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# Economic Analysis of Basmati under Organic and Non-Organic Conditions

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**ABSTRACT**

Jammu and Kashmir Union Territory is divided into varied agro climatic zones temperate Kashmir valley and humid sub-tropical and tropical region of Jammu. Each has its own specific geo-climatic conditions which determine the cropping pattern and productivity profits. Organic farming has been considered as one of the best options for protecting/sustaining soil health, and is gaining lot of importance in present day agriculture. The present study was confined to the Research Farm, SKUAST, Jammu, Chatha, Jammu and Kashmir Union Territory as this farm has the area under both organic and non-organic basmati. The per hectare cost of cultivation of organic and non-organic basmati rice for human labour, machine labour and irrigation charges were found to be same i.e., ₹ 6863.12, ₹ 3587.05 and ₹ 3640.00 respectively. Whereas expenditure incurred on other items such as seed and manure and fertilizer were found to be maximum in organic cultivation i.e., ₹ 1800.00/ha and ₹ 12000.00/ha respectively. The per hectare cost $C_2$ was ₹ 30201.13 for organic farm, and ₹ 19790.49 for non-organic farm. After working out management cost, i.e., 10 percent of cost $C_2$, per hectare cost $C_3$ found to be ₹ 33221.24 and ₹ 21769.53 for organic and non-organic farms respectively. Cost benefit ratio for non-organic basmati is higher as compare to organic basmati whereas the net return per hectare in organic basmati is higher as compare to non-organic basmati.

**HIGHLIGHTS**

- Cost benefit ratio for non-organic basmati is higher as compare to organic basmati whereas the net return per hectare in organic basmati is higher as compare to non-organic basmati.
- Per hectare cost incurred for the cultivation of Basmati on Organic farm is higher as compared to non-organic farm.

**Keywords:** Organic, inorganic, basmati, cost, returns

According to Indian Brand Equity Foundation 2019, Agriculture is the primary source of livelihood for about 58 per cent of India's population. Gross Value Added by agriculture, forestry and fishing is estimated at ₹ 18.53 trillion (US$ 271.00 billion) in FY18. Rice production is considered to have begun simultaneously in many countries over 6500 years ago. Rice has been produced in china since ancient times. Most believe the roots of rice came during 3000 BC in India. Maximum area under rice falls in Asia. Rice, the most important cereal crop grown in India. According to the Food and Agriculture Organization (FAO), about 26 per cent rice production of the world is produced in India. In India rice is grown in almost all the states such as Jammu & Kashmir Union Territory, Kerala, Bihar, Uttar Pradesh, Madhya Pradesh, and West Bengal etc. Introduction of high yielding varieties (HYVs) and intensive rice farming had led to magnified use

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of chemical fertilizers and pesticides. Continuous and increased/indiscriminate use of sole chemical fertilizers lead to several harmful effects on the soil environment, ground and surface water, and even atmospheric pollution, reducing the productivity of the soil by affecting soil health in terms of physical, chemical and biological properties (Prakash *et al.* 2003; Rakshit *et al.* 2015).

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 is the major crop that receives maximum quantity of fertilizers (40%) and pesticides (17-18%) and these are two major challenges in organic rice farming. They are: nutrient management and pest management. Rice is fully-grown in more than hundred countries, with a total harvested area of approximately 158 million hectares, producing over 700 million tons annually and there have been around 161.1 million hectares of rice cultivated area worldwide in 2016/2017 (OECD/FOA, 2017). In India, the cultivated area under rice is 433.88 lakh ha. with a production of 115.60 million tonnes (Dept. of Agriculture, Cooperation & Farmers Welfare, 2019).

Jammu and Kashmir Union Territory is divided into varied agro climatic zones temperate Kashmir valley and humid sub-tropical and tropical region of Jammu. Each has its own specific geo-climatic conditions which determine the cropping pattern and productivity profits. Therefore, agricultural sector continues to stay the vital sector for socio-economic development of the individuals. In J&K, the area under rice cultivation is 262.01 thousand ha. with the production of 6161 thousand quintals and the productivity of 23.51 quintals per hectare. The area under rice in Jammu division is about 131.52 thousand ha. with production of 2839.00 thousand quintals (Digest of Statistics J&K, 2018-19).

Organic farming has been considered as one of the best options for protecting/sustaining soil health, and is gaining lot of importance in present day agriculture. Significant enhancements in soil physical, fertility and biological properties have been reported in several organic farming experiments. Although grain yield under organic farming is usually not up to under standard farming, it is feasible to have increased rice yields under the former. Organic agriculture enables ecosystems to better adjust to the effects of climate change, and also improves carbon sequestration potential of the soil. Therefore the present study is undertaken with the objective to find out the cost and returns of Basmati under organic and non-organic conditions.

## MATERIAL AND METHODS

The present study was confined to the Research Farm, SKUAST, Jammu, Chatha, Jammu and Kashmir Union Territory as this farm has the area under both organic and non-organic basmati.

**Cost and Return Analysis**: For computation of costs and returns, the concepts framed by CACP were used.

Cost A1 = Expenditure on casual labour, farm machinery, seeds, fertilizer and manure, plant protection chemicals, irrigation, miscellaneous expenditure (cost of transportation, baskets and ropes) and interest on working capital + land revenue.

Cost A2 = Cost A1 + rent paid for leased-in land.
Cost B1 = Cost A1 +interest on value of owned fixed capital excluding land.

Cost B2 = Cost B1 + rental value on owned land (net of land revenue) + rent paid for leased-in land.

Cost C1 = Cost B1 +imputed value of owned labour.

Cost C2 = Cost B2 + imputed value of owned labour.
Cost C3 = Cost C2 + 10% of Cost C2 (as managerial cost)

### 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.

$$\text{BCR} = \Sigma\left\{(B_t)/(1+r)^t / \Sigma\left[(C_t)/(1+r)^t\right]\right\}$$

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, ……., $i$, ……., 30)

## RESULTS AND DISCUSSION

Cost of cultivation of organic and non-organic basmati is presented in table 1, which indicated the cost structure for growing basmati rice in organic and non-organic farms. The per hectare cost of cultivation of organic and non-organic basmati rice for human labour, machine labour and irrigation charges were found to be same i.e., ₹ 6863.12, ₹ 3587.05 and ₹ 3640.00 respectively. Whereas expenditure incurred on other items such as seed and manure and fertilizer were found to be maximum in organic cultivation i.e., ₹ 1800.00/ha. and ₹ 12000.00/ha. respectively. For non-organic basmati expenditure incurred on weedicides and pesticides was found to be higher i.e., ₹ 1350.00 as compare to organic basmati i.e., ₹ 60/ha. However, the operational cost was to the tune of 99.48 per cent for organic farm and 99.21 for non-organic farm to that of total cost. Expenditure on human labour, machine labour, seed, manure and fertilizer, plant protection chemicals was the important components of operational cost. Similarly land revenue and interest on fixed capital were the major components of fixed cost, which accounted for ₹ 154.7/ha. for both organic and non-organic farm.

**Table 1:** Item wise cost of cultivation of organic and non-organic basmati on sampled farm (₹/ha.)

| Items | Organic | Non-organic |
|---|---|---|
| **(A) Operational cost** | | |
| Labour | | |
| Human Labour | 6863.12 | 6863.12 |
| Machine Labour | 3587.05 | 3587.05 |
| **Total Labour** | 10450.17 | 10450.17 |
| Seed | 1800.00 | 1400.00 |
| Manure & fertilizer | 12000.00 | 1587.12 |
| Weedicides and Pesticides | 60.00 | 1350.00 |
| Irrigation charges | 3640 | 3640 |
| Interest on working capital | 2096.26 | 1208.50 |
| **Total** | **30046.43** | **19635.79** |
| **(B) Fixed Cost** | | |
| Land revenue | 140.00 | 140.00 |
| Rental value of land | 0.00 | 0.00 |
| Interest on fixed capital (excluding land) | 14.7 | 14.7 |
| **Total** | **154.7** | **154.7** |
| **Total cost (A+B)** | **30201.13** | **19790.49** |

### Concept wise cost of cultivation

In order to view the cost of cultivation of organic and non-organic basmati, various cost concepts were also worked out on per hectare basis and are presented in Table 2. The table revealed that per hectare cost $A_1$ and $A_2$ for the organic and non-organic farms were same i.e., ₹ 30046.43 and ₹ 19635.79 respectively as the value of rent paid for leased land was negligible which constitutes about 90.44 percent and 90.11 percent of total cost (Cost $C_3$) respectively. Similarly, per hectare cost $B_1$ was ₹ 30061.13 and ₹ 19650.49 in organic and non-organic farm of Research farm, SKUAST-Jammu, respectively whereas cost $B_2$ was ₹ 30201.13 for organic farm and ₹ 19790.49 for non-organic farm. The cost $C_1$ constituted was equal to cost $B_1$ as there was no involvement of family labour. The per hectare cost $C_2$ was ₹ 30201.13 for organic farm, and ₹ 19790.49 for non-organic farm. After working out management cost, i.e., 10 percent of cost $C_2$, per hectare cost $C_3$ found to be ₹ 33221.24 and ₹ 21769.53 for organic and non-organic farms respectively.

**Table 2:** Cost concept wise cost of cultivation of basmati on sampled farms (₹/ha)

| Particulars category | Organic | Non-organic |
|---|---|---|
| **Cost – $A_1$** | | |
| Human labour | 6863.12 | 6863.12 |
| Machine labour | 3587.05 | 3587.05 |
| Seed | 1800.00 | 1400.00 |
| Manure & Fertilizer | 12000 | 1587.12 |
| Plant protection chemicals | 60.00 | 1350.00 |
| Irrigation charges | 3640.00 | 3640.00 |
| Interest on working capital | 2096.26 | 1208.50 |
| Total cost - $A_1$ | 30046.43 | 19635.79 |
| **Cost - $A_2$** | | |
| Cost – $A_1$ | 30046.43 | 19635.79 |
| Rent paid for leased in land | 0.00 | 0.00 |
| Total cost – $A_2$ | 30046.43 | 19635.79 |
| **Cost – $B_1$** | | |
| Cost – $A_1$ | 30046.43 | 19635.79 |
| Interest on fixed capital (excluding land) | 14.70 | 14.70 |
| Total cost – $B_1$ | 30061.13 | 19650.49 |
| **Cost – $B_2$** | | |
| Cost – $B_1$ | 30061.13 | 19650.49 |
| Rental value of owned land | 140.00 | 140.00 |
| Total cost – $B_2$ | 30201.13 | 19790.49 |

| | | |
|---|---|---|
| **Cost – $C_1$** | | |
| Cost – $B_1$ | 30061.13 | 19650.49 |
| Family labour | 0.00 | 0.00 |
| Total cost $C_1$ | 30061.13 | 19650.49 |
| **Cost – $C_2$** | | |
| Cost – $B_2$ | 30201.13 | 19790.49 |
| Family Labour | 0.00 | 0.00 |
| Total cost – $C_2$ | 30201.13 | 19790.49 |
| Cost C3 | | |
| Cost C2 | 30201.13 | 19790.49 |
| Cost of management (10% of Cost-C2) | 3020.11 | 1979.04 |
| Cost C3 | 33221.24 | 21769.53 |

**Economics of basmati cultivation**

The comparative economics of basmati cultivation under the sampled farm is presented in Table 3 which revealed that per hectare yield of main product and by product of basmati from organic farm were found to maximum in organic basmati for both main and by product i.e., 30 quintals and 75 quintals respectively. Per hectare yield of main product and by product of basmati from non-organic farm were 28 quintals and 70 quintals respectively. For main product and by product of organic basmati returns were found to maximum i.e., ₹ 30046.43/ha. and ₹ 11250.00/ha., respectively, with a total produce of basmati i.e., ₹ 146250.00/ha whereas in non-organic condition the returns for main product and by product were ₹ 105000.00/ha. and ₹ 10500.00/ha., respectively, with a total produce of ₹ 115500.00/ha.

**Table 3:** Economics of Basmati rice on sampled farm (₹/ha.)

| Sl. No. | Particulars | Organic | Non-organic |
|---|---|---|---|
| **1** | **Cost** | | |
| | Total variable cost | 30046.43 | 19635.79 |
| | Total Fixed cost | 154.7 | 154.7 |
| | Total cost | 30201.13 | 19790.49 |
| **2** | **Return** | | |
| | Gross Return | 146250.00 | 115500.00 |
| | Net return | 116048.90 | 98235.59 |
| | C.B. Ratio | 1:4.84 | 1:5.96 |

Net returns and cost benefit ratio over different costs is presented in Table 4 which revealed that per hectare net returns of organic basmati cultivation over cost $A_1$, cost $A_2$, cost $B_1$, cost $B_2$, cost $C_1$, cost $C_2$ and cost $C_3$ were, ₹ 116203.57, ₹ 116203.57, ₹ 116188.87, ₹ 116048.87, ₹ 116188.87, ₹ 116048.87, ₹ 113028.76, respectively, whereas per hectare net returns of non-organic basmati cultivation over cost $A_1$, cost $A_2$, cost $B_1$, cost $B_2$, cost $C_1$, cost $C_2$ and cost $C_3$ were, ₹ 95864.21, ₹ 95864.21, ₹ 95849.51, ₹ 95709.51, ₹ 95849.51, ₹ 95709.51, and ₹ 93730.47, respectively. The net income over various costs on non-organic farm i.e. cost $A_1$ (Rs.95864.21), $A_2$ (₹ 95864.21), $B_1$ (₹ 95849.51), $B_2$ (₹ 95709.51), $C_1$ (₹ 95849.51), $C_2$ (₹ 95709.51), and $C_3$ (₹ 93730.47). The returns over each rupee invested in basmati cultivation on non-organic farm i.e. cost-benefit ratio were as cost $A_1$ and $A_2$ (1:5.88), $B_1$ (1:5.87), $B_2$ (1:5.84), $C_1$(1:5.87) and $C_2$ (1:5.84) and $C_3$ (1:5.30). As per the results, cost benefit ratio for non-organic basmati is higher as compare to organic basmati whereas the net return per hectare in organic basmati is higher as compare to non-organic basmati. Thus, the farmer who can incurred higher expenditure can go for organic cultivation.

**Table 4:** Net Return and Cost-Benefit ratio over different costs (₹/ha.)

| Particulars | Net Return | | Cost Benefit Ratio | |
|---|---|---|---|---|
| | Organic | Non -Organic | Organic | Non – Organic |
| Cost $A_1$ | 116203.57 | 95864.21 | 1:4.87 | 1:5.88 |
| Cost $A_2$ | 116203.57 | 95864.21 | 1:4.87 | 1:5.88 |
| Cost $B_1$ | 116188.87 | 95849.51 | 1:4.86 | 1:5.87 |
| Cost $B_2$ | 116048.87 | 95709.51 | 1:4.84 | 1:5.84 |
| Cost $C_1$ | 116188.87 | 95849.51 | 1:4.86 | 1:5.87 |
| Cost $C_2$ | 116048.87 | 95709.51 | 1:4.84 | 1:5.84 |
| Cost $C_3$ | 113028.76 | 93730.47 | 1:4.40 | 1:5.30 |

## CONCLUSION

The per hectare cost of cultivation of basmati rice were ₹ 30201.13 on organic farm, and ₹ 19790.49 on non-organic farm while as the respective cost A1 (₹ 116203.57), A2 (₹ 116203.57), B1 (₹ 116188.87), B2 (₹ 116048.87), C1 (₹ 116188.87), C2 (₹ 116048.87), and C3 (₹ 113028.76) for organic farm cost A1 (₹ 95864.21), A2 (₹ 95864.21), B1 (₹ 95849.51), B2 (₹ 95709.51), C1 (₹ 95849.51), C2 (₹ 95709.51), and C3 (₹ 93730.47) for non-organic. The cost- benefit ratio were 1:3.84 and 1:4.96 for organic and non-organic basmati respectively. Per hectare total variable cost from organic and non-organic farm was ₹ 30046.43 and ₹ 19635.79 respectively. Per hectare total fixed was same for both organic and non-organic farm.

The gross return for organic and non-organic farm were ₹ 146250.00 and ₹ 115500.00 respectively. The net return for organic and non- organic farm were ₹ 116048.90 and ₹ 98235.59, respectively.

## REFERENCES


Bwala, M. and John, A. 2018. Profitability analysis of paddy production: A case of agricultural zone 1, Niger State Nigeria. *J. of the Bangladesh Agric. Univ.*, **16**(1): 88-92.

Cameron, L.A 1999. The importance of learning in the adoption of high-yielding variety seeds. *American Journal of Agricultural Economics*, **81**: 83-94.

DES J&K. 2020-21 D*igest of statistics, J&K.* Directorate of Economics and Statistics, Government of Jammu and Kashmir.

Kachroo. J. and Kachroo, D. 2007. Economics Analysis of Fine Rice Production under Subtropical Agro-climatic Zone of Jammu and Kashmir State. *Agricultural Situation in India,* **08**(2): 413-417.

Marothia, D.K., Singh, R.K., Chandrakar, M.R. and Jain, B.C. 2007. Economics and Marketing of Aromatic Rice - A Case Study of Chhattisgarh. *Agricultural Economics, Research Review*, **20**: 29-46.

Mohandas, K. and Thomas, E.K. 1997. Economic Analysis of Rice Production in Kuttanad Areas of Kerala. *Agricultural Situation India*, **43**(3): 555-561.

Prakash, Y.S., Bhadoria, P.B.S., Rakshit, A. and Wais, A. 2003. Response of Basmati rice to integrated nutrient sources in lateritic soil of eastern India. *Italian J. Agron*., **6**: 143-150.

Rakshit, A., Singh, H.B. and Sen, A. 2015. Nutrient Use Efficiency: From Basic to Advances. XXIII, 417 p. 56 illus., 38 illus. in color. Springer-Verlag GmbH. Heidelberger Platz 3 14197 Berlin Germany. ISBN 978-81-322-2169-2.