UNIVERSITI TEKNOLOGI MARA
Cawangan Terengganu
Kampus Bukit Besi

TITLE:
DETERMINATION OF SOIL PROPERTIES AT BUKIT WAN, KUALA TERENGGANU AREA WITH AND WITHOUT PLANTATION OF RUBBER TREE

SUPERVISOR:
Prof Madya Dr Sarifah Fauziah Binti Draman

SCHOOL OF CHEMICAL ENGINEERING
COLLEGE OF ENGINEERING

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ABSTRACT

Soil as diverse and dynamic natural resource is crucial to produce food, fibre, and other products as well as a vast choice of ecological services. For many applications, including agriculture, forestry, and environmental management, it is essential to understand the physical and chemical properties of soil. In this study, physical and chemical properties of soil in the rubber tree area has been analysed. The sample is taken from Bukit Wan, Kuala Terengganu (5.39586° N, 103.00617° E). The physicochemical properties of soil without rubber tree plantation also was determined to compare whether the properties of soil have changed because of agricultural activities. The results show that the change is not significant but the comparison between the properties of soil with and without plantation can be seen that the properties of soil has changed. The pH of the soil shows that the soil has become more acidic, the density of the soil has become denser and the texture of the soil has higher silt contain after the plantation. In summary, the agricultural activities have slightly changed the soil properties. Further study need to carried out to know whether the plantation give positive impact or not to environment.

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CHAPTER ONE
BACKGROUND

1.1 Introduction

A significant amount of all agricultural land is used for tree plantations, which have grown quickly in Southeast Asia (Gibbs et al., 2010). One of the tree crops that had a significant expansion into non-traditional growing zones was rubber (Hevea brasiliensis) (Lang et al., 2019). The intensive agricultural practises used in rubber plantations are major contributors to soil degradation when land availability is constrained and rubber prices decline concurrently. This can put producers in long-term loss-loss scenarios.(Nguyen et al., 2020). In other words, monoculture rubber tree farming has the ability to gradually raise the severity of risks to soil since it is a land-use system defined by sequential changes in place and time.(Tondoh et al., 2019). Organic matter may be depleted in rubber plantations due to ongoing cultivation. Higher Mucuna green matter and litter production can raise the organic matter content of soils used for producing rubber, improving soil fertility.(Chathurika et al., 2010). Therefore, for the sustainable management of biodiversity in this forest environment, an understanding of the effects different land uses have on the variety of tree species, the physicochemical qualities of the soil, and the interaction between these variables is crucial. (Appiah-Badu et al., 2022).

1.1.1 Soil Health

According to the Ad Hoc Committee on Soil Quality of the Soil Science Society of America "the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or improve water and air quality, and support human health and habitation."(Doran & Zeiss, 2000). The ability of soil to function as a dynamic living system to preserve biological production, improve environmental quality, and uphold plant and animal health is referred to as "soil health" in a broader sense. Soil quality is typically related with a soil's fitness for a given use. In this sense, sustainability and soil health are interchangeable terms. Within the limitations imposed by climate and ecology, the physical and chemical characteristics of the soil determine an inherent component of the soil's quality. (Wu et al., 2020). However, soil is a non-renewable resource. A variety of processes and the provision of essential ecosystem services are supported by healthy soils (Urra et al., 2019). The core of the framework for assessing soil quality and health is soil taxonomy, or the collection of intrinsic soil properties communicated via classification. Each particular soil contains intrinsic soil quality traits that are influenced by the long-term interactions of the parent material, plants, microorganisms, geography, and climate.

Crop rotation, tillage, and organic amendments are examples of agricultural techniques that have a big impact on the chemical and physical fertility of the soil.(Abbott & Manning, 2015). Contamination of the soil, environmental degradation, and biodiversity loss are global issues that pose serious risks to the safety, health, and productivity of people. In the current context, the necessity to take action to preserve soil and its immediate environment has become a vital and difficult issue.(Bharti Mittu, 2015). The activities that take place in soils on a biological, chemical, and physical level are extremely complicated. As a result, it is particularly challenging to comprehend and forecast how a soil system will evolve after being altered by agricultural methods. The capacity of a soil to perform as a significant ecosystem is known as "soil health," which refers to the status of the processes and mechanisms in a specific soil. The idea of "soil health" (formerly "soil quality") views soil as an ecosystem that can be managed to become more "healthy."(Bhattacharya et al., 2020)