Study of Soil Properties Affecting the Yield of Bangchang Shallots in Kho Wang District, Yasothon Province

Prepared by: Chutikarn Thongwut, Chutisara Thongwut, Pattaranicha Hemthong
Grade Level: Mathayom 5
Advisors: Yupaporn Somphanpiang, Piyarat Pimsawat
School: Kho Wang Witthayakhom, Kho Wang District, Yasothon Province

Abstract

This study investigated soil properties influencing the yield of Bangchang shallots in Ban Khae, Kho Wang District, Yasothon Province. Soil samples were collected from a depth of 0–15 centimeters in the major shallot-growing areas. The analysis covered soil organic matter (SOM), phosphorus (P), potassium (K), temperature, pH, and soil moisture. Results showed SOM ranging from 1.04–2.43%, available phosphorus from 12–91 milligrams per kilogram, and available potassium from 20–163 milligrams per kilogram. Soil temperature varied between 22.6–30°C, pH ranged from 5.8–6.4, and soil moisture from 3.85–4.61%.

Introduction

A study found that most farmers in Kho Wang District prefer growing Bangchang shallots. The main problem in shallot production in this area of Yasothon Province is the low yield and poor quality, caused by limited knowledge and lack of production technology. Therefore, this study focuses on analyzing soil quality factors that affect shallot yield, with farmers participating in the soil quality assessment.

Research Question

Do the soils used for growing Bangchang shallots differ in their properties? If so, how?

Research Hypothesis

Areas where Bangchang shallots are grown have different soil properties.

Materials and Methods

Materials

1. Thermometer (°C)
2. Soil pH test kit
3. Simple moisture-measuring oven, MEMMERT brand
4. Balance, OHAUS brand: CENT-O-GRAM model, 331g capacity
5. Beaker
6. SOMNPK portable test kit by NSTDA, used to measure soil organic matter (SOM), available phosphorus (P), and available potassium (K)

Research Procedures

1. Select 10 plots where Bangchang shallots are grown.
2. Collect soil samples randomly and prepare them for testing.
3. Measure temperature at 10 sampling points using a thermometer.
4. Analyze soil pH.
5. Analyze soil organic matter, available phosphorus, and available potassium using the SOMNPK portable test kit.
6. Analyze soil moisture.
7. Record all results, compare findings, and summarize outcomes.

Research Output

This research investigated soil properties in Bangchang shallot cultivation areas in Ban Khae, Fa Huan Subdistrict, Kho Wang District, Yasothon Province, with the following outcomes:

Table 1
Soil Property Averages in Areas Growing Bangchang Shallots

Soil properties	The area where Bang Chang variety of shallots are grown (plot)										Average
	At 1	At 2	At 3	At 4	At 5	At 6	At 7	At 8	At 9	At 10	
Temperature (°C)	30.00	23.30	24.60	23.60	23.30	24.30	29.00	26.60	27.00	22.60	25.43
(pH)	5.80	5.80	6.40	6.40	5.80	6.40	6.10	6.40	6.10	6.10	6.13
Soil moisture (%)	3.90	3.88	4.61	4.03	3.99	4.04	3.90	4.34	3.85	4.06	4.06

Table 2
Findings from Soil Tests in Bang Chang Shallot Fields

Soil properties	The area where Bang Chang variety of shallots are grown (plot)										Average
	At 1	At 2	At 3	At 4	At 5	At 6	At 7	At 8	At 9	At 10	
Organic matter content in the soil (SOM) (%)	1.04	1.04	1.04	2.12	2.12	2.43	1.04	1.04	1.04	1.04	1.39
Available phosphorus (P) (mg/kg)	18	91	50	61	82	91	12	18	38	18	47.9
Beneficial potassium (K) (mg/kg)	78+++	78+++	39++	39++	20++	20++	59++	59++	163++	130++	69++

Conclusion and Discussion

Of the ten study locations, Sites 8, 9, and 10 offered the most suitable soil environment, with temperatures of 22–27 °C, pH levels of 6.1–6.4, and moisture levels of 3.85–4.43 percent. Soil organic matter measured 1.04 percent, available phosphorus ranged from 18–38 milligrams per kilogram, and available potassium from 59 to 163 milligrams per kilogram. These factors contributed to the highest yield.

These findings match the work of P. Promphanjai (2012), who noted that medium organic matter, slightly acidic to neutral pH, and good water and air circulation support strong shallot production. Minor differences in soil conditions can greatly influence yield.

Acknowledgements

This research on soil properties affecting shallot yield in Kho Wang District, Yasothon Province, was successfully completed thanks to the generous support of Mr. Narongchai Erawan, Director of Kho Wang Witthayakhom School; Mr. Kriangkrai Laohupongpan, Deputy Director; Mr. Watit Saengchan, Deputy Director; Ms. Yupaporn Somphanphiang and Ms. Piyarat Phimsawat, who kindly provided guidance, knowledge, suggestions, and corrections throughout the study. The researcher extends sincere gratitude for their invaluable assistance.

Appreciation is also extended to the community leaders and residents of Ban Khae for their full cooperation during the fieldwork phase of this research.

Lastly, heartfelt thanks go to all colleagues for their encouragement, support, and help in every aspect, enabling this research to be successfully completed. The researcher hopes this work will be useful to relevant organizations and individuals interested in further study.

References

Land Development Department. Characteristics and properties of soil series. January 2022, from http://www.ldd.go.th/thaisoils_museum/pf_desc/northeast/Re.htm.

Department of Agriculture. 2010. Fertilizer recommendations for economic crops. Technical Document No. 001/2010. ISBN 978-974-436-749-5, 121 pages.

Department of Agriculture. Shallots. January 2022, from https://www.doa.go.th/sc/khonkaen/?tag=%E0%B8%96%E0%B8%B1%E0%B9%88%E0%B8%A7%E0%B8%A5%E0%B8%B4%E0%B8%AA%E0%B8%87.

Jinatda Mueangchan, Chatcharee Narutum, and Supatra Srisuwan. 2009. Farmers' knowledge in applying technology for shallot cultivation in Srisail District, Sisaket Province. Agricultural Extension and Communication Journal, 1: 52–61.

Peyao Prompanjai. 2012. Development of quality shallot production technology in the lower northern and lower northeastern regions. Department of Agriculture, Bangkok.

Academic Service Center, Chulalongkorn University. 2013. Development of cultivation and selection of shallot varieties. Lecture materials from the project meeting on research and development to improve production, storage, and marketing of shallots under a complete-cycle approach based on marketing concepts to support free-trade expansion of Thailand. Held on February 6, 2013, at Phrompiman Hotel, Sisaket.