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CONTRIBUTION TO THE KNOWLEDGE OF THE VASCULAR FLORA OF THE PIGELLETO, MT. AMIATA, ITALY

Abstract — The results of the floristic research carried out during 1985-1986 and 1988-1993 in the fir woods of the Pigelletto, south-east of Mt. Amiata (central-southern Tuscany, Italy) are reported. The area has nearly 450 ha and is characterized by a relict nucleus of *Abies alba* Miller at a low altitude. 367 entities were accounted for. Among these, species of phytogeographic interest are well represented and *Koeleria pyramidalis* (Lam.) Domin is new to Tuscany.

Riassunto — *Contributo alla conoscenza della flora vascolare del Pigelletto, Monte Amiata, Italia.* - Sono riportati i risultati delle ricerche floristiche svolte negli anni 1985-1986 e 1988-1993 all'Abetina del Pigelletto, situata sul versante sud-est del Monte Amiata (Toscana centro-meridionale, Italia). Si tratta di un'area di circa 450 ha, caratterizzata dalla presenza di un nucleo relitto di Abete bianco (*Abies alba* Miller) a bassa quota. Sono state rinvenute 367 entità; tra queste sono ben rappresentate le specie di elevato interesse fitogeografico. Inoltre, *Koeleria pyramidalis* (Lam.) Domin risulta nuova per la Toscana.

Key words — Vascular flora / Mt. Amiata (SI) / central-southern Tuscany.

INTRODUCTION

MONTORZI (1971a) reported the fir woods of the Pigelletto of Mt. Amiata as a biotope of high vegetational interest because of the presence of relict populations of autochthonous *Abies alba* Miller, growing at relatively low altitudes compared to the data concerning the Apennine areas (i.e. BERTOLONI, 1819; CARUEL, 1860; PAVARI, 1931; GIACOBBE 1950a, 1950b). TITO LIVIO (Hist. Rom., Dec. 3 Lib. 8) who recalls a fir wood reaching the village of Roselle (300m a.s.l.), PIO II (1584) in his "Commentarii" and SANTI (1795), in addition to palinological data (CLERICI, 1903; TONGIORGI, 1938, 1939; BERTOLANI-MARCHETTI & JACOPI,

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1962; BERTOLANI-MARCHETTI & SOLETTI, 1972) confirm the presence of natural fir woods at low altitudes on the Mt. Amiata slopes.

This biotope has recently been the subject of vegetational (DE DOMINICIS *et al.*, 1991, 1992) and mycocoenological research (PERINI *et al.*, 1990; COMANDINI *et al.*, 1993). The floristic knowledge on the other hand mainly refers to botanists of the last century, such as SAVI (1811) and CARUEL (1860), who quote data gathered by SANTI (1795), or more recently to NEGRI (1943) and GIACOBBE (1950b), even though both report only incomplete floristic lists. Also the vegetational studies of ARRIGONI & NARDI (1975) provide floristic data.

The compilation of the vascular flora in this area aims to advance the floristic knowledge and is part of a nature conservation project which is still going on supported by the Province Administration and supervised by the University of Siena.

STUDY AREA

The area investigated is on the south-eastern slope of Mt. Amiata, near Piancastagnaio (Siena). According to MONTORZI (1971a) the biotope, located on the northern slope of Poggio Pampagliano at the altitude of 700-800m, reaches a surface of about 20 ha. Its southern limit is the Senna stream, tributary of the Paglia river. However, according to DE DOMINICIS *et al.* (1992) and our observation, the fir is spontaneous in a wider area, spreading south to the Siele stream (tributary of the Paglia river) and west to the Scabbia stream (tributary of the Fiora river). For this reason our floristic collection covered the whole area in which *Abies alba* naturally grows and was not limited to the biotope indicated by MONTORZI (1971a).

This area, about 450 ha, is bordered southward by a cartroad that leads from the provincial road to the San Filippo farm, and eastward by the same provincial road that goes from Selvena to Pietralunga.

The altitude ranges from 625m to 969m and includes a chain of hills: Roccaccia (913m), Pampagliano (969m) and Roccone (913m). The farms were abandoned years ago and now the area is completely covered by woods. In particular, the Roccaccia farm has been afforested with conifers, mainly silver fir and black pine but also Norway spruce and larch.

GEOLOGICAL SETTINGS

According to JACOBACCI *et al.* (1965) and GIANNINI *et al.* (1971) the

main outcrop belongs to the "Liguridi" complex. It is mostly clayey and has rather frequent layers of limestone, marl and sandstone. The Pietraforte lime sandstone on the top of the hills produces a fertile and well-drained soil (MANCINI, 1950; LULLI, 1971). In addition, recent debris deriving from the breakdown of the soil of late mineral excavations in the east area can be found. Notice should be taken of outcrops of small Selagiti limbs (intrusive volcanic rock) near the Senna Morta stream.

CLIMATE

Information was obtained from the climatic station of Piancastagnaio (772m a.s.l.) (Tab. 1). Rainfall is concentrated in the autumn/winter months with a maximum of 177mm in November and a minimum of 47.5mm in July (reported for 1963-1986 by MINISTERO LL.PP., SERVIZIO IDROGRAFICO, 1962-1980). Temperature reaches its maximum in August with an average of 19.3°C and its minimum in January with an average of 3.2°C; the annual mean temperature is 10.7°C. The climate of the Piancastagnaio station is moist submediterranean. In fact the Mt. Amiata, an isolated cone 1738m high, condenses clouds and for this reason the area has the highest rainfall of southern Tuscany (BARAZZUOLI & MICHELUCCHINI, 1982; BARAZZUOLI *et al.*, 1993), the average annual rainfall generally is above 1300mm, it sometimes reaches 1800mm (registered at the Selvena station in 1979).

TAB. 1 - Mean monthly and yearly rainfall and temperature.

	<i>J</i>	<i>F</i>	<i>M</i>	<i>A</i>	<i>M</i>	<i>J</i>	<i>J</i>	<i>A</i>	<i>S</i>	<i>O</i>	<i>N</i>	<i>D</i>	<i>Year</i>
<i>mm</i>	123.7	138.1	116.8	88.4	85.4	68.1	47.5	70.0	103.9	149.1	190.3	145.2	1319.2
<i>°C</i>	3.2	3.7	5.9	8.9	12.7	17.0	18.8	19.3	16.2	11.7	7.3	4.1	10.7

VASCULAR FLORA

This floristic list is principally based on plants collected during the years 1985-1986 and 1988-1993. The exsiccata of the collected samples are preserved in the *Herbarium Universitatis Senensis* (SIENA). In addition the species not found during our collection and reported by SANTI (1795) (preceded by the symbol **S**), NEGRI (1943) (**N**) and GIACOBBE (1950b) (**G**) or found in the relevés by DE DOMINICIS *et al.*

(1992) (**D**) are also listed, but are not included in the chorological-type and life-form spectra.

The systematic frame used here follows that of the Med-Checklist (GREUTER *et al.*, 1984-1989), PIGNATTI (1982) for the phanerogams and FERRARINI *et al.* (1986) for the pteridophytes.

The life-forms are those proposed by RAUNKIAER (1934) and modified by PICHI SERMOLLI (1948). As for the chorological types we principally refer to HESS *et al.* (1967-1972), HULTÉN (1958; 1964; 1970), MEUSEL *et al.* (1965, 1978), TUTIN *et al.* (1964-1980), GUINOCHE & VILMORIN (1973-1984), FIORI (1923-1929), ZANGHERI (1976), PIGNATTI (1982), ORSINO *et al.* (1982), MARIOTTI *et al.* (1986) and CHIARUCCI *et al.* (1993).

The chorological types applied are:

Subcosmopolitan: species of great diffusion in the world (**Subcosm** and **Subtrop**).

Naturalized: species adventitious which have settled permanently and reproduce spontaneously (**Nat**).

Introduced: species introduced for forestry or agricultural purposes and which do not reproduce spontaneously (**Intr**).

Circumboreal: species of the cold and temperate regions of the North hemisphere (**Circumbor**).

Eurosiberian: species with predominant diffusion in northern Europe and Siberia (**Eurosib**).

Euroasiatic: species mainly diffused in the temperate regions of Europe and Asia (**Euras**), or limited to western Europe and Asia (**EurWAs**) or southern Europe and western Asia (**SEurWAs**).

European: species largely diffused in Europe (**Eur**), or limited to central Europe (**CEur**), to central-western Europe (**CWEur**) or western Europe (**WEur**).

Central-southern European: species diffused in middle and southern Europe (**CSEur**), or limited to central south-eastern Europe (**CSEEur**).

Southern European: species diffused in southern Europe (**SEur**), or limited to south-western Europe (**SWEur**), or to south-eastern Europe (**SEur**).

Sub-Mediterranean: species largely distributed in the Mediterranean area spreading out to the nearby regions (**SubMedit**).

Mediterranean-Atlantic: species diffused in the Mediterranean regions and along the Atlantic coast from Morocco to northern Europe (**MeditAtl**) or spreading from these areas towards nearby regions (**SubMeditAtl**), or limited to the western Europe (**WEur**).

Mediterranean: species mainly distributed along the Mediterranean coast (**Medit**), or limited to western Mediterranean (**WMedit**), central-western Mediterranean (**CWMedit**), central Mediterranean (**CMedit**), central-east Mediterranean (**CEMedit**), eastern Mediterranean (**EMedit**), north-east Mediterranean (**NEMedit**) or southern Mediterranean (**SMedit**).

Endemic: species present only on part of the Italian territory (**Endem**) or that only partially trespass other regions (**Subendem**).

Localities were not cited because of the limited extent of the study area. The abundance of species in the area was conventionally expressed as follows: + = rare entity; ++ = diffused entity; +++ = very diffused and abundant entity.

FLORISTIC LIST

EQUISETACEAE

Equisetum arvense L. **Grh - Circumbor** ++

Equisetum telmateja Ehrh. **Grh - Circumbor** ++

HYPOLEPIDACEAE

Pteridium aquilinum (L.) Kuhn **Grh - Subcosm** ++

ASPLENIACEAE

N *Asplenium adiantum-nigrum* L.

Asplenium onopteris L. **Grh - MeditAtl** ++

Asplenium trichomanes L. subsp. *quadriovalens* D.E. Meyer **Grh - Subcosm** +++

The diagnostic character compared to the subsp. *pachyrachis* (Christ) Lovis et Reichst., recently recorded in Italy (FERRARINI *et al.*, 1986), do not allow an easy distinction between the two entities.

Phyllitis scolopendrium (L.) Newman **Grh - Circumbor** +

ATHYRIACEAE

Athyrium filix-foemina (L.) Roth **Grh - Circumbor** +

ASPIDIACEAE

Dryopteris filix-mas (L.) Schott **Grh - Subtrop** +++

Polystichum setiferum (Forsskål) Woynar **Grh - Subtrop** +++

POLYPODIACEAE

Polypodium vulgare L. **Grh - Circumbor** +++

For the determination of this species we followed FERRARINI *et al.* (1986), NARDI & TOMMEI (1976) and PIGNATTI (1982).

PINACEAE

Abies alba Miller **Pm - SEur** +++

This species is autochthonous in the study area and constitutes natural fir woods in two other areas of Mt. Amiata: near Vivo d'Orcia and at the SS. Trinità convent (MONTORZI, 1971b, 1971c; DE DOMINICIS *et al.*, 1992). GIACOBBE (1950b) supposed the existence of an apenninic variety of this species, more resistant to drought while BERNETTI (1982) hypothesised the existence of an Amiata ecotype. In this case the Amiata fir ecotype is probably genetically endangered by introduced plants of unknown origin.

Larix decidua Miller **Pm - Intr** +

Picea abies (L.) Karsten **Pm - Intr** +

Pinus nigra Arnold **Pm - Intr** +

CUPRESSACEAE

Juniperus communis L. subsp. *communis* **Pn - Circumbor** ++

Chamaecyparis lawsoniana (Murray) Parl. **Pm - Intr** +

TAXACEAE

Taxus baccata L. **Pm - Euras** +

Typical of the Colchicum vegetational belt (PIGNATTI, 1979), this species was thought extremely rare in Tuscany in the past (CARUEL, 1860; BARONI, 1897-1908), and populations of several dozens of individuals at the Alpi Apuane (LONGO, 1927; PAMPANINI, 1927; BARTELLETI & TOMEI, 1991) and at Mt. Fumaiolo (BONAVENTURA, 1947) were believed exceptional. Finding this species on the Pigelletto, NEGRI (1943) claims it as subatlantic and mountain-mediterranean of mesophile forests with a high submountain or lower mountain horizon, as well as constant companion of the fir. But recently several populations of *T. baccata* have been ascertained in areas of central (CHIARUCCI & DE DOMINICIS, 1992) and southern Tuscany (DE DOMINICIS, 1969; SAMMURI & BORRI, 1977; DE DOMINICIS & CASINI, 1979).

SALICACEAE

Populus tremula L. **Pm - Euras** +

Salix apennina Skvortsov **Pm - Endem** +

This endemic species spreads on the Apennine chain from Liguria to Basilicata and Sicily and was recently also found on the southern

slopes of the Alps (MARTINI & PAIERO, 1988). In southern Tuscany it has been reported for the Farma Valley (CHIARUCCI *et al.*, 1993).

- Salix cinerea** L. **Pn - Euras** ++
Salix eleagnos Scop. **Pn - SEur** +

JUGLANDACEAE

Juglans regia L. **Pm - Nat** +

BETULACEAE

Alnus cordata (Loisel.) Loisel. **Pm - Intr** +

CORYLACEAE

Carpinus betulus L. **Pm - CSEur** ++
Corylus avellana L. **Pn - Eur** +
Ostrya carpinifolia Scop. **Pm - SEEur** ++

FAGACEAE

Castanea sativa Miller **Pm - CEur** ++
Fagus sylvatica L. subsp. *sylvatica* **Pm - CSEur** +++
Quercus cerris L. **Pm - SEEur** +++
Quercus dalechampii Ten. **Pm - SEEur** ++
Quercus ilex L. **Pm - Medit** +
D *Quercus petraea* (Mattuschka) Liebl.
Quercus pubescens Willd. **Pm - SubMedit** +
S *Quercus robur* L. subsp. *robur*

ULMACEAE

Ulmus glabra Hudson **Pm - EurWAs** +++
Ulmus minor Miller **Pm - Euras** +

URTICACEAE

N, G *Parietaria diffusa* M. et K.
Parietaria officinalis L. **Hscap - CSEur** ++
Urtica dioica L. **Hscap - Subcosm** +++

SANTALACEAE

Thesium linophyllum L. **Hscap - CSEur** +

LORANTHACEAE

G *Viscum album* L.

ARISTOLOCHIACEAE

Aristolochia lutea Desf. **Grtb - SEur +**

Aristolochia rotunda L. **Grtb - Medit ++**

For the identification of the *Aristolochia* specimens we referred to NARDI (1984).

Asarum europaeum L. subsp. *europaeum* **Grtb - Eurosib +++**

POLYGONACEAE

Rumex acetosa L. **Hscap - Circumbor ++**

Rumex acetosella L. **Hscap - Subcosm ++**

Rumex sanguineus L. **Hscap - EurWAs +++**

CHENOPODIACEAE

Atriplex patula L. **Ter - Circumbor +**

CARYOPHYLLACEAE

N *Cerastium arvense* L.

Although NEGRI (1943) has not indicated the subspecies, we can presume it to be the subsp. *arvense* considering its ecological characteristics and distribution range.

N *Cerastium fontanum* Baugm. subsp. *vulgare* (Hartman) Greuter et Burdet

Cerastium semidecandrum L. **Ter - Euras ++**

G *Cerastium alpinum* L.

Dianthus carthusianorum L. **Hscap - CSEur ++**

S, N *Dianthus monspessulanus* L.

S *Dianthus plumarius* L.

N *Dianthus sylvestris* Wulfen

Moehringia trinervia (L.) Clairv. **Ter - Euras +++**

Silene flos-cuculi (L.) Greuter et Burdet **Hscap - Euras ++**

Silene italica (L.) Pers. subsp. *italica* **Hscap - SubMedit +++**

Silene latifolia Poiret subsp. *alba* (Miller) Greuter et Burdet **Hscap - Euras ++**

Silene vulgaris (Moench) Garcke **Hscap - Circumbor ++**

Stellaria media (L.) Vill. subsp. *media* **Ter - Subcosm +++**

Stellaria montana Pirrat **Hrept - CWEur +**

RANUNCULACEAE

Anemone nemorosa L. **Grh - Circumbor +++**

Aquilegia vulgaris L. **Hscap - Euras +**

Clematis vitalba L. **Pl - CSEur ++**

Consolida regalis S.F. Gray **Ter - SubMedit** +
Helleborus bocconeui Ten. subsp. *bocconeui* **Grh - Endem** +
Helleborus foetidus L. **Hscap - SWEur** +++
S, N Helleborus viridis L.

SANTI (1795) and NEGRI (1943) reported for this area *H. viridis* L., but already LONGO (1913) and previously CARUEL (1870) excluded its existence in Tuscany. Furthermore, *H. viridis* is not present in Tuscany according to PIGNATTI (1982) and thus should be excluded from the flora of this area.

Hepatica nobilis Miller **Grh - Eur** ++

Ranunculus bulbosus L. subsp. *aleae* (Willk.) Rouy et Fouc. **Hscap - SubMedit** ++

Ranunculus ficaria L. subsp. *ficaria* **Grtb - Euras** ++

Ranunculus lanuginosus L. **Hscap - CSEur** +++

Ranunculus repens L. **Hrept - Euras** +

GUTTIFERAE

Hypericum androsaemum L. **Pn - SubMeditAtl** +

Hypericum montanum L. **Hcaesp - Euras** ++

Hypericum perforatum L. **Hscap - Subcosm** ++

PAPAVERACEAE

Corydalis cava (L.) Schweigg. et Koerte **Gb - Eur** ++

CRUCIFERAE

Alliaria petiolata (MB.) Cavara et Grande **Ter - Euras** +++

N Arabis alpina L.

Arabis hirsuta (L.) Scop. **Hbien - Euras** ++

Arabis turrita L. **Hbien - SubMedit** ++

Barbarea vulgaris R. Br. **Hbien - Euras** ++

Cardamine bulbifera (L.) Crantz **Grh - Eur** ++

Cardamine heptaphylla (Vill.) O.E. Schultz **Grh - CSEur** ++

Cardamine hirsuta L. **Ter - Subcosm** +

Cardamine impatiens L. **Ter - Euras** +

Cardamine kitaibelii Becherer **Grh - SEEur** +

Hesperis matronalis L. **Hscap - EurWAs** +

Lepidium campestre (L.) R. Br. **Ter - EurWAs** ++

CRASSULACEAE

Sedum cepaea L. **Tsucc - SEur** ++

ROSACEAE

- Agrimonia eupatoria* L. **Hscap - Eur** +++
Aremonia agrimonoides (L.) DC. **Hros - SubMedit** +
Crataegus monogyna Jacq. **Pn - EurWAs** ++
Crataegus oxyacantha L. **Pn - CEur** ++
Filipendula vulgaris Moench **Hscap - Eurosib** ++
Fragaria vesca L. **Hros - Euras** +++
Geum urbanum L. **Hscap - Euras** +++
Malus sylvestris Miller **Pm - EurWAs** +
Potentilla hirta L. **Hscap - SubMedit** ++
Potentilla micrantha Ramond **Hros - SubMedit** ++
Potentilla recta L. **Hscap - Euras** +
Potentilla reptans L. **Hrept - Euras** ++
Prunus avium L. **Pm - CSEur** +
Prunus spinosa L. **Pn - EurWAs** ++
S, N, G *Pyracantha coccinea* M.J. Roemer
N, G *Pyrus communis* L.
Pyrus pyraster Burgsd. **Pm - Euras** ++
Rosa arvensis Hudson **Pl - CSEur** +++
Rosa canina L. **Pn - Euras** ++
Rosa pouzinii Tratt. **Pn - WMedit** +
Rubus caesius L. **Pn - Euras** +++
Rubus canescens DC. **Pn - SubMedit** ++
Rubus hirtus W. et K. **Pn - Eur** ++
N *Rubus idaeus* L.
N *Rubus procerus* P.J. Muller
Rubus ulmifolius Schott **Pn - WMeditAtl** ++
Sanguisorba minor Scop. subsp. *muricata* Briq. **Hscap - SubMedit** +
Sorbus aucuparia L. subsp. *aucuparia* **Pm - Eur** +
Sorbus domestica L. **Pm - SubMedit** ++
Sorbus torminalis (L.) Crantz. **Pm - EurWAs** +

LEGUMINOSAE

- Astragalus glycyphyllos* L. **Hrept - Euras** ++
Astragalus monspessulanus L. subsp. *monspessulanus* **Chrept - SEur** ++
Chamaecytisus hirsutus (L.) Link **Pn - SEurWAs** +
Cytisus scoparius (L.) Link **Pn - WEur** +
Cytisus sessilifolius L. **Pn - SWEur** +
Cytisus villosus Pourret **Pn - Medit** ++
Dorycnium hirsutum (L.) Ser. **Chsuff - SubMedit** +
Dorycnium herbaceum Vill. subsp. *herbaceum* **Hscap - SEur** +++
Genista germanica L. **Pn - Eur** +

Genista pilosa L. **Pn - CWEur ++**

Genista tinctoria L. subsp. *tinctoria* **Chsuff - Euras** +++

The samples of Pigelletto do not seem ascribable to the subsp. *ovata* (Waldst. et Kit.) Arcang., signaled in Tuscany at Castelnuovo Val di Cecina (PIGNATTI, 1973) and recently in Farma Valley (CHIARUCCI *et al.*, 1993).

Hedysarum coronarium L. **Hscap - WMedit** +

Hippocrepis comosa L. **Hcaesp - CSEur** +

Hippocrepis emerus (L.) Lassen subsp. *emerus* **Pn - SEur** ++

N *Laburnum anagyroides* Medicus

Lathyrus aphaca L. **Tscd - SubMeditAtl** +

Lathyrus latifolius L. **Hscd - SEur** ++

Lathyrus linifolius (Reichard) Bassler **Hscap - Eur** +++

As in the Farma Valley and on all the metalliferous hills (CHIARUCCI *et al.*, 1993), individuals with leaf segments of 12-16 x 30-35 mm and stenophyllous forms with leaves of 1-3 x 25-40 mm were also found on the Pigelletto. According to PIGNATTI (1982) these populations are very frequent between the Tuscan-Emiliano Apennines and Maremma.

Lathyrus niger (L.) Bernh. **Grh - EurWAs** +++

Lathyrus pannonicus (Jacq.) Garcke **Grh - Eurosib** +

Lathyrus pratensis L. **Hscd - Euras** +

Lathyrus sativus L. **Ter - Intr** +

Lathyrus venetus (Miller) Wohlf. **Grh - Euras** +++

Lotus corniculatus L. **Hscap - Euras** ++

Medicago lupulina L. **Trept - Euras** ++

Melilotus altissima Thuill. **Grh - Euras** +

Onobrychis viciifolia Scop. **Hbien - Subcosm** +

Ononis spinosa L. subsp. *spinosa* **Chsuff - CWEur** +

Robinia pseudoacacia L. **Pm - Nat** +

Spartium junceum L. **Pn - SubMedit** +

Trifolium angustifolium L. **Ter - MeditAtl** +

N *Trifolium arvense* L.

Trifolium campestre Schreber **Ter - EurWAs** +

Trifolium medium L. subsp. *medium* **Hscap - EurWAs** +++

Trifolium ochroleucon Hudson **Hscap - Eur** +++

Trifolium pratense L. subsp. *pratense* **Hscap - Subcosm** +

Trifolium repens L. subsp. *repens* **Hrept - Subcosm** ++

Trifolium rubens L. **Hscap - CEur** +

Vicia bithynica (L.) L. **Tscd - SubMeditAtl** ++

Vicia cracca L. **Hscd - Euras** +

Vicia sativa L. subsp. *sativa* **Tscd - Medit** +

Vicia sepium L. **Hscd - Euras** +++

Vicia tenuissima (Bieb.) Sch. et Th. **Tscd - SubMedit** +

N *Vicia villosa* Roth subsp. *varia* (Host) Corb.

OXALIDACEAE

N *Oxalis acetosella* L.

GERANIACEAE

Geranium columbinum L. **Ter - Euras** ++

Geranium dissectum L. **Ter - Euras** +

Geranium nodosum L. **Hscap - SEur** +

A mountain species of the north Mediterranean is near its limits of distribution in southern Tuscany (PIGNATTI, 1982); on the rest of the peninsula it is in fact substituted by *Geranium versicolor* L., an amphiadriatic species.

Geranium robertianum L. **Ter - Circumbor** +++

Geranium sanguineum L. **Hscap - Eur** +

LINACEAE

Linum bienne Miller **Hbien - MeditAtl** +

Linum tenuifolium L. **Chsuff - CSEur** +

EUPHORBIACEAE

Euphorbia amygdaloides L. subsp. *amygdaloides* **Chsuff - EurWAs** +++

Euphorbia dulcis L. subsp. *purpurata* (Thuill.) Rothm. **Grh - CSEur** ++

Mercurialis perennis L. **Grh - Eur** ++

POLYGALACEAE

Polygala flavescens DC. **Hscap - Endem** ++

Polygala vulgaris L. **Ter - Euras** +

ACERACEAE

Acer campestre L. **Pm - EurWAs** ++

Acer obtusatum Willd. subsp. *obtusatum* **Pm - SEEur** +

Some samples of *A. obtusatum*, above all for the leaf size, seem to belong to the subsp. *neapolitanum* (Ten.) Pax which has its northern limit in Lazio and is not known in Tuscany. Anyway, slight morphologic differences do not often allow a convincing attribution to one or another subspecies.

Acer pseudoplatanus L. **Pm - EurWAs** +

AQUIFOLIACEAE

Ilex aquifolium L. **Pn - SubMeditAtl** ++

CELASTRACEAE

Evonymus europaeus L. **Pn - EurWAs** ++

TILIACEAE

Tilia cordata Miller **Pm - Eur** +*Tilia platyphyllos* Scop. subsp. *platyphyllos* **Pm - CSEur** ++**N Tilia platyphyllos** Scop. x *vulgaris* Hayne

THYMELEACEAE

Daphne laureola L. **Pn - SubMeditAtl** +++

VIOLACEAE

Viola alba Besser subsp. *dehnhardtii* (Ten.) W. Becker **Hros - WMedit**
+++*Viola arvensis* Murray **Ter - EurWAs** +*Viola etrusca* Erben **Hscap - Endem**

Pointed out by FOGGI *et al.* (1993) on the Pigelletto for Poggio La Roccaccia, this species has been described by ERBEN (1986) among the *Viola calcarata* orophile group which unites endemics of mountain areas. So far its presence has been ascertained for the preapennine mountains of southern Tuscany both on siliceous and calcareous substratum. It spreads on two distinct nuclei, one from Cornate di Gerfalco (*loc. clas.*), Poggio di Montieri and Poggio Ritrovoli and the other including the Mt. Amiata cone and the calcareous area that from Vivo d'Orcia reaches Mt. Labbro (CLAUSER *et al.*, 1992; FOGGI *et al.*, 1993).

N Viola hirta L.*Viola odorata* L. **Hros - Eur** +*Viola reichenbachiana* Jordan ex Boreau **Hscap - Eur** +++*Viola riviniana* Rchb. **Hscap - Eur** +

CISTACEAE

Helianthemum nummularium (L.) Miller subsp. *obscureum* (Celak.) J. Molub **Chsuff - EurWAs** +

ONAGRACEAE

Circaeaa lutetiana L. **Grdg - Euras** +++*Epilobium hirsutum* L. **Hscap - Euras** +

Epilobium montanum L. **Hscap - Euras** ++
 N *Epilobium parviflorum* Schreber

CORNACEAE

Cornus mas L. **Pn - CSEEur** ++
Cornus sanguinea L. **Pn - Euras** ++

ARALIACEAE

Hedera helix L. **Pl - Eur** +++

UMBELLIFERAE

N *Angelica sylvestris* L.
Apium nodiflorum (L.) Lag. **Hscap - SubMedit** +
Bunium bulbocastanum L. **Gb - WEur** +
Chaerophyllum temulum L. **Hbien - Eur** ++
Daucus carota L. subsp. *carota* **Hbien - Subcosm** +++
Oenanthe fistulosa L. **Hscap - Euras** +
Oenanthe pimpinelloides L. **Hscap - SubMeditAtl** ++
Sanicula europaea L. **Hros - EurWAs** +++
Smyrnium perfoliatum L. **Hbien - SubMedit** ++
Torilis japonica (Houtt.) DC. **Ter - Subcosm** +

PYROLACEAE

N *Monotropa hypopitys* L.

ERICACEAE

Erica arborea L. **Pn - SubMedit** +

PRIMULACEAE

Anagallis arvensis L. **Ter - Subcosm** ++
Cyclamen hederifolium Aiton **Gb - SEur** ++
Cyclamen repandum Sm. **Gb - NEMedit** ++
Primula acaulis (L.) L. **Hros - SubMeditAtl** +++

OLEACEAE

Fraxinus ornus L. **Pm - SubMedit** ++
Fraxinus angustifolia Vahl subsp. *oxyacarpa* (Willd.) Franco et Rocha Afonso **Pm - SEEur** +
D *Fraxinus excelsior* L.
Ligustrum vulgare L. **Pn - Eur** +++

GENTIANACEAE

Centaurium erythraea Rafn. **Ter - EurWAs ++**

N, G *Centaurium pulchellum* (Swarte) Druce

APOCYNACEAE

Vinca minor L. **Chsuff - SEEur ++**

RUBIACEAE

Cruciata glabra (L.) Ehrend. **Hscap - SEur +++**

Galium aparine L. **Ter - Subcosm +++**

Galium corrudifolium Vill. **Hscap - Medit ++**

Galium lucidum All. **Hscap - SubMedit +**

The two latter species are not distinguished easily because of their similar morphological and ecological characteristics and their common origin (the second deriving from the first by polyploidization and hybridation). They should be more correctly included in the *G. lucidum* All. group which comprises possible hybrids of the *Galium mollugo* group (MARIOTTI, in press).

Galium mollugo L. **Hscap - CSEur ++**

Galium odoratum (L.) Scop. **Grh - Euras ++**

Galium palustre L. **Hscap - EurWAs +**

Galium rotundifolium L. **Hscap - EurWAs +**

N *Galium aristatum* L.

Rubia peregrina L. **Pl - MeditAtl +++**

BORAGINACEAE

Lithospermum purpurocaeruleum L. **Chsuff - CSEur +++**

Myosotis decumbens Host subsp. *florentina* Grau **Hscap - Endem +**

This species limits its distribution to the Tuscan-Emiliano Apennines and Colli Albani and is a geographic vicariant of other subspecies: subsp. *decumbens* (artic-alpine), subsp. *rifana* (Maire) Greuter et Burdet (of the Marocco mountains), subsp. *teresiana* (Sennen) Grau (of the Pyrenees) etc. (MARIOTTI & CHIARUCCI, 1993). In the province of Siena it was found only on Mt. Amiata. Our specimen have a shorter calyx (6 mm) than the ones described by GRAU (1964).

Myosotis laxa Lehm. subsp. *caespitosa* (C.F. Schultz) Hyl. ex Nordh.

Hbien - SubMedit ++

Myosotis scorpioides L. **Hbien - Eurosib +**

This is an entity not easily distinguished from the others of the subser.

Palustres Schuster and most of all from *Myosotis nemorosa* Besser.

According to Grau and Merxmuller (in PIGNATTI, 1982) only this last

species is present in central-southern Italy, while *M. scorpioides* is more northern, restricted to the plain of the Po. Although an exact determination is questionable, the exsiccata were identified as *M. scorpioides* and NEGRI (1943) points out the presence of *Myosotis palustris* (L.) Hill which we think could be included as *M. scorpioides*.

***Pulmonaria saccharata* Miller Hscap - Subendem +++**

A wide-spread endemic of the Italian peninsula and southern France.

PUPPI & CRISTOFOLINI (1991) believe that the oldest binomial published for the Italian population is *Pulmonaria picta* Rouy, while *P. saccharata* should be considered of the Belgian populations which became spontaneous after cultivation centuries ago.

***Symphytum tuberosum* L. subsp. *angustifolium* (A. Kerner) Nyman
Grh - SEEur +++**

LABIATAE

***Ajuga reptans* L. Hrept - Eur +++**

***Galeopsis speciosa* Miller Ter - Euras +**

***Lamium maculatum* L. Hscap - Euras +++**

***Lycopus europaeus* L. Hscap - Circumbor ++**

***Melittis melissophyllum* L. Hscap - CSEur ++**

***Mentha aquatica* L. subsp. *aquatica* Grdg - Euras ++**

***Mentha pulegium* L. Hscap - Subcosm +**

***Prunella laciniata* (L.) L. Hscap - SubMedit +**

***Prunella vulgaris* L. Hscap - Euras +++**

***Salvia glutinosa* L. Hscap - Euras +**

***Satureja vulgaris* (L.) Fritsch Hscap - EurWAs ++**

***Scutellaria columnae* All. Hscap - SEEur ++**

***Stachys heraclea* All. Hscap - SubMedit +**

***Stachys officinalis* (L.) Trevisan subsp. *officinalis* Grh - Eur +**

***Stachys sylvatica* L. Hscap - Eurosib ++**

***Teucrium chamaedrys* L. Chsuff - SubMedit ++**

***Thymus longicaulis* C. Presl Chrept - SubMedit ++**

SOLANACEAE

***Atropa belladonna* L. Hscap - SubMedit +**

This rather rare species typical for humid glades and clearings of broadleaf woods (mostly oak), has been and is used in the preparation of medicinal herbs for its alkaloid and atropine contents. Extensive picking brought its disappearance in many areas. NANNIZZI (1934) hypothesized its cultivation on Mt. Amiata "where

this herb finds the natural conditions of soil and climate most favourable for its growth" in order to allow its picking.

SCROPHULARIACEAE

N *Digitalis ferruginea* L.

Digitalis micrantha Roth **Hscap - Endem ++**

Kickxia elatine (L.) Dumort. **Ter - SubMedit +**

Lathraea squamaria L. **Hscap - Eur +**

Melampyrum arvense L. **Ter - Euras +**

Odontites rubra (Baumg.) Opiz **Ter - Euras ++**

Rhinanthus alectorolophus (Scop.) Pollich **Ter - CSEur ++**

Scrophularia nodosa L. **Grtb - Euras ++**

S *Scrophularia peregrina* L.

N *Veronica anagallis-aquatica* L.

Veronica hederifolia L. **Ter - Euras ++**

Veronica montana L. **Hrept - CWEur +**

Veronica officinalis L. **Hrept - Euras +++**

Veronica serpyllifolia L. **Hrept - Circumbor ++**

PLANTAGINACEAE

Plantago lanceolata L. **Hros - Euras ++**

Plantago major L. **Hros - Subcosm ++**

Plantago maritima L. subsp. *maritima* **Grh - EurWAs +**

This species, chiefly on Pliocene subsalt clay, has found refuge in our study area. This is a rare entity, present in central Italy, limited only to Tuscany and Emilia (PIGNATTI, 1982; MARIOTTI, 1990).

CAPRIFOLIACEAE

Lonicera caprifolium L. **Pl - SEEur ++**

S, N *Lonicera periclymenum* L.

This rare subatlantic species is at its south-eastern limit of distribution (MARIOTTI, 1990). Not having found it, its presence on the Pigelletto should be checked since it could have disappeared after recent afforestation or been confused with *Lonicera caprifolium* L..

Sambucus ebulus L. **Grh - EurWAs +**

Sambucus nigra L. **Pm - Eur ++**

ADOXACEAE

Adoxa moschatellina L. **Grh - Circumbor +**

DIPSACACEAE

Dipsacus fullonum L. **Hbien - SubMedit ++**

Knautia arvensis (L.) Coulter **Hscap - EurWAs +**

CAMPANULACEAE

Campanula rapunculus L. **Hbien - EurWAs ++**

Campanula trachelium L. **Hscap - Euras ++**

Jastione montana L. **Hbien - Eur +**

Phyteuma scorzonerifolium Vill. **Hscap - Subendem +**

This is a western alpine species subendemic of northern Italy, the French and Swiss mountains; it spreads down to the northern Apennines and to Mt. Amiata, the southern limit of its distribution (PIGNATTI, 1982; MARIOTTI, 1990).

COMPOSITAE

Anthemis tinctoria L. **Chsuff - Euras ++**

Arctium minus (Hill) Bernh. **Hbien - Eur +**

N *Arctium nemorosum* Lej. et Court.

Artemisia vulgaris L. **Hscap - Euras ++**

Bellis perennis L. **Hros - Eur ++**

Carlina vulgaris L. **Hscap - Eur +**

Centaurea jacea L. **Hscap - Eur +++**

Cichorium intybus L. **Hscap - Euras ++**

Cirsium arvense (L.) Scop. **Grh - Euras ++**

Cirsium vulgare (Savi) Ten. **Hbien - Euras +**

Crepis leontodontoides All. **Hbien - CMedit +**

Eupatorium cannabinum L. **Hscap - EurWAs ++**

Hieracium piloselloides Vill. **Hscap - CSEur ++**

Hieracium sylvaticum (L.) L. **Hscap - Eurosib +++**

NEGRI (1943) points out *Hieracium* gr. *muronorum* with no further specification. Even having various samples at our disposal identification is difficult for us because of many intermediate agamospecies of the group (PIGNATTI, 1982).

Hypochoeris achyrophorus L. **Ter - Medit +**

Inula conyzoides DC. **Hbien - EurWAs ++**

N *Inula hirta* L.

Inula salicina L. **Hscap - Euras +**

Lapsana communis L. **Ter - Euras ++**

N *Leucanthemum praecox* Horvatic var. *praecox*

Mycelis muralis (L.) Dumort. **Hbien - Euras +++**

Petasites albus (L.) Gaertn. **Grh - EurWAs ++**

Petasites hybridus (L.) Gaertn. **Grh - Euras ++**

Picris echioides L. **Ter - SubMedit ++**

Picris hieracioides L. **Hbien - Euras ++**

Pulicaria dysenterica (L.) Bernh. **Hscap - SubMeditAtl ++**

Senecio aquaticus Hudson subsp. *barbareafolius* (Wimm. et Grab.)

Walters **Hbien** - **SEur** ++

Senecio fuchsii Gmelin **Hscap** - **CSEur** +++

Serratula tinctoria L. **Hscap** - **Eurosib** +++

Solidago virgaurea L. subsp. *virgaurea* **Hscap** - **Circumbor** +++

Sonchus asper (L.) Hill **Ter** - **Subcosm** ++

Tanacetum corymbosum (L.) Sch. Bib. var. *tenuifolium* (Willd.) Briz. et Covill. **Hscap** - **SubMedit** ++

Taraxacum officinale Weber **Hros** - **Subcosm** ++

Tragopogon porrifolius L. subsp. *porrifolius* **Hbien** - **SubMedit** ++

Tussilago farfara L. **Grh** - **Euras** +++

LILIACEAE

Allium pendulinum Ten. **Gb** - **Medit** ++

Allium ursinum L. **Gb** - **Euras** +

Asparagus tenuifolius Lam. **Grh** - **CSEur** ++

Asphodelus albus Miller **Grtb** - **SubMeditAtl** ++

Gagea lutea (L.) Ker - Gawl **Gb** - **Eurosib** +

Leopoldia comosa (L.) Parl. **Gb** - **SubMedit** ++

Lilium bulbiferum L. subsp. *croceum* (Chaix) Baker **Gb** - **CSEur** +

Ornithogalum pyramidale L. **Gb** - **CSEur** ++

Ornithogalum pyrenaicum L. **Gb** - **SubMedit** +

Polygonatum multiflorum (L.) All. **Grh** - **Euras** +++

Polygonatum odoratum (Miller) Druce **Grh** - **Circumbor** +

Ruscus aculeatus L. **Grh** - **MeditAtl** +++

Scilla bifolia L. **Gb** - **CSEur** +

AMARYLLIDACEAE

Galanthus nivalis L. **Gb** - **CSEur** +

DIOSCOREACEAE

Tamus communis L. **Grtb** - **MeditAtl** +++

IRIDACEAE

Crocus napolitanus Mord. et Loisel. **Gb** - **SubMedit** ++

JUNCACEAE

Juncus articulatus L. **Grh** - **Circumbor** ++

Juncus bufonius L. **Ter** - **Subcosm** +

Juncus conglomeratus L. **Hcaesp** - **Eur** +

Juncus effusus L. **Hcaesp** - **Subcosm** ++

Juncus inflexus L. **Hcaesp - Euras** ++

Luzula campestris (L.) DC. **Hcaesp - Eur** ++

Luzula forsteri (Sm.) DC. **Hcaesp - SubMeditAtl** +++

N *Luzula pilosa* (L.) Willd.

Luzula sieberi Tausch **Hcaesp - SEur** +

Luzula sylvatica (Hudson) Gaudin **Hcaesp - Eur** ++

This entity can be distinguished from *Luzula sieberi* Tausch for the larger leaf size and subequal capsule at the perigonium. PIGNATTI (1982) indicates it for the eastern Alp woods (500-1600 m) but it has more than once been signaled for Tuscany (RAFFAELLI & RIZZOTTO, 1991; CHIARUCCI *et al.*, 1993).

GRAMINEAE

Agropyron caninum (L.) Beauv. **Hcaesp - Circumbor** +

Aira caryophyllea L. subsp. *caryophyllea* Ter - **CWEur** +

Anthoxanthum odoratum L. **Hcaesp - Eurosib** +

Arundo donax L. **Grh - Euras** +

Avenella flexuosa (L.) Parl. **Hcaesp - Subcosm** +

Brachypodium rupestre (Host) R. et S. **Hcaesp - Eur** ++

Brachypodium sylvaticum (Hudson) Beauv. **Hcaesp - Euras** ++

Briza maxima L. **Ter - Medit** +

Briza media L. **Ter - Medit** ++

Bromus benekenii Lange **Hcaesp - Euras** ++

Bromus erectus Hudson **Hcaesp - Eur** +++

Bromus molliformis Lloyd **Ter - SubMedit** +

Bromus ramosus Hudson **Hcaesp - Eur** ++

Cynosurus cristatus L. **Hcaesp - Euras** ++

Cynosurus echinatus L. **Ter - SubMeditAtl** ++

N *Cynosurus elegans* Desf.

Dactylis glomerata L. **Hcaesp - Euras** ++

Dactylis hispanica Roth **Hcaesp - Medit** ++

Deschampsia caespitosa (L.) Beauv. subsp. *caespitosa* **Hcaesp - Subcosm** +

Festuca altissima All. **Hcaesp - CSEur** +

Festuca arundinacea Schreber **Hcaesp - EurWAs** +

Festuca heterophylla Lam. **Hcaesp - Eur** +++

Festuca cfr. *stricta* Host subsp. *trachyphylla* (Hackel) Patzke **Hcaesp +**

Plants not easily classified with the current floras; the samples found could be attributed to the subsp. *trachyphylla* because of their morphological characteristics (according to TORNADORE *et al.*, 1983). This subspecies has a wide diffusion in central and northern

Europe and was found in Italy only in Trentino and Lombardia by PIGNATTI (1982). It has recently been reported on the western Liguria Apennines (MARTINI & ZAPPA, 1993) but never for Tuscany. Since the determination is not sure, the chorological type is not reported.

Holcus lanatus L. **Hcaesp - Eur ++**

Koeleria pyramidata (Lam.) Domin **Hcaesp - Eur +**

Species not yet signaled for Tuscany, it reaches its southern boundary in Liguria and is diffused in prairies and on dry and stony slopes from 500 to 2600 m (PIGNATTI, 1982). It is vicariant of *Koeleria vallesiana* (Honckeny) Bertol., species with a more mediterranean gravitation (MARIOTTI, in press).

Lolium multiflorum Lam. subsp. *multiflorum* **Hbien - SubMeditAtl ++**

Lolium perenne L. **Hcaesp - Subcosm ++**

Melica uniflora Retz. **Grdg - Eur +++**

Milium effusum L. **Grh - Circumbor ++**

Phalaris coerulescens Desf. **Hcaesp - SubMeditAtl +**

Phleum pratense L. **Hcaesp - Subcosm +**

Phleum bertolonii DC. **Hcaesp - SubMedit +**

Poa bulbosa L. **Hcaesp - Circumbor +**

Poa compressa L. **Hcaesp - Circumbor ++**

Poa nemoralis L. **Hcaesp - Circumbor +**

Poa sylvicola Guss. **Hcaesp - SubMedit +++**

Poa trivialis L. **Hcaesp - Euras +**

ARACEAE

Arum italicum Miller **Grtb - MeditAtl +**

Arum maculatum L. **Grtb - Eur ++**

CYPERACEAE

N *Carex distans* L.

Carex divulsa Stokes **Hcaesp - MeditAtl +**

Carex flacca Schreber subsp. *flacca* **Grh - Eur ++**

Carex hirta L. **Grh - EurWAs +**

Carex pallescens L. **Hcaesp - Circumbor +**

Carex pendula Hudson **Hcaesp - Euras +++**

Carex sylvatica Hudson **Hcaesp - EurWAs +++**

ORCHIDACEAE

Anacamptis pyramidalis (L.) L.C. Rich. **Grtb - SubMeditAtl ++**

Cephalanthera damasonium (Miller) Druce **Grtb - SubMedit +**

- N** *Cephalanthera rubra* (L.) L.C. Rich
Epipactis helleborine (L.) Crantz **Grh - Euras** +++
Gymnadenia conopsea (L.) R.Br. **Grtb - Euras** +
Listera ovata (L.) R. Br. **Grtb - Euras** +++
Neottia nidus - avis (L.) L.C.M. Richard **Grh - EurWAs** ++
Orchis maculata L. **Grtb - Euras** +++
Orchis mascula L. **Grtb - Eur** +
Orchis purpurea Hudson **Grtb - Euras** +
N *Platanthera bifolia* (L.) Rchb.
Platanthera chlorantha (Custer) Rchb. **Grtb - Eurosib** ++

CONCLUDING REMARKS

The total number of recorded species reaches 367 (including 6 unnaturalized introduced forestry species) which is fairly high for the limited area and especially the environmental homogeneity. In fact, almost all of the surface is covered by woods. The life-form spectrum compiled without the introduced forestry species (Tab. 2) reveals that: i) the hemicryptophytes prevail in agreement with the recent floras of southern Tuscany used as comparison (Mt. Labbro, MACCHERINI *et al.*, in press; Farma Valley, CHIARUCCI *et al.*, 1993) and with the temperate climate of the area; ii) the percentage of phanerophytes is higher compared to the other cited above environments due to the concentration of woodland; iii) the therophytes have a low percentage because of the scarcity of cultivated and ex-cultivated land in addition to the moderate anthropic influence and the low mediterranean character of the climate. The scarcity of therophytes is counterbalanced by the higher percentage of geophytes.

The chorological-type spectrum established excluding the introduced forestry species and the *Festuca* cfr. *stricta* subsp. *trachyphylla* is reported in Tab. 3. Its reveals a clear prevalence of continental species (European and especially Euroasiatic) which make up almost half of the total flora, to the detriment of the mediterranean and submediterranean species, compared to Monte Labbro (MACCHERINI *et al.*, in press) and Farma Valley (CHIARUCCI *et al.*, 1993). This is probably due both to the macroclimatic conditions of the area, with high rainfall and frequent winter frosts, and to the microclimate, created by the thick tree covering. As far as the endemic entities (only 2,2 %) are concerned, most of them are rather common species in central Italy, with wide Apennine or peninsular distribution: *Digitalis micrantha*,

TAB. 2 - Life-form spectrum.

	<i>n.</i>	<i>%</i>		<i>n.</i>	<i>%</i>
Pm	30	8,31	Grh	43	11,91
Pn	29	8,03	Grtb	17	4.72
Pl	5	1,39	Gb	14	3.89
P	64	17,73	Grdg	3	0.83
			G	77	21.34
Chsuff	10	2,77			
Chrept	2	0,55	Ter	36	9.97
Ch	12	3,32	Tscd	4	1.11
			Trept	1	0.27
Hscap	79	21,88	Tsucc	1	0.27
Hcaesp	40	11,08	T	42	11.62
Hbien	22	6,09			
Hros	11	3,05	Total	361	100
Hrept	10	2,77			
Hscd	4	1,11			
H	166	45,98			

TAB. 3 - Chorological-type spectrum.

	<i>n.</i>	<i>%</i>		<i>n.</i>	<i>%</i>
Subcosmopolitan	26	7.22	Southern European	24	6.67
Naturalized	2	0.56	Sub-Mediterranean	31	8.61
Circumboreal	23	6.39	Mediterranean-Atlantic	29	8.05
Eurosiberian	10	2.78	Mediterranean	15	4.16
Euroasiatic	114	31.67	Endemic	8	2.23
European	51	14.16	Central-southern European	27	7.05
			Total	360	100

Helleborus bocconeи subsp. *bocconeи*, *Myosotis decumbens* subsp. *florentina*, *Polygala flavescens*, *Pulmonaria saccharata*, *Salix apennina*, *Phyteuma scorzonerifolium*. Only *Viola etrusca*, a recently described endemic species (ERBEN, 1986), limits its distribution to some areas of southern Tuscany (Cornate di Gerfalco, Poggio di Montieri, Poggio Ritrovoli, the Mt. Amiata and its calcareous basement from Vivo d'Orcia to Monte Labbro). Growing in the Pigelletto fir woods there are other entities of phytogeographic interest because of their distribution range or systematic status: *Abies alba*, *Genista pilosa*, *Geranium nodosum*, *Lilium bulbiferum* subsp. *croceum*, *Plantago maritima* subsp. *maritima* and *Taxus baccata*. Moreover *Koeleria pyramidata* is new to the region.

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