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Cost, returns and resource use efficiency in Jalgaon brinjal production in Jalgaon district of Maharashtra

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Abstract

The study *viz.* “Economics of production and marketing of Jalgaon Brinjal in Jalgaon district of Maharashtra” was conducted in six villages of Yawal and Bhusawal tehsil of Jalgaon district. The objective of the study was to estimate the resource use, cost returns and productivity of brinjal. The study was based on the primary data of brinjal growers for the year 2018-19, spread over the six randomly selected villages of two tehsils. From each selected village, 15 growers, 5 from each size group *viz.* small, medium and large were randomly selected.

Thus the total sample consisted of 30 farmers each of small, medium and large size groups, the average per hectare use of resources such as human labour, bullock labour, machine power, seeds and manure was 592.22 man-days, 11.70 pair days, 2.25 hours, 1.43 kg and 31.18 tonnes respectively. The average use of fertilizers was 286.75 kg nitrogen 391.26 kg Phosphorus and 387.91 kg potash per hectare at all level. Per hectare cost cultivation of brinjal was estimated to ₹ 439518.49. Among the items of total cost, the rental value of land, human labour, bullock labour, manure, PPC, etc. were the major items of cost in the total cost of cultivation of brinjal. The cost 'A' and cost 'B' were ₹ 235159.04 and ₹ 426659.67 respectively. The average production of 225.99 quintal per hectare of produce was obtained from Jalgaon brinjal. The gross returns of obtained were ₹ 1016970.00 at the overall level with B:C ratio was 2.31 and profit at cost 'C' ₹ 577451.5. Regression coefficient of manure, Nitrogen, Phosphorus, Potash and irrigation cost were positive and significant while male labour, female labour were positive but non-significant. Plant protection cost was negatively significant. At overall level, there was a large variation amongst farmers. The coefficient of multiple determination (R^2) was 0.94. The MVP to MFC ratio was found to be highest in Irrigation (86.70), followed by Nitrogen (33.47), Phosphorus (10.33), Potassium (5.12), Female labour (1.58), Manure (1.47) and Male labour (0.14).

Keywords: cost, Jalgaon brinjal, input use, returns

Introduction

India is second largest producer of vegetables next to China. India grows the maximum number of vegetables in one or the other parts of the country. Vegetable cultivation is spread all over the country and is no more confined to rural areas. Vegetable cultivation has become commercial venture since it provided to be intellectually satisfying and economically rewarding.

Brinjal has origin in India. Its botanical name is *Solanum melongena* L. It belongs to family Solanaceae. Different varieties of brinjal from private sector are bioseed companys-brinjal trishul, Ankur-Ajay, Mauli-Vishal, Gaurav-Panchganga etc. and released by various agricultural universities are Pusa purple Long, Bhagyamathi, Green Spiny, Polur, Swarna Shobha (HABR-4), Kashi Prakash (IVBR-1), Krishna, Mnjari gota, Vaishali, Pragati, Phule harit. In brinjal no endogenous toxins or significant levels of anti-nutritional factors have been found till date. It is so not considered a pathogen and is not capable of causing any disease in humans, animals or plants. Brinjal fruit are available throughout the year. It is used in curry preparation giving the taste of non-vegetable food. The Bhurta is common dish in North India, prepared from brinjal. Bhurta is also famous in Khandesh region. Apart from this it is used as medicine to cure toothache and for diabetic patient. Besides from fruit leaves and seeds used in medicine. It has about 1.4 per cent protein, 4 per cent carbohydrate, 0.3 per cent fat, 0.3 per cent minerals and 1.3 per cent fibre. Vitamin C content is around 6mg/100g and vitamin A is 30 I.U. White cultivars contain twice as much crude fibre as the purple and green cultivars. The amino acid content is more in the purple cultivars than the white varieties. On the contrary, potassium and chloride content is highest in green and lowest in purple variety. Sometimes brinjal fruits taste bitter which is due to the presence of glycoalkaloids that are of wide occurrence in plants belonging to Solanaceae family.

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Generally, high amount of glycoalkaloids (20 mg/100g fresh wt.) produces a bitter taste and off flavour. In most of the commercial cultivars of India, usually glycoalkaloid contents vary from 0.37 to 4.83 mg/ 100g fresh weight. Studies on organic and mineral element analysis of matured brinjal fruits revealed that copper content and polyphenol oxidase activity is higher in the purple coloured fruits than in white cultivars, whereas iron content and catalase activity is highest in the green and lowest in white cultivars. Studies also suggested that the green cultivar had better processing properties than the more popular purple cultivars. The white cultivars, long white and round white, lack anthocyanins.

The production and consumption of vegetables has expanded enormously in recent years, with the global growth in the production of more than 50% in the last decade. The rate of increasing is much higher than for other commodities. Vegetables constitute important part of varied and healthy diet and provides significant amount of vitamin, antioxidants and other substances that prevent disease and contribute to an improvement in the quality of life. As a consequence, It is expected that in the coming years, Vegetable crop production will continue its expansion.

Brinjal is native of India. Brinjal or eggplant is an important crop of sub-tropics and tropics. The name brinjal is popular in Indian subcontinent and is derived from Arabic and Sanskrit whereas the name eggplant has been derived from the shape of the fruit varieties which are white and resemble in shape to chicken eggs. It is also called aubergine (French word) in Europe. The brinjal is of much importance in the warm areas of Far East, being grown extensively in India, Bangladesh, Pakistan, China and the Philippines. It is also popular in Egypt, France, Italy, and United states. In India, it is one of the most common, popular and principal vegetable crop grown throughout the country except in higher altitudes, It is a versatile crop adopted in different agro-climatic regions and can be grown throughout the year. It is a perennial but grown commercially as an annual crop. A number of cultivars are grown in India, consumer preference being dependent upon fruit colour, size and shape.

Nutritive Value of Brinjal

Brinjal fruit (unripe) is primarily consumed as cooked vegetable in various ways and dried shoots are used as fuel in rural areas. It is low in calories and fats, contains mostly water, some protein, fibre and carbohydrates. It is a good source of minerals and vitamins and is rich in total water soluble sugars, free reducing sugars, amide proteins among other nutrients. Jalgaon is known as city of Brinjals. Jalgaon received special recognition because of this vegetable. Light Green color brinjals from Jalgaon are famous for bharit (mashed brinjal). Yaval and Bhusaval talukas in Jalgaon district are very famous for the brinjals that are specifically used for preparing bharit and hence they are locally known as "Bharit vanga".

Bamnod village in Yawal Taluka is famous for large-sized variety of Bharit Brinjals. Farmers in this region specifically cultivate bharit vangi (mashed brinjal). Village rejoices unique medium spicy taste of Bharit in the form of small group parties and get-togethers. These bharit brinjals are grown in the area near Tapi river basin. Asoda is a village in Jalgaon District; Maharashtra state in western India, which itself is located on the northern Deccan Plateau. It is 5 km from Jalgaon, located within the productive, irrigated agricultural region of Khandesh. Asoda is famous for bharit

brinjal cultivation. Other villages in which cultivation of bharit brinjal occurs are Mamurabad, Bhadli and Bhalod. Soil in Jalgaon which is black and well drained makes brinjal cultivation most favourable in this region. Bharit brinjal cultivars prefer small-sized seeds to get large brinjal crop from Khandesh's rich medium-black fertile soil. These large-sized bharit brinjals have now turned popular throughout the State.

Jalgaon Brinjal recently got GI tag because of its uniqueness and to know the existing production level and marketing efficiency, the study on Economics of production and marketing of Jalgaon brinjal in Jalgaon district is selected with following objective.

Objectives

1. To study the resource use, costs and returns of Jalgaon Brinjal.
2. To estimate resource use efficiency.

Methodology

The sampling design adopted for the investigation was two stage purposive and random sampling with sample tahsil as a primary unit of sampling and village as a secondary unit of sampling. Three villages each from Yawal and Bhusaval tehsil were selected purposively from for study on the basis of area under brinjal cultivation. The list of brinjal growers along with their operational area and area under brinjal cultivation for each of the selected villages were prepared on the basis of information obtained from village revenue office. The Brinjal growers were then arranged in descending order of their operational area for each of the selected villages and five growers from each of the three predetermined size classes (i.e. area under Brinjal cultivation) viz., Group I (up to 0.40ha), Group II (0.41 to 0.80ha) and Group III (0.81 ha and above) thereby making a total of 15 growers for each village were selected randomly. Thus, the total sample size for the study was consists of 90 brinjal growers comprising 30 each size group.

To fulfil the specific objectives of the study, based on the nature and extent of availability of data, analytical tools and techniques viz., tabular analysis was adopted to compile the general characteristics of the sample farmers, Standard cost concepts Cost-A, Cost-B, Cost-C, Estimation of resource use productivity Cobb - Douglas type production function, Resource use efficiency.

Results and Discussion

Average Family Size and It's Composition

The information about the size and family gives an idea about the available labour force and also indirectly indicates the consumption needs of the family. The details about the size and compositions of the selected farm families growing brinjal is presented in the Table 1.

It can be seen from the table that, at the overall level the average size of family was 5.06 consisting 51.40 per cent male and 38.53 per cent females.

Percentage of members working on farm was highest in small size of group, followed by medium and large size of group and they were 52.94, 52.53, 47.26, respectively. At overall level age is 48.24 years. The average family size of the small size group was found to be 5.10, consisting of 49.02 per cent males and 38.63 per cent females and 12.35 per cent childrens. Percentage of members working on the farm was 52.94 per cent. In small size group age was 46.37 years.

In medium size group average Family size was 5.14 consisting 54.47 per cent male, 36.38 per cent females and 9.14 per cent childrens. Percentage of members working on farm was 52.53, age was 51.13 years.

In large size group average size of family was 4.93 consisting 50.71 per cent male 40.57 per cent females and 8.72 per cent children. Percentage of members working on farm, age in years was 47.26 and 47.23, respectively.

Table 1: Average Family size and composition of Jalgaon brinjal farmers (Numbers)

Sr. No.	Particulars	Size Groups			
		Small	Medium	Large	Overall
1	Family size (Number)				
A	Male	2.50 (49.02)	2.80 (54.47)	2.50 (50.71)	2.60 (51.40)
B	Female	1.97 (38.63)	1.87 (36.38)	2.00 (40.57)	1.95 (38.53)
C	Children	0.63 (12.35)	0.47 (9.15)	0.43 (8.72)	0.51 (10.07)
	Sub Total	5.10 (100.00)	5.14 (100.00)	4.93 (100.00)	5.06 (100.00)
2	Members working on Farm	2.70 (52.94)	2.70 (52.53)	2.33 (47.26)	2.58 (50.96)
3	Age (years)	46.37	51.13	47.23	48.24

Figures in the parentheses are percentage to the total

Educational Status of Jalgaon Brinjal Growers

Education is an important factor influencing managerial ability and technical knowledge of the farmers. The information regarding education is presented in Table 2.

At the overall level 21.11 per cent of family members were

having education upto degree level, 40.00 per cent members having education upto higher secondary level, 14.44 per cent family members having education upto secondary level, 20.00 per cent family members having education upto primary level and 4.44 per cent family members were illiterate.

Table 2: Educational Status of Jalgaon Brinjal Growers (Numbers)

Sr. No.	Particulars	Size Groups			
		Small	Medium	Large	Overall
1	Up to Primary	5.00 (16.67)	7.00 (23.33)	6.00 (20.00)	6.00 (20.00)
2	Up to Secondary	4.00 (13.33)	5.00 (16.67)	4.00 (13.33)	4.33 (14.44)
3	Up to Higher secondary	13.00 (43.33)	11.00 (36.67)	12.00 (40.01)	12.00 (40.01)
4	Up to Degree	6.00 (20.00)	6.00 (20.00)	7.00 (23.33)	6.33 (21.11)
5	Illiterate	2.00 (6.67)	1.00 (3.33)	1.00 (3.33)	1.33 (4.44)
	Total	30.00 (100.00)	30.00 (100.00)	30.00 (100.00)	30.00 (100.00)

Figures in the parentheses are percentage to the total

It was observed that in small size group 20.00 per cent family members were educated upto degree level, 43.33 per cent members were upto higher secondary level, 13.33 per cent upto secondary level, 16.67 per cent family members were upto primary level and 6.67 per cent family members were illiterate. It was observed in small size group.

In medium size group, 20.00 per cent family members were educated upto degree level, 36.67 per cent upto higher secondary level, 16.67 per cent upto secondary level, 23.33 per cent upto primary level and 3.33 per cent family members were illiterate.

In large size group 23.33 percent of family members were educated upto degree level, 40.00 per cent upto higher secondary, 13.33 per cent upto secondary level, 20.00 per cent upto primary level and 3.33 per cent family members were illiterate in large size group.

Land Use Pattern of Jalgaon Brinjal Farmers

The average land holding was 2.63, 2.89 and 3.92 hectare in small, medium and large size group of sample farmers respectively with an overall average holding of 3.15 hectares. The net sown area at the overall level was 3.03 hectares, which accounted for 96.35 per cent of total holdings. At the overall level the area under permanent fallow land was 3.65 per cent. At overall level, the gross cropped area was 3.81 hectares and cropping intensity was 126.04 per cent.

In small size holding the net sown area was 2.54 hectares, which accounted for 97.03 per cent, the gross cropped area was 3.26 hectares and cropping intensity was 128.35 per cent In medium size holding the net sown area was 2.81 hectares, which accounted for 97.20 per cent, the gross cropped area

was 3.57 hectares and cropping intensity was 127.05 per cent. In large size holding the net sown area was 3.74 hectares, which accounted for 95.41 per cent, the gross cropped area was 4.59 hectares and cropping intensity was 122.73 per cent.

Cropping Pattern of Jalgaon Brinjal Growers

The cropping pattern is another vital factor influencing the level of expenses on the farm and returns from farm business. It is also indicator of the economic condition of selected farm families.

At the overall level, Banana occupied the highest i.e. 37.17 per cent of gross cropped area. Followed by brinjal 16.41 per cent, fruit vegetables 7.26 per cent, ber 7.22 per cent, wheat 5.81 per cent, cotton 4.58 per cent, groundnut 3.64 per cent, sorghum 4.52 per cent, onion 4.38 per cent, groundnut 2.24 per cent, maize 2.15 per cent and fodder (sorghum) 1.09 per cent respectively. At the overall level cropping intensity was 126.04 per cent. Among the different size of holding the cropping intensity was 128.35 per cent, 127.05 per cent and 122.73 per cent in small, medium and large size groups, respectively.

The cropping intensity of small size group was more than medium and large size groups. At the overall level gross cropped are was 3.81 ha. It was 3.26, 3.57, 4.59 ha. In small, medium and large size groups, respectively.

Resource Use, Costs and Returns of Jalgaon Brinjal

Per ha physical inputs used in brinjal production were estimated and presented in Table 3. It can be observed from the table that, at the overall level, the use of total human labour was 592.22 man days per hectare, comprising 136.13

male labour and 456.09 female labour days. The average per hectare labour utilization was 566.69, 611.21 and 598.75 man days for small, medium and large size of groups. At the overall level, per hectare use of bullock labour was 11.70 pair days. The per hectare bullock power utilization was observed more in case of small group of holding (12.46 pair days) than large (11.39 pair days) and medium (11.26 pair days) size group of holdings. At the overall level 1.43 (kg) seeds were used. Seeds were used more in medium size group (1.79 kg) followed by small size group (1.32 kg) and large size group (1.19 kg). At the overall level, the use of manure was 31.18 tonnes per hectare. The use of manure was found more in medium size group of holdings than small and large size

group of holdings. At the overall level, per hectare use of chemical fertilizers i.e Nitrogenous, Phosphorus and Potash was 286.75, 391.26 and 387.91 kg ha respectively. The farmers from medium size group had used more fertilizers than small and large size groups. At the overall level per hectare irrigation cost was (₹ 6122.55) per hectare irrigation costs were more in medium size group (₹ 6182.75) than large (₹ 6144.75) and small (₹ 6040.48) size groups. It can be observed from the table that, at overall level, the plant protection costs was ₹ 15416.04. The use of plant protection was found more in small (₹ 15799.17) size group of holding than medium (₹ 15696.93) and large (₹ 14752.02) size group of holding.

Table 3: Per hectare physical inputs used in Jalgaon brinjal production

Sr. No.	Particulars	Size of group holding			Overall
		Small	Medium	Large	
1	Human labour (Days)	566.69	611.21	598.75	592.22
	Male	139.25	142.19	126.94	136.13
	Female	427.44	469.02	471.81	456.09
2	Bullock Labour(Pair day)	12.46	11.26	11.39	11.70
3	Machine labour(Hours)	4.55	1.47	0.73	2.25
4	Seed (kg)	1.32	1.79	1.19	1.43
5	Manures (Tonnes)	32.10	33.33	28.10	31.18
6	Fertilizers (kg)				
	N	304.81	284.12	271.33	286.75
	P	368.20	384.71	420.87	391.26
	K	384.04	408.63	371.05	387.91
7	Irrigation costs (₹)	6040.48	6182.75	6144.41	6122.54
8	Plant protection (₹)	15799.17	15696.93	14752.02	15416.04

Cost of cultivation of Jalgaon Brinjal

Per hectare cost of cultivation of brinjal was worked out by using standard cost concepts. The information on various items of cost of cultivation of brinjal in Jalgaon district for different size groups of holdings is presented in table 4.

It can be observed from the table that, at the overall level per hectare cost of cultivation of brinjal i.e. Cost 'C' was ₹ 439518.49. Amongst the different items of cost, rental value of land was the major item of cost which accounted for ₹ 185871.48 (44.49%) followed by manure ₹ 62357.79 (14.93%), hired human labour ₹ 72834.60 (16.57%) where male ₹ 27225.24 (6.19%) and female ₹ 45609.36 (10.38%), fertilizer ₹ 34488.13 (7.85%), plant protection ₹ 15416.04 (3.51%), family labour ₹ 12858.13 (3.08%), where male

labour ₹ 10335.80 (2.47%), female ₹ 2523.02 (0.60%), bullock labour ₹ 1644.95 (2.92%), interest on working capital ₹ 13140.88(2.99%), seed ₹ 7170.99 (1.72%), irrigation ₹ 6122.55(1.39%), machinery ₹ 5975.20 (1.41%), interest on fixed capital ₹ 5629.22 (1.35%), incidental charges ₹ 1811.67 (0.43%), Repairs ₹ 1192.76 (0.29%), land revenue ₹ 210.83 (0.05%) of the total cost of cultivation of brinjal, Cost 'A' was ₹. 235159.04 (53.50%) and Cost 'B' was ₹ 4426659.67 (97.07%). In case of cost 'B' and cost 'C' It was seen that, the cost was decreasing with increase in size group of holding. The per quintal cost of brinjal cultivation was observed to be high for small size of holdings as compared to medium and large size group of holdings.

Table 4: Itemwise cost of production of Jalgaon brinjal (per ha)

Sr. No.	Particulars	Group			Overall
		Small	Medium	Large	
A.	Cost of Cultivation				
i)	Hired Labour				
	Male	27850.73 (6.26)	28437.87 (6.34)	25387.13 (5.97)	27225.24 (6.19)
	Female	42744.43 (9.61)	46902.47 (10.46)	47181.17 (11.09)	45609.36 (10.38)
	Total labour	70595.16 (15.87)	75340.34 (16.80)	72568.3 (17.06)	72834.60 (16.57)
ii)	Bullock labour	12463.69 (3.09)	11083.2 (2.73)	11387.96 (2.94)	11644.95 (2.92)
iii)	Seed	6594.54 (1.48)	8957.73 (2.00)	5960.71 (1.40)	7170.99 (1.63)
iv)	Machinery	10977.06 (2.47)	4729.72 (1.05)	2218.82 (0.52)	5975.20 (1.35)
v)	Manure	64204.84 (14.44)	66665.53 (14.86)	56202.99 (13.22)	62357.79 (14.19)
vi)	Fertilizer	37909.08 (8.52)	35782.74 (7.98)	29772.58 (7.00)	34488.13 (7.85)
vii)	Irrigation	6040.48 (1.36)	6182.75 (1.38)	6144.41 (1.44)	6122.55 (1.39)
viii)	PPC	15799.17 (3.55)	15696.93 (3.50)	14752.02 (3.47)	15416.04 (3.51)
ix)	Repairs	1132.09 (0.25)	1256.55 (0.28)	1189.63 (0.28)	1192.76 (0.27)
x)	Incidental charges	1884.79 (0.42)	1792.08 (0.40)	1758.14 (0.41)	1811.67 (0.41)
xi)	Working Capital	227600.903 (51.45)	227487.557 (50.98)	201955.54 (47.74)	219014.67 (49.83)
xii)	Interest on working	13656.05	13649.25	12117.33	13140.88

	capital @6%	(3.07)	(3.04)	(2.85)	(2.99)
xiii)	Depreciation	1348.61 (0.30)	2097.1 (0.47)	4932.27 (1.16)	2792.66 (0.64)
xiv)	Land revenue	210 (0.05)	208.5 (0.05)	214 (0.05)	210.83 (0.05)
	Cost A	242815.57 (54.59)	243442.41 (54.87)	219219.14 (51.55)	235159.04 (53.50)
xv)	Rental value of land	177836.49 (39.98)	190107.69 (42.39)	189670.04 (44.60)	185871.41 (42.29)
xvi)	Interest on F.C.	3536.23 (0.80)	4259.86 (0.95)	9091.56 (2.14)	5629.22 (1.28)
	Cost B	424188.288 (95.65)	437809.965 (97.88)	417980.75 (98.29)	426659.67 (97.07)
	Family labour				
i)	Male	16625.95 (3.74)	8571.18 (1.91)	5810.28 (1.37)	10335.80 (2.35)
ii)	Female	3962.9 (0.89)	2124.94 (0.47)	1481.23 (0.35)	2523.02 (0.57)
	Total	20588.85 (4.63)	10696.12 (2.38)	7291.51 (1.71)	12858.83 (2.93)
	Cost C	444777.14 (100.00)	448506.08 (100.00)	425272.26 (100.00)	439518.49 (100.00)
B.	Output				
	Main produce	194.23	216.32	267.43	225.99
	By produce	0.00	0.00	0.00	0.00
	Gross value	874035.00	973440.00	1203435.00	1016970.00
C.	Per Qtl. Cost of Production	2289.95	2073.35	1590.22	1984.51

The per hectare total cost of cultivation for small, medium and large size group was ₹. 444777.14 ₹. 448506.08 and ₹. 425272.26 respectively. There was higher variation in use of different inputs among all types of size groups which has resulted into vast difference in cost of cultivation of brinjal.

Costs, Returns, Gross Income and B:C Ratio of Jalgaon Brinjal

The information on per hectare cost, returns, gross income and B:C ratio of brinjal are presented in given Table 5. From the table it is observed that, per hectare gross income received by brinjal growers was ₹. 874035.00, ₹ 973440.00 and 1203435.00 for small, medium and large size group of holdings respectively. At the overall level it was ₹ 1016970.00 with per hectare production of 225.99 quintals of brinjal. Among the different size of holdings per hectare yield were 194.23, 216.32 and 267.43 quintals in small, medium and large size groups respectively. It indicates that per hectare yield of brinjal was highest in large size group. The per

hectare profit at cost C was highest in case of large size group (₹. 778162.74.) followed by medium size group of farm (₹. 524933.92) and small size group (₹.429257.86).

The benefit cost ratio at cost 'C' was highest in case of large size group (2.83) of holding. Followed by medium size group (2.17) and small size group (1.97) of holdings. At overall level, benefit cost ratio was 2.31.

The cultivation of brinjal is economically viable as the benefit cost ratio at all the levels of cost and groups were observed more than unity, Hence the hypothesis that Jalgaon Brinjal is Profitable is proved.

Results of Cobb-Douglas Production Function

It can be revealed from the table 6. That, at the overall level the value of co-efficient of multiple determination was estimated 94 per cent. The value of co-efficient of multiple determination thus indicated that the nine resource variables jointly together explained 94 per cent variation in the output of brinjal.

Table 5: Costs, returns, gross income and B:C ratio (per ha)

Sr. No.	Particulars	Size Group			
		Small	Medium	Large	Overall
1	Gross returns	874035.00	973440.00	1203435.00	1016970.00
2	Costs (₹.)				
	i) Cost A	242815.57	243442.41	219219.14	235159.04
	ii) Cost B	424188.29	437809.96	417980.75	426659.67
	iii) Cost C	444777.14	448506.08	425272.26	439518.49
3	Profit (₹.)				
	i) Cost A	631219.43	729997.59	984215.86	781810.96
	ii) Cost B	449846.71	535630.04	785454.25	590310.33
	iii) Cost C	429257.86	524933.92	778162.74	577451.51
4	Production	194.23	216.32	267.43	225.99
5	Benefit - Cost ratio	1.97	2.17	2.83	2.31

Table 6: Results of estimated Cobb-Douglas Production Function

Sr. No.	Variables	Regression coefficients
1	Constant (Intercept)	1.12
		1.25
2	Seed (X1)	-0.002 NS
		0.01
3	Male (X2)	0.003NS
		0.03
4	Female (X3)	0.06 NS
		0.05
6	Manure (X4)	0.18**
		0.03
7	Nitrogen (X5)	0.10***

		0.03
8	Phosphorus (X ₆)	0.14***
		0.04
9	Potassium (X ₇)	0.05***
		0.02
10	Irrigation Cost (X ₈)	0.48***
		0.09
11	Plant Protection Cost (X ₉)	-0.29***
		0.10
	R ²	0.94

Figures in parentheses indicate standard error

The regression co-efficient of nitrogen(X₅), phosphorus(X₆), potassium(X₇), Irrigation cost(X₈) were positive and highly significant at 1 per cent level of significance. The regression co-efficient of Manure(X₄) were positive and significant at 5 per cent level of significance, this indicates that there is scope to increase the use of these resources to increase the production. Positive and significant coefficients indicated

that, one per cent increase in the use of N, P, K, Irrigation cost and Manure would increase the yield by 0.10, 0.14, 0.05, 0.48 and 0.18 per cent respectively.

While plant protection cost(X₉) was negatively significant at 1 per cent level of significance, however seed(X₁), male(X₂) and female(X₃) were Non-significant.

Table 7: Resource Use Efficiency

Sr. No.	Resources	M.V.P.	F.C.(Px)	MVP/FC	Remarks	
1	Seed (X ₁)	-2234.28	5000	-0.45	Excess utilized	NS
2	Male (X ₂)	28.61	200	0.14	Excess utilized	NS
3	Female (X ₃)	157.59	100	1.58	Excess utilized	NS
4	Manure (X ₄)	2948.68	2000	1.47	Under utilized	**
5	Nitrogen (X ₅)	398.64	11.91	33.47	Under utilized	***
6	Phosphorus (X ₆)	387.55	37.5	10.33	Under utilized	***
7	Potassium (X ₇)	143.48	28	5.12	Under utilized	***
8	Irrigation Cost (X ₈)	86.70	1	86.70	Under utilized	***
9	Plant Protection Cost (X ₉)	-21.09	1	-21.09	Excess utilized	***

Note: *Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

NS- Non significant

An efficiency of resource use on the sample farm was judged with the help of MVP/FC ratio. It was observed from table 7. that, MVP/FC ratio for the variables seed (X₁), male (X₂) and plant protection cost (X₉) was less than unity showing that optimum resource use efficiency was not achieved and in case of variables female (X₃), manure (X₄), N (X₅), P (X₆), K(X₇) and irrigation cost (X₈) were greater than unity, this implied that higher resource use efficiency was achieved. In case of these variables analysis revealed that the profitability of brinjal production could be maximized by increasing the use of female labour, manure, nitrogen, phosphorus, potassium and irrigation charges.

Conclusion

Per ha cost of cultivation were 417755.00 ₹ /ha with B:C ratio 2.31 (highly profitable). The per hectare gross returns realized were ₹. 1016970.00 at overall level. The value of coefficient of multiple determination i.e. R² = 0.94. Results revealed that Jalgaon brinjal cultivation is highly profitable

Policy Implication

The production function analysis indicated that the coefficient of plant protection measures was negatively significant which emphasizes the need of dissemination of detailed knowledge regarding appropriate qualitative and quantitative use of pesticides and fungicides among the Jalgaon Brinjal producers by arranging training programmes of state agriculture department.

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