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Floristic remarks on garrigues of the Salento region (Apulia, Italy)

Abstract

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The geographical position of the Salento peninsula (Apulia, Italy) is very peculiar, in the centre of the Mediterranean basin: here, eastern and western Mediterranean come together creating a variety of exclusive landscapes and vegetation types.

Introduction

The word *garrigue* means "fallow land" in old Provencal language, referring to spiny oak (*Quercus coccifera*) bushes. Today, this word is generally used to define evergreen bushes on sandy or rocky soils, that come from a heavy degradation of Mediterranean maquis by means of pasture and fire (Giacomini & Fenaroli 1958). However, even if life conditions are hard, garrigues are often very rich in species that are well adapted to seasonal drought and belong to L*eguminosae*, *Labiatae*, *Euphorbiaceae*, *Compositae*, *Liliaceae* and *Orchidaceae*.

Description of the study area

The Salento territory is part of Apulia, in the south-eastern Italy. It includes the land between the slopes of the Murge hills and the cape of S. Maria di Leuca (Baldacci 1962). It's mostly flat, having its highest elevation point at 200 m a.s.l., on the Serre Salentine hills, in the south-west of the area.

The main geological foundation of Salento originates from the collision between the African and the Eurasian Plates during the Mesozoic; the region was submerged by the sea several times afterwards, thus leading to the accumulation of marine sediments. These sediments now compose most of the local rocks, that are organogenic limestone with macro- and micro fossils. Due to the permeability of limestone rocks, very few water courses can be observed on the surface: the Salento territory, although, shows a variety of karstic occurrences. (Ciaranfi & al. 1988, 1993; Palmentola 1987).

Climate is typically Mediterranean, with a combination of winter rainfall and summer drought. This region can be seen as a transitional zone between temperate areas, where climatic variations are associated with differences in the thermal regime, and tropical areas where rainfall is the main factor. According to Koppen's classification, we are in a C_s temperate climate with dry summer, with at least 3 times as much precipitation in wettest winter month as in driest summer month (Zito & al. 1988, 1989).

No great climatic variations occur in the Salento peninsula, because of its small extent, absence of consistent relief, simple morphology: some differences occur between the two coasts or between coast and inland. The highest rainfall is found on the Serre Salentine hills; the dryness of the Ionian region is due both to higher mean temperature and to the fact that the Serre Salentine hills act like a barrier towards the southern damp winds (Macchia 1984).

Soils are in an early evolutionary stage, depending heavily on the nature of the underlying rocks: in addition to this, the constant disturbance by agricultural activities leads to a situation of shallow, rocky soils throughout the region. Most soils of the Salento region can be referred to Inceptisols on calcareous Miocene rocks (Lopez 1979; Yaalon 1997).

Natural landscape in Salento is the result of thousands of years of human activities: agriculture, husbandry, deforestation and forest fires together deeply altered natural vegetation, constraining it in areas where cultivation is impossible.

Natural vegetation is therefore extremely endangered, and reduced to small patches of maquis or its degradation forms, xeric grasslands and garrigues. (Caniglia & al. 1984; Biondi 1997).

Material and methods

Garrigues are the main subject of this study: chamaephytic and nanophanerophytic vegetation have been investigated during the years from 1998 and 2001 in the framework of a PhD thesis. Vegetation types have been described using the traditional Braun-Blanquet methods (Braun-Blanquet & al., 1952; Gehu, Rivas-Martinez, 1981) and multivariate analysis (Feoli & al. 1982; Van Der Maarel 1989). Floristic data from this work are here examined in order to describe the behaviour of garrigue plants from a phytogeographical point of view.

Results

7 vegetation types are described: details will not be analysed here, as this paper focuses on the phytogeographical aspects of the research, so hereby is a brief description.

The most common chamaephytic formations in Salento are *Thymus capitatus* (L.) Hofmanns. & Link garrigues, mainly found on shallow and rocky soils, or sand. They can be considered one of the extreme degradation forms of maquis, whose remains are often recognizable.

Alongside with *Thymus capitatus*, *Euphorbia spinosa* L. is often found: it is, however, an indicator of even more degraded situations, not far from a complete removal of soil substratum.

A similar aspect, on sand or debris, is characterised by *Helichrysum italicum* (Roth) G. Don, that builds very poor association with many therophytes.

Cistus monspeliensis L. garrigues are typical responses to frequent fires: the coenoses are generally quite chaotic and not well structured.

Pioneer vegetations that dwell on shallow patches of soil, often on rocky outcrops, are quite common in Salento, and can be considered as endemic (see below). Character species are *Satureja cuneifolia* Ten. and *Helianthemum jonium* Lacaita.

An interesting aspect of natural vegetation in Salento are *Rosmarinus officinalis* L. garrigues: they are found in coastal areas, on sandy or rocky soils. In some of these associations, rosemary coexists with *Erica manipuliflora* Salisb., thus creating a vegetation feature that is exclusive to the Salento region.

Along the dynamical pathway towards more complex vegetations, we find various stages of maquis, the most common of which is made of *Calicotome infesta* (C. Presl.) Guss. and *Myrtus communis* L.

Floristic remarks

283 *taxa* have been found in the vegetation types (*Herbarium lupiense* LEC): the average number of species per quadrant was 25. In comparison with the values found for the Salento region, these vegetations show a higher number of chamaephytes and phanerophytes, which are the main descriptors for garrigues: nonetheless, many therophytes and herbaceous plants are found, due to dynamic contacts with grasslands and cultivated fields. In spite of the heavy disturbance by human activities, these vegetations are still quite close to naturality. As can be seen in the chorological spectrum the highest percentage is represented by steno-mediterranean species, with a very low number of exotic and high diffusion *taxa*, in comparison with the study area.

Chamaephytic vegetation in Salento can be considered one of the steps in the dynamic series that goes from natural woods and maquis, to steppic and ruderal communities and forth. This pathway is more often taken towards a decline of the plant cover, as human disturbance is the main factor that leads the dynamics of natural vegetation. Nonetheless, garrigues still host a huge number of species, many of which are interesting for various reasons.

5 species listed the National Red List have been found (*Anthemis hydruntina* Groves, *Centaurea subtilis* Bertol., *Erica manipuliflora* Salisb., *Sarcopoterium spinosum* (L.) Spach, *Vicia giacominiana* Segelberg), 3 species listed in the Regional Red List (*Anthyllis hermanniae* L., *Coronilla juncea* L., *Cytinus ruber* (Fourr.) Komarov), 7 endemics(*Thymus spinulosus* Ten., *Stipa austroitalica* Martinowsky, *Micromeria microphylla* (Durv.) Bentham, *Micromeria canescens* (Guss.) Bentham, *Helianthemum jonium* Lacaita, *Centaurea subtilis* Bertol., *Centaurea deusta* Ten.) and 12 species of the protected family *Orchidaceae* (*Serapias vomeracea* (Burm.) Briq., S. *parviflora* Parl., S. *lingua* L., *Orchis papilionacea* L., *O. morio* L., *Ophrys tenthredinifera* Willd., *O. sphecodes* Miller, *O. lutea* Cav., *O. fusca* Link, *O. bombyliflora* Link, *O. bertolonii* Mor., *Anacamptis pyramidalis* (L.) L.C. Rich.).

Some of the above cited species are characteristic for described associations, thus creating very interesting aspects of Salento landscape: they are *Erica manipuliflora* Salisb., *Anthyllis hermanniae* L. and *Sarcopoterium spinosum* (L.) Spach. These species build three different aspects of coastal, endemic garrigues, associating with other taxa, more

common in the area, like *Rosmarinus officinalis* L., *Thymus capitatus* (L.) Hofmgg. & Lk., *Calicotome infesta* (C. Presl) Guss., *Myrtus communis* L., etc.

Other associations can be considered as endemic to the Salento region as a whole, because of the distribution of their characteristic species: garrigues with *Satureja cuneifolia* Ten. ed *Helianthemum jonium* Lacaita are well spread throughout the area.

Phytogeographical remarks

The geographical peculiarity of Salento reflects on plant communities, and our region has been considered for a long time as the westernmost part of the Eastern Mediterranean basin. In this case, garrigues would be the preferential habitat for eastern species.

Eastern taxa actually build many garrigue associations in Salento as characterisitc species: these communities clearly resemble the phrygana vegetations that are widespread in Greece and near East. But in addition to the striking species, there are many other plants that build up these associations, and that should be taken into account when speculating phytogeographical matters.

As can be seen in Table 1, where species are grouped according to their preferential distribution, the number of species belonging to the western Mediterranean basin is comparable to the number of eastern taxa.

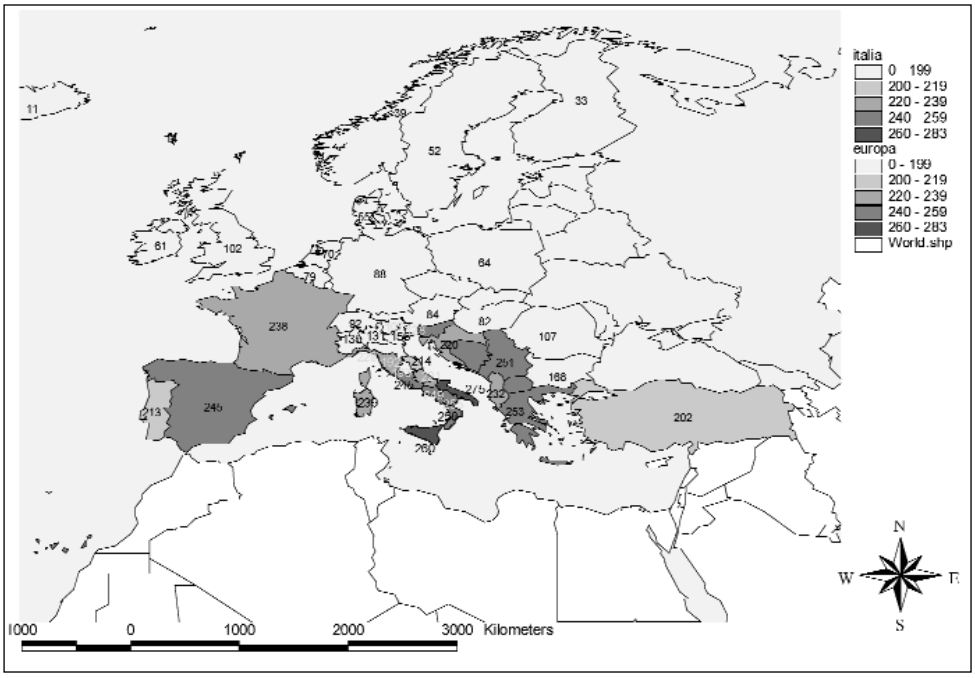

Fig. 1. European distribution of the studied species.

Table 1. Preferential distribution of the studied species.

	garrigues	**Salento**
mediterranean	70,9%	44,0%
boreal	4,0%	10,9%
eastern	10,4%	13,1%
western	8,6%	11,6%
southern	2,9%	13,4%
cosmopolitan	3,2%	7,0%

The map shown in Figure 1 graphically shows the distribution of garrigue species in Italian regions and European countries, according to Flora Europaea (Tutin & al., 1964-1980) and Flora d'Italia (Pignatti 1982): the graphical rendering shows, along with table 1, that neither the Eastern nor the Western sector of the Mediterranean basin prevail in affecting the geographical distribution of garrigue plants.

This study validates, for what concerns shrubby vegetations, a former analysis (Marchiori & Tornadore 1988) that describes Salento as a link between east and west, with none of the two sectors prevailing on the other. This interpretation should also be extended from floristic remarks to the phytosociological framework.

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