Analyzing the Mycorrhizae of Non-Native and Native Hawaiian Trees

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Approximately 90% of plants have a mutualistic symbiosis with soil fungi, known as a mycorrhizal relationship. The plants and fungi exchange nutrients through the plant's roots. Mycorrhizae are an important part of all plant-containing ecosystems. They are, however, understudied, especially in Hawai?i. Any new information on this subject could help us better understand native ecosystems and better support endangered native plants. This project examines the fungi present in the roots of four trees. The koa (Acacia koa) and hala (Pandanus tectorius) are native trees, while the Cook pine (Araucaria columnaris) and ironwood (Casuarina equisetifolia) are introduced. The question was whether there would be differences between the mycorrhizal fungal diversity of native and non-native trees. It was hypothesized that there would be significant differences. The native species could have more because of co-evolution with native mycorrhizal fungi. Alternatively, the non-native trees could have been introduced along with their mycorrhizal fungi. DNA sequences from last year were processed using the EPI2ME Labs wf-metagenomics workflow to generate a report of the species of fungi present in each sample. This report was analyzed to determine significant patterns and suggest possibilities for future research. The results could not confirm or reject the hypothesis. Most species found were not mycorrhizal, and little information was available about the role of most species. The two non-native trees had the lowest and highest diversity, with the Cook pine and ironwood having 30 and 4 species respectively. The koa and hala had 11 and 5 species respectively. Almost all of the fungi found were unique to each sample. A much larger survey would be needed to generate significant results.

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