Gujarat Journal of Extension Education Vol. 34 : Issue 1 : December 22 *https://doi.org/10.56572/gjoee.2022.34.1.0008*

RELATIONSHIP BETWEEN SELECTED CHARACTERISTICS OF THE FARMERS AND THEIR LEVEL OF KNOWLEDGE REGARDING THE SOIL HEALTH MANAGEMENT PRACTICES

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ABSTRACT

Soil health is the capacity of a soil to function as a living system, with ecosystem and land use boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and promote plant and animal health.. The present study was conducted through Ex-post Facto research design and multistage sampling method. Total 150 farmers were selected from fifteen villages belongs to Deesa, Dantiwada and Palanpur talukas of Banaskantha district of Gujarat state. The present study revealed that the overall farmers had medium level of knowledge about soil health management practices. Whereas, practice-wise knowledge level of soil health management practices indicated that, in case of soil testing nearly three fifth (58.67%) of the farmers were well aware of the soil type of their field. While in Integrated Nutrient management vast majority (94.66%) of the farmers had correct knowledge on primary nutrients needed for soil. Whereas, in case of soil reclamation nearly three fifth (58.66%) of the farmers had correct knowledge on what is added to reclaim acidic soil. In case of agronomical practices vast majority (90.66%) of the farmers had correct knowledge on leguminous crops. Twelve independent and two dependent variables were selected for study. The independent variable viz., education, herd size, occupation, annual income, social participation, crop intensity, source of information and innovativeness had positive and significant with knowledge level on soil health management practices. While, age and farming experience had negative and significant correlation with knowledge level on soil health management practices. Whereas, family size had negative and non-significant correlation with knowledge level on soil health management practices.

Keywords: *knowledge, farmers, soil health management practices, association, knowledge level*

INTRODUCTION

The concept of soil health has been explained differently by different scientists and organizations. According to Food and Agricultural organization (FAO) " soil health is the capacity of a soil to function as a living system, with ecosystem and land use boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and promote plant and animal health".

There are three reasons behind degradation of soil health. First one is, the carrying capacity of the soil is transgressed consistently which declines the soil quality due to overburdening. The second reason is that the mismatches if land use and attributes amplifies the processes of degradation, and, third reason is, more concentration on application of modern inputs of right kind, in right amounts, at right time and at right place in contrast with native source and knowledge, can negate the adverse effects of exploitation by humans and land misuse.

According to the government data, nearly 30.00 per cent of theland in india, or about 97 million hectares, is degraded whersas, in Gujarat state is about 3.12 million ha, which is 16.00 per cent of the total geographical area.

OBJECTIVES

(1) To study the selected characteristics of the farmers

(2) To find out the relationship between selected characteristics of the farmers and their level of knowledge regarding the soil health management practices

(3) To assess the knowledge level of farmers regarding the soil health management practices

METHODOLOGY

The present investigation was carried out in Banaskantha district of Gujarat State. Ex-post facto research

design was used for this study as the independent variables were already operated in the study area. The multistage sampling technique was used to select a representative sample of respondents for present investigation. Among the fourteen talukas of Banaskantha district, three talukas viz., Deesa, Dantiwada and Palanpur were randomly selected for the study. Five villages from each taluka were selected randomly. From each village ten farmers were selected randomly. Thus, total 150 respondents were selected for the study. The data were collected by personal contact method with the help of structured interview schedule.

The independent and dependent variables were measured with the help of the scales and indices developed by the past researchers as well as structured schedules which were framed for purpose. A knowledge test was developed to measure the knowledge level of the farmers covering different aspects of soil health management. Each correct answer was credited with one (1) score and zero (0) score was given to wrong answer. The possible total score of a farmers could obtain from the range of '0' to '58' score. Based on the total score of the farmers, they were categorized into low, medium and high categories of knowledge level by using mean and standard deviation as a measure of check..Practice-wise level of knowledge index was calculated in percentage than, it was assigned a rank in descending order. The collected data were analyzed by using percentage, mean, standard deviation and correlation coefficient(r).

RESULTS AND DISCUSSION

Selected characteristics of farmers

Keeping in the view the objectives of study, the relevant variables were selected on the basis of an extensive review of literature related to the study, in consultation with experts and members of advisory committee. Only those variables which are found most relevant to the present investigation were finally selected. The results of the same are presented inTable.1

The data presented in Table.1 indicates that most of the (79.34%) farmers belonged to middle to old age group, had primary to middle school level education (55.34%), had medium to high level farming experience (81.33%),had 3 to 6 family members (79.34%), had medium herd size of animal (50.00%),had farming + animal husbandry as their main occupation, had marginal to semi-medium size of land holding (91.34%), had annual income up to ₹ 1, 50,000/- (79.34 %),had up to 4 ha land holding (94.67%) had membership in social organization (51.33%), had high cropping intensity (82.00%), had medium level of utilization of sources of information (64.67%), had medium innovativeness (62.00%).

Table 1: Selected characteristics of the farmers (n=150)

Sr. No.	Selected characteristics of the farmers	Frequency	Percent
(A)	**Personal characteristics**		
1	**Age**		
	Young age (up to 35 years)	31	20.66
	Middle age (36 to 50 years)	76	50.67
	Old age (above 50 years)	43	28.67
2	**Education**		
	Illiterate	14	09.33
	Functionally literate	24	16.00
	Primary school (Up to 8th standard)	52	34.67
	Middle school (9th to 10th standard)	28	18.67
	High school (11th to 12th standard)	20	13.33
	Under Graduate and Post Graduate (UG/PG)	12	08.00
3	**Farming experience**		
	Low (up to 10 year)	28	18.67
	Medium (11 to 25 year)	63	42.00
	High (above 25 year)	59	39.33
(B)	**Socio-economic characteristics**		
4	**Size of family**		
	1 to 2 members	00	00.00
	3 to 4 members	55	36.67
	5 to 6 members	64	42.67
	7 to 8 members	31	20.66
	Above 8 members	00	00.00

Sr. No.	Selected characteristics of the farmers		Frequency	Percent
5	**Herd size**			
	Small (up to 4 animals)		32	21.33
	Medium (5 to 8 animals)		75	50.00
	Large (9 to 12 animals)		39	26.00
	Very large (above 12 animals)		04	02.67
6	**Occupation**			
	Farming only		00	00.00
	Farming + Animal husbandry		108	72.00
	Farming + Animal husbandry + Service		31	20.67
	Farming + Animal husbandry + Business		11	07.33
7	**Annual income**			
	Up to ₹ 50,000		22	14.67
	₹ 50,001 to ₹ 1,00,000		68	45.34
	₹ 1,00,001 to ₹ 1,50, 000		29	19.33
	₹ 1,50,001 to ₹ 2,00,000		17	11.33
	Above ₹ 2,00,000		14	09.33
8	**Size of land holding**			
	Marginal (up to 1.00 ha.)		16	10.67
	Small (1.01 to 2.00 ha.)		51	34.00
	Semi medium (2.01 to 4.00 ha)		75	50.00
	Medium (4.01 to 10 ha)		08	05.33
	Large (above 10.00 ha.)		00	00.00
9	**Social participation**			
	No participation		72	48.00
	Member in one organization		77	51.33
	Member in more than one organization		01	00.67
	Membership with office bearer		00	00.00
(C)	**Situational characteristics**			
10	**Cropping intensity**			
	Low (up to 100%)		01	00.67
	Medium (101% to 200%)		25	17.33
	High (above 200%)		124	82.00
(D)	**Communicational characteristics**			
11	**Source of information**	Low (≤ 33.45 score)	22	14.66
		Medium (33.46 to 49.00 score)	97	64.67
		High (≥ 49.01 score)	31	20.67
		Mean = 41.23 S.D. = 7.78		
(E)	**Psychological characteristics**			
12	**Innovativeness**	Low (≤ 14.93 score)	11	07.33
		Medium (14.94 to 19.70 score)	112	74.67
		High (≥ 19.71 score)	27	18.00
		Mean = 17.32 S.D. = 2.39		

Relationship between selected characteristics of farmers and their knowledge level regarding soil health management practices

The association between the personal profile of the farmers viz. age, education, farming experience, size of family, herd size, occupation, annual income, size of land holding, social participation, cropping intensity, source of information and innovativeness with their knowledge level on soil health management practices were worked out by using coefficient of correlation. The findings are presented in Table 2.

(1) Age and their knowledge level

The data in the Table 2 reveals that, age of the farmers had negative and significant correlation (r = -0.187) with knowledge level of the farmers regarding soil health management practices of farmers. The negative direction of association indicated that knowledge levels of farmers were

Table 2: Association between selected characteristics of farmers and their level of knowledge on soil health management practices (n=150)

Sr. No.	Independent Variables	Correlation Coefficient (r)
X_1	**Age**	-0.187*
X_2	**Education**	0.171*
X_3	**Farming experience**	-0.192*
X_4	**Family size**	-0.091NS
X_5	**Herd size**	0.167*
X_6	**Occupation**	0.189*
X_7	**Annual income**	0.195*
X_8	**Land holding**	0.114NS
X_9	**Social participation**	0.198*
X_{10}	**Cropping intensity**	0.200*
X_{11}	**Source of information**	0.195*
X_{12}	**Innovativeness**	0.162*

***** Significant at 0.05 level of probability
NS = Non-significant

found to be decreased proportionally with increase in age of farmers. The findings are similar with Jaganathan *et al.* (2012) and Sharma (2014).

(2) Education and their knowledge level

The data in the Table 2 reveals that, education of farmers had positive and significant correlation (r = 0.171) with knowledge level regarding soil health management practices of farmers.. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in education of farmers. The findings are similar with Suman (2017), Bhaltilak *et al.* (2018) and Madhu *et al.* (2020).

(3) Farming experience and their knowledge level

The data in the Table 2 reveals that, farming experience of farmers had negative and significant association (r = -0.192) with knowledge level regarding soil health management practices of farmers. The negative direction of association indicated that knowledge levels of farmers were found to be decreased proportionally with increase in farming experience of farmers.

(4) Family size and their knowledge level

The data in the Table 2 reveals that, family size of farmers had negative and non-significant association (r = -0.091) with knowledge level regarding soil health management practices of farmers. It implies that family size did not play any role in the knowledge level of farmers. The findings are similar with Verma (2019).

(5) Herd size and their knowledge level

The data in the Table 2 reveals that, herd size of farmers had positive and significant association (r = 0.167) with knowledge level regarding soil health management practices of farmers. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in herd size of farmers. The findings are similar with Jaganathan *et al.* (2012) and Kumar *et al.* (2014).

(6) Occupation and their knowledge level

The data in the Table 2 reveals that, occupation of farmers had positive and significant correlation (r = 0.189) with knowledge level regarding soil health management practices of farmers. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in occupation of farmers.The findings are similar with Meena (2012) and Mistry *et al.* (2016).

(7) Annual income and their knowledge level

The data in the Table 2 reveals that, annual income of farmers had positive and significant correlation (r = 0.195) with knowledge level regarding soil health management practices of farmers. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in annual income of farmers.The findings are similar with Suman (2017).

(8) Size of land holding and their knowledge level

The data in the Table 2 reveals that, size of land holding of farmers had positive and non-significant correlation (r = 0.114) with knowledge level regarding soil health management practices of farmers. It implies that size of land holding did not play any role in the knowledge level of farmers. The findings are similar with Sharma (2014), Verma (2019) and Madhu (2020).

(9) Social participation and their knowledge level

The data in the Table 2 reveals that, social participation of farmers had positive and significant correlation (r = 0.198) with knowledge level regarding soil health management practices of farmers. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in social participation of farmers. The findings are similar with Mistry *et al.* (2016).

(10) Cropping intensity and their knowledge level

The data in the Table 2 reveals that, cropping intensity of farmers had positive and significant correlation (r = 0.200) with knowledge level regarding soil health management practices of farmers. The positive direction of correlation indicated that knowledge levels of farmers were found to be increased proportionally with increase in crop intensity of farmers.The findings are similar with Melkunde (2013), Shaik (2017) and Raval (2021).

(11) Source of information and their knowledge level

The data in the Table 2 reveals that, source of information of farmers had positive and significant correlation (r = 0.195) between source of information and knowledge level of the farmers regarding soil health management practices of farmers. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in source of information of farmers. The findings are similar with Bhaltilak *et al.* (2018), Patel (2020) and Dholariya (2021).

(12) Innovativeness and their knowledge level

The data in the Table 2 reveals that, innovativeness of farmers had positive and significant correlation (r = 0.162) with knowledge level. The positive direction of association indicated that knowledge levels of farmers were found to be increased proportionally with increase in innovativeness of farmers. The findings are similar with Kumar *et al.* (2014) and Raval (2021).

Extent of practice-wise knowledge level of farmers regarding the soil health management practices

The extent of practice-wise knowledge level of farmers regarding the soil health management practices is summarized in Table 3, 4, 5 and 6, respectively.

Knowledge level of the farmers on soil testing technology

Table 3 : Knowledge level of the farmers on soil testing technology (n=150)

Sr. No	Particulars	Maximum score	Obtained score	Percentage	Rank
1	**Type of the soil**	150	88	58.67	I
2	**Awareness about soil health card**	150	84	56.00	II
3	**Proper weight of the soil sample**	150	68	45.33	III
4	**Areas should be avoided while soil sample collection**	450	189	42.00	IV
5	**Proper depth of collection of soil sample**	150	49	32.67	V
6	**Organic matter content in soil testing report**	150	44	29.33	VI
7	**Soil sample testing**	150	42	28.00	VII
8	**Suitable time for collection of soil sample**	150	42	28.00	VIII
9	**Knowledge regarding soil testing report**	150	41	27.33	IX
10	**Nature of the soil**	150	39	26.00	X
11	**Period of soil testing**	150	37	24.67	XI
12	**Numbers of parameter performed in soils testing**	150	36	24.00	XII
13	**Significance of soil testing**	150	35	23.33	XIII
14	**soil health card possessed**	150	25	16.67	XIV
15	**Collection of soil sample per hectare (Nos.)**	150	0	00.00	XV

The data presented in Table 3 indicate that the practice-wise knowledge levelof the farmers on soil testing technologyvaried from practice to practice. The practice-wise knowledge level among the farmers was ranging from 00.00 to 58.67 percent.

The data presented in Table 3 revealed that high knowledge level was observed that the farmers were well aware of the soil type (58.67%), soil health card (56.00%), proper weight of soil sample required for testing (45.33%), areas to be avoided while collecting soil sample (42.00%), 32.67 per cent of the farmers had correct knowledge on proper depth for collecting soil sample and knowledge on organic matter content in their soil (29.33%), 28.00 per cent of the farmers in the study area have got their soil sample tested at some point of time and suitable time for collection of soil sample, 27.33 per cent aware about soil test report, 26.00 per cent of the farmers had aware about nature of the soil, 24.67 per cent had correct knowledge on after how many years' soil samples should be tested and 24.00 per cent had knowledge about total numbers of parameters on which soil samples are tested, 23.33 per cent had knowledge about significance of soil testing, 16.67 per cent had aware about soil health

card and None of the farmers had any knowledge on how many soil samples are required for true representation of one hectare of land.

Knowledge level of farmers on Integrated Nutrient Management

Table 4 : Knowledge level of farmers on Integrated Nutrient Management (n = 150)

Sr. No.	Particulars	Maximum score	Obtained score	Percentage	Rank
1	**Primary nutrients**	150	142	94.66	I
2	**Nitrogenous fertilizer**	300	274	91.33	II
3	**Phosphorus fertilizer**	300	268	89.33	III
4	**Potassium fertilizer**	300	246	82.00	IV
5	**Sulphur fertilizer**	150	121	80.66	V
6	**Significance of organic manure in soil**	450	328	72.88	VI
7	**Sources of organic manure**	450	305	67.77	VII
8	**Vermi-composting raw materials**	450	269	59.77	VIII
9	**Bio- fertilizers**	300	128	42.66	IX
10	**Micro nutrients**	450	177	39.33	XI
11	**Time for decomposing of vermi-compost**	150	52	34.66	X
12	**Integrated Nutrient Management**	150	27	18.00	XII

The data presented in Table 4 indicate that the practice-wise knowledge levelof the farmers on Integrated Nutrient Management varied from practice to practice. The practice-wise knowledge level among the farmers was ranging from 18.00 to 94.66 percent.

The data presented in Table 4 revealed that high knowledge level was observed that 94.66 per cent of the farmers had correct knowledge on primary nutrients needed for soil followed by sources of nitrogen (91.33%) and sources of phosphorus (89.33%), While, 82.00 per cent of the farmers had aware about sources of potassium fertilizers and 80.66 per cent having correct knowledge of sources of sulphur fertilizers. Whereas, knowledge of the farmers regarding nutrient management were; importance of organic matter in soil (72.88%), sources of organic manure (67.77%), raw materials used for vermin-composting (59.77%), bio-fertilizers (42.66%), micronutrients (39.33%), suitable time for decomposing of vermin-compost (34.66%) and knowledge of meaning of Integrated Nutrient Management(18.00%).

Knowledge level of farmers on soil reclamation

Table 5: Knowledge level of farmers on soil reclamation (n = 150)

Sr. No.	Particulars	Maximum score	Obtained score	Percentage	Rank
1	**Reclamation of acidic soil**	150	88	58.66	I
2	**Reclamation of alkaline soil**	150	77	51.33	II
3	**pH for acidic soil**	150	53	35.33	III
4	**pH for alkaline soil**	150	52	34.67	IV

The data presented in Table 5 indicate that the practice-wise knowledge levelof the farmers on soil reclamation varied from practice to practice. The practice-wise knowledge level among the farmers was ranging from 34.67 to 58.66 percent.

The data presented in Table 5 revealed that high knowledge level was observed that 58.66 per cent of the farmers had correct knowledge on what is added to reclaim acidic soil followed by 35.33 per cent of the farmers having correct knowledge on pH for acidic soil. More than half (51.33%) of the farmers had correct knowledge what is added to reclaim alkaline soil and 34.67 per cent of the farmers had knowledge on pH for alkaline soil.

Knowledge level of the farmers on agronomical practices

The data presented in Table 6 indicate that the practice-wise knowledge levelof the farmers on agronomical practices varied from practice to practice. The practice-wise knowledge level among the farmers was ranging from 06.67 to 90.66 percent.

The data presented in Table 6 revealed that high knowledge level was observed that 90.66 per cent of the

Table 6 : Knowledge level of the farmers on agronomical practices (n = 150)

Sr. No.	Particulars	Maximum score	Obtained score	Percentage	Rank
1	**Awareness about leguminous crops add nitrogen in soil**	150	136	90.66	I
2	**Nitrogen fixation crops**	150	123	82.00	II
3	**Crop rotation**	150	108	72.00	III
4	**Sources used for increasing soil fertility except chemical fertilizers**	300	215	71.67	IV
5	**Mulching**	150	105	70.00	V
6	**Tillage**	450	305	67.77	VI
7	**Cover crop**	150	89	59.33	VII
8	**Crop diversification**	150	11	07.33	VIII
9	**Green manuring**	150	10	06.67	IX

farmers had correct knowledge on leguminous crops followed by 82.00 per cent of the farmers aware about nitrogen fixation crops. Whereas, 72.00 per cent farmers had know the benefit of crop rotation and 71.67 per cent had correct knowledge on others sources used for increasing soil fertility besides chemical fertilizers. While 70.00 per cent had knowledge about mulching, 67.77 per cent know about tillage practice, 59.33 per cent know the benefit of cover crops. Only 07.33 per cent farmers had Low knowledge about benefit of diversifying crop and 06.67 per cent had correct knowledge on benefits of growing green manuring in the field.

Extent of overall knowledge level of farmers regarding the soil health management practices

Knowledge is the cognitive behaviour of an individual. Knowledge plays an important role in coverts as well as overt behaviour of an individual. Knowledge was measured with the help of structure schedule was developed for the purpose.

Table 7: Distribution of farmers according to their knowledge level on soil health management practices (n=150)

Sr. No	Knowledge level on soil health management practices	Frequency	Percent
1	**Low** (≤14.60 score)	23	15.33
2	**Medium** (14.61 to 27.95 score)	101	67.34
3	**High** (≥ 27.96 score)	26	17.33

Mean= 21.28 S.D= 6.68

The data presented in Table 7 indicate that more than two third (67.34%) of the farmers were in the medium level of knowledge followed by 17.33 per cent and 15.33 per cent farmers had high to low level of knowledge, respectively. In general, it can be said that the majority (84.67%) of the farmers had medium to high level of knowledge regarding soil health management practices.

The similar findings have been reported by Naruka *et al.* (2018) and Madhu *et al.* (2020).

CONCLUSION

The finding related to the selected characteristics of the farmers indicated that most of the farmers belonged to middle to old age group, had primary to middle school level education, had medium to high level farming experience, had 3 to 6 family members, had medium herd size of animal, had farming + animal husbandry as their main occupation, had marginal to semi-medium size of land holding, had annual income up to ₹ 1, 50,000/-, had up to 4 ha land holding, had membership in social organization, had high cropping intensity, had medium level of utilization of sources of information, had medium innovativeness.

It can be concluded that out of the twelve independent variables, twelve variables viz., education, herd size, occupation, annual income, social participation, crop intensity, source of information and innovativeness had positive and significant association with knowledge level on soil health management practices. Age and farming experiences had negative and significant association with knowledge level on soil health management practices. Size of land holding had positive and non-significant association with knowledge level on soil health management practices. Family size had negative and non-significant association with knowledge level on soil health management practices.

This study concluded that more than two third (67.34%) of the farmers were in the medium level of knowledge followed by 17.33 per cent and 15.33 per cent farmers had high to low level of knowledge, respectively. While in practice-wise knowledge level of soil health management practices indicated that, in case of soil testing

nearly three fifth (58.67%) of the farmers were well aware of the soil type of their field. Majority of the farmers (56.00%) were aware of soil health card. Whereas, in Integrated Nutrient management vast majority (94.66%) of the farmers had correct knowledge on primary nutrients needed for soil followed by sources of nitrogen (91.33%) and sources of phosphorus (89.33%). While soil reclamation nearly three fifth (58.66%) of the farmers had correct knowledge on what is added to reclaim acidic soil and more than half (51.33%) of the farmers had correct knowledge what is added to reclaim alkaline. In case of agronomical practices vast majority (90.66%) of the farmers had correct knowledge on leguminous crops followed by 82.00 per cent of the farmers aware about nitrogen fixation crops.

CONFLICT OF INTEREST

No conflict of interest among researchers.

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Received : October 2022 : Accepted : December 2022