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PATTERN OF FARMING PRACTICES AND SUSTAINABLE AGRICULTURAL DEVELOPMENT: A STUDY ON THE LINKAGE

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ABSTRACT

Agricultural development is the sine qua non for socio-economic development of a nation in general and developing countries in particular. The sustainable agriculture can be traced that it enhances the environmental quality and the resource base upon which agriculture depends. This form of agriculture is expected to provide basic human food and other major needs which are socially desirable and economically viable. This awareness has come to the centre stage of global debate as a result of degradation of natural resources and environment. The present study is an attempt to examine the farming practices in Cuddalore district of Tamil Nadu, India. The study is an empirical investigation based upon the data collected from the above mentioned field. The data were collected from 335 respondents of the district who were selected through multi-stage stratified random sampling method. In the first phase one developed taluk, a backward taluk, and a most backward taluk were identified. In the second phase one community development block is selected from each taluk. Third phase is the selection of five villages from each block. And at the final stage from each village 10 per cent of the farm households were selected at random. From the selected respondents the data were collected by using the tool of interview-schedule. The farming pattern of each educational group is associated with the views on advantages of cultivating traditional crop variety and the awareness of impact of chemical fertilizer on land and crops.

Keywords: *agricultural pattern, educational attainment, traditional crop cultivation*

INTRODUCTION

Warren and Cashman (1989) have emphasized the need of indigenous knowledge for practicing sustainable agriculture. Smith (1990) has pointed out the need for role of political leaders, donors, NGOs, farmers and consumers in practice of sustainable agriculture. The crop production and animal production could be based on conservation of natural resources. Stenholm and Waggoner (1990) have referred that sustainable agriculture is an intensive resource conserving management practices. They urged the need of flexibility in new agricultural practices to allow more creative, profitable and locally acceptable strategy of sustainable agriculture.

There is a growing concern about the practicing of low input sustainable agricultural practices throughout the globe. It has received wider attention among the planners, researchers and policy makers and it results in incorporation of sustainable policies of agricultural development in many countries. Hence, there is a need to analyze a few works in this area.

The main purpose of the research is to contribute to the development of efficient policy approaches for sustainable agricultural management in India. In order to do so, it is essential to understand the issues relating to the farmers' land preparation technique, mode of ploughing, choice of crop, views on chemical and bio-fertilizers, knowledge on organic farming, and awareness on biological pest control method. Hence, the present study attempts to understand the ground reality through the following objectives: 1) to assess the farmers' land preparation technique and mode of ploughing; 2) to understand the choice of crop variety and their views on traditional crop cultivation; 3) to study their views on advantages of chemical and bio-fertilizers; and 4) to measure their awareness on biological method of pest control.

RESEARCH METHOD

Sampling design

Cuddalore District was selected for the purpose of present study. The district is predominantly an agrarian district and agriculture is done in all the villages. The concept of organic farming is spreading in this district. This district has six Taluks viz., Chidambaram, Cuddalore, Kattumannarkoil, Virudhachalam, Panruti, Thittakudi. Among these Taluks Chidambaram and Cuddalore are agriculturally developed in terms of yield potential and irrigational facilities. Kattumannarkoil and Virudhachalam are agriculturally backward, whereas Panruti and Thittakudi are the most backward Taluk.

A multistage stratified random sampling was employed for data collection. In the first phase, the researchers had selected Chidambaram to represent a developed taluk, Kattumannarkoil to represent a backward taluk, and Panruti to represent the most backward taluk. Chidambaram Taluk has three blocks (Keerapalayam, Bhuvanagiri and Parangipettai); Kattumannarkoil Taluk has two blocks (Kumaratchi and Kattumannarkoil), and Panruti Taluk has two block (Annagrammam and Panruti). In the second phase, one community development block was selected from each Taluk. For the purpose of study, Bhuvanagiri block, Kumaratchi block, and Panruti block were selected to represent the corresponding taluk.

Third stage was the selection of 5 villages from each representative community development block to make totally 15 villages, or about 10% of the village in each block. The following villages were selected from the Bhuvanagiri block, viz.: Mutlur, Pudaiyur, Melamoongiladi, Keezhamoongiladi, and Manikollai. From each village 10% of the farms households are selected as sample thus totally 107 farmers were selected from this block (Table 1). From the Panruti block, the selected villages were Sirugramam, Manappakam, Semakottai, Veerapperumanallur, and Talambattu, where 10% of the farmhouse-holds are selected as sample from each village thus totally 114 farmers were selected as sample (Table 2). Similarly, from Kumaratchi block, the selected villages were Kumaratchi, Elleri, Lalpettai, Edaiyar, and Mullangudi, where 10% of the farmhouse holds are selected from each village as samples comprised of 114 farmers (Table 3). Thus totally 335 respondents were selected from the three community development block (Table 4).

Table 1. Samples of farm household selected from Bhuvanagiri block

Village	Total farm households (Farmers)	Sample	10%
B. Mutlur	218	21	9.63
Pudaiyur	216	22	10.18
Melamoongiladi	246	24	9.75
Keezhamoongiladi	239	23	9.62
Manikollai	173	17	9.82
Total	1092	107	9.79

Table 2. Samples of farm household selected from Panruti block

Village	Total farm households (Farmers)	Sample	10%
Sirugramam	291	29	9.96
Manappakkam	287	28	9.75
Semakottai	198	19	9.59
Veeraperumanallur	208	20	9.61
Talambattu	181	18	9.94
Total	1165	114	9.78

Table 3. Samples of farm household selected from Kumaratchi block

Village	Total farm households (Farmers)	Sample	10%
Kumaratchi	312	31	9.93
Elleri	216	21	9.72
Lalpettai	225	22	9.70
Edaiyar	213	21	9.85
Mullangudi	189	19	10.05
Total	1155	114	9.87

Table 4. Samples of farm household representing three community development blocks

Blocks	Total farm households (Farmers)	Sample	10%
Bhuvanagiri	1092	107	9.79
Panruti	1165	114	9.78
Kumaratchi	1155	114	9.87
Total	3412	335	9.82

Data collection

The relevant data are obtained from the respondents by adopting a well-structured interview schedule. The researcher has made a visit each and every household and relevant data were obtained from them by establishing a good rapport.

Tools of analysis

The data collected from the respondents were subject to statistical analysis such as averages, percentages and the results were interpreted in the light of the findings. Chi-square test was also used to identify the association among variables.

RESULTS AND DISCUSSION

Table 5 presents data on the education wise distribution of respondents. It can be noted that out of the total 335 respondents 24.77 per cent of them are illiterates. They constitute more among the respondents of Talambattu village (44.44%), Elleri village (38.09%), Sirugramam village (34.48%), Manappakkam village (39.28%) and Veeraperumanallur village (35%) than those of others. Out of the total 335 respondents 33.43 per cent of them have primary level of education. The majority of the respondents of B-Mutlur village (42.85%), Pudaiyur village (45.45%) and Melamoongiladi village (41.66%) have primary level of education. Of the total 335 respondents 23.88 per cent of them have secondary level of education. Edaiyar villages occupy the first position (47.61%) in respect of having secondary level of education. Moreover, 17.91 per cent of the total 335 respondents have degree level of education. Their proportion is more among the villages of B-Mutlur, Pudaiyur and Melamoongiladi than those of others.

Table 6 presents data on the education-wise respondents' efforts to improve the fertility of their lands. It was more than three fourth of the degree level educated farmers 86.66% and secondary level educated farmers 81.25% had undertaken efforts to enhance the fertility of their lands. More than a two-third of the illiterate farmers 69.87% and more than a half of the primary level educated farmers 58.92% have not undertaken any effort to improve the fertility of their lands. Based on the methods of land improvements, more than a half of the illiterate and primary level educated farmers had undertaken land improvement

Table 5. Education-wise distribution of respondents

	Illiterate		Primary		Secondary		Degree		Total
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
B.Mutlur	2	9.52	9	42.85	3	14.28	7	33.33	21
Pudaiyur	3	13.63	10	45.45	3	13.63	6	27.27	22
Melamoongiladi	2	8.33	10	41.66	5	20.83	7	29.16	24
Keezhamoongiladi	6	26.08	8	34.78	5	21.73	4	17.39	23
Manikollai	5	29.41	6	35.29	4	23.52	2	11.76	17
Sirugramam	10	34.48	10	34.48	6	27.58	3	10.34	29
Manappakkam	11	39.28	8	28.57	5	17.85	4	14.28	28
Semakottai	6	31.57	8	42.10	3	15.78	2	10.52	19
Veeraperumanallur	7	35.0	5	25.0	5	25.0	3	15.0	20
Talambattu	8	44.44	4	22.22	4	22.22	2	11.11	18
Kumaratchi	8	25.80	8	25.80	10	32.25	5	16.12	31
Elleri	8	38.09	6	28.57	4	19.05	3	14.28	21
Lalpettai	3	13.63	6	27.27	8	36.36	5	22.72	22
Edaiyar	2	9.52	6	28.57	10	47.61	3	14.28	21
Mullangudi	2	10.52	8	42.10	5	26.31	4	21.05	19
Total	83	24.77	112	33.43	80	23.88	60	17.91	335

works in terms of reclamation and bunding. The majority of the secondary level educated additionally has undertaken soil testing work. The majority of the degree level educated respondents have undertaken multiple ways of land improvement works such as reclamation, bunding, soil testing and leveling. Furthermore, the chi square test indicated a significant difference in educational status with respect to respondents' efforts to enhance the fertility of their lands.

Data presented in Table 7 indicate the distribution of respondents in implementing mode of ploughing. The illiterate farmers occupy the first position 71.08% and primary level educated farmers come to next position 70.53% with respect to their desire to practice traditional method of ploughing. More than a half of the secondary level educated farmers 55% follow both traditional and modern methods of ploughing. The majority of the degree level educated farmers 58.33% practice exclusively modern method of ploughing. Based on the chi square test, a significant different was observed among the educational background of the respondents in implementing mode of ploughing. It became clear that the illiterate and primary level educated farmers showed much interest on traditional method of ploughing by realizing its advantages. On the other hand, the secondary level educated farmers prefered to practice mainly both traditional and modern method of ploughing and degree level educated farmers put more emphasis on modern method of ploughing than that of traditional method.

Data presented in Table 8 indicate the varieties adopted for crop production among the respondents. The illiterate farmers occupy the first position 71.08% and primary level educated farmers come to next position 70.53% with respect to their ambition to select local organic variety of crops. More than a half of the 55% secondary level educated farmers desire to cultivate mixed variety of crops viz., local organic variety and HYV of crops. The majority of the degree level educated farmers desire to cultivate HYV of crops. Further chi square test indicated a significant difference among the respondents with respect to the choice of variety for crop production. Therefore, It can be inferred that the illiterate and primary level educated farmers showed much interest on cultivating of local organic variety of crops by realizing its advantages through their traditional wisdom. However, secondary level and degree level educated farmers show more interest on cultivation of exclusively HYV of crops or mixed variety of both.

Table No. 7 Education-wise of respondents in implementing mode of ploughing

Education	Traditional method	Tractor as power tiller	Both	Total
Illiterate	59 (71.08)	14 (6.86)	10 (12.04)	83
Primary	79 (70.53)	12 10.71	21 (18.75)	112
Secondary	8 (10)	28 (35)	44 (55)	80
Degree	6 (10)	35 (58.33)	19 (31.66)	60
Total	152 (45.37)	89 (26.56)	94 (28.05)	335

Values in brackets indicate the percentage of respondents; Chi square value = 136.8*; df = 6;
* = Significant at 1 per cent level

Table 8. Education -wise of respondents in implementing crop production

Education	Local crop variety	HYV of crops	Mixed variety	Total
Illiterate	59 (71.08)	14 (16.86)	10 (12.04)	83
Primary	79 (70.53)	12 (10.71)	21 (18.75)	112
Secondary	8 (10)	28 (35)	44 (55)	80
Degree	6 (10)	35 (58.33)	19 (31.66)	60
Total	152 (45.37)	89 (26.56)	94 (28.05)	335

Values in brackets indicate the percentage of respondents; Chi square value = 136.8*; df = 6;
* = Significant at 1 per cent level

Table 9 presents the respondents' views on advantages of cultivating traditional variety of crops. More than a half of the illiterate respondents refer the advantages of cultivating local organic variety of crops in terms of production of healthful food and getting more strength and stamina by consuming such food. A considerable majority 46% of the small farmers say it as production of nutritious food. More than a half of the degree level educated farmers 56% and a more than two third of the 73.08% secondary level educated farmers refer three advantages of cultivating, local organic variety of crops such as production of nutritious food, production of healthful food and getting more strength and stamina by consuming food raised through local variety. Statistically, a significant difference between educational status of the farmers and their views on advantages of cultivating local organic variety crops was confirmed through the chi square test. It can be inferred that secondary level and degree level educated farmers perceive more on many advantages of cultivating local organic variety of crops than that of small and marginal farmers.

With respect to the views on advantages of applying bio-fertilizers and chemical fertilizers, the majority of the illiterate respondents refer the advantages of applying bio-fertilizers in terms of production of food that gives more strength and stamina to consuming human beings and animals and primary level educated farmers say it as production of nutritious food (Table 10). The majority of the 40.38% secondary level educated farmers refer its advantage as an eco-friendly method. More than a half of the degree level educated farmers opine the multiple advantages of applying bio-fertilizers, such as production of nutritious food, disease free food production, food that gives more strength and stamina and as an eco-friendly method. Conversely, a half of the illiterate respondents refer the advantage of applying chemical fertilizers in terms of high yield potential and large scale production. The majority of the 60.60% of the small farmers regard it as rapid growth and enhancement of multiple cropping. A more than two third of the degree level 70.37% educated and more than a half of the secondary level 59.72% educated farmers attribute the multiple advantages of applying chemical fertilizers to raise their crops. A significant difference in the chi square

Table 9. Education-wise of respondents' views on advantages of cultivating traditional crop variety

Education	Production of nutri-tious food	Healthful food and it gives more strength and stamina	All	Total
Illiterate	18 (26.08)	41 (59.42)	10 (14.50)	69
Primary	46 (46.00)	22 (22.00)	32 (32.00)	100
Secondary	7 (13.46)	7 (13.46)	38 (73.08)	52
Degree	6 (24.00)	5 (20.00)	14 (56.00)	25
Total	77 31.30	75 (30.48)	94 (38.21)	246

Values in brackets indicate the percentage of respondents; Chi square value = 31.70*; df = 6;
* = Significant at 1 percent level

Table 10. Education and respondents' views on advantages of chemical and bio-fertilizers

Education	Advantages of bio-fertilizers						Advantages of chemical fertilizers			
	Production of nutri-tious food	Free from disease	To have stamina of animals	Eco-friendly method	All	Total	High yield large scale production	Rapid growth + multiple cropping	All	Total
Illiterate	14 (20.28)	10 (14.49)	34 (49.27)	6 (8.69)	5 (7.24)	69	12 (50)	7 (29.16)	5 (20.83)	24
Primary	38 (38)	12 (12)	14 (14)	5 (5)	31 (31)	100	8 (24.20)	20 (60.60)	5 (15.15)	33
Secondary	2 (3.84)	8 (15.38)	9 (17.30)	21 (40.38)	12 (23.07)	52	8 (11.11)	21 (29.16)	43 (59.72)	72
Degree	3 (12)	4 (16)	3 (12)	2 (8)	13 (52)	25	12 (22.22)	4 (7.40)	38 (70.37)	54
Total	57 (23.17)	34 (13.82)	60 (24.39)	34 (13.82)	61 (24.79)	246	40 (21.85)	52 (28.42)	91 (49.73)	183

Values in brackets indicate the percentage of respondents; Chi square value = 96.24*; df = 12 (bio-fertilizers); Chi square value = 51.07*; df = 6 (chemical fertilizers); * = Significant at 1 percent level

test was observed among the respondents' views on advantages of applying bio-fertilizers to raise their crops. A similar result was also observed with respect to application of chemical fertilizers. These indicated that degree level educated farmers realize more on multiple advantages of applying bio-fertilizers and chemical fertilizers rather than individual advantage. On the other hand, the majority of the illiterate and primary level educated farmers perceive mainly on individual advantage of either applying bio-fertilizers or chemical fertilizers to raise their crops.

The awareness on biological method of pest control among the respondents was depicted in Table 11. Although more than 60 per cent of the respondents in all educational groups are aware of biological method of pest control, the secondary level educated 65% lag behind others in their awareness. A closer inspection on the data, it can be revealed that more than two third of the illiterate farmers (76.81%) and primary level educated (68.75%) were familiar only organic insecticide method of pest control. There were 42.30% of secondary level educated respondents 42.30% are aware of additionally male sterilization method of pest control. In addition, more than a half of the degree level educated farmers 51.11% are aware of three methods such as organic insecticide, male sterilization technique and encouraging the predictor species. Nevertheless, a non-significant difference observed from the chi square test indicated that the educational status did not differentiate the respondent in the awareness on biological method of pest control.

The distribution of respondents' sources of knowledge about organic farming is presented in Table 12. More than a half of the illiterate respondents were familiar with organic farming concept through the activities of M.S. Swaminathan Research Foundation and a considerable majority of the primary level educated farmers (44.64%) were aware of it through interaction with their friends and fellow farmers. The majority of the secondary level educated farmers (55%) and degree level educated farmers (50%) were familiar with organic farming concept through many sources such as friends, fellow farmers, M.S. Swaminathan Research Foundation and the NGOs. Moreover, a significant different observed from chi square test suggested that the secondary and degree level educated farmers are aware of organic farming concept through many sources. The primary level educated farmers and illiterate farmers are mainly aware of organic farming concept either one source or two sources.

Table 11. Education-wise of respondents in awareness on biological method of pest control

Education	Knowledge about biological method of pests control		Various biological methods of pest control				Total
	Yes	No	Organic insecticide	1+ Male sterilization	1+2 encouraging growth of predator species	Total	
Illiterate	69 (83.13)	14 (16.86)	53 (76.81)	9 (13.04)	7 (10.14)	69	83
Primary	80 (71.42)	32 (28.57)	55 (68.75)	15 (18.75)	10 (12.5)	80	112
Secondary	52 (65)	28 (35)	19 (36.53)	22 (42.30)	11 (21.15)	52	80
Degree	45 (75)	15 (25)	15 (33.33)	7 (15.55)	23 (51.11)	45	60
Total	246 (73.43)	89 (26.56)	142 (57.72)	53 (21.54)	51 (20.73)	246	335

Values in brackets indicate the percentage of respondents; Chi square value = 7.225 NS; df = 3; NS = Not Significant at 5 per cent level

CONCLUSION

The sustainable agricultural production must be on sustainable consumption. The developing countries must focus attention on the traditional farmers who are the warehouse of traditional knowledge and having interest to practice sustainability for sustainable production. Their knowledge must be utilized for transforming the attitude of the farmers practicing modern mode of production towards sustainable production.

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