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Floristic composition of traditional olive grove on Ionian coast of South Italy

Abstract

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Data about floristic composition of an olive plantation in traditional use on the Ionian cost of Calabria (South Italy) are presented. The area under study consist of 14 Ha, the basic rocks are granodiorits. Region belongs to Meso-Mediterranean thermoclimatic belt The plantation was created in 1920s and since 1986 the main agricultural applied technique are pruning and burning of cut branches, ploughing and collecting fruits using traditional techniques and mechanistic, without use of any chemicals.

The flora under study consists of 274 species and subspecies. Taxonomic spectra show dominance of *Asteraceae, Fabaceae* and *Poaceae* to which families belongs almost half of the species. The most of the species are Therophytes followed by Hemycriptophytes and Geophytes. Phanerophytes are presented in hedges by Mediterranean shrubs. The most of the species have Mediterranean and Sub-Mediterranean distribution and together with Cosmopolits (s.l.) form more then 60%.

Introduction

Olive production is a significant land use in the Southern Europe with important environmental, social and economic considerations. Italy, and especially the Southern part, is one of the main areas of olive oil production together with Spain, Greece and Portugal.

There are considerable differences in the dimension and kind of management of olive farming areas. Traditional plantations, often with ancient trees and typically planted on terraces, are very spread in South Italy. They cover a high percentage of land and representing an important landscape element. As a result of their particular plantation characteristics and farming practices, with few or no chemical inputs, these traditional plantations are supposed to have potentially a high natural, biodiversity and landscape value.

Aim of this study is to analyse the floristic diversity in a typical olive grove on the Calabrian Jonian coast. The studied area is situated on the Copanello promontory, between the village of Catanzaro Lido and the Gulf of Squillace at an altitude of about 180 m.

It is a orchard of about 28 Ha large, with a olive-grove 14 ha and about 1000 olive trees. From 1985 the farm was managed traditionally, without using chemicals. Green manure of spontaneous grass is kept in order to enrich the soil in organic substance. In summer it is harrowed to prevent fires and to clean under the trees to make easier collection of olives.

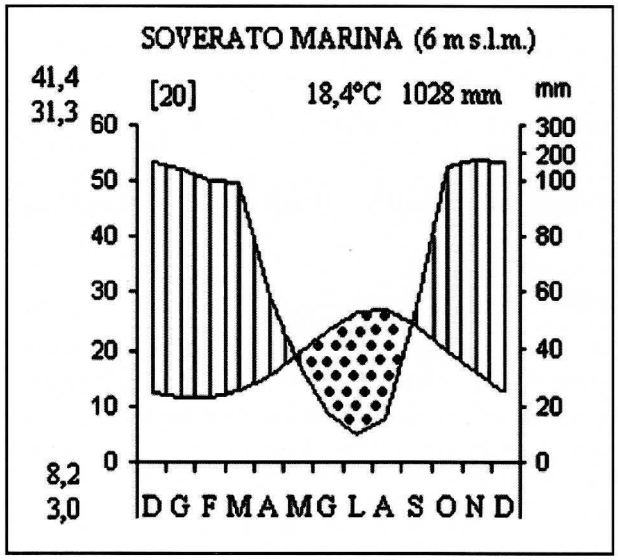

Fig. 1. Thermopluviometric Walter's diagram of the station of Soverato Marina based on climatic data of the period 1962-1987.

The orchard is placed on steep terrain with granodioritic substratum. Soils are acid and take origin from a deep stratum of weathered rock.

Climate is Mediterranean, with average annual temperature (village Soverato Marina) of 18,4 °C. The maximum average temperature of the warmest month (August) is 31,3 °C and the average of minimum temperatures of the coldest month (January) is 8,2 °C. The average annual rainfall is 1028 mm, with November as the rainiest month (173 mm) (Ciancio 1971). According to the bioclimatic classification of Rivas-Martinez & al. (1981), this territory belongs to Thermo-Mediterranean bioclimate, with long summer drought and rainfall distributed mostly from autumn to spring. Figure 1 shows the thermopluviometric Walter's diagram of the station.

Most of the area in the region is cultivated, grazed and frequently fired. Climax vegetation is disappeared or degraded, only on the sloppiest place it is still possible to find fragments of well preserved natural vegetation. Termophilous communities with *Quercus suber* L. and *Q. virgiliana* Ten. represent forestal vegetation, included in the class of *Quercetea ilicis* Br.-Bl. ex A. Bolòs 1950 (Brullo & Marcenò 1985).

Shrubby communities with *Pistacia lentiscus* L., *Myrtus communis* L., *Asparagus albus* L., *Calicotome infesta* (Presl) Guss. are more spread on the slopes and often substituted by grasslands dominated by *Ampelodesmos mauritanicus* (Poiret.) Dur. et Sch. and *Cymbopogon hirtus* (L.) Janchen, favourite by the overuse of the land and frequent fires.

Olive groves occupy a large part of the territory and, especially on the sloppy places, they are in contact and mixed with fragments of seminatural shrubby communities. In

some cases this vegetation is kept and managed as hedge to protect soil from erosion and dispersion of water.

Under olive trees, vegetation is characterised by herbaceous communities dominated by Terophytes. It is possible to distinguish between winter-spring communities characterised by *Calendula arvensis* L., *Sonchus asper* (L.) Hill, *Euphorbia peplus* L. and *Oxalis pes-caprae* L. included in the order of *Polygono-Chenopodietalia* R. Tx. & Lohm in R. Tx. 1950 em. J. Tx. 1966 and summer-autumn communities with *Heliotropium europaeum* L., *Setaria verticillata* (L.) Beauv., *Amaranthus retroflexus* L. of *Solano-Polygonetalia* (Sissingh 1946) O. Bolòs 1962 em. Brullo & Marcenò 1980 (Brullo et Marcenò, 1983).

Material and methods

Floristic data have been collected during excursion organised to cover all seasons of the year (from 1998 to 2001 year). Relevès have been made in fixed squares in order to study periodicity and dynamics of herbaceous stratum of the olive-grove.

As taxonomic base is used Flora d'Italia (Pignatti 1982) as well as for life form types of species. To identify chorological type of species distribution are used data mainly from Pignatti 1982 and Brullo & al. 1996.

Results

Flora of the studied area consists of 274 *taxa* (273 species and 1 subspecies) distributed in 213 genera and 59 families as followed:

Acanthaceae: *Acanthus mollis* L., Stenomedit.-W, H scap.

Amaranthaceae: *Amaranthus albus* L., Avven,T scap; *Amaranthus retroflexus* L., Avven, T scap.

Anacardiaceae: *Pistacia lentiscus* L.,Eurimedit.,P caesp.

Araceae: *Arisarum vulgare* Targ.- Tozz., Stenomedit.,G rhiz; *Arum italicum* Miller, Eurimedit.-Atlant., G rhiz.

Aspleniaceae: *Asplenium onopteris* L., Eurimedit., H ros.; *Ceterach officinarum* DC., Eurimedit.-SubAtlant., H ros.

Boraginaceae: *Anchusa italica* Retz., Eurimedit., H scap; *Borago officinalis* L., Eurimedit., T scap; *Cynoglossum creticum* Miller, Eurimedit., H bienn.; *Echium parviflorum* Moench, Stenomedit., T scap; *Echium plantagineum* L., Eurimedit., T scap; *Heliotropium europaeum* L., Eurimedit.-Pont., T scap; *Symphytum tuberosum* L., Eurimedit.-Pont., G rhiz.

Cactaceae: *Opuntia ficus-indica* Miller, Avven, P succ.

Campanulaceae: *Campanula erinus* L., Stenomedit., T scap.

Caryophyllaceae: *Cerastium semidecandrum* L., Sub-Europ., T scap; *Petrorhagia prolifera* (L.) P. W. Ball et Heywood, Eurimedit.-Pont., T scap; *Silene colorata* Poiret, Stenomedit., T scap; *Silene gallica* L., Subcosmopol., T scap; *Silene italica* (L.) Pers.,Eurimedit., H ros; *Silene vulgaris* (Moench) Garcke subsp. *angustifolia* (Miller) Hayek,Stenomedit.-E, H scap; *Stellaria media* (L.) Vill. subsp. *cupaniana* (Jordan et Fourr.) Nyman, Cosmopol., Trept; *Stellaria neglecta* Weihe, Eurasiat., T scap.

Chenopodiaceae: *Chenopodium album* L.,Cosmopol., T scap; *Chenopodium ambrosioides* L., Avven, T scap.

Cistaceae: *Cistus monspeliensis* L.,Stenomedit.,NP.

Compositae: *Andryala integrifolia* L., Eurimedit.-W, T scap; *Anthemis triumfetti* All., Europea-S, H scap; *Artemisia variabilis* Ten., Endem., Ch frut.; *Aster squamatus* (Sprengel) Hieron., Avven, T scap; *Bellis perennis* L., Sub-Europ., h ros.; *Bellis sylvestris* Cyr., Eurimedit., H ros; *Calendula arvensis* L., Eurimedit., T scap; *Carlina corymbosa* L., Stenomedit., H scap; *Centaurea sonchifolia* L., Stenomedit., H scap; *Centaurea napifolia* L., Stenomedit.-W, T scap; *Chondrilla juncea* L., Eurimedit.-Pont., H scap; *Chrysanthemum coronarium* L., Stenomedit., T scap; *Chrysanthemum segetum* L., Stenomedit., T scap; *Cichorium intybus* L., SubEurasiat., H scap; *Cirsium arvense* (L.) Scop., SubEurasiat., G rad.; *Conyza bonariensis* (L.) Cronq., Avven, T scap; *Crepis corimbosa* Ten., Eurimedit.-E, T scap; *Crepis vesicaria* L., Eurimedit., T scap; *Eryngium campestre* L., Eurimedit.-Pont., H scap; *Eupatorium cannabinum* L., Eurasiat., H scap; *Galactites tomentosa* Moench, Stenomedit., H bienn.; *Hedypnois cretica* (L.) Willd., Stenomedit., T scap; *Hypochoeris achyrophorus* L., Stenomedit., T scap; *Inula graveolens* (L.) Desf., Eurimedit., T scap; *Inula viscosa* (L.) Aitos, Eurimedit., H scap; *Lactuca virosa* L., Eurimedit.-Atlant., T scap; *Leontodon tuberosus* L., Stenomedit., H ros.; *Leucanthemum vulgare* Lam., Eurasiat., H scap; *Phagnalon saxatile* (L.) Cass., Eurimedit.-W, Ch suffr; *Picris hieracioides* L., Eurasiat., H scap; *Reichardia picroides* (L.) Roth, Stenomedit., H scap; *Scorzonera trachysperma* Guss., Endem., H scap; *Senecio vulgaris* L., Eurasiat., T scap; *Sonchus arvensis* L., Eurasiat., H scap; *Sonchus oleraceus* L., Eurasiat., T scap; *Tragopogon porrifolius* L., Eurimedit., H bienn.; *Urospermum dalechampii* (L.) Schmidt, Eurimedit.-W, H scap; *Urospermum picroides* (L.) Schmidt, Stenomedit., T scap; *Xanthium italicum* Moretti, Eurimedit., T scap.

Convolvulaceae: *Convolvolus cantabrica* L., Eurimedit., H scap; *Convolvulus althaeoides* L., Stenomedit., H scand.

Crassulaceae: *Umbilicus horizontalis* (Guss.) DC, Eurimedit., G bulb; *Umbilicus rupestris* (Salis) Dandy, Eurimedit.-Atlant., G bulb.

Cruciferae: *Alyssum saxatile* L., Eurimedit.-Pont., Ch suffr; *Arabidopsis thaliana* (L.) Heynh., Cosmopol., T scap; *Arabis verna* (L.) R. Br., Stenomedit., T scap; *Biscutella didyma* L., Eurimedit.-Turan., T scap; *Biscutella lyrata* L., Endem., T scap; *Brassica nigra* (L.) Koch, Eurimedit.-E, T scap; *Brassica rapa* L., Eurimedit., T scap; *Bunias erucago* L., Eurimedit., T scap; *Capsella bursa-pastoris* (L.) Medicus, Cosmopol., H bienn.; *Cardamine hirsuta* L., Cosmopol., T scap; *Diplotaxis erucoides* (L.) DC., Eurimedit.-W, T scap; *Erophila verna* (L.) Chevall., Cosmopol., T scap; *Erucastrum virgatum* (Presl.) Presl., Endem., H scap; *Gypsophila arrostii* Guss., Eurimed.-E, Ch suffr; *Lobularia maritima* (L.) Desv., Stenomedit., H scap; Sinapis alba L., Eurimedit., T scap.

Cucurbitaceae: *Ecballium elaterium* A. Rich., Eurimedit., G bulb.

Cyperaceae: *Cyperus esculentus* L., Avven, G rhiz.

Dipsacaceae: *Knautia integrifolia* (L.) Bertol., Eurimedit., T scap; *Scabiosa maritima* L., Stenomedit., T scap.

Equisetaceae: *Equisetum telmateja* Ehrh., Cosmopol., G rhiz.

Euphorbiaceae: *Euphorbia exigua* L., Sub-Europ., T scap; *Euphorbia falcata* L., Eurimedit.-Pont., T scap; *Euphorbia helioscopia* L., Sub-Europ., T scap; *Euphorbia peplus*

L., Sub-Europ., T scap; *Mercurialis annua* L., Eurimedit.-Pont., T scap; *Ricinus communis* L., Avven, P scap.

Fagaceae: *Quercus suber* L., Eurimedit.-W, P scap; *Quercus virgiliana* Ten., Eurimedit.-E, P scap.

Gentianaceae: *Blackstonia perfoliata* (L.) Hudson , Eurimedit., T scap.

Geraniaceae: *Erodium malacoides* (L.) L'Hér., Stenomedit., T scap; *Geranium columbinum* L. , Eurasiat., T scap; *Geranium molle* L., SubEurasiat., T scap; *Geranium purpureum* Vill., Eurimedit.-Atlant., T scap; *Geranium rotundifolium* L., Eurasiat., T scap.

Graminaceae: *Aegilops geniculata* Roth, Stenomedit.-Turan., T scap; *Agropyron caninum* (L.) Beauv., Cosmopol., H caesp.; *Agrostis stolonifera* L., Cosmopol., H rept.; *Aira caryophyllea* L. , Eurimedit.-Atlant., T scap; *Ampelodesmos mauritanicus* (Poiret.) Dur. et Sch, Stenomedit.-W, H caesp.; *Arundo donax* L., Eurimedit., G rhiz; *Avena barbata* Potter, Cosmopol., T scap; *Avena fatua* L., SubEurasiat., T scap; *Brachypodium sylvaticum* (Hudson) Beauv., SubSSib., H caesp.; *Briza maxima* L., Eurimedit., T scap; *Bromus madritensis* L. , Eurimedit.-Atlant., T scap; *Bromus rigidus* Roth. , Eurimedit., T scap; *Bromus sterilis* L., SubEurasiat., T scap; *Catapodium rigidum* (L.) Hubbard, Eurimedit.-Atlant., T scap; *Cymbopogon hirtus* (L.) Janchen, Eurimedit., H caesp.; *Cynodon dactylon* (L.) Pers., Cosmopol., T scap; *Cynosurus echinatus* L. , Eurimedit.-Atlant., T scap; *Dactylis hispanica* Roth, Stenomedit., H caesp.; *Dasypirum villosum* (L.) Borbas, Eurimedit.-Turan., T scap; *Hordeum leporinum* Link., Eurimedit., T scap; *Lagurus ovatus* L., Eurimedit., T scap; *Lolium multiflorum* Gaudin subsp. *gaudinii* (Parl.) Sch. et Th. , Eurimedit., T scap; *Lolium perenne* L., Sub-Europ., Hcaesp; *Lolium rigidum* Gaudin, Eurimedit.-Turan., T scap; *Lophochloa cristata* (L.) Hyl., Subcosmopol., Tcaesp; *Oryzopsis miliacea* (L.) Asch et Scweinf., Stenomedit.-Turan., H caesp.; *Phalaris coerulescens* Desf., Eurimedit., H caesp.; *Polypogon subspataceus* Req., Stenomedit., T scap; *Polypogon viridis* (Gouan) Breistr., Eurimedit., H caesp.; *Setaria verticillata* (L.) Beauv., Cosmopol., T scap; *Sorghum halepense* (L.) Pers., Cosmopol., G rhiz; *Stipa capensis* Thunb., Stenomedit., T scap; *Vulpia ciliata* (Danth.) Link, Eurimedit., T caesp.

Hypericaceae: *Hypericum perfoliatum* L., Stenomedit., H scap.

Iridaceae: *Gladiolus italicus* Miller, Eurimedit., G bulb; *Hermodactylus tuberosus* (L.) Salisb., Stenomed.-N, G rhiz; *Romulea bulbocodium* (L.) Seb. et Mauri , Stenomedit., G bulb.

Labiatae: *Calamintha nepeta* (L.) Savi, Eurimedit.-Atlant., H scap; *Clinopodium vulgare* L., subsp. *arundanum* (Boiss.) Nyman, Cosmopol., H scap; *Lamium amplexicaule* L., SubEurasiat., T scap; *Lavandula angustifolia* Miller, Stenomedit.-W, NP; *Mentha longifolia* (L.) Hudson, Sub-Europ., H scap; *Micromeria graeca* (L.) Bentham, Stenomedit., Ch suffr; *Prasium majus* L., Stenomedit., Ch frut.; *Rosmarinus officinalis* L., Stenomedit., NP; *Salvia verbenaca* L., Eurimedit.-Atlant., H scap; *Teucrium chamaedrys* L., Eurimedit., Ch suffr; *Teucrium polium* L., Stenomedit.-Pont., Ch suffr; *Teucrium siculum* Rafin, Endem., H scap.

Leguminosae: *Acacia cyanophylla* Lindley, Avven, P scap; *Anthyllis tetraphylla* L., Stenomedit., T scap; *Calicotome infesta* (Presl) Guss., Stenomedit., P caesp; *Coronilla emerus* L., Eurimedit., NP; *Dorycnium hirsutum* (L.) Ser., Eurimedit., Ch suffr; *Hedysarum glomeratum* Dietrich, Eurimedit.-W, T scap; *Hymenocarpus circinnatus* (L.) Savi, Stenomedit., H scap; *Lathyrus articulatus* L., Stenomedit., T scap; *Lathyrus sphaer-*

icus Retz., Eurimedit., T scap; *Lotus edulis* L., Stenomedit., T scap; *Lotus ornithopodioides* L., Stenomedit., T scap; *Lupinus angustifolius* L., Stenomedit., T scap; *Medicago truncatula* Gaertner, Eurimedit.-Atlant., T scap; *Medicago orbicularis* (L) Bartal., Eurimedit., T scap; *Medicago sativa* L., Avven, H scap; *Melilotus italica* (L.) Lam., Stenomedit., T scap; *Onobrichis caput-galli* (L.) Lam., Eurimedit., T scap; *Ononis natrix* L., Eurimedit., H caesp.; *Ornithopus compressus* L., Eurimedit., T scap; *Psoralea bituminosa* L., Eurimedit., H scap; *Scorpiurus muricatus* L., Eurimedit., T scap; *Spartium junceum* L., Eurimedit., P caesp; *Tetragonolobus biflorus* (Desc.) Ser, Eurimedit.-WS, T scap; *Tetragonolobus purpureus* Moench, Stenomedit., T scap; *Trifolium arvense* L., Sub-Europ., T scap; *Trifolium campestre* Schreber, Sub-Europ., T scap; *Trifolium spumosum* L., Stenomedit., T scap; *Trifolium nigrescens* Viv., Eurimedit., T scap; *Trifolium stellatum* L., Eurimedit., T scap; *Vicia bithinica* (L.) L., Eurimedit., T scap; *Vicia sativa* (Thuill.) Gaudin subsp. *segetalis*, Eurimedit., T scap; *Vicia villosa* Roth, Eurimedit.-Pont., T scap.

Liliaceae: *Allium ampeloprasum* L., Eurimedit., G bulb; *Allium roseum* L., Stenomedit., G bulb; *Allium sphaerocephalum* L., Eurimedit.-Pont., G bulb; *Asparagus acutifolius* L., Stenomedit., G rhiz; *Asparagus albus* L., Stenomedit.-W, Ch frut.; *Asphodeline lutea* (L.) Rchb., Eurimedit.-E, G rhiz; *Asphodelus microcarpus* Salzm. et Viv., Stenomedit., G rhiz; *Leopoldia comosa* (L.) Parl., Eurimedit., G bulb; *Muscari atlanticum* Boiss. et Reuter, Eurimedit.-Turan., G bulb; *Scilla autumnalis* L., Eurimedit., G bulb; *Smilax aspera* L., Eurimedit., NP; *Urginea maritima* (L.) Baker, Eurimedit., G bulb.

Linaceae: *Linum bienne* Miller, Eurimedit.-SubAtlant., H bienn.; *Linum strictum* L., Eurimedit.-Turan., T scap.

Lycopodiaceae: *Selaginella denticulata* (L.) Link, Stenomedit., Ch rept.

Malvaceae: *Althea cannabina* L., Eurimedit.-Pont., H scap; *Lavatera cretica* L., Stenomedit., T scap; *Malva nicaensis* All. , Stenomedit., T scap; *Malva sylvestris* L. , Sub-Europ., H scap;

Moraceae: *Ficus carica* L., Eurimedit., P scap; *Morus alba* L., Avven, P scap.

Myrtaceae: *Eucaliptus globulus* Labill., Avven, P scap; *Myrtus communis* L., Stenomedit., P caesp.

Oleaceae: *Olea europaea* L., Stenomedit., P caesp.

Orchidaceae: *Barlia robertiana* (Loisel.) Greuter, Stenomedit., G bulb; *Ophrys bertolonii* Moretti, Eurimedit., G bulb; *Orchis italica* Poiret, Stenomedit., G bulb.

Orobanchaceae: *Orobanche lavandulacea* Rchb., Eurimedit.-W, T par.; *Orobanche minor* Sm. , Eurimedit.-Atlant., Tpar.

Oxalidaceae: *Oxalis corniculata* L., Cosmopol., H rept.; *Oxalis pes-caprae* L., Avven, G bulb.

Papaveraceae: *Fumaria capreolata* L., Eurimedit., T scap; *Fumaria flabellata* Gasparr., Stenomedit., T scap; *Papaver rhoeas* L., Sub-Europ., T scap.

Plantaginaceae: *Plantago lagopus* L., Stenomedit., T scap; *Plantago lanceolata* L., Eurasiat., H ros.; *Plantago major* L., Eurasiat., H ros.; *Plantago psyllium* L., Stenomedit., T scap.

Polygonaceae: *Rumex bucephalophorus* L., Eurimedit., T scap.

Portulacaceae: *Portulaca oleracea* L., Subcosmopol., T scap.

Primulaceae: *Anagallis arvensis* L., Cosmopol., T rept.

Ranunculaceae: *Anemone hortensis* L., Stenomedit., G bulb; *Clematis cirrhosa* L., Stenomedit., P lian; *Clematis vitalba* L., Eurimedit.-Atlant., P lian; *Delphinium halteratum* S.et S., Stenomedit., T scap; *Nigella damascena* L., Eurimedit., T scap; *Ranunculus millefoliatus* Vahl, Eurimedit.-E, H scap.

Resedaceae: *Reseda lutea* L. , Sub-Europ., H scap.

Rosaceae: *Crataegus monogyna* Jacq., Sub-Europ., P caesp; *Pyrus amygdaliformis* Vill., Stenomedit., P caesp; *Rosa sempervirens* L., Stenomedit., NP; *Rubus ulmifolius* Schott., Eurimedit., NP; *Sanguisorba minor* Scop., Subcosmopol., H scap.

Rubiaceae: *Galium aparine* L., Eurasiat., T scap; *Galium lucidum* All., Eurimedit., H scap; *Galium verrucosum* Hudson, Stenomedit., T scap; *Rubia peregrina* L., Stenomedit., P lian; *Sherardia arvensis* L., Subcosmopol., T scap.

Salicaceae: *Salix alba* L., Sub-Europ., P scap.

Schrophulariaceae: *Bellardia trixago* (L.) All., Eurimedit., T scap; *Cymbalaria muralis* Gaertner, Stenomedit., H scap; *Kickxia spuria* (L.) Dumort., Eurimedit.-Atlant., T scap; *Linaria reflexa* (L.) Desf., Stenomedit.-C, T rept.; *Linaria simplex* (Willd.) DC., Eurimedit., T scap; *Misopates orontium* (L.) Rafin, Sub-Europ., T scap; *Verbascum sinuatum* L., Eurimedit., H bienn.; *Veronica cymbalaria* Bodard, Eurimedit., T scap.

Sinopteridaceae: *Cheilanthes pterioides* (Reichard) C. Chr., Stenomedit.-Turan., H ros.

Solanaceae: *Solanum nigrum* L., Cosmopol., T scap.

Theligonaceae: *Theligonum cynocrambe* L., Stenomedit., T scap.

Umbelliferae: *Ammoides pusilla* (Brot.) Breist., Stenomedit., T scap; *Daucus carota* L. subsp. *carota*, Eurasiat., H bienn.; *Daucus carota* L. subsp. *maximus* (Desf.) Ball, Stenomedit., H bienn.; *Ferula communis* L., Stenomedit., H scap; *Foeniculum vulgare* Miller, Eurimedit., H scap; *Smyrnium olusatrum* L., Eurimedit.-Atlant., H bienn.; *Smyrnium rotundifolium* Miller, Eurimed.-E, H bienn.; *Tordylium apulum* L., Stenomedit., T scap; *Torilis nodosa* (L.) Gaertner, Eurimedit.-SubAtlant., T scap.

Urticaceae: *Parietaria diffusa* M. et K., Eurimedit., H scap; *Parietaria lusitanica* L., Stenomedit., T rept.; *Urtica membranacea* Poiret , Eurimed.-S, T scap.

Valerianaceae: *Centranthus ruber* (L.) DC., Stenomedit., Ch suffr; *Valerianella eriocarpa* (L.) Dc.Desv., Eurimedit.-Atlant., T scap.

Verbenaceae: *Verbena officinalis* L., Cosmopol., H scap.

Vitaceae: *Vitis vinifera* L., SubEurasiat., P lian.

Zygophyllaceae: *Tribulus terrestris* L., Eurimedit.-Pont., T rept.

Discussion and conclusions

The richest families are *Asteraceae* (with 39 species), *Poaceae* (33), *Fabaceae* (32), *Brassicaceae* (16), *Lamiaceae* (12), *Liliaceae* (12), *Apiaceae* (9), *Schrophulariaceae* (8), *Caryophyllaceae* (7), and *Boraginaceae* (7). Twenty-four families are presented with only one species. The low value of this index is due to the small dimensions of the area and to the secondary character of the biotopes. The richest genera are *Trifolium* (with 5 species), *Euphorbia* (4), *Geranium* (4), *Plantago* (4), *Silene* (4), *Allium* (3), *Bromus* (3), *Galium* (3), *Lolium* (3), *Medicago* (3), *Teucrium* (3), *Vicia* (3). All other genera are represented by one or two species.

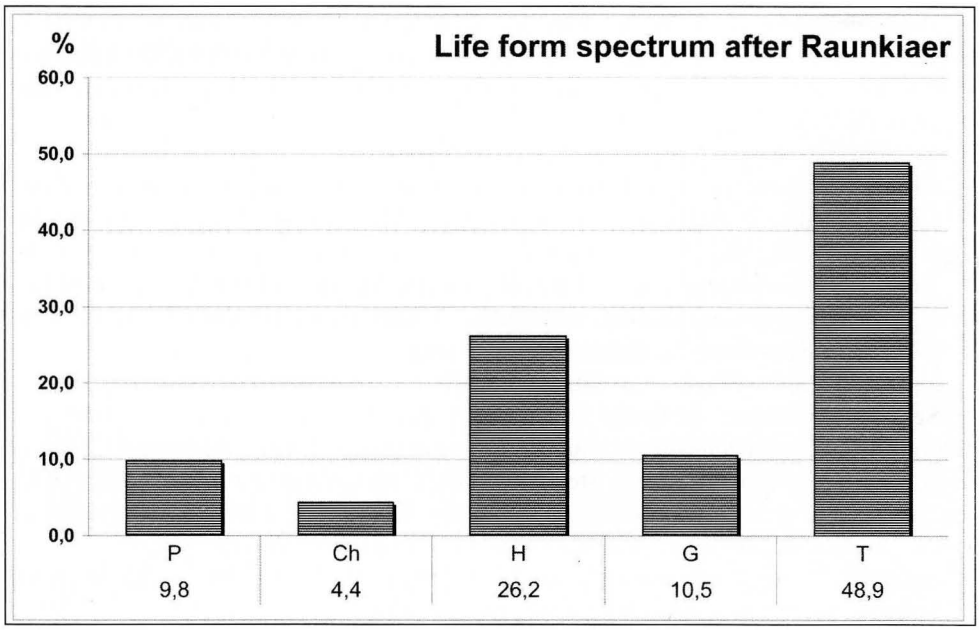

Fig. 2. Life form spectrum after Raunkiaer (**H** hemicryptophytes; **G** geophytes; **Ch** chamaephytes; **Th** therophytes; **Ph** phanerophytes).

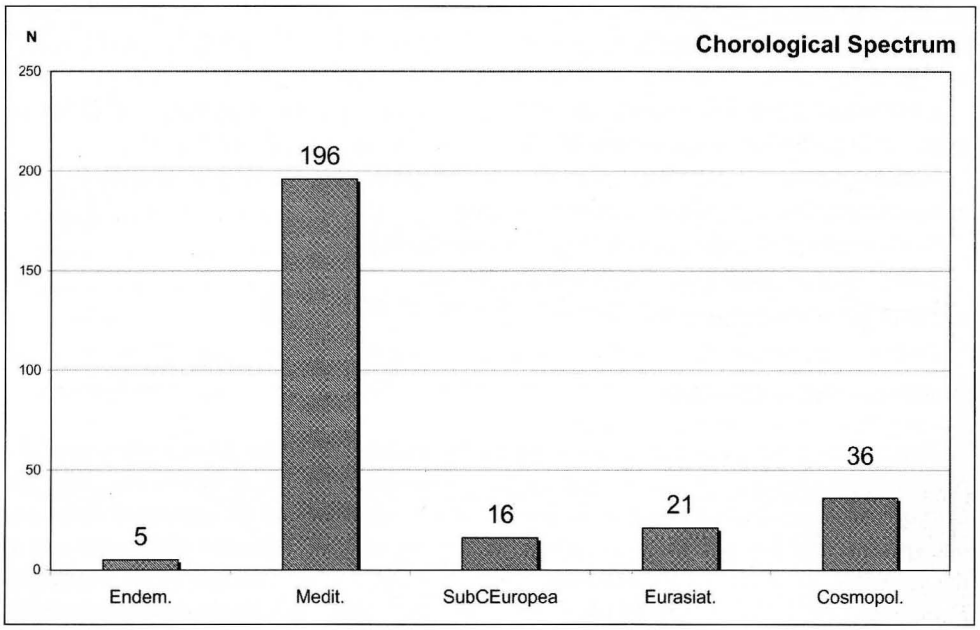

Fig. 3. Chorological spectrum.

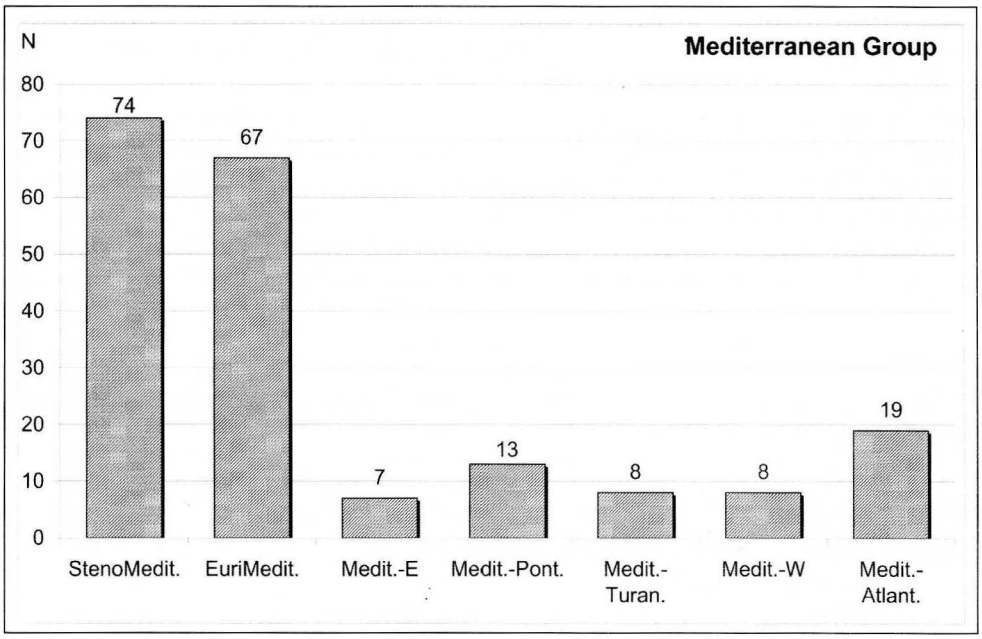

Fig. 4. Chorological spectrum of the Mediterranean element.

The life form spectrum (Fig. 2.) shows the dominance of Terophytes (49.1%) and Hemycriptophytes (26.2%), followed by relatively high values of Geophytes (10.5%). This kind of spectrum is in relation to the bioclimate of the area but also to the human activities in cultivated areas that favourites species with a short cycle. Phanerophytes (9.8%) consist of species distributed in hedges and represent elements of natural vegetation.

Chorological spectrum (Fig. 3.) shows the dominance of Mediterranean species (196), due to the phytogeographic localisation of the studied flora and to its secondary character.

Euro-Asiatics (21 species) and Cosmopolites (36) are represented mainly by weeds and ruderals - species with large ecology, adapted to the conditions of the agricultural ecosystem and well distributed within their areals.

Endemic species are five, all distributed within South Apennine area - *Scorzonera trachysperma* Guss., *Artemisia variabilis* Ten., *Biscutella lyrata* L., *Erucastrum virgatum* (Presl.) Presl., *Teucrium siculum* Rafin.

Chorological spectrum presented in Figure 4. analyses the Mediterranean element. It shows almost equally presence of the species with E-Mediterranean and W-Mediterranean distribution.

The high value of floristic diversity in the studied area shows how traditional agricultural practices permit the conservation of small "islands" of natural and semi-natural vegetation. In fact even if weeds and ruderals are abundant, many species typical of wild Mediterranean vegetation, have been found. It's interesting to mention the presence of

some *Orchidaceae* like *Barlia robertiana* (Loisel.) Greuter, *Ophrys bertolonii* Moretti, *Orchis italica* Poiret.

In particular the high number of Phanerophytes is due to the practice of keeping fragments of natural shrubby vegetation as hedge inside and along the border of the olive grove. The practice to keep natural herbaceous stratum under the trees seems to control the diffusion of weeds and to favourite processes of naturalisation, how the relatively high value of Hemycriptophytes could demonstrates.

Traditional olive-groves are very spread in South Italy. Present data show that this kind of cultivation represents an important habitat for many rare species.

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