dorycnium hirsutum (L.) Ser. - Ch suffr - Euri-Medit - G, PA
Lotus angustissimus L. - T scap - Euri-Medit - G
Lotus corniculatus L. s.s. - H scap - Cosmopol - PA
Lotus ornithopodioides L. - T scap - Steno-Medit - PA
Lotus tenuis Waldst. & Kit. - H scap - Paleotemp - G, PA
Ornithopus compressus L. - T scap - Euri-Medit - PT
Coronilla scorpioides (L.) Koch - T scap - Euri-Medit - G, PA, PT
Scorpiurus muricatus L. - T scap - Euri-Medit - G, PA
Hippocrepis emerus (L.) Lassen - NP - C Europ - M, Q
Hippocrepis comosa L. - H caesp - CS Europ - G
Hippocrepis unisiliquosa L. - T scap - Steno-Medit, Mediterranean - PA
Onobrychis caput-galli (L.) Lam. - H scap - Medit-Mont - G, PA, PT
Onobrychis viciifolia Scop. - H scap - Medit-Mont, - G, S

Lythraceae

Lythrum hyssopifolia L. - T scap - Subcosmop - G
Lythrum salicaria L. - H scap - Subcosmop - AU, G, I

Onagraceae

Epilobium hirsutum L. - H scap - Subcosmop - PA
Epilobium tetragonum L. - H scap - Paleotemp - G, PA, S

Cornaceae

Cornus mas L. - P scap - SE Europ-Pont - G, M, Q
Cornus sanguinea L. - P caesp - Eurasiat-Temp - G, I, M, PA, Q

Santalaceae

Osyris alba L. - NP - Euri-Medit - G, M, Q
Thesium divaricatum Jan - Ch suffr - Euri-Medit - G
Thesium linophyllon L. - H scap - SE Europ - G

Celastraceae

Euonymus europaeus L. - P caesp - Eurasiat - Q

Euphorbiaceae

Euphorbia amygdaloides L. - Ch sffr - Centroeurop-Caucas - G, Q
Euphorbia barrelieri Savi - Ch suffr - NE Medit - G
Euphorbia exigua L. - T scap - Euri-Medit - G, PA, PT
Euphorbia falcata L. - T scap - Euri-Medit - PT, S
Euphorbia helioscopia L. - T scap - Cosmop - G, M, S
+ *Euphorbia maculata* L. - T rept - Adventitious
Euphorbia peplus L. - T scap - Cosmop - M
Euphorbia platyphyllos L. - T scap - Euri-Medit - G, M, PA
Euphorbia pubescens Vahl - G rhiz - Medit-Mac - G
Euphorbia spinosa L. - Ch suffr - N Medit - G, M
Euphorbia terracina L. - T scap - Steno-Medit - G, PA, PT
Euphorbia verrucosa L. - Ch suffr - S Europ-Pont - G
Chrozophora tinctoria (L.) Juss. - T scap - Medit-Turan - PA, PT
Mercurialis perennis L. - G rhiz - Europ-Caucas - Q

Rhamnaceae

Rhamnus alaternus L. - P caesp - Steno-Medit - G, M, Q
Paliurus spina-christi Miller - P caesp - SE Europ-Pont - G, M, Q

Vitaceae

Vitis vinifera subsp. *sylvestris* (Gmel.) Hegi - P lian - Medit - M, Q

Linaceae

Linum bienne Miller - H bienn - Euri-Medit-Subatl - PT
Linum nodiflorum L. - T scap - Euri-Medit - M, PT
Linum strictum subsp. *corymbulosum* (Rchb.) Rouy - T scap - Steno-Medit - M
Linum strictum L. subsp. *strictum* - T scap - Steno-Medit - G, PT
Linum tenuifolium L. - Ch suffr - Submedit-Pont - G, M, PT
Linum trigynum L. - T scap - Euri-Medit - G

Polygalaceae

Polygala flavescens DC. - H scap - Endem - G
Polygala monspeliaca L. - T scap - Steno-Medit - G

Aceraceae

Acer campestre L. - P scap - Europ-Caucas - Q, M
Acer monspessulanum L. - P scap - Euri-Medit - Q, M
Acer obtusatum Waldst. & K.it ex Willd. - P scap - SE Europ - I

Anacardiaceae

Pistacia lentiscus L. - P caesp - Steno-Medit - G, M, Q

Oxalidaceae

Oxalis acetosella L. - G rhiz - Circumbor - S

Geraniaceae

Geranium columbinum L. - T scap - Europ-S Siber - PA
Geranium dissectum L. - T scap - Subcosmop - PT
Geranium molle L. - T scap - Subcosmop - PT, S
Geranium robertianum subsp. *purpureum* (Vill.) Nyman - T scap - Euri-Medit - M, PA
Geranium robertianum L. subsp. *robertianum* - T scap - Subcosmop - I, M, Q
Geranium rotundifolium L. - T scap - Paleotemp - M
Geranium sanguineum L. - H scap - Europ-Caucas - PA, PT
Erodium cicutarium (L.) L'Hér. s.l. - T scap - Subcosmop - PT
Erodium malacoides (L.) L'Her. - T scap - Medit-Mac - AU, G

Araliaceae

Hedera helix L. - P lian - Submedit-Subatl - I, M, Q

Apiaceae

Apium nodiflorum (L.) Lag. - H scap - Euri-Medit - AU, G, S
Bupleurum baldense Turra - T scap - Euri-Medit - G, PT
Bupleurum praealtum L. - H scap - SE Europ - G
*Bupleurum subovatu*m Link ex Spreng. - T scap - Medit-Turan - PA
Ammi visnaga (L.) Lam. - T scap - Euri-Medit - AU
Pimpinella peregrina L. - H bienn - Euri-Medit - G
Anthriscus sylvestris (L.) Hoffm. - H scap - Paleotemp - Q
Scandix pecten-veneris L. - T scap - Subcosmop - PA
Chaerophyllum temulentum L. - H bienn - Eurasiat - I, Q
Torilis arvensis (Hudson) Link - T scap - Subcosmop - G, PA, PT
Torilis japonica (Houtt) DC. - T scap - Subcosmop - M
Torilis nodosa (L.) Gaertn. - T scap - Euri-Medit-Turan - PA
Orlaya grandiflora (L.) Hoffm. - T scap - Euri-Medit - G, M
Daucus broteri Ten. - T scap - E Medit - G
Daucus carota L. - H bienn - Subcosmop - G, M, PA
Conium maculatum L. - H scap - Subcosmop - Q
Seseli tortuosum L. - H bienn - Steno-Medit - G
Oenanthe pimpinelloides L. - H scap - Eurasiat - M, PT
Foeniculum vulgare Miller - H scap - S Medit - G, PA
Peucedanum cervaria (L.) Lapeyr. - H scap - Eurosib - Q
Opopanax chironium (L.) Koch - H scap - Steno-Medit - G
Tordylium apulum L. - T scap - Steno-Medit - G
Tordylium maximum L. - T scap - Euri-Medit - G, S
Eryngium campestre L. - H scap - Euri-Medit - G, PT

Gentianaceae

Blackstonia perfoliata (L.) Hudson - T scap - Euri-Medit - AU, G, M, PA, PT
Centaurium erythraea Rafn. - H bienn - Paleotemp - PA, PT
Centaurium pulchellum (Sw.) Druce - T scap - Paleotemp - G, PT

Apocynaceae

Vinca major L. - Ch rept - Euri-Medit - M, S

Solanaceae

Solanum dulcamara L. - NP - Paleotemp - AU
Solanum nigrum L. - T scap - Cosmop - G, S
Datura stramonium L. - T scap - Cosmop - S

Convolvulaceae

Convolvulus arvensis L. - G rhiz - Cosmop - G, M, PA, PS
Convolvulus cantabrica L. - H scap - Euri-Medit - G, M
Calystegia sepium (L.) R. Br. - H scand - Paleotemp - G

Cuscutaceae

+ *Cuscuta cesatiana* Bertol. - T par - Adventitious
Cuscuta planiflora Ten. - T par - Euri-Medit - G

Boraginaceae

Borago officinalis L. - T scap - Euri-Medit - G, S
Heliotropium europaeum L. - T scap - Euri-Medit-Turan - G
Buglossoides arvensis (L) I. M. Johnst. - Tscap - Euri-Medit - G
Lithospermum purpureocaerulea (L.) I. M. Johnst. - H scap - S Europ-Pont - Q
Cerinthe major L. - T scap - Steno-Medit - AU, G
Echium italicum L. - H bienn - Euri-Medit - G, PT
Echium plantagineum L. - H bienn - Euri-Medit - M
Echium vulgare L. - H bienn - Europ - G, PA
Anchusa azurea Mill. - H scap - Euri-Medit - M
Anchusa undulata subsp. *hybrida* (Ten.) Bég. - H bienn - Euri-Medit - G
Myosotis arvensis (L.) Hill. - T scap - Europeo-W Asiat - G, PT
Myosotis scorpioides L. - H scap - Europ-W Asiat - M

Verbenaceae

Verbena officinalis L. - H scap - Cosmop - G, M, PA, PT

Lamiaceae

Lamium amplexicaule L. - T scap - Paleotemp - M
Lamium bifidum Cirillo - T scap - Steno-Medit - G
Lamium maculatum L. - H scap - Eurasiat-Temp - S
Lamium purpureum L. - T scap - Europeo-Caucas - Q, S
Ajuga chamaepitys (L.) Schreber - H bienn - Euri-Medit - R
Ajuga iva (L.) Schreber - Ch suffr - Steno-Medit - G, PA
Ajuga reptans L. - H scap - Europ-Caucas - PT
Teucrium chamaedrys L. - Ch suffr - Euri-Medit - G, M, Q
Teucrium flavum L. - Ch frut - Steno-Medit - R
Teucrium montanum L. - Ch suffr - Orof-S Europ - G, PA

Teucrium polium subsp. *capitatum* (L.) Arcang. - Ch suffr - Steno-Medit - G, PA
Teucrium scordium L. - H scap - Europ-Caucas - Q
Teucrium scorodonia L. - H scap - W Europ - Q
Scutellaria columnae All. - H scap - NE-Medit-Mont - I, Q
Marrubium vulgare L. - H scap - Subcosmop - M
Sideritis romana L. - T scap - Steno-Medit - G, M, PA, PT
Galeopsis angustifolia Ehrh. - T scap - N Medit - G, PA
Galeopsis ladanum L. - H scap - Eurasiat - Q
Ballota nigra subsp. *foetida* Hayek - H scap - Submedit-Subatl - Q, S
Stachys annua (L.) L. - T scap - Euri-Medit - G
Stachys cretica subsp. *salviifolia* (Ten.) Greuter & Burdet [= *Stachys salviifolia* Ten.] - H scap - NE Medit - G
Stachys germanica L - H scap - Euri-Medit - G, PA
Stachys officinalis (L.) Trevisan - H scap - Europ-Caucas - M, Q
Stachys recta L. - H scap - Orof-N Medit - G, M
Prunella vulgaris L. - H scap - Circumbor - G, M, S
Melissa officinalis L. - H scap - Euri-Medit - G, S
Melittis melissophyllum L. - H scap - NE Medit-Mont - Q
Satureja graeca subsp. *tenuifolia* (Ten.) Fiori [= *Micromeria graeca* subsp. *tenuifolia* (Ten.) Nyman] - Ch suffr - Steno-Medit - G
Satureja menthifolia (Host.) Fritsch - [= *Calamintha sylvatica* Bromf.] - H scap - Europe-Caucas - Q
Satureja montana L. - Ch suffr - Orof-W Medit - G, M, PA
Satureja nepeta (L.) Scheele [= *Calamintha nepeta* (L.) Savi] - H scap - Medit-Mont - AU, G, PA, S
Satureja vulgaris (L.) Fritsch [= *Clinopodium vulgare* L.] - H scap - Circumbor - I, Q
Origanum vulgare L. - H scap - Eurasiat - G, Q
Thymus longicaulis Presl. - Ch rept - Steno-Medit - G, M
Lycopus europaeus L. - H scap - Circumbor - I, AU
Mentha aquatica L. - H scap - Subcosmop - AU
Mentha arvensis L. - H scap - Circumbor - PT, G
Mentha suaveolens Ehrh. - H caesp - Euri-Medit - AU, PA
Salvia clandestina L. - H scap - Medit-Atl - G
Salvia verbenaca L. - H scap - Medit-Atl - G
Salvia virgata Jacq. - H scap - SE Europ - M

Plantaginaceae

Plantago afra L. - T scap - Steno-Medit - G
Plantago bellardi All. - T scap - S Medit - G
Plantago lanceolata L. - H ros - Cosmop - G, M, PA, PT
Plantago major L. - H ros - Subcosmop - G, S
Plantago maritima L. - H ros - Subsiber- PT

Oleaceae

\+ *Olea europaea* L. - P caesp - Cultivated

Phillyrea latifolia L. - P scap - Steno-Medit - M, Q
Ligustrum vulgare L. - NP - Europ-W Asiat - M, Q
Fraxinus angustifolia subsp. *oxycarpa* (Willd.) Franco & Rocha Alfonso - P scap - SE Europ - AU, I, M, Q
Fraxinus ornus L. - P scap - N Euri-Medit-Pont - G, M, Q

Scrophulariaceae

Scrophularia canina L. - H scap - Euri-Medit - G, PA
Verbascum blattaria L. - H bienn - Cosmopol - G
Verbascum sinuatum L. - H bienn - Euri-Medit - G, PA
Misopates orontium (L.) Rafin. - T scap - Paleotemp - G, M
Chaenorhinum minus (L.) Lange - T scap - Euri-Medit - G
Linaria vulgaris Miller - H scap - Eurasiat - M, S
Kickxia elatine (L.) Dumort. - T scap - Euri-Medit - PA
Kickxia spuria (L.) Dumort. - T scap - Eurasiat - PA
Digitalis micrantha Roth. - H scap - Endem - Q
Veronica anagallis-aquatica L. - H scap - Cosmop - AU
Veronica arvensis L. - T scap - Subcosmop - PT
Veronica persica Poir. - T scap - Subcosmop - PT
Veronica spicata subsp. *barrelieri* (Roem. & Schult.) Murb. [= *Pseudolysimachion barrelieri* (Schott ex Roemer & Schultes) Holub] - H rept - E Alp - G

Globulariaceae

Globularia bisnagarica L. [= *Globularia punctata* Lapeyr.] - H scap - Orof-C Europ - G, PA

Campanulaceae

Campanula erinus L. - T scap - Steno-Medit - PT
Campanula rapunculus L. - H bienn - Paleotemp - M, Q
Campanula trachelium L. - H scap - Paleotemp - Q
Legousia speculum-veneris (L.) Chaix - T scap - Euri-Medit - M
Jasione montana L. - H bienn - Europ-Caucas - G

Rubiaceae

Rubia peregrina L. - P lian - Steno-Medit-Mac - G, I, M, Q
Sherardia arvensis L. - T scap - Subcosmop - PA
Asperula cynanchica L. - H scap - Euri-MeditEur - G
Galium album Miller - H scap - W Eurasiat - G, PA, Q
Galium aparine L. - T scap - Eurasiat - I, PA, Q
Galium corrudifolium Vill. - H scap - Steno-Medit - G, PA
Galium divaricatum Lam. - Tscap - Steno-Medit - PT
Galium lucidum All. - H scap - Euri-Medit - G
Cruciata glabra (L.) Ehrend - T scap - Euri-Medit - M, PA, Q
Cruciata laevipes Opiz - H scap - Eurasiat - M, S

CAPRIFOLIACEAE

Sambucus nigra L. - P caesp - Europ-Caucas - I, Q
Viburnum tinus L. - P caesp - Steno-Medit - Q
Lonicera caprifolium L. - P lian - SE Europ - Q
Lonicera etrusca Santi - P lian - SE Europ - M, Q
Lonicera implexa Aiton - P lian - Steno-Medit - M

VALERIANACEAE

Valerianella eriocarpa Desv. - T scap - Steno-Medit - G

DIPSACACEAE

Dipsacus fullonum L. - T scap - Euri-Medit - G, PA
Cephalaria leucantha (L.) Schrader - H scap - S Europ - S
Cephalaria transsylvanica (L.) Schrader - T scap - SE Europ-Caucas - PA
Knautia integrifolia (L.) Bertol. - T scap - Euri-Medit - G, M, Q
Knautia purpurea (Vill.) Borbas. - H scap - W Medit-Mont - G
Scabiosa columbaria L. - H scap - Eurasiat - G, PA
Scabiosa uniseta Savi - H scap - Endem - G, PA
Sixalis atropurpurea subsp. *maritima* (L.) Greuter & Burdet [= *Scabiosa maritima* L.] - H bienn - Steno-Medit - G

ASTERACEAE

Aster linosyris (L.) Bernh. - H scap - Euri-Medit-S Siber - G
Bellis annua L. - T scap - Steno-Medit-Mac - PT
Bellis perennis L. - H ros - Europeo-Caucas - M, PA, PT
+ *Bidens frondosa* L. - T scap - Adventitious
+ *Conyza canadensis* (L.) Cronq. - T scap - Adventitious
Filago germanica (L.) Hudson - T scap - Paleotemp - G
Filago pyramidata L. - T scap - Euri-Medit - G, PA, PT
Oglifa gallica (L.) Chrtek & Holub [= *Filago gallica* L.) - T scap - Euri-Medit - PT
Bombycilaena erecta (L.) Smolj - T scap - S Europ-S Siber - G, PT
Helichrysum italicum (Roth) G. Don fil. - Ch suffr - S Europ - G, M, PA
Inula conyza DC. - H bienn - Medit-Europ-W Asiat - Q
Dittrichia viscosa (L.) Greuter - H scap - Euri-Medit - G, M, PA
Pulicaria dysenterica L. - H scap - Euri-Medit - G, PA, S
Pulicaria odora (L.) Rchb. - H scap - Euri-Medit - G
Pulicaria vulgaris Gaertner - T scap - Paleotemp - G, S
Pallenis spinosa (L.) Cass. - T scap - Euri-Medit - PT
+ *Helianthus annuus* L. - T scap - Cultivated
+ *Helianthus tuberosus* L. - G bulb - Cultivated
+ *Xanthium spinosum* L. - T scap - Adventitious
Xantium italicum Moretti - T scap - S Europ - G, PA, S
Tussilago farfara L. - G rhiz - Paleotemp - AU, G, R, S
Petasites hybridus (L.) Gaertner, B.Meyer & Scherb. - H bienn - Eurasiat - I
Senecio erraticus Bertol. - H bienn - C Europ-Subatl - S

Senecio vulgaris L. - T scap - Eurosib - AU, G, M, PT, S
Calendula arvensis L. - T scap - Subcosmop - G
Santolina etrusca (Lacaita) Marchi & D’Amato - NP - Endem - G, M, PA
Anthemis altissima L. - T scap - S Europ-W Asiat - S
Anthemis arvensis L. - H scap - Subcosmop - G, PA, PT, S
Anthemis tinctoria L. - Ch suffr - Centroeurop - AU, G, PA
Anthemis triumfetti All. - H scap - S Europ - G
Achillea ageratum L. - H scap - W Steno-Medit - G, M
Achillea collina Becker - H scap - SE Europ - M, Q
Matricaria chamomilla L. - T scap - Subcosmop - S
Tanacetum corymbosum (L.) Sch. Bip. - H scap - Euri-Medit - M
Coleostephus myconis (L.) Cass. - T scap - Steno-Medit - G, PA, PT
Artemisia verlotorum Lamotte - H scap, E Asia - S
Artemisia vulgaris L. - H scap - Circumbor - S
Eupatorium cannabinum L. - H scap - Paleotemp - AU, G, I, PA
Carlina corymbosa L. - H scap - Steno-Medit - G
Xeranthemum cylindraceum S. & S. - T scap - S Siber-S Europ - G
Arctium lappa L. - H bienn - Eurasiat-Temp - S
Staehelina dubia L. - Ch frut - W Medit - G
Carduus acicularis Bertol. - T scap - N Medit - S
Carduus nutans L. - H bienn - W Europ - G
Carduus pycnocephalus L. - H bienn - Medit-Turan - G
Cirsium arvense (L.) Scop. - G rad - Subcosmop - S
Cirsium italicum (Savi) DC. - H bienn - SE Europ - S
Cirsium vulgare (Savi) Ten. - H bienn - Subcosmop - G
Notobasis syriaca (L.) Cass. - T scap - Steno-Medit - G
Galactites elegans (All.) Soldano [= *Galactites tomentosa* Moench] - H bienn - Steno-Medit - G, M, PA, PT
Tyrimnus leucographus (L.) Cass. - T scap - Steno-Medit - PT
Cynara cardunculus L. - H scap - Steno-Medit - PT
Silybum marianum (L.) Gaertner - H bienn - Medit-Turan - G
Serratula cichoracea subsp. *mucronata* (Desf) Lacaita - H scap - SW Medit - S
Centaurea bracteata Scop. - H scap - SE Europ - G, S
Centaurea calcitrapa L. - H bienn - Subcosmop - G
Centaurea cyanus L. - T scap - Subcosmop - PA
Centaurea deusta Ten. subsp. *deusta* - H scap - Endem - PT
Centaurea deusta subsp. *splendens* (Arcang.) Matthas & Pignatti - H bienn - Endem - M
Centaurea paniculata subsp. *carueliana* (Micheletti) Arrigoni [=*Centaurea aplolepa* subsp. *carueliana* (Micheletti) Dostàl] - H bienn - Endem - PT
Centaurea solstitialis L. - H bienn - Subcosmop - G, PA, PT
Crupina crupinastrum (Moris) Vis. - T scap - Steno-Medit - G, M, PT
Crupina vulgaris Cass. - T scap - Subsiber-Euri-Medit - G
Carthamus lanatus L. - T scap - Euri-Medit - PA
Scolymus hispanicus L. - H bienn - Euri- Medit - G
Scolymus maculatus L. T scap - S Medit - S

Cichorium intybus L. - H scap - Cosmop - G, PA
Cichorium pumilum Jacq. - T scap - Steno-Medit - PA
Rhagadiolus stellatus (L.) Willd. - T scap - Euri-Medit - S
Hypochoeris achyrophorus L. - T scap - Steno-Medit - AU, G, M, PT
Hypochoeris glabra L. - T scap - Euri-Medit - PT
Urospermum dalechampii (L.) Schmidt - H scap - CW Euri-Medit - G, PA
Urospermum picroides (L.) Schmidt - T scap - Euri-Medit - M
Leontodon rosani Ten. - H ros - NW Medit - G
Picris echioides L. - T scap - Euri-Medit - G, PA, PT
Picris hieracioides L. - H scap - Eurosib - PA
Tragopogon dubius Scop. - H bienn - S Europ-Caucas - G
Tragopogon hybridus L. - T scap - Steno-Medit - PA
Tragopogon porrifolius L. - H scap - Eurosib - G
Reichardia picroides (L.) Roth. - H scap - Steno-Medit - G, PA
Sonchus asper (L.) Hill. - T scap - Subcosmop - G, M, PA, PT
Sonchus oleraceus L. - T scap - Subcosmop - PT
Lactuca saligna L. - H scap - Euri-Medit-Turan - M, Q
Lactuca serriola L. - H bienn - Euri-Medit-S Siber - PA
Lactuca viminea (L.) Presl. - H bienn - Euri-Medit-W Asiat - S
Taraxacum laevigatum (Willd.) DC. - H ros - Paleotemp - PT
Taraxacum officinale Weber (aggr.) - H ros - Circumbor - AU, M, S
Chondrilla juncea L. - H scap - Euri-Medit-S Siber - G, PA, PT
Lapsana communis L. - T scap - Paleotemp - G, M, PT
Crepis leontodontoides All. - H ros - W Medit-Mont - G
Crepis neglecta L. - T scap - Steno-Medit - G, PA, PT, S
Crepis pulchra L. - T scap - Euri-Medit - G, PT
Crepis sancta (L.) Babc. - T scap - Euri-Medit - AU, G, M, PA, PT, S
Crepis setosa Haller fil. - T scap - Euri-Medit Orient - G
Crepis zacintha (L.) Babc. - T scap - Steno-Medit - G
Andryala integrifolia L. - T scap - W Medit - G, PA, PT
Hieracium gr. *murorum* L. - H scap - Europ - Q
Hieracium pilosella L. - H ros - Europ-Caucas - G, Q
Hieracium piloselloides Vill. - H scap - Europ-Caucas - G

MAGNOLIOPHYTA-LILIOPSIDA

Dioscoraceae

Tamus communis L. - G rad - Euri-Medit - M, Q

Smilacaceae

Smilax aspera L. - P lian - Paleo-Subtrop - M, Q

Asparagaceae

Asparagus acutifolius L. - G rhiz - Steno-Medit - G, M, Q

Ruscaceae

Ruscus aculeatus L. - Ch suffr - Euri-Medit - M, Q

Anthericaceae

Anthericum liliago L. - G bulb - Submedit-Subatl - M

Hyacinthaceae

Muscari commutatum Guss - G bulb - CE Medit - M, PT
Muscari neglectum Guss. - G bulb - Euri-Medit-Turan - M
Leopoldia comosa (L.) Parl. - G bulb - Euri-Medit - G, M
Scilla bifolia L. - G bulb - Centro-Europ-Caucas - Q
Ornithogalum excapum Ten. - G bulb - S Europ - PT
Ornithogalum narbonense L. - G bulb - Euri-Medit - G, Q
Ornithogalum orthophyllum Ten. - G bulb - Euri-Medit - PT

Alliaceae

Allium amethystinum Tausch - G bulb - E Medit-Mont - G
Allium ampeloprasum L. - G bulb - Euri-Medit - G
Allium chamaemoly L. - G bulb - Steno-Medit - AU
Allium cirrhosum Vandelli - G bulb - Medit-Mont - G
Allium neapolitanum Cirillo - G bulb - Steno-Medit - PA, S
Allium nigrum L. - G bulb - Steno-Medit - S
Allium paniculatum L. - G bulb - Paleotemp - G
Allium roseum L. - G bulb - Steno-Medit - PA
Allium rotundum L. - G bulb - Euri-Medit - PA
Allium sativum L. - G bulb - Adventitious
Allium sphaerocephalon L. - G bulb - Paleotemp - G
Allium tenuiflorum Ten. - G bulb - Steno-Medit - M
Allium vineale L. - G bulb - Euri-Medit-Europ - G

Amaryllidaceae

Narcissus poeticus L. - G bulb - Orof-SE Europ - Q
Narcissus pseudonarcissus L. - G bulb - Adventitious
Galanthus nivalis L. - G bulb - Europ-Caucas - Q

Iridaceae

+ *Iris germanica* L. - G rhiz - Adventitious
Gladiolus italicus Miller - G bulb - Euri-Medit - G, M, PT
Romulea bulbocodium (L.) Seb. & Mauri - G bulb - Steno-Medit - G
Crocus vernus (L.) Hill. - G bulb - Euri-Medit - M, Q

Orchidaceae

Orchys coriophora L. - G bulb - Euri-Medit - G
Dactylorhiza romana (Seb.) Soò - G bulb - Steno-Medit - M
Ophrys bertolonii Moretti - G bulb - W Steno-Medit - G

Ophrys sphegodes Miller - G bulb - Euri-Medit - G, M, S
Serapias lingua L. - G bulb - Steno-Medit - G
Serapias vomeracea (Burm. f.) Briq. - G bulb - Euri-Medit - G
Anacamptis pyramidalis (L.) Rich. - G bulb - Euri-Medit - G, M
Gymnadenia conopsea (L.) R. Br. - G bulb - Eurasiat-Temp - G

Araceae

Arum italicum Miller - G rhiz - Steno-Medit - Q

Alismataceae

Alisma plantago-aquatica L. - I rad - Subcosmop - AU

Typhaceae

Typha angustifolia L. - G rhiz - Circumbor - AU
Typha latifolia L. - G rhiz - Cosmop - AU

Juncaceae

Juncus articulatus L. - G rhiz - Circumbor - AU
Juncus bufonius L. - T caesp - Cosmop - AU
Juncus inflexus L. - H caesp - Paleotemp - AU
Luzula forsteri (Sm.) DC. - H caesp - Euri-Medit - Q

Cyperaceae

Cyperus fuscus L. - T caesp - Paleotemp - AU
Scirpus holoschoenus L. - G rhiz - Steno-Medit - G, I, PT
Eleocharis palustris (L.) Roemer & Schultes - G rhiz - Subcosmop - AU
Carex caryophyllea La Tourr. - H scap - Eurasiat - G
Carex distachya Desf. - H caesp - Eurasiat - G, M
Carex distans L. - H caesp - Euri-Medit - Q
Carex flacca Schereber - G rhiz - Europ - G, M, PA, PT
Carex hallerana Asso - H caesp - Euri-Med - G, PT
Carex otrubae Podp. - H caesp - Euri-Medit-Atl - AU, I
Carex pendula Hudson - H caesp - Eurasiat - I

Poaceae

Poa annua L. - T caesp - Cosmop - G, S
Poa bulbosa L. - H caesp - Paleotemp - PT, G
Poa trivialis subsp. *sylvicola* (Guss.) H. Lindb. fil. - H caesp - Euri-Medit - M, PT
Festuca arundinacea Schreber - H caesp - Paleotemp - M, PA, PT
Festuca heterophylla Lam. - H caesp - Europ-Caucas - Q
Lolium multiflorum subsp. *gaudinii* (Parl.) Sch. & Th. - H scap - Euri-Medit - G
Lolium perenne L. - H caesp - Euri-Medit - G, S, PA, PT
Lolium rigidum Gaudin - T scap - Paleo-Subtrop - G, PA
Vulpia ciliata (Danth.) Link - T caesp - Euri-Medit - G, PA, PT
Catapodium rigidum (L.) Hubbard - T scap - Euri-Medit - G, M, PA, PT

Dactylis glomerata L. subsp. *glomerata*- H caesp - Paleotemp - G, M, PA, PT, Q
Dactylis glomerata subsp. *hispanica* (Roth.) Nyman - H caesp - Steno-Medit - G
Cynosurus echinatus L. - T scap - Euri-Medit - G, PA
Briza maxima L. - T scap - Paleo-Subtrop - G, M, PA
Sesleria italica (Pamp.) Ujhelyi - H caesp - Endem - G, M
Bromus arvensis L. - T scap - Eurosib - G
Bromus erectus L. - H caesp - Paleotemp - G
Bromus gussonei Parl. T scap Euri-Medit - G, M
Bromus hordeaceus L. - T scap - Subcosmop - G, PT
Bromus madritensis L. - T scap - Euri-Medit - G, M, PA, PT
Bromus rigidus Roth. - T scap - Paleo-Subtrop - G
Bromus rubens L. - T scap - S Medit-Turan - G
Bromus sterilis L. - T scap - Euri-Medit-Turan - G, M, PA
Brachypodium distachyon (L.) P. Beauv. - T scap - Steno-Medit-Turan - M, PA, PT, Q
Brachypodium rupestre (Host) Roemer & Schultes - H caesp, Subatl - G, M, Q
Brachypodium sylvaticum (Hudson) P. Beauv. - H caesp - Paleotemp - AU, M, Q
Elymus caninus (L.) L. [= *Agropyron caninum* (L.) Beauv.] - H caesp - Circumbor - G
Elymus repens (L.) Gould [= *Agropyron repens* (L.) Beauv.] - G rhiz - Circumbor - G, M, PA, PT
Elymus pungens (Pers.) Melderis [= *Agropyron pungens* (L.) Beauv.] - G rhiz - Euri-Medit - G, S
Aegilops geniculata Roth. - T scap - Steno-Medit-Turan - G, PT, S
Aegilops triuncialis L. - T scap - Euri-Medit -M, PA, PT
+ *Triticum aestivum* L. - T scap - Cultivated
Hordeum leporinum Link - T scap - Euri-Medit - PT
Psilurus incurvus (Gouan) Sch. & Th. - T scap - Euri-Medit - PA, PT
Avena barbata Pott. ex Link - T scap - Euri-Medit-Turan - G, M, PA, PT
Avena fatua L. - T scap - Eurasiat - G, PA
Gaudinia fragilis (L.) Beauv. - T scap - Euri-Medit - G, PA, PT
Lophochloa cristata (L.) Hyl. - T scap - Subcosmop - PT
Trisetaria aurea (Ten.) Pignatti - T scap - CE Steno-Medit - PT
Trisetaria panicea (Lam.) Maire - T scap - W Steno-Medit - G, PT
Gastridium ventricosum (Gouan) Sch. & Th. - T scap - Medit-Atl - G, PA, PT
Polypogon monspeliensis (L.) Desf. - T scap - Paleo-Subtrop - AU
Polypogon viridis (Gouan) Breistr. - Hcaesp - Paleo-Subtrop - PT
Phleum ambiguum Ten. - G rhiz - Endem - PA, PT
Phleum bertolonii DC. - H caesp - Euri-Medit - G, M
Phleum hirsutum Honckeny - G rhiz - Orof-SE Europ - PA
Phleum pratense L. - H caesp - Centro-Europ - G, PA, PT
Phleum subulatum (Savi) Asch. & Graebn. - T scap - Steno-Medit - G, PA, PT
Alopecurus myosuroides Hudson - T scap - Subcosmop - G, PA
Phalaris brachystachys Link - T scap - Steno-Medit - S
Phalaris coerulescens Desf. - H caesp - Steno-Medit-Mac - PA
Phalaris paradoxa L. - Tscap - Steno-Medit - PA
Holcus lanatus L. - H caesp - Circumbor - G, S, M
Anthoxanthum odoratum L. - H caesp - Eurasiat - PT, Q
Agrostis stolonifera L. - H rept - Circumbor - AU, G, M, PA, S

Melica ciliata L. - H caesp - Euri-Medit-Turan - G
Melica transsylvanica Schur - H caesp - SE Europ-Subsiber - G
Melica uniflora Retz. - H caesp - Paleotropicale - G, M, Q
Parapholis pycnantha (Hack.) C.E. Hubb. - T scap - Steno-Medit - PT
Haynardia cylindrica (Willd.) Greuter - T scap - Euri-Medit - G
Stipa bromoides (L.) Doerfl. - H caesp - Steno-Medit - G
Oryzopsis miliacea L. Ash. & Schweinf. [= *Piptatherum miliacea* (L.) Coss.] - H caesp - Steno-Medit-Turan - G
Ampelodesmos mauritanicus (Poiret) Dur. & Sch. - H caesp - SW Steno-Medit - G, M, PA, PT
Echinochloa crus-galli (L.) Beauv. - T scap - Subcosmop - G
Setaria verticillata (L.) Beauv. - T scap - Termocosmop - G
Setaria viridis (L.) Beauv. - T scap - Subcosmop - G
Dichantium ischaemum (L.) Roberty [= *Bothriochloa ischaemon* (L.) Keng] - H caesp - Termocosmop, - G, PA
Sorghum halepense (L.) Pers. - G rhiz - Termocosmop - PA
Cleistogenes serotina (L.) Keng - H caesp - N Medit-S Siber - G
Cynodon dactylon (L.) Pers. - G rhiz - Termocosmop - G, PA
+ *Arundo donax* L. - G rhiz - Adventitious
Arundo pliniana Turra - G rhiz - W Steno-Medit - M
Phragmites australis (Cav.) Trin. - G rhiz - Subcosmop - AU, G, I, M, PT
Molinia arundinacea Schrank - H caesp - Europ-Caucas - G, PT

Discussion

Quantitative, distributional and ecological aspects

The floristic list includes 684 entities, divided into 85 families and 358 genera. Twenty-two species (4.1%) are non-native, five of which are cultivated in surrounding areas and seventeen are introduced or naturalised. The native flora consists of 662 species and intraspecific *taxa*, 83 families and 348 genera. The most represented families are *Asteraceae* (94 species, 14.4%), *Fabaceae* (77 species, 11.5%) and *Poaceae* (70 species, 10.6%) (Fig. 2).

Including about 20 % of species and subspecies recorded for Tuscany (3435 specific and subspecific taxa; Conti & al. 2005), the Trasubbie S.I.R. harbours a remarkably rich flora in a relatively small area. This is mainly due to the high habitat diversity of the biotope and to the remarkable dynamics of the open habitats which favours a continuous floristic turn-over. Beside floodings, sheep grazing and recurrent fires contribute to maintain open vegetation types in which is possible for species from surrounding areas to arrive and establish. Natural and anthropic disturbance allows the arrival of numerous annual and biennial, pioneer and synanthropic species, which tend to disappear when the chamaephytic and hemicryptophytic vegetation cover is re-established.

A biogeographically relevant feature of the Trasubbie stream system is that it provides a unique connection and a contact corridor between the Mediterranean-montane, mainly calcicolous flora of the massifs of the upper Albegna valley and the more thermophilous

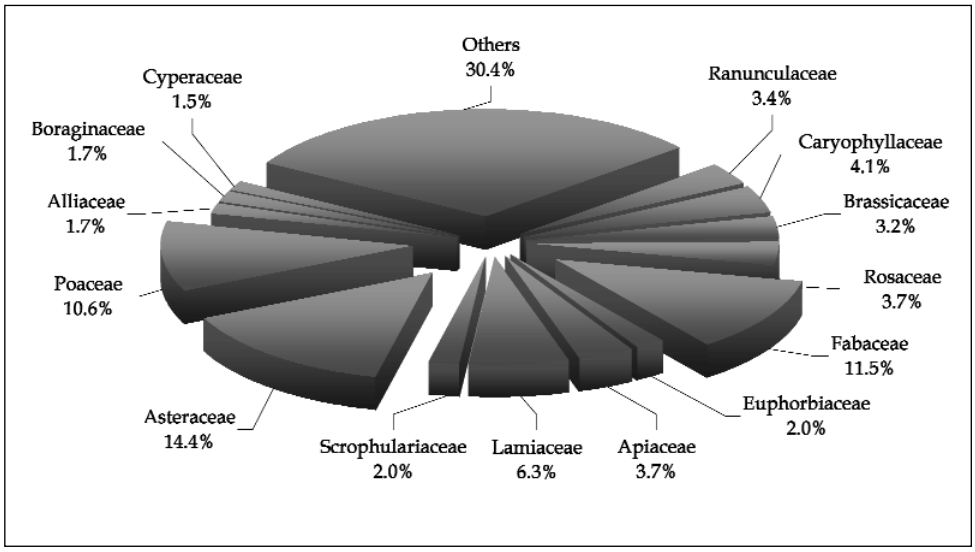

Fig. 2. Families with at least 10 species.

Mediterranean, often psammophilous flora of the Maremma coast. Typical members of the former group are for example *Erysimum pseudorhaeticum*, *Alyssum montanum*, *Satureja montana*, *Teucrium montanum*, *Veronica spicata* subsp. *barrelieri*, *Sesleria italica* and *Phleum ambiguum*. Their presence at a low altitude may be due to seed transportation from near mountains and to the particular microclimate (lower temperatures and higher humidity compared to adjacent areas) of the riparian areas, referred to as "oasis effect" in climatology (Oke 1987; Malanson 1993). On the other hand, some entities typical of coastal dune systems - such as *Glaucium flavum*, *Euphorbia barrelieri*, *Cuscuta cesatiana* and *Euphorbia terracina* - are able to spread upstream thanks to the sandy and pebbly alluvial deposits of the river bed.

From a phytogeographical point of view, the following entities - rare in Italy and Tuscany and/or with a fragmentary area of distribution - are worth of mention:

Glaucium flavum: this species can be found along Italy's coasts, on ruins, on sandy slopes and beaches and, sometimes, on dunes (Pignatti 1982). Even though it is mainly a coastal species, it can also be found in interior areas as in the case of the small populations on the pebbly banks of the Torrente Trasubbie.

Velezia rigida: this mediterranean-turanian species is common in Sicily and Sardinia, whereas it is rare and declining in the Italian peninsula (Pignatti 1982). It was collected in past times also in Tuscany where it reaches its northern distribution limit near Florence, the Elba Island and from uncultivated land around Siena (specimens in FI !). This is the first record for the Grosseto province.

Linum nodiflorum is a mediterranean species whose area of distribution is centred in the eastern parts of the basin. In Italy its distribution is discontinuous, and in Tuscany it was recorded for only the vicinity of Florence (Pignatti 1982) and Bosco Rocconi (Angiolini & al. 2004c).

Allium amethystinum: this is a Mediterranean species with an eastern barycentre of distribution. This is the second finding in Tuscany after the report by Garbari & Corsi (1972) from the Uccellina Hills.

Aegilops triuncialis: it is a rare, sub-Mediterranean species, present in Italy only in Emilia-Romagna, Veneto, Trieste, all along the Tyrrhenian coast from Liguria to Southern Italy and on islands (Pignatti 1982, Chiarucci & al. 1995). It grows in pastureland, uncultivated fields and near garrigues with *Santolina etrusca* and *Satureja montana.*

From a conservation point of view, *Lavatera punctata* and *Santolina etrusca* are included in the Regional Red List (Conti & al. 1997), whereas 31 species are subject to some forms of protection or collection restrictions (Regional Law 56/2000) (Table 2).

Table 2. List of protected taxa.

Protected taxa	**IUCN**	**CITES**	**Regional Law 56/2000**
Anacamptis pyramidalis		x	x
Anemone apennina			x
Bryonia dioica			x
Centauerea paniculata subsp. *carueliana*			x
Cyclamen hederifolium		x	
Cyclamen repandum		x	
Dactylorhiza romana		x	
Daphne laureola			x
Dianthus sylvestris subsp. *longicaulis*			x
Eleocharis palustris			x
Euphorbia pubescens			x
Globularia punctata			x
Hymenocarpus circinnatus			x
Lavatera punctata	LR		x
Malope malacoides			x
Narcissus poeticus			x
Opopanax chironium			x
Ophrys bertolonii		x	
Ophrys sphegodes		x	x
Orchis coriophora		x	
Plantago maritima			x
Ruscus aculeatus			x
Santolina etrusca	LR		x
Scabiosa uniseta			x
Scilla bifolia			x
Serapias lingua		x	
Serapias vomeracea		x	x
Sesleria italica			x
Silene paradoxa			x
Typha angustifolia			x
Typha latifolia			x
Velezia rigida			x

Biological spectrum

The biological spectrum (Fig. 3) shows a comparable proportion of therophytes (238 species, 36.4%) and hemicryptophytes (240 species, 36.6%), possibly in relation to the transitional macroclimate between the Mid-European and the Mediterranean areas. The H/T ratio (1.00) indicates that phytogeographically the Trasubbie is intermediate between the flora of coastal areas of southern Tuscany (Angiolini & al. 2002; Sforzi & Selvi 1999) and that of inner mountain systems (Baldini 1996; Frignani & al. 2004). Perennial forms dominate in the upper part of the valley, where both streams come into contact with deciduous forest formations which provide an optimal habitat for numerous nemoral-mesophilic and mesohygrophilous species. Thermophilic scrubs and garrigues dominate downstream on alluvial terraces, where numerous annual Mediterranean species, among which weeds of cereal crops, colonize the low-flow bed and the areas subject to frequent disturbance by floods, fires and anthropic activities. The chamaephytic component is also remarkable (4.6%); this is mainly represented by species of terraces and garrigues (e.g. *Euphorbia spinosa*, *Helichrysum italicum*, *Satureja montana* and *S. graeca*).

Hydrophytes are represented by only two species (*Alisma plantago-aquatica* and *Ranuculus peltatus*, 0.3%) and species of helophytic communities (*Nasturtium officinale*, *Veronica anagallis-aquatica, Juncus* sp.pl., *Thypha* sp.pl. and *Phragmites australis*), are limited to wet, muddy banks and to lateral depressions with permanent water stagnation in the lower part of the valley. Most of the species which are common in the hydro-helophytic communities of peninsular Italy's watercourses are absent. On the whole, the percentage of phanerophytes and geophytes is fairly low, due to the small extent of mature woods, mainly situated upstream of the Torrente Trasubbino and on the outer terraces.

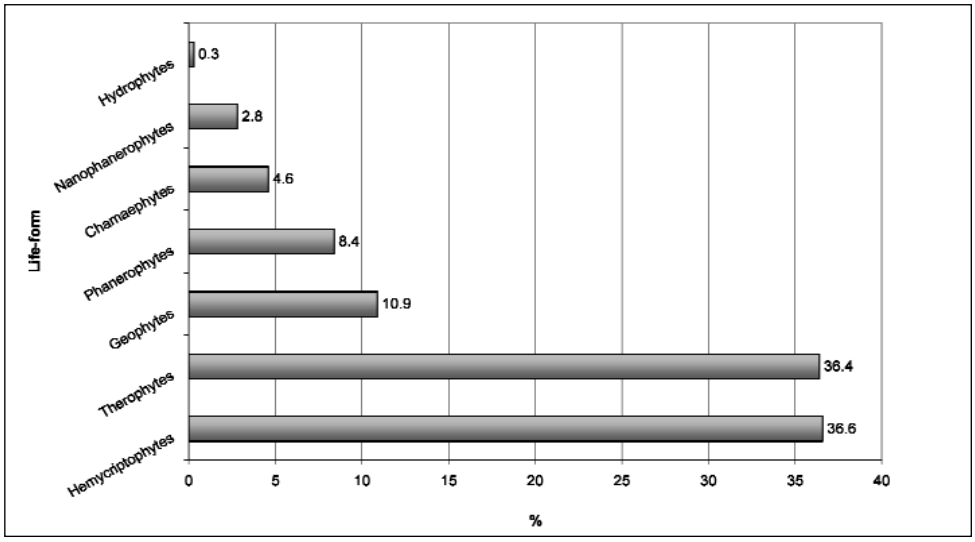

Fig. 3. Biological spectrum.

Chorology

The chorological spectrum (Fig. 4) is in line with the biological spectrum in showing that about half of the flora is formed by species with a broad Mediterranean distribution (49.4%). Stenomediterranean species are fairly well represented (13.0%), and several of them are coastal, north-Mediterranean (2.0%) and west-Mediterranean (1.4%) entities widespread in the warmer littoral belt of Maremma. The high number of widely distributed, ubiquist species (cosmopolitan and sub-cosmopolitan) is related to the presence in the S.I.R. of cultivated land (pastures, olive groves, cereal fields) and uncultivated land, as well as to the intense anthropic activity in the surrounding areas.

The low proportion of endemic species (1.7%) is a typical feature of the flora of mainland Southern Tuscany. The only remarkable local endemics are:

Santolina etrusca, which occurs with isolated populations in southern Tuscany, Latium and Umbria, usually in river terrace garrigues or in dry grasslands on alkaline substrates from 30 to 950 m a.s.l (Arrigoni 1979, 1982; Angiolini & De Dominicis 2001).

At the infraspecific level a second endemic is *Centaurea paniculata* subsp. *carueliana*: according to Pignatti (1982), subsp. *carueliana* occurs in Tuscany in dry meadows between 300 and 1,000 m a.s.l., on ophiolites or limestone, while Arrigoni (2003) considers an obligate serpentinophyte endemic to Tuscan ophiolites.

Others endemic species are of Apenninic type:

Erysimum pseudorhaeticum: endemic species of the northern and central Apennines, it is peculiar to stony grounds and dry pastureland on calcareous soils from 100 to 900 m (rarely up to 1,800 m; Maccherini & al. 1994).

Centaurea deusta subsp. *splendens*: the nominal subspecies grows in uncultivated land, dry meadows and pastureland; in Southern Tuscany, subsp. *splendens* is reported for

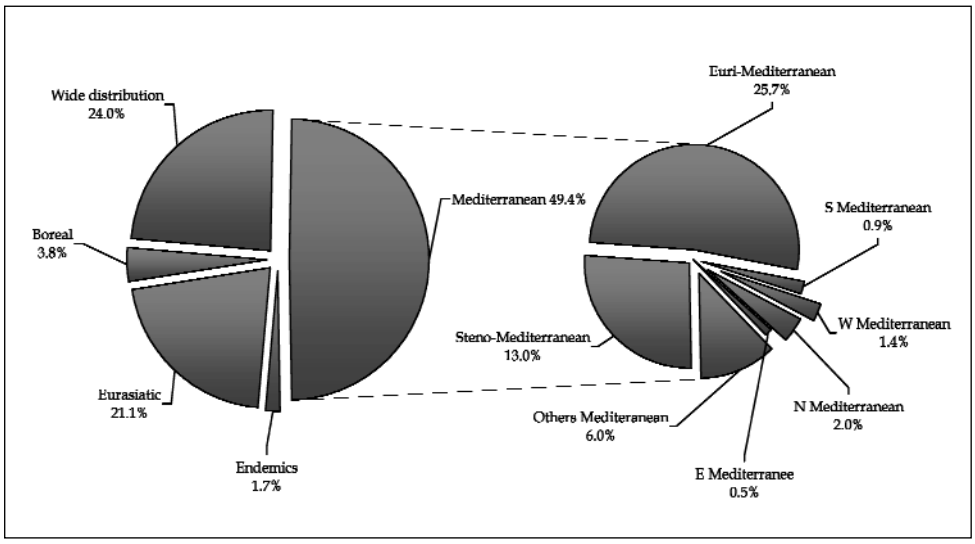

Fig. 3. Chorological spectrum.

Mount Labbro (Maccherini & al. 1994; Baldini 1996), Poggio all'Olmo Nature Reserve (Maccherini & al. 2001) and Mount Amiata (Selvi 1996).

Sesleria italica: it is a fairly rare endemite of Central Italy, restricted to the Tusco-Emilian and Umbro-Marchigiano Apennine, with a second area around the Mount Amiata's volcanic cone (Selvi 1996). It thrives on slopes subject to landslides, on pebbly river banks, often on marls and clays usually between 700 and 1,200 m a.s.l. (Pignatti 1982). The populations on Torrente Trasubbie's pebbly banks are therefore disjunct and at an usually low altitude.

Conclusions

This paper contributes to a better knowledge of the flora of Tuscany, and provide a measure of the phytotaxonomic richness and composition of a protected area with a remarkable environmental complexity and landscape relevance. The riparian and flood-plain strips of the biotope are the most valuable habitats in the area, especially considering that they are becoming more and more rare throughout Italy and Europe. Despite the intense exploitation of the territory in this flat, easily-accessible area suitable for cultivation, the Trasubbie S.I.R. shows a high degree of naturality, both in the downstream area in direct contact with cultivated land and in the upstream areas, where the watercourse flows through narrow valleys bordered by steep slopes.

The role that the fluvial strip has as a corridor allowing the contact between distinct ecological and phytogeographical elements enhances its ecological importance.

The dynamics of the fine ecosystem mosaic occurring in the unusually broad bed of is still maintained and regulated by natural events and traditional factors of anthropic disturbance.

Accordingly, the "Torrente Trasubbie" nature reserve can be seen, at the regional level at least, as an Important Plant Area (Palmer & Smart 2001) for the conservation of a multiplicity of peculiar habitats and vegetation types which harbour a remarkable floristic diversity.

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