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A comparative study on the economic viability of jute production by organic system of farming in West Bengal.

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Abstract

Lower productivity (7.28%) of organic jute associated with higher prime cost of cultivation (11.27%) has made organic growers to earn a net return 20.42 below conventional average. Higher premium prices for organic is not enough to cover the dual set back in yield loss and larger prime cost of organic jute production. But the yield of jute produced by this eco-friendly farming system is marginally greater (1.37%) than that of inorganic managed farms. Higher premium prices along with increased productivity has helped the farmers to realise 9.30% more total return which has not only compensated the 19.76% more prime cost of cultivation, but also held them to obtain a net return of 1.55% above inorganically produced jute. Development of dedicated marketing channel and extensive programme for promotion of products produced from organic jute will ensure higher premium prices is required to incentivise growers to continue and expand area under this sustainable crop production system.

Keywords: Organic, inorganic, conventional, prime cost, yield gap, premium price.

India has achieved self sufficiency in foodgrains production from a severely food shortage country after the introduction of Green revolution generated modern crop production technology embedded with the application of higher doses of fossil- fuelled based chemical fertilizers and plant protection chemicals and irrigations coupled with HYVs of cereals, mostly wheat during mid-sixties. But the ill-effects of the modern farm technology on environment, including soils came to surface from the last decade of the twentieth century when productivity of major foodgrains crops started to show declining trend, though not stagnant along with related socio-economic problems. Reducing soil quality and contamination of underground water (Canter, 1997; Sartain, 1990; Snyder *et al*, 1984), increasing farm income disparity among various farm size groups (Ray, 1990; Lekhi and Singh, 2002; Jhunjhunwala and Mepherson, 1972) are identified as major causes of this crisis in agricultural sector. The post revolution period scenario of India agriculture is characterised with the problems of stagnation in production, productivity of major food grains crops coupled with dwindling natural resources and increasing the production cost due to decline in factor productivity (Chhonkar and Dwebedi, 2004). Swaminathan (1990), also commented that with the greying of green revolution, the Punjab agriculture as well as the overall Indian agriculture is in crisis.

Under such situation, it has become essential to critically analyse and examine the major farming system in their proper perceptions' to make pertinent recommendation to the policy makers and farmers in order to ensure food security and efficient, competitive low-cost and sustainable agriculture in 21st century (Thakur and Sharma, 2005). So, innovation and development of alternative agriculture production

methods' that will not only address the harmful by effect of inorganic or conventional (Organic + inorganic together) farming on environment and ensure food and nutritional security of the world in general and particularly in India, the second largest populace country in the world. Organic farming has been the human health, but also be economical and millions of Indian has become the priority research were over the last few years. After extensive research the scientists, environmentalists as well as NGOs have more or less unanimously prescribed the introduction and promotion of organic farming as the panacea of all evils arising out of conventional or purely inorganic system of farming. Organic farming has the potential to provide benefits in term is of environmental protection conservation of non- renewable energy sources, improve food quality, reduction in output of surplus production and the reorientation of agriculture towards area of market demand (Lampkin, 1990). USDA has define organic farming as a production system which voids or largely excludes the use of synthetically produced compound fertilizers, pesticides, growth regulators and livestock additions (Magar, S.S., 2004). It is a system that attempts to provide and balance environment, in which the maintenance of soil fertility and control of pest and decreases are achieved by the enhancement of natural process and cycles, with moderate inputs of the energy and resources which maintain the productivity (Hodges, 1981). It is claimed to be an ideal from of eco-friendly production system that can be more conducing to food security and will ensure sustainability in the long term (UNEP-UNCTA, 2008). But the major issue concerning the policy makers is the productivity of organically produced crops as it is alleged that the yield of the crops produced by organic means is below conventional average resulting lower income for the growers which is the major driving force in adoption of a new farm technology. The premium price which the crop deserves for their contribution the society will be more than sufficient to compensate the loss in physical yield as claimed by the proponents of organic farming.

Under this backdrop, the present study is a modest attempt to examine the relative profitability of jute cultivation, an important cash crop in West Bengal, by practicing three alternative crop production system namely organic, conventional and purely inorganic farming system. The specific objective of the study can be outlined as follows

(i) To estimate and compare the costs and returns structure of jute cultivation by sample farmers following these three major crop production systems.

(ii) To assess the differences in yield, total and net return from jute cultivation among these system.

(iii) To study the marketing of jute produced organically by farmers of the study region.

(iv) To suggest policy options for adoption of this eco-friendly sustainable crop production system.

Materials and Methods

Organic farming is an alternative form of production system that put emphasis on use of organic sources of plant nutrients (crop residues, animal excreta, legumes, farm wastes, bio-fertilizers etc.) and completely avoids application of agro-chemical based fertilizers and pesticides, whereas the conventional farming refers to a production system in which both chemical fertilizers and organically produced inputs are applied for supplying essential plant nutrients. Inorganic farming refers to a crop production system that uses only manufactured chemicals such as chemical fertilizers, growth regulators, pesticides etc. for raising crops.

Primary information related to costs and returns structure of jute cultivation by following three major crop production systems collected form 60 sample farmers, 20 each of these three groups of farmers forms the basis of the study. These farmers are chosen following simple random sampling without replacement (SRSWOR) from purposively selected five villages designated as bio-villages of Baduria Block of North 24 Parganas district of West Bengal, where a NGO is involved in promoting organic farming among farmers by providing organic crop management technology along with the facilities of supplying organic inputs and marketing of products by applying. Information is collected through well-structured pre-tested schedule by personal interview method. Simple tabular and percentage technique have been employed in analysing data. Differences

in yield of jute produced by these three systems are estimated using following formula:

$$\text{Yield Gap} = \frac{\text{(Organic – Conventional / Inorganic system of farming)}}{\text{Organic system of farming}} \times 100$$

Estimates of costs and returns for cultivation of jute have been made by applying cost concept used in farm management studies. Prime cost of cultivation which is the summation of cost of all variable inputs including family labour minus land revenue and cess is also employed to avoid arbitrariness in estimating imputed rental value of owned land and interest on fixed capital (Mukhopadhy, A., 1990).

Table 1. Estimation of costs incurred and returns obtained by sample farmers growing from jute cultivation following organic, conventional and inorganic system of farming (₹ ha^{-1})

S.No.	Particulars	Organic	Conventional	Purely Inorganic
A.	Costs components of Cost A_1			
i.	Seed	1595.14	1441.07	1550.65
ii.	Manure	6631.23	4772.32	0.00
iii.	Organic fertilizers	2533.60	21.80	0.00
iv.	Organic insecticides	888.81	21.80	0.00
v.	Inorganic fertilizer	0	4111.74	6636.79
vi.	Inorganic PPCL	0	499.25	892.38
vii.	Irrigation charges	2287.56	1661.26	2236.94
viii.	Bullock labour	2662.72	2590.01	2178.92
ix.	Hired human labour	6239.01	5356.60	5180.98
x.	Miscellaneous cost	920.87	791.38	846.36
xi.	Interest on working capital	594.42	531.95	488.21
B.	Total Cost A_1	24361.61	21801.39	20010.41
xii.	Imputed rental value of own land	20465.88	20113.23	18551.21
C.	Cost B	44827.49	41914.67	38559.62
xiii.	Imputed value of family labour	4978.77	4241.79	3530.84
D.	Cost C	49806.26	46156.40	42090.46
E.	Prime Cost of cultivation {(i) to (ix) + (xi)}	29240.38	25943.17	23462.45
F.	Return structure			
i.	Physical output (q h^{-1})	26.91	28.87	26.54
ii.	Total return (a+b)	68219.32	67044.10	61837.36
	a. Main Product	64573.72	63508.27	58395.31
	b. By product	3645.60	3535.83	3441.99
iii	Cost of production (₹q^{-1})	1850.85	1598.77	1585.92
iv.	Net return over Cost A_1	43857.71	45242.71	41828.95
v.	Net return over Cost B	23391.83	25129.48	23277.74
vi.	Net return over Cost C	18413.06	20887.69	19746.90
vii.	Return cost ratio over Cost A_1	2.80	3.08	3.09
viii.	Return cost ratio over Cost B	1.52	1.60	1.60
ix.	Return cost ratio over Cost C	1.37	1.45	1.47
x.	Net return over prime cost	38978.94	41100.93	38374.39
xi.	Return cost ratio over prime cost	2.33	1.58	2.64
xii	Cost of production over prime cost (₹/q)	1086.60	898.62	884.04

Results and Discussion

At the outset, we will compare the costs incurred and returns obtained by sample farmers of purposively selected 5 (five) villages of Baduria Block of North 24 Paragnas district of West Bengal from cultivation of jute by practising different farming systems. Table 1 demonstrates that sample farmers growing jute by organic means have made an expenditure of ⊚24361.61 ha^{-1} on various cost components constituting Cost A1 whereas the same for conventional; and inorganic systems are estimated to be ₹ 21801.39 and 20010.41 ha^{-1} respectively.

Expense on manure is found to be the highest cost component amounting ⊚6631.23 ha^{-1} (27.22%) followed by payment toward hired human labour (25.61%) and subsequently followed by cost on bullock labour (10.93%) and organic fertilizers (10.40%) in case of organic jute cultivation. Farmers producing jute by conventional system have made highest expenditure on wage payment for hired human labour amounting ₹ 5356.60 ha^{-1} which is 24.54 percentage of total Cost A_1 ha^{-1}. Expenditure on manures is the second highest cost compost accounting ₹ 4772.32 ha^{-1} a (21.89%) and then comes chemical fertilizers with an investment of ₹ 4111.74 ha^{-1} which accounts 18.86% of the total. In case of jute production by inorganic means, the share of inorganic fertilizers, hired human labour, and irrigation charges in the Cost A_1 is accounted to be 33.17, 25.89 and 11.18 percentage respectively when arranged in descending order of their contribution. The contribution of the remaining components to the respective total Cost A_1 ha^{-1} are more or less same except cost on organic insecticide in case of organic jute production. In short, expenses on manures, hired human labour and inorganic fertilizers are the dominant cost component of corresponding Cost A_1 for jute cultivation by organic, conventional and inorganic systems respectively. Estimates of Cost B ha^{-1} which is obtained by adding 30% of the total return (Raju et.al 1991) to Cost A_1 are ₹ 44, 827.49, ₹ 41914.61 and ₹ 38, 559.62 ha^{-1} in the same order. Variations in Cost B ha^{-1} across systems may be attributed to the fluctuation in the magnitude of imputed rental value of owned land which in turn depends on the variation in total returns realised from these systems of jute cultivation. The total cost of cultivation *i.e.* Cost C obtained by adding imputed value of family labour to Cost B is estimated to be ₹ 49,809.26, ₹ 46,156.00 and 42,090.46 respectively in the same order. The highest imputed value of family labour in organic jute production implies that employment generation potentiality for family labour is maximum in case of jute production by organic system relative to conventional system which in turn more effective compared to inorganic means. Measures of cost of cultivation by using prime cost concept reveals that the total investment for ha^{-1} jute cultivation is drastically reduced to ₹ 29,240.38, ₹ 25,943.17 and ₹ 23,462.45 in case of organic, convention and inorganic system respectively.

Study on returns structure also presented in Table 1 reveals that the productivity of organic jute is 26.91 quintal ha^{-1} as against 28.87 and 26.54 quintal ha^{-1} for conventional and inorganic means and the corresponding total returns which are the summation of value of main and by-products are estimated to be ₹ 68,219.32, ₹ 67,044 and ₹ 61,837.36. Higher total return ha^{-1} in organic jute compared to other systems is due to presence of premium prices which the crop deserves for eco-friendly system of production. Net returns over three cost concepts namely, Cost A_1, Cost B and Cost C obtained by sample farmers from organic jute cultivation are estimated to be ₹ 43,857.71, ₹ 23391.48 and ₹ 18,413.06 ha and the associated return- cost ratios are 2.80, 1.52 and 1.37 respectively. The corresponding values of net return for conventionally produced jute are ₹ 45,242.71, ₹ 23,277.74 and ₹ 19,746.90 ha and the returns from per rupee investment represented by return–cost ratio are 3.09, 1.660 and 1.47 in the same order. In case of jute produced by inorganic means, the corresponding values are ₹ 41828.95, ₹ 23277.74 and ₹ 19746.90 ha and the associated return-cost ratios are 3.09, 1.60 and 1.47. Summarily, the economic performance of conventionally grown jute is better than that of organic and inorganically produced jute in all measures. Again, organic jute growers have realised higher net returns over Cost A_1 and Cost B compared to that of its counter parts in inorganic farms, but the situation is exactly reverse when measured over Cost C because of higher value of Cost C arising out of high expenditure on family labour in organic farms i.e., inorganically produced jute gives higher net return relative to organic. But the net return over prime cost of cultivation represents a similar trend as that is observed in case of Cost A_1 i.e. conventionally grown jute cultivation is the most

Table 2. Estimation of differences in Physical Yield, Total Return, Net Return and Prime Cost of cultivation of Jute between Organic and Conventional system of farming

Sl. No.	Particulars	Organic	Conventional	Difference	Percentage Difference
1	Physical Yield (q ha^{-1})	26.91	28.87	-1.96	-7.28
2	Total Return (₹ha^{-1})	68219.32	72880.25	-4660.93	-6.83
3	Prime Cost (₹ha^{-1})	29240.38	25943.17	3297.21	11.27
4	Net return (₹ha^{-1})	38978.94	46937.08	-7958.14	-20.42

Table 3: Estimation of differences in Physical Yield, Total Return, Net Return and Prime Cost of Jute cultivation between Organic and Inorganic system of farming

Sl. No.	Particulars	Organic	Inorganic	Difference	Percentage Difference
1	Physical Yield (q ha^{-1})	26.91	26.54	0.37	1.37
2	Total Return (Rs ha^{-1})	68219.32	61837.36	6381.96	9.35
3	Prime Cost (₹ha^{-1})	29240.38	23462.45	5777.93	19.76
4	Net return (₹ha^{-1})	38978.94	38374.92	604.02	1.55

Table 4: Percentage differences in cost components constituting Prime Cost of cultivation of Jute produced by organic over conventional and inorganic system of farming:

(ha^{-1})

Sl. No.	Particulars	Percentage differences between organic and conventional	Percentage differences between organic and Inorganic
1	Manures and Fertilizer	4.09	28.55
2	Human Labours	14.43	22.35
3	Others*	14.58	7.09
4	Prime Cost	11.27	19.76

(*Others include seed, organic insecticide, inorganic insecticide, irrigation, Animal labour Miscellaneous costs components)

profitable compared to organic and inorganic system of production but, organic jute provides greater net return compared to inorganic system. High cost of cultivation along with low yield has resulted in highest cost of production of organic jute. Jute production in organically managed farm requires an investment of ₹ 1850.85 to produce one quintal of raw jute as against ₹ 1598.77 and 1585.92 in case of conventional and inorganic farms, but the same are drastically come down to ₹ 1086.60, ₹ 898.62 and ₹ 884.41 in the same sequence when measured using prime cost concept.

Now, we will make an attempt to throw some light in the matter of relative yield gap as well as differences in the total return and net return over prime cost of cultivation of jute grown by three systems. Table 3 discusses that lower yield at the rate of 7.28 percentage coupled with 11.27 percentage higher prime cost of cultivation have rendered organic growers to earn an average net return of 20.42 percentage below conventional average.

Although premium prices for organic jute reflected in the total return has partially compensated the loss in physical yield, but not sufficient to cover the dual set back in productivity and higher cost of cultivation (Table 2). But the performance of jute grown organically is superior to inorganic farms in spite of being higher prime cost of cultivation of organic jute. Table 4 reveals that prime cost of organic jute cultivation is 19.76 percentage above inorganically

managed farmers, but higher productivity measuring 1.37 percentage in association with higher premium prices has helped the organic jute growers to realise 9.35 percentage more total return which has ultimately rendered the farmers to earn 1.55 percentage higher net return over its counter parts in inorganic farms (Table 3).

So, in short, jute cultivation by organic means is less remunerative compared to conventional system but profitable over inorganic system of cultivation. Several studies mostly made in the western countries by researchers and scientists may be presented in support of lower yield in organic farming than conventional agriculture (Padel and Uli, 1994; Henning, 1994). Lampkin (1993) has reported that organic yields are 30-40 percentage lower relative to conventional after comparing the variation of organic relative to conventional winter yields in 28 German farmers from 1978 to 1992. The organic crop yields are about 40 percentages below the conventional average (Dubgaard, 1994). In case of organic jute cultivation, the estimated higher prime cost contradicts the findings of many past studies. Cereals and grain legumes are typically less than 60 percentage of the cost in conventional cropping (Vine and Bateman, 1981). Padel and Uli, (1994) also reported that total variable cost is 45 percentage lower than on conventional farms. But in the present study, higher cost of organic jute production can be attributed to larger expense on manures and fertilizers and human labour, more specifically the family labour compared to conventional and inorganic farms (Table 4).

Marketing of Organic Jute

In the study, there is no dedicated channel for marketing of organic jute like that of jute produced by conventional and inorganic farmers. The NGO engaged in promoting organic farming in the study region also make arrangement for marketing of organic jute. They contract with the mills willing to purchase the product directly from growers and they bear all cost associated with the marketing of jute including transport, loading, unloading and weighing etc. The price is determined through mutual contract between farmers and millers and the concerned NGO acts as an intermediary. Depending on the qualities of the products farmers generally receive 15-20 percentage premium prices over the existing market price of jute produced by alternative means. The growers could have got more than they received provided there are separate channel for marketing of organic jute.

Conclusion

Lower yield coupled with high cost of cultivation have rendered organic jute production is less remunerative compared to conventional system. But existence of premium price have made this eco-friendly production system as an viable alternative purely inorganic system of crop cultivation, though the later form of crop production is better placed in terms of physical yield. As the yield of organically produced jute is below the average of conventional and inorganic farms, higher premium prices through development of dedicated marketing channel for organic jute may be an efficient strategy to encourage farmers to grow organic jute. On the other hand, continuous research for yield improvement at least to the level that is achieved in conventional farms through development of organic practices, production of nutrient rich organic manures may be helpful in augmenting yield and thereby increase in income of organic growers. At initial stage, government may supply inputs at subsidized rate, provide assurance for higher premium prices, introduce easy certification system and provide crop loan at lower interest rate, take up large scale promotional activities to grow consciousness for use of products produced from organic jute to create market demand which will ultimately help the farmers to compensate the loss in physical yield. Government also may not find it difficult to extend financial support to organic growers considering their contribution to the society.

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