# Foliar manganese concentration as a proxy for root carboxylate exudation in native species from southern Chile

Panel

Interacciones Planta-Ambiente

**Francisca Mayorga [1],** Yoselin Cerda [2], Veronique Amiard [2], Patricio Javier Barra [2], Mabel Delgado [2].

(1) Universidad de la Frontera, Carrera de Biotecnología, Facultad de Ciencias Agropecuarias y Medio Ambiente, Av. Francisco Salazar 01145, Temuco, Chile..
(2) Universidad de La Frontera, Centro de Interacción Suelo-Planta y Biotecnología de Recursos Naturales, Núcleo Científico Tecnológico en Biorecursos (BIOREN-UFRO) (BIOREN), Av. Francisco Salazar 01145, Temuco, Chile..

frac.m.mayorga@gmail.com

Native forests of southern Chile often grow on nutrient-poor volcanic soils, which has driven the evolution of adaptive strategies to optimize nutrient acquisition. Among these, the exudation of carboxylates by roots enables the mobilization of soil-bound phosphorus (P). Recent studies suggest that foliar manganese ([Mn]) concentration can be used as an indirect indicator of such exudation, although this relationship has not yet been evaluated in native South American species. The aim of this study was to assess whether foliar [Mn] correlates with root carboxylate exudation across different native species.

We evaluated eight native tree species differing in shade tolerance and fertility requirements: *Drimys winteri*, *Maytenus boaria*, *Embothrium coccineum*, *Podocarpus salignus*, *Saxegothaea conspicua*, *Gevuina avellana*, *Caldcluvia panniculata*, and *Aextoxicon punctatum*. Eight-month-old seedlings were cultivated in sand for four months (spring season) in greenhouse conditions. At the end of the experiment, foliar and root [Mn] concentrations and root-exuded carboxylates were quantified for each species.

Results revealed marked interspecific variability. In general, light-demanding species with lower nutrient requirements exhibited greater carboxylate exudation (mainly citrate and malate) and higher foliar [Mn] concentrations. A positive correlation between foliar [Mn] and root carboxylate exudation was observed in specific species ( *E. coccineum*, *C. panniculata*, *A. punctatum*, *D. winteri*, and *P. salignus*), although no significant correlation emerged when all species were analyzed together. We conclude that foliar [Mn] can serve as a useful proxy for root carboxylate exudation, but its reliability varies among species. Understanding the adaptive strategies that enable native plants to thrive on nutrient-impoverished soils is critical to improving nursery practices for conservation and supporting their effective integration into ecological restoration efforts.

**Acknowledgments:** FONDECYT Regular N° 1210684, 1241293; ANID/Anillo ATE220038.

**Palabras Clave**

(1) roots strategies, (2) native plants, (3) phosphorus acquisition.

**Financiamiento:**

FONDECYT Regular N° 1210684, 1241293; ANID/Anillo ATE220038.