The Influence of Soil Microbes on the Restoration Success in the Critically Endangered Widdringtonia whytei

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Purpose: Analyze microbial biomass of soil samples from natural and restoration sites of Mulanje cedar trees to determine if a higher population of bacteria than fungi is present, contributing to high seedling mortality rates in the critically endangered Mulanje cedar trees. Confirm presence of bacterial and fungal activity with analysis of particular enzymes produced either by both bacteria and fungi or only fungi and determine soil microbe characteristics. Procedure: Weigh out soil and add glucose to each jar. Of the 6 jars for each location, add tetracycline to two, chloroheximide to two. Insert vial with NaOH to each jar and store the jars in a dark cupboard for two days. Titrate NaOH with HCl and calculate moles of CO_2 produced. For enzyme analysis, centrifuge soil sample with sodium acetate buffer, creating four microplates, with 4 enzyme substrates, and apply 3 solutions to each plate. Allow to incubate for specific time according to substrate used. At the end of incubation, read absorbance at 405nm on plate reader. Conclusion: Natural sites have a larger fungal population than bacterial--ideal for soil communities. All restored soil sites, except for sites 5, 7, and 12a, also have larger fungal activity than bacterial activity. The occurrence of more bacterial activity in three restored sites very likely contributes to the statistic, approximately 70% of planted seedlings die within six months because of the presence of a large microbial load.

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