

Evaluation of sap flow density of *Acacia melanoxylon* R. Br. (blackwood) trees in overstocked stands in north-western Iberian Peninsula

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Abstract Sap flow density and meteorological variables were monitored in a very dense *Acacia melanoxylon* stand (about 9,000 trees/ha) in north-western Iberian Peninsula during the growing season of 2006 (from 8 June to 24 August). Evidences of an increment of stomatal control on transpiration were observed during the study period, probably as a consequence of higher evaporative demand of the atmosphere. However, high sap flow density values observed for the whole study period (from 1.14 to 52.73 dm³ dm⁻² day⁻¹) were similar than those found for other fast-growing species. Mean transpiration for the whole study period was 2.21 mm day⁻¹, with a maximum value of 3.17 mm day⁻¹ and a minimum of 1.23 mm day⁻¹. Mean sap flow density values were correlated with crown length and crown ratio, relationships being fairly weak with other dendrometric parameters such as tree diameter or height. Mean transpiration values were correlated with main dendrometric parameters (diameter at breast height, total height, crown length, sapwood area and leaf biomass). It was found that the degree of competition per tree could be used as a good index for sap flow density. Taking into account the high tree density of the stand and the sap flow density values, water consumptions of *A. melanoxylon* can be very high,

playing a relevant role in the hydrological balances of the watersheds where it grows.

Keywords *Acacia melanoxylon* · Sap flow density · Potential evapotranspiration · Dendrometric parameters · Competition index

Introduction

Acacia melanoxylon R. Br. is an introduced species that has its origin in the temperate forests of south-east Australia and Tasmania. It is a versatile and highly adaptive tree species which has spread all over the world (Knapic et al. 2006), and currently covers a considerable area in the coastal area of the north-western Iberian Peninsula, both in monocultures and in mixed stands with *Eucalyptus globulus*. Forest plantations of this species started in north-western Iberian Peninsula at the beginning of twentieth century (Areses 1953), currently considered as invasive (Xunta de Galicia 2007), characterized by vigorous tree or root sprouts and with seed germination stimulated by fire. Contrary to the value given to the wood of *A. melanoxylon* as a carpentry and cabinet-making wood in its natural region (Jennings et al. 2003) and in other countries such as Chile (Pinilla-Suárez et al. 2006), *A. melanoxylon* has still not found a way into the timber industry in Europe.

This fast-growing species can play an important role in the hydrological balances of the watershed in which it grows. *A. melanoxylon* is found usually in high-density patches and can contribute significantly to forest water consumption in north-western Iberian Peninsula in forest catchments in which continually degraded *E. globulus* stands (by *Gonipterus scutellatus* Gill. attack, unsustainable forest harvesting, or repeated fires) are being naturally substituted by *Acacia*

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