Effects of pre-commercial thinning on transpiration in young post-fire maritime pine stands

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Summary

In the present study, the effect of heavy thinning on soil water content was investigated in relation to water use in an 8-year-old post-fire-regenerated maritime pine (*Pinus pinaster* Ait.) stand in northwestern Spain over two growing seasons. Three different treatment levels were selected: control (unthinned, 40 200 saplings ha^{-1}), intense thinning (leaving 3850 saplings ha^{-1}) and very intense thinning (leaving 1925 saplings ha^{-1}); sap flow measurements were made on 10 saplings in each treatment throughout two growing seasons following thinning. Soil water availability in thinned plots was 1.8 times higher in the first growing season and 2.5 times higher in the second season, than in the control plots. Sap flow density in very intensely thinned plots was lower than in the control plots 3–5 months after treatment. However, for the whole study period the mean sap flow density in saplings was higher in thinned plots than in unthinned plots (about double in the first growing season and 1.7 times higher in the second). Monthly transpiration at plot level was 8.8 and 4.4 times higher in control plots, than in very intensely and intensely thinned plots, respectively, in the first growing season, and 4.5 and 2.8 in the second season. Very intense thinning did not result in significant differences in saplings sap flow and transpiration at plot level, compared with intense thinning. Some consequences of these results for the management of such juvenile stands are discussed.

Introduction

Pinus pinaster Ait. is considered a fire-adapted species (Gil *et al.*, 1990; Agee, 1998; Keeley and Zedler, 1998; Tapias and Gil, 2000; Vega, 2000; Tapias *et al.*, 2004) and usually exhibits a good post-fire recruitment. When conditions are optimal, regeneration may even be extremely dense (Vega *et al.*, 2002; Madrigal, 2005). In this case, heavy thinning is recommended to regulate sapling competition, improve sapling growth and form, accelerate seed production to safeguard permanence of the species and to reduce fuel accumulation, especially in areas with a short fire return period (Vega *et al.*, 2002; Madrigal, 2005). However, water stress may increase after

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