



# Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil.

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## Abstract

This study aims to develop Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil. The primary materials used are algae and rice straw in three ratio formulations: 10:0, 9:1, and 8:2, respectively, and supplemented with agricultural by-products such as crushed eggshells for calcium and fungal prevention, earthworm castings to increase NPK, and starch paste as a binder to form the soil cover material. The experiments were divided into 10 sets: Sets 1-5 used loamy soil (planting soil) and sets 6-10 used clayey sandy soil (low in minerals) to test various soil properties, including pH, temperature, NPK content, moisture, and organic matter content, as well as to study the water used for irrigating plants and the decomposition of the soil cover materials. The results showed that the soil cover material with an 8:2 ratio provided the best moisture retention due to the algae's high water-holding capacity and the rice straw's role in reducing water evaporation. Using soil cover materials from algae mixed with natural materials not only helped retain moisture in the soil but also increased soil fertility through decomposition, which released important minerals for plant growth. Thus, this material is suitable for organic farming and soil and water conservation.

## Results

### Section 1: Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil.

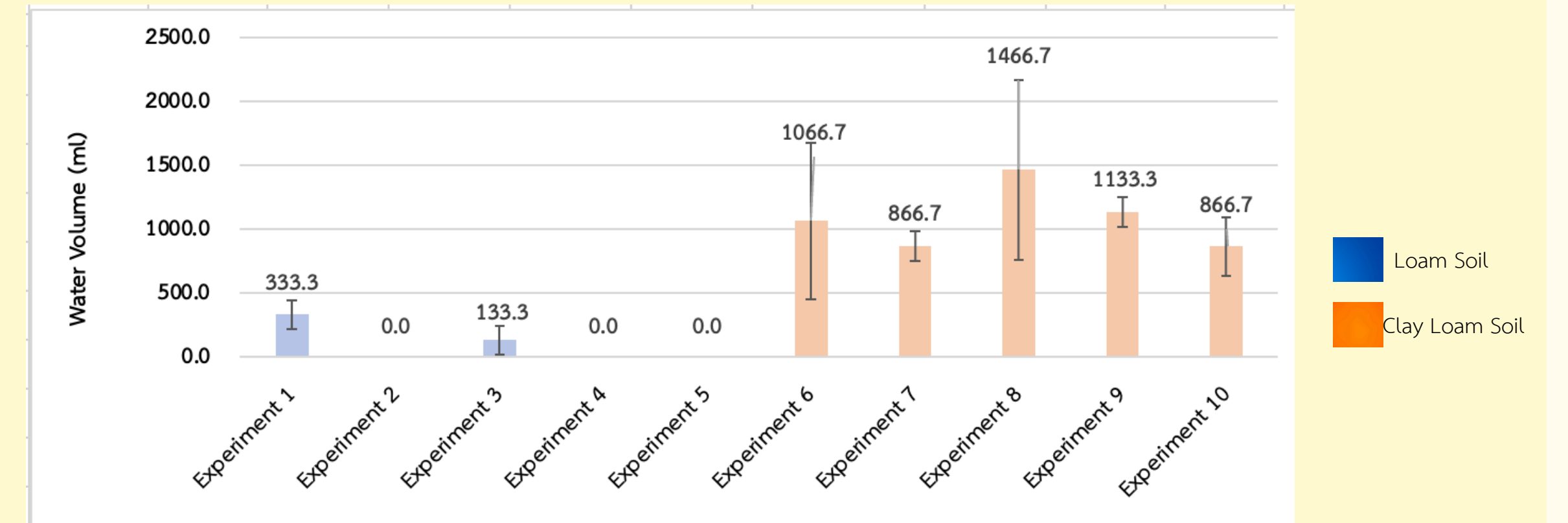


Image 4: Bar Chart Showing Watering Volume Over 1 Week When Using Mulch Made from Freshwater Algae Mixed with Natural Materials

### Section 2: Results of Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil.

Soil Properties	Experiment									
	1	2	3	4	5	6	7	8	9	10
Soil pH	8	8	8	8	8	8	8	8	8	8
% Moisture	65.63	74.54	70.76	75.46	77.17	52.91	53.71	55.2	55.73	59.69
Soil Temperature	32	32	31	31	31	30	31	30	30	30
Soil Texture	Loam Soil					Clay Loam Soil				
N before	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace
N after	trace	trace	high	high	high	trace	trace	medium	medium	medium
P before	low	low	low	low	low	trace	trace	trace	trace	trace
P after	low	low	high	high	high	trace	trace	low	low	low
K before	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace
K after	trace	trace	high	high	high	trace	trace	medium	medium	medium
Organic Matter (Before)	45.15	45.16	45	45.06	45.1	5.07	5.13	5.6	5.23	5.1
Organic Matter (After)	45.15	45.16	95.55	93.5	90.55	5.07	5.13	26.23	25.1	24.13

Table 2 presents the results of the study on how mulch made from freshwater algae mixed with natural materials affects the average soil quality.

### Section 3: Results of Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil.

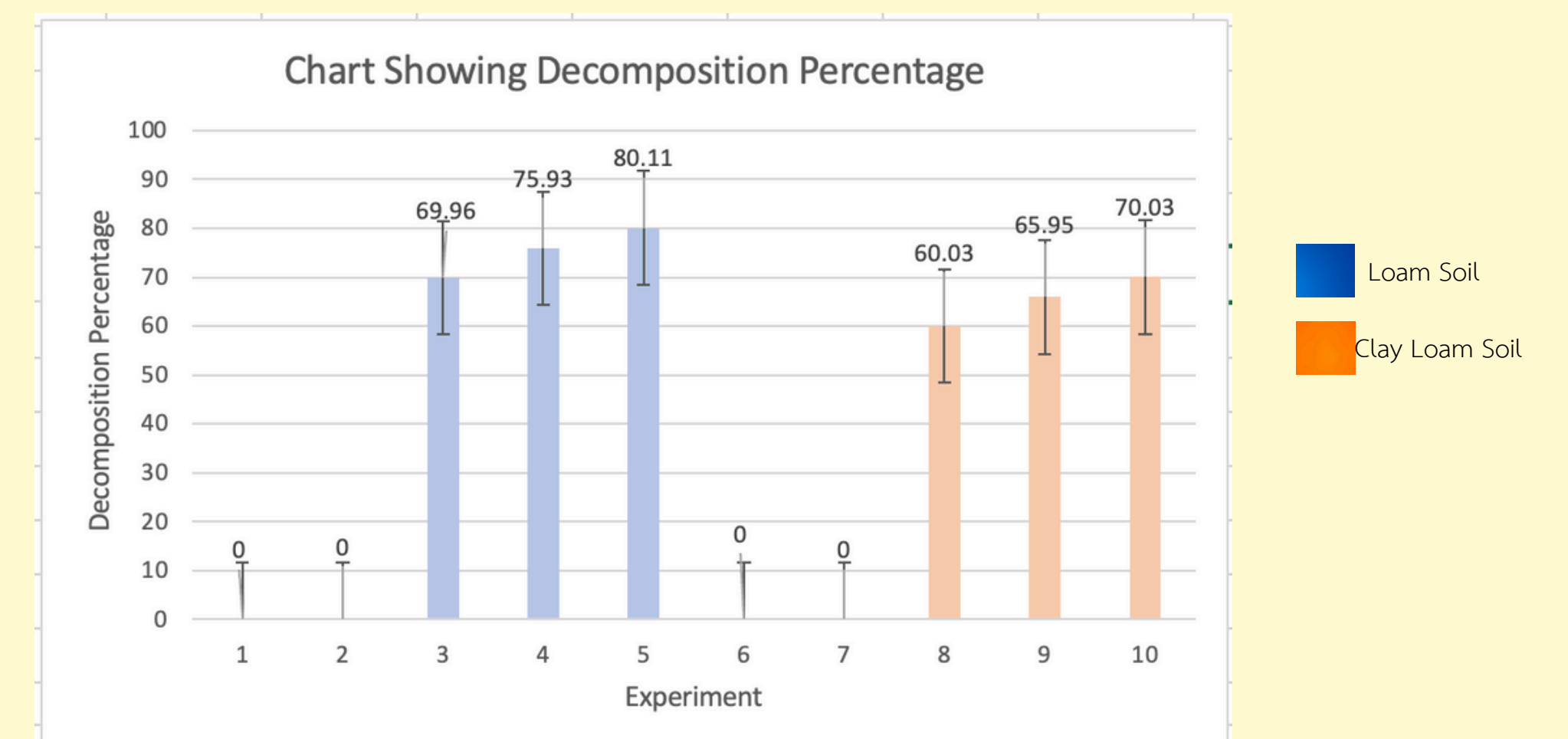


Image 9: Bar Chart Showing the Degradation of Mulch Made from Freshwater Algae Mixed with Natural Materials

## Introduction



## Research Question ?

Can aquatic algae mixed with natural materials as a mulch help retain moisture and increase minerals in the soil? If so, how?

## Objective

To develop a mulch made from aquatic algae mixed with natural materials that helps retain moisture and increase minerals in the soil.

## Hypothesis

Aquatic algae mixed with natural materials can retain moisture and increase minerals in the soil.

## Research Methodology



## Results

### Section 1: Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil.

Experiment	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Experiment Set 1	90.0±0.0	60.0±0.0 <sup>A</sup>	66.7±1.2	60.0±0.0	60.0±0.0	67.0±0.0	55.7±0.6
Experiment Set 2	100.0±0.0	65.7±0.0 <sup>B</sup>	87.7±1.2	67.7±0.6	76.7±1.2	64.7±0.6	59.3±1.2
Experiment Set 3	100.0±0.0	55.3±0.6 <sup>C</sup>	85.3±1.0	67.7±0.6	64.0±1.0	65.3±0.6	57.7±1.0
Experiment Set 4	100.0±0.0	73.3±0.6 <sup>D</sup>	90.3±0.6	72.3±1.2	64.7±0.6	73.3±1.2	54.3±0.6
Experiment Set 5	100.0±0.0	80.3±0.6 <sup>E</sup>	89.3±0.6	86.0±0.6	63.3±0.6	64.3±0.6	57.0±0.6
Experiment Set 6	62.0±0.0	60.7±0.6 <sup>F</sup>	39.0±1.2	47.3±0.0	52.7±1.2	54.0±0.0	52.7±1.2
Experiment Set 7	67.7±0.6	59.7±0.6 <sup>G</sup>	47.0±0.6	45.0±0.6	49.0±0.6	54.3±0.6	53.3±0.6
Experiment Set 8	63.0±0.6	57.7±1.2 <sup>H</sup>	55.0±0.0	45.0±1.2	51.7±0.0	56.7±1.2	57.3±0.0
Experiment Set 9	60.7±0.6	61.7±1.2 <sup>I</sup>	52.7±0.6	60.0±0.6	52.3±0.6	49.7±0.6	53.0±0.6
Experiment Set 10	69.7±0.6	75.0±0.0 <sup>J</sup>	47.7±1.2	55.3±0.6	60.7±1.2	56.7±0.6	52.7±1.2

All experimental groups showed a statistically significant difference at the 0.05 level.

## Summary and Discussion of Research Results

Study of mulch base from freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil. The ratio of freshwater algae and rice straw at 8:2 was found to be the most effective in retaining soil moisture. The 20% rice straw mixture helped increase air gaps in the soil, improving water drainage while still maintaining good moisture retention. The frequency of watering could be significantly reduced, resulting in water savings and more efficient plant maintenance costs. The experimental groups using freshwater algae mixed with natural materials to retain moisture and increase minerals in the soil. Experimental groups 3-5 showed high levels of NPK (Nitrogen, Phosphorus, and Potassium) in the soil, while groups 8-10 showed moderate levels of NPK. The decomposition occurred naturally. The ratio of freshwater algae to rice straw significantly affected the decomposition percentage. After one month, the 8:2 ratio had the highest decomposition percentage.

## Acknowledgements



## References

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