

Interactions between invasive earthworms, arbuscular mycorrhizal fungi and diazotrophic bacteria on native araucaria pine seedling performance

Martins Azevedo Trigo Priscila¹, Dilmar Baretta², Brown George³, Jurandy Bran Nogueira
Cardoso Elke¹

¹Escola Superior de Agricultura "Luiz de Queiroz" / Universidade de São Paulo (ESALQ/USP)

²Centro de Educação Superior do Oeste, Universidade do Estado de Santa Catarina

³Embrapa Florestas

The *Araucaria angustifolia* is a tree of high lumber and resin values, a source of food, and the most important tree in the Mixed Subtropical Ombrophilous forest in Brazil, a rich ecosystem with many endemic species. However, due to intense exploration for decades, the Araucaria is presently considered a critically endangered species, and the understanding of this ecosystem is fundamental for conservation and regeneration purposes. Soil organisms such as earthworms, arbuscular mycorrhizal fungi (AMF) and diazotrophic bacteria play an essential role in nutrient cycling and can increase plant performance. Many studies have evaluated the impact of each of these organisms independently, but few have studied their interactions. Therefore, the aim of this study was to evaluate the inoculation effects of invasive earthworms (*Amyntas corticis*), AMF (*Gigaspora rosea*) and an isolated of diazotrophic bacteria, and the interactions between each of these, on the performance of *A. angustifolia* seedlings. The plants were grown in greenhouse conditions in a block-type randomized design with a factorial layout of 2x2x2, being: presence and absence of earthworms (*A. corticis*), presence and absence of AMF (*G. rosea*) and presence and absence of diazotrophic bacteria (isolated S32274), in eight replicates, evaluated at 150 and 250 d after transplanting. The following parameters were evaluated: plant height and diameter, shoot and root biomass, shoot nutrient content (P, N), number of AMF spores, root mycorrhizal colonization rate and earthworm survival, reproduction and fresh biomass. Plant biomass and shoot nutrient content were affected by the three-way interaction of earthworms, AMF and bacteria. AMF inoculation enhanced *A. angustifolia* performance, while bacterial inoculation alone had no significant effect on plants, and earthworms had low survival rates and tended to reduce plant biomass. Microbial-faunal interactions can lead to important changes in plant growth and should be considered in future research and development of sustainable Araucaria forest management practices.