

## CONSTRAINTS OF BIO-BASED FARMING SYSTEM: A STUDY IN HOOGHLY & SOUTH 24 PARGANAS DISTRICTS OF SOUTH WEST BENGAL

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### KEYWORDS:

Bio-Based Farming System (BBFS), LEISA, Synthetic, Sustainable agriculture

### ARTICLE INFO

#### Received on:

16.05.2020

#### Revised on:

26.06.2020

#### Accepted on:

27.06.2020

### ABSTRACT

To cater the demand for rapidly growing population, Indian agriculture was mainly based on synthetic based modern agriculture. In spite of drastic positive change, this chemical-based agriculture was highly criticized from environmental point of view. Organic farming, low external input and sustainable agriculture (LEISA), Bio-Based Farming System (BBFS), bio-dynamic farming etc. are some of the practices having same objectives being practiced in developed and developing countries, recognized as the best alternatives to conventional chemical farming. The growing demand for non-chemical agriculture are in top priority for maintaining soil fertility as well as soil health for sustainable agricultural production. Farmers practicing organic farming are facing constraints during conversion from chemical base to non-chemical agriculture: like non-availability of readymade input output markets, absence of skill, awareness, price premium etc. The idea of this present study has been conceived with the objectives of building authentic database regarding demographic profile of the farmers, practicing bio-based farming system and constraints they are facing while practicing this in South West Bengal. Randomly selected two districts of south West Bengal, from which, two blocks also have been randomly selected. Two villages have been purposively selected and then 50 farmers from each village (total 100 farmers) have been selected from those two blocks. Results showed seventeen constraints and while ranking those constraints – ‘Lacking of Price advantage’ and ‘Lower profitability’ have scored the maximum reflecting the maximum constraints as faced by the BBFS practicing farmers. More study is needed for generalization of these constraints of bio-based farming.

### INTRODUCTION

Identification of appropriate technologies for organic related farming is the major priorities to mitigate the crisis of synthetic base agriculture and degradation of natural resources. This will ensure food security, restore ecological balance and ensure and enhance sustainable farming system. The strategy of organic farming is to protect and sustain the livelihoods of resource poor farmers who are experiencing production constraints, from various angles, due to excessive use of farm inputs and problems created by soil erosion and moisture stress. These faced constraints may be the major pivotal factors for promotions of non-chemical farming systems like Bio-Based Farming Systems (BBFS).

In 1992 in India, M.S. Swaminathan Research Foundation first used Bio-Based Farming System (BBFS) with technical assistance and funding from Govt. of India and the

International Fund for Agricultural Development (IFAD) and Food and Agricultural Organization (FAO), the United Nations Development Programme (UNDP). This has been described as ‘pro-nature and pro-poor’ collaborative effort and development programme. This BBFS is a model for rural development provides an alternative as it pays concurrent attention to natural resource conservation, productivity improvement and poverty eradication with the strategy of promoting sustainable agricultural development, improved nutrition and food security (FAO, 1998).

The idea of organic farming was primarily developed by Stienner 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, low 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 resources. India has become the 9<sup>th</sup> country of the world having largest areas of organic agricultural land of 1.8 million hectare and third country of the world with highest increase of organic farm land of 460,000 in 2014-15 (FiBL Survey, 2017).

While practicing the organic farming, particularly in the transition period, farmers are facing numbers of constraints without knowing the process of mitigating these. The present study is an attempt to investigate the constraints and the ranking of those constraints facing by the farmers practicing bio-based farming system (BBFS) with the following objectives: To study the socio economic conditions of the area, to identify the constraints faced by the farmers while practicing Bio-Based Farming System (BBFS) and Ranking of identified constraints.

Midmore *et al.* (2001) investigated with 1240 respondent farms in England about the perceptual barriers of farmers' attitudes toward conversion to organic farming over time. Study was carried out with five point Likert scale to investigate the perceptual barriers of farmers' attitudes. In 2008, Edeogbon *et al.* also did similar type of study in Edo, Nigeria with 96 respondents by using 4-point Likert scale. 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'. Amarnath *et al.* (2012), in the study 'An Economic analysis of organic farming' identified the constraints of organic growers in the productivity of organic turmeric and organic cotton through Garrett's Ranking Techniques and converting these percentage positions estimated were into scores through Garrett's table. The higher the mean value of the attributes, the higher the importance. Biswas (2014) has made an attempt to examine the extent of organic farming by identifying the constraints and ranking them through four-point scoring pattern and Rank Based Quotient (RBQ) technique. Then the constraints were categorized into four categories as i) socio-economic, ii) infrastructural, iii) environmental and iv) situational. Padel (2001) assessed and reviewed number of studies of organic farmers carried out in several countries over a period of about 20 years to fit the framework of adoption of organic into farming community. Potential barriers to organic farming were access to information, access to markets, problems of farm structures including availability of necessary organic inputs, problems with

landlords and banks, and technical problems. Complexity and need for whole system change, higher risk, economic disadvantage, incompatibility with other aspects of farming system are also the rationale choice of non-adoption of organic farming. Organic farming is complex system and the conversion to organic management affects the whole farming system. Organic farming could be tried in a small section of land like vegetable garden and then farmers can go for conversion after gaining some experience of this new technique. Trying to part of a land for organic farming can lead to difficulties because of complexity of the system and this will not show the potentiality of crop performance which may lead to economically non-viable and organic certification will not allow certification of small patch of land. In most cases, during conversion period, organic farming is costly. There are also cases after conversion period, farmers achieve better financial return through price premium, government support through conversion aid and organic farming subsidy programme. Bello (2008) discussed the issues related to the problems and prospects of adopting organic farming in development countries. The major problems as faced by the organically produced farms are - lack of technical know-how, lack of market information, certification, organic products are expensive, higher labour inputs for same amount of organic products than conventional products, consumers are not sure about organically produced products. Mohanty *et al.* (2011) studied to identify the major constraints in adopting/developing participatory agri-aquaculture. After listing constraints through SWOT analysis, preferential ranking technique was applied for analyzing the constraints with RBQ values. Lower the mean rank value of the constraints, higher was the severity of the problem with higher RBQ values. Mandal *et al.* (2013) analysed the impact and financial feasibility of land shaping models along with the factors influencing the farmers' behaviour towards adoption of these technologies through Logistic regression model to analyze the probability of adoption of land shaping technology and Rank Based Quotient is applied to rank the constraints for adoption of this technology. Similar study was also done by Babu *et al.* (2017) to analyze the prospects and problems of organic farming in North East (NE) India. Both the problems and potentiality of organic farming in this NE region are vividly mentioned including the SWOT analysis of organic farming.

## MATERIALS AND METHODS

In the present study, the research design has been formulated, keeping the idea in mind, to achieve the objectives of the study. Southern West Bengal has been taken in the present study. Randomly selected two districts of South West Bengal, from which, two blocks have been randomly selected. They are Khanakul-I block of Hooghly district, and Baruipur block of South 24 Pgs district. 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. They are Udaypur village of Hooghly

district and Teurhat village form South 24 Pgs. district. From those two villages, 100 farmers (50 farmers from each village, those how are practicing Bio-Based Farming System) have been purposively selected in the study as sample profile of the study.

The interview schedule was developed to explore the information regarding personal and demographic profile of the study area farmers. A constraints scale of the farmers was prepared to access the constraints as faced by the farmers. A four point descriptive constraints scale was done to know the intensity of the constraints. Agreement / disagreement of the respondents' were categorized as "Strongly Agree", "Moderately Agree", "Agree" and "Disagree", and on each of the items and the scale were

scored as 4,3,2,1 respectively reflecting the level of constraints. Accordingly, total score, mean score and ranking of the constraints faced, were done. The higher the score, the severe the constraints on individual items faced by the farmers practicing BBFS.

#### Data Collection

A thoroughly pre-tested, interview schedule is developed based on extensive literature review, expert consultation and exploration of field studies. The primary data of the study have been collected through -

1. Personal interview
2. Focus Group Discussion and
3. PRA method for the purpose of this study.

#### Study Area

District	Block	Village	Latitude	Longitude
Hooghly	Khanakul-I	Udaypur,	22.691716, North	87.863460 East
South 24 Pgs	Baruipur	Teurhat,	22.287769, North	88.496100 East

#### RESULTS AND DISCUSSION

Personal profile of the respondent farmers gained through analysis of surveyed data and the findings were presented below:

#### Profile of the respondent farmers

##### Gender and Age

All the farmers belonged to male category. The age of the respondent farmers was found to be ranged from 23 yrs to 72 yrs. 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 both the villages, Udaypur and Teurhat, more than 50% belonged to higher age group i.e. 56% and 60 % respectively. Overall average of the respondents' is 51.99 yrs. The respondents belonged to middle age group (35%) and higher age group category (58%) contributing maximum 93 % of the total respondents (Table -1). The total number of respondents and the sum of percentage of individual categories are same as 100, that is why, separate percentage column is not done in the total column.

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

Baseline characteristics	Udaypur		Teurhat		Total	
	N=50		N=50		N=100	
	No.	%	No.	%	No. and %	
Gender	M	50	100	50	100	
	F	-	-	-	-	
	Total	50	100	50	100	
Age	18 - 35	3	6	4	8	7
	>35-50	19	38	16	32	35
	>50	28	56	30	60	58
	Total	50	100	50	100	100
	Avj.	51.62		52.36		51.99
Year of Education	Up to 4	0	0	6	12	6
	>4 - 8	5	10	30	60	35
	>8 - 10	21	42	7	14	28
	>10-12	16	32	2	4	18
	>12	8	16	5	10	13
	Total	50	100	50	100	100
	Max.	23	-	18	-	23
	Min.	7	-	2	-	2
Av.	11.16	-	8.06	-	9.62	
Caste	Gen	47	94	2	4	49
	SC	2	4	48	96	50

Baseline characteristics	Udaypur		Teurhat		Total
	N=50		N=50		N=100
	No.	%	No.	%	No. and %
ST	-	-	-	-	0
OBC	1	2	-	-	1
Total	50	100	50	100	100
Religion	Hindu	50	100	50	100
	Others	-	-	-	-
	Total	50	100	50	100

### 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 - 2 years and v) >12 years. Maximum respondents (63%) having >4 – 8 years (35%) and 8 – 10 years (28%) of education. Both average year of education (11.16 years) and higher education (16%) are maximum in case Udaypur village in comparison to Teurhat village. In Udaypur, maximum respondents (42%) belong to >8 – 10 yrs, education, where as in Teurhat maximum farmers (60%) belong to >4 – 8 yrs. education.

### Caste and Religion

Four categories of castes 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 general caste is in majority in Udaypur village (94%) where as scheduled caste are in majority (96%) Teurhat village. All the respondent farmers belonged to Hindu category (Table -1).

### Occupation, Family Size APL-BPL

#### 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 51% respondent having business as secondary occupation on an average and maximum (56%) in case of Teurhat village (Table 2).

**Table 2: Occupation, family size and APL-BPL**

Baseline characteristics		Udaypur		Teurhat		Total
		N=50		N=50		N=100
		No.	%	No.	%	No. and %
Primary Occupation	Agriculture	50	100	50	100	100
	Service	14	28.0	8	16.0	22
	Business	23	46.0	28	56.0	51
Secondary Occupation	Others	1	2.0	0	0	1
	Nil	12	24.0	14	28.0	26
	Total	50	100	50	100	100
Family Size	Up to 4	29	58	28	56	57
	>4- 6	19	38	17	34	36
	>6	2	4	5	10	7
	Total	50	100	50	100	100
	Av.	4.54		4.42		4.48
Poverty Line	APL	37	74	23	46	60
	BPL	13	26	27	54	40
	Total	50	100	50	100	100

### Household size & APL-BPL

Overall average household size of the respondent farmers is 4.48 and it ranges from 1 member to 13 members in Teurhat and Udaypur village respectively. Regarding poverty line, majority of the respondents are in Above Poverty Line category (60%). Maximum APL category is found in Udaypur village (74%) where as maximum BPL category is found in Teurhat village (54%) (Table-2).

### 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 (62%) of the farmers having farming experience of more than 20 years. In Teurhat village, maximum farmers (82%) having farming 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 27.15 years (Table-3) which is an

important component in practicing BBFS for understanding the soil, climate, agriculture of the area.

**Table 3: Farming Experience**

Yrs.	Villages	Udaypur		Teurhat		Over all
		N=50		N=50		N=100
		No.	%	No.	%	No. and %
	0-5	1	2	5	10	6
	>5-10	4	8	0	0	4
	>10-15	8	16	1	2	9
	>15-20	16	32	3	6	19
	>20	21	42	41	82	62
	Total	50	100	50	100	100
	Max.	45	-	55	-	55
	Min.	4	-	3	-	3
	Av.	20.8	-	33.5	-	27.15

#### Land holding

Average land holding of the respondents has been found as 1.19 acres of land which is highest in Udaypur (2.41 acres) followed by Teurhat (2.32 acres). Out of total land holding, farmers using majority of land in traditional farming i.e.

69.32%. Average land holding is higher in Teurhat village (2.32 acre) in comparison to Udaypur (2.41acre) In case of BBFS on an average 0.73 acre of land is under BBFS, which 30.69% of total land (Table-4).

**Table 4: Average land holding: Traditional Vs. BBFS land holding**

Landholding (acre)	Udaypur		Teurhat		Over all	
	N=50		N=50		N=100	
	Avj.	%	Avj.	%	Avj.	%
Traditional	1.46	60.58	1.81	78.05	1.64	69.32
BBFS	0.95	39.42	0.51	21.95	0.73	30.69
Total	2.41	100	2.32	100	1.19	100

#### Constraints of BBFS

Constraints faced by the respondent farmers, while practicing BBFS, were listed out during primary survey through Focus Group Discussion and PRA method. A total of seventeen constraints have been found out. They are i) High cost of organic inputs, ii) Non-availability of organic inputs, iii) Poor Quality Organic Inputs, iv) Non-availability of suitable land, v) Inconvenience of organic techniques, vi) Lacking of price advantage for organic products, vii) Lower yield from BBFS, viii) Lower profitability from BBFS, ix) Lack of market for organic products, x) Lack of experience on organic farming, xi) More recurring cost for BBFS inputs, xii) Higher production risk, xiii) Not aware about BBFS, xiv) Lack of training on organic practices, xv) Lower employment potentiality, xvi) No scope of Organic Farming and xvii) Small holding size for practicing BBFS. Scaling of the constraints were find out by constructing a four-point descriptive constraints scale to know the severity of the constraints faced by the farmers regarding BBFS. Agreement / disagreement of the respondents' were

categorized as "Strongly Agree", "Moderately Agree", "Agree" and "Disagree", and on each of the items and the scale were scored as 4,3,2,1 respectively reflecting the level of constraints. The higher the score the severe the constraints and reverse in case reflecting the severity. Item wise scores of the respondent farmers have been depicted in details in table No.5. Maximum score has been shown in item 'Lacking of Price advantage' followed by the item 'Lower profitability' showing total score of 330 and 317 and mean score of 3.30 and 3.17 respectively. Means people are not getting price premium of the organic products and this BBFS practice is not profitable. 50% people strongly agree with this constraint of price premium. Similarly, 44% people strongly agree about the constraints of non-profitability. On the other hand 'Lack of training on organic practices', 'Lower yield of BBFS products', 'Not aware regarding BBFS' and 'Lower employment potentiality' are in the lower side of constraints scale having less scores. Details of the item wise scores have been given in Table 5.

**Table 5: Constraints scale of the respondent farmers by scores**

Sl. No.	Constraints of BBFS	No	Low	Medium	High	Total Score	Mean Score	Total	Ranks
1	High cost of organic inputs	15	13	35	37	294	2.94	100	8
2	Non-availability of organic inputs	5	25	35	35	300	3	100	6
3	Poor Quality Organic Inputs	15	25	36	24	269	2.69	100	12
4	Non-availability of suitable land	12	15	25	48	309	3.09	100	3
5	Inconvenience of organic techniques	17	25	40	18	259	2.59	100	13
6	Lacking of price advantage	5	10	35	50	330	3.3	100	1
7	Lower yield	24	33	23	20	239	2.39	100	16
8	Lower profitability	5	17	34	44	317	3.17	100	2
9	Lack of market	9	15	35	41	308	3.08	100	4
10	Lack of experience on organic farming	12	18	27	43	301	3.01	100	5
11	More recurring cost for inputs	12	20	25	43	299	2.99	100	7
12	Higher production risk	15	17	35	33	286	2.86	100	11
13	Not aware	20	25	40	15	250	2.5	100	15
14	Lack of training on organic practices	22	32	35	11	235	2.35	100	17
15	Lower employment potentiality	14	35	30	21	258	2.58	100	14
16	No scope of Organic Farming	13	17	34	36	293	2.93	100	9
17	Small holding size	17	18	24	41	289	2.89	100	10

## CONCLUSION

Non – synthetic farming like bio-dynamic farming, bio-based farming, organic farming, lowexternal input and sustainable agriculture (LEISA) etc. are almost with the same objectives, as some of the alternatives to chemical farming. Further details study, both cross-section and time-series are needed for replication and recommendation of Bio-based Farming System (BBFS) by taking care of the constraints faced by the farmers. Presently, for last few years, Govt. of India as implemented Paramparagat Krishi Vikas Yojona (PKVY), which is also implementing in different parts of India, West Bengal as well as southern west Bengal which is a group approach.

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#### **How to cite this article?**

Debabrata Giri, Bidhan Chandra Roy, Debashis Sarkar and Sourendranath Das. 2020. Constraints of bio-based farming system: a study in Hooghly & South 24 Parganas districts of South West Bengal. *Innovative Farming*, 5(2): 103-109.