A Comparison of Soil Quality and Nutrition Among Landmarks in Toco, Trinidad

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Abstract- A study was conducted on the soil quality of several landmarks within the region of Toco, Trinidad. Ten landmarks were sampled for soil analysis. The pH, nitrogen, phosphorus, and potassium were measured in each sample's location. A large majority of the soil collected was loam soil, but a few were clay-like and one sample contained sand soil. The average of the pH tested was around the healthy range, but most of the samples were depleted of nitrogen and potassium.

Keywords*- soil quality, soil nutrition, landmarks, Trinidad*

I. INTRODUCTION

Soil quality is an essential part of plant growth because soil provides the main nutrients that a plant need. One such nutrient is nitrogen, which is naturally fixated into the soil by some plants, such as legumes (Lines-Kelly, 1970). Nitrogen is necessary for quick foliage growth and the green color in plant leaves (Crouse, 2018). Another nutrient is phosphorus, which helps facilitate photosynthesis and stimulates root growth (Lines-Kelly, 1970). Potassium is also critical to plant growth in that it increases the plant's resistance to drought and disease (Crouse, 2018).

Soil quality is also dependent upon the type and location of soils. Some soil types do not hold nutrients as well, and nearby sources of water and vegetation can contribute to nutrient content (Crouse, 2018). The activity of soil fauna and decomposers also work closely together to replenish and recycle the nutrients within the soil (Göltenboth, Langenberger, & Widmann, 2006). This variation in soil quality is explored in this study to better understand how different ecosystems can have different nutrient content in their soils. The Toco region in Trinidad hosts a great biodiversity among its major water sources and land, which makes it an ideal location for this type of study.

II. MATERIALS AND METHODS

Collecting Soil Samples

A total of ten soil samples were collected around the region of Toco, Trinidad. To collect each sample, a soil sample tube was placed about three inches deep into the soil and the soil collected was released into a soil sample bag. The sample bag was labeled with the number of the sample, the type of soil collected, and the location of the collection site. At each site, a soil tester probe was placed three to four inches into the soil and the given pH, light intensity, and moisture level was recorded. The geographical coordinates of the site location were then recorded using a GPS device.

Testing Soil Samples

Each sample was prepared in a labeled testing container by mixing one-fourth cup of the soil sample with three-fourths cup of purified water for one minute. Each soil mixture was then allowed to settle for at least three hours in order to gain a more accurate reading. Next, a dropper was rinsed three times with water to clear it of any impurities that may affect the test readings. The dropper was then used to transfer the liquid portion of the resulting solution into the chambers of the tester compartment. A color tester capsule was emptied into the testing chamber and the compartment was shaken thoroughly for about 45 seconds. The testing mixture was left to sit for ten minutes and the results were recorded based on the color reading chart provided.

III. RESULTS AND DISCUSSION

A vast majority of the soil tested was depleted of nitrogen and the average pH of the soil was neutral to alkaline. The phosphorus and potassium content across all the samples was deficient on average. There were several outliers in the testing data recorded. The two locations, Jammev Creek and the Tompire River bank, had the only samples with a sufficient amount of potassium. The grasslands near the Galera Point lighthouse had a sufficient amount of phosphorus. A higher amount of nitrogen content was found in the sample obtained from the land near Tompire River. The pH from the sample was also 6.5, which was considerably lower than the average. The pH of the soil near the river's bank was also unusually acidic. The pH and moisture level of the Rio Grande River soil sample could not be obtained at the time of collection.

Table 1) Data Collected on Soil Samples

Sample #	Location	Coordinates	Soil type	pH from tester kit	Nitrogen	Phosphorus	Potassium	pH from probe	Moisture
1	Jammev Gardens	10.82703, -60.93269	Loam	7-7.4 (neutral)	N0 Depleted	P1 Deficient	K2 Adequate	8 (alkaline)	1 (Very dry)
2	Fighting Pit	10.82664,-60.93358	Loam	7.5 (alkaline)	N2 Adequate	P1 Deficient	K2 Adequate	8 (alkaline)	2 (Dry)
3	Tompire River	10.78192,-60.95127	Loam	6.5 (slightly acidic)	N4 Surplus	P1 Deficient	K0 Depleted	8 (alkaline)	1 (Very dry)
4	Salybia Reef	10.83403, -60.9206	Loam	7 (neutral)	N2 Adequate	P2 Adequate	K1 Deficient	7	6 (Moist)
5	Matura River	10.41261, -61.4148	Clay	7.5 (alkaline)	N0 Depleted	P1 Deficient	K1 Deficient	7	10 (very wet)
6	Keshorn Walcott Galera Point Lighthouse	10.83477, -60.90968	Loam	7 (neutral)	N0 Depleted	P1 Deficient	K0 Depleted	7	7
7	Grassland near lighthouse	10.83476, -60.9101	Loam	7 (neutral)	N0 Depleted	P3 Sufficient	K0 Depleted	7	10 (very wet)
8	Rio Grande River	10.67241, -61.09580	Sandy	7 (neutral)	N0 Depleted	P2 Adequate	K0 Depleted	n/a	n/a
9	Jammev Creek	10.82309,-60.93461	Clay	6.5 (slightly acidic)	N0 Depleted	P2 Adequate	K3 Sufficient	6	10 (Very moist)
10	Tompire River bank	10.78217, -60.95114	Clay	6 (acidic)	N0 Depleted	P2 Adequate	K3 Sufficient	7	10 (Very moist)

The soil collected near rivers tend to be more clay-like versus the soil collected closer inland, which was loam typed. The soil samples from Jammev Gardens and the fighting pit were the only dry soil samples. This is most likely because they were collected farther away from water sources versus the other samples. The nutrient levels were low across all samples regardless of the vegetation and fauna present. Despite testing various samples, very little correlation can be derived from the data gathered.

In the future, this study could be further extended to find a trend throughout multiple regions in Trinidad. A higher sample count could also contribute to a more noticeable correlation. The soil tester kit used for this study did not give exact results for the nutrient content. Therefore, lab testing could be done on the soil in future trials to yield more accurate data.

IV. REFERENCES

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