Study of the impacts of soil amendment material on soil quaility and plant growth

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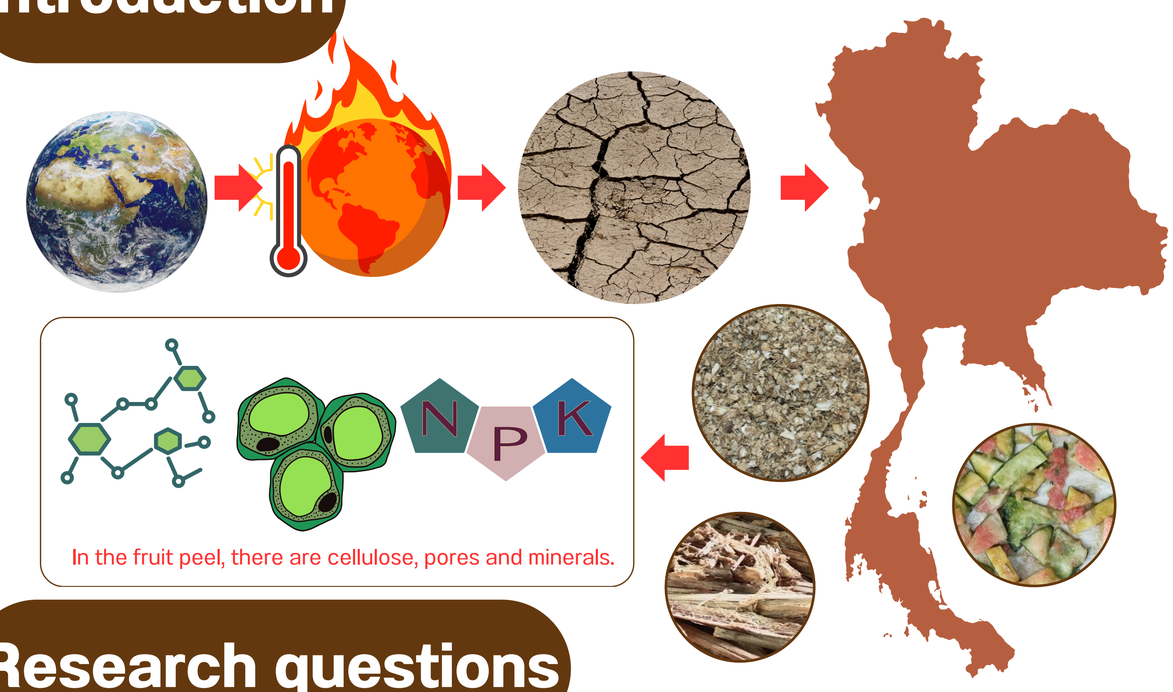
Abstract

This study aims to develop soil improvers from natural waste materials and evaluate their water absorption capacity. Additionally, it examines the soil quality before and after planting, as well as the growth of plants. Four different soil improver formulas were created using peanut shells, watermelon peels, bagasse, and goat manure as key ingredients. The water absorption test revealed that Formula 3 had the highest absorption rate.

The soil pH increased after planting in all formulas compared to before planting. Analysis of mineral content indicated that Formula 1 and Formula 2 led to an increase in nitrogen, potassium, and phosphorus levels. Formula 3 resulted in increased phosphorus and potassium, while Formula 4 showed an increase in nitrogen and phosphorus. In contrast, the control group exhibited no increase in mineral

Keywords: Soil Amendment Materials , Soil Quality , Plant Growth

Introduction



Research questions

1. Can soil improvers from natural waste materials maintain soil moisture?
2. Do soil improvement materials from natural waste materials affect the amount of minerals in the soil?
3. Do soil improvement materials from natural waste affect plant growth?

Research hypothesi

1. Soil improvement materials from natural waste can maintain soil moisture.
2. Soil improvement materials from natural waste affect the mineral content in the soil.
3. Soil improvement materials from natural waste materials affect plant growth.

conduct research

Result

Chart 1 shows the percentage of water absorption.

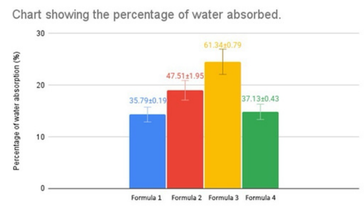


Chart 2 shows the amount of NPK minerals in the soil (before the experiment).

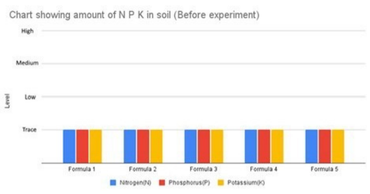


Chart 3 shows the amount of NPK minerals in the soil (after the experiment).

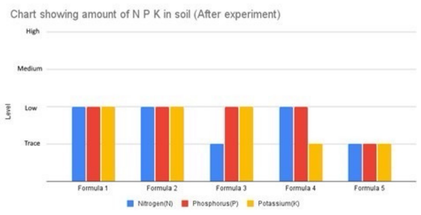


Chart 4 shows the pH in the soil.

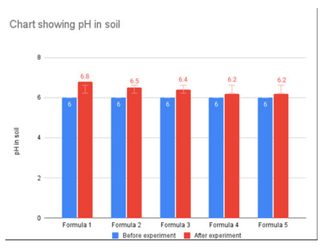


Chart 5 shows the percentage of soil moisture.

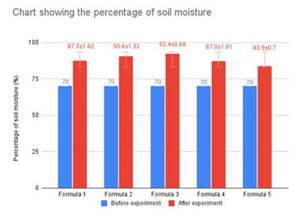


Chart 6 shows the width of the leaves.

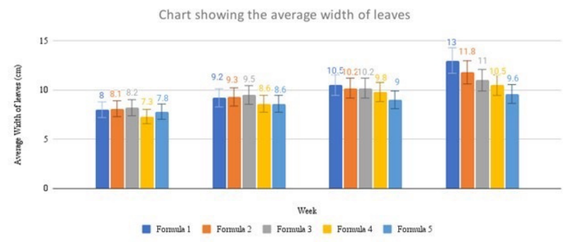


Chart 7 shows the average number of leaves increased by the plant.

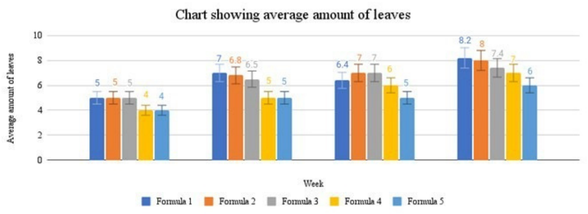
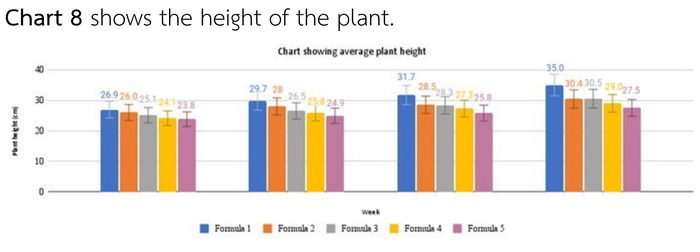


Chart 8 shows the height of the plant.



Conclusion

The water absorption test of soil improvers and soil moisture revealed that Formula 3 exhibited the highest percentage of water absorption and retained the most soil moisture. This finding aligns with previous research on the development of water-absorbing materials from sugarcane bagasse, which help retain soil moisture and enhance water-use efficiency in the agricultural sector.

The study of soil quality showed that the soil pH increased after planting across all formulas. An analysis of mineral content indicated that Formula 1 and Formula 2 led to an increase in nitrogen, potassium, and phosphorus levels, while Formula 3 resulted in higher phosphorus and potassium content. Formula 4 exhibited an increase in nitrogen and phosphorus. In contrast, the control group showed no increase in mineral content.

Regarding plant growth, the four-week study of Cantonese (Brassica rapa) demonstrated that Formula 1 produced the highest average plant height, leaf width, and number of leaves. This is attributed to its high concentration of peanut shells, which are a valuable source of nutrients for plant growth. This result is consistent with previous research on the effects of organic matter on plant development.

Acknowledgments

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