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Cost and Return Analysis of Organic Crops for Sustainable Livelihood Security of Small & Marginal Farmers

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ABSTRACT: Organic farming has the potential to provide benefits in terms of environmental protection, conservation of non-renewable resources and improved food quality. But it needs to overcome challenges like low yield during initial years of conversion and government support to help farmers in the production as well as marketing process. The present investigation Cost and Return Analysis of Organic Crops were carried out in the field experiments conducted at Organic Farming Research Centre, SKUAST-Jammu, Chatha during 2016-17, 2017-2018 and 2018-2019. CACP cost concepts and economic viability tools are used for analysis of the data. Per hectare gross returns and net returns for Basmati 370 was found to be Rs. 79200.00 and Rs. 52556.75, respectively whereas for Moong, Mash and Toria, gross returns was found to be Rs. 60750.00, Rs. 45840.00 and Rs. 28200.00, respectively and net returns of Rs. 38003.85, Rs. 22484.85 and Rs. 16720.85, respectively. The benefit cost ratio was found to be 1:2.97 which shows that Organic Basmati 370 is more responsive towards the inputs use and under good management and it can give even higher returns. The benefit cost ratio for Moong SML-668 was found to be 1:2.67 whereas for Mash 1008 and Toria, it was found to be 1:2.04 and 1:2.46, respectively.

Keyword: Organic Farming, Cost and Return Analysis, Sustainable Agriculture

INTRODUCTION

Agriculture continues to be core sector of the Indian economy, on which more than 60 per cent of our population is dependent for their livelihood. Organic agriculture is a unique production management system which promotes and enhances health of agro eco-system, including biodiversity, biological cycles and soil biological activity and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off farm inputs. India is bestowed with lot of potential to produce all varieties of organic products due to its suitable agro-climatic factors in several parts of the country; the inherited tradition of organic farming is an added advantage (APEDA, 2010). Organic farming systems have attracted increasing attention over the last one decade because they are perceived to offer some solutions to the problems currently besetting the agricultural sector. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of non-renewable resources and improved food quality. Countries like Europe have recognized and responded to these potential benefits by encouraging farmers to adopt organic farming practices, either directly through financial incentives or indirectly through support for research, extension and marketing initiatives. As a consequence, the organic sector throughout Europe is expanded rapidly (24% of world's organic land). But, in the developing countries like India, the share is around 2 per cent only (included certified and wildlife). However, there is considerable latent interest among farmers in conversion to organic farming in India. But, some farmers are reluctant to convert because of the perceived high costs and risks involved. Those who have converted are earning equal incomes to their conventional counterparts, if premium markets exist for organic produce. In this scenario, little studies are available to educate the farmers on the benefits of organic farming especially on cost and returns and, efficiency fronts over conventional farming.

India has tremendous potential to become a major exporter of organic rice in the International market. Agricultural and Processed Food Products Export Development Authority (APEDA) made efforts to produce and export basmati rice, aromatic rice and other rice varieties by establishing model farms in states like Punjab, Haryana and Uttar Pradesh. Rice cultivation is considered to have begun simultaneously in many countries over 6500 year ago. Rice is the most important cereal crop grown in India covers an area 45 million hectare with 90 million tones production, 2000 kg/ ha as its productivity and is consumed by 65 per cent of the total population of the country. Thus, Basmati rice production is very much gainful for predominant growers of J&K. Pulses are a critical and

inexpensive source of plant-based proteins, vitamins and minerals for people around the globe. They have a low fat content, contain zero cholesterol, and are a significant source of dietary fibre. Moreover, they contain no gluten and are rich in minerals and B vitamins, all of which are important for a healthy life. From an agricultural point of view, multiple cropping systems that include pulses enhance soil fertility, improve yields, and contribute to a more sustainable food system. It is particularly noteworthy that pulses have a very low water footprint compared with other protein sources, and can be grown in very poor soils where other crops cannot be cultivated. Crop residues of pulses, and legumes in general, can also be used as animal fodder, thus increasing the quality of the animal diet. Furthermore, pulses can play an important role in climate change adaptation, since they have a broad genetic diversity from which climate-resilient varieties can be selected and/or bred (FAO, 2016). Several studies have shown that legumes are been associated with long-lived food cultures such as the Japanese (soy, tofu, natto, miso), the Swedes (brown beans, peas), and the Mediterranean people (lentils, chickpeas, white beans) and that they could be an important dietary factor in improving longevity. Pulses add 0.15-0.25 per cent organic matter to the soil in the form of their roots after harvesting of the crop and improve soil fertility by fixing atmospheric elemental nitrogen in the soil and improve soil structure and water absorbing as well as water retention capacity of soil. Apart from the cheapest source of protein in human as well as animal diet, beside grains, green fodder of most of the pulses is also rich in protein and is palatable feed for cattle. Due to their plant type and ideal maturity durations, most of the pulses can be fitted in various cropping systems including relay cropping (Sharma, 2001). Number of studies on cost and return analysis of organic farming already exists but the present study makes an effect to study the cost and returns in Organic Basmati rice production and Pulses on sampled farms which is the main advantage.

MATERIAL AND METHOD

A. Methodology

The present investigation Cost and Return Analysis of Organic Basmati and Organic Pulse Crops were carried out in the field experiments conducted during 2016-17, 2017-2018 and 2018-2019 at Organic Farming Research Centre, Chatha.

For computation of costs and returns, the concepts framed by CACP were used.

$CostA_1$ = Expenditure on casual labour, bullock labour, farm machinery, seeds, fertilizer and manure, plant protection chemicals, irrigation, miscellaneous expenditure (cost of transportation, baskets and ropes) and interest on working capital + depreciation + land revenue.

$CostA_2 = CostA_1$ + rent paid for leased-in land.

$CostB_1 = CostA_1$ + interest on value of owned fixed capital excluding land.

$CostB_2 = CostB_1$ + rental value of owned land (net of land revenue) + rent paid for leased-in land.

$CostC_1 = CostB_1$ + imputed value of family labour.

$CostC_2 = costB_2$ + imputed value of family labour.

Cost C_3= cost C_2 +10 per cent of cost C_2 on account of managerial function performed by the farmer.

B. Benefit Cost Ratio (BCR)

The benefit cost ratio (BCR) of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all cash outflows during the life of the project. It can be estimated as follows

$$BCR = \sum_{t=0}^{n} \{(B_t)/(1+r)^t / \sum_{t=0}^{n} [(C_t) / (1+r)^t\}$$

Where,

B_t = gross returns in time t

C_t = variable cost in time t

R = rate of interest

t = time period (t = 0, 1, 2, …….., i, ……., n)

RESULTS AND DISCUSSION

A. Average Cost and return analysis of Organic crops during three years

Basmati 370. The cost and return analysis of basmati 370 is presented in Table 1. Per hectare total variable costs which included all the variable costs excluding the family human labour were found to be Rs. 26643.75. It has been observed that the highest expenditure of Rs. 11130.00 was incurred on hired labour (machine + human) followed by Rs. 7000.00 on vermicompost, Rs. 5000.00 on farm yard manure and Rs. 1800.00 on seed. As far as cost incurred on hired labour is concerned, it was found that highest cost was incurred on transplanting (Rs. 3600.00) followed by land preparation (Rs. 2250.00). Lowest cost of Rs. 360.00 each was incurred in three components of hired labour viz., preparation of nursery, plant protection and bagging. The yield in quintals was found to be 36 per hectare. The further perusal of data indicated that gross returns were Rs. 79200.00 per hectare whereas net returns were found to be Rs. 52556.75). The benefit cost ratio was found to be 1:2.97 which shows that Organic Basmati 370 is more responsive towards the inputs use and under good management and it can give even higher returns. The results are in close proximity with Kachroo, 2007 and Kumar, 2013. Higher returns due to higher market price were also obtained by Suwanmaneepong *et al.*, 2020 in her study Cost and return analysis of organic and conventional rice production in Thailand.

Table 1: Average Cost and return analysis of cultivation of Basmati 370 (Rs/ha).

S. No.	Input	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
A	**Operations**				
1	Land preparation by tractor	3 hours	One ha	750.00	2250.00
2	Preparation of nursery	02 labours	One day	180.00	360.00
3	Transplanting	10 labours	Two days	180.00	3600.00
4	Application of Organic manures & bio fertilizers	02 labours	Two days	180.00	720.00
5	Irrigation	01 Labours	Five days	180.00	900.00
6	Weeding and other operations	03 Labours	Two days	180.00	1080.00
7	Plant protection	01 labours	Two days	180.00	360.00
8	Harvesting and threshing by combiner	01 hours	One ha	1500.00	1500.00
9	Bagging	02 labours	One day	180.00	360.00
	Total operational costs				**11130.00**
B	**Material**				
1	Seed	40	kg	45.00	1800.00
2	Manure				
	FYM	5	ton	1000.00	5000.00
	Vermicompost	1	ton	7000.00	7000.00
3	Neem cake	25	kg	28.00	700.00
4	Neem oil	1.2	litres	120.00	120.00
	Inputs (Trichoderma, Pseudomonas, NSKE, Cow Urine etc)				500.00
	Total material costs				**15120.00**
	Total costs (A+B)				**26250.00**
	Interest on working capital @ 6% p.a for 3 months				393.75
	Total cost of production with interest				**26643.75**
	Yield	36	Quintals/ha	2200/q	79200.00
	Gross returns (Rs)				79200.00
	Net returns (Rs)				**52556.75**
	Cost Benefit ratio				**2.97**

Moong SML 668. The cost and return analysis of Moong SML-668 is presented in Table 2. Per hectare total variable costs which included all the variable costs excluding the family human labour were found to be Rs. 22410.00. It has been observed that the highest expenditure of Rs. 7290.00 was incurred on hired labour (machine + human) followed by Rs. 7000.00 on vermicompost, 5000.00 on farm yard manure and Rs. 1800.00 on seed. As far as cost incurred on hired labour is concerned, it was found that highest cost was incurred on land preparation (Rs. 2250.00) whereas lowest cost of Rs. 360.00 each was incurred in four components of hired labour viz., labour engaged in land preparation, sowing, plant protection and irrigation. The yield in quintals was found to be 6.75 per hectare. The further perusal of data indicated that gross returns were Rs. 60750.00 per hectare whereas net returns were found to be Rs. 38003.85. The benefit cost ratio was found to be 1:2.67. The results are in close proximity with Hegde *et al.* 2013.

Mash 1008. The cost and return analysis of Mash 1008 is presented in Table 3. Per hectare total variable costs which included all the variable costs excluding the family human labour were found to be Rs. 23010.00. It has been observed that the highest expenditure of Rs. 7290.00 was incurred on hired labour (machine + human) followed by Rs. 7000.00 on vermicompost, Rs. 5000.00 on farm yard manure and Rs. 2400.00 on seed. As far as cost incurred on hired labour is concerned, it was found that highest cost was incurred on land preparation (Rs. 2250.00) whereas lowest cost of Rs. 360.00 each was incurred in four components of hired labour viz., labour engaged in land preparation, sowing, plant protection and irrigation. The yield in quintals was found to be 3.82 per hectare. The further perusal of data indicated that gross returns were Rs. 45840.00 per hectare whereas net returns were found to be Rs. 22484.85. The benefit cost ratio was found to be 1:2.04. The results are in close proximity with Kumar, 2012.

Table 2: Average Cost and return analysis of cultivation of Moong SML-668 (Rs./ha).

S. No.	Input	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
A	**Operations**				
1	Land preparation by tractor	3 hours	One ha	750.00	2250.00
2	Land preparation by Labour	02 labours	One day	180.00	360.00
3	Sowing	02 labours	One day	180.00	360.00
4	Application of Organic manures & bio fertilizers	02 labours	Two days	180.00	720.00
5	Irrigation	01 Labour	Two days	180.00	360.00
6	Weeding and other operations	03 Labours	Two days	180.00	1080.00
7	Plant protection	01 labour	Two days	180.00	360.00
8	Picking, Harvesting, threshing and Bagging	10 Labours	One day	180.00	1800.00
	Total operational costs				**7290.00**
B	**Material**				
1	Seed	20	kg	90.00	1800.00
2	Manure				
	FYM	5	ton	1000.00	5000.00
	Vermicompost	1	ton	7000.00	7000.00
3	Neem cake	25	kg	28.00	700.00
4	Neem oil	1.2	litres	120.00	120.00
	Inputs (Trichoderma, Pseudomonas, NSKE, Cow Urine etc)				500.00
	Total material costs				**15120.00**
	Total costs (A+B)				**22410.00**
	Interest on working capital @ 6% p.a for 3 months				336.15
	Total cost of production with interest				**22746.15**
	Yield	6.75	Quintals/ha	9000/q	60750.00
	Gross returns (Rs)				60750.00
	Net returns (Rs)				**38003.85**
	Cost Benefit ratio				**2.67**

Table 3: Average Cost and return analysis of cultivation of Mash 1008 (Rs./ha).

S. No.	Input	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
A	**Operations**				
1	Land preparation by tractor	3 hours	One ha	750.00	2250.00
2	Land preparation by Labour	02 labours	One day	180.00	360.00
3	Sowing	02 labours	One day	180.00	360.00
4	Application of Organic manures & bio fertilizers	02 labours	Two days	180.00	720.00
5	Irrigation	01 Labour	Two days	180.00	360.00
6	Weeding and other operations	03 Labours	Two days	180.00	1080.00
7	Plant protection	01 labour	Two days	180.00	360.00
8	Picking, Harvesting, threshing and Bagging	10 Labours	One day	180.00	1800.00
	Total operational costs				**7290.00**
B	**Material**				
1	Seed	20	kg	120.00	2400.00
2	Manure				
	FYM	5	ton	1000.00	5000.00
	Vermicompost	1	ton	7000.00	7000.00
3	Neem cake	25	kg	28.00	700.00
4	Neem oil	1.2	litres	120.00	120.00
	Inputs (Trichoderma, Pseudomonas, NSKE, Cow Urine etc)				500.00
	Total material costs				**15720.00**
	Total costs (A+B)				**23010.00**
	Interest on working capital @ 6% p.a for 3 months				345.15
	Total cost of production with interest				**23355.15**
	Yield	3.82	Quintals/ha	12000/q	45840.00
	Gross returns (Rs)				45840.00
	Net returns (Rs)				**22484.85**
	Cost Benefit ratio				**2.04**

Toria (RSPT-1). The cost and return analysis of Toria RSPT-1 is presented in Table 4. Per hectare total variable costs which included all the variable costs excluding the family human labour were found to be Rs. 11310.00. It has been observed that the highest expenditure of Rs. 4950.00 was incurred on hired labour (machine + human) followed by Rs. 3500.00 on vermicompost and Rs. 2000.00 on farm yard manure. As far as cost incurred on hired labour is concerned, it was found that highest cost was incurred on land preparation (Rs. 2250.00) whereas lowest cost of Rs. 180.00 was incurred for irrigation purpose. The yield in quintals was found to be 2.35 per hectare. The further perusal of data indicated that gross returns were Rs. 28200.00 per hectare whereas net returns were found to be Rs. 16720.85. The benefit cost ratio was found to be 1:2.46. The results are in close proximity with Kumar, 2012 and Divya, 2014.

Table 4: Average Cost and return analysis of cultivation of Toria RSPT-1 (Rs./ha).

S. No.	Input	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
A	**Operations**				
1	Land preparation by tractor	3 hours	One ha	750.00	2250.00
2	Land preparation by Labour	02 labours	One day	180.00	360.00
3	Sowing	02 labours	One day	180.00	360.00
4	Application of Organic manures & bio fertilizers	02 labours	One day	180.00	360.00
5	Irrigation	01 Labour	One day	180.00	180.00
6	Weeding and other operations	02 Labours	One day	180.00	360.00
7	Plant protection	01 labour	One day	180.00	180.00
8	Harvesting, threshing and Bagging	05 Labours	One day	180.00	900.00
	Total operational costs				**4950.00**
B	**Material**				
1	Seed	04	kg	60.00	240.00
2	Manure				
	FYM	2	ton	1000.00	2000.00
	Vermicompost	0.5	ton	7000.00	3500.00
3	Neem oil	1.2	litres	120.00	120.00
	Inputs (Trichoderma, Pseudomonas, NSKE, Cow Urine etc)				500.00
	Total material costs				**6360.00**
	Total costs (A+B)				**11310.00**
	Interest on working capital @ 6% p.a for 3 months				169.65 170.00
	Total cost of production with interest				**11480.00**
	Oil Yield	2.35	Quintals/ha	12000/q	28200.00
	Gross returns (Rs)				28200.00
	Net returns (Rs)				**16720.00**
	Cost Benefit ratio				**2.46**

CONCLUSION

This study investigates the cost and returns of organic Basmati rice and organic pulses in Organic Farm Research Centre, Chatha. The total variable cost per hectare of Basmati was found to be Rs. 26643.75 and in case of Moong SML 668, Mash 1008 and Toria (RSPT-1), it was found to be Rs. 22410.00, Rs. 23010.00 and Rs. 11310.00, respectively. The benefit cost ratio in case of Basmati rice was found to be 1:2.97 which shows that Organic Basmati 370 is more responsive towards the inputs use and under good management and it can give even higher returns. The benefit cost ratio in case of Moong, Mash and Toria was found to be 1:2.67, 1:2.04 and 1:2.46, respectively. It has been worked out that Basmati is a profitable commercial organic crop and is most profitable as compared to organic pulses with average returns of Rs. 52556.75 per hectare acre per year. This study reveals the importance of price as an indicator in the profitability of organic crops.

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