SOIL TESTING IN BELIZE: MAKING A CASE FOR SHADE-GROWN PRODUCTS

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For my project, soil in several different areas of Belize was tested for both macro- and micro-nutrient levels. Soil samples were taken from a rainforest area, a vegetable plot, a pine savannah, a push plot on the periphery of the rainforest, and a slash-and-burn plot on the periphery of the rainforest. The nutrient levels for each soil sample were compared to investigate whether nutrient levels are higher in areas where the forest has not been cleared. This research will be used to make a case for non-timber forest products, especially shade-grown products, as an alternate source of income for farmers in Belize. This research will also be used to develop the vegetable plot into a model for shade-grown products at Hillbank Research Station.

Literature Review

Non-timber forest products have been acclaimed as an environmentally friendly way to boost local economies (Primack, Bray, Galletti, & Ponciano, 1998, p. 141). This is because they are sustainable and have few negative effects on the natural environment where they are being grown (Siebert, 2002, p. 1898). Since there are relatively few negative ecological effects, non-timber forest products are ideal for areas on the periphery of forests that have not been cleared (Primack et al., 1998, p. 141).

Shade-grown products, or products grown under the canopy of trees, are one example of a non-timber forest product (Philpott & Dietsch, 2003, p. 1844). They are environmentally friendly because forest area does not have to be cleared away to grow the products (Primack at al., 1998, p. 141) and because native species, especially songbirds, can still inhabit the area (Siebert, 2002, p. 1895). As an added bonus, songbirds living in the tree canopy help control pest populations, which can help reduce pesticide use (Seattle Audobon Society, 2007). Finally, fallen foliage serves as a natural fertilizer for the plants, which helps to reduce the cost of buying commercial fertilizers and labor (Siebert, 2002, p. 1896). Due to increased environmental awareness, shade-grown products are in high demand today (Tejeda-Cruz & Sutherland, 2004, p. 170), which make them a profitable economic endeavor for farmers who own land that has not yet been cleared.

Understanding of Community Need

The Rio Bravo Conservation and Management Area in Belize is an important area to develop a market for shade-grown products because the products

could be grown on the yet-to-be-cleared margins of the Conservation and Management Area. Shade-grown products could provide a unique opportunity as a source of income for local farmers while offering a means to conserve the environment of the area surrounding the Conservation and Management Area.

Programme for Belize is interested in setting aside a test plot of shaded land to research the feasibility of cultivating shade-grown products in the Rio Bravo area. While it would be possible to grow a variety of shade-grown products on this test plot, soil analysis must first be done to decide which plants would best grow in the soil conditions. This test plot would serve as a concrete example of the benefits of shade-grown products to farmers on the forest periphery in the Rio Bravo area.

Since most farmers in Belize use other farmers as their main source of information, word will spread about these products if the test plots are successful. In this way, more and more farmers on the periphery will be exposed to the benefits of shade-grown products and consider growing those products themselves, providing a concrete alternative to agricultural deforestation. In addition, local farmers will be provided with a low input source of income that will have minimal impact on the environment.

Programme for Belize asked for soil testing to be done on a vegetable plot in the Hillbank Research Station to determine whether soil conditions were appropriate for growing bananas. The project was expanded to include several different areas of Belize in order to compare nutrient levels for different soil environments.

PROTOCOL

For each soil site, the soil pH meter was inserted into the soil directly next to the testing site. A trowel full of soil was taken from each site and the pH was recorded. The soil was then compared to the Munsell scale

to see what components made up each sample. Two samples were taken from a vegetable plot, two from the rainforest, one from a push plot, one from a slash-and-burn plot, and one from pine savannah. The nutrients were extracted from 15 of the soil samples using an acid wash and the protocol set forth by Lamott. Macronutrients and micronutrients were tested for in the United States using Lamott's protocol.

Conclusion

After comparing the macronutrient values for each of the soil samples, there does not seem to be any difference in the nitrate, nitrite, and phosphorus levels between cleared areas and areas that have not been cleared. One big difference the samples exhibited was that the two cleared areas I tested (the push plot and the slash-and-burn plot) had elevated potassium levels when compared to the samples from uncleared areas. The soil from the cleared areas also had a slightly lower pH than the soil from areas that had not been cleared. Also, phosphorus levels were very low in all sites tested. This is interesting because water phosphate levels were all very high. This suggests that phosphorus might be leached out of soil by the water and that high phosphate levels may not be the result of fertilizer use. None of the micronutrients were found to be limiting factors for any soil samples in Belize.

Reflection

This project enabled me to make my first impact on a global level instead of just on a personal or community level, helping me gain a sense of community with the world around me while challenging my own limited viewpoint.

In Belize, the intrinsic intelligence of the citizens really struck me. Even so, they lacked some very small but crucial pieces of information that could drastically improve their productivity and quality of life, information to which I have access. By combining our community partners' knowledge and my access to critical information and technology, we can improve productivity, quality of life, and the environment. This not only benefits the people directly involved but the world as a whole.

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