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RESEARCH ARTICLE

Perspectives of farmers on soil management in Jorhat district of Assam

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ABSTRACT : The importance soil management lies with the fact that 95.00 per cent of our food is directly or indirectly produced on our soils and the sustainable management of soil can produce upto 58.00 per cent more food than produced usually. Present study was conducted in three villages of Jorhat district of Assam to understand the perception of farmers on soil management for boosting healthy soil. A purposive sampling technique was followed and statistical methods such as percentage, frequency were used for analyzing the data. Data were collected from 90 respondent farmers through personal interview method with the help of a structured schedule. Among different soil management practices followed in the study area, majority (90.00%) of the farmers highly agreed that straw mulching as the most convenient and available soil management practices for boosting healthy soil whereas another majority (51.11%) of farmers agreed that soil management practices are time and labour consuming.

KEY WORDS : Soil management, Farmers' perspective, Mulching, Crop diversification

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INTRODUCTION

Soils constitute the foundation for agricultural development, essential ecosystem functions and food security and hence, are key to sustaining life on Earth. Healthy soils contribute to resilient food production. Reviving soils and building our collective knowledge on soil health can only be effective if studies are carried out with the farming families who are important custodians of the world's soil. Farmers across the globe have recognized that healthy soils and watersheds are critical to the productivity and profitability of agricultural systems, as well as to rural communities and wildlife. Romig *et al.* (1995) noted that farmers tend to have a stronger temporal perspective of their soil than do scientists. They can observe how a given field responds to different kinds of storms, or how crops respond to a variety of climatic extremes and they have a feel for how soil aggrades or degrades over long periods of time. Farmers do not separate management and measurement of soil health. In fact, they seemed to focus more on the processes that believe to create or destroy soil health than on the soil properties themselves. However, in India, with growing population of 1.29 billion, increased demand for agriculture based products, changing climate, increasing water scarcity in many areas, and loss of agriculturally productive lands need to give emphasis on

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soil management through crop diversification, minimum tillage, mulching, nutrient management, pest management. Effective soil management is essential to the long-term sustainability and commercial viability of agriculture. It is also the foundation of effective environmental management of farming systems. Sati (2004) in the book "Horticultural Development in Hills" pointed out that orchards help in maintaining ecological balance by checking soil erosion, maintaining soil moisture and better utilization of cultivable wasteland. The need for more effective and comprehensive soil management has become even more urgent as a means to both mitigate and adapt to the effects of climate change. Wani *et al*. (1994) in their study compared crop rotations to learn their effect on yield and on soil characteristics with three treatments. First, they compared an 8-year rotation that included the return of plant residue and animal manure to the soil, secondly, a continuous barley system fertilized with nitrogen, and at last, a 5-year rotation including forages and cereals but no return of residues or manure to the soil. The third treatment showed the lowest barley yields and the first treatment showed increases in total C, N, and P; available N, P and K; CEC; microbial biomass, microbial respiration and counts of bacteria, fungi, and mycorrhizae. Allaverdian and Fayon (2015) mentioned that more than two decades ago in the Irrawaddy delta in Myanmar, farmers began planting two rice crops each year. However, soil health was affected by depleted organic matter and acidification. 200 farmers who couldn't afford fertilizer started to compost rice straw. With this, they have been able to maintain rice yields and reduce fertilizer costs.

In North East India, the process of agricultural development has been very slow. However, there is distinct spatial variation within the region. Goswami (1989) in his publication mentioned that a major part of North East India is covered by the hills with mountains with fertile soil experiencing remarkable production of horticultural crops on the steep slopes. A significant aspect of agricultural development in this region is the prevalence of a variety of agricultural systems, which are controlled by the topographic features, soil and climatic conditions. For example, traditional shifting cultivation on hill slopes and extensive settled cultivation in the river valleys including Brahmaputra plains are major features of agricultural development. The hill agricultural system as well as intensive crop production systems of the plains is controlled by different factors of landscape. Soil quality is the capacity of soil to function within natural or managed ecosystem boundaries to sustain plant and animal productivity, maintain or enhance water and air quality and support human health and habitation (Karlen *et al.*, 1997). Soil quality cannot be measured directly; it must be inferred from a wide range of soil properties (physical, chemical and biological) that influence the capacity of soil to perform effectively. It also varies with time, climate, rainfall and plants and human factor (Arshad and Martin, 2002 and Doran, 2002). The main reasons of soil quality degradation are the inadequate and imbalance application of agro-chemicals (fertilizers, pesticides, herbicides and insecticides) to the soils (Majumdar *et al*., 2002). Besides, frequent occurring dry spells during rainy season and short winters due to rise in temperature have also enhanced soil fertility deterioration in agricultural areas (Urkurkar *et al*., 2010).

Intensive agriculture without adequate and balanced use of chemical fertilizers, non-eco-friendly tillage practices and with little or no use of organic manure caused severe fertility deterioration of our agricultural soils, resulting in stagnating or even declining crop productivity (Barua and Bora, 1975). Keeping in mind these views the present study was conducted with the objectives:

- To study the profile of the farmers in the study area
- To study the soil management practices followed by the farmers
- To understand the perception of farmers on soil management for boosting healthy soil.

METHODOLOGY

The study was conducted in Jorhat district of Upper Brahmaputra Valley Zone of Assam. Out of three sub divisions in the district, Jorhat sub-division was selected purposively. A total of ninety farmer respondents were selected from three villages namely Nakachari, Selenga and no.1 Sonari of Jorhat sub-division. The data in the present study were collected directly from the respondents with the help of structured schedule, through the personal interview method during the month of May and June of the year 2016 in order to achieve the objectives of the study. The statistical techniques used are frequency, percentage for analysis.

OBSERVATION AND ASSESSMENT

The experimental findings obtained from the present study have been discussed in following heads:

Personal profile of the farmers:

It is evident from the data presented in Table 1 that majority of the respondents (53.34 %) were in the middle age. Next to the middle aged people, most of the respondents (27.78%) were young aged and few of the respondents (18.88%) were old aged. It was observed that majority (67.77%) of the respondent farmers belong to nuclear family and 32.33 per cent farmers had joint family. In order to find out the size of the family, the respondents were asked about the number of family members present in the family. It is observed that most (47.77%) of the respondents had 2 to 4 members in their family followed by respondents (30.00%) having 5 to 7 members and 22.23 per cent respondents have 8 or more number of members in their family. It is seen that majority (41.12%) of the respondent farmers were small famers holding 1.1 to 2 ha of operational land followed by big farmers (31.11%) holding more than 2 ha of land for agricultural operation. The study has shown that 27.77 per cent of the respondents were marginal farmers holding less than 1 ha of land for agricultural operation. The respondents were asked to indicate their farming experience in years. The data presented has revealed that majority (53.34%) of the respondents were having medium level of farming experience followed by 26.66 per cent of the respondents having lower level of farming experience and 20.00 per cent of the respondents having higher level of farming experience.

Soil management practices followed by the farmers:

The data presented in the Table 2 are based on different soil management practices followed by the farmers in their vegetable cultivations such as brinjal, cucurbits, tomato, cabbage, onion, garlic etc. The data presented revealed that most (91.11%) of the respondents were following crop diversification in their fields. The vegetable crops grown by the farmers for crop diversification were brinjal, cucurbits, tomato, cabbage, onion, garlic etc. Mulching as a soil management practice was used by 81.11 per cent respondents for conserving moisture and soil. The respondents used straw mulch mostly in comparison to other plastic mulch. Nutrient management for boosting healthy soil was done by 61.11 per cent of the farmers in their field by application of

Table 1 : Personal profile of the farmers

Characteristics	No. of respondents	
	Frequency	Percentage
Age		
Young (Upto 35 years)	25	27.78
Middle aged (35 to 50 years)	48	53.34
Old (50 years and above)	17	18.88
Family type		
Nuclear	61	67.77
Joint	29	32.23
Size of family		
2-4	43	47.77
5-7	27	30.00
8 and above	20	22.23
Operational land holding		
Marginal (1 ha and below)	25	27.77
Small (1.1-2 ha)	37	41.12
Big (2.1 ha and above)	28	31.11
Agricultural experience		
Low (Below $\bar{x}$ - S.D. = 10.2)	24	26.66
Medium ($\bar{x}$ -S.D.) to ($\bar{x}$ +S.D.) = 10.2- 30.4	48	53.34
High (Above $\bar{x}$ +S.D.= 30.4)	18	20.00

vermicompost and farm yard manures. A few farmers who used inorganic fertilizers viewed application of vermicompost and farm yard manures as more labourous job. A total of 52.22 per cent of the respondents mentioned that they use marigold, tulsi at one side of their vegetable rows to reduce the pests attack. It was found that only a few (4.44%) respondents in the study area followed the cover crop management practice which is considered as one of the best management practice for conserving soil and boosting healthy soil.

Perception of farmers on soil management for boosting healthy soil :

From the views of the farmers, the Table 3 reflects that majority (90.00%) of the respondents in the study area highly agreed that straw mulch is most convenient and available management tool for boosting healthy soil. Perception on use of plastic mulch is costly was highly agreed by 77.78 per cent of the respondents. However, majority (70.00%) of the respondents perceived that cropping in sequence improves production and nutrient use efficiency. Another 70.00 per cent of the respondents highly agreed that soil management minimize weed population, maintains soil quality and prevents erosion. The nutrient management for managing healthy soil give better yield was highly agreed by 51.11 per cent of the respondents. However, 47.78 per cent of the respondents highly agreed that soil management practices are time and labour consuming. 40.00 per cent respondent farmer' highly agreed that growing plants such as tulsi, marigold against pest decrease pests population.

Conclusion:

Soil management practices are primary determinants of soil quality and health. Therefore, farmers and researchers should not only use these indicators of soil quality and health for benefit in the farming system but should identify the condition of the soil resource and also define the economic and environmental sustainability of land management practices to assist governmental agencies in formulating realistic agricultural and land-use policies. The costs associated with some soil health practices are clearly a significant barrier for the farmers. It could be concluded that the respondents follow crop diversification, mulching, nutrient management and pest management practices in their cultivation fields which are regarded as convenient soil management practices in the farmer's situation. Survey responses indicate that farmers' perception on these soil management practices were different as, where, they agreed that soil management practices minimize weed population, maintains soil quality and

Table 2 : Soil management practices followed by the farmers

Soil management practices	No. of respondents	
	Frequency	Percentage
Crop diversification	82	91.11
Mulching	73	81.11
Nutrient management	55	61.11
Pest management	47	52.22
Minimum tillage	19	21.11
Cover crop	4	4.44

Table 3 : Perception of farmers on soil management for boosting healthy soil

Items	Response					
	Highly agreed	Frequency	Agreed	Frequency	Not agreed	Frequency
Straw mulch is convenient and available	81	90.00	1	1.11	8	8.89
Use of plastic mulch is costly	70	77.78	20	22.22	-	-
Cropping in sequence improves production, nutrient use efficiency	63	70.00	19	21.11	8	8.89
Soil management minimize weed population, maintains soil quality and prevents erosion	63	70.00	27	30.00	-	-
Nutrient management for managing healthy soil give better yield	46	51.11	18	20.00	26	28.89
Soil management practices are time and labour consuming	43	47.78	46	51.11	1	1.11
Growing plants (e.g. *Tulsi*, marigold) decrease pests	36	40.00	19	21.11	35	38.89

prevents erosion, cropping in sequence improves production and nutrient use efficiency, use of plastic mulch is costly and straw mulch is convenient and available, nutrient management give better yield, growing plants (e.g. *Tulsi*, marigold) decrease pests, whereas, some farmers highly agreed that soil management practices are time and labour consuming.

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