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Considerations on protection and forestal restoring of the *Quercus calliprinos* vegetation in Sicily

Abstract

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This study is based on field investigations aimed to monitoring relictual Kermes oak vegetation in Sicily and characterizing it from ecological, phytocoenotic and synphytosociological point of view. Field surveys display a notable ecological range and good silvicultural potentialities for *Quercus calliprinos*. This species is suitable for forestal restoration projects inside Sicilian natural protected areas.

Introduction

The Kermes oak (*Quercus coccifera* L. s.l.) is characterized by a remarkable morphological variation and scattered distribution within its wide geographical range (Fig. 1). According to different authors, many taxa at specific and intraspecific rank are included in the *Quercus coccifera* group.

As already pointed out by Lojacono-Pojero (1904), Kermes oak populations are always very heterogeneous (Fig. 2) and fragmented, even if today most authors have referred the ones present in Sicily to as *Quercus calliprinos* Webb (Gentile 1962; Furnari 1965; Marcenò & Raimondo 1972; Brullo & Ronsisvalle 1975; Gentile & Gastaldo 1976; Bartolo & al. 1978; Barbagallo 1983; Ottonello & al. 1991; La Mantia & Gianguzzi 1999a; ecc.).

Unlike *Quercus coccifera* s. s., the main taxonomical characters of *Quercus calliprinos* are represented by the arboreous habit, the young twigs yellowish, stellate-pubescent persisting until the second year anf female catkins tomentose (Pignatti 1982).

Due to the ancient human action in the island, the original maquis vegetation is at present reduced and few *Quercus calliprinos* formations are scattered along the coastal belt of western and southern Sicily. This study is based on field investigations aimed to monitoring the relictual vegetation aspects and characterizing them from ecological, phytocoenotic and synphytosociological point of view. Silvicultural potentialities of these coenoses in suitable areas are also discussed. In order to reach a satisfying cartographic representation of these communities, herbarium, bibliographic and field researches were carried out. In a former study (La Mantia 2003) data were reported on 1:25000 scale support (Tavolette I.G.M.I.) and for more limited areas on 1:10000 scale support (C.T.R.). field surveys based on Braun-Blanquet method, were recorded and the vegetation series and dynamic connections

were analyzed. Furthermore Rivas-Martinez (1995) bioclimatic indexes were applied to the data from Hydrographic Service of Genio Civile (Duro & al. 1996).

Results

According to field researches and bibliographic data, Sicilian *Quercus calliprinos* populations are distributed – from North to South and from West to East – in the following

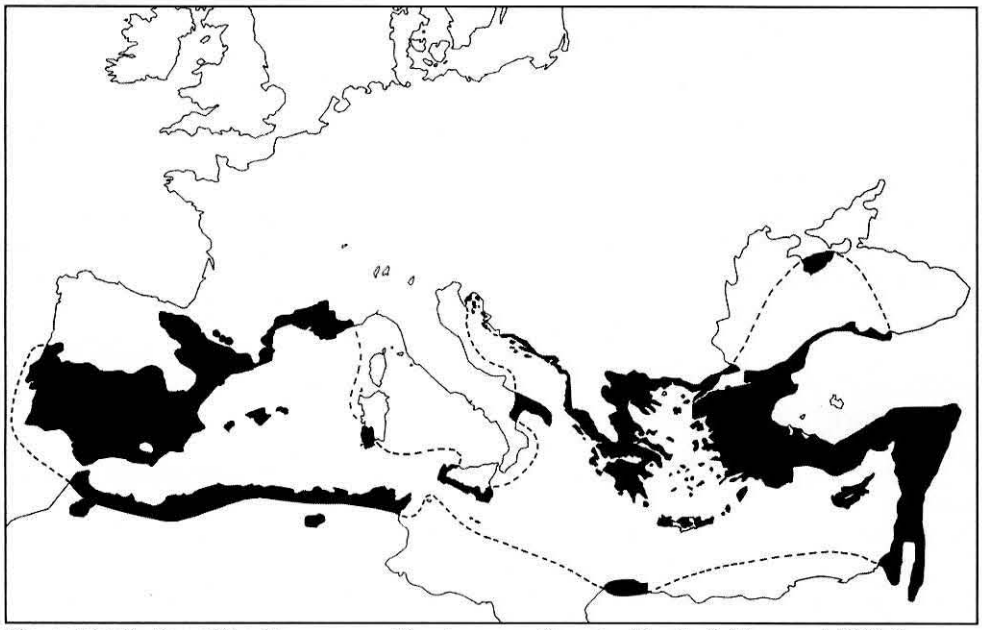

Fig. 1. Distribution of the *Quercus coccifera* L. group (from La Mantia & Gianguzzi 1999a).

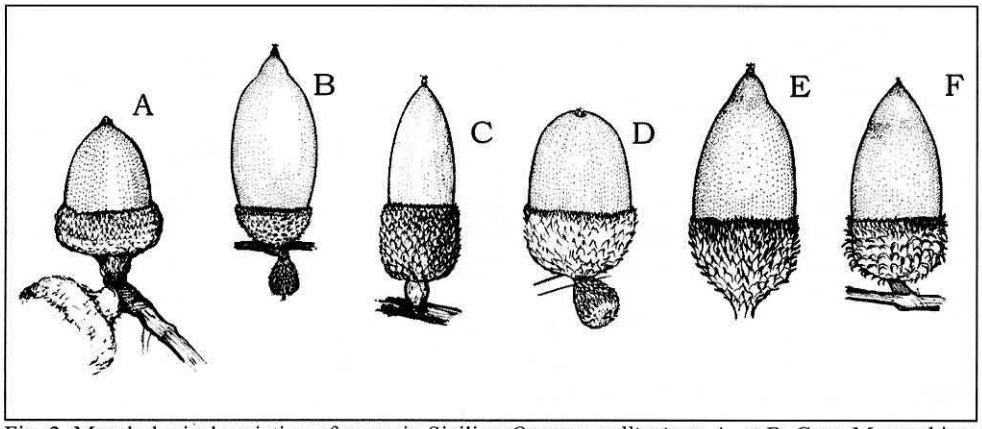

Fig. 2. Morphological variation of acorn in Sicilian *Quercus calliprinos*: A. et B. Capo Mongerbino; C. Capo Rama; D. Cava Randello; E. Sciare di Marsala; F. Niscemi.

areas: Catalfano (Gussone 1843; Marcenò & Raimondo 1972), Capo Rama (La Mantia & Gianguzzi 1999a), Marausa (Gussone 1843; Ottonello & al. 1991), Sciare di Marsala (Gussone 1843; Lojacono-Pojero 1904), Sciare di Mazara and Gorghi Tondi (Gussone 1843; Brullo & Ronsisvalle 1975), Torretta Granitola and Campobello di Mazara (Gussone 1843; Lojacono-Pojero 1904), Piano Stravolata near Niscemi (Tornabene 1887; Lojacono-Pojero 1904; Barbagallo 1983), Bosco di Santo Pietro (Furnari 1965), Cava Randello and Cava d'Ippari (Gussone 1843; Gentile 1962; Bartolo & al. 1982), Punta delle Formiche (Bartolo & al. 1976). Based on field observations the populations recorded from Cofano (Ponzo 1900) and Fondaco dell'Agnone (Gussone 1843; Tornabene 1887) were not checked.

All the Sicilian populations are distributed in the thermomediterranean bioclimatic belt with different ombrotypes from lower dry to lower subhumid (Fig. 3); on carbonatic substrata (Triassic-Miocene) and sandish and calcarenitic substrata (Plio-Pleistocene). From a syntaxonomic point of view, the Sicilian *Quercus calliprinos* vegetation aspects have been referred to as two different associations (Table 1): *Junipero turbinatae-Quercetum calliprini* Bartolo, Brullo & Marcenò 1982 (character species: *Juniperus turbinata*) and *Chamaeropo humilis-Quercetum calliprini* Brullo & Marcenò 1985 (character and differential species: *Chamaerops humilis, Galium litorale* and *Quercus* x *soluntina*).

The *Junipero turbinatae-Quercetum calliprini* was surveyed in some stands of southern Siciliy, as Niscemi territory. From a physiognomic point of view, the phytocoenoses is characterized by forestal aspects dominated by *Quercus calliprinos*, in association with *Juniperus macrocarpa, Teucrium fruticans, Pistacia lentiscus, Ephedra fragilis, Phillyrea*

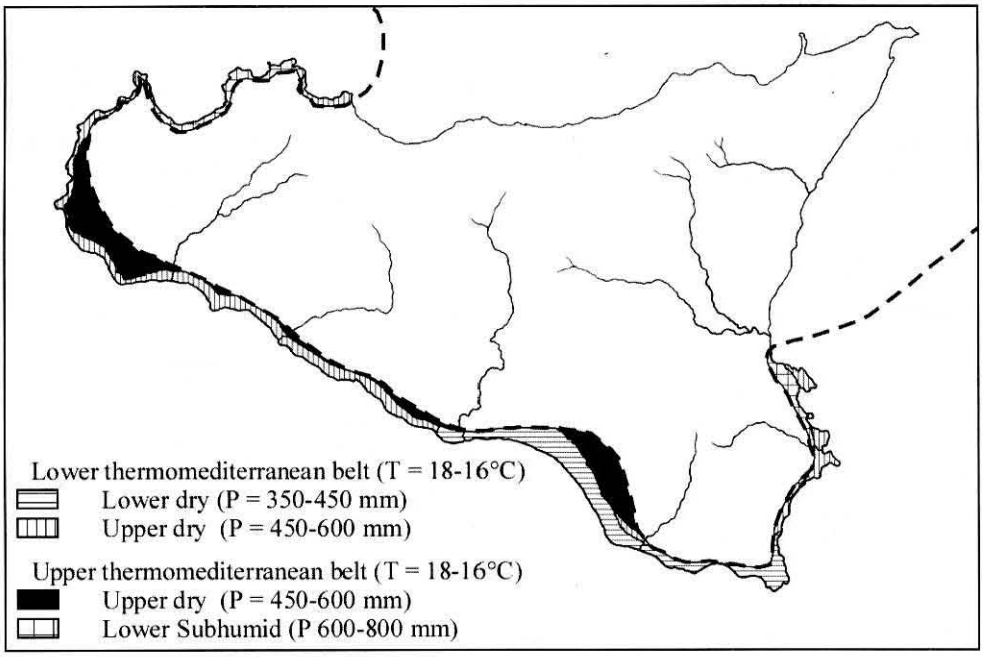

Fig. 3. Bioclimatic map of *Quercus calliprinos* potential range in Sicily.

latifolia, Olea europaea var. *sylvestris, Lonicera implexa, Smilax aspera,* ecc. (Table 1, columns 1-2). From phytosociological point of view, the association is referred to as *Juniperion turbinatae* Rivas-Martinez (1975) 1987 (*Pistacio-Rhamnetalia alterni* Br.-Bl. 1936 em. Rivas-Martinez 1975, *Quercetea ilicis* Br.-Bl. 1947).

The *Chamaeropo humilis-Quercetum calliprini* association represents another type of maquis, distributed along the coastal belt of western Sicily on carbonatic and calcarenitic substrata. Besides in the southern part of the island it is very scattered (Fig. 4). When there are very good ecological conditions *Q. calliprinos* reaches arboreous habit dominating the phytocoenoses in association with many other sclerophyllous species referred to the *Oleo-Ceratonion* alliance Br.-Bl. 1936 em. Rivas-Martinez 1975 and to *Pistacio-Rhamnetalia alterni* order (*Quercetea ilicis* class). Other widespread species are *Pistacia lentiscus, Olea europaea* var. *sylvestris, Phillyrea latifolia, Rhamnus lycioides* subsp. *oleoides, Quercus ilex, Calicotome infesta, Ampedesmos mauritanicus, Asparagus albus, Teucrium fruticans, Prasium majus, Osyris alba,* ecc. (Table 1, columns 3-12).

Q. calliprinos is also recorded from other forestal coenoses fragmented due to the fire and deforestation: one in Niscemi and Caltagirone territories dominated by *Quercus suber* (*Stipo bromoidis-Quercetum suberis* Barbagallo 1983, *Erico-Quercion ilicis* Brullo, Di Martino & Marcenò 1977, *Quercetalia ilicis, Quercetea ilicis*) and another one in Ippari Valley characterized by *Pinus halepensis* Miller (*Thymo-Pinetum halepensis* De Marco & Caneva 1985). The latter one, in Vittoria territory, is referred to the *Cisto-Ericion* Horvatic 1958 (*Cisto-Ericetalia* Horvatic 1958, *Cisto-Micromerietea* Oberd. 1954).

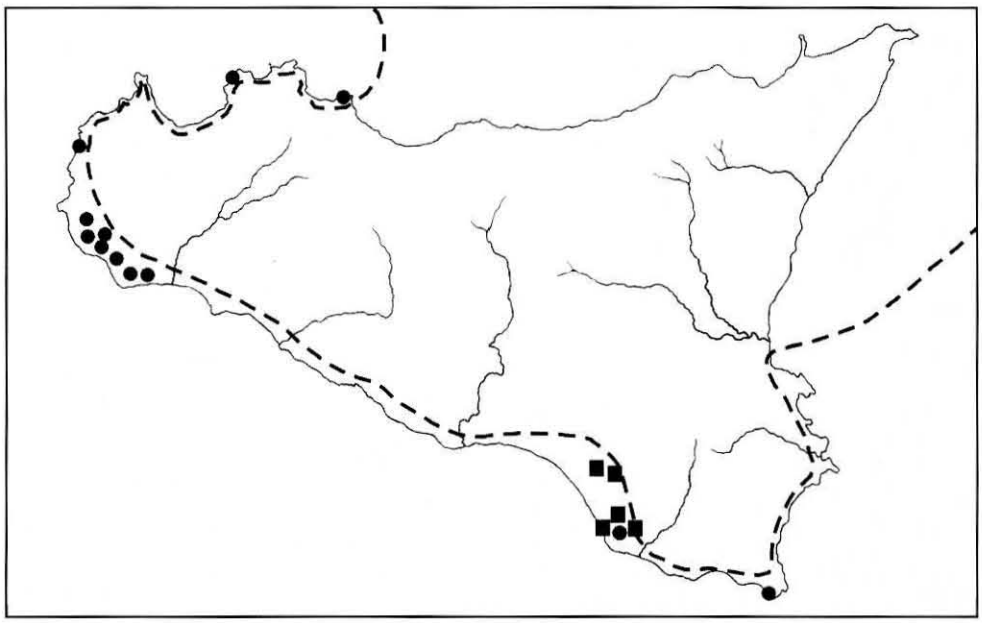

Fig. 4. Distribution of *Quercus calliprinos* associations in Sicily: (●) *Chamaeropo-Quercetum calliprini;* (■) *Junipero-Quercetum calliprini*; (— —) potential rang.

Table 1. Synthetic table of the *Quercus calliprinos* associations in Sicily (accidental species are not included): *Junipero turbinatae-Quercetum calliprini* (rels. 1-2), and *Chamaeropo humilis-Quercetum calliprini* (rels. 3-12).

NUMBER OF COLUMN	1	2	3	4	5	6	7	8	9	10	11	12
NUMBER OF RELEVES	8	2	4	3	4	1	4	7	4	2	2	1
Dominant species												
Quercus calliprinos Webb	V	2	4	3	4	1	V	V	4	2	2	1
Char. species of the *Junipero turbinatae-Quercetum calliprini* association and *Juniperion turbinatae* alliance												
Juniperus turbinata Guss. ssp. *turbinata*	V	2	.	.	.	.	.	.	.	.	.	.
Juniperus macrocarpa S. et S.	II	1	.	.	.	.	.	.	.	.	.	.
Char. and diff. species of the *Chamaeropo humilis -Quercetum calliprini* association												
Chamaerops humilis L.	V	2	4	1	2	1	IV	V	4	1	1	1
Quercus xsoluntina Tod.ex Lojac.	.	.	2	.	.	1	.	.	.	.	.	.
Galium litorale Guss.	.	.	.	.	.	.	III	.	4	.	.	.
Char. species of the *Oleo-Ceratonion* alliance and the *Pistacio-Rhamnetalia alaterni* order												
Teucrium fruticans L.	V	2	3	.	3	1	IV	V	4	2	2	1
Pistacia lentiscus L.	V	2	3	.	2	1	II	V	3	2	2	1
Prasium majus L.	V	2	3	3	3	.	V	V	3	2	.	1
Olea europaea L.var. *sylvestris* Hoffmgg. et Link	I	2	.	3	1	1	I	III	.	1	2	.
Calicotome infesta (Presl) Guss.	I	1	4	1	.	.	I	II	4	2	2	.
Ephedra fragilis Desf.	V	2	.	3	.	1	.	.	.	1	1	1
Asparagus albus L.	.	.	.	2	1	.	III	I	4	.	.	.
Rhamnus lycioides L. ssp. *oleoides* (L.) Jahandiez et Maire	.	.	.	.	4	1	IV	V	4	.	.	.
Ceratonia siliqua L.	I	.	.	1	.	.	.	.	.	1	2	.
Clematis cirrhosa L.	.	.	.	1	.	.	.	I	.	1	1	.
Teucrium flavum L.	.	.	.	.	.	.	.	II	.	1	2	1
Euphorbia dendroides L.	II	.	.	2	.	.	.	.	.	.	.	.
Phillyrea angustifolia L.	IV	.	.	.	.	.	.	II	.	.	.	.
Asparagus stipularis Forsskål	.	.	.	1	.	.	.	.	.	.	.	.
Asparagus aphyllus L.	.	.	.	.	.	1	.	.	.	.	.	.
Pistacia terebinthus L.	.	.	.	.	.	1	.	.	.	.	.	.
Anagyris foetida L.	.	.	.	.	.	.	.	I	.	.	.	.
Pinus halepensis Miller	.	.	.	.	.	.	.	.	.	.	2	.
Char. species of the *Quercetea ilicis* class												
Asparagus acutifolius L.	I	2	4	1	4	1	II	V	2	2	2	1
Phillyrea latifolia L.	V	2	3	1	4	.	III	I	4	2	1	1
Rubia peregrina L. ssp. *longifolia* (Poiret) De Bolos	IV	.	2	3	2	.	II	II	2	2	2	1
Smilax aspera L.	III	2	1	3	4	.	I	II	1	.	.	1
Lonicera implexa Aiton	III	2	1	.	2	.	.	.	2	1	.	1
Ampelodesmos mauritanicus (Poiret) Dur. et Sch.	.	.	4	.	.	.	II	IV	1	1	.	.
Osyris alba L.	I	.	.	1	.	.	II	IV	.	1	.	.
Quercus ilex L.	II	.	2	.	.	1	.	III	.	.	.	.
Daphne gnidium L.	II	.	1	.	.	.	.	I	4	.	.	.
Pulicaria odora (L.) Rchb.	.	.	2	.	.	.	.	.	1	.	.	.
Carex distachya Desf.	.	.	.	.	4	.	.	.	2	.	.	.
Arbutus unedo L.	II	.	.	.	.	.	.	.	.	.	.	.
Quercus suber L.	I	.		.	.	.	.	.	.	.	.	.
Cyclamen repandum S. et S.	.	.	2	.	.	.	.	.	.	.	.	.
Ruta chalepensis L.	.	.		1	.	.	.	.	.	.	.	.
Melica arrecta Kuntze	.	.	.	.	.	.	.	.	.	2	.	.
Euphorbia characias L.	.	.	.	.	.	.	.	.	.	1	.	.
Other species												
Asphodelus microcarpus Viv.	II	1	1	2	.	1	I	II	1	1	.	1
Cistus creticus L.	I	2	4	.	4	.	IV	III	4	1	2	.
Arisarum vulgare Targ.-Tozz.	V	2	2	.	4	.	.	I	.	2	2	1
Urginea maritima (L.) Baker	I	2	2	.	.	.	III	III	3	1	.	1
Oryzopsis miliacea (L.) Asch. et Schwinf.	IV	2	.	2	.	.	I	.	1	.	2	.
Dactylis ispanica Roth	IV	.	.	.	.	.	III	IV	3	1	.	1
Erica multiflora L.	.	.	4	.	2	.	II	.	2	1	1	.
Brachypodium ramosum (L.) R. et S.	.	.	4	1	4	.	III	III	3	.	.	.
Corydothymus capitatus Rchb. f.	.	.	.	.	.	1	III	II	3	1	.	.
Allium subhirsutum L.	III	.	.	.	.	.	I	IV	1	.	.	.

Conclusions

Besides a protection of these present Kermes-oak vegetation aspects, a forestal program aimed to restore the scattered coenoses and to increase their extension, is to be established. The autecology of *Q. calliprinos* allows the utilization of this species in several areas of Sicily, above all in the xeric places of southern and western part. Field surveys display a notable ecological range, a high seed germination (over 90%) and a good sprouting capability of young plants (La Mantia 2003). Conservation *in situ* of this germplasm is connected to development of seedling nurseries, at present not satisfying forestry activities. Based on of the study of the vegetation series of sicilian territory, *Quercus calliprinos* shows a good suitability to be utilized in forestal restoration plans of different protected areas (Natural reserves and Sites of Community Importance).

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Appendix - Refences of the relevés reported in Table 1.

1 - Passo Marinaro (Ragusa), from Bartolo, Brullo & Marcenò (1982), Tab. 32; 2 - Passo Marinaro (Ragusa), from La Mantia (2003), Tab. 6: rels. 8-9; 3 - Monte Catalfano (Bagheria), from La Mantia (2003), Tab. 5: rels. 1-4; 4 - Capo Rama (Terrasini), from La Mantia & Gianguzzi (1999), Tab. 1; 5 - Marausa (Trapani), from La Mantia (2003), Tab. 5: rels. 8-11; 6 - Contrada Chirco (Marsala), from La Mantia (2003), Tab. 5: rel. 20; 7 - Sciare (Marsala and Mazara del Vallo), from Brullo & Marcenò (1985), Tab. 23: rels. 1, 6-9; 8 - Gorghi Tondi (Mazara del Vallo), from Brullo & Marcenò (1985), Tab. 23: rels. 10-16; 9 - Torretta Granitola (Campobello di Mazara), from Brullo & Marcenò (1985), Tab. 23: rels. 2-5; 10 - Poggio Tremolazza (Ragusa), from Gentile (1962); 11 - Poggio Tremolazza (Ragusa), from La Mantia (2003), Tab. 7: rels. 10-11; 12 - Punta delle Formiche (Pachino), from La Mantia (2003), Tab. 5: rel. 19.