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SOIL TESTING AND SOIL AWARENESS

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ABSTRACT

Soil testing and soil awareness are essential for understanding soil quality, fertility, and its suitability for agricultural and environmental purposes. Soil properties, including organic matter and moisture content, play an important role in plant growth, nutrient availability, and soil health. To create awareness about soil quality and the importance of soil testing, soil samples from Rajasthan and Bhayandar were analysed and compared. The aim of the study was to determine the organic matter and moisture content of the collected soil samples using standard laboratory methods. Organic matter was estimated by the Walkley– Black method, which involves the oxidation of organic carbon using potassium dichromate in the presence of concentrated sulphuric acid, followed by titration with ferrous ammonium sulphate. Moisture content was determined gravimetrically by drying the soil samples in an oven at 105°C until a constant weight was obtained.The experimental results showed that the Rajasthan soil sample contained 0.38% moisture and 0.50% organic matter, whereas the Bhayandar soil sample showed 12.52% moisture and 0.465% organic matter. These results indicate differences in the moisture and organic matter content of the two soil samples. Such variations may be associated with differences in environmental conditions, soil composition, and water-retention properties.In conclusion, the study highlights the importance of soil testing in assessing soil quality and promoting soil awareness. Comparing soil samples from different regions helps develop an understanding of soil characteristics and their influence on plant growth and environmental sustainability. Regular soil testing can support informed

decisions regarding soil management, agricultural practices, and the conservation of soil resources.

KEYWORDS: Soil testing, Soil awareness, Soil moisture, Organic matter, Rajasthan soil, Bhayandar soil, Walkley–Black method, Soil quality *etc*.

INTRODUCTION

Soil is one of the most important natural resources that supports plant growth, agriculture, and environmental sustainability[1]. It provides essential nutrients, water, and physical support for plants and serves as a habitat for various microorganisms[2]. The quality of soil depends on several factors, including its moisture content, organic matter, nutrient availability, and physical and chemical properties. Therefore, soil testing is an important scientific method for assessing soil health and understanding its suitability for different purposes[3].

Soil organic matter consists of decomposed plant and animal residues, microbial biomass, and other organic substances. It improves soil structure, enhances nutrient availability, promotes microbial activity, and helps maintain soil fertility[4]. Soil moisture content refers to the amount of water present in the soil. It influences seed germination, plant growth, nutrient transport, and the biological activities occurring within the soil. Both organic matter and moisture content are important indicators of soil quality[5].

The present Community Engagement Project (CEP), titled “Soil Testing and Soil Awareness,” focuses on studying and comparing soil samples collected from Rajasthan and Bhayandar, Maharashtra. The organic matter content of the soil samples was determined using the Walkley– Black method, which involves redox titration with potassium dichromate and ferrous ammonium sulphate. The moisture content was determined by the gravimetric method[6], in which soil samples were dried in an oven at 105°C and the loss in weight was measured.

The experimental results showed that the Rajasthan soil sample contained 0.38% moisture and 0.50% organic matter, while the Bhayandar soil sample contained 12.52% moisture and 0.465% organic matter. These results demonstrate variations in the measured properties of soils from different geographical regions.

Through this project, an effort is made to create awareness about the importance of soil testing among the community and to explain how soil quality influences agriculture, plant growth, and environmental health. The project also highlights the need for responsible soil

management, conservation of natural resources, and regular soil testing to support sustainable agricultural and environmental practices.

Literature Review

1. Soil Quality and Soil Health

According to the United States Department of Agriculture (USDA), soil quality is determined by the ability of soil to support plant growth, store water, cycle nutrients, and sustain living organisms. Soil health can be assessed through physical, chemical, and biological indicators. This supports the importance of testing soil samples to understand their condition and identify differences in soil properties.

2. Importance of Soil Organic Matter

The Food and Agriculture Organization (FAO) explains that soil organic matter influences soil structure, nutrient availability, water infiltration, and the activity of soil organisms. Organic matter is therefore an important indicator of soil fertility and sustainability. Its determination helps in understanding the quality of soil samples collected from different regions.

4. Importance of Soil Moisture Content

The USDA Natural Resources Conservation Service identifies soil moisture as an important factor affecting soil functions, including water storage and transport. Moisture availability influences plant growth and the activity of soil organisms. Measuring moisture content helps determine the amount of water present in a soil sample and provides useful information for comparing soils from different locations.

5. Relationship Between Organic Matter and Water Retention

Research and guidance published by the FAO indicate that soil organic matter influences the capacity of soil to retain moisture, maintain porosity, and support biological activity. Maintaining suitable organic matter levels can improve soil structure and water management. This relationship is important when studying the moisture and organic matter content of Rajasthan and Bhayandar soils.

6. Comparison of Soil Samples from Different Regions

The USDA recommends assessing soil quality through measurable indicators and comparing results across locations or over time. Soil properties may vary according to environmental conditions, soil composition, and land management practices. In the present project, Rajasthan soil and Bhayandar soil were analysed to compare their moisture and organic matter content and understand regional variations.

7. Soil Awareness and Sustainable Soil Management

The USDA Natural Resources Conservation Service provides educational resources to help people understand soil health, organic matter, and moisture management. Soil awareness encourages communities to recognise the importance of soil conservation and responsible land use. The present Community Engagement Project aims to promote this awareness by demonstrating basic soil-testing techniques and explaining how laboratory results can contribute to better soil management.

METHODOLOGY

Survey Method : The present Community Engagement Project (CEP), titled "Soil Testing and Soil Awareness," was carried out using a survey-based approach along with practical laboratory analysis. The main objective was to understand the importance of soil testing, assess soil quality, and create awareness about soil conservation and sustainable soil management.

Survey Question

1. What is your Age Group?

- **15-20 Years**
- **21-30 Years**
- **31-40 Years**
- **41-50 Years & Above**

2. Have you heard about soil testing before?

- Yes

- No

3. Do you know that soil has a pH value?

- Yes

- No

4. Do you think soil quality affects plant growth?

- Yes

- No

5. Have you ever tested soil before?

- Yes

- No

6. Do you think soil should be tested before applying fertilizers?

- Yes

- No

8. Which of the following can negatively affect soil quality?

- Excessive fertilizers
- Plastic waste
- Industrial waste
- All of the above

9. What does soil pH indicate?

- Soil acidity/alkalinity
- Soil colour
- Soil temperature
- Soil weight

10. Which of the following can improve soil quality?

- Compost/organic matter
- Plastic waste
- Excesses Chemicals
- Industrial Waste

11. Do you think soil erosion is a serious environmental problem?

- Yes

- No

12. Which factor can cause soil erosion?

- Heavy rainfall
- Wind
- Removal of vegetation
- All of the above

13. Do you think excessive use of chemical fertilizers can harm soil?

- Yes

- No

14. Would you be interested in testing the soil around your home, garden or college?

- Yes

- No

15. Which practice is best for soil conservation?

- Planting vegetation
- Dumping waste

- Removing Vegetation
- Excessive tilling

16. Do you think soil conservation is important for future generations?

- Yes

- No

17. After learning about soil testing, would you recommend soil testing to others?

- Yes
- No

Aim, Observation, Graphical Representation and Conclusion

1.Aim : The main aim of this experiment is to determine and compare the moisture content and organic matter content of soil samples collected from Rajasthan and Bhayandar, Maharashtra, using standard laboratory methods.

The specific objectives are:

- To determine the percentage of moisture present in the collected soil samples by the gravimetric method.
- To estimate the organic matter content of soil samples using the Walkley–Black method.
- To compare the physical and chemical characteristics of soil samples collected from two different geographical locations.
- To understand the importance of soil moisture and organic matter in maintaining soil fertility, supporting plant growth, and sustaining soil health.
- To create awareness among the community about the importance of soil testing, soil conservation, and sustainable soil management practices.

2. Observation

A. Observation table for moisture content

The moisture content of the soil samples was determined by weighing the soil before and after drying it in an oven at 105°C until a constant weight was obtained. The loss in weight represents the moisture removed from the sample.

Sr. No.		Particulars	Rajasthan Soil	Bhayandar Soil
	1	Location of sample	Rajasthan	Bhayandar, Maharashtra
	2	Method Used	Walkley Black Method	Walkley Black Method
	4	Moisture Content of the soil	0.38%	12.52%

Interpretation

The Rajasthan soil sample showed a moisture content of 0.38%, whereas the Bhayandar soil sample showed a moisture content of 12.52 %. Thus, the Bhayandar sample contained substantially more moisture than the Rajasthan sample at the time of testing.

This difference may be associated with variations in the initial water content, sample storage, environmental conditions, and the water-retention properties of the soils. However, the results represent only the samples tested and do not establish the average moisture content of either region.

B. Observation table for organic matter content

The organic matter content was estimated using the Walkley–Black method. In this method, organic carbon present in the soil is oxidised using potassium dichromate in the presence of concentrated sulphuric acid. The remaining dichromate is then determined by titration with ferrous ammonium sulphate.

Sr. No.	Particulars	Rajasthan Soil	Bhayandar Soil
1	Location of sample	Rajasthan	Bhayandar, Maharashtra
2	Method Used	Walkley Black Method	Walkley Black Method
4	Organic Matter	0.50%	0.456%

Interpretation

The Rajasthan soil sample showed an organic matter content of 0.50%, while the Bhayandar soil sample showed 0.465%. The Rajasthan sample therefore had a slightly higher measured organic matter content than the Bhayandar sample.

Organic matter is an important component of soil because it contributes to nutrient cycling, improves soil structure, supports beneficial microorganisms, and influences water retention. The small difference observed between the samples should be interpreted cautiously, considering experimental uncertainty and the limited number of samples tested.

3. Graphical representation

The following charts compare the results obtained from the two soil samples.

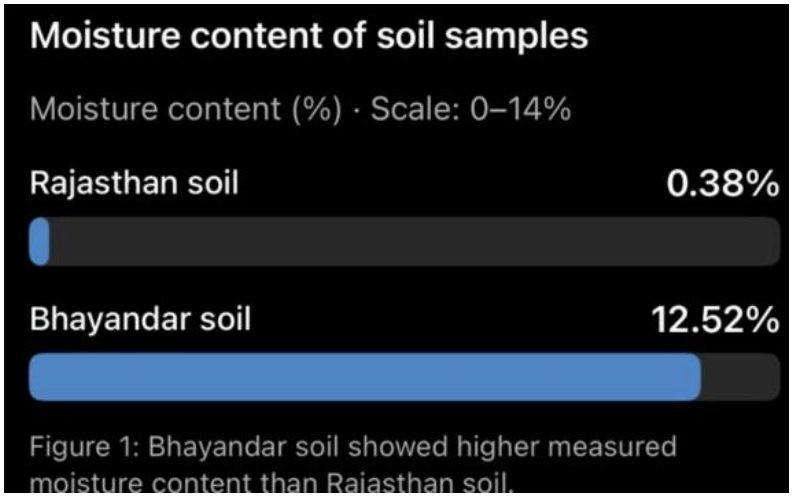


Chart 1: Comparison of moisture content.

Explanation: The chart shows a considerable difference in moisture content between the two samples. The Bhayandar sample recorded 12.52%, compared with 0.38% for Rajasthan. This indicates that the Bhayandar sample contained more water at the time of analysis.

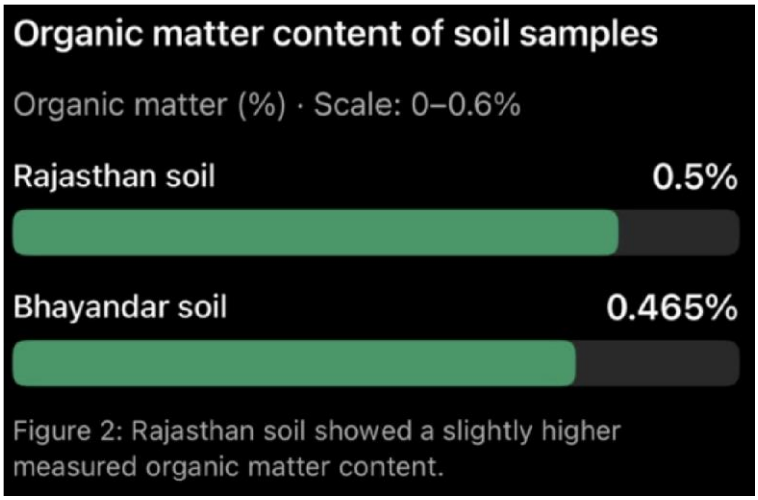


Chart 2: Comparison of organic matter content.

Explanation: The chart shows that the organic matter content of Rajasthan soil was 0.50%, while that of Bhayandar soil was 0.465%. The difference is small, indicating broadly similar measured organic matter percentages in the two samples.

4.DISCUSSION OF RESULT

The results obtained from the experiment demonstrate differences in two important indicators of soil characteristics: moisture content and organic matter content.

The moisture content of Bhayandar soil was much higher than that of Rajasthan soil. Moisture is essential for seed germination, nutrient transport, and plant growth. However, soil moisture can change significantly depending on rainfall, irrigation, temperature, drainage, and the conditions under which the sample was collected and stored. Therefore, the observed difference cannot be attributed to geographical location alone.

In terms of organic matter, Rajasthan soil showed a value of 0.50%, compared with 0.465% for Bhayandar soil. Organic matter contributes to soil fertility, improves aggregation, and supports microbial activity. Although the Rajasthan sample had a slightly higher measured value, more samples and repeated analyses would be necessary to determine whether this difference is representative of the two locations.

The experiment highlights the value of laboratory analysis in understanding soil characteristics. It also demonstrates that soil moisture and organic matter are separate indicators and should be evaluated together with other parameters, such as pH, electrical conductivity, texture, and available nutrients, to obtain a more complete assessment of soil quality.

5.Importance of the experiment for soil awareness

This experiment supports the objectives of the Community Engagement Project by demonstrating how simple laboratory tests can help people understand soil quality.

- Awareness of soil moisture: Understanding moisture levels helps explain the role of water in plant growth and soil management.
- Awareness of organic matter: Learning about organic matter helps explain the importance of composting, organic residues, and maintaining soil fertility.
- Importance of soil testing: Testing provides measurable information rather than relying only on the appearance of soil.
- Sustainable soil management: Soil testing can guide suitable agricultural practices, reduce inappropriate use of fertilisers, and support conservation.
- Community education: Sharing the results can encourage people to recognise soil as an important natural resource that requires proper care.

6. CONCLUSION

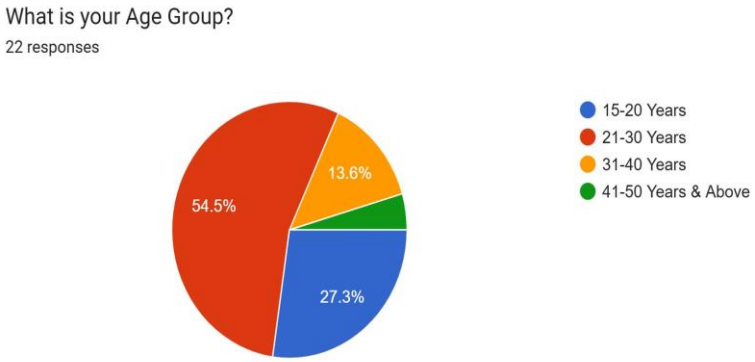
The experiment successfully compared the moisture and organic matter content of soil samples collected from Rajasthan and Bhayandar, Maharashtra. The Rajasthan sample

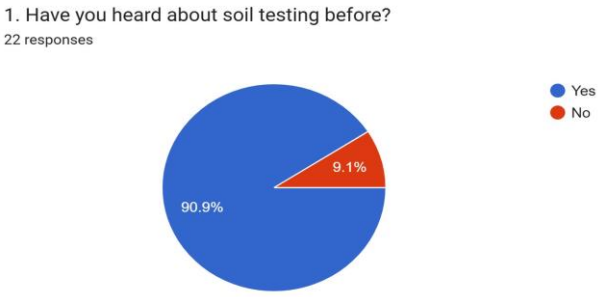
showed 0.38% moisture content and 0.50% organic matter, while the Bhayandar sample showed 12.52% moisture content and 0.465% organic matter.

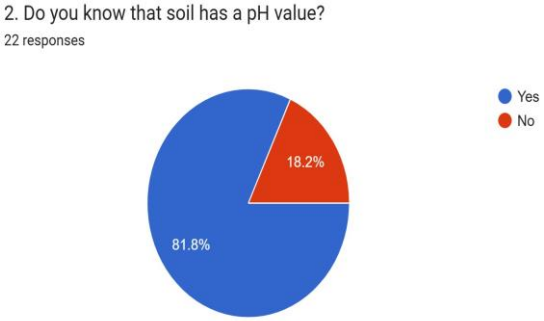
The Bhayandar sample had a higher measured moisture content, whereas the Rajasthan sample had a slightly higher measured organic matter content. These findings illustrate the variations that can occur between soil samples and demonstrate the usefulness of laboratory techniques in soil analysis.

Overall, the project emphasises that regular soil testing is valuable for understanding soil characteristics, supporting informed soil management, and promoting environmental awareness. Further testing of multiple samples from each location would provide a more reliable assessment of regional soil conditions.

Survey Observation

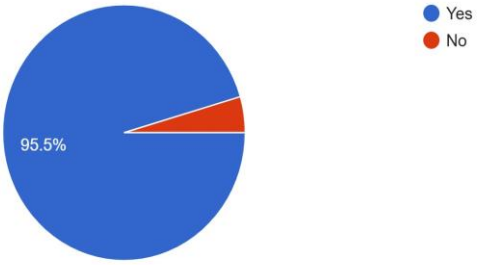






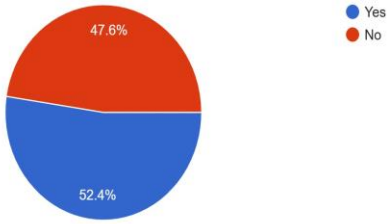
3. Do you think soil quality affects plant growth?

22 responses



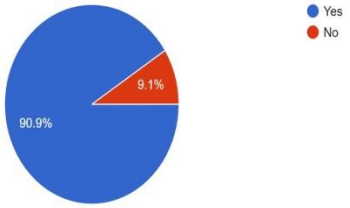
4. Have you ever tested soil before?

21 responses



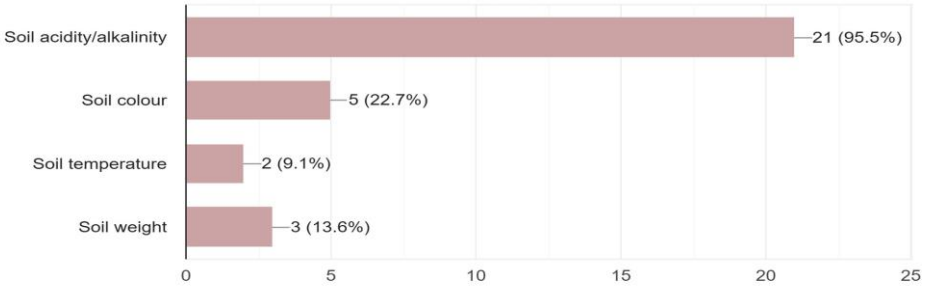
5. Do you think soil should be tested before applying fertilizers?

22 responses



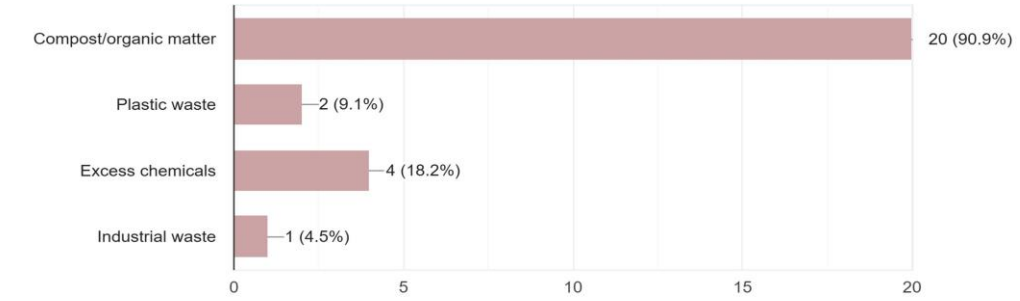
7. What does soil pH indicate?

22 responses



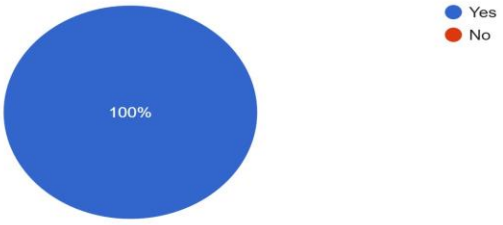
8. Which of the following can improve soil quality?

22 responses



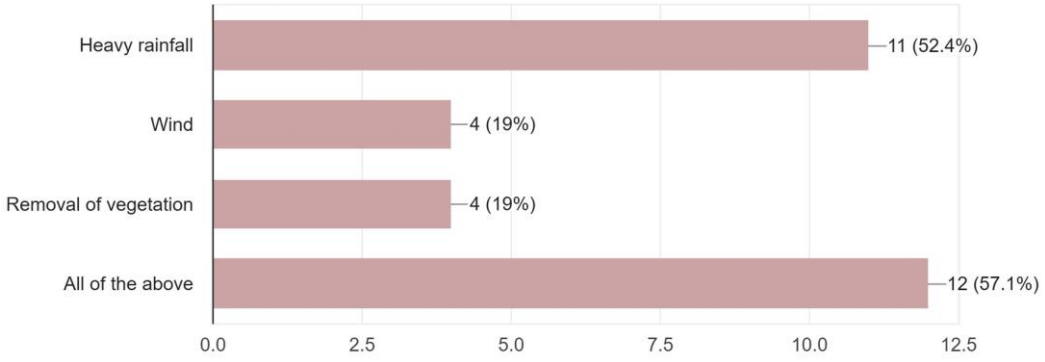
9. Do you think soil erosion is a serious environmental problem?

21 responses



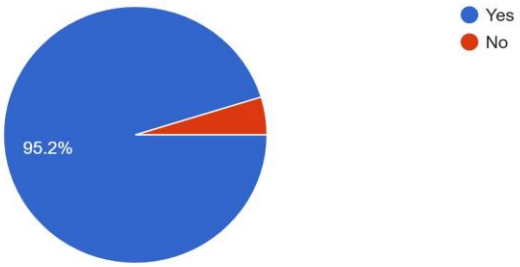
10. Which factor can cause soil erosion?

21 responses

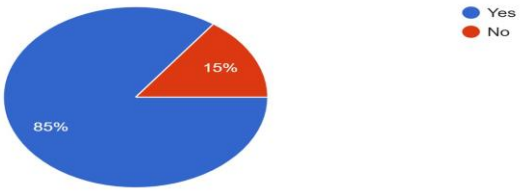


11. Do you think excessive use of chemical fertilizers can harm soil?

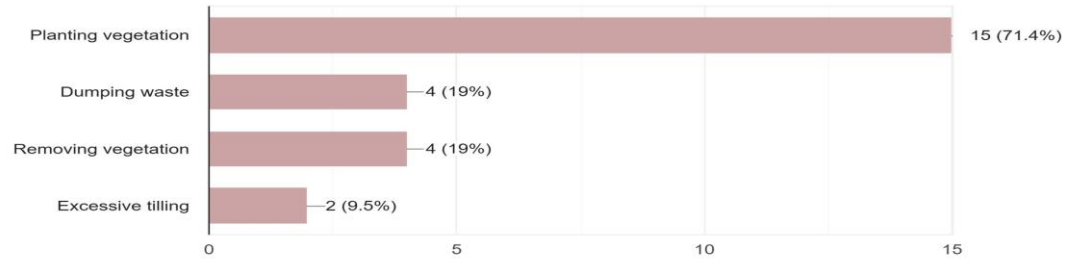
21 responses



12. Would you be interested in testing the soil around your home, garden or college?
20 responses



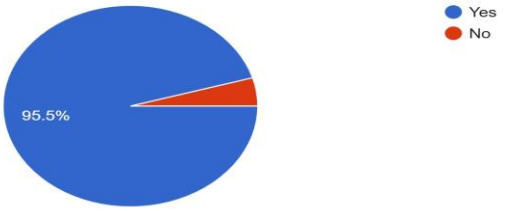
13. Which practice is best for soil conservation?
21 responses



14. Do you think soil conservation is important for future generations?
21 responses



15. After learning about soil testing, would you recommend soil testing to others?
22 responses



SURVEY CONCLUSION

The survey on "Soil Testing and Soil Awareness" was conducted to understand people's knowledge, awareness, and opinions regarding soil testing, soil quality, soil pollution, and soil conservation. A total of 22 respondents participated in the survey, mainly belonging to the 21– 30 years age group.

The survey results show that 90.9% of respondents had heard about soil testing, while 81.8% knew that soil has a pH value. Additionally, 95.5% of respondents believed that soil quality

affects plant growth, indicating that most participants understand the importance of healthy soil for agriculture and plant development. However, only 52.4% of respondents had tested soil before, showing that practical awareness and participation in soil testing still need improvement.

The survey also revealed that respondents were aware of the major factors affecting soil quality. Most participants identified excessive fertilizers, plastic waste, and industrial waste as harmful to soil. Furthermore, 90.9% of respondents correctly understood that soil pH indicates soil acidity or alkalinity. Composting organic matter was widely recognized as an effective method of improving soil quality.

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