Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title: **Resisting climatic stress based on the evolutionary proximate trees**

Project ID: 261

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Context

Forests are experiencing the results of climate-change, with dominant tree species starting to decline in many areas. Numerous options are being considered as ways to maintain forests under continued climate change. One option that is of increasing interest is importing species from regions of a drier climate. However, there are possible risks in implementing such assisted migration: native animals and fungi might not be able use these imported tree species or genotypes, the introduced species might become invasive, or alternatively fail to adapt well to the local soil and biotic conditions. For this reason, forest management strategies favoring the resistance or resilience of native species would be preferable. I propose such strategies, taking into account the interactions between trees via the mutualists or natural enemies shared among trees. Forests are often composed of evolutionary proximate trees. On the one hand, evolutionary proximate trees are more likely to share or exchange enemies and diseases. On the other hand, evolutionary proximate trees might benefit from the presence of shared mutualists, such as mycorrhizae. Thus, my overall hypothesis is that resistance to climatic stress might increase in a plot with more close relatives (due to increased mutualist support) or might also decrease (due to increased enemy pressure). Manipulating the evolutionary proximity of trees might be an effective strategy to maintain native trees despite climate change.

Scientific Objectives

I will test: (1) whether trees in a plot with a larger number of close relatives had better performance ('Growth and Yield', 'Tree vitality','Foliage','Tree Phenology','Leaf Area Index'); (2) whether trees in a plot with a larger number of close relatives had more litter fall and whether that litter fall decomposed more rapidly; (3) I will also test the relationship between 'Meteorological Measurements' / 'Soil Chemistry' and tree performance, to determine whether trees in a plot with a larger number of close relatives are better resist for adverse climatic conditions. (4) Finally, I will test whether the tolerance or climatic plasticity of trees to adverse climatic conditions increases the resistance to or resilience of the entire forest to climate change. I predict that trees in plot with more close relatives (1) will have better performance, and (2) can compensate for adverse climatic conditions.

Statistical Methods

I will select as many focal species as possible, based on the species composition shared by the plots. Then, I will quantify the mean phylogenetic distance of each species to other plants in the plot based on phylogenetic classification. I will use GLMs to explore the effects of phylogenetic distance, climate variables, and their interaction on the performance of each plant.