The effects of treeshelters on the growth of *Quercus coccifera* L. seedlings in a semiarid environment

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Summary

In a field trial, the effects of five different types of treeshelter on the microclimatic conditions, survival, aerial relative growth rate (RGR) and root growth of *Quercus coccifera* L. seedlings were compared with the results obtained from seedlings of the same species grown without treeshelters. The tested treeshelter characteristics were: ventilation, height and material of which they were made. During the experiment the microclimatic conditions were monitored in order to control the factors affecting the seedlings' development. Results shows that a brown plastic protector of only 30 cm in height appears to be the most beneficial for biomass growth, both above and below ground. The more extensive development of the root system facilitates a faster growth rate as accessibility to soil water is increased. The benefit gained from such a shelter is probably due to the reduction of radiation inside the protector to around the optimum photosynthetic levels for the species, and also due to a small increase in the temperature compared with values detected in taller protectors. The shelter ventilation did not show a significant effect on root and biomass growth compared with unventilated shelters.

Introduction

The land restoration of degraded areas, wildfire-damaged forests and shrubland, as well as the revegetation of old fields (EC, 1999), is a priority in semiarid ecosystems in order to prevent the process of desertification. In the driest and most wildfire-affected areas, the regeneration of a layer of vegetation that guarantees the protection of the soil during the periods of intense rainfall is extremely difficult (Abad *et al.*, 1997). The restoration programmes of the Spanish Forestry Services frequently report very low survival and growth rates of the native and non-native introduced species (Vallejo and Alloza, 1999). Such a situation demands specific research in order to improve the survival of the plantations, introducing techniques of seedling treatments in the nursery, and improving the traditionally used methods of afforestation.

Among the available techniques (Domínguez *et al.*, 1999), the advantages gained by the use of any type of shelters arise both from physical protection from wind and animal browsing (Potter, 1991; Mayhead and Jenkins, 1992; Balandier *et al.*, 1995), and from changes in the micrometeorological conditions inside the shelters surrounding the seedlings. These micrometeorological improvements, which mean increases in temperature, air humidity and reduction of