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TITLE:

Determination of physicochemical properties of soil before and after agricultural mulching process at MMP Fresh Farm, Kedah (Eggplant Farm Area)

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ABSTRACT

A layer of organic or inorganic material is placed on top of the soil surface as part of the horticulture practise known as soil mulching. The mulching material can be either organic (such as leaves, grass clippings, straw, or bark) or inorganic (such as plastic or landscape fabric). It is normally put in a layer that is 2-4 inches thick. Soil mulching has several benefits, including controlling soil temperature, lowering water evaporation, preventing weed development, enhancing soil structure and fertility, and preserving moisture in the soil. Mulching can help prevent the spread of some diseases and pests and can also help boost the growth and productivity of plants by maintaining cool, moist soil. Mulching has advantages for the soil in addition to aesthetic benefits for a garden or landscape. A flower or vegetable garden that has been thoroughly mulched appears neat, tidy, and well-maintained. The material used for mulching might degrade with time, especially if it is an organic material, therefore it is crucial to remember that it is not a one-time application. Mulch should therefore be reapplied occasionally to preserve its efficacy. Finally, soil mulching is a quick and easy way to enhance the health of your plants and the overall look of your garden or landscape. Mulching can assist promote healthy plant growth and result in a more productive and attractive garden by lowering water evaporation, decreasing weed growth, controlling soil temperature, and conserving moisture. This study examines how the physical and chemical characteristics of soil have changed both before and after cultivation. At MMP Fresh Farm in Sungai Petani, Kedah, soil samples were taken from both farming and non-farming regions. Numerous factors, including textures, pH, bulk density, porosity, and organic matter, were examined for both samples. According to the findings, compared to non-agriculture soil, agricultural soil had a lower pH, nutritional content, and organic matter. After agricultural techniques, the soil's structure and texture were also changed. These results show that agriculture significantly affects the chemical and physical characteristics of soil and emphasise the significance of sustainable farming methods to preserve soil health.

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BACKGROUND

1.1 Introduction

Mulches have been utilised extensively for vegetable production since ancient times, and the name mulch is derived from the German word molsch, which meaning "easy to decay" (Lightfoot 1994). Mulching is the process of applying various covering materials to the soil's surface in order to reduce moisture loss, weed growth, and increase crop yield (Nalayini 2007; Kader et al. 2019). Mulches may reduce water runoff, increase soil infiltration capacity, reduce weed growth by providing shade, and act as an evapotranspiration hurdle (Rathore et al. 1998). Other beneficial environmental impacts of mulching include regulating soil and plant root temperature, minimising nutrient losses, reducing soil erosion and compaction, and improving the physical qualities of soil (Ngouajio and McGiffen 2004; Lamont 2005).

Most of the land is covered in loose surface material called soil. It is made up of both organic and inorganic materials. In addition to being a source of water and nutrients, soil gives agricultural plants the structural support they need to grow. The chemical and physical characteristics of soils vary widely. A variety of diverse soil types are created by the interaction of many processes, including leaching, weathering, and microbiological activity. Each variety has unique advantages and disadvantages in terms of agricultural production (LEEPER, G.W. and UREN, N.C. 1993). For many applications, including agriculture, forestry, and environmental management, it is crucial to comprehend the physical and chemical properties of soil. Physical characteristics of the soil include its structure, texture, and bulk density, whereas chemical characteristics include pH, nutrient content, and the presence of contaminants.

1.1.1 Soil Physical and Chemical Properties Analysis

A variety of connections between functional (intensity) features, such as aeration and water availability, are caused by the interactions between soil texture and other physical composition (capacity) qualities of the soil, such as bulk density and porosity. No matter how sustainable a change in agricultural land use may be, it cannot be denied that these changes also lead to increased fertiliser and pesticide use, agricultural water use, mulching, and other management practises. All of these practises have the potential to significantly and permanently affect physicochemical properties. (Reichert et al., 2023, Nabi et al., 2022).

The ability to identify and characterise the physical and chemical characteristics of soil makes soil analysis a crucial part of agricultural and environmental management. These features are crucial in determining how well the soil works with various crops and whether it has the potential to pollute the environment. We will look at the various methods of soil analysis, the physical and chemical characteristics of soil that are typically evaluated, and the consequences of these characteristics for agricultural and environmental management in this overview of the literature.

The pH, nutritional makeup, and presence of dangerous compounds are only a few of the soil's chemical characteristics. Most plants do best on neutral to slightly acidic soils (pH 6.0-7.0). The quantities of nutrients like nitrogen, phosphorus, and potassium can also have an impact on how a plant develops. In addition, the presence of heavy metals or other dangerous substances in soil can be harmful to plants and the creatures that depend on them. The soil texture also has a big impact on the inter-particle pore space. The soil texture, especially clay, has a considerable impact on the production of certain aggregate sizes, which further favours the formation of larger aggregate sizes and inter-aggregate holes. (Wilding & Naidu, 2012, Wang et al., 2023).

In conclusion, because it enables the identification and characterization of the physical and chemical characteristics of soil, soil analysis is a vital part of agricultural and environmental management. These features are crucial in determining how well the soil works with various crops and whether it has the potential to pollute the environment. In this literature review, the methods of soil analysis, frequently studied physical and chemical soil properties, and the consequences of these attributes for agricultural and environmental management are explored. (Black et al., 2016)