

# EFFECT OF TREE NATIVE SPECIES ASSEMBLAGES IN C, N & P CONTENTS IN BURNED SOILS

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Releases of CO<sub>2</sub>

The diagram illustrates the impact of a forest fire. At the top, a photograph of a fire in a forest is overlaid with a stylized fire graphic. Two red callout boxes point to the fire: 'Losses O.M.' on the left and 'Releases of CO<sub>2</sub>' on the right. Below the ground line, a tree's root system is shown. Five orange callout boxes with 'X' marks point to different parts of the root system, labeled 'Soil exposure and temperature increase', 'Soil composition', 'Soil structure', 'Nutrient leaching', and 'Erosion'. To the right, a text box describes 'Volatilization of nutrients and removal of organic matter', with a note that 'Ash and burnt wood can increase nutrients in the short-term'.

Losses O.M.

Soil exposure and  
temperature increase

Soil composition

Soil structure

Nutrient leaching

Erosion

Volatilization of nutrients  
and removal of organic  
matter

Ash and burnt wood  
can increase nutrients  
in the short-term

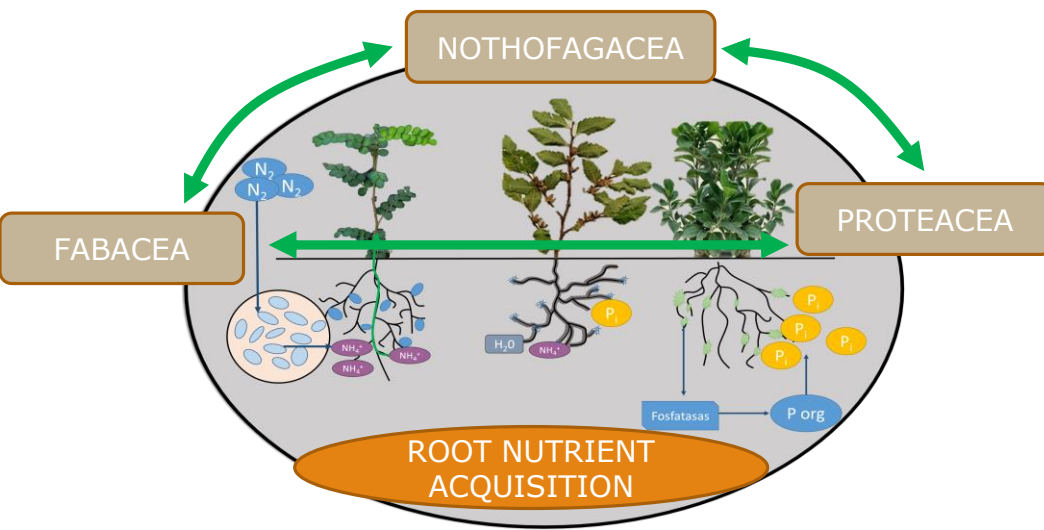


# WORKING HYPOTHESIS

*¿ How interactions between complementary species modify availability and acquisition of nutrients in degraded soils?*

H<sub>1</sub>

Inclusion of a **legume** (*Sophora cassiodes*) increases nitrogen fixation, nitrogen availability and acquisition, similarly inclusion of a **proteacea** (*Lomatia dentata*) increases available P and acquisition. The **oak** (*Nothofagus obliqua*) benefits from these previous species and improves its N and P acquisition



**COMMUNITY ASSEMBLAGE**

Complementary fertilization reduces the need for complementary interactions nutrient acquisition diluting the effects of interspecific competition

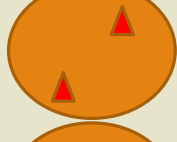
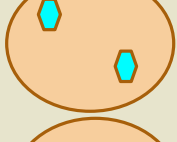
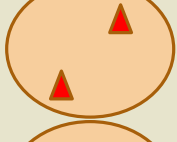
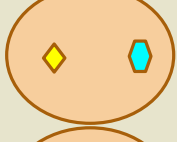
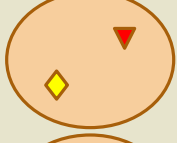
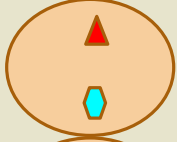
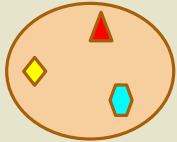
H<sub>2</sub>





# Experiment setup

With fertilization      Without fertilization



- ▲ Oak (*Nothofagus obliqua*)
- ⬡ Legume (*Sophora cassioides*)
- ◆ Proteacea (*Lomatia dentata*)

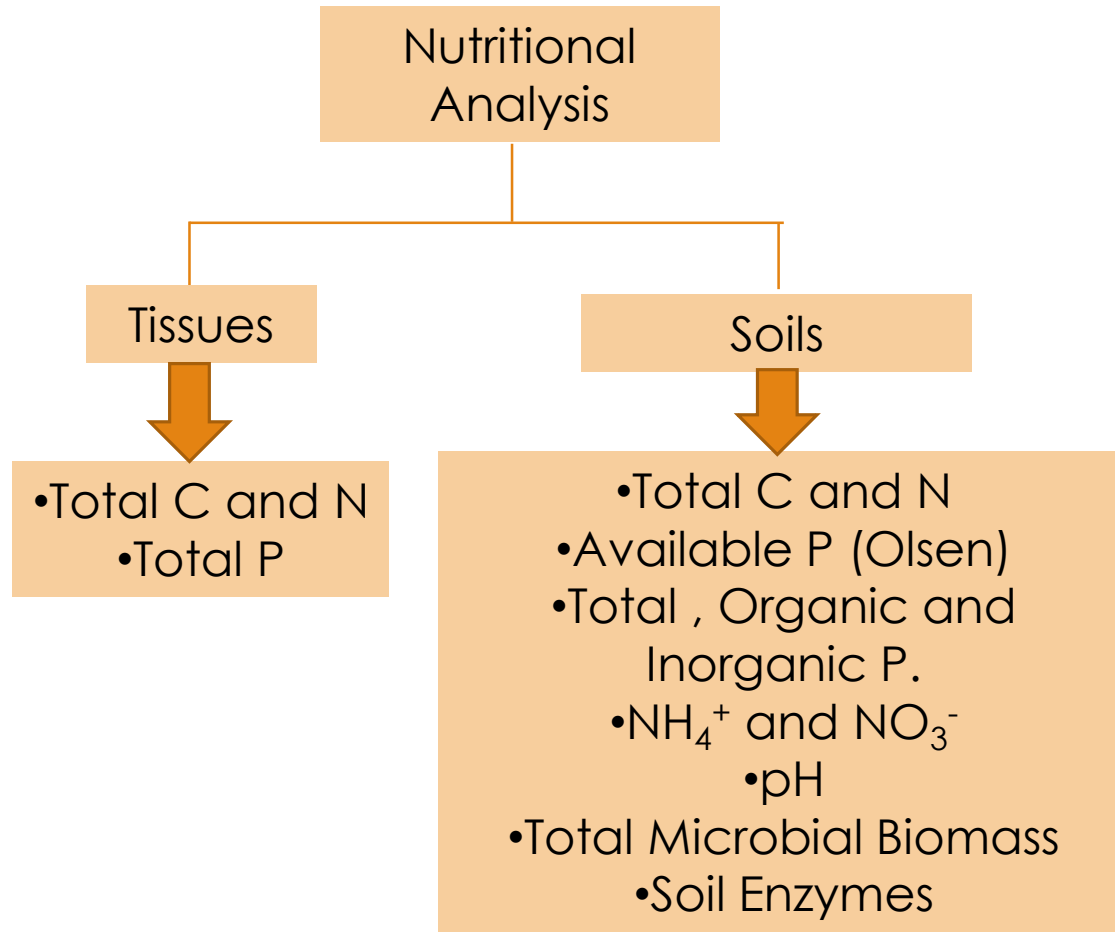
**Irrigated with and without a Nutrient Solution based on Hoagland & Arnon (1950)**

- 3 Species (Proteacea/Legume/Oak)
- 7 Plant Assamblages
- 2 Fertilization Treatments
- Full factorial with 10 Replicates
- Soil sampled 2 year after a fire in an non-vegetated site. Soil are Treguaco Asociation (fine, mixed, thermic Dystric xerochrepts)





# Methods

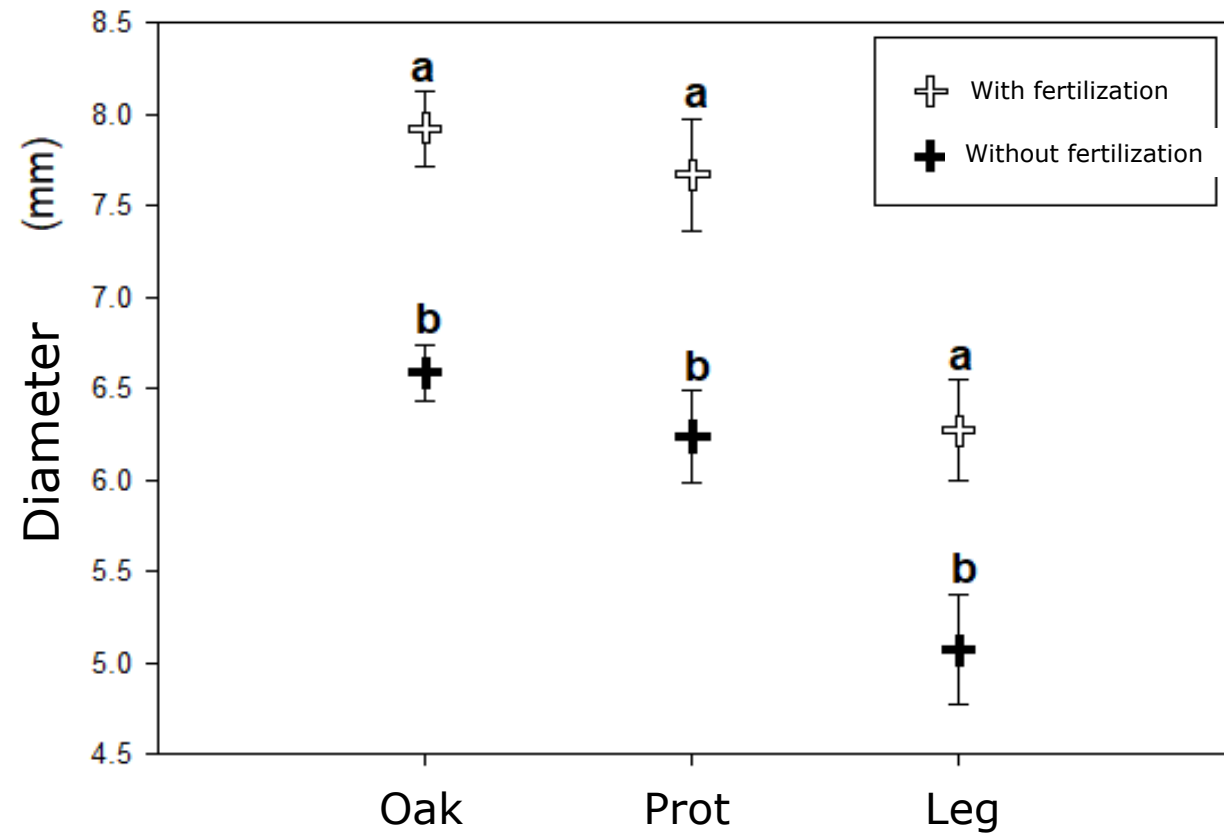
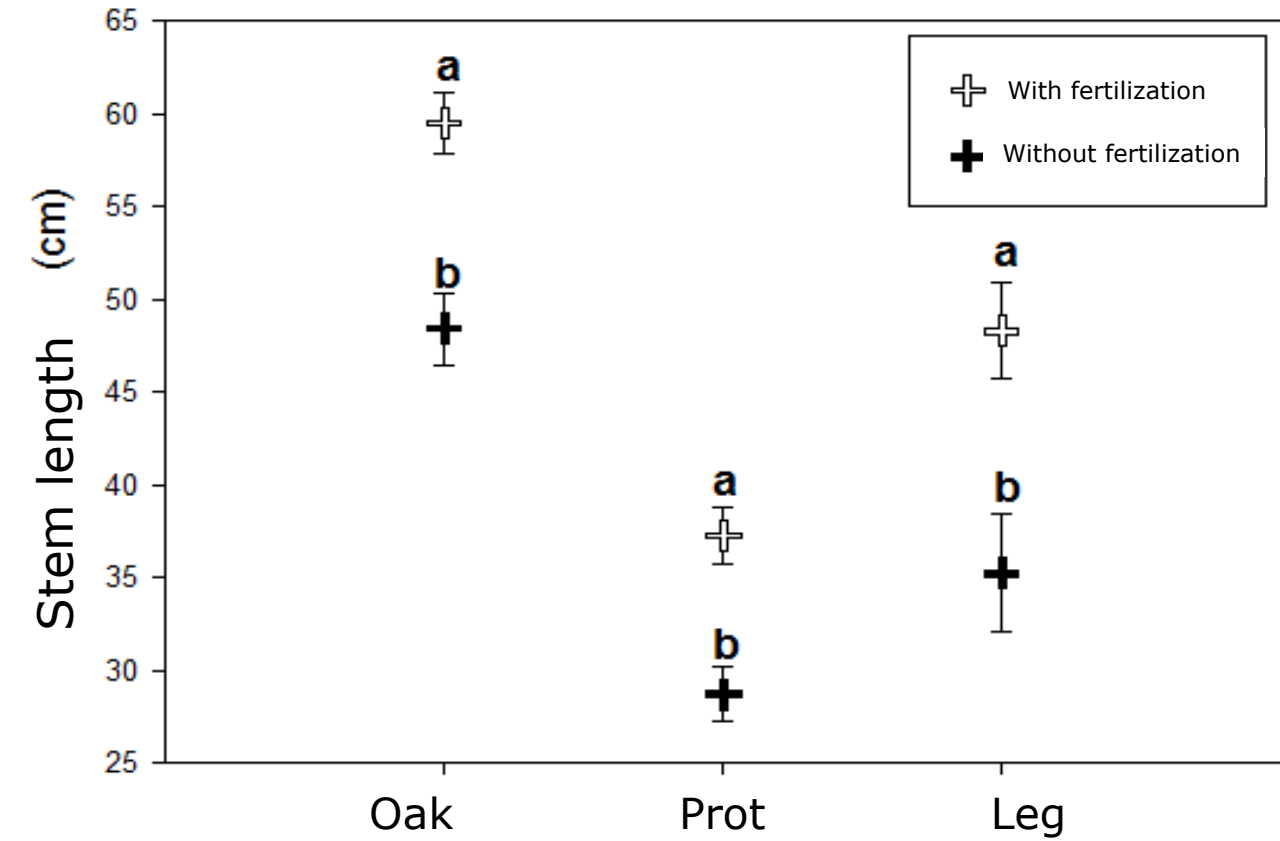


## Growth Variables

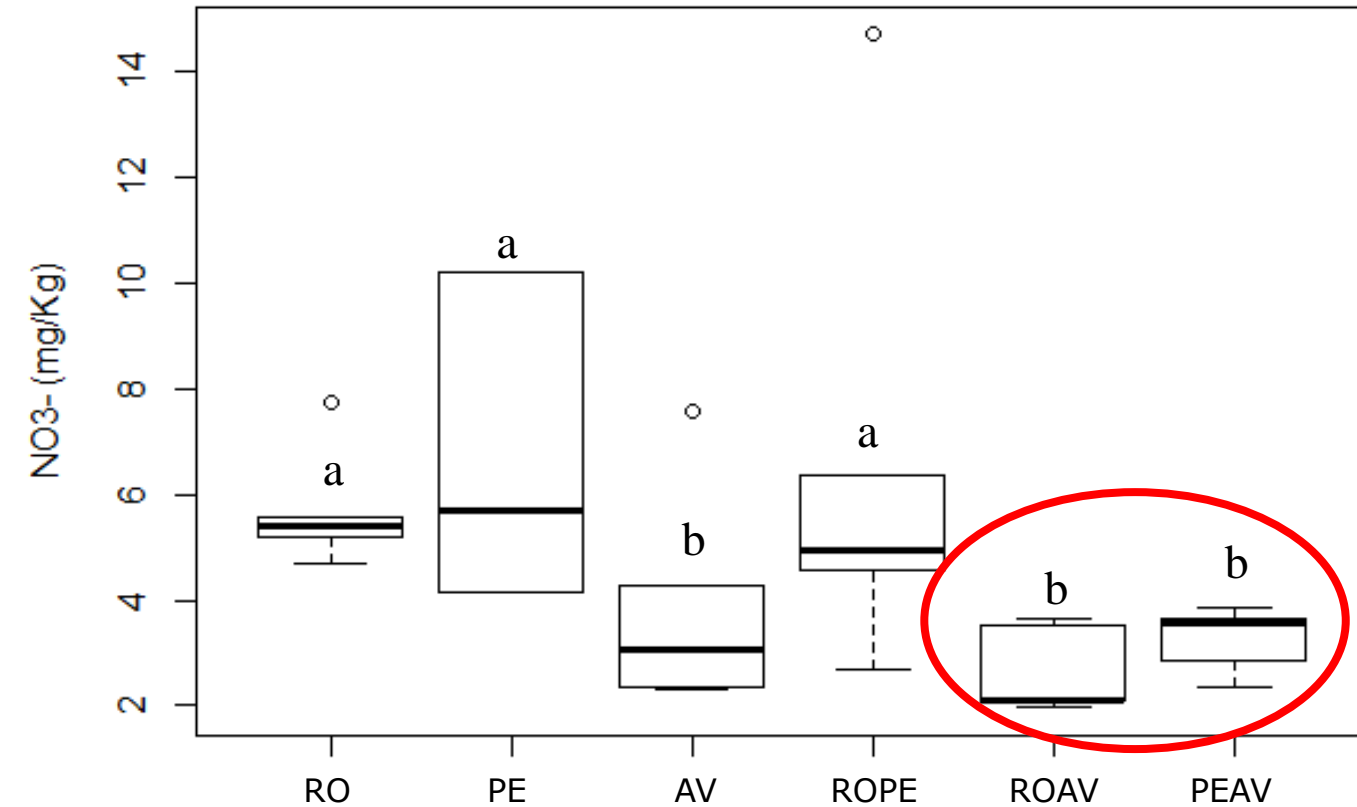
- Total Root Biomass
- Total Aerial Biomass (Shoot and Leaf)
- Monthly Shoot length and diameter



Does complementary fertilization reduces the effects of interspecific competition?

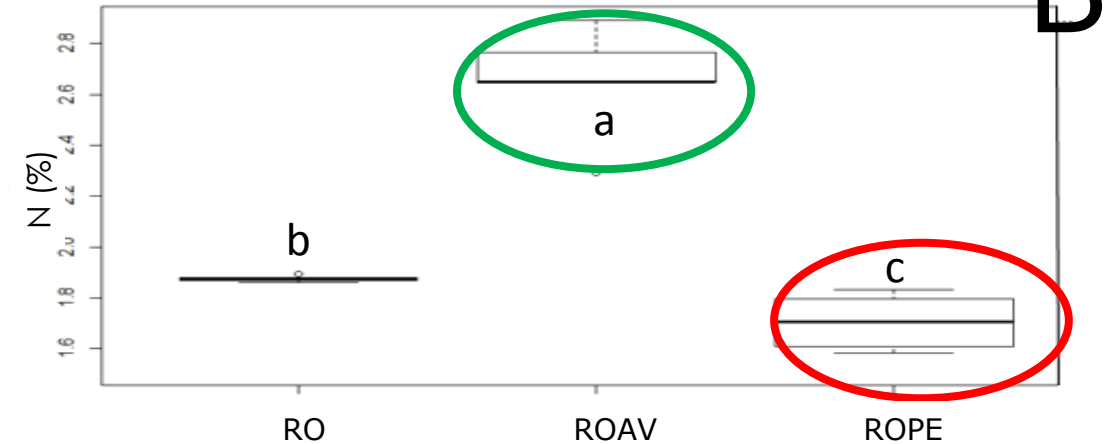
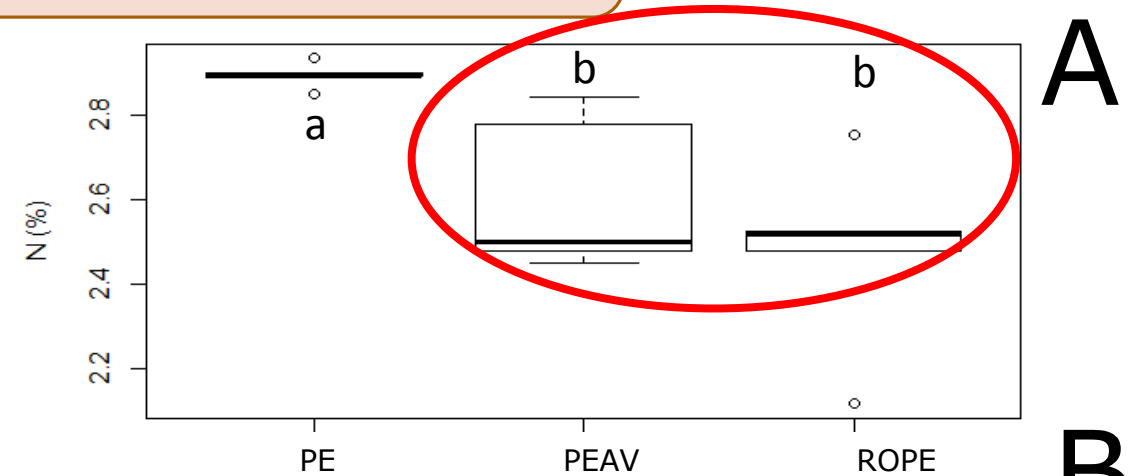


Does the presence of a Legume (*Sophora cassioides*) increase nitrogen in the soil? Do the accompanying species benefit?



Ensamble

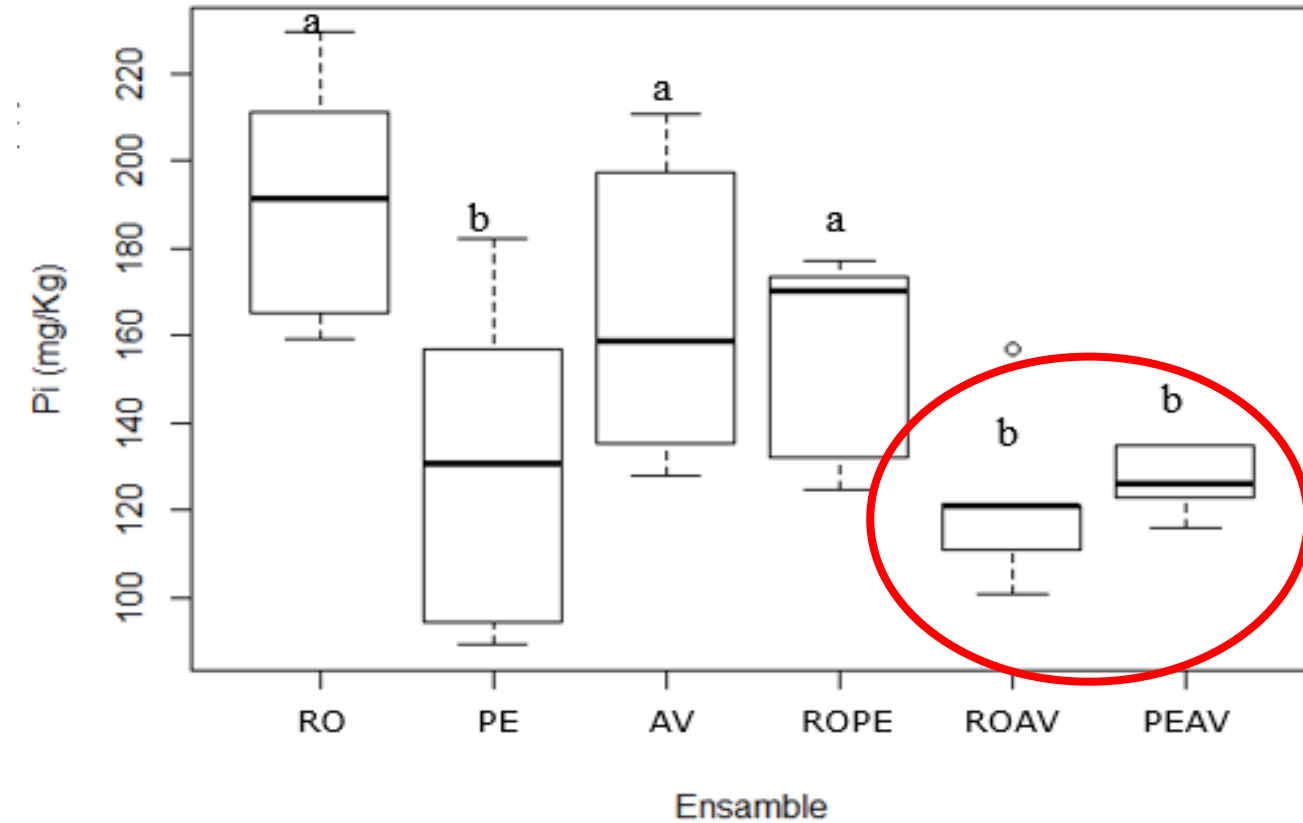
Soil  $\text{NO}_3^-$ . Different letters indicate statistically significant differences ( $p \leq 0.05$ ) RO (*N. obliqua*), PE (*S. cassioides*), AV (*L. dentata*)



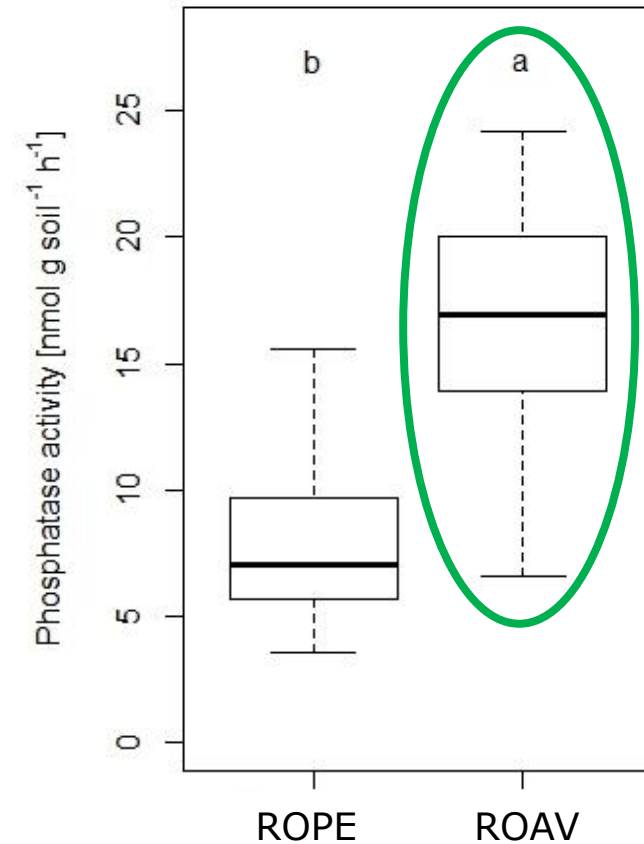
Ensamble

*C. foliar* total nitrogen (N%) of *S. cassioides* (A) and *N. obliqua* (B) in each assemblage. Different letters indicate statistically significant differences ( $p \leq 0.05$ )

Does the presence of a Proteacea (*Lomatia dentata*) increase the phosphorus in the soil? Are the accompanying species benefited?



Inorganic phosphorus in the soil. Different letters indicate statistically significant differences ( $p \leq 0.05$ ) RO (*N. obliqua*), PE (*S. cassioides*), AV (*L. dentata*)







# Final thoughts

- There is competition for resources when look at the specific level, however there is an increment in the total mesocosm productivity and nutrient acquisition.
- Assemblages have a direct effect in nutrient available pools and reservoirs. C, N and P are increase under assemblages especially the ones including the proteacea specie.
- The inclusion of the proteacea specie seems to contribute more significantly to the overall increment in mesocosm productivity.



# ACKNOWLEDGEMENTS

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