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TITLE: RAW MICROALGAE BASED BIOCHAR APPLICATION IN AGRICULTURE

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ABSTRACT

This report explores the characteristics, ecological significance, and potential applications of microalgae belonging to the Chlorophyta division. Chlorophyta, commonly known as green algae, are photosynthetic organisms found in diverse aquatic environments. They play a crucial role in carbon sequestration, biofuel production, wastewater treatment, and as a nutritional resource. This study focuses on analyzing different surface media for microalgae growth and their potential impact on plant development.

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CHAPTER ONE BACKGROUND

1.1 Introduction

Microalgae, particularly species from the Chlorophyta group, have garnered significant attention in recent years for their ecological importance and diverse applications in biotechnology. As primary producers in aquatic ecosystems, Chlorophyta contribute significantly to oxygen generation and carbon fixation, playing a critical role in maintaining the Earth's ecological balance. Beyond their natural functions, these microalgae have been increasingly recognized for their potential in a variety of industrial sectors, including agriculture, biofuels, and environmental sustainability.

One of the most promising applications of Chlorophyta lies in sustainable agriculture. Studies have demonstrated that microalgae biomass, rich in biomolecules such as amino acids, micronutrients, polysaccharides, and phytohormones, can serve as natural plant growth stimulants. These compounds not only enhance plant growth but also improve crop productivity and disease resistance. For instance, Chlorophyta extracts have been shown to significantly enhance the growth of tomato plants, highlighting their potential as biostimulants to reduce reliance on chemical fertilizers and promote more sustainable farming practices (Nature, 2020).

In addition to their role in agriculture, optimizing the cultivation systems for Chlorophyta is crucial to maximizing their industrial potential. Recent studies have explored how the volume-to-surface area ratio in culture systems affects the growth and productivity of microalgae. These findings provide valuable insights into how cultivation parameters can be fine-tuned to enhance photosynthetic efficiency, growth rates, and overall biomass productivity. Such optimization is key for large-scale applications of Chlorophyta, particularly in biofuel production, wastewater treatment, and other biotechnological innovations (ResearchGate, 2022).

This report aims to explore the multifaceted potential of Chlorophyta sp., focusing on their taxonomy, physiological characteristics, and diverse industrial applications. Drawing on recent research, it will examine their beneficial effects in agriculture, the

optimization of cultivation systems, and their promise as a sustainable resource for future biotechnological developments (PMC, 2023).

1.2 Literature Review

1.2.1 Background of Microalgae

Microalgae are microscopic photosynthetic organisms found in marine and freshwater environments. They play a vital role in aquatic ecosystems by contributing to oxygen production, carbon sequestration, and serving as a primary food source for aquatic organisms (Nature, 2020). Chlorophyta, a major division of microalgae, is known for its rapid growth, high lipid content, and diverse applications in biofuel production, wastewater treatment, and agriculture (ResearchGate, 2022). Additionally, microalgae have gained interest in the biotechnology sector due to their ability to produce valuable biomolecules such as proteins, lipids, and pigments, which are useful for pharmaceutical and cosmetic applications.



Figure 1.2.1.1 & Figure 1.2.1.1: The green algae is found in the drain (UiTM Bukit Besi, Terengganu)

1.2.2 Importance of Chlorophyta

Chlorophyta species are widely studied for their ecological and economic benefits. They have been identified as promising candidates for biofertilizers and