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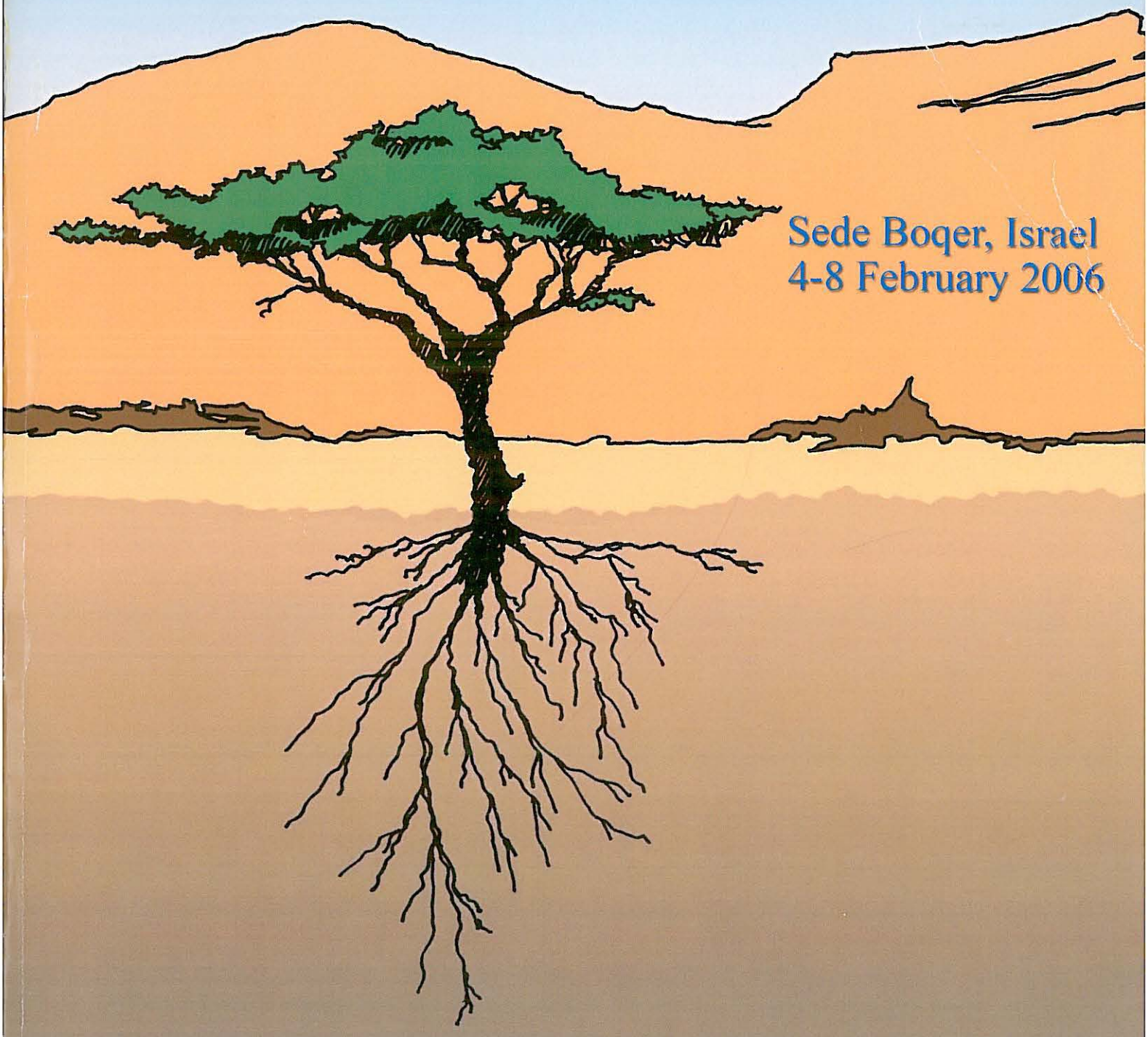
WOODY ROOT PROCESSES
REVEALING THE HIDDEN HALF



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COST E38: Woody root processes

DISTRIBUTION AND DEVELOPMENT OF THE ROOT SYSTEM OF *CASTANEA SATIVA* AND *PSEUDOTSUGA MENZIESII* IN YOUNG FOREST PLANTATIONS

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The distribution of roots in the soil results of a series of complex and dynamic processes, which include interactions between the environment, the soil and the plants in full growth (Prichett & Fisher, 1987; Jourdan e Rey, 1997; Gonçalves & Benedetti, 2000). Most studies of the root systems in forest species are conducted under water stress conditions; hence, the major concern focuses on the deep root development. Understanding the root system of forest species might enable recommendation on which species are more adequate to each site according to the characteristics of the latest, thus allowing a better use of the soil (Prichett & Fisher, 1987; Magalhães & Blum, 2000; Lecompte et al., 2001) and, consequently, mitigate the risks of mortality, pests and diseases (Curt et al., 2001).

In order to obtain information on the development of the root system of *Castanea sativa* (*CS*) and *Pseudotsuga menziesii* (*PM*), observations were made at 14 and 26 months after plantation, without and with destroying the trees, respectively. The following treatments, randomly distributed in three blocks, were tested in 375 m^2 experimental plots, representing different tillage intensities: (1) no previous subsoil mobilization with furrow-hillock surface soil with two plough passes and plantation in the hillock side (SRVC); (2) located subsoil mobilization, followed by two plough passes, leaving furrow-hillock surface soil and plantation as in (1) (RLVC); (3) continuous subsoil mobilization, followed by two plough passes, leaving furrow-hillock surface soil and plantation as in(1) (RCVC); (4) continuous subsoil mobilization followed by continuous plough and plantation in the furrow (RCLC). To study the root system at 14 months, 4 trees were randomly chosen (2 *CS* and 2 *PM*), per treatment and block. Holes were open near the trees, one parallel and another perpendicular to the planting line, and by means of a 50 x 50 cm grid, 2 x 2 cm mesh, the root parameters were quantified: number, length, diameter classes, soil layer with greatest root density and soil volume explored by the roots. At 26 months, four trees were observed (2 *CS* and 2 *PM*) in treatments RLVC and RCLC, in two blocks, and 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 in their full length, collected and all the above-mentioned variables quantified. Above-ground biomass was collected and quantified. The results show: (i) on *CS* a deeper root system, 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 the more intensive treatments; (iii) root biomass, when classified according to estimated root diameter, has a fairly uniform distribution in *CS*, whereas in *PM* the thinner 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: forest species, root systems, soil mobilization