

II International Symposium Mycorrhizal Symbiosis in South America

6th-8th March 2019 - Bariloche, Argentina



island where, at the beginning of the last century, the Argentine government started a project to introduce many tree species to see which would grow better in the region. To this end, they planted over 130 tree species from all continents but Antarctica. In this area pines are able to spread but only to areas relatively near the original plantations. With a series of greenhouse and field studies, coupled with molecular analyses, we found that appropriate fungi were missing far from the plantations (ca. 2000 m), and this absence is halting the spread of introduced trees. Co-invasion of trees and their associated fungi is happening on the island since trees associate only with nonnative ectomycorrhizal fungi. Also nonnative mammals, mainly European deer and wild boar, seem to be the main drivers of the dispersal of fungi. Feces of deer and wild boar contained spores that can inoculate Pinaceae. With detailed surveys and molecular analyses, we found that some fungal species appear to have a high dispersal ability (notably the Suilloids), and other fungal species seem to be confined to the original plantations. A few species of fungi (Suilloids) dispersed by nonnative mammals seem to be driving the pine invasion on Isla Victoria. These results highlight the importance of soil biota to explain the pattern of spread of highly invasive trees in the Pinaceae family. Without an understanding of the ecology of soil biota, it would have been difficult to understand the detailed mechanisms of the observed pattern of tree invasion.

Keywords: *biological invasion, ectomycorrhiza, Isla Victoria, Pinaceae*

12.05 – 12.20 pm

OS19

Forest management and seasonal effects on the diversity and ecological function of soil fungi in a Northwestern Patagonian shrubland

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The shrublands of the Andean-Patagonian region present high biodiversity and provide multiple ecosystem services, being one of the ecosystems with higher forestry activities in the region. Several natural and anthropogenic factors influence the soil fungus community. These microorganisms play a central role in ecosystem functioning and interaction with different species. Our objective was to evaluate the effects of forest management and season (autumn vs. summer) in the soil fungal community and their ecological function. Eight experimental plots were established in a native shrubland combining: thinning intensity (basal area removed 70, 50, 30 and 0%) and implantation of native tree species (implanted and not implanted). A soil sample/plot was collected in autumn and summer, one year after the forest management. We determined soil community characteristics and ectomycorrhizal occurrence of a dominant native tree (*N. antarctica*). The fungal soil community analysis was performed with the Roche Sequencing using the entire ITS region of fungal nrDNA (ITS1F-ITS4). The taxonomic classification were RAPD with UNITE/QIIME database and were assigned a trophic mode using FUNGuild database. Then, a

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NMDS test was performed using Bray-Curtis dissimilarity. All *N. antarctica* adults had high values of ectomycorrhizal colonization (~80%) with non-significant differences between plots. At fungal classes, only a correlation was observed between taxonomic diversity and the season. The abundance of Eurotiomycetes and Dothideomycetes (including other mycorrhizal fungi, such as *Cenococcum*) was higher in autumn, while Sordariomycetes, Tremellomycetes and Leotiomycetes abundance was higher in summer. When the trophic modes were analyzed there were no correlation between them, the season, the thinning or the implantation. The saprotrophs and sapro-symbiotrophs were the most abundant trophic mode, represented by the genera *Hygrocybe* and *Mortierella* in both seasons. After this general behavior, the pathogens and symbionts that followed them in abundance presented different trends between seasons. Autumn was associated with the pathogen mode and summer with the symbiotrophic mode, particularly represented by ectomycorrhizal fungi with greater abundance of *Cortinarius*, *Descomyces* and *Inocybe*. The results suggest that in a Patagonian shrubland seasonal factors influence fungal diversity, at the class and gender level, and ecological function. Management factors do not appear to be determinant after one year of established thinning intensity and implantation of native tree species.

Keywords: *ectomycorrhizal fungi, Nothofagus antarctica, seasons and soil characteristics*

INVITED SPEAKER: Dr. Lucas Garibaldi

12.20 – 12.40 pm

O107

Sustainable management of the native mixed forest: aerial and belowground interactions between plants and insects

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The loss of native forests and the services that these provide is a problem of great relevance in Argentina and worldwide. Such loss is partly due to the lack of technologies that allow producers to use the forest sustainably, both in economic and environmental terms. In Río Negro, the native mixed forest, one of the most diverse in the region (also known as tall shrubland), has been historically replaced by livestock systems or by afforestation with exotic species. In three mixed forests of Río Negro, we are evaluating the relationship between economic profitability and the environmental impact of 8 management practices. These practices result from a factorial design at the plot level (1418 m² each), which includes 4 harvesting intensities crossed with plantation of native tree species (plots with or without plantation). At the transect level within the plot, we planted 3 origins of each of 6 native tree species (one species per transect). These practices prioritize different forest products, such as firewood and non-wood products in the unplanted plots vs. timber in the planted plots, and we expect them to have different environmental and economic impacts. We are evaluating the response of quantitative plant-insect interaction networks, both

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aerial and belowground, focusing on plant-pollinator interactions, plant-leaf herbivores and plant-root herbivores. Insects are an important component of the biodiversity of Patagonian forests, which in turn can have an impact on forest productivity and timber quality as well as on non-wood products. We will evaluate leaf quality for herbivores and physical-chemical characteristics of soils that impact both plants and insects. We will relate the impact of practices on quantitative networks of plant-insect interaction with aspects of economic profitability (e.g. product quality, target market and price). From the point of view of the implementation of local and regional policies, we will provide information lacking on management technologies, economic profitability and environmental impact that will contribute to the adequate implementation of the Law 26,331 of Minimum Budgets for the Protection of Native Forests. For example, our results will contribute to the allocation of economic incentives to producers by Law 26,331 according to the economic profitability and the environmental impact of the practices proposed in their management plans. From the global and conceptual point of view, our results will be novel contributions on less explored aspects of agricultural and forestry theory, such as the simultaneous interaction of a diverse group of plants and insects and their consequences on the belowground and aerial processes.

Keywords: *ecological intensification, forest management, biodiversity, ecological interactions, ecosystem services*

CONFERENCE: Dr. Maarja Öpik

2.15 – 2.55 pm

C05

Arbuscular mycorrhizal fungi under the pressures of environmental change

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Current global environmental change has palpable influence on humans and nature alike. Soil biota, including fungi in soil and plant-symbiotic arbuscular mycorrhizal (AM) fungi are directly and indirectly influenced by changes in climate, increased frequency of extreme weather events, changed and increasing anthropogenic pressure, including loss and fragmentation of habitats as well as invasion of non-native species. The various aspects of global change influence other biota, which in turn change the biotic and abiotic environment for AM fungi. In my presentation I will address the current knowledge on how land use and its change influences AM fungal diversity and functioning. Further, I will explore how the less-studied non-nutritional functionalities of AM fungi such as drought protection matter under the conditions of fluctuating weather. I will also look into the scenarios where AM fungi can be successfully applied to improve vegetation restoration. I will conclude with looking into the most burning knowledge gaps on the way of fostering soil biota, including AM fungi, for global change mitigation and adaptation.

Keywords: *arbuscular mycorrhiza, land use, environmental change, diversity*