Analysis of Extracellular Enzyme Activity of Microbial Communities in Wetland Soil

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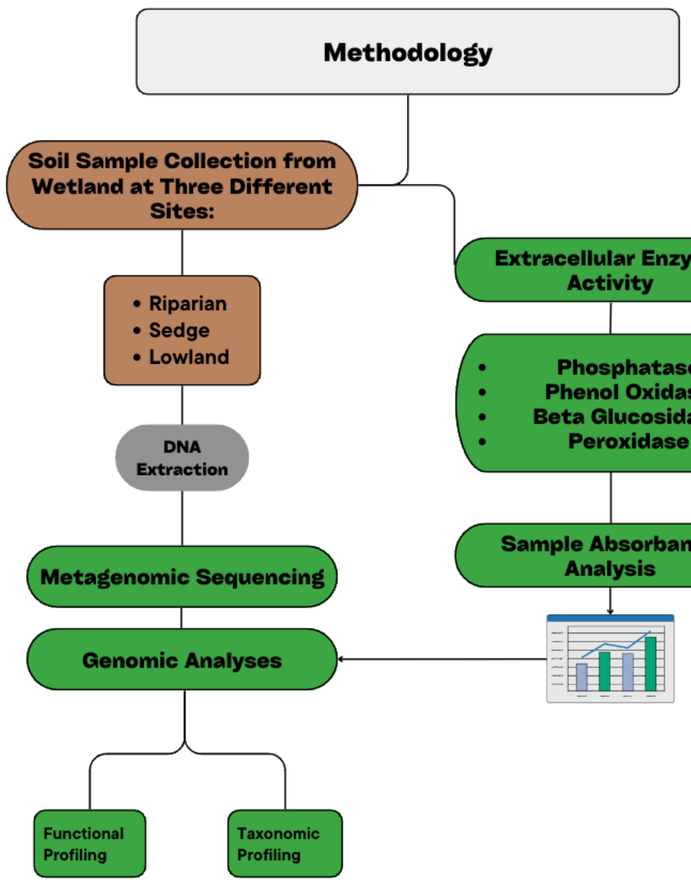
INTRODUCTION

- Wetlands hold relatively large amounts of carbon compared to other environmental C storages.
- Studying carbon degradation pathways of wetland soil microbial communities is important in understanding nutrient cycling.
- Soil samples were collected from three different vegetation sites in the CSUSM wetland.

We were interested in seeing:

- How enzyme activity varied between the vegetation types
- To determine any correlation between extracellular enzyme activity and microbial functional pathways.

METHODS



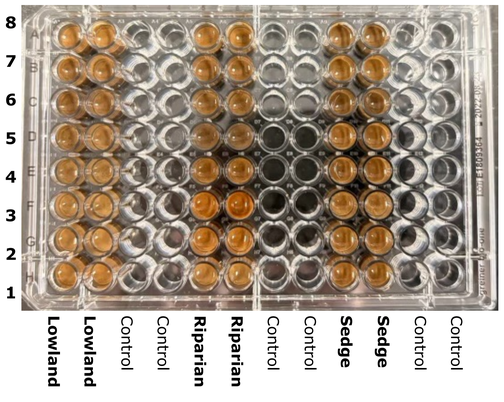


Figure 1. Extracellular Enzyme Assay Setup. Each soil type had its own columns with duplicates. Control columns were also duplicated which contained solely buffer and substrate of interest.

RESULTS

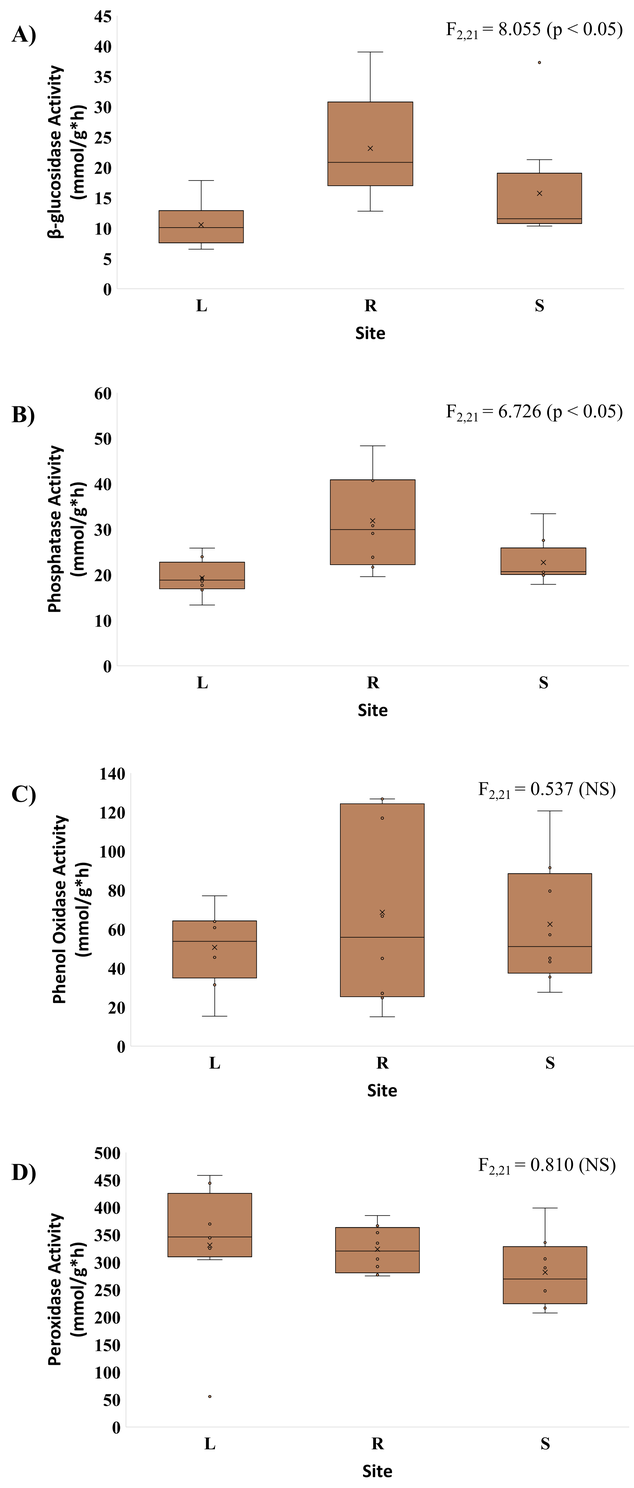


Figure 2. Boxplots of extracellular enzyme activities in lowland (L), riparian (R), and sedge (S) vegetation in the CSUSM wetland. The F-statistics and p-values were calculated using ANOVA. (a) β-glucosidase activity (mmol/g*h) at each site, (b) phosphatase activity (mmol/g*h) at each site, (c) phenol oxidase activity (mmol/g*h) at each site, & (d) peroxidase activity (mmol/g*h) at each site.

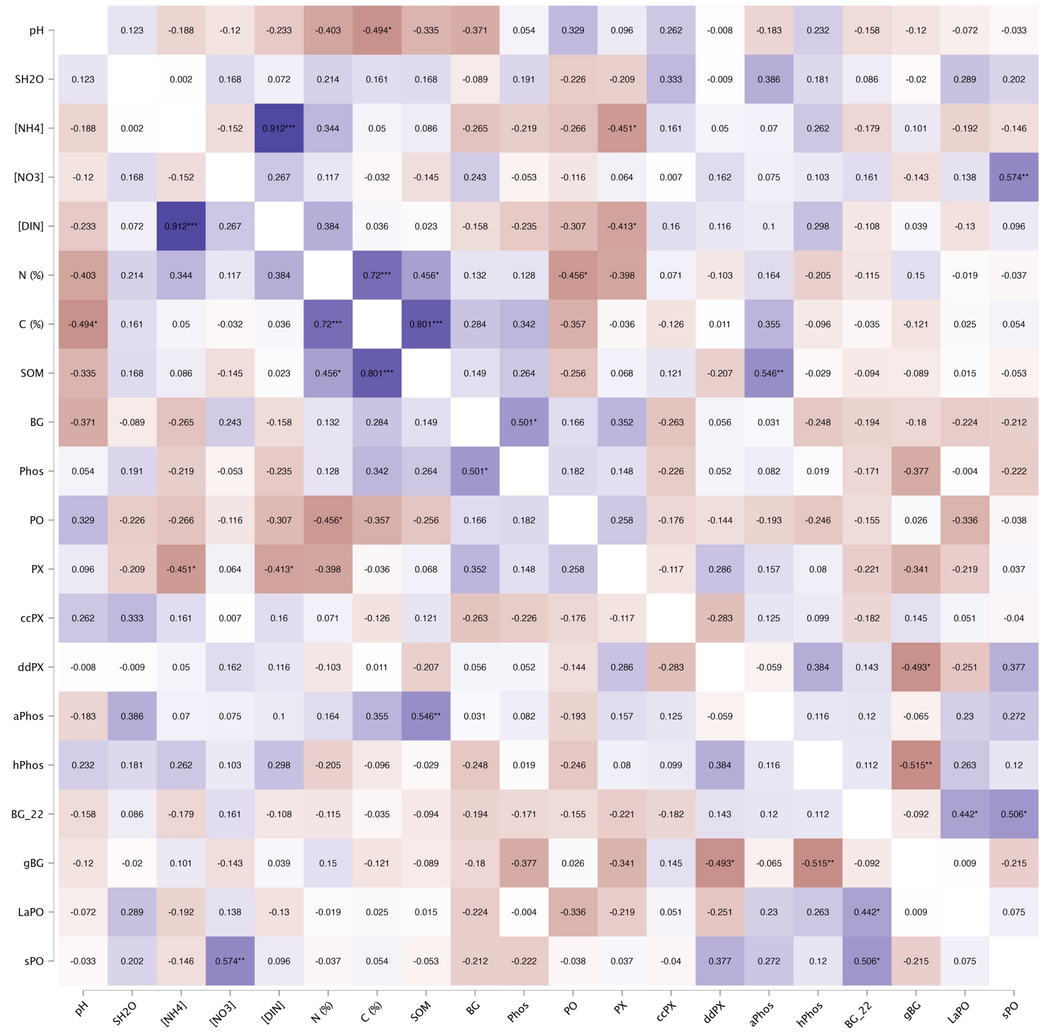


Figure 3. Heatmap of environmental, enzymatic, and functional pathway data from correlation analysis in JASP software. Statistically significant correlation values are marked with succeeding asterisk(s) (*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$).

CONCLUSIONS

- There were statistically significant differences for β-glucosidase and phosphatase activity between the vegetation types.
- Phenol oxidase and peroxidase were the only enzymes that had any correlation between our environmental data, and they were negatively correlated.
- There was no correlation between phosphatase or β-glucosidase and our environmental data.