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ORIGINAL ARTICLE

## Irrigation regime as a key factor to improve growth performance of *Quercus suber* L.

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### Abstract

Cork oak (*Quercus suber* L.) is a Mediterranean evergreen tree species which plays a key economic role due to its precious bark. Cork oak stands start to become productive 30–40 years after planting, i.e. when commercial cork can be removed every 10 years after the first bark stripping, according to the laws in force. Forcing plant growth with appropriate irrigation, fertilization, top-dressing and stand density minimizes the time between cork oak planting and first bark stripping and makes commercial cork available earlier. In this study, the objective was to determine the influence of different irrigation regimes on cork oak growth. An experimental field was established near Tarquinia (Tuscia District, North Latium, Italy), within the natural cork oak range, to test the effects of irrigation regime on growth performance of cork oak. Three treatments were applied that differed in the amount and timing of water supplied. Treatments were replicated three times. Dendrometric and biomass parameters were measured at three different times for 2 years after planting and statistical descriptive analysis, as well as ANOVA, were used to evaluate the benefits of irrigation. Irrigation with  $4\text{ l m}^{-2}$  three times per week for 2 years improved diameter growth by 33% and shortened the time to first bark stripping by 6–10 years, thus producing substantial economic benefits.

**Keywords:** growth performance, irrigation influence, maximized production, *Quercus suber*.

### Introduction

Naturally restricted to the western Mediterranean (s.l.) regions, the cork oak (*Quercus suber* L.) is an emblematic evergreen tree that occurs in three out of 10 biodiversity hotspots in the Mediterranean basin. The natural range of *Q. suber* corresponds to areas with an oceanic Mediterranean climate. Its distribution is discontinuous, extending from the Atlantic coasts of North Africa and the Iberian Peninsula to the south-eastern regions of Italy (Apulia), including the main western Mediterranean islands and the coastal belts of Maghreb (Algeria and Tunisia), Provence (France) and Catalonia (Spain) (Simeone et al., 2009). Cork production is based on the periodical removal of the cork layer that covers the stem and branches up to a certain level, and on the capacity of the tree to regenerate new cork after

each stripping. This product is commonly used as raw material in several industries such as stoppers for wine bottles or cohibentation manufacture (Lopez Quero, 1995; Costa et al., 2001).

Wild cork grows on plants 18–30 years old, depending on soil fertility, but it is considered of poor quality because of its technological features (low cell density, high porosity, scarce compressive and flexural strength) and it is commonly used as grinding material. To produce high-quality commercial cork, oaks are grown in plantations where the cork can be easily harvested and trees managed. By law, the cork can first be removed when the bark reaches 25 mm in thickness. It typically takes 30–40 years from stand plantation to obtain the initial harvest of cork for normal oak growth rates in traditionally managed plantations. After the initial harvest of cork, the time between subsequent extractions is

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