

New study shows benefits of ammonium for pine root growth

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New study of UMA shows benefits of ammonium for pine root growth. Credit: University of Malaga

In ecological terms, coniferous formations represent the biggest terrestrial carbon sink, they play an essential part in the pollination of the

ecosystems where they grow and, moreover, help improve agricultural production. At the same time, from an economic point of view, they are the main source of raw material for wood industries.

This is confirmed by researchers of the groups of Biotechnology and Molecular Biology and the Integrative Molecular Biology Lab of the University of Malaga, who have conducted an unprecedented study whereby they evidence the benefits of [ammonium](#)—one of the most abundant forms of inorganic nitrogen available in soils—for the development of the roots of a specific conifer: the pine.

"An appropriate development of roots enables the establishment and proper growth of plants, which is essential for [crop production](#)," explains Rafael A. Cañas, head of the study, recently published in the scientific journal *Plant, Cell & Environment*.

Thanks to this study, they could evidence that, although excessive amounts of ammonium can cause toxicity in most [plants](#), conifers show higher tolerance, as they do not suffer adverse effects.

"This finding is highly important, since it is a first step to discover new molecular mechanisms involved in the presence of ammonium, which will enable higher crop production with a more effective and resilient [root](#) system," assures the researcher of the UMA Francisco Ortigosa.

State-of-the-art techniques

The use of state-of-the-art techniques, such as tissue isolation by laser capture microdissection, which enabled the identification of different regulators of root growth and architecture, was essential for this research.

Likewise, in collaboration with Professor Shu Taira of the Fukushima

University (Japan), the researchers applied a cutting-edge technique of mass spectrometry to determine how ammonium affects the distribution of phytohormones in growth areas of pine roots.

Future source of nitrogen

The scientists of the University of Malaga propose ammonium as the best source of nitrogen in the future. This way, one of the next steps of this study is performing comparative analyses with other plant species with higher sensitivity to ammonium nutrition and great agronomic value.

All this, as they say, will allow them to identify genes eligible to be used as biotechnological tools to obtain new crop varieties, which are very useful to avoid [soil erosion](#), as well as better adapted to the current atmospheric CO₂ increase, and help ensure the [agricultural production](#).

More information: Francisco Ortigosa et al, Ammonium regulates the development of pine roots through hormonal crosstalk and differential expression of transcription factors in the apex, *Plant, Cell & Environment* (2021). [DOI: 10.1111/pce.14214](https://doi.org/10.1111/pce.14214)

Provided by University of Malaga

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