

## First observation of *Quercus pedunculiflora* C. Koch in the Italian Peninsula – Short Communication

R. CARELLA

*Bari, Italy*

**ABSTRACT:** A few individuals of Grayish oak have been observed in the Low Murgia Plateau, Puglia Region. This is the first time that *Quercus pedunculiflora* C. Koch has been found in Italy. The territory is dominated by olive trees, where spontaneous vegetation occurs only in residual patches in particular along an important old dry erosion stream, Lama Lamasinata. Individuals of Grayish oak are located along a rural road and in a closed abandoned park which is in the vicinity of Lama Lamasinata, near Balsignano, one of the most important archaeological sites of the Low Murgia Plateau. In the area other deciduous oaks such as Italian pubescent oak, the most common spontaneous oak in the western district of the Murgia Plateau, and Hungarian oak, which is very rare in the Low Murgia Plateau, have been observed.

**Keywords:** Grayish oak; Low Murgia Plateau; Lama Lamasinata; ecology; refuge area

The present study regards the first observation of *Quercus pedunculiflora* C. Koch in the Italian Peninsula. Puglia Region, where the stand of Grayish oak has been found, is well known as oak land (CARANO 1934) for its abundance of spontaneous oaks in its territory. The concentration of Eastern Mediterranean spontaneous oak species such as *Quercus frainetto* Ten., *Quercus cerris* L., *Quercus calliprinos* Webb, *Quercus trojana* Webb, *Quercus macrolepis* Kotschy (CARELLA 2006) reveals an affinity of Puglia with the Balkans.

The Grayish oak (*Quercus pedunculiflora* C. Koch) is a species controversial in taxonomy.

Some authors consider *Quercus pedunculiflora* a race of *Quercus robur* L., strongly heterogeneous, the characteristics of which are results of an adaptation to drought climate and probable introgression of other species [*Quercus pubescens* Willd. and *Quercus petraea* (Mattuschka) Liebl. in the North of its range and *Quercus infectoria* Oliv. in the South]. This theory agrees with authors who noticed introgression of *Quercus robur* with more xerophilous oak (KLEINSCHMIT 1993), which took place at the time of the migration of *Quercus robur* in *Quercus pubescens* area and vice versa. Almost all characteristics which distinguish the subspe-

cies, when the Grayish oak is considered as intra-specific unit of *Quercus robur*, are typical of *Quercus pubescens*.

In the Consolidated Index to Flora Europaea (HALLIDAY, BEADLE 1983) it is considered as a species and also Schwarz in TUTIN et al. (1993) considered it a valid species, nevertheless similar to *Quercus robur* subsp. *brutia* (Ten.) (SCHWARZ 1993). The existence of two separate species is also supported by a bimodal floral phenology distribution that is considered as a complete barrier between *Quercus pedunculiflora* and *Quercus robur* (CHESNOIU et al. 2009). GEORGESCU and CRETZOIU (1941), BORZA (1947), COLDEA et al. (2010) also consider *Quercus pedunculiflora* as a valid species.

### Distribution range and ecology of *Quercus pedunculiflora*

Natural distribution of Grayish oak extends from South-Eastern Europe, in the Balkan Peninsula and Peloponnesos, through Thrace and Anatolia, to Western Asia in the Caucasian Region.

The Grayish oak is listed in Southern Albania, in Serbia near Belgrade (VUCKOVIC 1984) and in

the Srem region of Vojvodina province (TOMOVIC et al. 2007), in Greece in Corfu island and Nestos Delta in the north-east of the country (BUCHHOLZ 2009), in Bulgaria in the Black Sea area (FET, POPOV 2007), in Slovakia (ROLEČEK 2005), in Romania (BORZA 1937); (GEORGESCU et al. 1942) in the Balkan-Moesic province from Southern Oltenia through Muntenia to the southern part of Moldova (BORZA 1960), in the Czech Republic, in Ukraine in Crimea, in Turkey in East and South-East Anatolia. In the Caucasian Region *Quercus pedunculiflora* is observed in Georgia (Ministry of Environment Protection and Natural Resources of Georgia 2010), in the west of Azerbaijan (PEPER 2006), in Northern Armenia and in Russia, in Dagestan area (SCHWARZ 1993) and in the north-west of Iran.

The area of distribution reveals the balcanic-caucasian-pontic character of Grayish oak.

COLDEA et al. (2010) considered the Grayish oak as a species with South-Eastern European distribution.

VICOL (2010) considered the Grayish oak a pontic element, BAKIŞ (2005) an Irano-Turanian element.

Grayish oak enters in relic fragments of floodplain forests as described in the North of Greece (BUCHHOLZ 2009), in Serbia (TOMOVIC et al. 2007), in the Thracian Lowland and in mesophytic and meso-hydrophytic forests of the Ayazmo Park (VAN HERZELE et al. 2004) in Bulgaria. Also in Romania Grayish oak enters in floodplain forests (TOMESCU, CHIFU 2006) in the alluvial forests of *Fraxinus oxycarpa* Bieb. near the Black Sea and also in the wooded steppe layer. In Georgia *Quercus pedunculiflora* occurs in floodplain forests in the eastern part of the country on the lowland and foothill rivers, Iori, Alazani, Kura (Ministry of Environment Protection and Natural Resources of

Georgia 2010) and along the Kura river in Azerbaijan (PEPER 2006).

*Quercus pedunculiflora* is better adapted to xeric conditions compared to *Quercus robur* (SOFLETEA, CURTU 2007) and in Slovakia it is one of the oak species which enters in dry-mesic oak forests of Slovakia (ROLEČEK 2005). In the Caucasian Area BOHN et al. (2007) considered *Quercus pedunculiflora* as part of thermophilous mixed broadleaved forests with *Quercus petraea* and *Carpinus orientalis* Miller.

## MATERIAL AND METHODS

A few specimens of Grayish oak have been found during a field survey near Modugno (Fig. 1), which is in the Province of Bari. Modugno is a little town which borders with Bari, the most important city of the Puglia Region. The site is located in the central part of Puglia Region about 9 km from the Adriatic Sea at the altitude of 85–90 m.

In the area there is an important archaeological site, Balsignano, which is located between two branches of a dry old erosion stream, called Lama Lamasinata. The area is located in the north-western district of the Low Murgia Plateau, a territory dominated by intensive olive farming (CARELLA 2010).

Some individuals of Grayish oak have been observed along a narrow rural road and in a closed abandoned park which is generally known as Il Boschetto, located at the end of the spontaneous woody hedge on the other side of the rural road. In the Il Boschetto park occur conifers (*Pinus halepensis* Miller, *Pinus pinea* L., *Cupressus sempervirens* L.) and also residual fragments of spontaneous vegetation with patches of evergreen thermophilous maquis and native deciduous oaks.



Fig. 1. Location of the site

Table 1. Monthly averages of temperature and rainfall (Grumo Appula, altitude: 180 m, 41°0'N, 16°42'E; data recorded in the period 1962–1994)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
T (°C)	8.3	8.7	11.1	14.3	18.8	23.1	25.8	25.9	22.1	17.5	12.7	9.4	16.5
P (mm)	47.6	59.6	54.2	38.9	36.8	38.4	24.6	26.4	54.4	51.7	61	61.3	555

Flat morphology, typical of the Low Murgia Plateau, becomes uneven in the considered area, just in some portions of the old erosion stream Lama Lamasinata. In these locations with morphology not suitable for crops, residual patches of spontaneous vegetation can be observed. This is a general scheme in all districts of the Low Murgia Plateau, which has been transformed in a crop field over time, where spontaneous vegetation can be observed just in residual patches along the old erosion streams which cut the considered territory.

The district where the site occurs is exposed to a strong influence of the sea. The Adriatic Sea is not far and the residual spontaneous vegetation, which occurs in the areas where cultural practices are not possible (rocky soils, high slopes), can in general be referred to as the *Oleo-Ceratonion* of the *Pistacio-Rhamnetalia alaterni*, typical Mediterranean shrubs of the littoral and sublittoral zone, nevertheless residual patches with thermophilous deciduous oak such as Italian pubescent oak can be observed locally.

Soils are typically Mediterranean red soils which originated from limestone (Calcari delle Murge, Calcare di Altamura), deep marine sediments which originated during the Cretaceous that are typical of the greatest part of the Murgia Plateau. Argillous soils on recent continental alluvial sediments (*Holocene-Pleistocene*) (Servizio Geologico d'Italia 1968) occur along the old erosion streams (lame) and also along the Lama Lamasinata.

Table 1 shows thermopluviometric data on Grumo Appula located on the Low Murgia Plateau, less than 10 km from the stand of Grayish oak. According to RIVAS-MARTÍNEZ (2004), weather is typically Mediterranean with dry hot summer and mild rainy winter. The site occurs in the Apulian subprovince of the Adriatica province of the Mediterranean oriental subregion. The bioclimatic belt is mesomediterranean.

## RESULTS AND DISCUSSION

Woody patches with deciduous oaks are rare in the whole north-western district of the Low Murgia

Plateau, where old erosion streams become refuge areas for spontaneous vegetation, as it happens for Lama Lamasinata in the study area. In this small residual-oaks dominated coenosis besides *Quercus virgiliana*, which is the typical spontaneous deciduous oak in the western district of the Murgia Plateau, also a rare species such as *Quercus frainetto* and this exceptional data on *Quercus pedunculiflora* have been observed.

The individuals of Grayish oak have been found along a narrow rural road bordered by a woody hedge with a few spontaneous oaks. In total there are almost 30 adult oaks along the considered rural road (Fig. 2), most of them are individuals of *Quercus virgiliana* (Ten.) and fewer of them are *Quercus frainetto*, very rare in the whole district of the Low Murgia Plateau where the Hungarian oak sometimes lives along some old erosion streams in more



Fig. 2. Individuals of spontaneous oak along the rural road where Grayish oak occurs

mesophilous conditions, and also 4 individuals of Grayish oak have been observed. *Quercus frainetto* individuals, sometimes very large and old, occur also in the closed abandoned park Il Boschetto, where also another individual of *Quercus pedunculiflora* has been found.

Grayish oak differs from *Q. robur* and *Q. robur* subsp. *brutia* in particular in leaves with persistent pubescence, while *Q. robur* subsp. *brutia* shows pubescence only on the young leaves (TUTIN et al. 1993).

Typical morphological characters are glaucous leaves and a persistent yellow-grey tomentum beneath, petiole up to 20 mm and verrucose, conrescent and pubescent involucre scales, with yellow hairs.

All the individuals of Grayish oak observed in the area show persistent pubescence that is evident in the adult leaves as well. Leaves are glaucous and pubescent underneath (Fig. 3) with yellow-grey hairs in particular along the midvein and have a petiole of 1.5–2 cm; in general they are 5–7 cm long and 3–5 cm wide, but can be sometimes much larger. Acorns are solitary or paired, rarely in a group of 3–4 with cupular appressed pubescent scales without patent and acute apices as typical in *Q. robur* subsp. *brutia*, with the petiole within a range of 0–2 cm, up to 3 cm, exceptionally more. Bark has the typical dark brown colour with deep longitudinal fissures.

The following coordinates (41°03'57.67"N, 16°47'40.02"E) indicate an individual of *Quercus pedunculiflora* located in the middle of the woody hedge along the rural road.

Other spontaneous plants observed under the oak trees along the rural road are *Crataegus monogyna* Jacq., *Smilax aspera* L., *Opuntia ficus-indica* (L.) Miller, *Prunus mahaleb* L., *Asparagus acu-*

*tifolius* L., *Osyris alba* L., among shrubs and in the herb layer *Arum italicum* Miller, *Umbilicus horizontalis* (Guss) DC., *Cyclamen hederifolium* Aiton, *Oryzopsis miliacea* (L.) Asch. et Schweinf.

Flora d'Italia has been used for the identification of the species (PIGNATTI 2002).

Oaks along the rural road have diameters between 20 and 40 cm, height between 4 and 9 m, while in some parts of the abandoned park Il Boschetto there are patches with native oaks where also live very large individuals of *Quercus virgiliana* and *Quercus frainetto*, older than the park.

Collected samples of considered individuals of Grayish oak found in the Modugno territory near Balsignano and Lama Lamasinata are conserved in the collection of the Herbarium of Natural History Museum, London.

The original forest cover has been deeply altered by agricultural activities, environment deterioration and tree cutting (BELLETTI et al. 2005). This is particularly true of an area such as the Murgia Plateau, which has been exposed to a strong anthropic influence. The great modifications occurred that have hidden the great importance of the Murgia Plateau for oak distribution. Furthermore it is important to underline how in correspondence with deep alluvial soils which occur along the old erosion stream, ecological conditions become favourable for mesophilous vegetation and Grayish oak has been observed in an area near to a branch of Lama Lamasinata.

This first occurrence of *Quercus pedunculiflora* in Italy is without doubt exceptional data, but it is not a surprise in the Puglia Region because of many reasons, the spontaneous vegetation can be considered as an appendix of the Balkan Peninsula. The main refuge areas for oaks during the last glacial



Fig. 3. Lower surface of a leaf of *Quercus pedunculiflora* (right), (left) by electron microscope

period were located on three Mediterranean peninsulas: the Iberian, the Apennine and the Balkan Peninsula (DERING et al. 2008). The Murgia Plateau has a strategic position in this scenery, which makes this territory a bridge between the Apennines and the Balkans.

Another key for interpretation of this occurrence is related to the place where a few specimens of *Quercus pedunculiflora* have been observed, near an old artificial park, where also an individual of Grayish oak lives. The possibility that some individuals of *Quercus pedunculiflora* have been introduced into this park and that it is not spontaneous in the area cannot be excluded.

Further investigations in the whole district of the Murgia Plateau are needed.

## References

- BAKIŞ Y. (2005): Morphometrical Analysis of Oaks (*Quercus* L.) Acorns in Turkey. [Ph.D. Thesis.] Bolu, Abant İzzet Baysal University: 72.
- BELLETTI P., LEONARDI S., MONTELEONE I., PIOVANI P. (2005): Allozyme variation in different species of deciduous oaks from northwestern Italy. *Silvae Genetica*, **54**: 9–16.
- BOHN U., ZAZANASHVILI N., NAKHUTSRISHVILI (2007): The map of the natural vegetation of Europe and its application in the Caucasus Ecoregion. *Bulletin of the Georgian National Academy of Sciences*, **175**: 112–121.
- BORZA A. (1937): Cercetari fitosociologica asupra padurilor basarabene. [Research of padurilor fitosociologica bessarabia.] *Buletinul Grădini Botanice și al Muzeului Botanic din Cluj*, **XVII**: 1–85.
- BORZA A. (1947): *Conspectus Florae Romaniae, Regionumque affinum*. Cluj, Tipografia Cartea Românească: 360.
- BORZA A. (1960): Provinciile floristice de R.P. Romane. In: *Monografia geografică a Republicii Populare Romine*. București, Editura Academiei: 541–587.
- BUCHHOLZ S. (2009): Community structure of spiders in coastal habitats of a Mediterranean delta region (Nestos Delta, NE Greece). *Animal Biodiversity and Conservation*, **32**: 101–115.
- CARANO E. (1934): Il suolo e la flora delle Puglie. [Soil and flora of Puglia.] In: *Proceedings of the 22<sup>nd</sup> Meeting Italian Society for the Advancement of Science*. Bari, 12.–18. October 1933. Rome, Società Italiana per il progresso delle scienze: 32–50.
- CARELLA R. (2006): Puglia region (South Italy): the oaks land. In: *Oak 2006: Advances in Principles and Practices of Oaks Silviculture and Genetics*. Steven Point, September 24.–27. September 2006. Steven Point, University of Wisconsin: 43–44.
- CARELLA R. (2010): Solutions for enhancing biodiversity in rural areas in Mediterranean context: the case of study of the area of intensive olive farming in the Low Murgia Plateau (Puglia region-South Italy). In: *4<sup>th</sup> International Conference on Plants and Environmental Pollution*. Lucknow, 8.–11. December 2010. ICPEP, Lucknow: 30.
- CHESNOIU E.N., SOFLETEA N., CURTU A.L., TOADER A., RADU R., ENESCU M. (2009): Bud burst and flowering production in a mixed oak forest from Eastern Romania. *Annals of Forest Research*, **52**: 199–206.
- COLDEA G., FARCĂS S., FILIPAS L., URSU T.M., STOICA I.A. (2010): Syntaxonomic revision of *Quercus virgiliana* Ten. and *Quercus pedunculiflora* Koch forests for Romania. *Studia Universitatis Babeș Bolyai, Biologia* **2**: 39–50.
- DERING M., LEWANDOWSKI A., UFNALSKI K., KEDZIER-SKA A. (2008): How far to the East was the migration of the white oaks from the Iberian Refugium? *Silva Fennica*, **42**: 327–335.
- FET V., POPOV A. (eds) (2007): *Biogeography and Ecology of Bulgaria*. Dordrecht, Springer: 690.
- GEORGESCU C.C., CRETZOIU P. (1941): Consideratiuni sistematice asupra speciei *Quercus pedunculiflora* K. Koch in Romania. [Systematic considerations on *Quercus pedunculiflora* K. Koch in Romania.] *Editura silvică*, **7**: 3–35.
- GEORGESCU C.C., LUPE L., CRETZOIU P. (1942): Raspandirea stejarului brumario (*Quercus pedunculiflora* C. Koch). [Natural distribution of Grayish oak (*Quercus pedunculiflora* C. Koch).] *Analele Icas*, **8**: 165–172.
- HALLIDAY G., BEADLE M. (1983): *Consolidate Index to Flora Europaea*. Cambridge, Cambridge University Press: 158.
- KLEINSCHMIT J. (1993): Intraspecific variation of growth and adaptive traits in European oak species. *Annales des Sciences Forestières*, **50** (Supplement 1): 166–185.
- Ministry of Environment Protection and Natural Resources of Georgia (2010): *Introductory report on nature conservation in Georgia*. In: *30<sup>th</sup> Meeting Convention on the Conservation of European Wildlife and Natural Habitat*. Strasbourg, 6.–9. December 2010. Strasbourg, Council of Europe: 10.
- PEPER J. (2006): *Walder und ihren degradationsstadien in der Kura Niederung (West-Aserbaidzhan)*. [Ph.D. Thesis.] Greifswald, Ernst Moritz Arndt Universität Greifswald: 114.
- PIGNATTI S. (2002): *Flora d'Italia*. [Flora of Italy.] Edagricole, Bologna: 2302.
- RIVAS-MARTÍNEZ S. (2004): *Clasificación bioclimática de la Tierra*. [Global bioclimatic.] Available at <http://www.globalbioclimatics.org> (accessed February 10, 2013).
- ROLEČEK J. (2005): *Vegetation type of dry-mesic oak forests in Slovakia*, *Preslia*, **77**: 241–261.
- SCHWARZ O. (1993): *Quercus* L. In: TUTIN T.G., BURGESS N.A., CHATER A.O., EDMONSON J.R., HEYWOOD V.H., MOOR D.M., VALENTINE D.H., WALTERS S.M., WEBB A.D. (eds): *Flora Europaea*. Cambridge, Cambridge University Press: 61–64.
- Servizio Geologico d'Italia (1968): *Sheet IGM 177, 1:100.000*. IGM, Firenze.

- SOFLETEA N., CURTU L. (2007): Dendrologie. [Dendrology.] Editura Universității Transilvania, Braşov: 540.
- TOMESCU C.V., CHIFU T. (2006): The association *Fraxino angustifolie-Quercetum pedunculiflorae* Chifu et al. 1998, from the river Suceava basin. Buletinelu Grădinii Botanice, Iasi, **13**: 11–18.
- TOMOVIC G., VUKOJICIC S., NIKETIC M., ZLATKOVIC B., STEVANOVIC V. (2007): *Fritillaria (Liliaceae)* in Serbia: distribution, habitats and some taxonomic notes. Phytologia Balcanica, **13**: 359–370.
- TUTIN T.G., BURGESS N.A., CHATER A.O., EDMONSON J.R., HEYWOOD V.H., MOOR D.M., VALENTINE D.H., WALTERS S.M., WEBB A.D. (eds) (1993): Flora Europaea. Cambridge, Cambridge University Press: 581.
- VAN HERZELE A., SALBITANO F., ISKREVA D. (2004): The Ayazmo Park Case Study Report: Action Research in Collaborative Woodland Management. European Commission's Fifth Framework Programme, Quality of Life and Management of Living Resources, QLK-2001-00165. Free University of Brussels, Brussel: 1–46.
- VICOL I. (2010): Preliminary study on epiphytic lichens as indicator of environmental quality in forest from around Bucharest municipality (Romania). Analele Universitatii din Oradea, Fascicula Biologie, **XVII/1**: 200–207.
- VUCKOVIC B. (1984): Novo stanište *Quercus pedunculiflora* C. Koch u Srbiji. [A new habitat of *Quercus pedunculiflora* C. Koch in Serbia (Yugoslavia).] Zbornik radova Instituta za sumarstvo i drvnu industriju, **22–23**: 111–113.

Received for publication August 24, 2012

Accepted after corrections February 20, 2013

---

*Corresponding author:*

Dr. ROCCO CARELLA, Via Torre d'Amore 18 Ceglie – Bari, 70129 Italy  
e-mail: roccocarella@yahoo.it

---