



HAL
open science

Spring and autumnal P availability, fine root properties and functional mycorrhizal diversity across *Pinus pinaster* stands with different productivity in southwest France

Claude C. Plassard, Mark Ronald M. R. Bakker, Pierre Trichet, Céline Meredieu, Frederic F. Danjon, Jacques Guinberteau, Laurent Augusto, Etienne Saur, Odile Domergue, Antoine Galiana, et al.

► To cite this version:

Claude C. Plassard, Mark Ronald M. R. Bakker, Pierre Trichet, Céline Meredieu, Frederic F. Danjon, et al.. Spring and autumnal P availability, fine root properties and functional mycorrhizal diversity across *Pinus pinaster* stands with different productivity in southwest France. 4. International Symposium on Dynamics of Physiological Processes in Roots of Woody Plants, Sep 2007, Bangor, United Kingdom. 1 p. hal-02821961

HAL Id: hal-02821961

<https://hal.inrae.fr/hal-02821961>

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.

Spring and autumnal P availability, fine root properties and functional mycorrhizal diversity across *Pinus pinaster* stands with different productivity in southwest France

C. Plassard^{1*}, M.R. Bakker³, P. Trichet², C. Meredieu², F. Danjon², J. Guinberteau⁵, L. Augusto⁴, E. Saur³, O. Domergue⁶, A. Galiana⁶, Y. Prin⁶, A.A. Muhammad¹, P. Hinsinger¹, B. Jaillard¹, S. Pellerin⁴, D. Loustau²

¹Rhizosphère et Symbiose, INRA-SupAgro, Montpellier

²INRA EPHYSE, Ecologie fonctionnelle et physique de l'environnement, Villenave d'Ornon, centre de Bordeaux

^{3,4}UMR Transfert sol- plante et Cycles des Eléments minéraux dans les Ecosystèmes Cultivés, ³ENITAB & ⁴INRA, Bordeaux

⁵UMR Mycologie & Sécurité des Aliments, INRA, Bordeaux

⁶Laboratoire des Symbioses Tropicales et Méditerranéennes, INRA-IRD-CIRAD-Agro-M, Montpellier, France

* Author for correspondence : Tel +33 4 99 61 29 79, Fax +33 4 99 61 30 88, email: plassard@montpellier.inra.fr

- The *Pinus pinaster* forest in south west France covers 0.9 million hectares, mainly on acidic sandy, nutrient-poor spodosols. This forest produces the fifth of French wood and is characterized by a large variation in productivity. We aimed at linking these variations to plant root, mycorrhizal parameters and nutritional soil status.

- Twenty-seven sites were selected so as to cover a range of site productivity, phosphorus and nitrogen fertility and water availability levels. These include fertilizer trials and other monitoring sites both on humid and dry environments. Site productivity was estimated from a standard forest inventory operated in 2005. In April and November 2006 eight pairs of sample points were chosen in the tree lines and between the tree lines closeto randomly distributed trees. Soil P status (Olsen P and total organic P), diversity and phosphatase activities of ectomycorrhizae (ECM) and their associated bacteria were determined in 15x8 cm cylindrical soil cores. Also, the following root parameters were measured: Fine Root Length Density (FRLD), Specific Root Length (SRL), vitality of apices and ECM colonization degree.

- Grouping samples according to sample position, fertilization, stand age or water availability shows that both P forms were greater in April than in November. Olsen P level was significantly higher only between the tree lines of annually fertilized plots compared to all other plots. All root parameters were significantly higher in November than in April. Only SRL and vitality of apices increased as a response to P fertilization. On the contrary, P-solubilizing capacities of mycorrhizospheric bacteria were greater in control plots with no P fertilizer. ECM pNPPase activities were always measurable and tended to decrease as a response to intensive fertilization.

- Differences between sites were striking. Although multivariate statistical analyses should help us to draw the relationships between tree productivity, biotic and abiotic factors in the root environment, our first results suggest that biotic parameters may be more sensitive than physical parameters to silvicultural treatments and environmental conditions.