

Study of the impacts of rice cultivation on soil and water in Moo 7, Nangam Subdistrict, Mueang District, Trang Province.



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Abstract

This study aimed to compare soil and water quality in rice fields before and after rice cultivation at Village No. 7, T.Nangam , A. Mueang , Trang Province, during 11 June 2024 - 31 January 2025. The soil quality (pH, electrical conductivity, salinity, organic matter, nitrogen, phosphorus, potassium) and water quality (temperature, nitrate, phosphate, oxygen, salinity) were studied. It was found that during the rice cultivation period, soil quality was slightly higher with an average nitrogen content of 5.33 mg/L, phosphorus content of 0.67 mg/L, potassium content of 17.11 mg/L, electrical conductivity of 0.10 cos, and salinity of 60.44 ppm. The pH value was 5.44-6.44. After rice cultivation, the soil electrical conductivity, salinity, and organic matter increased. Nitrogen and potassium decreased

Water quality in the rice field pH 5.33-7, salinity 73.50 ppm, nitrate 0.5 mg/L, phosphate 0.28 mg/L. Water near the rice field has pH 7.5, salinity 54.67 ppm, phosphate 0.33 mg/L. After rice cultivation, it was found that the pH, salinity and phosphate values in the water sources near the rice field increase

GLOBE Badges

I am a data scientist We conducted field visits to collect data and soil and water samples in rice fields, Village 7, Na Ngam Subdistrict, Mueang District, Trang Province. The data were analyzed for soil nutrients, temperature and moisture measurements, sample collection, and oxygen measurements in water sources in rice fields and nearby water sources. The data were analyzed using in-depth analysis of data downloaded from the GLOBE soil and water databases. The data was collected, graphs and tables were created, and statistical/mathematical analysis was conducted appropriately. The data was presented in a format that illustrates the data and analysis, along with references from related research.

I am a collaborator Our research team has a clear and efficient division of work. All members cooperate and do their assigned tasks to the fullest extent throughout the work. We emphasize unity and mutual assistance. When a problem occurs during work, we help each other solve it by brainstorming with everyone in the team. Therefore, we can successfully solve the problem. The problem that occurs will be an important experience in developing teamwork skills and developing ourselves to work effectively with others.

I make an impact Our research team is interested in studying the physical and chemical characteristics of soil and water before, during, and after rice farming to compare each round. We go to the area where we want to study and collect soil and water samples or other related information, examine, analyze, and interpret the results to make them easier to understand so that the knowledge we study reaches farmers in that area. We also recommend solutions to farmers so that they can use the knowledge they have gained to improve their farming in the future.

Research methodology

STEP 1: Define the Study Area

STEP 2: Measure Soil Quality

STEP 3: Measure Water Quality

STEP 4: Collect and Analyze Soil and Water Quality Data



Research results

- Study of soil and water quality Analysis of water quality in the rice fields and surrounding water before and after rice cultivation.

Analysis of soil quality in rice field

Survey time	pH	Electrical conductivity (ppm)	Salinity (ppt)	Organic matter (%)	Nitrogen (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)
11 June 2024 (Before rice farming)	7.0	0.0	0.0	5.2	0.60	0.28	17.11
7 November 2024 (During rice farming 1)	7.0	0.0	0.250	4.1	54.242	0.67	17.11
8 December 2024 (During rice farming 2)	5.0	0.0	0.330	4.3	54.072	0.67	17.11
31 January 2025 (After rice farming)	5.33	0.10	0.280	0.67	54.000	0.67	17.11

Survey time	pH	Nitrate (mg/L)	Phosphate (mg/L)	Oxygen (mg/L)	Salinity (ppm)	Degree (°C)
7 November 2024 (During rice farming 1)	7.0	0.5	0.28	0.5	73.50	27.08
8 December 2024 (During rice farming 2)	7.0	0.5	0.33	0.5	73.50	27.17
31 January 2025 (After rice farming)	7.5	0.5	0.33	0.5	54.67	26.67

Survey time	Degree (°C)	pH	Salinity (ppm)	Nitrate (mg/L)	Phosphate (mg/L)
7 November 2024 (During rice farming 1)	27.08	7.0	63.17	0.5	0.28
8 December 2024 (During rice farming 2)	27.17	7.0	73.50	0.5	0.33
31 January 2025 (After rice farming)	26.67	7.5	54.67	0.5	0.33

Table 3 shows the results of the analysis of water quality in the rice field water , including pH, degree, salinity, nitrate, and phosphate and in Moo 7, Nangam Subdistrict, Mueang District, Trang Province.

Table 2 shows the results of the analysis of water quality in the surrounding water sources, including pH, Degree, salinity, nitrate, phosphate, and oxygen in Moo 7, Nangam Subdistrict, Mueang District, Trang Province.

The graph shows the analysis of soil quality and comparison of water quality in nearby water sources and water in rice fields before and after rice cultivation.



Introduction



Research Questions

- Soil quality in Moo 7, T. Nangam , A. Mueang , Trang Province. Is there any change in soil or water quality before and after rice cultivation, and if so, what are the changes?
- Water quality in nearby water sources and water in Moo 7, T. Nangam , A. Mueang , Trang Province. Is there any change in water quality in nearby water sources and rice field water before and after rice cultivation, and if so, what are the changes?
- Rice cultivation in Moo 7, T. Nangam , A. Mueang , Trang Province. Does it impact the physical and chemical quality of soil and water, and if so, how?

Hypotheses

- Soil quality will decrease after rice cultivation due to the use of soil nutrients and the application of agricultural chemicals, such as chemical fertilizers and pesticides.
- The water quality in nearby water sources and the water in the rice fields will change after rice cultivation, with water in the fields having lower quality compared to before cultivation. This is due to the use of fertilizers and chemicals in rice farming, which may increase the levels of toxins or nutrients in the water.
- The water quality in the rice cultivation area will decrease after rice farming due to contamination from agricultural chemicals such as pesticides, chemical fertilizers, or herbicides.

The study area

Study area in Moo 7, T. Nangam , A. Mueang , Trang Province 92000 Thailand



materials and equipment



honorary declaration

This project would not have been completed without the support and guidance of several individuals. We would like to express our sincere gratitude to our project advisor, Ms. Jiraporn Sirirat, for her invaluable guidance. We also extend our thanks to Wichienmatu School for providing the facilities for our experiments and research, as well as the financial support. Our appreciation goes to the Wichienmatu School Special Classroom Project for their assistance with equipment and tools. We would also like to thank our parents and friends for their advice and cooperation, which greatly contributed to the success of this project. Lastly, the researchers would like to express their heartfelt thanks to everyone involved.

Summary and Discussion of Research Findings

Soil quality The soil in the rice field in Village 7, Nangam Subdistrict, Mueang District, Trang Province has a moderate acidity (pH 6.27). Soils in the standard range (5.0-6.5) are suitable for cultivation (Science Institute for Land Development, 2004).Electrical conductivity of less than 2 dS/m (Land Development Department, 2010) indicates low salt content, does not affect plants. The organic matter content of 3.40% is considered quite high. The primary nutrients (nitrogen, phosphorus, potassium) are low. It should be improved by using compost, manure, or planting legumes to increase nitrogen to meet demand (Science Institute for Land Development, 2004).

Water quality from water sources from water analysis found that the acidity and alkalinity, electrical conductivity in canals and rice fields in the area of Village 7, Nangam Subdistrict, Mueang District, Trang Province, were similar in both rice field and water sources, except that the rice field water had a high salinity and a pH value that was more acidic than the water from the water source.

References

- Kanya Sitthitho, Chuanphit Charat, Naphaporn Khamkhan, Prateep Duangwaew, Uraporn Boonman (2014), Study of Soil Quality in Rice Fields, Tha Tum District, Surin Province, Kasetsart Journal of Science, 36(1), 42-49.
- Land Development Department, Ministry of Agriculture and Cooperatives (2010), Soil Chemical Analysis Process Operation Manual, accessible from <https://www.ldd.go.th/PMQA/2553/Manual/OSD-03.pdf>.
- Patcharee Thirachindakhon. (2011). Soil Chemical Analysis Manual (3rd ed.). Khon Kaen: Khon Kaen University Printing House, 141-150
- Piyaporn Srisom, Jinda Sirta, Piyada Yotsunthon, Waleephan Rakittikul, Supawadi Kaewpama. (2017), Soil quality assessment for agricultural use in Nang Lae village in Nang Lae sub-district, Mueang district, Chiang Rai province, Kasalongkham Research Journal 11(3). 61-68