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ON THE PRESENCE OF *CARPINUS ORIENTALIS* MILL. IN TUSCANY

Abstract - The finding of two stands of *Carpinus orientalis* in the south of the Province of Siena is reported. This finding confirms the presence of this species in Tuscany and shifts the central-southern part of its distribution in Italy considerably to the northwest. The fact that the stands are situated on limestone substrate in an area of transition between the domains of *Quercetea ilicis* and *Querco-Fagetea* confirms the known ecological characteristics of *Carpinus orientalis*.

Key words - *Carpinus orientalis*, Siena province, Tuscany; vegetation.

Riassunto - *Sulla presenza di* Carpinus orientalis *Mill. in Toscana*. Nel presente lavoro viene riportato il rinvenimento di due stazioni di *Carpinus orientalis*, localizzate nel sud della provincia di Siena. Tale ritrovamento conferma la presenza della specie in Toscana e sposta notevolmente a NW la porzione centromeridionale del suo areale in Italia. La localizzazione di queste due stazioni, su substrato carbonatico e in area di transizione fra i domini delle *Quercetea ilicis* e delle *Querco-Fagetea*, conferma le caratteristiche ecologiche note per *Carpinus orientalis*.

Parole chiave - *Carpinus orientalis*, provincia di Siena, Toscana, vegetazione.

INTRODUCTION

Carpinus orientalis Mill. is a south-eastern European species, distributed from Italy to the Crimea and from the Caucasus to Asia Minor (Meusel *et al.*, 1965; Tutin *et al.*, 1993). In Italy, its distribution is discontinuous, consisting of a northern nucleus that extends from the Karst of Trieste to Grado, and a central-southern nucleus which includes Latium, and stretches from the Marches down to Apulia and Sicily (Fenaroli, 1967; Pignatti, 1982). For Tuscany, there is a doubtful report from the Maremma near Capalbio (Gellini, 1973; Pignatti, 1982).

Carpinus orientalis is a thermophilous, very xerophytic species that prefers calcareous substrates. It is a typical constituent of karstic woods. According to the classification of Pavari, it is collocated at the upper limits of the *Lauretum* and at the lower limits of the *Castanetum* (Gellini, 1973). In Illyria, the centre of its distribution, it characterizes a belt of deciduous sub-Mediterranean forest rich in thermophilous elements, situated between woods of *Quercus ilex* and woods of *Quercus pubescens* (Pignatti, 1982). In the Balkans, it is a component of deciduous oak woods typical of inland areas with an annual rainfall of 700-1000 mm, and mean temperatures in January and July of 0-5°C and 20-25°C respectively (Horvat *et al.*, 1974; Polunin & Walters, 1987). Tree cover in this sparse, prostrate vegetation is provided by *Quercus pubescens* Willd., *Q. cerris* L., *Ostrya carpinifolia* Scop., *Carpinus orientalis* Mill., *Fraxinus ornus* L., *Acer monspessulanum* L., *A. obtusatum* W. et K., *Sorbus domestica* L. and *S. torminalis* Crantz. In central-southern Italy, *Carpinus orientalis* is found in mixed communities with tree cover consisting of *Ostrya carpinifolia*, *Fraxinus ornus*, *Acer obtusatum* and *Quercus pubescens* (Blasi *et al.*, 1982). *Carpinus orientalis* suckers vigorously and this enables it to survive fires.

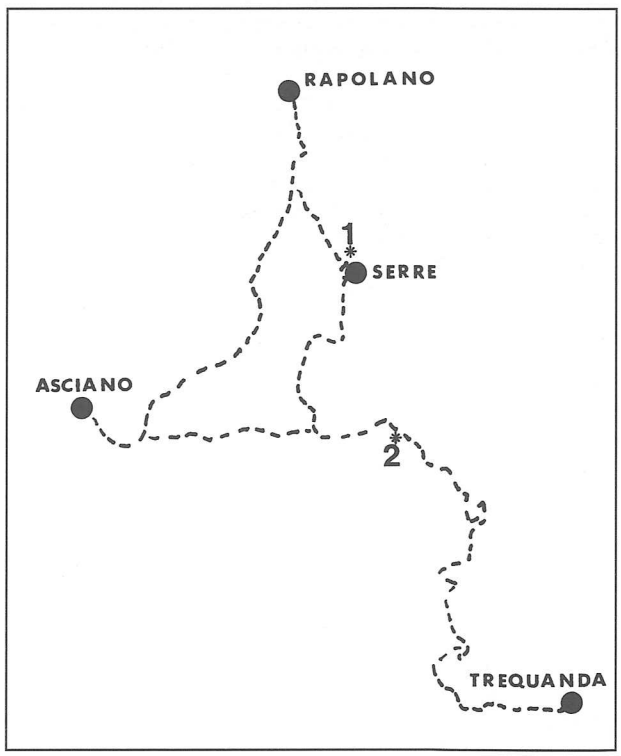

Figure 1 - Map showing the stations in which *Carpinus orientalis* Mill. was found; 1. station 1; 2. station 2.

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FINDING OF *CARPINUS ORIENTALIS* IN TUSCANY

While surveying for a vegetation map of the Province of Siena, several shrubby individuals provisionally referred to *Carpinus orientalis* were found on the top of an arid calcareous hill colonized by sparse thermophilous wood with *Quercus ilex* and *Q. pubescens*. The survey was later extended to the surrounding hills. Other specimens with fruit were found nearby and the attribution to *C. orientalis* was confirmed. Exsiccata are stored in SIENA. The first finding was in the Municipality of Rapolano Terme, just north of the town of Serre di Rapolano at an altitude of 300 m. The other was in the Municipality of Asciano at 360 m, just north of Torre di S. Alberto (Fig. 1). Both coenoses consist of oaks regularly subject to compound coppicing. Table 1 gives the floristic and vegetation data of the two stations.

In both stations, species of *Quercetea ilicis* and *Querco-Fagetea* were found. In the upper layer, deciduous species were dominant. In the intermediate and lower layers there was no clear prevalence of species of either class. The species of *Quercetea ilicis* found were the least xerophilous and most cold tolerant ones, whereas those of *Querco-Fagetea* were the most thermophilous and drought resistant. Interesting findings in the second station were *Physospermum cornubiense* (L.) DC. and *Ilex aquifolium* L., species, unlike the others, which prefer situations with a high gradient of atmospheric humidity.

In both stations, *Carpinus orientalis* was abundant and found prevalently in the intermediate layer as vigorous clumps of suckers. The species was not found in any other relevés of forest vegetation on carbonate rocks, nor was it found on siliceous substrates. Cool moist stations, north-exposed slopes, gullies and gentle reliefs of the latter tended, rather, to host *Carpinus betulus* L.

The areas in which *Carpinus orientalis* was found are both in marginal parts of a subhumid C2 type climate zone, bordering subhumid-dry C1 type, according to RUSTICI & BIGI (1984). The climatic data is shown in Table 2.

CONCLUSIONS

The finding of *Carpinus orientalis* in the Province of Siena considerably shifts the central-southern part of its distribution in Italy (Fig. 2). The tree composition of the vegetation, formed by *Quercus cerris* L., *Q. ilex* L., *Q. pubescens* Will., *Ostrya carpinifolia* Scop. and *Sorbus domestica* L., is similar to the characteristic composition of the vegetation where *C. orientalis* is found, throughout its distribution area. The floristic composition of the two stations, with species of *Quercetea ilicis* and *Querco-Fagetea*, confirms *Carpinus orientalis* Mill. as a plant of transition communities between Mediterranean woods and relatively xerophilous submontane woods of sites with cold winters. The thermo-pluviometric characteristics

Table 1 - Vegetation data of the two station of *Carpinus orientalis*. The cover of each species is reported for the different layers.

Station.	1	2
Elevation a.s.l. (m)	300	360
Total ground cover (%)	100	100
Exposure	SW	NE
Slope (°)	5-15	15-30
Rocky (%)	< 0.2	< 0.2
Stone (%)	< 0.1	0.1 - 3
upper layer (A) height (m)	5	12
upper layer (A) cover (%)	75	50
intermediate layer (B) height (m)	2	4
intermediate layer (B) cover (%)	50	75
lower layer (C) cover (%)	20	20
Quercetea ilicis* and *Quercetalia ilicis		
(A) *Quercus ilex* L.	2	1
(B) *Quercus ilex* L.		3
(C) *Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker	+	+
(C) *Rubia peregrina* L.	+	+
(B) *Ruscus aculeatus* L.	1	
(C) *Ruscus aculeatus* L.		+
(C) *Asparagus acutifolius* L.	+	
(C) *Carex distachya* L.		+
(B) *Erica arborea* L.		+
(C) *Rosa sempervirens* L.		+
Querco-Fagetea* and *Quercetalia pubescentis		
(A) *Quercus pubescens* Willd.	2	2
(B) *Quercus pubescens* Willd.		2
(A) *Quercus cerris* L.	2	1
(B) *Quercus cerris* L.		2
(B) *Sorbus domestica*		1
(B) *Crataegus monogyna* Jacq.		1
(C) *Crataegus monogyna* Jacq.	+	
(C) *Hypericum montanum* L.		r
(C) *Ligustrum vulgare* L.		+
(C) *Clematis vitalba* L.		+
(C) *Coronilla emerus* L.		1
(C) *Stachys officinalis* (L.) Trevisan	+	
(C) *Helleborus bocconei* Ten.	+	
(C) *Melittis melissophyllum* L.	1	
Other species		
(A) *Carpinus orientalis* Mill.	1	
(B) *Carpinus orientalis* Mill.	3	3
(B) *Ostrya carpinifolia* Scop.		1
(C) *Osyris alba* L.	2	
(C) *Pyrus pyraster* Burgsd.		
(C) *Hedera helix* L.	1	2
(C) *Carex flacca* L.	+	
(C) *Brachypodium rupestre* (Host) R. et S.	+	
(C) *Cruciata glabra* L.	+	
(C) *Lathyrus niger* L.	r	
(C) *Lonicera caprifolium* L.	r	
(C) *Ilex aquifolium* L.		+
(C) *Physospermum cornubiense* (L.) DC		r

Table 2 - Climatic data for the nearest climatic stations.

Station	alt. (m)	climatic type	annual rainfall (mm)	mean annual temp. (°C)	men jul. temp. (°C)	mean Jan. temp. (°C)
Siena	348	C1	791	13.6	23.4	4.8
M.Oliveto	401	C2	774	14.6	23.8	5.8

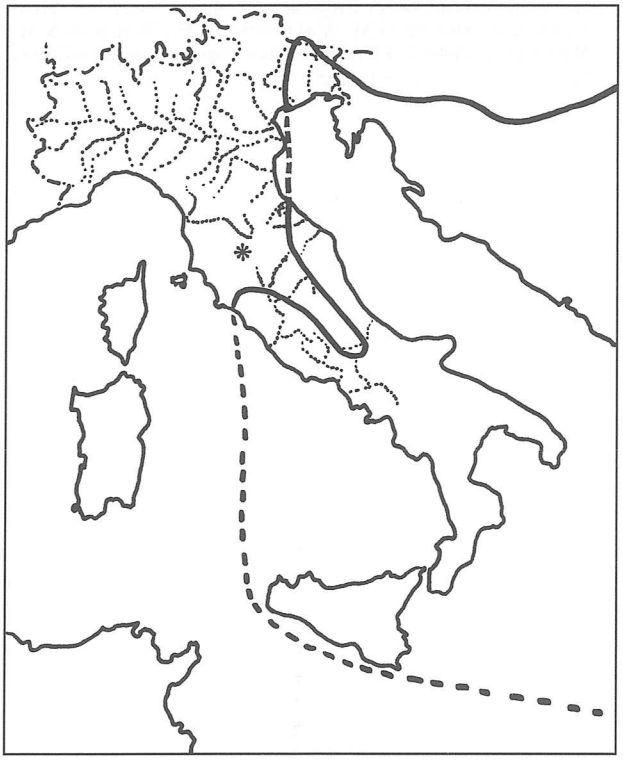

Figure 2 - Distribution of *Carpinus orientalis* in Italy and localisation (asterisk) of the two new findings.

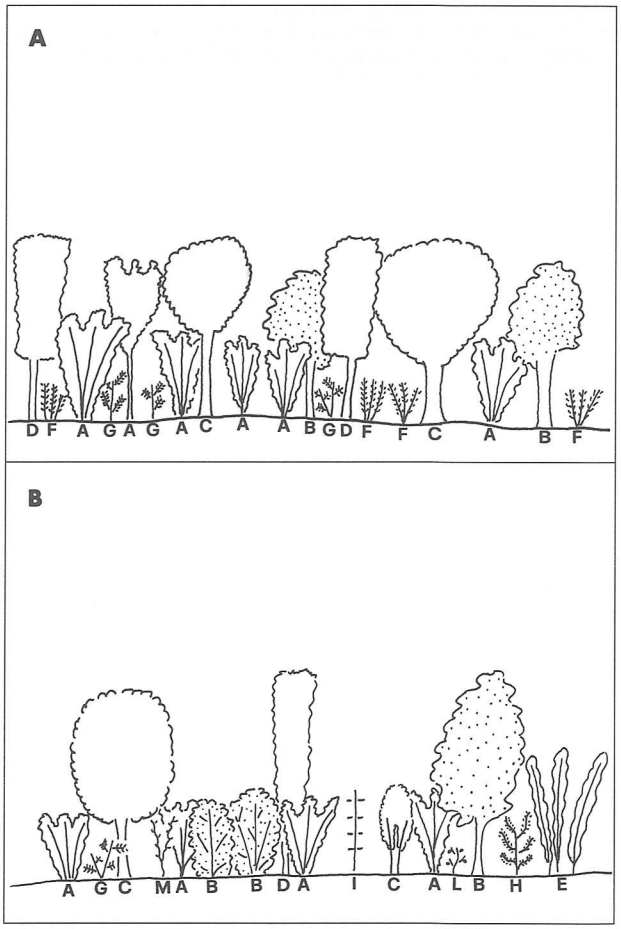

Figure 3 - Structure of the coenoses: 3a. station 1; 3b. station 2. The letters indicate the following species: A: *Carpinus orientalis*; B: *Quercus ilex*; C: *Q. pubescens*; D: *Q. cerris*; E: *Ostrya carpinifolia*; F: *Osyris alba*; G: *Ruscus aculeatus*; H: *Pyrus pyraster*; I: *Sorbus domestica*; L: *Ilex aquifolium*; M: *Crataegus monogyna*.

of the two stations resemble those reported by Polunin & Walters (1987) for woods with *Carpinus orientalis* Mill. in Illyria. The fact that the species was found exclusively on calcareous outcrops confirms its marked calcicolous character.

The present findings does may sustain both the hypotheses that i) the alliance *Ostryo-carpinion orientalis* is widespread throughout the Italian peninsula (Poldini, 1987; 1988) or ii) this area lies within the transition between the domains of *Ostryo-carpinion orientalis* and *Lonicero etruscae-Quercion pubescentis*, an ecological and geographic vicariant of the central-western European *Quercion pubescentis* and of the Balkan *Ostryo-carpinion* (Arrigoni & Foggi, 1988; Scoppola, *et al.*, 1993). These interesting reasons make it necessary to study the actual geographic and ecological distribution of *Carpinus orientalis* in southern Tuscany, particularly in view of the fact that the climate, geological substrate and floristic composition of this area are often those regarded as optimal for this species.

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