EGU2020-20202
https://doi.org/10.5194/egusphere-egu2020-20202
EGU General Assembly 2020

Effect of tree native species assemblages on C, N & P contents of burned soils

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Keywords: Assemblage, Interaction, nutrients

Forest fires can cause a temporary nutrient deficiency or imbalance in the soil. Post fire forest restauration could be enhance by simulating process of vegetation succession taking advantage of beneficial interaction between species (e.g. facilitation and complementarity), which could help coping with nutrient imbalances. To determine the type of interactions and their effects on soil nutrients affected by fires and on the acquisition of nutrients by plants, a meso-cosmos experiment was established under controlled conditions, using surface soils affected by the Cayumanque megafire (Región del Biobio). Seven assemblages of three species with different nutrient acquisition strategies were established: Nothofagus obliqua (mycorrhizae), Lomatia dentata (proteiform roots) and Sophora cassioides (nodules). In a complete factorial design of two blocks (with and without complementary fertilization). The main interactions resulted in competition between N. obliqua from S. cassioides and L. dentata, while S. cassioides was not be significantly affected by the presence of L. dentate, suggesting complementarity. Fertilization did not interact with assemblages or reduce competition, but increased plant growth in all assemblages. Available soil nitrogen (NO_3^-) increased significantly in the presence of S. cassioides (6.88±3.10) and decreased in the presence of L. dentata (2.67±0.84). Finally, N. obliqua increased its nitrogen acquisition by 44% in the presence of L. dentata and decreased by 5% in the presence of S. cassioides. Although no significant differences were observed in P_{Olsen}, the fraction of inorganic phosphorus was significantly lower in the presence of proteacea (122.24±20.99). In addition, enzyme analysis showed no significant differences for microbial biomass and LAP activity. However, the combination of N.O. and L.D. showed significantly high phosphatase activity (16.36±5.57).

Finally, further isotopic and enzymes work is in process to study nutrient pools in plants and soil either of L. hirsuta and N. obliqua individuals growing alone or in combination. Because native Nothofagus spec. forests have been affected by forestry fires and replaced by plantations of exotic tree species throughout Chile, knowledge on interactions among native species affecting tree nutrition is lacking. Therefore, the results of our research support the use of plant assemblages as a potentially effective restoration strategy in post-fire soils with low nutrient content.

Acknowledgement: Special thanks to National forestry institute, BayCEER and Yvonne Oelmann's laboratory for contribute to this research and make it possible at an international scale.