International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 1, 2019
ISSN: 1475-7192

Measures to Improve the Soil Quality: An Empirical Study of Farmers Opinion in India

SHASHANK SRIVASTAV , Assistant Professor, Department of Agriculture , Graphic Era Hill University, Dehradun Uttarakhand India 248002 ,

Abstract

A significant factor in determining the sustainability and productivity of agriculture is soil quality. In India, where agriculture is the primary occupation of a large section of the population, the quality of soil directly impacts the livelihoods of millions of farmers. Despite its significance, soil degradation is a major problem in India, and poor soil quality is the main obstacle to growing crops that produce higher yields and better quality. Soil quality improvement strategies must be developed and put into action. This study investigates Indian farmers' knowledge and perception of soil quality, the causes of soil degradation, and the actions that farmers can take to improve soil health to ascertain the farmers' thoughts on the best ways to improve soil quality. For the creation of focused plans for soil conservation and restoration by policymakers, extension agents, and agricultural practitioners. A sample of 196 farmers were surveyed to know the measures taken by the farmers to improve the soil quality. The researcher also studied the impact of different measures in improving the soil quality and concludes that there is significant impact of different measures in improving the soil quality.

Keywords: *Soil Quality Measures, Agriculture, Soil Degradation, Farmer Knowledge, Soil Conservation.*

Introduction

An important problem in India is soil deterioration, which has a big impact on the agricultural industry, which provides the majority of the country's people with their main source of income. Farmers are essential in preserving and enhancing soil quality, but they encounter many obstacles in doing so, including a lack of information, resources, and technological access. The significance of enhancing soil quality in India is highlighted, as is the Soil Health Card Scheme's contribution to farmers' access to information on fertilizer management and soil health. The program has caused

a decrease in the use of chemical fertilizers and an increase in the use of organic and natural techniques to enhance soil quality. The author also mentions that Indian farmers are prepared to take action to enhance soil health because they are aware of how soil degradation affects agricultural yield. It stresses the significance of enhancing soil health in India and the Soil Health Card Scheme's role in arming farmers with the knowledge they need to implement sustainable soil management methods (Amarender 2017).

To determine how various organic matter sources in India affect soil quality. The research established that enhancing the soil's fertility, structure, and water-holding ability by adding organic matter is possible. Organic matter enriches the soil with vital nutrients like potassium, phosphorus, and nitrogen, which can enhance crop output and growth. Moreover, it enhances the organic carbon in the soil, which can enhance the soil's structure and water-holding ability. Compost, manure, crop leftovers, and green manure are just a few of the organic matter sources that farmers can utilise to enhance the quality of their soil. To enhance soil quality, crop leftovers including leaves, stems, and roots can be either left on the soil's surface or mixed into the ground (Biswas et al. 2016).

Diversifying crops is crucial for enhancing soil quality and halting soil erosion. Farmers can improve soil fertility and lower insect and disease infestations by rotating their crops. Bera also emphasizes the value of conservation tillage, which involves using less heavy machinery and causing the least amount of soil disturbance possible while planting. This method can aid in retaining soil moisture and organic matter, which can enhance the health of the soil. It highlights the need to employ efficient water management techniques while managing soil health. This includes using strategies to conserve water and lessen water waste, such as mulching, drip irrigation, and rainwater collection. These steps can support soil health by preserving soil moisture, reducing soil erosion (Bera 2015).

Literature Review

According to Lal (2004), ensuring sustainable agricultural productivity, promoting food security, and reducing global climate change all depend on India's soil quality being improved. He contends that implementing soil carbon sequestration techniques can significantly lower greenhouse gas

emissions and improve the health of the soil. proposes a variety of conservation techniques that can boost soil organic matter and enhance soil structure and fertility, including conservation tillage, cover crops, and agroforestry. In addition, it emphasizes the significance of decreasing soil erosion, which poses a significant challenge in India and results in losses of soil carbon and decreased crop output. Farming techniques like contour farming, terracing, mulching, and conservation tillage are recommended for farmers to use to reduce soil erosion. In general, research on improving soil quality in India highlights the need for sustainable agriculture techniques that improve soil health and productivity while reducing climate change.

Crop rotation is a technique where farmers throughout time change the crops that are cultivated on a plot of land. Crop rotation has been shown by Gurung et al. (2007) to be a successful strategy for enhancing soil quality. Crop rotation has several advantages, including enhancing soil fertility, lowering the risk of diseases transmitted through the soil, and raising crop production. Crop rotation can raise soil fertility by making the best use of nutrients. Various crops use nutrients in different ways and have varying nutrient needs. For instance, legumes like beans and peas fix nitrogen from the air into the soil, which other crops in the cycle can utilize. Moreover, crop rotation helps lessen the nutrient depletion caused by a single crop, which can result in a loss in soil fertility. Farmers can preserve the soil's fertility and enhance the soil's general health by rotating their crops. Rotating crops can help keep pests and illnesses from gathering in the soil. Since they can accumulate and harm crops and lower yields, several pests and illnesses are peculiar to certain crops. Through the introduction of various crops, crop rotation can disrupt the life cycle of these pests and diseases, reducing their number and resulting harm.

Adimassu et al. (2012) investigated the factors that influence farmers' investments in land management; their findings may be relevant for soil management and conservation in India. They discovered that a variety of elements, including the availability of credit, access to information and knowledge, perceptions of the severity of soil erosion issues, and the presence of social networks, affected farmers' decisions to invest in soil and water conservation methods. They suggested that, to ensure the viability of the practices, initiatives to promote soil conservation and management should take these aspects into account and include community involvement. This might be applied to India by integrating farmers in the establishment of soil conservation policies and programmes,

granting access to credit and information, and encouraging the development of social networks to encourage knowledge exchange and cooperation among farmers.

Reducing soil erosion has been shown to dramatically enhance soil quality and boost agricultural output, according to Velayutham and Palanisamy (2012). As soil fragments are uprooted and carried away by wind or water, soil erosion takes place. Increased runoff and soil compaction are possible outcomes of this process, along with the loss of soil fertility and organic matter. To reduce soil erosion and enhance soil quality, farmers can use a variety of soil conservation techniques. Contour farming is one such method, which entails laying up rows of crops along the slope in contour lines. This lessens soil erosion by slowing down water discharge and increasing water infiltration into the soil. One further technique for preventing soil erosion is terracing. On steep slopes, it entails constructing step-like structures.

Amsalu and Graaff's ((2007) study emphasises the value of soil conservation as well as the advantages of stone terracing for reducing soil evaporation and enhancing soil quality. They contend that a few variables, such as the availability of labour, access to capital, and government policies and programmes, have an impact on farmers' decision to adopt and maintain these methods. The authors contend that encouraging farmers to adopt and maintain sustainable land management practises can be accomplished by highlighting the advantages of soil conservation techniques and enhancing access to resources and assistance. They also stress the necessity of a participatory strategy that includes farmers in decision-making and considers the variety of regional settings and requirements. to protect soil quality and ensure food security, underline the significance of sustainable land management approaches.

A crucial element influencing soil quality and plant growth is the pH of the soil. According to Pathak et al. (2016), keeping the right soil pH is essential for enhancing soil quality. 7 is considered neutral on the pH scale, which goes from 0 to 14. Over 7 is alkaline, while anything between is acidic. In addition to affecting the availability of nutrients in the soil, microbial activity, and plant growth, soil pH has varying requirements for various crops. Farmers should routinely evaluate their soil pH levels to make sure it is within the ideal range for their crops. You can test your soil

either at home with a soil test kit or at a lab that performs soil tests. Results of soil tests will show the soil's pH and nutrient levels, which can help.

Soil quality and carbon sequestration are greatly impacted by the degradation of the land brought on by erosive processes and other reasons (Mchunu & Chaplot, 2012). To stop soil erosion and maintain soil organic matter, it is essential to implement soil conservation techniques like mulching, contour farming, and terracing. According to Du Preez et al. (2011), good land use management practises and crop rotation can increase soil organic matter content, which is essential for preserving soil fertility and production.

According to research done by Badia and Marti (2008), semi-arid locations can benefit from using forest management techniques like controlled burning to improve the quality of the soil and lessen soil erosion. According to their research, controlled fire decreased runoff volume and the rate of soil detachment, which in turn decreased soil erosion. Furthermore, the scientists mentioned that burning forest waste boosts soil organic matter, which can enhance soil fertility and boost agricultural productivity. Farmers in India, where soil erosion and degradation are significant obstacles to sustainable agriculture, should take note of these findings. Farmers can maintain soil carbon levels, enhance soil quality, and maintain soil fertility by implementing sustainable land use methods, such as controlled burning. As a result, agricultural productivity and food production may be increased.

Objective

1. To know the measures taken by the farmers to improve the soil quality.
2. To know the impact of different measures in improving the soil quality.

Methodology

A sample of 196 farmers were surveyed to know the measures taken by the farmers to improve the soil quality. The researcher also studied the impact of different measures in improving the soil quality. The survey was conducted with the help of a structured questionnaire. The researcher had collected the primary data through convenient sampling method. Data was analyzed and evaluated by mean and t-test.

Findings

Table below is sharing general details of the respondents. It is found from the table that in total 196 respondents 58.7% are male and rest 40.3% are female. 35.2% of the respondents are below 35 years of age, 42.3% are between 35 to 42 years of age and rest 22.4% are above 42 years of age. 31.1% of the respondents are in farming of crops, 30.1% in vegetable farming, 29.1% in fruits and rest 9.7% in farming of other things.

General Details

Variables	**Respondents**	**Percentage**
Gender		
Male	117	58.7
Female	79	40.3
Total	**196**	**100**
Age (years)		
Below 35	69	35.2
35-42	83	42.3
Above 42	44	22.4
Total	**196**	**100**
Kind of farming		
Crops	61	31.1
Vegetables	59	30.1
Fruits	57	29.1
Others	19	9.7
Total	**196**	**100**

Measures to improve the soil quality

S. No.	**Statements**	**Mean Value**	**t value**	**Sig.**
1.	Soil quality is improved by decrease use of chemical fertilizers	3.19	2.707	0.004

2.	Increase use of organic and natural techniques enhance soil quality	3.12	1.720	0.043
3.	Farmers' access to information on fertilizer management and soil health helps to improve soil quality	3.15	2.185	0.015
4.	Arming farmers with knowledge they need to implement sustainable soil management methods	3.17	2.426	0.008
5.	Increase in organic carbon in the soil enhance its structure and water-holding ability	3.13	1.886	0.030
6.	Crop leftovers (leaves, stems, and roots) can be either left on the soil's surface or mixed into the ground to enhance soil quality	3.18	2.567	0.006
7.	Implementing soil carbon sequestration techniques can significantly lower greenhouse gas emissions	3.16	2.303	0.011
8.	Conservation techniques like conservation tillage, cover crops, and agroforestry boost soil organic matter and enhance soil fertility	3.14	2.024	0.022

Table above is sharing different measures taken by the farmers to improve the soil quality. The respondent says that Soil quality is improved by decrease use of chemical fertilizers with mean value 3.19, Crop leftovers (leaves, stems, and roots) can be either left on the soil's surface or mixed into the ground to enhance soil quality with mean value 3.18, Arming farmers with knowledge they need to implement sustainable soil management methods with mean value 3.17. The respondent shares that implementing soil carbon sequestration techniques can significantly lower greenhouse gas emissions with mean value 3.16, Farmers' access to information on fertilizer management and soil health helps to improve soil quality with mean value 3.15, Conservation techniques like conservation tillage, cover crops, and agroforestry boost soil organic matter and enhance soil fertility with mean value 3.14, Increase in organic carbon in the soil enhance its structure and water-holding ability with mean value 3.13 and Increase use of organic and natural techniques enhance soil quality with mean value 3.12. Further t-test shows that all the statements are significant with the value below 0.05 under significant column.

Conclusion

In conclusion, soil quality is a crucial component of sustainable agriculture and food security in India. The soil plays a crucial role in the nation's agriculture, and its degradation can have a big impact on crop yields and food production. Using strategies to enhance soil quality is essential in this regard. Compost, manure, crop wastes, and green manure applications are examples of organic matter management practices that are useful for enhancing soil fertility, structure, and water-holding capacity. Moreover, reducing soil erosion by techniques like contour farming, terracing, mulching, and conservation tillage can lessen soil deterioration and improve soil quality. Another crucial step that can raise soil quality and slow climate change is soil carbon sequestration. Using techniques like conservation tillage, cover crops, and agroforestry can help trap carbon in the soil, enhancing soil health and lowering greenhouse gas emissions. The quality of the soil can be improved, and soil erosion can be decreased in semi-arid areas by using forest management techniques like controlled burning. By preserving soil fertility, preserving soil carbon levels, and improving crop yield, these techniques can assist to secure the food supply. Generally, for sustainable agriculture and food security in India, soil quality improvement is essential. Farmers may contribute to the nation's food security and economic growth by implementing sustainable land use techniques because they can maintain healthy soils, maximize fertilizer utilization, lessen soil degradation, and increase crop output. To encourage sustainable land use practises that enhance soil health and protection, the government, policymakers, and farmers must collaborate.
The study explored different measures taken by the farmers to improve the soil quality and found that Soil quality is improved by decrease use of chemical fertilizers, Crop leftovers (leaves, stems, and roots) can be either left on the soil's surface or mixed into the ground, Arming farmers with knowledge they need to implement sustainable soil management methods, implementing soil carbon sequestration techniques can significantly lower greenhouse gas emissions and Farmers' access to information on fertilizer management and soil health helps to improve soil quality. Study concludes that there is significant impact of different measures in improving the soil quality.

References

1. Amsalu, A., & De Graaff, J. (2007). Determinants of adoption and continued use of stone terraces for soil and water conservation in an Ethiopian highland watershed. Ecological Economics, 61, 294-302.

2. Bera, M. (2015). Soil health management in India: A holistic approach. Journal of Soil and Water Conservation, 14(2), 115-123.
3. Adimassu, Z., Kessler, A., & Hengsdijk, H. (2012). Exploring determinants of farmers' investments in land management in the Central Rift Valley of Ethiopia. Applied Geography, 35, 191-198
4. Amarender, R.A. (2017). Impact of Soil Health Card Scheme in India. Hyderabad: National Institute of Agricultural Extension Management (MANAGE).
5. Bera, S. (2015). A soil health card is not enough for balanced fertilizer use.
6. Biswas, A. K., Choudhury, P. R., & Ghosh, P. K. (2016). Soil organic carbon sequestration in relation to organic matter amendment in tropics. Journal of Soil Science and Plant Nutrition, 16(3), 692-714.
7. Velayutham, M., & Palanisamy, K. (2012). Conservation tillage: An efficient tool to minimize soil erosion and to improve soil health. Journal of Agroecology and Natural Resource Management, 1(3), 62-68.
8. Pathak, H., Singh, R., & Dubey, A. (2016). Effect of soil pH on nutrient availability and plant growth: A review. International Journal of Agriculture, Environment and Biotechnology, 9(2), 275-280.
9. Gurung, S. K., Jat, M. L., & Singh, R. G. (2007). Crop rotation: A tool for sustainable agriculture. Indian Farming, 57(11), 7-9.
10. Badia, D., & Marti, C. (n.d.). Fire and rainfall energy affects soil erosion and runoff generation in semi-arid forested lands. Arid Land Research and Management.
11. Lal, R. (2004). Soil carbon sequestration impacts global climate change and food security. Science, 304(5677), 1623-1627. Mchunu, C., & Chaplot, V. (2012). Land degradation impacts on soil carbon losses through water erosion and CO2 emissions. Geoderma, 177, 72-79.
12. Badia, D., & Marti, C. (2008). Fire and rainfall energy affects soil erosion and runoff generation in semi-arid forested lands. Arid Land Research and Management, 22(2), 93-108.
13. Du Preez, C. C., van Huyssteen, C. W., & Mnkeni, P. N. S. (2011). Land use and soil organic matter in South Africa 2: A review on the influence of arable crop production. South African Journal of Science, 107(5/6), 35-42.

14. Mchunu, C., & Chaplot, V. (2012). Land degradation impacts on soil carbon losses through water erosion and CO2 emissions. Geoderma, 177, 72-79.