

## Assessing and Improving Soil Fertility at Chonradsadornumrung School using the Selected Organic and Inorganic Substances

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### Abstract

This scientific investigation aims to assess and improve the soil fertility at Chonradsadornumrung School using various organic and inorganic substances. The quality of the soil from the chosen site was tested using the standard protocol from Globe and equipment from Extech. The study site was divided into 6 sections and treated with organic and inorganic substances such as egg shells, oyster shells, shredded papers, fruits, and combined substances while the other section has no treatment (control). The results of the different experiments were observed, gathered, and compared using one-way ANOVA and Tukey HSD Test. Based on the experimentations, results and gathered data, the researchers concluded that there was a significant difference ( $p < 0.05$ ) in soil pH, relative humidity, air temperature, and soil temperature measured at 5 cm and 10 cm depth. The organic and inorganic substances can improve the soil fertility at Chonradsadornumrung School and among the treatments, the combined substances are the most effective in increasing the amount of nitrogen (N), phosphorus (P), and potassium (K). In addition, more research should be done to test the other soil properties in the study site and the amount of NPK will be measured after 1 month.

**Keywords:** Soil Fertility, soil parameter, ANOVA and Tukey HSD Test

### Research Questions

- 1.) Is there a significant difference in various soil parameters measured for four times at Chonradsadornumrung School?
2. Can various organic and inorganic substances improve the soil fertility at Chonradsadornumrung School?
3. Which substance is the most effective in improving the soil fertility at Chonradsadornumrung School?

### Hypotheses

**Alternative:** There is a significant difference in various soil parameters measured and the selected organic and inorganic substances can improve the soil fertility at Chonradsadornumrung School.

**Null:** There is no significant difference in various soil parameters measured and the selected organic and inorganic substances cannot improve the soil fertility at Chonradsadornumrung School.

### Introduction

The primary goals of the current environmental research are to improve the soil fertility by using the organic and inorganic substances at Chonradsadornumrung School, as well as to reduce the food waste from school's canteen. The said school is one of the famous public secondary schools located in the Eastern part of Thailand that promotes academic excellence. The Educational Service Area Office evaluated and certified the school as an ASEAN model school at the educational area level. This is due to the fact that the results of the national achievement test for Mathayom 3 (Grade 9) and Mathayom 6 (Grade 12) students were higher than the average scores at the provincial and national levels. Numerous infrastructures have recently been constructed on campus to address the issue of a lack of classrooms as well as sports facilities to improve the students' athletic endeavors. Lastly, the area where the school is located has been experiencing drought because it hasn't rained in almost three months. As a result, the ground surrounding the school is completely dry. The current soil quality inside the school must be assessed, hence soil testing is unquestionably required.

The campus's huge amount of inorganic and organic wastes in the canteen is being thrown and wasted. Food wastes can be utilized to nutrient-poor soils because it is typically rich with nitrogen. According to O'Connor et al. (2022), dehydrated vegetable FW has a high concentration of plant-available N (1.71 g kg<sup>-1</sup>) and total N (3.25%), making it suitable for use as a fertilizer to enhance crop growth. Anaerobic digestate from food wastes in particular has a high N concentration. Before drying, the digestate typically contains 1.5 to 6.2 g kg<sup>-1</sup> of total nitrogen (Du et al., 2018). These situations prompted the researchers to conduct this environmental research entitled "Assessing and Improving Soil Fertility at Chonradsadornumrung School using the Selected Organic and Inorganic Substances". This current investigation aimed to improve the soil quality in the school by using organic and inorganic substances.

### Research Methodology



### Results

The figures below show the data encoded on Globe web page from 22 December 2023 to 24 January 2024.

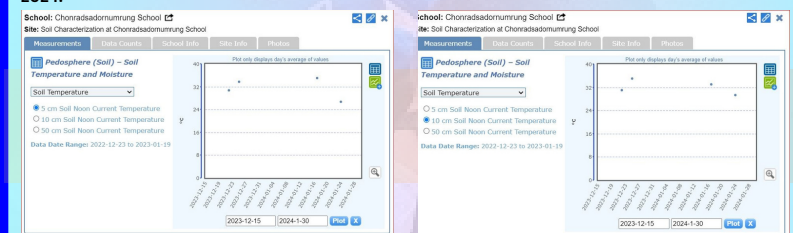


Figure 1. Soil temperature at 5 cm.

Figure 2. Soil Temperature at 10 cm.

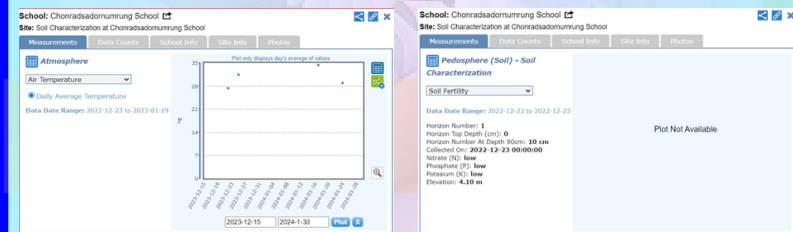


Figure 3. Air Temperature

Figure 4. Soil Fertility

Parameters	22 Dec. 2023 (4:09 PM)	24 Dec. 2023 (4:30 PM)	17 Jan. 2024 (4:30 PM)	24 Jan. 2024 (4:30 PM)
Soil pH	7	7	7	7
Soil Temperature (5 cm)	35.67	33.67	35	26.67
Soil Temperature (10 cm)	31	35	33	29.33
Relative Humidity (%)	43	48.87	36	41.33
Air Temperature (°C)	27.3	31.4	34.3	28.9
Soil Color	Grayish brown	Grayish brown	Grayish brown	Grayish brown
Soil Structure	Granular	Granular	Granular	Granular
Soil Texture	Medium Loam	Medium Loam	Medium Loam	Medium Loam
Soil Consistency	Loose	Loose	Loose	Loose
Soil Moisture	Dry	Dry	Dry	Dry

Figure 5. Relative Humidity

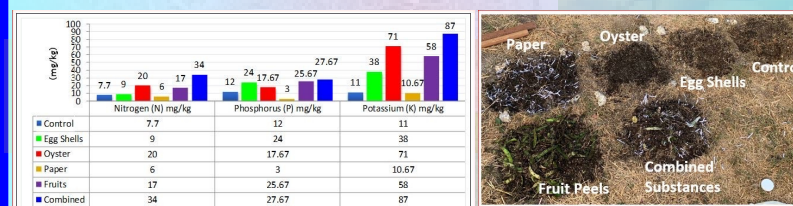


Figure 6. Average nitrogen (N), phosphorus (P), and potassium (K) level of soil (mg/kg) after 7 days of applying the organic and inorganic substances.



Figure 8. Soil sections in the study site with the treatments

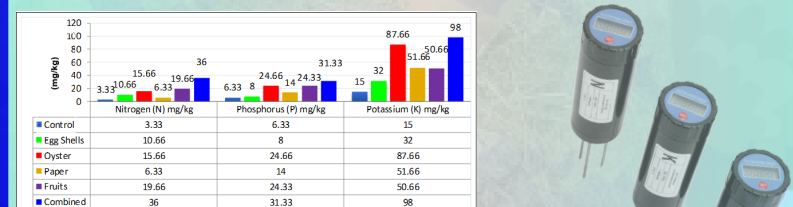


Figure 7. Average nitrogen (N), phosphorus (P), and potassium (K) level of soil (mg/kg) after 14 days of applying the organic and inorganic substances.

### Conclusion

Based on the experimentations, results and gathered data, the researchers concluded that there are significant differences ( $p < 0.05$ ) in soil pH, relative humidity, air temperature, and soil temperature measured at 5 cm and 10 cm depth. Additionally, the organic and inorganic substances can improve the soil fertility at Chonradsadornumrung School and among the treatments, the combined substances are the most effective in increasing the amount of nitrogen (N), phosphorus (P), and potassium (K).

### Recommendations

For the improvement of the study, more research should be done to test the other soil properties in the study site and the amount of NPK will be measured after 1 month to determine the level of nutrients. Furthermore, more organic and inorganic substances will be used to improve the soil fertility at Chonradsadornumrung School

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