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A Socio Economic Evaluation of the Government Initiative to Develop Agribusiness Based on Organic Farming in Respect of Sustainable Development in West Bengal

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ABSTRACT

At present Indian agriculture is shifting from subsistence level agriculture to commercial agriculture. Indian farmers are now transforming from agriculturist to agripreneur. They have to achieve several goals, eg, profit maximisation, sustainability of production, to meet consumers' expectation to have a healthy and poison free food, standard for global market etc. Moreover they have to face ill consequences of several natural disasters. Development of agribusiness based on organic farming is needed. Several government initiatives like PKVY were taken to establish organic farming. The study aims to evaluate extent of adoption of organic farming in the studied clusters of PKVY at Magrahat1 and Pathar Pratima block of South 24 Parganas. The study reveals that organic farming in vegetable is not adopted at all due to lack of implementation of plant protection measures and lack of receiving premium price. Organic farming is suitable for scented rice and folk rice. This is also proved to be suitable as protective measures against several natural disasters. Establishment of organised market linkages between organic producers and organic buyers is needed to make organic farming successful.

Key Words : Agripreneure. Agribusiness, Cost A1, Net return overcost A1, Organic Farming,

Introduction :

Now a days agriculture of the state is at the juncture of the two regimes. Earlier farmers carry on the farming as the means of their family's subsistence. Agriculture was their only livelihood to have their food, clothing etc. basic needs. This stage of agriculture is called subsistence level agriculture, which is characterized by low productivity, low production and low income. Recent magical development of agricultural technology causes a big leap in production, productivity as well as farm income. New younger generations of farming community are more well-off and educated than their predecessors, as they are more aspirant and eager to earn more to meet their higher standard of living.

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Therefore, goal of the present agriculture has been shifted from subsistence agriculture to commercial agriculture. Here farming is now known as agripreneurship. Farmers of now a days are called agripreneur, ie, Agri + Entrepreneur and their objective is not only to maximise food production but also to maximise profit. Therefore, they have to allocate their scarce resources rationally so that they get optimum output. Profit seeking farmers are now following market signals to attain their goals and to choose their crops to produce. Thus the path of commercial agriculture has been paved. They are now giving priority to the consumers' choice. Consumers of affluent society of the cities are now more concerned about healthy and pesticide residue free foods, low calorie foods. Moreover, global markets are now more accessible to the Indian farmers during post globalisation periods. Organically grown foods are more suitable for export. Therefore new techniques of growing food, like organic farming etc are getting more importance than the chemical based farming. Moreover, our environmental issues like global warming are throwing challenges to the modern agriculture. Agriculture is the means of livelihood, which manipulates several natural biotic and abiotic resources to get good crop yields. Agriculture is the most vulnerable to the different natural consequences and natural disasters, which should be avoided to reduce production instability. Moreover, soil fertility and bio diversity within the crop fields are gradually degrading due to intensive and unbalanced use of chemical fertilisers and pesticides. We are gradually losing agro-ecological services rendered by several defenders of the crops. Intensified use of high yielding variety /Hybrid seeds causes loss of crop biodiversity. Traditional varieties are also well suited with local environment and also may be used for diversified purposes. Organic farming may be one of the solutions to cope challenges coming from natural disasters and to sustain crop yield. Success of organic farming depends on availability of market facilities. Therefore agribusiness related to organic farming needed to be supported.

John Davis and Rav Gold Berg both defined agribusiness as the sum total of all operations involved in the manufacture, and distributions of farm supplies; production operations on the farm; and the storage, processing and distribution of the resulting farm commodities and inputs. Therefore to develop agribusiness of organic farming means all round development as stated above. Inputs suited for organic farming is needed to be available. Marketing channels of the organic produce as well as transport, storage etc facilities are needed to be established. Hence government intervention is needed to facilitate the farmers to have several technical training, conversion the land to fit for organic farming. Government also facilitates the farmers regarding certification of organic produce. Several government schemes like "Bio village" under RKVY, Paramparagat Krishi Vikash Yojona (PKVY) were introduced to establish organic farming.

Organic Farming in India and West Bengal :

Indian government has given emphasis to grow organic farming. India occupies 2.59% to the land cultivated organically in the world. Total land under organic farming

in India is 1.5 Million hectare (Willer *et al.*, 2021). Government of India recently launched National Programme for Organic Production (NPOP) to monitor certification process, to set standard for organic production.

West Bengal occupies 21003 hectares of land under organic cultivation during 2020-21 (APEDA, 2021). Around 37% of organic production in West Bengal was exported to the different countries through APEDA and rest are consumed domestically. West Bengal has good potential to increase the organic production particularly nonbasmati scented rice, pulses and vegetables. Several scented rice, like *Radhunipagal, Kalonunia, Tulaipanji , Gobindo Bhog , Kanak Chur, Dadshal* etc are getting importance in export markets.In this regard The Parliamentary Committee led by Mr Shanta Kumar expressed their observation that India produces some fine quality non-Basmati varieties also such as *Sona Masuri, Matta, Ponni, Gobindobhog and Tulaipanji* etc . These varieties are very good quality rice and are bound to be appreciated by International buyers.

Paramparagat Krishi VikashYojona :

This is a flagship central sector project under Major project NMSA. It was introduced in this state during 2015-16 with the aim of establishing 120 nos. of farmers clusters, aggregating 6000 acre @50 acre each. It is based on cluster approach of the farmers, who are included in the demarcated 50acre.Here certification programme is based on Participatory Guarantee Scheme. Lead Resource Person (LRP) is the in-charge of the cluster, who himself is a participant farmers and also supervise the entire project. Checking and monitoring are done by each neighbour farmers. Any farmer, breaking the norms is checked by others. Therefore, cost of certification is less than individual farmer interested in organic farming. Conversion period from inorganic to organic is three years. After three years he will get certificate of organic farming. During first two years assistance will be given for conversion to organic, establishment of traditional organic input production, planting of *Gliricidia, Sesbania* etc, setting up of botanical extract production, distribution of bio pesticides and bio fertilisers, setting up of vermicompost production unit. During the 3rd year assistance for marketing arrangement, certification arrangement is provided.

Aim of Paramparagat Krishi Vikash Yojona :

- Development of organic village through on-farm Natural Resource Management for sustainable and chemical residue free agriculture production.
- Reduction of dependency on fertilisers and agro-chemicals.
- To promote commercial production under organic concept.
- Expansion of area under organic cultivation through PGS certification for development of organic market source for the benefit of farmers.

Previous attempts of agribusiness :

Das *et al.* (2021) studied empirically on 'Agri business opportunities of organic agriculture in West Bengal' . They selected 80 farmers from three villages of Kakdwip,

Pathar Pratima and Baruipur Blocks purposefully who were following organic farming during January to June, 2020. Data was collected from semi structured interview schedule of Google Form and disseminated by email, whatsapp. The study reveals that organic farming is getting gradually importance among farmers of West Bengal. Farmers were growing organic paddy and organic vegetable. Farmers are receiving higher prices even in local market selling aromatic rice produced organically. But profitability in case of organically produced vegetable is less. No price discrimination is found among organically produced vegetables and chemically produced vegetables, moreover loss of yield is higher in organically produced vegetables than chemically produced vegetables. Study reveals that consumers are interested to pay premium price for healthy organically produced commodities. Promotion of aromatic rice varieties along with branding and packaging would be profitable. Ensuring premium price for to the quality rice and market linkage can be helpful and essential for promotion of organic farming. Government may play vital role in this regard. Training on bio pesticides, bio fertilisers ,pest management is needed.

Biswas *et al.* (2011), a team of Agro-Economic Research Centre, Biswa Bharati studied impacts and constraints of organic farming in West Bengal. Two villages from each of Barasat-1 and Baduria Block of North 24 Parganas and two villages from each of Kalchini and Jalpaiguri Sadar block of Jalpaiguri district were selected for study purposefully. 30 farmers i.e., 15 each from organic and inorganic has been selected from each village based on simple random sampling. Total 120 farmers were selected. Data are collected by personal interview using pretested survey schedule during 2009-2010. The study reveals that has been gradually extended. Economics of organic visavis inorganic farming for six vegetable crops studied. Production in organic area was lower than inorganic area. Prices were high where NGOs arranged organised buyers, otherwise farmers are not getting higher price. But higher prices to cover higher cost of production of organic produce are needed to ensure sustenance of organic farming. The study identifies several constraints, e.g., unavailability of organic inputs, low yield, lack of market, no price advantage of organic produce, lack of training of organic production. The study suggests several policy measures, e.g; formation of FPO for increasing collective bargaining, Awareness and training programme at regular interval, training on IPM, extended credit facilities through KCC, Tax exemption of organic produce, government intervention on market linkage.

Keeping all these backgrounds in mind the objective of the Study is framed as :

1. To study present position of the organic farming after completion of scheme PKVY.
2. To study extent of adoption of the organic farming after completion of scheme.
3. To evaluate comparative economics between crops cultivated using organic farming and using chemicals.
4. To identify the crop suitable for organic farming.

Materials and Methods :

An attempt has been made to evaluate PKVY scheme after few years of completion of the scheme. The scheme started on 2015-16 and executed upto 2018-19. Here scheme period is 2015-2019. Post scheme period means 2021-2022. Two farmers' clusters from each block, eg, Magrahat1 and Patharpratima are selected purposefully. Name of the clusters of Magrahat1 block are Deula Farmers' organisation and Ujilberia Farmers' organisation and name of the clusters of Patharpratima Block are Ramakrishna Farmers' Organisation and Kalpataru Farmers' Organisation. Each cluster contains 50 farmers and 50 acre (20hactare) land as per scheme specification. Farmers are met cluster wise for Rapid Rural Appraisal at the common place of the villages. Several information is collected after group discussion among the farmers. Apart from that 50nos of farmers are selected randomly from all clusters of Magrahat1 Block and Patharpratima. Data regarding cost of cultivation are collected by preparing pretested schedule from these selected clusters. Moreover office record of the Assistant Director of Agriculture (ADMN) is used for study related to scheme period.

Concepts Used :

Cost of cultivation has been enumerated for organic crops and inorganic crops. Following costs are enumerated.

Cost A1 : Cost of labour, fertilisers, pesticides etc cash expenses.

Cost A 2 : CostA1 + Rent of the leased land

Here all the farmers are land owner, therefore rent of the leased land=0 and CostA1=CostA2

Statistical Tests :

To determine degree of association between adoption of organic farming and time lag after completion of scheme X^2 (Chi-square) test has been made.

Here H_0= Distribution of land under Organic farming is associated with scheme period and Post scheme period for both Kharif and Rabi. Null hypotheses H_0 is expected to be rejected.

$X^2 = \Sigma (O-E)^2/E$

Here, O = Observed data E = expected data.

Results and Discussion :

Present position of the organic farming after completion of scheme PKVY :

Details of four clusters are given below in Table1 reveals that the clusters of Magrahat1 are relatively closer than that of Patharpratima from the city Kolkata. Therefore these two are more suitable for establishment of market linkage rather than clusters of Patharpratima block, which are in deltaic areas. Paikars are sole marketing agents, who purchase output from farmers at local market. There are no specialised buyers for organic output, so no premium prices are offered to the organic producers. No farm gate sale occurs. Farmers bring their produces at local market by van ricksaw in Magrahat1 Block and by van and boat in Patharpratima blocks. Land situation of Magrahat1 is deep and semi deep suited for local paddy varieties , whereas land situation for Pathar Pratima is relatively higher and well drained. Average number of family members is ranging between 5.2 to 4.6 numbers per household. Average number of cattle per family ranges from

1.6 to 2.4. Cattle dung and urine are the chief sources of organic manure. Apart from that several local resources are being converted into organic manures. Vermicompost, Panchamrita, Panchagavya etc are used as organic manure by cluster members of Pathar Pratima. Green Manuring by *Dhaincha* is widely used in all clusters. *Glyricidia* is used as green manure in Patharpratima block. No input dealer is found for organic fertilisers and pesticides. There is dearth in supply of organic pesticides. Neem based pesticides are being prepared locally when needed. Organic farming in these four clusters are based on on- farm natural resource management, which is as per aims of the PKVY as stated above. Organic seeds are procured from previous year crops. Moong seeds could not be procured due to loss caused by *YASH* and *AMPAN*.

Table 2 shows that average land holding size ranges from 0.985 acre to 1.08 acre. It shows that the all farmers belong to small and marginal category. Production is low due to small holding causing low marketing surplus. This will reduce bargaining power of farmers. All participant farmers are land owners.

Extent of adoption of the organic farming after completion of scheme :

Table 3.1 & 3.2 shows period wise and type of cultivation wise cropping pattern for kharif and rabi season for all clusters respectively. Chi-square (X^2) test shows that distribution of *kharif* & *Rabi* crop of land based on organic and inorganic land is significantly depend on scheme is still running or not at 1% level of probability. Table 3.1 Shows that all lands are dedicated to the organic farming during scheme period, i.e., 2015-19 in all clusters. Subseqently the land diverted from organic to inorganic in subsequently during *kharif*. During *rabi* also same pattern followed. Total portion of organic area in *kharif* during scheme period was 100% irrespective of clusters; subsequently which declines ranging between 35% to 52.5%. Still clusters of Patharpratima occupies more than 50% of the land under organic farming. Farmers of PatharPratima states that they relies on organic farming as the Block lies in Deltaic area of Sundarban, so the area is very much prone to the natural calamity and salinity due to ingression of saline water and local paddy varieties are tolerant to the salinity. Apart from that organic manures have buffering capacity to the chemical reaction. Different local varieties cultivated in Organic fields of the studied area are listed in Table 4. Local paddy varieties cultivated with the organic manures sustain better than other HYV varieties. Shift from local varieties and scented rice to inorganically cultivated HYV rice in Magrahat1 is due to the higher yield and home consumption. Scented rice and local paddy varieties are cultivated organically. Due to aroma and fineness of the grain scented rice and fine local varieties earn higher prices even in local market. “Chaitee Moong” - a local variety suited well in organic situation in *rabi* season are predominant in rabi cropping programme. Moong seeds could not be procured from the field in the last two years due to untimely rain during January-February and thus causes no moong area in Magrahat1 block due to its deeper topography. Reliable organic seeds are not available in marketing channel. It is very hard to protect vegetable by organic means

from different insects and pests as per version of organic farmers. Therefore, they did not adopt organic farming in vegetable cultivation.

Table 5 shows distribution of farmers as per period wise and type of cultivation wise. The study reveals that farmers associated with the scheme is diverting from organic cultivation as scheme is withdrawn. Still farmers of two clusters of Pathar Pratima are more adhering organic farming than the famers of clusters of Mathurapur1. Reasons are mentioned in above table.

In support of discontinuance of organic farming, farmers explains that after completion of scheme, **Participatory Guarantee Scheme of certification** was also withdrawn. Due to non-issuing of certificate for organic produce, receiving of premium price was stopped. So advantage of organic farming over chemical farming was stopped. Secondly lack of organised market farmers were bound to sell at local market, where no price discrimination was followed in favour of organic farming. Due to lack of suitable pest management technique for organic farming, it is tough to control pest of vegetables successfully. Hence vegetable farmers discontinued organic production. But farmers received better price for scented rice and fine local paddy varieties which can be grown successfully by adopting organic production, than HYV paddy varieties

Evaluation of Comparative Economics between Organic farming and Chemical Farming :

Table 6 shows comparative cost, price and revenue study of different organically and chemically grown crops in the studied areas. The study reveals that traditional varieties of scented rice, folk rice like Dudheswar and Moong are grown organically successfully. Even after withdrawal of advantages given to the cultivators through different scheme components scented rice, folk rice like Dudheswar and folk pulse variety Chaitee moong of South 24 Parganas reap better price due to their aroma, texture of grains. Even local buyers purchase these varieties at higher prices. Respondent farmers of scented rice informed that installation of rice mill with rubber huller would be fruitful for fetching better values. Organic farming in vegetables would be successful if technology on Integrated Pest Management was available at farmer's field. Secondly premium price of organic produce available effectively after completion of scheme too. Thirdly efficient marketing channel is to be established to link organic buyers and organic producers.

Conclusion :

At present, Indian agriculture is shifting from subsistence level agriculture to commercial agriculture. Indian farmers are now transforming from agriculturist to agripreneur. Economic scenario of the country has changed considerably, causing change of income and change of taste and preferences. In this situation, Indian farmers' motto is not only profit maximisation, but also objectives like, meet up consumers' expectation regarding healthy poison free foods as well as they have to consider sustainability of the production, so that fertility, several agro-ecological services remain intact for future generations. Moreover, our environment are becoming fragile and occurrences of

natural disasters are more frequent. Organic farming may be solution to meet all these objectives.

Government has taken several initiatives to introduce organic farming in this state, which have been already executed. Now it is to verify these experiences to evaluate it's prospects and constraints. Two literatures are reviewed.

Das *et al.* (2021) studied empirically on 'Agri business opportunities of organic agriculture in West Bengal'. They found out that the organic paddy, especially aromatic rice varieties are receiving higher price with respect to organic vegetable. Promotion of aromatic rice varieties along with branding and packaging would be profitable. Ensuring premium price for to the quality rice and market linkage can be helpful and essential for promotion of organic farming. Government may play vital role in this regard. Training on bio pesticides, bio fertilisers, pest management is needed.

Biswas *et al.* (2011), a team of Agro-Economic Research Centre, Biswa Bharati studied impacts and constraints of organic farming. The study reveals that organic farming has been gradually extended in studied areas. Economics of organic *vis a vis* inorganic farming for six vegetable crops studied. Production in organic area was lower than inorganic area. Prices were high where NGOs arranged organised buyers, otherwise farmers are not getting higher price. But higher prices to cover higher cost of production of organic produce are needed to ensure sustenance of organic farming. The study identifies several constraints, e.g., unavailability of organic inputs, low yield, lack of market, no price advantage of organic produce, lack of training of organic production.

In this present study the government initiative of the Paramparagat Krishi Vikas Yojona has been reviewed. Four Clusters were selected, two each from Magrahat1 Block and PatharPratima block. All farmers of these four clusters are resource poor small and marginal farmers. Source of organic inputs are all on-farm which is fit with the aim of the objective of the PKVY. Average no of cattle is ranging from 1.8 to 2.4 per family. These cattles are one of the chief sources of organic manures. No external organic sources are found. The farmers sold their organic output to the paikars at local market. No organised organic produced markets are not available after scheme period. Farmers of the clusters do not get premium price to their produces. This study also endorsed by Das *et al.*

A study has been made regarding extent of adoption of organic farming after completion of scheme. The study reveals that the lands allocated for organic farming are gradually shifted to the chemical-based farming as they did earlier for both kharif and rabi. Farmers of all clusters refuted organic farming in case of vegetable. Observation of Das *et al* (2011) also narrates identical results. Vegetable is very much prone to sucking insects, which is difficult to control with the organic means and thus causing reduction of yield. Das *et al* (2011) studied that demand for healthy organic vegetable is higher to the urban consumers and they are willing to pay premium price for organic vegetables. Therefore, efficient marketing channel is to be established to link organic buyers and

organic producers. Intensive long duration on farm training on integrated pest management is needed to reduce use of unnecessary pesticides application or rely and promotion of natural pesticides. Farmers may be trained to rear different defenders in their homestead and to isolate several beneficial microbes from local soil . This will genuinely open new opportunity of organic input based agri-business. The study reveals that input dealership selling bio fertilisers and bio pesticides is absent at village level. This attempt will surely bridge the gaps.

The study also reveals that the shift of organic farming for Scented rice and fine folk rice is less. Cost and revenue study shows that the net return over cost A1 is higher in case of scented rice and folk rice. The farmers cultivating scented rice receives better price even in local markets, but there is ample scope to organise scented rice growers under farmers producers organisations, which will be able to accumulate all farmers' produce in one place. Rice Mills with rubber hullers will be installed under those Farmers' Producers Organisation (FPO) and thus it will be capable to process scented rice minimising broken rice. This FPOs may be connected with SUFAL Bangla , a government marketing initiatives to reach final consumers. This will ensure better producer's share in consumers rupee. Share of organic farming is higher in the clusters of PatharPratima than the clusters of Magrahat1 block. Patharpratima is a Sundarban block and most susceptible to natural disaster. Therefore organic farming is effective to protect agro biodiversity and to minimise production uncertainty. An initiative to establish agribusiness based on organic farming is to be formulated. Thus, sustainable development through agribusiness may be achieved.

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Table 1. Details of Farmers clusters

	Name of Farmers' Clusters			
Description	Deula FO	Ugilberia FO	Ramkrishna FO	Kalpataru FO
Village	Deula	Ugilberia	RakshasKhali	Rakshaskhali
Block	Magrahat1	Magrahat1	PatharPratima	Patharpratima
Distance from Kolkata(Km)	45	47	86	86
Total Cultivated Land unerOrganic(Ha)	20	20	20	20
Total No of Farmers	50	50	50	50
Land Ownership	Owned	Owned	Owned	Owned
Name of LRP	Raju Bar	Chand Bar	Ashok Pradhan	Dipesh Bera
Ave No of Family Member	5.2	4.7	4.8	4.6
Ave No of Cattle	1.6	1.8	2.3	2.4
Nearest local market	Deula/Usthi	Deula/Usthi	Roydighi/Ramganga/ Kakdwip	Roydighi/Ramganga/ Kakdwip
Marketing Agent purchasing output	Paikar	Paikar	Paikar	Paikar
Transport to carry output to Local Market	Van ricksaw	Van ricksaw	Van &Boat	Van &boat
Input Dealer organic	Nil	Nil	Nil	Nil
Input Dealer Inorganic	2	2	1	1
Source of Organic Fertilisers	Cowdung Manure, FYM, Compost of Kachuri Pana and other water weeds, Oilcake	Cowdung Manure, FYM, Compost of Kachuri Pana and other water weeds, Oilcake	Cowdung Manure, Vermicompost, FYM, Panchagabya, Dosamrita, Compost, Compost of Kachuripana and other water weeds	Cowdung Manure, Vermicompost, FYM, Panchagabya, Dosamrita, Compost, Compost of Kachuripana and other water weeds
Green Manuring	Dhaincha	Dhaincha	Dhaincha and Glyricidia	Dhaincha and Glyricidia
Organic Pesticides	Nil	Nil	Occasionally Neembased and Dasamrita	Neembased and Dasamrita
Organic seeds	Seeds of previous crops	Seeds of previous crops	Seeds of previous crops	Seeds of previous crops

Table 2. Distribution of Farmers according to Land holding size class (in acre)

	Name of Farmers' Clusters			
Land Holding size class	Deula FO	Ugilberia FO	Ramkrishna FO	Kalpataru FO
<0.5 acre	5	6	4	4
0.5-1 acre	20	22	24	18
1-1.5 acre	17	15	13	20
1.5-2 acre	5	6	7	6
>2acre	3	1	2	2
Total	50	50	50	50
Average holding	1.045	0.985	1.03	1.08

Table 3.1. Period wise and type of cultivation wise cropping pattern for *kharif* season of different clusters

Period	Name of Clusters	Type of cultivation										
		Organic					Inorganic					
		Scented Rice (Local)	Local (others)	HIV	Kharif Vege-table	Total Kharif (O)	Scented Rice (Local)	Local (others)	HIV	Kharif Vege-table	Total Kharif (O)	Total Land
Scheme period	Deula	13.5 (67.5)	2.2 (11.0)	0	4.3 (21.5)	20 (100)	0	0	0	0	0	20 (100)
	Ugelberia	14.3 (71.5)	1.7 (8,5)	0	4(20)	20 (100)	0	0	0	0	0	20 (100)
	Ramkrishna	12.8 (64.0)	2(10)	0	5.2 (26)	20 (100)	0	0	0	0	0	20 (100)
	Kalpataru	15.1 (75.5)	2.1 (10.5)	0	2.8 (14)	20 (100)	0	0	0	0	0	20 (100)
Post scheme Period	Deula	6(30)	1(5)	0	0	7 (35)	0	0	8.2 (41)	4.8 (24)	13 (65)	20 (100)
	Ugelberia	6.3 (31.5)	2(10)	0	0	8.3 (41.5)	0	1(5)	6.5 (32.5)	4.2 (21)	11.7 (58.5)	20 (100)
	Ramkrishna	7.2 (36)	3(15)	0	0	10.2 (51)	0	0	4 (20)	5.8 (29)	9.8 (49)	20 (100)
	Kalpataru	7.5 (37.5)	3.2 (16)	0	0	10.7 (53.5)	0	0	6.5 (32.5)	2.8 (14)	9.3 (46.5)	20 (100)

Area in hectare, Figure in the parentheses indicates percentage to the total land.

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Deula=21.83*

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Ugilberia=33.978*

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Ramkrishna=33.673*

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Kalpataru=33.738*

* Chi-square test is significant at 1% level of probability.

Table 3.2. Periodwise and type of cultivation wise cropping pattern for *rabi* season of different clusters

Period	Name of Clusters	Type of cultivation							
		Organic			Inorganic			Fallow	Total Land
		Moong	Rabi Vegetables	Total Rabi (O)	Moong	Rabi Vegetable	Total Rabi (I)		
Scheme period	Deula	8.5 (42.5)	6.5 (32.5)	15 (75)	0	0	0	5 (25)	20 (100)
	Ugelberia	7.7 (38.5)	5.6 (28)	13.3 (66.5)	0	0	0	6.7 (33.5)	20 (100)
	Ramkrishna	9.5 (47.5)	7.2 (36)	16.7 (83.5)	0	0	0	3.3 (16.5)	20 (100)
	Kalpataru	9(45)	7.5 (37.5)	16.5 (82.5)	0	0	0	3.5 (17.5)	20 (100)
Post scheme Period	Deula	2.5 (12.5)	0	2.5 (12.5)	0	6.5 (32.5)	6.5 (32.5)	11 (55)	20 (100)
	Ugelberia	3 (15)	0	3 (15)	0	7 (35)	7 (35)	10 (50)	20 (100)
	Ramkrishna	9 (45)	0	9 (45)	0	7.2 (36)	7.2 (36)	3.8 (19)	20 (100)
	Kalpataru	9 (45)	0	9 (45)	0	8 (40)	8 (40)	3 (15)	20 (100)

Area in hectare, Figure in the parentheses indicates percentage to the total land.

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Deula=19.35*

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Ugilberia=29.678*

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Ramkrishna=15.373*

$X^2$for 1df for distribution of Organic plots with respect to different scheme period in Kalpataru=14.725*

* Chi-square test is significant at 1% level of probability.

Table 4. Different local varieties cultivated in organic fields of the studied area

Name of the crop	Type	Varieties	Remarks
Paddy	Scented Rice	Gobindobhog, Dadshal, Kanakchur, Harinakhuri	Gobindobhog-scented rice, worldwide popular non Basmati varieties. Dadsal-Excellnt aromatic variety for Payes. Kanakchur;- Aromatic varieties for making Joynagarer Moya.
	Local Rice varieties Fine	Dudhsar, Baskati	Fine long slender rice. Fetches better price.
	Local rice varieties- Coarse	Moule, Malabati, Hamai, Mohan. Kumragor, Kalo Mota, Gheonch, Talmugur, Patnai	Salt tolerant , Popular for making puff rice.
Moong	Local	Chaitee	Fine indigenous variety, most suited for local environment.

Several local crop biodiversity are enlisted in above table can be protected by adopting organic farming.

Table 5. Period wise and type of cultivation wise distribution of farmers of different cluster of study are

Name of Cluster	Period			
	Scheme Period		Post Scheme Period	
	Organic	Inorganic	Organic	Inorganic
Deula	50	0	12	38
Ugilberia	50	0	18	32
Ramkrishna	50	0	22	28
Kalpataru	50	0	24	26
Total	200	0	76	124

Table 6. Price, production, costs, revenue of different organic and inorganic crops produced in the studied area

Type of Cultivation	Crop	Cost of Seed (Rs)	Cost of Pwer Tille	Cost of Labour (Rs)	Cost of Ferttiliser	Cost of Pesticide	Cost A1 (Rs)	Production (Kg)	Price Rs/ Kg	Gross Revenue	Net Revenue over
Organic	Scented Rice	0	1600	6800	0	0	8400	550	40	22000	13600
	Dudherswar	0	1600	6800	0	0	8400	450	35	15750	7350
	Moong	0	800	9000	0	0	9800	300	60	18000	8200
Inorganic	HYV Paddy	300	1600	7100	2000	0	11000	800	25	20000	9000
	Ridge gourd	200	1600	22000	6000	1500	31300	3000	25	75000	43700
	Ladies finger	300	1600	34000	6000	4000	45900	3750	25	93750	47850
	Tomato	300	1600	34500	10000	8000	54400	6500	15	97500	43100

Land = 1 Bigha = .33 acre