

MANAGED FORESTS IN FUTURE LANDSCAPES

IMPLICATIONS FOR WATER AND CARBON CYCLES

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BOOK OF ABSTRACTS



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VERTICAL AND HORIZONTAL DISTRIBUTION OF THE ROOTS SYSTEM IN YOUNG FOREST PLANTATIONS IN RESPONSE TO SITE PREPARATION

FELÍCIA FONSECA¹, TOMÁS DE FIGUEIREDO¹, AFONSO MARTINS²

¹Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança (ESAB/IPB),
Apartado 1172, 5301-855 Bragança, Portugal, e-mail: tomasfig@ipb.pt.

²Universidade de Trás-os-Montes e Alto Douro,
Apartado 1013, 5001-911 Vila Real, Portugal, e-mail: amartins@utad.pt.

ABSTRACT

The distribution of roots in the soil results of a series of complex and dynamic processes, which include interactions between the soil, other environment elements and the plants in full growth. Most studies of root systems in forest species are conducted under water stress conditions; thus focusing on deep root development. This is a critical issue for the success of forest stands in the first years after plantation. In order to obtain information on the roots' vertical and horizontal distribution of *Castanea sativa* (CS) and *Pseudotsuga menziesii* (PM), observations were made 26 months after plantation of a mixed-stand in NE Portugal. Treatments compared in 375 m² experimental plots, represented different tillage intensities: (RLVC) subsoiling on planting row, followed by two plough passes, leaving furrow hillock surface soil and plantation in the hillock side; (RCLC) Continuous subsoiling followed by continuous ploughing and plantation in the furrow. To study the roots system, sixteen trees (8 CS and 8 PM) were selected, according to average height, in each plot. To expose the root system, trenches were carefully and manually opened, and all the roots were observed, quantifying the number, length, diameter classes, soil layer with greatest root density, soil volume explored by the roots, after what all roots were collected for biomass determination. Above-ground biomass was collected and quantified. The results show: (i) a deeper root system on CS, with higher proportion of roots in the 20-30 cm layer and more uniformly distributed in depth, whereas on PM the higher root density was found in the 10-20 cm layer; (ii) a volume of soil explored by roots greater on CS than on PM, this parameter having a higher value in treatment where the soil was more intensively tilled; (iii) root biomass, when classified according to estimated root diameter, has a fairly uniform distribution in CS, whereas in PM the finer roots represent a distinctly higher proportion of the root biomass; (iv) the above-ground biomass is 2 to 3 times higher than the below-ground biomass in CS and 3 to 4 times higher in PM.

KEYWORDS: root systems, site preparation, *Castanea sativa*, *Pseudotsuga menziesii*