SOIL CHARACTERIZATION AND GEOGRAPHIC INFORMATION SYSTEM (GIS) MAPPING OF ROBUSTA COFFEE (*Coffea canephora*) IN SELECTED AREAS IN CAVITE

THESIS

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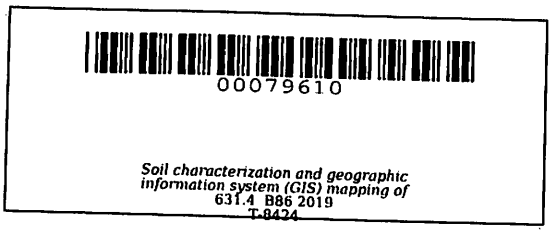
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ABSTRACT

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The study was conducted from November 2018-March 2019 in the different barangays located within seven municipalities and cities in Cavite: Amadeo, Indang, Alfonso, Mendez, Magallanes, Silang and General Emilio Aguinaldo (Bailen). Specifically, this study aimed to: (1) classify the land use in Cavite using Geographic Information System; (2) identify the areas in Cavite where Robusta coffee can be found; (3) determine the soil characteristics suitable for the growth of Robusta coffee; and (4) determine the soil characteristics of Robusta coffee plantations in Cavite in terms of soil fertility (pH, N, P, % OM), bulk density, moisture content, soil depth (soil profile), permeability, soil texture, porosity, and exchangeable bases (Ca, Mg, Na, K).

Geographic Information System (GIS) was utilized to generate maps showing the land uses of selected seven coffee productions areas in Cavite. The results of the study using unsupervised image classification technique in ArcMap 10.5.showed three land uses namely agricultural, built-up areas and forest.

Most of the Robusta coffee are located in agricultural land use with an area of 39,185 ha that is equivalent to 78 percent of the total land use classification. With the help of the land use map, the locations of Robusta coffee plantations were easier to identify and focus on.

Generally, good results were obtained on the soil analysis of samples from the Robusta coffee plantations. The soil fertility (pH, N, P, % OM), bulk density, moisture content, soil depth (soil profile), permeability, soil texture, porosity met the acceptable values for Robusta coffee. In terms of exchangeable bases (Ca, Mg, Na, K), results also met the acceptable criteria of coffee.

The soil pH in the selected Robusta coffee plantations ranged from 4.17-5.99 (strongly acidic to very strongly acidic). The nitrogen (N) ranged from 2.384-3.857%; phosphorus (P) ranged from 13ppm; organic matter (OM) ranged from 1.192-1.929 percent; and potassium (K) ranged from 322-1424 ppm.

The collected soil samples contain exchangeable potassium (K) which ranged from 0.698–3.536 me/100g of soil, calcium (Ca) at 9.833-19.330 me/100g of soil, magnesium (Mg) at 3.891-5. 967me/100g of soil, and sodium (Na) at 0.126-1.210 g/100g of the soil.

In terms of bulk density, values ranged from 1.84-2.31 g/cm^3. The permeability of soil is moderately slow to slow with pore space volume. The soil moisture content ranged from 10.82-19.00 percent. Soil texture varied from clay loam to loam. In addition in terms of soil depth, values ranged from < 0.07m.

With these results, the seven coffee production areas in Cavite are therefore not totally highly recommended for the production of crops, especially for coffee. because some parameters such as bulk density, porosity, %OM N, P, and K did not meet the acceptable criteria of suitable for Robusta coffee.

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INTRODUCTION

The Philippines has four different species of coffee such as: Arabica, Liberica (*Barako*), Excelsa and Robusta. Based on the climatic condition of the Philippines from lowland to mountain regions, the country is suitable for all four varieties. In the Philippines, coffee has a history as rich as its flavor. By the 1860s, America exported a coffee in Batangas (Bautista, 2016). In 1987, Cavite followed suit by growing the first coffee seedlings in Amadeo. In spite of this, Lipa, Batangas still reigned as the center for coffee production in the Philippines (Coffee Origin of Philippines, 2018).

Philippines has 70 percent of production of Robusta coffee and Cavite is considered as one of the top producers in terms of volume of production. In Cavite, Alfonso, Amadeo, General Emilio Aguinaldo, Indang, Mendez, Magallanes, and Silang, are the municipalities/city that produce coffee (Philippine Coffee Board, 2016). Coffee is an economically and industrially important crop of the country. Coffee farms focus on the management practices to increase coffee seed production in order to meet the increasing demand of coffee consumption. As part of coffee farming