



# ASSESSING FARMER'S PERCEPTION AND ATTITUDES OF SOIL CONSTRAINTS AND SOIL MANAGEMENT PRACTICES: A CASE STUDY IN VALLAPUZHA

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## ABSTRACT

*This research explores farmers' perceptions and attitudes toward soil constraints and soil management practices in Kerala, with a focus on Vallapuzha, known for its laterite soils. Findings reveal generational differences in perception regarding soil testing, a predominant recognition of physical constraints, limited awareness of chemical constraints, and an awareness-action gap attributed to technical knowledge and cost concerns. The study highlights varying attitudes towards soil management practices, offering essential insights for bridging the policy-implementation gap to enhance soil health and agricultural productivity.*

## 1. INTRODUCTION

Kerala predominantly features laterite soils characterized by inherent deficiencies in soil fertility. These soils present a spectrum of challenges, including phosphorus fixation, a low cation exchange capacity (CEC), and a dearth of organic matter content.[1] Prolonged and unvaried agricultural practices in these soil types, involving both excessive and inadequate fertilization, have given rise to an uneven distribution of soil nutrients, manifesting as various nutritional deficiencies and toxicities and has further engendered soil-related issues, such as soil acidification, compaction, and degradation.[2] The occurrence of recent floods in the state have accelerated these issues.[3] In this context, the government launched many programmes such as the 'Soil and Root Health Management & Productivity Improvement', to provide support to farmers for improving soil health and to improve productivity.[4]. The success of government projects aimed at improving soil health and increasing agricultural productivity hinges on the adoption of recommended practices by farmers. Therefore, conducting a thorough analysis of the perception and attitude of farmers regarding soil constraints and soil management practices is of paramount importance. While governmental initiatives provide valuable resources and guidance, it is ultimately the farmers who must implement these strategies. Understanding their perspectives and attitudes towards soil-related challenges and management practices can provide insights into the barriers and motivations that influence their decision-making. This analysis can help tailor the projects to better align with the needs and preferences of the farming community, increasing the likelihood of widespread adoption and, consequently, the overall effectiveness of efforts to enhance soil health and boost productivity. It is a vital step in bridging the gap between policy implementation and on-ground results.

## 2. RESEARCH OBJECTIVES

The region of Vallapuzha located in Palakkad district, primarily blanketed by laterite soil, serves as an illustrative microcosm within the state. Understanding the perceptions and attitudes of

farmers in this region regarding soil constraints can offer valuable insights at a micro level. Notably, since approximately 70% of Kerala's terrain is dominated by laterite soil, this localized study in Vallapuzha can act as a representative sample, shedding light on the challenges and opportunities associated with laterite soil agriculture across the broader state. The research is conducted

1. To assess and understand the perceptions and attitudes of farmers towards soil constraints and their management practices.
2. To investigate the factors influencing farmer's decisions and actions in managing soil constraints, and to provide insights into the key drivers and barriers that shape their adoption of specific soil management practices.

## 3. METHODOLOGY

In order to conduct this study, a survey encompassing a sample of 30 farmers residing in Vallapuzha Village was undertaken. This research employed a mixed-methods approach that combined the administration of structured questionnaires to the participants with semi-structured interviews to gather comprehensive data. The collected data underwent a rigorous process of analysis utilizing software tools such as Microsoft Excel to manage and quantify the quantitative responses. For qualitative insights obtained from the semi-structured interviews, a systematic coding and thematic analysis was carried out, facilitating the identification of recurrent themes and patterns. Subsequently, the findings were presented in a coherent and organized manner through the use of thematic analysis, which allows for a nuanced exploration of the participants' perspectives and attitudes.

### Survey Questions

1. What are your thoughts on soil testing, and do you perform soil testing in your field?
2. In your experience, what do you perceive as the primary challenge related to your soil? Are you aware



of chemical constraints in your field, and if so, which one is the major issue? Do you understand the nutrient imbalances caused by soil acidity?

- How do you view the use of fertilizers and lime in your farming practices? Are they practices you consider necessary for improving crop production? Do you have specific guidelines or considerations for their application rates?
- What are the major soil management practices that you do in your field? What do you think about soil management practices such as organic manure application and crop rotation? Do you find these practices logistically challenging, or are you willing to

embrace them with the right guidance? What is your perspective on soil conservation practices, cover cropping, and no-till farming, and have you incorporated any of these into your farming methods?

**Limitations**

It is important to note that soil constraints and soil management practices may vary from region to region, the perceptions and attitudes may vary too. The research focuses solely on the information provided by local farmers, which may not encompass all soil constraints in the region. The soil management practices discussed represent the major approaches in the specific region.

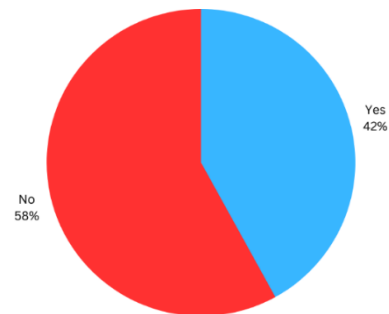
**4. DATA ANALYSIS AND INTERPRETATION**

**4.1 Quantitative Analysis**

This research quantitatively assessed farmer’s awareness levels pertaining to soil constrains and their adoption of specific soil management practices, providing valuable insights into the prevailing agricultural landscape. Lesser number of farmers conducted soil testing, and among them, a proportion recognized issues related to soil acidity and the need to address deficiencies in secondary nutrients and micronutrients. Furthermore, a small percentage applied organic manures to their fields, while only a fraction adopted crop rotation practices, soil conservation practices, and cover cropping.

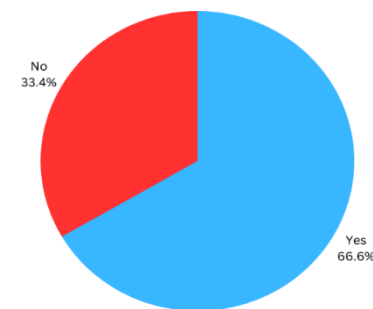
- Soil testing was conducted by 43.3% of the farmers.

Response	Number of farmers
Yes	13
No	17



- 66.6% of the farmers were aware about physical soil constraints.

Response	No of farmers
Yes	20
No	10

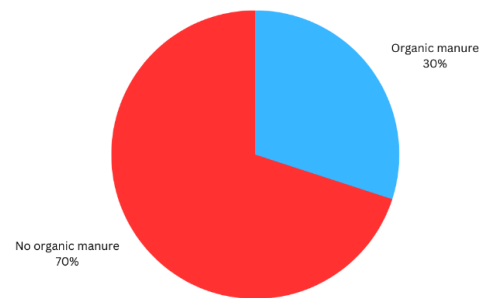


- Among the 43.3 % of farmers conducting soil testing, 69.2 % were aware about the soil acidity issue, 53.8% of farmers recognize the importance of addressing deficiencies in secondary nutrients (Calcium and Magnesium) and micronutrients (boron) through recommended practices, such as applying lime materials and copper sulphate, zinc sulphate and borax .

Awareness Regarding	Number Of Farmers
Soil acidity	8
Micronutrient deficiency	5
Total number of farmers conducting soil test	13

4. 17% of the farmers applied organic manures to their fields.

Usage	Number of farmers
Using organic manure	9
Not using organic manure	21



5. 10 % of farmers adopted crop rotation practices, 40% of farmers adopted soil conservation practices , and very few farmers adopted cover cropping.

Practice	Number of farmers adopting the practice
Crop rotation	9
Soil conservation measures	12
Cover cropping	2

## 4.2 Qualitative Analysis

### 4.2.1. Soil testing

Different farmers conveyed a wide range of perceptions and attitudes regarding soil testing, illustrating the diversity of viewpoints within the agricultural community.

Farmer John shared his perspective, stating, "I've been farming for over 40 years, and I've always relied on my instincts and the way my father taught me. Soil testing? Well, I've heard about it, but I've never bothered. It just seems unnecessary."

In contrast, Farmer Sarah, a younger farmer, elaborated on her approach: "I started farming recently, and I immediately got my soil tested. I want to make sure my crops have the best chance. It's a no-brainer for me, really."

Farmer Raj, an older farmer, expressed his evolving viewpoint: "You know, I'm in my 50s, and I've seen changes in farming practices. I still trust my gut, but I've started to think maybe I should consider soil testing. Some of the younger farmers I know swear by it."

Maria, another farmer, commented on the community dynamics: "I've got a mix of old and young farmers in my community. The older ones are reluctant to change, while the younger ones are all about soil testing. It's like a battle between tradition and modernity."

Tom, an initially skeptical farmer, shared his transformation: "I used to be skeptical about soil testing, but then I saw the results. It opened my eyes to how much better my soil could be. Now, I recommend it to everyone I know."

### 4.2.2. Soil Constrains.

Many farmers displayed differing levels of awareness and understanding about various physical, and chemical constrains of soil.

A farmer named John shared his perspective, saying, "You know, I've always thought that the physical aspects of my soil

were the main challenge. Compacted soil, drainage issues, and all that. I never really considered the chemical stuff. It's not something we talk about much around here."

One of the farmers, Sarah, elaborated on her recent experience with soil testing: "I got my soil tested recently, and they told me about soil acidity and its effects. It was an eye-opener. Now I'm more aware of the chemical side of things, but I can't say I fully understand how it affects nutrient availability."

Raj, an old-school farmer, mentioned, "I don't pay much attention to the scientific details. I just want to grow my crops. I've heard the term 'biological constraints,' but it's not something I lose sleep over."

Maria noted the gap between awareness and action, saying, "There's this gap, you know? Some of us are aware of these soil issues, but we're not really doing much about it. It sounds like a lot of technical stuff. And cost, well, it's a concern for many."

Tom observed the variable attitudes within the community, commenting, "I've seen folks around here dump lime all over their fields because they heard it helps. But they might be overdoing it. It's clear we need more guidance on proper soil management."

Laura, actively following soil conservation practices, mentioned, "I've been trying to follow some soil conservation practices, like crop rotation and cover cropping. It's not easy, but I think it's the way to go for the long-term health of my farm."

### 4.2.3. Soil Management Practices

Farmers held varying perspectives on soil management practices, with some acknowledging their significance, some not recognizing their importance, and others remaining completely unaware of these practices.

John mentioned, "You know, it's all about the fertilizers and lime for me. I believe it's the key to high yields." However, it's worth noting that some farmers did recognize instances of



over-liming and excessive fertilizer use, indicating room for improvement in their practices and guidance.

According to Sarah "I've had my doubts about composts and manures increasing my productivity. But if they provide us with the right knowledge and training, I'd be open to trying it. That biochar thing seems interesting too."

Farmers viewed crop rotation as a crucial method for preventing soil depletion, managing diseases, and controlling pests. However, logistical challenges occasionally cropped up in discussions.

Many farmers expressed their genuine appreciation for crop rotation, with one stating, "I see the benefits, and I'm willing to give it a shot. But I'd need some guidance on the right crops to choose and techniques to follow."

Farmers acknowledged the significance of soil conservation practices like terracing, contour farming, and erosion control. They recognized their value but remained conscious of the labor-intensive nature and associated costs.

Some farmers had already integrated soil conservation practices into their farming, while others were apprehensive about the challenges and expenses. One farmer summed it up, saying, "I know it's important, but it's not easy or cheap. We need some help with this."

Farmers generally recognized the importance of cover crops for soil conservation but often raised concerns about the costs and potential competition with primary crops for nutrients.

Attitudes toward cover cropping varied. One farmer proudly shared, "I've embraced cover crops despite the cost. They're worth it for the soil." However, others remained hesitant due to budget concerns, indicating a need for more education and outreach.

During interviews, farmers predominantly viewed no-till farming as impractical and unscientific.

## 5. FINDINGS

### 5.1 Soil Testing

- Perception: Among the surveyed farmers, there is a general perception that soil testing is not necessary.
- Attitude: Younger farmers display a more positive attitude towards soil testing, recognizing its long-term benefits and investing in related services. In contrast, some older farmers exhibit reluctance and favor traditional methods and intuition, indicating a generational divide. Various factors influenced this decision-making process.

### 5.2 Soil Constraints

- Perception: Farmers predominantly perceive physical constraints as the primary soil-related challenges in their fields, with chemical constraints being less evident to them. Notably, only those farmers who have undertaken soil testing recognize the presence of

chemical constraints, indicating a significant gap in awareness among the broader farming community. Those who acknowledged chemical constraints were aware of the effects of soil acidity in their field but lack specific knowledge about its effect on availability of particular nutrients. Farmers generally lack awareness and understanding of biological constraints, with a prevailing perception that these constraints are not a significant issue in their farming practices.

- Attitude: A gap exists between awareness and action, with some farmers not actively practicing soil management, mainly due to a lack of technical knowledge and perceived increase in cost. Lack of guidance are leading to varied attitudes, including potential overuse of lime. A limited number of farmers are following soil conservation practices.

## 5.3 Soil Management

### 5.3.1 Fertilizer and Lime Application

- Perception: Farmers generally consider the application of fertilizers and lime as compulsory practices necessary for enhancing crop production.
- Attitude: Farmers hold the belief that increasing fertilizer application can lead to higher yields, often without meticulous consideration of optimal application rates. There are cases of over liming and fertilizer over use.

### 5.3.2 Composts and Manures

- Perception: Farmers recognize composts and manures as beneficial for soil health and the environment, but they harbor doubts regarding the economic feasibility. Concepts such as biochar are relatively new and less well-understood.
- Attitude: Due to concerns about potential impacts on productivity, farmers have been hesitant to widely adopt compost and manure application. However, they express readiness to embrace sustainable agricultural practices like biochar if provided with adequate training.

### 5.3.3 Crop Rotation

- Perception: Farmers perceive crop rotation as a practice that helps in preventing soil depletion, disease control, and pest management. However, some may view it as logistically challenging.
- Attitude: Many farmers appreciate the benefits of crop rotation and are willing to implement it, especially if they receive guidance on suitable crop sequences and techniques.

### 5.3.4 Soil Conservation Practices

- Perception: Farmers acknowledge the importance of soil conservation practices such as terracing, contour farming, and erosion control. However, they may find these practices labour-intensive and costly.
- Attitude: While some farmers have integrated soil conservation practices into their farming methods,



others are deterred by the perceived challenges and expenses involved.

### 5.3.5 Cover Crops

- Perception: Farmers perceive cover crops as essential for soil conservation but often view it as a costly practice. Some also believe that cover crops may compete with main crops for nutrients.
- Attitude: A minority of farmers have embraced cover cropping, while others remain hesitant due to cost concerns.

### 5.3.6 No-Till Farming

- Perception: Farmers generally consider no-till farming as impractical and unscientific.
- Attitude: There is limited interest among farmers in adopting no-till farming practices.

## 6. SUGGESTIONS

1. Develop online platforms and apps that allow farmers to request soil testing service and receive results remotely. This can save time and improve convenience.
2. Establish demonstration farms where farmers can see firsthand the benefits of soil testing and recommended practices in action. This can serve as a practical learning experience.
3. Given the high awareness of physical constraints, there is an opportunity to launch soil conservation initiatives. These initiatives can include the promotion of erosion control measures, contour farming, and other sustainable land management practices. Engaging local agricultural experts and organizations can provide valuable support.
4. Advocate for supportive government policies that incentivize sustainable soil management practices. These policies can include tax incentives, subsidies, or grants for adopting practices that improve soil health and sustainability.
5. Create carbon credit programs that reward farmers for sequestering carbon in their soils. Farmers who adopt practices such as cover cropping and reduced tillage can earn carbon credits based on the carbon dioxide they remove from the atmosphere and store in the soil. These carbon credits can be traded in the carbon market or used to offset emissions from other

industries. By monetizing the environmental benefits of climate-smart soil management, this approach provides a direct financial incentive for farmers to adopt and maintain sustainable practices while contributing to global carbon reduction efforts.

## 7. CONCLUSION

The study's insights unveil the distinct generational divide among farmers in Kerala's Vallapuzha region, accentuating the crucial role of perception and attitude in shaping soil management practices. Younger farmers exhibit a positive outlook on soil testing, recognizing its long-term benefits, while their older counterparts often favor conventional methods. The prevalence of physical soil constraints, coupled with limited awareness of chemical and biological issues, underscores the need for tailored education and guidance.

This diversity extends to soil management practices, with varying attitudes toward fertilizers, composts, crop rotation, conservation methods, cover crops, and no-till farming. To bolster soil health and productivity, practical recommendations emerge. Online platforms for remote soil testing, demonstration farms, soil conservation initiatives, supportive government policies, and carbon credit programs offer a roadmap to bridge knowledge gaps, incentivize sustainable practices, and address environmental concerns.

Understanding and adapting to farmers' perceptions and attitudes stand as pivotal strategies in the quest for improved soil health and sustainable agriculture in Kerala, allowing for more effective and regionally nuanced approaches.

## 8. REFERENCES

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