

BENEFIT COST RATIO ANALYSIS OF ORGANIC AND INORGANIC RICE CROP PRODUCTION; EVIDENCE FROM DISTRICT SHEIKHUPURA IN PUNJAB PAKISTAN

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ABSTRACT: Most of the farmers in Pakistan are unaware of the long term benefits of organic farming due to many reasons and they prefer quantity instead of quality. The present study was carried out to evaluate the benefits and costs associated with organic farming of rice in comparison with inorganic farming. The benefit cost ratio (BCR) of organic and inorganic rice crop was calculated in district Sheikhupura on per acre basis. Stratified random sampling technique was used to collect data from three zones of the study area. Sixty respondents were selected for the collection of data regarding crop husbandry practices along with their costs and yield. The study revealed that per acre cost of production of organic rice was 21.5 percent lower than that of inorganic rice while the gross income received from one acre of organic rice was 15 percent lower as compared to inorganic rice. On the other hand, Benefit Cost Ratio (BCR) of organic rice was 1.147 while it was 1.044 for inorganic rice. The study showed encouraging results for the cultivation of organic rice in the long run keeping in view the environmental and cultural aspects. The study also showed the desirability of R & D in terms of capacity building, development of resistance against insects, pests and diseases and exploring ways and means for the promotion of green agriculture to compete the ever-increasing competition in a globalized world.

Key words: BCR, organic and inorganic, rice crop.

INTRODUCTION

Agriculture has played a pivotal role in the economic development of Pakistan and it continues to play its part presently by contributing more than one fifth to the gross domestic product (GDP) of the country and by absorbing forty five percent of the country's total labor force. This sector supplies essential raw material to industrial sector and thus helps in generating foreign exchange earnings through export of textile and industrial goods. In last two decades, the average annual growth rate of agriculture remained about 4 percent which is a healthy indicator for growth and development (GOP, 2009-10).

Major cropping seasons of Pakistan are Kharif (April-October) and Rabi (November-March). Major Kharif crops are cotton, rice, maize and major Rabi crops are wheat, gram & oil seeds. Rice is an important cash crop and one of the major export items of the country. It accounts for 6.4 percent of value added in agriculture and 1.4 percent of the agricultural GDP (GOP, 2009-10).

Over the years, agricultural activities focused on intensive cultivation of land along with concentrated use of chemical fertilizers and pesticides which have provoked some voices with respect to environmental and cultural aspects. Conversely, organic agriculture is considered to be holistic production management system, which not only promotes and enhances the agro-

ecosystem but also increases the bio-diversity, biological cycles, and microorganisms' activities thus helps in leading to the sustainable agriculture (Bateman, 1993, Hole *et al.*, 2005 and Widemer *et al.*, 2007). Many studies have emphasized the use of management practices in preference over the use of off-farm inputs, which can be accomplished by using, where possible, agronomic, biological, and mechanical techniques for the conservation of natural and physical environment where agricultural activities take place.

Now a day, organic agriculture is developing rapidly as it is evident from the statistical information available from 141 countries of the world which highlights that about 33 million hectares of agricultural land is being cultivated by utilizing non-synthetic inputs by more than 1.2 million organic growers, majority of them being smallholders (Willer and Klicher, 2009). Western consumers' demand for organic products has surged considerably in the recent past. Similarly, farmlands being managed by organic culture are 2 percent, 4 percent and 10 percent in Germany, Italy and Australia, respectively.

As far as the scenario in Pakistan is concerned, majority of the farmers emphasize on quantity rather than quality of the products due to lack of information about demand and price of the organic products. Therefore, the present study was undertaken to explore the hidden truth for farming community, NGOs, researchers, government

agencies and policy makers after comparing benefit cost ratios of organic and inorganic rice crop production in District Sheikhpura of Punjab Province.

The main objective of this study was to highlight the social and economic aspects which are pertinent for the adoption of organic rice production in the study area. It also aimed to make an economic comparison between the benefits and costs of producing organic and inorganic rice crops.

MATERIALS AND METHODS

It has been observed that time and costs are the frequently limiting factors in the field of social sciences, therefore this study was based on a sample rather than the whole population. For this purpose, stratified random sampling technique was adopted for data collection. District Sheikhpura was divided into three zones and each zone contained two villages. Furthermore, five respondents each from organic and inorganic rice growers were selected from each village thus making the sample size of 60. They were contacted randomly and interviewed using a pre-designed, pre-tested questionnaire. The information collected was tabulated, edited and analyzed using the statistical techniques like averages, percentages, standard errors, and T test.

a. Cost of Production and Gross Margin

$$C_p = C_{seed} + C_{ferti/manure} + C_{pp} + C_{labor} + C_{land,prep} + C_{irri} + C_{other}$$

Where,

C_p = Cost of production

C_{seed} = Cost on seed

$C_{ferti/manure}$ = Cost on fertilizer or manure

C_{pp} = Cost on plant protection (organic or inorganic)

C_{labor} = Cost on labor

$C_{land,prep}$ = Cost on land preparation

C_{irri} = Cost on irrigation

C_{other} = Cost on other inputs

b. Gross Margin

Gross margin was calculated by deducting total variable cost from gross returns given by the following formula:

Gross Margin = Gross Return-total variable cost

c. Benefit Cost Ratio Analysis

Benefit Cost Ratio is the ratio of the benefits of an activity or production, relative to its costs, both expressed in monetary terms.

$$BCR = \text{Gross Margin} / \text{Total Cost}$$

RESULTS AND DISCUSSION

Keeping in view the objectives of the study, the comparison between organic and inorganic rice crop production was made considering the following aspects.

a. Cost Analysis: After detailed investigation and data collection, average cost of production of

organic and inorganic rice crop was calculated. Average cost on per acre seed was Rs. 305 in organic while it was found to be Rs. 506 in case of inorganic rice production. Similarly, the average cost on fertilizer was Rs. 7034 in inorganic rice while there was no fertilizer cost involved in organic rice but an amount equal to Rs. 3006 was spent for the purchase of organic manures which included animal/poultry/green manure. In addition, a cost of Rs. 744 was incurred on pesticides/insecticides for controlling different pests in inorganic rice as compared Rs. 350 which were spent on organic rice farms.

There is evidence of controlling pests through the use of organic compounds which helps in reducing costs as Ko *et al.* (2003) reported that edible plant oil such as sunflower oil through can prove effective to control powdery mildew of many crops as well as aerial plant diseases. Usage of labor is most important factor in organic farming. Many researchers (Park and Timothy, 2009 and Pimentel *et al.* 2005) argued that organic farming is more labor intensive than conventional farming and charge more money as it is clear from study in hand i.e. average cost on labor was observed to be equal to Rs. 6820 in organic rice crop as against Rs. 5064 on inorganic rice per acre. Similarly, for irrigation, an amount equal to Rs. 4125 was incurred in organic rice as compared to Rs. 3670 incurred in inorganic rice.

Considering marketing costs for organic rice, it was found that marketing cost was equal to Rs. 680 per acre as compared to inorganic rice costing Rs. 800 per acre. Finally, it was found that average per acre cost of production on rice crop on organic farms was Rs. 15959 while it was Rs. 19403 in case of inorganic rice showing a considerable difference of about 22 percent. Similar findings were reported by Adhikari (2009) and Mehmood *et al.* (2011). It was observed that cost on seed, cost on fertilizer/manures, cost on tillage operations and cost on labor were found significant ($P < 0.05$). Cost on irrigation and other costs including marketing and transportation were found to be non-significant.

b. Gross Margin: To calculate gross margin, one needs yield and the per unit price of the product. In the present study, a higher rice output was obtained at inorganic rice farms equal to 1.412 tonnes/acre than that of the organic rice which yielded 1.201 tonnes/acre but the market price fetched by the organic rice was Rs. 1141 per 40 kg and it was higher as compared to inorganic rice for which the average market price was Rs. 1123 per 40kg. The table 2 shows that the gross margin calculated by deducting total cost from the gross income was found to be equal to Rs. 20259 and Rs.18312 per acre for inorganic and

organic rice, respectively. This shows that the gross margin from inorganic rice is more than that obtained from organic rice but this difference is quite meager (about 15 percent) and this result is not so much discouraging as

most of the farmers are not still aware of the technology, benefits and approaches of growing organic crops and they follow conventional cropping pattern and farming practices.

Table 1: Per acre cost of production of organic and inorganic rice crop.

Sr. No	Inputs	Organic rice production (Rs)	Standard Error organic rice	Inorganic rice production (Rs)	Standard Error Inorganic rice	t-test
1	Cost on seed [a]	305	23.63	506	29.35	-5.28*
2	Cost on fertilizer/ manures [b]	3006	134.20	7034	100.76	-20.61*
3	Cost on tillage operations/land Preparations [c]	1128	70.80	1130	54.44	-7.93*
4	Cost on pesticides/ organic plant protection [d]	350	35.17	744	68.84	-5.13*
5	Cost on labor [e]	6820	288.22	5064	161.05	5.28*
6	Cost on irrigation [f]	3670	128.73	4125	134.97	-2.56
7	Cost on other inputs/(Marketing & Transportation Cost) [g]	680	43.07	800	53.78	-1.79
Total cost of production			---			
[C_p = a+b+c+d+e+f+g]		15959		19403	---	---

*significant

Table 2: Per Acre Gross Margins of organic and inorganic rice system

Sr. No	Particulars	Organic rice	Inorganic rice
1	Income per acre (Rs.)	34271	39662
2	Total cost per acre (Rs.)	15959	19403
Gross Margin (Rs.)		18312	20259

- c. **BCR Analysis:** After employing the statistical techniques, the results were obtained by computing different costs which included seed, land preparation, fertilizer (for conventional farming), green fodder/farm yard manure (for organic farms), organic plant protection treatment, pesticides for conventional crop, labor, irrigation charges, marketing cost, transportation cost and other inputs cost. The results showed that average cost of production of organic rice crop per acre was Rs. 15959 as compared to Rs. 19403 of inorganic rice crop per acre. Similarly, gross benefits per acre for both groups were found to be Rs. 34271 for organic rice and Rs. 39662 for inorganic rice.

Benefit cost ratios of both farming systems were computed by dividing benefit to the costs. It was estimated to be 1.147 for organic rice while it was 1.044 for inorganic crop. However, per acre yield of organic rice was comparatively less than that of the conventional rice output. Due to lower cost of production and higher sale price, the BCR was higher for organic rice as

compared with inorganic rice. These results are in conformity with the findings of Adhikari (2009) who calculated BCR for organic and inorganic carrot production systems equal to 1.52 and 1.44, respectively.

BCR of organic rice crop (per acre)

$$\text{BCR} = \text{Rs. } 18312 / 15959 \\ = 1.147$$

BCR of inorganic rice crop (per acre)

$$\text{BCR} = \text{Rs. } 20259 / 19403 \\ = 1.044$$

Conclusion: Organic farming is based on fewer inputs and better market demand for health and environment conscious consumers. Both the health and environmental issues are getting more importance with the passage of time which need immediate attention of the government, in general and the farming community, in particular. The study in hand was conducted to assess the economic comparison between organic and inorganic rice crop in district Sheikhpura. In the light of the results, it was concluded that although per acre yield and income obtained from organic rice is less than the yield and income obtained from inorganic rice system but the cost incurred on per acre production of organic rice was comparatively less and there are much prospects that it will go down with the passage of time as long as technology and knowledge develops and becomes popular among the farming community. Moreover, Benefit Cost Ratio for organic rice (1.147) was higher as compared to inorganic crop of rice (1.044). Furthermore research and development and dissemination among the general public and farming community will improve

natural resource conservation, household health and environmental sustainability.

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