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Assessment of personal, socio-economic, communicational and psychological characteristics of sugarcane growers in relation to soil health management practices

[1]SS Jadhav, [2]HP Sonawane and [3]BD Tayade

[1]PG Scholar, Agricultural Extension Education RCSM, College of Agriculture, Kolhapur, Maharashtra, India

[2]Professor (CAS) of Agricultural Extension Education, RCSM College of Agriculture, Kolhapur, MPKV, Rahuri, Maharashtra, India

[3]Ph.D. Scholar, Department of Agriculture Extension and Communication, B. A. College of Agriculture Anand Agricultural University, Anand, Gujrat, India

Corresponding Author: SS Jadhav

Abstract

The research was conducted in three tehsils of Kolhapur district Karveer, Hatkanangle, and Shirol that are prominent for sugarcane cultivation. A total of 150 sugarcane farmers were selected and interviewed personally using a structured and pre-tested interview schedule. The study considered thirteen independent variables encompassing the personal, socio-economic, communicational, and psychological attributes of the respondents, measured through suitable tools and scales. The findings indicated that most sugarcane growers were from the middle-age category, had education up to higher secondary level, owned small to semi-medium landholdings, and possessed moderate farming experience. The majority displayed medium levels of mass media utilization, information-seeking behaviour, social participation and innovativeness. Overall, most respondents had moderate knowledge but low adoption of Soil Health Management (SHM) practices. The primary challenges faced were inadequate awareness of recommended fertilizer dosages and limited technical skills in soil testing. The study recommends enhancing training facilities, improving accessibility to soil testing services and ensuring the availability of organic inputs. Strengthened efforts by the Department of Agriculture and extension agencies such as demonstrations, farmer rallies and awareness programs are essential to increase the adoption of SHM practices among sugarcane farmers in the area.

Keywords: Soil health management, sugarcane growers, adoption of practices, socio-economic characteristics

Introduction

Agriculture is the backbone of the Indian economy, engaging over 58% of the population and significantly contributing to national development (IBEF, 2021) [1]. Among commercial crops, sugarcane plays a vital role in India's agro-based economy, with states like Uttar Pradesh, Maharashtra, Karnataka and Tamil Nadu leading in its production (FAO, 2020). Particularly, Kolhapur district in Maharashtra is known for its high sugarcane productivity and industrial linkages. However, the continuous and intensive cultivation of sugarcane has led to deterioration of soil health—manifested through nutrient imbalances, low organic matter and declining fertility which threatens long-term sustainability (Rajula Shanthy, 2016) [6]. Recognizing this, the Government of India launched initiatives like the Soil Health Card Scheme and National Mission for Sustainable Agriculture, promoting Integrated Soil Health Management (MoA & FW, 2015; NMSA, 2020) [3, 4]. These practices include the use of organic manures, crop rotation, bio-fertilizers, and balanced fertilizer application.

Despite these efforts, adoption of Soil Health Management practices among sugarcane growers varies widely, largely influenced by their personal traits, socio-economic status, communication access and psychological characteristics (Gupta & Nagar, 2017; DAC&FW, 2021) [5, 7]. Understanding these factors is critical for enhancing adoption rates and ensuring sustainable cultivation.

In this context, the present article entitled "Assessment of Personal, Socio-economic, Communicational and Psychological Attributes of Sugarcane Growers in Relation to Soil Health Management Practices" aims to explore how these farmer-specific attributes influence knowledge and adoption of soil health practices, while identifying the major constraints and offering actionable insights for sustainable sugarcane production.

Methodology

The present study was conducted in Kolhapur district of Maharashtra, which holds a prominent position in the state's sugarcane production. The tahsils of Karveer, Hatkanangle, and Shirol were deliberately selected as the study area owing to their extensive sugarcane cultivation, high productivity, and better access to irrigation facilities. An ex-post facto research design was employed for the investigation. Kolhapur district consists of twelve tahsils: Karveer, Shahuwadi, Panhala, Hatkanangle, Shirol, Radhanagari, Kagal, Bhudargad, Chandgad, Ajra, Gaganbawda and Gadhinglaj. Among these Karveer,

Hatkanangle and Shirol purposively selected based on the predominance of sugarcane farming. From each of these tehsil's, five villages were identified based on the number of sugarcane cultivators, making a total of 15 villages. A random sampling technique used to select 10 sugarcane farmers from each village, resulting in a total sample size of 150 respondents for the study.

Results and Discussion
1. Age
The data in Table No.1 indicates that, the approximately three-fifths (59.34%) of sugarcane growers are middle aged followed by 25.33 per cent in the old age group and only 15.33 per cent belong in the young age group.
The findings show that, the three-fifths (59.34%) of respondents were middle-aged, which is typically more experienced and actively involved in farm choices. Middle-aged farmers tend to be more motivated, have moderate agricultural experience and are more efficient than young people. Furthermore, middle-aged farmers had stronger physical strength and shouldered higher family duties compared to younger age groups. The low percentage of young farmers shows a lack of interest in farming as a profession, the fact that farming requires physical efforts.
Similar findings were reported by Dangre, Vishwakarma (2020) [10] and Choudhary.

2. Education
The data presented in Table No.1 illustrate the all farmers from those who have no formal education to those with postgraduate degrees were involved in the growing of sugarcane. Specifically, approximately two-fifths (41.33%) had completed higher secondary school, whereas 31.33 per cent had finished secondary education. Furthermore, 18.67 per cent of sugarcane farmers were graduates, 05.33 per cent had primary education and 03.33 per cent had postgraduate degrees. Importantly, the study included no- illiterate farmers.
Vishwakarma (2020) [10] and Kumar (2021) [12] observed similar results.

3. Farming experience
The data presented in Table No.1 describes the sugarcane growers' farming experiences. More than half (56.67%) of the sugarcane farmers had medium experience, followed by those with low experience 23.33 per cent and high experience 20.00 per cent, according to the study.
The more than half (56.67%) of sugarcane growers are in the medium age category, which explains they have a predominant of medium farming experience.
The results of the study are in line with the results reported by Dangre (2017), Mandal (2018) [9].

4. Occupation
The data in table No.1 presents that, more than half (54.00%) of respondents listed farming as their primary occupation. A considerable proportion 29.33 per cent worked in both agriculture and animal husbandry. A lesser proportion of respondents reported combining agricultural with either service 06.67 per cent or labour 05.33 per cent. Only 04.67 per cent of respondents were involved in agriculture and business.

The results clearly reveal that, farming is the primary source of revenue for most sugarcane growers. Many farmers maintain animals to supplement their income. A lesser percentage of farmers work in jobs, labour, or small enterprises in addition to farming, but these chances appear to be limited possibly due to a lack of education, skills, or resources.
The findings of the present investigation are identical to those of Choudhary (2022).

5. Annual income
The table No.1 depicted that, the nearly one third of respondents (32.00%) had a low of annual income (Rs.4,10,001 to Rs.6,95,000), followed by 28.00 per cent who had a 'Medium' income level (Rs.6,95,001 to Rs.9,80,000) and 24.00 per cent were in the 'Very Low' income category (up to Rs.4,10,000). Only 10.00 per cent of respondents were in the 'High' income group (Rs.9,80,001 to Rs.12,65,000), while a mere 06.00 per cent reported a 'Very High' income (above Rs.12,65,001).
The findings indicate that income level is a key factor influencing the adoption of sustainable practices among sugarcane growers.
The income distribution in the present study, a majority of the respondents falling under low to medium income groups, this result somewhat aligned with the findings of Yadav (2021) [13], Mandal (2018) [9] and Choudhary (2022) who also observed a higher proportion of respondents within the medium income category.

6. Size of land holding
The information in table No. 1 illustrate that, the little over one-half (50.67%) of sugarcane growers owned small land holdings (between 1.01 and 2.00 hectares), roughly one-fourth 26.00 per cent, own marginal land holdings (up to 1.00 hectare). Furthermore, 04.67 per cent of growers of sugarcane are in the medium land-holding category (4.01 to 10.00 hectares) and 18.66 per cent are in the semi-medium land holding category (2.01 to 4.00 hectares). Interestingly enough, no sugarcane growers came under the large land holding category, which covers holdings more than 10 hectares. This suggests that, most of sugarcane grower farmers' fall into the small or semi-medium landholder category.
Dangre and Choudhary also reported similar outcomes in their studies.

7. Soil type
The table No.1 indicates that, the half (50.67%) of the respondents reported deep black soil on their farms. This was followed by 40.00 per cent of respondents had medium black soil, while only 09.33 per cent were cultivating on coarse shallow soil.
The result indicates that, the half (50.67%) of the respondents from study region had fertile and moisture-retentive deep black soils, which are generally well suited for sugarcane cultivation. A smaller proportion of farmers had coarse shallow soils, which are typically less productive and may limit crop performance. The type of soil plays a vital role in determining nutrient management practices and adoption of soil health technologies. These findings suggest that soil type is an important factor influencing the farming

capacity and productivity of sugarcane growers.
The findings are somewhat similar to those of Kumar (2017) [17].

8. Cropping pattern
The data in table No.1 found that, the cropping pattern used by the respondents during various seasons. During the *Kharif* season, paddy was the most usually cultivated crop (35.33%), followed by soybean 34.00 per cent and groundnut 29.33 per cent, demonstrating different preference. In the Rabi season, (28.67%) of respondents cultivated sorghum, followed by wheat 25.33 per cent and Gram 20.67 per cent, demonstrating the importance of food and pulse crops. Maize emerged as the most popular summer crop, with (35.33%) of farmers planting it, while just 11.33 per cent planted sunflower. Notably, all respondents (100.00%) cultivated sugarcane on an annual basis, indicating its dominance in the study area and validating its choice for analysing Soil health management strategies.
The results correspond to the study conducted by Jadhav (2019) [15].

9. Cropping intensity
The data in table No.1 found that, the the half (50.00%) of respondents are reported medium cropping intensity, with scores ranging from (149 to 163). This was followed by 30.00 per cent of respondents falling into the low intensity category (up to 148 score), with just 20.00 per cent achieving a high level of cropping intensity (164 and above).
These data imply that, while half of the farmers practiced moderate cropping intensity, a significant number still had low land use efficiency, indicating room for improvement in crop planning and land management.
Comparable results reported in the research of Mandal (2018) [9] and Jadhav (2019) [15].

10. Mass media utilization
The data in table No.1 inferred that, the nearly half (49.33%) of the respondents had medium of mass media utilization, followed by 27.33 per cent having low of mass media utilization and only 23.33 per cent were having high of mass media utilization. These findings indicate that most farmers had moderate exposure to mass media, with a considerable number still needing improved access and engagement.
Mohapatra (2013) [16] and Mandal (2018) [9] reported similar findings.

11. Information seeking behaviour
Table No.1 indicates that, the majority (71.33%) of respondents exhibited medium levels of information seeking activity, followed by low levels 20.00 per cent and high levels 08.67 per cent. The respondents' medium degree of mass media exposure and low level of social activity may be the cause.
The present results align with the observations of Mandal (2018) [9].

12. Social participation
Table No.1 shows that, the half (50.67%) of the respondents had a medium level of social participation, followed by 38.67 per cent of respondents had a low level of social participation, while only 10.66 per cent of the respondents showed a high level of participation.
It can be concluded from the above data that the half (50.67%) of respondents had a medium level of social participation, reflecting a moderate involvement in local institutions and farmer groups.
These findings are consistent with the results reported by Kokani and Dangre, who also noted a similar pattern of participation among farmers.

13. Innovativeness
The results shown in Table No. 1 Shown that, the majority (65.33%) of respondents had a medium level of innovation proneness towards Soil health management techniques, followed by 22.67 per cent with low and 12.00 per cent with high innovation proneness.
Thus, majority (65.33%) of respondents demonstrated a medium level of innovation in soil health management approaches. This may be due to their moderate annual income, which may limit their ability to embrace new behaviours.
These results lined up with those revealed by Mandal (2018) [9], Lamkane (2018) [14] and Patel.

Table 1: Personal, Socio-economic, communicational and Psychological Characteristics of sugarcane Growers in Relation to Soil Health Management Practices.

Sr. No.	Variable	Category	Frequency (N=150)	Percentage (%)
1.	Age	Young (Up to 35 years)	23	15.33
		Middle (36 to 55 years)	89	59.34
		Old (56 and above years)	38	25.33
2.	Education	Illiterate (Can't read /write)	00	00.00
		Primary (1st to 7th Std)	08	05.33
		Secondary (8th to 10th Std)	47	31.33
		Higher Secondary (11th to 12th Std)	62	41.33
		Graduation (UG degree)	28	18.67
		Post-Graduation (PG degree)	05	03.33
3.	Farming experience	Low (Up to 20)	35	23.33
		Medium (21 to 35)	85	56.67
		High (36 and above)	30	20.00
4.	Occupation	Farming only	81	54.00
		Farming + Animal Husbandry	44	29.33
		Farming + Labour work	08	05.33

		Farming + Business	07	04.67
		Farming + Services	10	06.67
5.	Annual income	Very low (Up to 4,10,000 Rs.)	36	24.00
		Low (4,10,001 Rs. to 6,95,000 Rs.)	48	32.00
		Medium (6,95,001 Rs. to 9,80,000 Rs.)	42	28.00
		High (9,80,001 Rs. to 12,65,000 Rs.)	15	10.00
		Very high (12,65,001 Rs. and above)	09	06.00
6.	Size of land holding	Marginal (up to 01.00 ha)	39	26.00
		Small (01.01 to 02.00 ha)	76	50.67
		Semi Medium (02.01 to 04.00 ha)	28	18.66
		Medium (04.01 to 10.00 ha)	07	04.67
		Large (more than 10.00 ha)	00	00.00
7.	Soil type	Coarse Shallow Soil	14	09.33
		Medium Black Soil	60	40.00
		Deep Black Soil	76	50.67
8.	Cropping pattern	A) *Kharif* crops		
		1) Soybean	51	34.00
		2) Groundnut	44	29.33
		3) Paddy	53	35.33
		B) *Rabi* crops		
		1) Wheat	38	25.33
		2) Gram	31	20.67
		3) Sorghum	43	28.67
		c) Summer crops		
		1) Maize	53	35.33
		2) Sunflower	17	11.33
		D) Annual crops		
		1) Sugarcane	150	100.00
9.	Cropping intensity	Low (Up to 148%)	45	30.00
		Medium (149% to 163%)	75	50.00
		High (164% and above)	30	20.00
10.	Mass media utilization	Low (Up to 6.0)	41	27.33
		Medium (7 to 8.0)	74	49.33
		High (9 and above)	35	23.33
11.	Information seeking behaviour	Low (Up to 10)	30	20.00
		Medium (11 to 15)	107	71.33
		High (16 and above)	13	08.67
12.	Social participation	Low (Up to 11)	58	38.67
		Medium (12 to 16)	76	50.67
		High (17 and above)	16	10.66
13.	Innovativeness	Low (Up to 07)	34	22.67
		Medium (08 to 10)	98	65.33
		High (11 and above)	18	12.00

Conclusion

The majority of the respondents belonged to the middle age group, had higher secondary education, small to medium land holdings and medium farming experience. Most of them had medium levels of mass media utilization, information-seeking behaviour, social participation and innovativeness. The majority showed a medium level of knowledge, while nearly half of the respondents had a low level of adoption regarding Soil Health Management practices.

The study observed that independent variables such as education, farming experience, annual income, and size of land holding, cropping intensity, mass media utilization, information seeking behaviour and innovativeness had a positive and significant correlation with adoption of SHM practices. Among these, education, mass media utilization, information seeking behaviour and innovativeness showed a highly significant relationship with SHM adoption.

The study concluded that lack of knowledge about recommended fertilizer doses and micronutrients as per the soil testing report was the major constraint (90.00%), followed by insufficient technical knowledge in soil sample collection and interpretation of reports (88.00%), high cost of organic fertilizers and bio-fertilizers (73.33%), lack of incentives/subsidies (70.00%) and inadequate knowledge of SHM techniques (64.67%).

Majority (92.00%) of the respondents suggested organizing demonstrations, field visits and training programs to promote better adoption of SHM practices. Followed by the establishment of local soil testing laboratories or mobile testing units (78.67%), provision of government subsidies on bio-fertilizers and compost (72.67%), availability of quality organic inputs and green manure seeds in the market (69.33%) and training on SHM techniques such as green manuring, crop rotation and organic amendments (64.67%).

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