Cost – Return benefit analysis of eco-friendly agricultural technologies – A case study in Indian context

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Abstract

Cleaner production strategy is gaining importance in the recent context of sustainable development and globalization. We examined the economy of agricultural procedure implementing natural eco-friendly approach in the contest of Indian economic development. The profit in the experimental paddy cultivation system using fully eco-friendly approach did not differ significantly from that of agricultural practices using synthetic fertilizers and pesticides.

Keywords : sustainable development, eco-friendly cultivation, cleaner practices, organic farming, cost-return benefit, agricultural process.

INTRODUCTION

Indian economy is chiefly agrarian. Sustainable Agricultural Development which requires eco-friendly approach, is the need of the hour for the promotion and development of agricultural economy in India. Economic development, which is unsustainable from environmental point of view, cannot be sustainable from economic point of view either (Nagarajan, 1996).

Cleaner production as a sustainable development strategy should be considered in the context of environmental, economic and social impacts (World Bank, 1952). This is categorically stated by Swaminathan (2004) "Future agricultural productive programmes will have to be based on a strategy without associated ecological and social harm". Further more, reducing the cost of production through eco-friendly-technology will provide greater opportunities for both employment and farm income (Tisdell et al., 1994; Swaminathan, 2004). The current challenges for cleaner production include waste reduction at source, process modification, product conversion and waste recycling. It also focuses on profitability through improvements in productivity and environmental safety. The present study examines the economy of eco-friendly approach in agricultural process in Indian context.

METHODOLOGY

A study was conducted on two different paddy fields with one of the areas using recurring chemical fertilizers and pesticides for the farm management and the other with the use of natural resources and agricultural refuses (organic farming). The data on the cost of investment, expenditure on the management and profits of both the cases were recorded. To ascertain the outcome, ten different similar field values on investment returns were also collected from concerned agriculturist's account and analyzed statistically (Tisdell *et al.*, 1994; Saha 1995).

RESULTS

There was considerable profit in both the categories of processes. In the case of paddy fields which adopted the natural cultivation process, the profit was Rs. 8,690 / acre against the total investment of Rs. 3,925 (Table 1). And in the trial of paddy arena employed with chemical fertilizers and pesticides, the net profit was Rs. 10,505 against the investment of Rs. 5,175 (Table 2). This suggested that cultivation procedures using eco-friendly approach are as effective as that of the use of synthetic chemicals in agricultural practices in terms of cost-return-profit benefit (Tables 1 and 2).

The comparative data of returns on investments are furnished in table 3. The mean value was 26.7% of profit in the category of farms managed with synthetic chemicals *viz.*, fertilizers and pesticides. On the other hand the corresponding mean value for the group of fields that adopted natural resources (organic farming) was 23.5 % (Table 3). The statistical analysis of the above data revealed that there was no significant difference between the two samples drawn. ("*t*" 0.839; *P* > 0.05). This showed that reasonable profit might also be obtained with lesser investment with the use of natural cultivation process (organic farming) as well.

DISCUSSION

In India, before introducing the modern agricultural technology, the agricultural practices were mainly based on natural eco-friendly approach. But in the post-green revolution scenario the agricultural food output has come mostly through the use of chemical fertilizers and pesticides. Such extensive crop cultivation had resulted in the great impingement on environment. The controversy of incompatibility between environment and sustainable agricultural development has been highly discussed and debated since 1980. In India, the main

Table 1. Mean investment (Rs./acre) and income (Rs. / acre) from paddy fields when eco-friendly approach was adopted

Expenditure (Rs. / acre)		Income (Rs. / acre)	
Item	Rupees	Item	Rupees
Preparation of paddy field	620.00	1,530 kg. paddy® Rs. 8/-perkg	12,240.00
Ploughing and sowing	620.00	750 kg hay @ Rs. 0.50 paise	375.00
Management of manuring	400.00	Total Income(Rs.) :	12,615.00
(natural)		Total Expenditure (Rs.) :	3,925.00
		Net profit (Rs.) :	8,690.00
Management of plant protection	1,150.00		
Labour for harvesting	1135.00		
Total expenditure	3,925.00	_	

Table 2. Mean investment (Rs./acre) and income (Rs./acre) of paddy field when the use of synthetic fertilizers and chemicals were adopted

Expenditure (Rs. / acre)		Income (Rs. /acre	e)
Item	Rupees	Item	Rupees
Preparation of paddy field	620.00	1,910 kg. paddy@ Rs. 8/ per kg	15,280.00
Ploughing and sowing	620.00	800 kg hay @ Rs. 0.50 paise	400.00
Management of manuring (chemical	1200.00	Total Income (Rs.): Total	15,680.00
fertilizers)		Expenditure (Rs.):	5,175.00
Management of plant protection	1600.00		
(Application of pesticide / herbicide		Net profit (Rs.) :	10,505.00
Labour for harvesting	1135.00		
Total expenditure	5175.00		

Table 3. Comparative data on cost-return profit in percentage from ten different samples

Sample No.	Management with synthetic Chemicals (fertilizers and pesticides)	Management with Natural Resources (organic farming)
1	33	39
2	27	19
3	24	21
4	18	31
5	36	18
6	30	23
7	42	20
8	16	33
9	22	20
10	19	11
Mean	26.7	23.5

confrontation is due to excessive application of chemical based inputs to raise bumper crops which may lead to unsustainable growth (Raghavan 1994; Swaminathan, 2004).

Already the developing countries have started phytosanitary activities. The integrated natural eco-friendly approach is necessary to remove the maladies of chemical technology in agriculture. The perfect adaptation to environment could be the only strategy for sustenance as crop management system fully based on the use of chemical fertilizers and pesticides will lose soil production potential in the long run, may lead to a hidden nutritional poverty in the soil and will also pose a problem of pesticidal pollution (Henson *et al.,* 2000).

The present study revealed that there is no significant difference in the cost-return-benefit between the natural organic farming and the use of fertilizers and pesticides in farming. Further organic farming may also enhance rural employment in the preparation of soil and crop management (Alauddin and Tisdell 1991; Swaminathan, 2004). Additionally, organic farming has other significant advantages such as retention of soil fertility, free from chemical pollution, zero pesticidal residues, reduction in investment, utilization of agricultural refuse and eco-friendly.

At present the market value of food products cultivated based on natural ways is 2500 Cr. Euro Dollars (Rs. 1,34,625 Cr.). It is expected that it will increase to 10,000 Cr. Euro Dollars (Rs.4,44,100 Cr.) in 2020. India is planning to provide subsidiary to the farmers who undertake natural methods of cultivations. The Sustainable Agricultural Development programme of India is to be introduced during 11th plan period (2007-2012) by promoting natural agricultural practices. Government of India is taking all intensive efforts, to meet second green revolution by adopting various encouraging schemes for marketing natural agricultural food products (Government of India, 1993). In this scenario, the results obtained in the present study are highly useful in highlighting the viability of organic farming in India.

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