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ENITA de Bordeaux

INTERNATIONAL SYMPOSIUM

**Forest soils under global and local changes :
from research to practice**



ABSTRACTS



**15 to 18 September 2004
Bordeaux, FRANCE**

**The effect of site preparation intensity on root development,
mortality and growth, in *Castanea sativa* and *Pseudotsuga menziesii*
species of young forest plantations**

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Abstract

In Portuguese conditions, the productivity of most soils used for forest plantations is limited by low root support, low available water volume and low nutrient availability. This requires soil preparation operations before planting, using more or less intense tillage in order to decrease those limitations. However, there is a lack of information concerning the effect of those operations on soil properties and plant behaviour. In order to improve the knowledge about this subject, a study is conducted supported by an experimental field established near Bragança, NE Portugal. This field was established in 2001, at 700 m height, mean annual rainfall 1000 mm, mean annual temperature 12°C and Mediterranean climate conditions, consisting of six treatments, randomly distributed, in plots with 375 m² area and comprising three blocks, each one in different topographic positions (near flat plateau, gentle slope shoulder, steep mid-slope). *Pseudotsuga menziesii* (*PM*) and *Castanea sativa* (*CS*), were used as forest species, on 4 × 2 m density and separated lines (2 for *PM* and 2 for *CS*), with 12 plants on each line by plot. The following treatments were applied: (a) No tillage and hole plantation with hole digger (SMPC); (b) Continuous subsoil mobilisation, using a covering shovel and plantation in the furrow (RCAV); (c) No previous subsoil mobilisation with furrow-hillock surface soil with two plough passes and plantation in the hillock side (SRVC); (d) Located subsoil mobilisation, followed by two plough passes, leaving furrow-hillock surface soil and plantation as in (c) (RLVC); (e) Continuous subsoil mobilisation, followed by two plough passes, leaving furrow-hillock surface soil and plantation as in (c) (RCVC); (f) Continuous subsoil mobilisation followed by continuous plough and plantation in the furrow (RCLC).

The deepness and density of root system, mortality after plantation, before summer period and after that and growth (height and diameter) during the two first years, were quantified on both planted species. The obtained results shows: (i) root density is higher on *PM* at 10-20 cm depth while *CS* shows a deeper

rooting system with higher density at 20-30 cm depth and higher soil volume exploited, especially on more intense treatments; (ii) after plantation and before summer period the highest mortality was observed on the lowest intensity treatments (SMPC and RCAV), and also on the highest intensity treatment (RCLC); (iii) after summer, the higher mortality was also observed on the lowest intensity treatments, while the lower values were detected on the intermediate treatments (SRVC and RLVC); (iv) plant growth (height and diameter) is similar in the different treatments, but, growth, when expressed as absolute value, is higher on *PM* than on *CS*, and, when expressed as relative increments in plant diameter, is higher in *CS* than in *PM* and always higher during the second year after plantation.