Fine root density, branching pattern and mycorrhizal diversity across Pinus pinaster stands in south west France: methodology and first results


To cite this version:
Claude Plassard, Céline Meredieu, Mark Ronald Bakker, Frederic Danjon, Pierre Trichet, et al.. Fine root density, branching pattern and mycorrhizal diversity across Pinus pinaster stands in south west France: methodology and first results. COST 38 Meeting, Roots, mycorrhizas and their external mycelia in carbon dynamics in forest soil, Sep 2006, Rovaniemi, Finland. n.p., 2006. hal-02814725

HAL Id: hal-02814725
https://hal.inrae.fr/hal-02814725

Submitted on 6 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Fine root density, branching pattern and mycorrhizal diversity across Pinus pinaster stands in south west of France: methodology and first results

1Rhizosphère & Symbiose, INRA-Agro-M, Montpellier; 2Ecologie fonctionnelle et physique de l’environnement, INRA, Bordeaux; 3, 4Transfert sol-plante et Cycles des Éléments minéraux dans les Écosystèmes Cultivés, IENITAB & INRA, Bordeaux; 5Mycologie & Sécurité des Aliments, INRA, Bordeaux; 6Laboratoire des Symbiose Tropicales et Méditerranéennes, INRA-IRD-CIRAD-Agro-M, Montpellier - FRANCE

Objectives
The Pinus pinaster forest in South-west France produces the fifth of French wood. It covers 0.9 million hectares over sandy spodosols and is characterised by a large variation in productivity. As a contribution for understanding these variations we carried out a project aimed at linking them to both hydrological and nutritional soil status.

Methods
25 experimental plots were selected in order to cover a range of forest productivity, fertilisation and water availability levels. Site productivity was estimated from a standard forest inventory carried out in 2005. In April 2006, 8 pairs of sample points (soil cores 15 cm deep and 8 cm diameter) were chosen on the free line and between the tree lines close to random selected trees. Figure 1 gives the procedure applied to core soils and the experimental data obtained. Statistical analysis of data was carried out to compare plots without any P application (control) or with P application once at the plantation (standard), or repeated P (P) or N (N) application; in addition, P or N plots received irrigation or not (irrigated or not irr).

Results
Root parameters: Fine root length density (FRLD) and specific root length (SRL) were affected by fertilisation, especially by repeated fertilisation, and not by irrigation (Fig. 2).

Root branching, estimated by the total number of short roots (SR), ranged from 37 to 45 SR/m root and was little affected by fertilisation or irrigation (not shown).

Ecotomycorrhizal diversity: Number of ECM types ranged from 2 to 13 among the sites and examples of ECM are given in figure 3. However, mean ECM types per treatment ranged from 4 to 8 and was not significantly affected by fertilisation, irrigation or water availability.

Conclusions and perspectives
To our knowledge, our methodology to address the question of productivity determinism of Pinus pinaster stands has not been used before. The first results show that there are differences between experimental plots affecting root growth and ECM activities. This first set of data will be completed by a second campaign in November 2006, the whole data should enable us to carry out a statistical analysis between stand productivity and all the studied variables. In addition, this project should provide information about the actual role of ECM and their associated bacterial populations on organic P mobilisation.

Acknowledgements: This study is financially supported by ECCO-PNBC (2005-2006 project), INSU, FRANCE
For all information, contact: Claude.Plassard@ensam.inra.fr