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### ► 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-02821961v1>**

Submitted on 6 Jun 2020

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

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- 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.