Awareness on Bio-Based Farming System: A Study in Four Districts of South West Bengal

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Abstract

To meet the demand for the growing population, post-independence Indian agriculture was highly based on synthetic based modern agriculture. Though there is a positive change highly contributed economic growth, this chemical-based agriculture was criticized from environmental aspects. Conflict arises between synthetic based agriculture and increasing demand for non-chemical agriculture like Bio-Based Farming System (BBFS), that are most important for maintaining soil fertility as well as soil health for sustainable agricultural production. To solve the conflict, awareness level of the farmers is more important between introducing any farming system like Bio-Based Farming System or maintaining a chemical traditional farming system. The present study is an attempt to study the awareness level of the farmers practicing bio-based farming system. Four districts of Southern West Bengal from which, four blocks and then four villages from those blocks have been randomly selected for the study. A total of 200 farmers have been selected (50 from each village). Results showed that 78% farmers strongly agree that quality of BBFS product is good than chemical based product; 67% respondents strongly agree that BBFS farming system is profitable. Similarly, about 70% respondents are aware about the use of crop rotation and recommended Package of Practice.

1. Introduction

The idea of organic farming was primarily developed by Stiener in 1940 in his book, 'An agriculture Testament' which influenced and created a new dimension for the agriculture scientists. The common platform for understanding and interaction regarding organic agriculture was created in 1972 as 'International Federation of Organic Agriculture Movement (IFOAM)'. The Tenth Five Year Plan, (GoI, 2002) document recognizes organic farming as the 'thrust area' in sustainable uses and management of agriculture resources. Organic farming, low input agriculture, sustainable agriculture, bio-dynamic farming, l*ow external input and sustainable agriculture (LEISA),* bio-based farming system (BBFS) are some of the practices having almost similar objectives regarding sustainable use of natural recourses. Bio-Based Farming System (BBFS) was first adopted by the M.S.Swaminathan Research Foundation, with funding and technical assistance from the Government of India and international agencies including FAO, the United Nations Development Programme (UNDP) and the International Fund for Agricultural Development (IFAD) in 1992 in India. India has become the 9th country of the world having largest areas of organic agricultural land of 1.8 million hectares and third country of the world with highest increase of organic farm land of 4,60,000 hectares in 2014-15 (Source: FiBL Survey, 2017). Many farmers are practicing organic farming without knowing the standards of it. The present study will investigate the awareness regarding bio-based farming system (BBFS).

Comparison of attitudes and beliefs of organic farmers along with conventional farmers had been studied by Sullivan *et al.* (1996). Organic farmers have greater awareness of and appreciation for nature with the land. Organic farmers having better crop diversity than that of conventional farmers. The appreciation for nature and awareness of the organic farmers are stronger than that among the conventional farmers. Midmore *et al.* (2001) investigated with 1240 respondent farms in England about the perceptual barriers of farmers' attitudes toward conversion to organic farming or whether they are changing in importance over time. Study

was carried out with five point Likert scale to investigate the perceptual barriers of farmers' attitudes toward conversion to organic farming. Studies revealed that majority (80%) of the respondents strongly believe about 'organic farming is kinder to the environment'. There is strong dis-agreement against control of weeds pests and diseases without chemicals and also strong agreement against restrictions of implementation of organic standards. In Edeoghon *et al*. (2008) studied the awareness in Edo, Nigeria with 96 respondents by using 4-point Likert scale. It has been found from the study that most of the respondents are aware about mixed cropping, cover cropping and application of organic manure fertilizer. For studying the barriers regarding and sustainable agriculture practices 3-point Likert type scale has been applied. Major barriers faced by the respondents in using sustainable agricultural practices are lack of encouragement of the government, lack of finance and sustainable agricultural practices are expensive. Similar study was done by Singh and George (2012) regarding belief and awareness of organic farming in Uttarakhand, India. The study was done with two-point scale of 72 respondents of hilly region and plain region to measure the beliefs of the farmers regarding organic farming. Study revealed the beliefs of the respondents that 'organic farming is environment friendly' and 'it is superior to conventional farming'. Farmers' awareness regarding various aspects of organic farming was also tested by them, with three-point descriptive rating awareness scale. Majority of the respondents have medium level environmental awareness and they are not aware about all the aspects related to organic certification and standards given by different agencies. Collecting data from 178 coconut growers, Herath and Wijekoon (2013) studied the important influencing factors for adoption of coconut organic farming in Sri Lanka. Data collected through five-point Likert scale and analysis was done through SPSS software package. Study expressed that organic growers did not have strong motivation to adopt organic farming because they are of the view that yields are low, even there is price premium for organically produced coconut. Further they are also reluctant to shift to organic as they are doing it for a long period of time. Piadozo *et al.* (2014) studied the extent of awareness, knowledge and source of knowledge of organic farming activities with 78 respondents of 13 provinces of two regions of the country like Philippine. The advantages of organic farming as perceived by majority the respondent farmers are, low input cost, improvement in soil fertility and price premium of organically produced products. Also they believe that organic farming beneficial for health and environment. Majority of the respondents have medium to high level awareness in selection of right of seed, fertilizer, pesticide, production of organic fertilizer and pesticide and marketing practices so far as organic farming is concern.

2. Materials and Methods

In the present study, the research design has been formulated, keeping in idea in mind, to achieve the objectives of the study. Southern West Bengal has been taken in the present study. Out of 14 districts of Southern West Bengal, 12 districts have been considered; Kolkata district has been excluded as non-agricultural district. Four districts and from them four blocks have been randomly selected. They are Bolpur-Srinikitan block of Birbhum, Khanakul-I block of Hooghly, Ausgram-I block of Burdwan and Baruipur block of South 24 Parganas. To have proper information regarding BBFS, discussion was made with the concerned block agriculture department and one village from each block is purposively selected, practicing BBFS. A total of 200 farmers has been purposively selected (fifty farmers from each four village) for the study, those how are practicing BBFS.

The interview schedule was developed to bring forth the information regarding personal and demographic profile of the study area farmers. Awareness scale of the farmers was prepared to access the awareness level of the farmers, after Participatory Rural Appraisal (PRA) and Focus Group Discussion (FGD). A four-point descriptive awareness scale was done to know the awareness level of the farmers regarding BBFS. Respondents' agreement/ disagreement were categorized as "Disagree", "Agree", "Moderately Agree" and "Strongly Agree" on each of the items and the scale were scored as 0,1,2,3 respectively reflecting the awareness level. Similarly, how the acquired knowledge and skill of BBFS used by the respondent farmers in practice, were also tested in two-point scale as "Yes" and "No" and scored as 2 and 1 respectively. Scoring will reflect the level of awareness on individual item of BBFS.

3. Results and Discussion

Personal profile of the respondent farmers gained through analysis of surveyed data and the finding were presented below.

3.1 Profile of the Respondent Farmers

3.1.1 Age

The age of the respondent farmers was found to be the ranged from 23 years to 72 years. Respondents were classified into three age groups, *i.e.*, i) 18-35 years, ii) > 35-50 years, and iii) > 50 years. It has been observed that in case of Kamalakantapur and Sukhadanga more than 50% respondents belonged to middle age- groups *i.e.*, 58% and 54% respectively. On the other hand, in case of Udaypur and Teurhat more than 50% belonged to higher age group *i.e.*, 56% and 60% respectively, engaged in BBFS. Overall average of the respondents' is 48.94 years. The respondents engaged in Bio-Based Farming System (BBFS) belonged to middle age group (45.5%) and higher age group category (43.5%) contributing maximum 89% of the total respondents (Table 1). All the farmers belonged to male category.

Table 1: Gender, age, education, caste, religion of the respondent farmers

Baseline characteristics		Kamalakantapur		Sukhadanga		Udaypur		Teurhat		Total	
		N=50		N=50		N=50		N=50		N=200	
Gender	M	50	100	50	100	50	100	50	100	50	100
	F	-	-	-	-	-	-	-	-	-	-
	Total	50	100	50	100	50	100	50	100	50	100
Age	18-35	6	12	9	18	3	6	4	8	22	11
	> 35-50	29	58	27	54	19	38	16	32	91	45.5
	> 50	15	30	14	28	28	56	30	60	87	43.5
	Total	50	100	50	100	50	100	50	100	50	100
	Avg.	46.72	-	45.04	-	51.62	-	52.36	-	48.94	-
Year of Education	Up to 4	1	2	2	4	0	0	6	12	9	4.5
	> 4-8	19	38	25	50	5	10	30	60	79	39.5
	> 8-10	15	30	18	36	21	42	7	14	61	30.5
	> 10-12	14	28	3	6	16	32	2	4	35	17.5
	> 12	1	2	2	4	8	16	5	10	16	8
	Total	50	100	50	100	50	100	50	100	200	100
	Avg.	9.24	-	8.36	-	11.16	-	8.06	-	9.02	-
Caste	Gen	2	4	-	-	47	94	2	4	51	25.5
	SC	2	4	-	-	2	4	48	96	52	26
	ST	40	80	49	98	-	-	-	-	89	44.5
	OBC	6	12	1	2	1	4	-	-	8	4
	Total	50	100	50	100	50	100	50	100	200	100
Religion	Hindu	50	100	50	100	50	100	50	100	200	100
	Others	-	-	-	-	-	-	-	-	-	-
	Total	50	100	50	100	50	100	50	100	200	100

3.1.2 Education

Education i.e. year of education of the respondents has been categorized into four groups i.e. i) up to 4 years, ii) > 4-8 years, iii) > 8-10 years, iv) > 10-12 years, and v) > 12 years. Maximum respondents (70%) having > 4-8 years (39.5%) and 8-10 years (30.5%) of education. Both average year of education (11.16 years) and higher education, *i.e.*, > 12 years of education (16%) are maximum in case Udaypur village in comparison to others. Average year of education is less (8.06 years) in relation to other villages (Table 1).

3.1.3 Caste and Religion

Four categories of caste *i.e.*, i) scheduled caste, ii) scheduled tribes, iii) other backward caste, and iv) general caste were found among the respondents' farmers. It has been revealed from the study that overall the scheduled tribe farmers are in majority (44.5%) contributing 80% in Kamalakantapur and 98% in Sukhadanga village. Among four villages, in two villages scheduled tribes, one village scheduled caste and in another

village general caste are in majority. All the respondent farmers belonged to Hindu category (Table 1).

3.2 Occupation, Family Size, APL-BPL

3.2.1 Occupation

Occupation is categorized into two - primary and secondary occupation. It is observed that all the respondents having agriculture as the primary occupation. Secondary occupation has been categorized as service, business, others and nil (for those who has not any secondary occupation). Regarding secondary occupation, it is revealed that 40% respondent having business as secondary occupation. In village wise, secondary occupation of Sukhadanga and Teurhat village are having majority in others (62%) and business (56%) respectively (Table 2).

3.2.2 Household Size & APL-BPL

Overall average household size of the respondent farmers is 4.56 and it ranges from 1 member to 13 members in Teurhat and Udaypur village respectively. Regarding poverty line,

Table 2: Occupation, family size and APL-BPL

Baseline characteristics		Kamalakantapur		Sukhadanga		Udaypur		Teurhat		Total	
		N=50		N=50		N=50		N=50		N=200	
		No.	%	No.	%	No.	%	No.	%	No.	%
Primary Occupation	Agriculture	50	100	50	100	50	100	50	100	200	100
Secondary Occupation	Service	12	24.0	4	8.0	14	28.0	8	16.0	38	19.0
	Business	16	32.0	13	26.0	23	46.0	28	56.0	80	40.0
	Others	13	26.0	31	62.0	1	2.0	0	0	45	22.5
	Nil	9	18.0	2	4.0	12	24.0	14	28.0	37	18.5
	Total	50	100	50	100	50	100	50	100	200	100
Family Size	Up to 4	27	54	20	40	29	58	28	56	104	52
	> 4-6	16	32	26	52	19	38	17	34	78	39
	> 6	7	14	4	8	2	4	5	10	18	9
	Total	50	100	50	100	50	100	50	100	200	100
	Avg.	4.64	-	4.66	-	4.54	-	4.42	-	4.56	-
Poverty Line	APL	9	18	5	10	37	74	23	46	74	37
	BPL	41	82	45	90	13	26	27	54	126	63
	Total	50	100	50	100	50	100	50	100	200	100

majority of the respondents are in Below Poverty Line category (63%). Maximum APL category is found in Udaypur village (74%) where as maximum BPL category is found in Sukhadanga village (90%) (Table 2).

Table 3: Farming Experience

		Kamalakantapur		Sukhadanga		Udaypur		Teurhat		Over all	
		N=50		N=50		N=50		N=50		N=200	
		No.	%	No.	%	No.	%	No.	%	No.	%
Farming Experience in years	0-5	2	4	0	0	1	2	5	10	8	4
	> 5-10	1	2	14	28	4	8	0	0	19	9.5
	> 10-15	16	32	12	24	8	16	1	2	37	18.5
	> 15-20	14	28	12	24	16	32	3	6	45	22.5
	> 20	17	34	12	24	21	42	41	82	91	45.5
	Total	50	100	50	100	50	100	50	100	200	100
	Max.	45	-	35	-	45	-	55	-	55	-
	Min.	5	-	6	-	4	-	3	-	3	-
	Avg.	21.3	-	16.8	-	20.8	-	33.5	-	23.1	-

3.3 Farming Experience

Number of farming experience of the respondents has categories into five, *i.e.*, i) 0-5 years, ii) > 5-10 years, iii) > 10-15 years, iv) > 15-20 years and v) > 20 years. It has been observed that majority (68%) of the farmers having farming experience of more than 15 years. In Teurhat village, maximum farmers (82%) having faming of more than 20 years. Range of farming experience is between 3-55 years, which also found in Teurhat village. Average farming experience is having 23.1 years (Table 3) which is an important component in practicing BBFS by understanding the soil, climate, agriculture of the area.

3.4 Land Holding

Average land holding of the respondents has been found as 1.89 acres of land which is highest in Udaypur (2.41 acres) followed by Teurhat (2.32 acres). In case of BBFS on an average 0.57 acre of land is under BBFS, which 30.24% of total land. In case of Udaypur village 39.42 % of total land is under BBFS, followed by Sukhadanga, 33.03% of total land (Table 4).

Table 4: Average land holding: Traditional vs. BBFS land holding

Landholding (acre)	Kamalakantapur		Sukhadanga		Udaypur		Teurhat		Overall	
	N=50		N=50		N=50		N=50		N=200	
	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%
Traditional	1.18	73.67	0.81	66.97	1.46	60.58	1.81	78.05	1.32	69.76
BBFS	0.42	26.33	0.40	33.03	0.95	39.42	0.51	21.95	0.57	30.24
Total	1.61	100	1.21	100	2.41	100	2.32	100	1.89	100

3.5 Awareness Regarding BBFS

Awareness of the respondent farmers about BBFS were find out by constructing a four points descriptive rating scale with the response categories of each variables - as "Disagree", "Agree", "Moderately Agree" and "Strongly Agree". Scale has been prepared by associating score 0, 1, 2 & 3 with the degree of agreement of the respondent - as "Disagree", "Agree", "Moderately Agree" and "Strongly Agree" respectively of individual variables. High score will reflect high level of awareness and reverse in case reflecting lack of awareness.

Item wise sores of the respondent farmers have been depicted in details in Table 5. Maximum score has been shown in item 'BBFS is having good quality product' followed by the item 'BBFS is having highly profitable' showing total score of 555 and 533 and mean score of 2.78 and 2.67 respectively. Means people are aware about those statements. About 77.5% people strongly agree while rest moderately agree that product of BBFS is having good in quality. Similarly, 67% people strongly agree while rest moderately agrees that BBFS is having highly profitable. In case of price premium of BBFS product, maximum people (67.5%) disagree having lowest score of 200 and mean score of 1.00. Similarly, in case of the item 'BBFS is having minimum production risk' and 'BBFS is having high employment potential' is also having the lower score of 355 and 422 and mean score of 1.78 and 2.11 respectively.

Table 5: Awareness scale of the respondent farmers by scores

Sl. No.	Statements about BBFS : 'BBFS is having…'	Agree						Disagree		Total Score	Mean Score
		Strong		Moderate		Low					
		No	%	No	%	No	%	No	%		
1	Highly profitable	133	66.5	67	33.5	-	-	-	-	533	2.67
2	Having Lower recurring cost	67	33.5	111	55.5	22	11	-	-	445	2.23
3	High employment potential	67	33.5	88	44	45	22.5	-	-	422	2.11
4	Minimum Production risk	-	-	155	77.5	45	22.5	-	-	355	1.78
5	Health Beneficial	133	66.5	45	22.5	22	11	-	-	511	2.56
6	Increases consumer demand	44	22	111	55.5	45	22.5	-	-	399	2.00
7	Having Price Premium	-	-	67	33.5	66	33	67	33.5	200	1.00
8	Good Quality Product	155	77.5	45	22.5	-	-	-	-	555	2.78

After adoption of BBFS, acquired knowledge and skill of BBFS used by the respondent farmers in practice, were also tested in two-point scale as "Yes" and "No" and scored as 2 and 1 respectively. Scoring will reflect the level of awareness on individual item of BBFS. Details of the item wise score have been given in Table 6.

Items like crop rotation, soil testing, seed treatment, use of medicine, bio-fertiliser, green manure, recommended package of practice (POP) and no use of synthetic medicine have been considered for the study to know the awareness level for BBFS practice. 'Use of green manure' and 'use of vermicompost' are having maximum score of 382 and 368 while maximum mean scores are 1.91 and 1.84 respectively. Means respondents are aware regarding 'use of green manure' and 'use of vermicompost'. In contrary, 'use of bio-medicine' and 'no use of synthetic medicine (BGYR colour)' are having lowest score like 316 and 317 and mean score of 1.58 and 1.59 respectively. Means respondents are reluctant regarding 'use of bio-medicine' 'no use of synthetic medicine.

Similar works were done by Sullivan *et al*. (1996) for comparison of beliefs and attitudes between the conventional and organic farmers. The appreciations of nature by the organic farmers are better than that of conventional farmers. Study done by Midmore *et al*. (2001) was similar in nature by introducing five point Likert scale was ('strong agreement', 'agreement, and 'disagreement', strong disagreement' and 'don't know) to analyze the perceptual barriers of farmers' attitudes toward conversion to organic farming. Strongly believed majority

Table 6: Awareness scale of BBFS practice of the respondent farmers by scores

Sl. No.	Item	No	%	Yes	%	Total Score	Mean Score
1	Crop Rotation	57	28.5	143	71.5	343	1.72
2	Soil Test	86	43	114	57	314	1.57
3	Seed Treatment	45	22.5	155	77.5	355	1.78
4	Bio-Medicine Use	84	42	116	58	316	1.58
5	Bio-Fertiliser use	36	18	164	82	364	1.82
6	Green Manure use	18	9	182	91	382	1.91
7	Vermicompost use	32	23	168	77	368	1.84
8	Use of recommended POP	63	31.5	137	68.5	337	1.69
9	No. Use of synthetic medicine (BGYR colour)	83	41.5	117	58.5	317	1.59

(80%) of the farmers that 'organic farming is kinder to the environment'. Study by Deshmukh *et al.* (2015) reveals that farmers are getting price premium for organic products than that of conventional products which is influencing farmers for shifting towards bio-based agriculture.

4. Conclusion

Further details study is needed for replication of Bio-based Farming System (BBFS) by increasing the awareness level of the BBFS adopting farmers. Present Govt., of India as implemented Paramparagat Krishi Vikas Yojona (PKVY), which is also implementing in different parts of West Bengal as well as southern west Bengal which is a group awareness approach.

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