Studying the effect of using sludge from wastewater treatment ponds from rubber factories on the growth of kale.

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Abstract

This project studied the effects of applying sludge from wastewater treatment ponds of rubber factories on the growth of kale. The experiment used six different growing media: 1) regular soil, 2) sludge from the wastewater treatment pond, 3) a mixture of sludge and duckweed in a 50:1 ratio, 4) 50:1.5 ratio, 5) 50:2 ratio, and 6) 50:2.5 ratio. The purpose was to compare the growth of kale in different media and analyze the soil quality (pH, soil texture, color, moisture, porosity, nutrients, and organic matter before and after the experiment).

The results showed that most of the growing media had a gray tone, except for the 50:1 ratio, which had a dark gray color. All the experimental soils were sandy loam. The highest moisture content was found in the 50:1 ratio at 90%, while the highest porosity (20.13%) was observed in the 50:1.5 ratio. The levels of nutrients and organic matter increased when duckweed was mixed with the sludge, with the 50:1.5 ratio showing the highest increase.

In terms of growth, Kale grew significantly better in sludge-treated media compared to regular soil. However, when duckweed was mixed with the sludge in the 50:2 and 50:2.5 ratios, the growth was slower. The best growth was observed in the 50:2.5 ratio.

In conclusion, sludge from wastewater treatment ponds in rubber factories can be developed as a plant growing medium for pots, enhancing the growth and yield of Kale.

Introduction

rubber factories

sludge from the wastewater treatment ponds of rubber factories

azolla

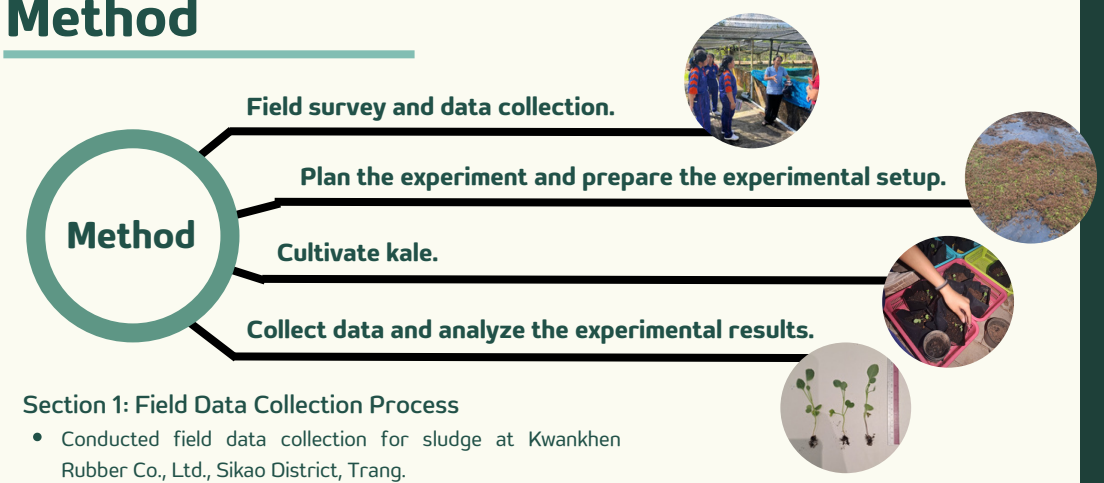
kale

Study site

Data collection fieldwork in Nam Muang Phet subdistrict, Sikao district, Trang province.

Data collection fieldwork in Na To Ming subdistrict, Mueang district, Trang province.

Method



Section 1: Field Data Collection Process

- Conducted field data collection for sludge at Kwankhen Rubber Co., Ltd., Sikao District, Trang.
- Collected data for duckweed at the Freshwater Aquaculture Research and Development Center, Mueang District, Trang.

Section 2: Experiment Planning and Setup Preparation

- Dried the collected duckweed until completely dry.
- Prepared 6 experimental setups:

T1: Potting soil T2: Wastewater treatment pond sludge T3: Wastewater treatment pond sludge: Duckweed at 50:1 T4: Wastewater treatment pond sludge: Duckweed at 50:1.5 T5: Wastewater treatment pond sludge: Duckweed at 50:2 T6: Wastewater treatment pond sludge: Duckweed at 50:2.5 Each setup was done in triplicates (3 plants per setup).

Section 3: Kale Planting Experiment Process

Planted kale in peat moss for one week, then transferred to the different experimental setups. Data on leaf count and plant height were recorded weekly for 7 weeks.

Section 4: Data Collection and Analysis Process

Input data into Excel, calculated the average for each experimental setup, then calculated the standard deviation. Graphs and charts were created using Excel.

Research Questions

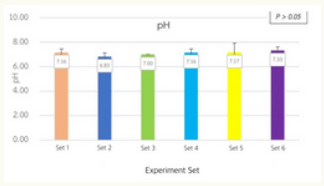
1. Can the sludge from the wastewater treatment ponds of rubber factories be applied for beneficial use?
2. Will duckweed result in better growth of kale and an increase in nutrients in soil from the wastewater treatment ponds of rubber factories?

Hypothesis

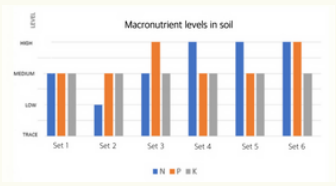
1. The sludge from the wastewater treatment ponds of rubber factories can be applied for beneficial use.
2. Duckweed can help kale grow well and increase the nutrient levels in the soil from the wastewater treatment ponds of rubber factories.

Results

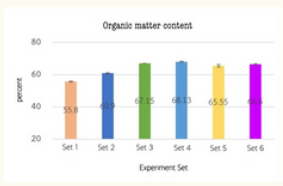
Section 1: Study of Soil Quality in All 6 Experimental Groups



Acidity-alkalinity or pH level

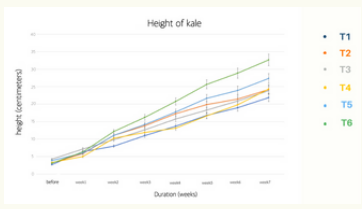


Nutrient content

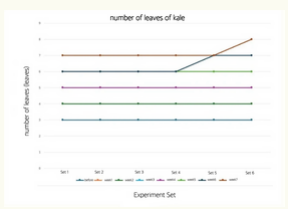


Organic matter content

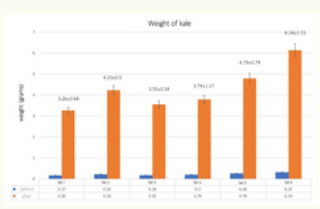
Section 2: Study of kale growth each week for 7 weeks.



Height of kale each week for 7 weeks.



Number of kale plants each week for 7 weeks.



Weight of kale before and after the experiment.

Conclusion

Based on the results of the experiment, it can be concluded that the experimental groups with the most suitable pH for growing kale are groups 2-5, as their pH values fall within the neutral range of 6.00-7.00. The experimental groups with the most appropriate nutrient levels for growing kale are groups 3-6, as they contain nitrogen at high levels and phosphorus and potassium at moderate levels, which are close to the nutrient requirements of kale. The experimental group with the most suitable amount of organic matter for growing kale is group 6, as kale prefers soil with very low organic matter content.

Based on the results of the experiment, it can be concluded that the experimental group where kale grew the best, when comparing the height before planting and the height in week 7, is group 6, with a height of 32.64Â±0.07 cm. The second-best group is group 5, with a height of 27.33Â±0.02 cm, followed by group 2, with a height of 24Â±0 cm. The experimental group where kale grew the slowest is group 1, with a height of 21.85Â±0.07 cm. This is because group 6 had the highest amount of duckweed mixed, resulting in the highest nitrogen content, which is ideal for kale, a plant that requires high nitrogen levels.

Acknowledgement

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Reference

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