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Study of the NPF and NRT transporter families in the conifer Pinus pinaster.

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Nitrogen, in natural environments, is the main limiting nutrient for plant growth and development[1]. This essential element can be presented in different forms in the soils being the two main forms nitrate and ammonium, although the relative abundance of these compounds depends on environmental conditions. In plants, nitrate uptake and transport involve the function of specific transporters, mainly of the NRT and NPF families. Genes encoding these transporters have been well studied in crop plants since in agricultural soils nitrate has become the predominant nitrogen compound as a result of the intensive use of fertilizers[2]. However, in soils of the large conifer forests dominating the boreal ecosystems, ammonium is the main source of inorganic nitrogen due to the limited nitrification process[3]. Consequently, conifers have been told to have a preference for ammonium over nitrate and only limited information is available about nitrate transporters in these gymnosperms.

Maritime pine (*Pinus pinaster* Aiton) is a conifer tree with a wide distribution in the western Mediterranean region and with a great morphological and physiological plasticity. This pine also has a good resistance to abiotic stress[4]. In maritime pine, the genomic resources have been improved in the last few years[5] allowing the identification and molecular analysis of members of the NRT and NPF gene families[6].

Growth and development responses have been compared on pine seedlings cultured under different nitrate and ammonium supplies. Gene expression have been analyzed and the results show a strong expression of different genes related with the uptake, transport and assimilation of nitrate in plants such as nitrate and nitrite reductases, glutamine synthetase and some genes from the NRT and NPF families, suggesting they are involved in nitrate acquisition from soil. Furthermore, the potential interaction between transporters of the NRT3 family and transporters of the NRT2 and NPF families is currently under study aiming for a better understanding of nitrate transport and uptake regulation in pine.

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