

Evergreen Oak
Woodlands' Role
in Tackling Climate
Change and Preserving
Mediterranean
Landscapes

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Edited by

Rocco Carella

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CHAPTER 1

INTRODUCTION

ROCCO CARELLA

The Mediterranean basin is one of the most important biodiversity hotspots on Earth, but at the same time one of the regions most affected by the dramatic consequences of climate crisis. As is well known, one of the most typical aspects of spontaneous vegetation in the Mediterranean basin are the evergreen coenoses in their different habitus, often the result of anthropogenic disturbance. In the forest environment, an outstanding and peculiar element is the well-known diverse complex of numerous sclerophyllous species, where a fundamental role is played by evergreen oaks. This text provides contributions that aim at improving and underlining the knowledge of three evergreen Mediterranean oaks – the Palestine oak, the holly oak and the cork oak – and their indispensable function in biodiversity and landscape conservation, which is more important than ever in the challenging global environment.

CHAPTER 2

A CONTRIBUTION TO THE ECOLOGICAL UNDERSTANDING OF A LESSER-KNOWN MEDITERRANEAN FOREST SPECIES. THE STATUS AND ECOLOGY OF THE PALESTINE OAK (*QUERCUS CALLIPRINOS* WEBB) IN THE MURGIA PLATEAU (APULIA REGION, SOUTH ITALY)

ROCCO CARELLA

2.1 Introduction

The Palestine oak (*Quercus calliprinos* Webb) is of great phytogeographical interest in Italy. For it is here that the most western populations of its natural distribution occur (Fig. 2–1).

Quercus calliprinos Webb is related to *Quercus coccifera* L., but differs in its geographical distribution and morphological aspects – such as the young yellowish twigs, stellate pubescent persisting until the second year and the female catkins tomentose (Pignatti, 2002). Some authors consider *Quercus calliprinos* as a subspecies of *Quercus coccifera* (Tutin et al., 1993) or a morphotype (Toumi & Loumaret, 2010), others as a valid species (Camus, 1936–38; Zohari, 1961; Pignatti, 2002).

While the holly oak (*Quercus coccifera*) is a shrub that lives in the western districts of the Mediterranean basin, the Palestine oak is a small tree up to 10 metres in height and distributed in the eastern part of the Mediterranean

basin (Italy, Greece, Albania, the former Yugoslavia, Turkey, Lebanon, Syria, Palestine, Israel, Jordan and Saudi Arabia, as well in the north-western Hijaz mountains according to Ghazanfar & Fischer (1998) (Fig. 2-1), with a different ecology since the species lives from the coastal line up to mountain level (Serruya, 1978).



Fig. 2-1. Natural distribution of *Quercus calliprinos* and *Quercus coccifera* (Gianguzzi L. & La Mantia A., Azienda Foreste Demaniali-Regione Sicilia, 2000).

According to some authors, in some districts of the natural distribution both *Quercus coccifera* and *Quercus calliprinos* can live (Zohari & Orshan, 1965; Gentile & Gastaldo, 1976).



Fig. 2–2. Leaf details of Quercus calliprinos (Photo Rocco Carella).



Fig. 2–3. Details of the lower side of the leaves of Quercus calliprinos (Photo Rocco Carella).



Fig. 2–4. Male inflorescence of Quercus calliprinos (Photo Rocco Carella).



Fig. 2–5. A flowering individual of Quercus calliprinos (Photo Rocco Carella).



Fig. 2–6. Details of Quercus calliprinos acorns (Photo Rocco Carella).



Fig. 2–7. Immature acorn (Photo Rocco Carella).

In Italy, spontaneous *Quercus calliprinos* coenoses occur in Apulia, in Basilicata –just in the Senise area in the southern part of Potenza province (Gavioli, 1935) – and on the two main islands, Sicily and Sardinia (Paffetti et al., 2001; La Mantia & Gianguzzi, 2003).

The Apulian natural distribution of *Quercus calliprinos* is discontinuous, with two distinct areas within the regional territory (Fig. 2–8). For some authors, the anthropogenic impact and, in particular, agricultural practices (Francini-Corti, 1966) are the reason for this peculiar distribution, leading to the deep alteration of the original vegetation mosaic (Chiesura Lorenzoni, 1974).

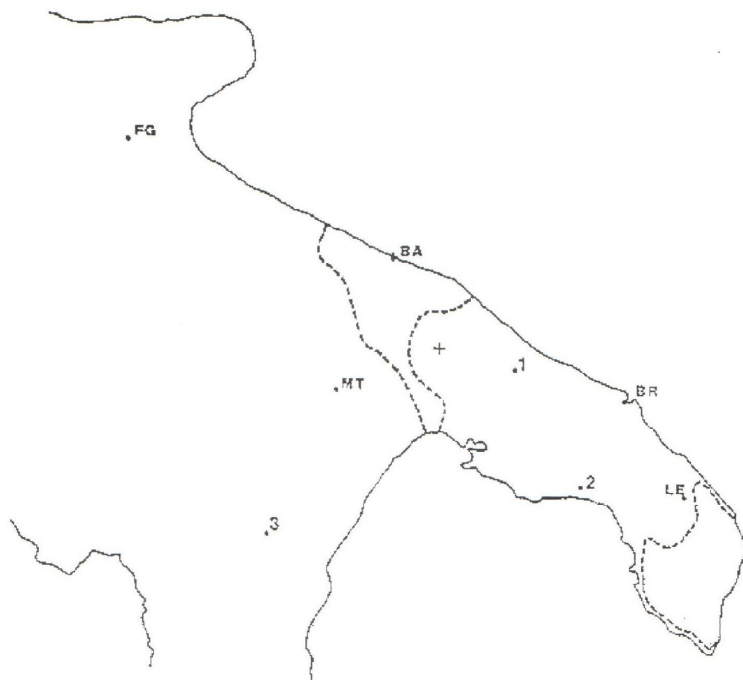


Fig. 2–8. Apulian natural distribution of *Quercus calliprinos* (in Bianco et al., 1989).

The southern Apulian populations that are located in southern Salento, and the northern Apulian populations of the Bari province, differ in ecological considerations, since in Salento *Quercus calliprinos* grows in termophilous maquis, and also on cliffs along the sea (Fig. 2–9), where the species can often be seen growing alongside the holm oak (*Quercus ilex* L.) (Sabato, 1972; Lorenzoni & Chiesura-Lorenzoni, 1987) and other sclerophyllous scrubs. In the northern part of the Apulian region, on the other hand, the species forms maquis and open forests that are spread mostly across that peculiar geographical district known as Conca di Bari (Bari basin) (Baldacci, 1962) (Fig. 2–10) or its borders, in the Murgia escarpment around Cassano delle Murge and, more rarely, in the High Murgia Plateau. Differently from what was recorded in Salento, the Palestine oak

populations of the northern part of the Apulian distribution are not observed along the coastal line, and can also live in hilly districts, several kilometres away from the Adriatic sea.

Another important aspect is that in the Bari province *Quercus calliprinos* populations do not form mixed coenoses with *Quercus ilex*. The holm oak is very rare in this part of the Murgia Plateau and occurs locally only where the disappearance of Palestine oak is recorded, as described for Lama Giotta (Carella, 2012) (Fig. 2–10), the southern ephemeral stream of the Bari basin.



Fig. 2–9. A stand of maquis with Quercus calliprinos in the southern Salento on the Otranto Cape – Baia d'Orte (Photo Rocco Carella).



Fig. 2–10. Holm oak high maquis along the bank of Lama Giotta ephemeral stream (Photo Rocco Carella).

The most important spontaneous coenoses with Palestine oak of the Murgia Plateau in Bari province have been investigated, leading to the results here presented. Nevertheless, in works regarding the study area, some authors have considered the species as *Quercus coccifera* s.l. or *Quercus coccifera* (Vita et al., 2001); the coenoses described in the present research are referred to as Palestine oak (*Quercus calliprinos*), which is considered a valid species. In the study area it is possible to find stands of Palestine oak with habitus of low maquis, but it is important to underline that whenever coenoses are not touched by fire for years, the physiognomy turns to high maquis forest; so locally solitary small trees of veteran individual *Quercus calliprinos* and relic undisturbed patches of high maquis and maquis forest up to 8 metres in height are observed (Fig. 2–11).



Fig. 2–11. Solitary veteran individual of Quercus calliprinos (Acquaviva delle Fonti – Masseria La Rena, Photo Rocco Carella).

2.2 Description of the study area

2.2.1 Geo-morphological and climatic aspects

The Murgia Plateau is a cretaceous limestone plateau of the Apulian platform, and here the soils are in general superficial *Terre Rosse*, while along the ephemeral streams deeper soils on the Quaternary alluvial sediments can exclusively be observed. In some portions of the plateau, on the cretaceous limestone, Pleistocenic deposits, known as *Tufi delle Murge*, can locally be observed (Azzaroli & Valduga, 1967).

Karsism is very evident in the whole plateau, with different phenomena where the most famous and amazing episodes are represented by deep caves, such as the Castellana Caves, and huge dolines, such as Pulo di Altamura (Fig. 2–12). As a consequence of its geomorphology, the Murgia Plateau shows a lack in the superficial waters.



Fig. 2–12. A view of Pulo di Altamura, the hugest doline of the Murgia Plateau (Photo Rocco Carella).

According to Rivas Martinez (2004), the whole Murgia Plateau occurs in the Mediterranean region, the Mediterranean Oriental sub-region, the Adriatica province, the Apuliana sub-province; the bioclimatic belt is meso-Mediterranean and the bioclimate is Mediterranean pluviseasonal oceanic.

The altitude of the Palestine oak stands of the Bari basin can vary from 40 to 355 metres above sea level. The following table shows the main climatic parameters recorded at Casamassima in the central part of the Bari basin (Tab. 2–1).

Yearly average temperature	14.7°C
Wearly average precipitation	545.8 mm
Average temperature of the coldest month of the year	7.1°C
Average temperature of the warmest month of the year	23.4°C
Average temperature of the absolute minimum	-2.9°C
Average temperature minimum of the coldest month of the year	3.5 °C
Average temperature maximum of the coldest month of the year	10.7°C
Continentality Index (Rivas Martinez)	Euoceanic
Termicity Index (Rivas Martinez)	290
Ombrotype (Rivas Martinez)	Upper dry (Udry)
Bioclimatic belt (Rivas Martinez)	Transition between Lower mesomediterranean (Lmme) and Upper mesomediterranean (Umme)
Winter Cold Stress Index (WCS Mitrakos)	145.6
Year Cold Stress Index (YCS Mitrakos)	180.8
Summer Drought Stress Index (SDS Mitrakos)	141.2
Year Drought Stress Index (YDS Mitrakos)	206.2
Yearly Evapotranspiration ETP according Thornthwaite and Mather (1955)	785.4 mm

Tab. 2–1. Main climate parameters of Casamassima (223 metres above sea level, period of observation 1967–96).

In the following figure is shown the evapotranspiration diagram for Casamassima (period of observation 1967–96) according to Thornthwaite & Mather (1955).

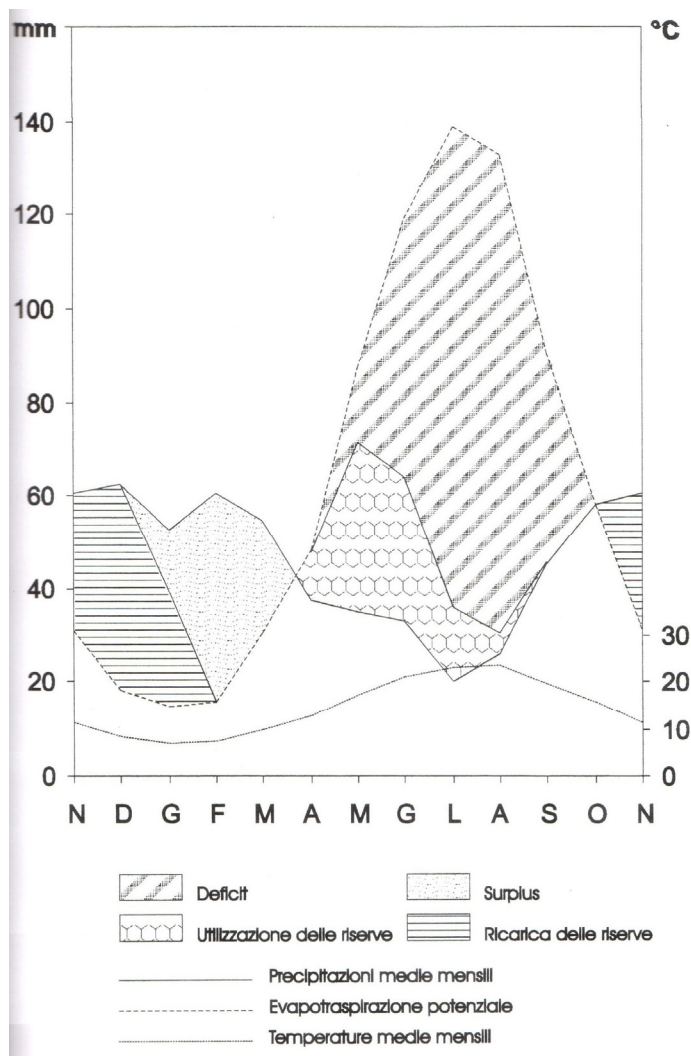


Fig. 2–13. ETP diagram of Casamassima (223 metres above sea level, period of observation 1967–96).

Table 2–2 shows the main climatic parameters recorded at Cassano delle Murge, where the Palestine oak is abundant on the Murge escarpment at the margin of the Bari basin.

Yearly average temperature	14.7°C
Wearly average precipitation	638.7 mm
Average temperature of the coldest month of the year	6.8°C
Average temperature of the warmest month of the year	24.0°C
Average temperature of the absolute minimum	-2.7°C
Average temperature minimum of the coldest month of the year	3.5 °C
Average temperature maximum of the coldest month of the year	9.5°C
Continentality Index (Rivas Martinez)	Euoeanic
Termicity Index (Rivas Martinez)	277
Ombrotype (Rivas Martinez)	Upper dry (Udry)
Bioclimatic belt (Rivas Martinez)	Upper mesomediterranean (Umme)
Winter Cold Stress (WCS) Index (Mitrakos)	168.3
Year Cold Stress (YCS) Index (Mitrakos)	196.3
Summer Drought Stress (SDS) Index (Mitrakos)	86.8
Year Drought Stress (YDS) Index (Mitrakos)	118.2
Yearly Evapotranspiration ETP according Thornthwaite and Mather (1955)	791.0 mm

Tab. 2–2. Main climate and bioclimatic parameters of Cassano delle Murge (420 metres above sea level, years of observation 1967–96).

The following figure (Fig. 2-14) is the Montero de Burgos bioclimatic diagram (1973) of Cassano delle Murge.

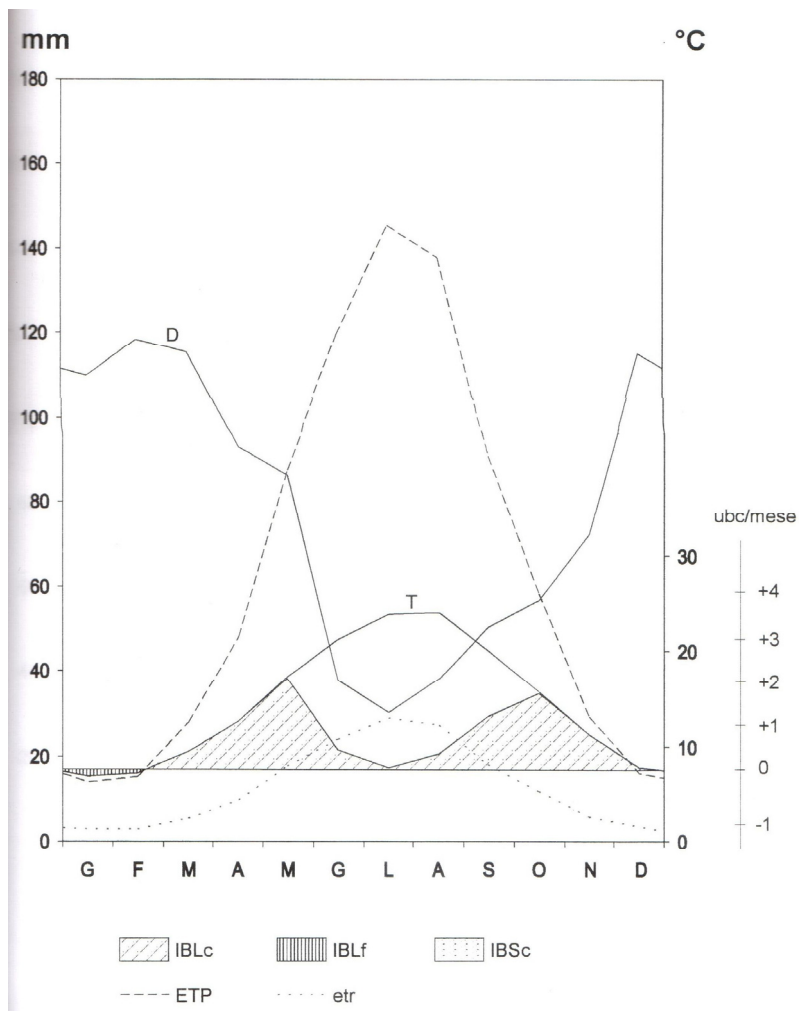


Fig. 2-14. Montero de Burgos bioclimatic diagram. Cassano delle Murge (420 metres above sea level, years of observation 1967-96).

2.2.2 Landscape and distribution of Palestine oak coenoses

The northern part of the Apulian distribution of the Palestine oak is spread in particular in the Bari province. Nevertheless, some authors, such as Giannuoli (1951), Crivellari (1950), Bianco et al. (1981–82), have in the past also described some stands in the south-western district near Mottola in the province of Taranto.

The following map (Fig. 2–15) shows the distribution of the *Quercus calliprinos* dominated coenoses in the Bari province.

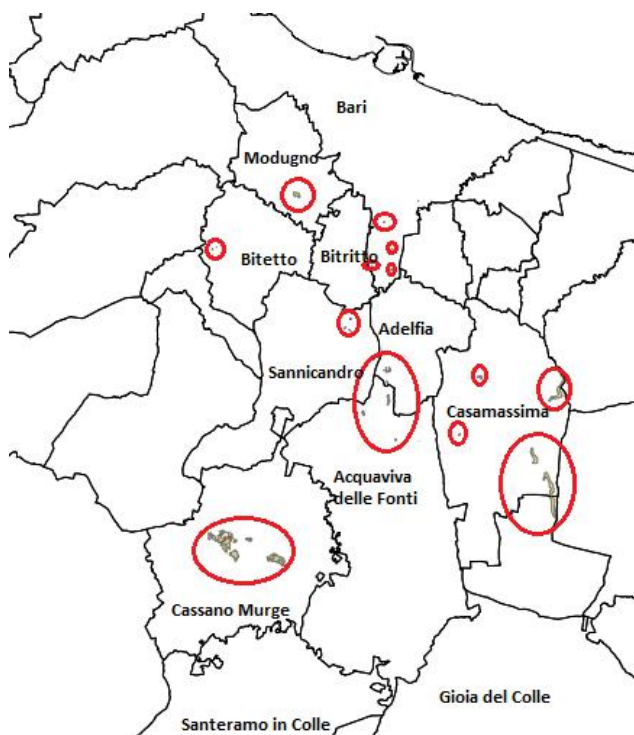


Fig. 2–15. Distribution of the *Quercus calliprinos* dominated coenoses in the Bari province.

The Palestine oak stands of the Bari basin district occur in particular along slopes and rocky banks of the ephemeral streams (Figs. 2–16, 2–17).



Fig. 2–16. Patches of Quercus calliprinos maquis on the rocky bank of Torrente Baronale ephemeral stream (Adelfia, Bari province) (Photo Rocco Carella).