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Study on Enhancing Agricultural Soil Fertility by the Recovering of Organic Liquid Fertilizer from Sugarcane Industrial Press-Mud

Girish Vittal Badiger[1], Dr. Brijbhushan S[2], Dr. Nagraj S. Patil[3] , Dr. B.T. Suresh Babu[4]
[1]*Girish Vittal Badiger, Research Scholar, VTU-RRC, Department of Civil Engineering, Visvesvaraya Technological University, CPGS, Kalaburagi-585105, Karnataka, India*
[2]*Dr. Brijbhushan S, Assistant Professor, Visvesvaraya Technological University, Kalaburagi-585105, Karnataka, India*
[3]*Dr. Nagraj S. Patil, Associate Professor, Visvesvaraya Technological University, Belagavi-590018, Karnataka, India*
[4]*Dr. B.T. Suresh Babu, Professor Department of Civil Engineering, Angadi Institute of Technology and Management Belagavi-590009, Karnataka, India*

Abstract: ***This study work examines the extraction of organic liquid fertilizer from sugarcane industrial press-mud, emphasizing its capacity to improve agricultural soil fertility. Challenges in trash management. The sugarcane business produces significant by-products, including filter mud, which, when properly handled by anaerobic digestion and composting, can produce nutrient-dense fertilizers. This study emphasizes the effects of organic fertilizers on soil health, illustrating enhancements in nutrient concentrations, microbial activity, and overall soil structure. Comparative analyses demonstrate substantial improvements in essential soil parameters after the application of organic liquid fertilizer, underscoring its effectiveness as a sustainable substitute for traditional chemical fertilizers. The results highlight the significance of incorporating agricultural by-products into sustainable practices, aiding in waste reduction and fostering ecological equilibrium within farming systems. This study encourages the adoption of innovative recycling techniques in the sugarcane sector to strengthen environmentally friendly and productive sustainable farming methods. Future implications indicate that expanding these approaches could profoundly alter food production systems and enhance sustainability objectives in agriculture.***
Keywords: Organic Liquid Fertilizer, Soil Fertility Enhancement, Waste Management, Microbial Activity, Sugarcane Press-Mud.

I. INTRODUCTION

Sustainable farming practices are becoming more and more necessary, and scientists are looking at novel ways to increase soil fertility while lessening their negative effects on the environment. innovative strategies to lessen their negative effects on the environment while increasing soil fertility. A viable alternative is the extraction of organic liquid fertilizer from sugarcane industrial press mud, a byproduct of sugar manufacturing frequently regarded as waste. This study seeks to evaluate the viability of transforming press-mud into a potent organic fertilizer, so tackling two significant challenges: waste management and soil nutrient deficit. In order to clarify the organic liquid fertilizer's efficacy in improving soil health and crop productivity, this study will examine its composition and potential uses. This research supports more sustainable agriculture techniques that benefit farmers and the environment by reusing waste materials and aligning with the growing emphasis on sustainable farming approaches. [1-3].

II. THE PROCESS OF RECOVERING ORGANIC LIQUID FERTILIZER

The sugarcane business is a vital agricultural and economic sector, especially in regions such as Egypt, where it has thrived for millennia and presently yields approximately 16 million tons yearly from diverse farms. This industry consists of two main stages: agricultural agriculture, which produces important residues like cane tops and dried leaves, and industrial processing, which generates essential by-products such as filter mud and bagasse. These by-products are essential to the manufacturing cycle and offer multiple opportunities for waste valorisation. For example, filter mud is frequently utilized as a soil amendment because of its nutrient density, whereas bagasse can be transformed into electricity or further processed into products like as paper. The misuse of these wastes has generated environmental issues, mandating sustainable approaches for their reuse and recycling to reduce pollution and improve soil fertility [2].

III. METHODS OF EXTRACTION FROM SUGARCANE PRESS-MUD

The extraction of organic liquid fertiliser from sugarcane press-mud has been accomplished using a number of innovative methods, all aimed at minimising environmental impact and optimising nutrient recovery. Anaerobic digestion is a popular technique that uses bacteria to break down organic materials.

Fermenting organic materials without oxygen produces biogas and a nutrient-rich liquid byproduct. In addition to reducing greenhouse gas emissions associated with traditional waste disposal, this method enhances the fertilizer's nutritional composition. Plant growth-promoting rhizobacteria (PGPR) and other microbial inoculants can enhance plant health and soil fertility, which raises the effectiveness of the extracted liquid fertiliser. [3-4].

It is essential to coordinate these extraction processes with sustainable practices that avert resource depletion and environmental damage, guaranteeing that agricultural production from these fertilizers is maintained. undermine sustained ecological integrity. This all-encompassing strategy emphasizes how crucial creative approaches are to sustainable agriculture [5].

IV. IMPACT OF ORGANIC LIQUID FERTILIZER ON SOIL FERTILITY

Organic liquid fertilisers increasingly acknowledged as a sustainable alternative to the chemical fertilisers on soil fertility. These fertilisers, derived from organic resources such as industrial press mud of sugarcane, provide a substantial amount of macronutrients and micronutrients, which are vital for plant growth. Application of organic liquid fertilisers improved physical, chemical and biological property of soil.

This leads to improved microbial activity and nutrient assimilation, which in turn increases crop yields. Research demonstrates that the integration of by-products such as filter mud and bagasse into composting processes can significantly stabilize nutrients, rendering them accessible for plant absorption while mitigating the phytotoxic effects linked to elevated salt concentrations found in other organic wastes, such as distillery spent wash. This demonstrates their many benefits for agricultural productivity and soil health. These organic treatments provide a sustainable way to improve soil fertility techniques and manage agricultural leftovers [6].

V. COMPARISON OF SOIL HEALTH BEFORE AND AFTER APPLICATION

There are significant changes in key soil indicators when comparing the health of the soil before and after applying organic liquid fertiliser manufactured from sugarcane industrial press mud. Before the application, the soil's nutritional profile often indicates that essential elements like phosphorus and nitrogen, which are required for healthy plant growth, are insufficient. Many things have happened since the treatment: nitrogen levels, microbial activity and even carbon and organic matter content of the soil have all changed significantly. Two essential components of sustainable agricultural techniques, studies claim that preserving sugarcane remains rather than burning or shredding them enhances the chemical properties of the organic matter in the soil and lowers the total quantity of particles floating in the atmosphere. [7]. Furthermore, applying press-mud fertiliser improves soil structure, water retention, biodiversity, and nutrient replenishment, all of which contribute to a healthier environment that supports strong crop development [8-9].

VI. CONCLUSION

To sum up, the research into the recovery of organic liquid fertilizer from sugarcane industrial press-mud is a potential way to improve the fertility of agricultural soil while also dealing with waste management problems. Filter mud, one of the many waste products produced by the sugarcane industry, can be very beneficial for enhancing soil sustainability and quality when used properly. By taking these steps, waste disposal's negative environmental effects can be lessened, improving agricultural practices' environmental friendliness and resource conservation. Implementing co-composting techniques, that mix press-mud with other organic waste materials has a huge potential to enhance the soil's overall health and quality of nutrients available to crops.

The results demonstrate that practically implementing new methods to recover agricultural waste will diffuse fertilizers in soil, but also promote sustainable understanding in the sugarcane sector.

A. Synopsis of Results and Prospective Consequences for Sustainable Agriculture

In conclusion, studies on the recovery of organic liquid fertiliser from sugarcane industrial press-mud indicate that there are viable approaches to enhancing agricultural soil fertility and promoting sustainability. The findings demonstrate that applying this organic fertiliser improves the soil's structure and microbial activity in addition to providing essential nutrients. In addition, using by-products from the sugarcane sector helps to reduce waste, which is in line with sustainable agriculture methods.

In the future, the widespread use of organic fertilizers could reduce the need for synthetic fertilizers, leading to a more environmentally responsible way of farming. As researchers keep investigating optimization techniques and enhancing processing methods, the potential for scaling this initiative could have a major effect on food production systems, improve environmental health, and support the goal of achieving sustainability in agricultural practices around the world. As a result, these discoveries provide a foundation for new methods that strike a balance between agricultural output and ecological stewardship.

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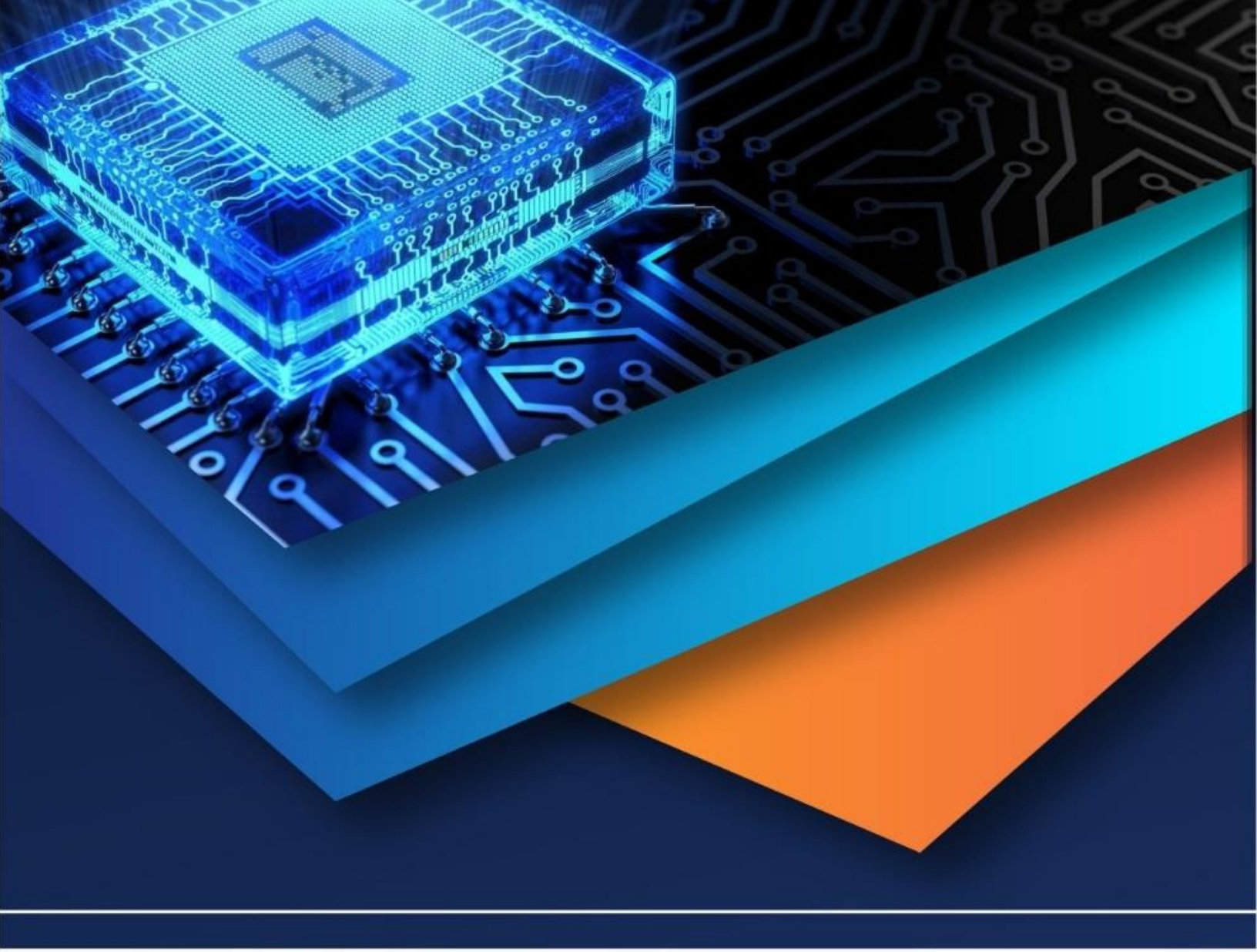

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