**You are NOT what you eat: the hopeless lack of homeostasis in N/P stoichiometry under chronic N deposition in *Abies pinsapo* forests**

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Although N deposition may increase forest primary production in the short term, it can lead to the forest decay associated the N saturation syndrome when deposition becomes chronic. Under these conditions, changes in nutrient stoichiometry are promoted, resulting in a shift in the primary limiting nutrient, from N to P. Several studies developed in temperate regions have already described the relationship between high N deposition rates and P deficiencies. However, studies in the Mediterranean region are really scarce despite its singularity in the way Mediterranean ecosystems respond to N deposition, which does not easily fit in the accepted N saturation paradigms.

In order to evaluate the applicability of N saturation models in Mediterranean ecosystems we have focused on *Abies pinsapo* fir forests, an endemic temperate-like species subject to the Mediterranean seasonality, where an N deposition geographic gradient exist around the industrialized area of Campo de Gibraltar.

Our main goal has been to perform a diagnosis of the nutrient stoichiometry in the trees in order to evaluate unbalancing nutrient contents reflecting N saturation and P limitation. We have compared forest stands close to the N source (N saturated) vs. stands located further from the source (N limited). Besides, we have developed a compensatory P fertilization experiment to show up the role of N and P interactions in the development of the N saturation syndrome and P limitation in trees and to evaluate the alleviation of the N saturation symptoms and the eventual retrieval of primary production.

In this sense we have evaluated the response of trees from stands along a deposition gradient and under the P fertilization treatment at several hierarchical levels: *i*, the genomic level, examining differential gene expression, *ii*, the biochemical level attending to the accumulation of amino acids as a detoxification mechanism and the N/P content in the different age needles (up to 5 years), and *iii*, the ecohpysiological level, evaluating photosynthetic rates and N and P photosynthetic use efficiency.

Due to the high longevity of *A. pinsapo* needles we have extended the evaluation of the N/P relationships in up-to-15-years-old needles, including the evaluation of needle functional traits and the fate of N by means of the addition of 15N in different needle cohorts, and have made a comparison with *Pinus pinaster* trees located in the same places and with much lower needle longevity, in order to reveal the different strategies of both species under N saturation.