

A new innovative way to fertilize through leaves

October 14 2014

A study conducted by researchers from UPM and the UAH suggests that foliar fertilization could be used as a tool in order to produce plants for high quality reforestation.

Various nitrogen sources were tested in this study in order to fertilize pine leaves and oak leaves instead of using the traditional fertilization which is based on the nitrogen [absorption](#) through the root. After assessing the efficiency of leaf nitrogen uptake of the two studied [species](#), the researcher team from Universidad de Alcalá and Politécnica de Madrid concluded that this fertilization system can be an efficient tool to complement radical fertilization regimes in order to improve plant nurseries and to plantations in nutrient-poor soils or arid conditions.

Foliar feeding is used in agriculture to rapidly and precisely control the nutrition of plants. This technique has not been tested in the forestry area, but its application for nursery production can provide solutions to improve plant quality produced for afforestation.

Researchers have used four types of [nitrogen fertilizers](#) in this study (urea, nitrate, ammonium and glycine) in two Mediterranean species typically used in restoration: the holm oak (*Quercus ilex* L.) and the Aleppo pine (*Pinus halepensis* Mill.). By using a stable isotope of nitrogen (N), researchers assessed the absorption efficiency of various nitrogen sources for both species. They observed that the best absorbed source was urea, followed by ammonia, glycine, and finally, the nitrate.

These differences among the four sources can be explained due to their physicochemical properties as polarity, hygroscopicity, and solubility of compounds.

Likewise, the holm oak absorbs via foliar better than the pine, and this is associated to different anatomical properties at leaves scale, such as stomatal density. Researchers have found within every species a close relationship between cuticle permeability and foliar absorption although this relationship can vary depending on the fertilizer used. Besides, the usage of organic sources such as glycine is something new in these types of research.

Throughout this study, researchers confirmed that the two species studied can absorb intact glycine via foliar. The foliar feeding caused an increase of the plant [nitrogen](#) content in the oak and the pine studied and all the products used.

The results confirm that foliar feeding is a suitable tool to complement the traditional methods of nursery fertilization based on the radical absorption (pointing out the urea as the most efficient fertilizer). Besides, foliar feeding could be a tool potentially useful in forest plantations and in situations in which absorption via radical is not possible. Likewise, the differences observed at the absorption rates between both species will allow researchers to predict the effects of atmospheric deposition on forest systems depending on the dominant species.

More information: Uscola, M; Villar-Salvador, P; Oliet, J; Warren, Charles R. "Foliar absorption and root translocation of nitrogen from different chemical forms in seedlings of two Mediterranean trees." *Environmental and Experimental Botany* 104: 34-43. [DOI: 10.1016/j.envexpbot.2014.03.004](https://doi.org/10.1016/j.envexpbot.2014.03.004). AUG 2014.

Provided by Universidad Politécnica de Madrid

Citation: A new innovative way to fertilize through leaves (2014, October 14) retrieved 25 April 2024 from <https://phys.org/news/2014-10-fertilize.html>

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