



اَوَّلُ مَا يَنْبَغِي وَاسْتِكْبَارُ
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MARA

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TITLE:
**DETERMINATION OF PLASTIC POLLUTION
AND ITS DEGRADATION IN SOIL AT
PINEAPPLE CULTIVATION AREA, OKRA
PLANTATION AREA, PALM OIL PLANTATION
AREA AND CHILLI FERTIGATION AREA**

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ABSTRACT

The rampant use of plastic has led to a significant environmental issue known as plastic pollution. This issue is a concern as plastic and microplastics in the soil can cause harmful impacts on the ecosystem, reduce soil fertility and even harm human health via food chain. To ensure the health of the soil and the environment, it is important to understand the extent of plastic pollution in agricultural soil. This research aims to examine the functional groups of plastic pollution in soil through ATR-FTIR spectroscopy and to explore the impact of soil degradation products on soil quality. 12 samples were collected from agricultural areas in Chepor, Perak for palm oil plantation(4.67156889,101.0941868) and Al-Muktafi Billal Shah, Durian Mas, Terengganu which are pineapple cultivation(4.60895436,103.20619946), chilli fertigation and okra plantation(4.60252849,103.20873261). The study employed various techniques such as sorting plastic by size, drying samples, using sodium chloride solution for density separation, and cleaning samples through alkaline digestion with sodium hydroxide. The FTIR spectrum displays distinct peaks at 2915cm⁻¹, 1467cm⁻¹, and 717cm⁻¹, which can be employed to detect and measure the amount of polyethylene (PE) present. This research has established that the soil in the study areas is contaminated with plastic waste and its degradation. Therefore, it is essential to implement effective strategies for managing and mitigating plastic pollution in the environment to maintain soil quality in the future.

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CHAPTER ONE

BACKGROUND

1.1 Introduction

Plastics are extensively utilized both in the industrial sector and throughout the nation. They are made of polymers, which are large organic compounds, and consist of monomers like ethylene, propylene, vinyl chloride, and styrene. Although plastics are convenient, they can degrade in soil over a period of months or years, potentially causing pollution due to toxic microplastics.

Microplastics, tiny plastic fragments produced from the manufacture of commercial products and the disintegration of larger plastic, pose a threat to the environment. These particles are composed of synthetic polymers that do not dissolve in water and are heat sensitive. (National Geographic, 1996)

Absorption spectroscopy, one of the types of spectroscopy, plays a role in the process of absorbing and releasing light and radiation. It encompasses the release of light from a substance and its subsequent capture by a detector. The data gathered from this process can then be utilized to recognize the substance and evaluate its characteristics. This method is extensively utilized across various disciplines, including chemistry, biology, and environmental science, to identify the chemical makeup of a sample and explore its relationship with light and radiation. and wavelengths, which form a spectrum. In this research, the main focus is on absorption spectroscopy, which atomic composition of a sample can be determined by examining the absorption of a particular element through light on the electromagnetic spectrum. (A. ,2020)

Soil contains Total Organic Carbon (TOC) in soil organic matter (SOM). Organic carbon enters soil through the degradation of plant and animal residues, root exudates, live and dead microorganisms, and soil biota. Soil organic matter is the organic fraction of plant and animal residues that haven't degraded. (Soil quality,2011)