

Economics of Production of French bean in Satara District of Maharashtra

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Abstract—The present study was intended to depict the picture of French bean growing enterprise in Satara district. The area under French bean has shown decreasing trend during overall period of 10 years. The area under French bean decreased at the rate of 1.86 per cent per annum. The per hectare total male labour use was 22.48 mandays and female labour use was 26.31 mandays, while the use of bullock labour was 8.55 pair days, seed rate used was 39.56 Kg ha⁻¹ and use of N, P was 10.52 and 26.77 Kg ha⁻¹, at overall level respectively. The per hectare cost 'A' 'B' and 'C' at overall level were worked out to Rs. 20786.24, 29661.90 and 32718.84, respectively. The benefit-cost ratio 1.39 at overall level indicated that, the French bean cultivation is profitable. The major items of cost of cultivation of French bean were rental value of land (22.86 Per cent), human labour charges (13.73 Per cent), bullock labour charges (13.07 Per cent). The per hectare gross income estimated were Rs. 54408.63, for small Rs. 44828.30 for medium and Rs. 41008.00, for large groups respectively.

Keywords: French Bean, Cost of cultivation, Economics of production.

1. INTRODUCTION

The French bean (*Phaseolus vulgaris* L.) belongs to the family leguminaceae. French bean is native of Middle and South America. Common beans are valued as grain legume or pulse crop in many tropical countries and usually consumed as Dry beans. In temperate countries several varieties have been developed for fresh pod consumption. It is also named as Common bean, Green bean, Dry bean, Rajma in North India and Navy bean when used as pulse crop. French bean also known as Rajma (Hindi) or Haricot bean or Kidney bean. It is valued for its protein rich (21%) seeds. The fresh pods and green leaves are used as vegetable. The antimetabolites of dry beans needs removal by cooking and soaking in water.

Health Benefits of French Bean

French bean have a favourable effect on our health as they contain all the vital nutrients necessary for the overall development of the body. Following are some of the positive effects of the consumption of French beans on our body:

- 1) French bean is rich in many soluble and insoluble fibres, which in turn help in lowering the level of cholesterol in our body. These fiber-rich French bean also help in improving the blood sugar level and are thus, a good

source of diet for people suffering from diabetes or hypoglycemia. The presence of fibers also helps in reducing the various risks associated with coronary heart diseases.

- 2) Magnesium present in French bean also help in preventing heart diseases. Folate helps in decreasing the levels of 'homocysteine', an amino acid. An increased blood level of these homocysteines are the actual cause of strokes, heart attacks, etc. Thus folate rich kidney beans help to mitigate the risk of heart attacks to a great extent.
- 3) The French bean is also rich in iron, a vital requirement for energizing the body. They thus help in replenishing the iron in our body. It is extremely important for pregnant women to have French bean because they need more of iron during this time. The flow of blood is also increased due to these iron rich French bean.
- 4) French bean also contains thiamine or Vitamin B₁, which is critical for the proper functioning of the brain cells. They, thus help in improving the memory power, and in reducing the Alzheimer's disease.

Choice of Promising varieties, namely 'HIM 1', 'Jawala', 'Hans', 'Jampa', 'Manus', 'waghya' and 'VL Rajamash 63' can be popularized in the new areas. 'Jawala' has attractive scarlet-red seeds, 'Hans' has bold white seeds and 'HIM 1' has medium bold, light pink seeds with red spots. Some of the recent promising varieties are 'PDR 3', 'PDR 14' and 'PDR 20'.

Nutritional Importance of French bean

Sr. No	Nutrition Particulars	Per 100 g
1	Carbohydrates	61 g
2	Dietary fibres	14 g
3	Sugars	2 g
4	Protein	21 g
5	Fat	1 g
7	Saturated fatty acid	0 g
8	Cholesterol	0 mg
9	Vitamin C	4.5 mg
10	Calcium	83 mg
11	Iron	6.7 mg
12	Energy	337 kcal

Source: Nutrition data from USDA SR-21.

Beneficial Characteristics of French bean:

1. It is a short duration crop. .
2. It is used as pulse as well as vegetable crop.
3. It also a good source of nutrients for nitrogen fixing bacteria.
4. It is suitable for inter, relay and rotational crop patterns with other crops.

Status of French bean in World, India and Maharashtra:

French bean is mainly cultivated in American and European countries such as America, England, Poland, Brazil, Mexico, China and India. In India, French bean is cultivated in hilly tracts of Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh and parts of western Maharashtra. As per the demand for French bean in India, there is only 10% production and 90% French bean is imported.

In Maharashtra, Satara district is leading both in area and production followed by Pune and Sangli districts. French bean is traditional crop in Satara. It is *kharif* crop sown in the month of June-July. The growers are attracted towards cultivation of French bean i.e. locally known as *Waghya Ghewada*, which is a traditional local variety of Western Maharashtra. It is mainly cultivated in North Koregaon taluka of Satara District in Maharashtra since 1950.

The Koregaon taluka has maximum numbers of growers involved in *Ghewada* cultivation. Only 10% of *Ghewada* is cultivated in India, out of which maximum production is from Satara district and mainly from Koregaon taluka.

2. OBJECTIVES

1. To estimate the trends in area, production and productivity of French bean.
2. To estimate resource use structure.
3. To estimate costs, returns and profitability in French bean.

3. METHODOLOGY

Primary data

The primary source of data for the present study was the selected sample French bean cultivators. The data for production were obtained through survey method from the French bean cultivators in Koregaon and Khatav tahsils of Satara district of Maharashtra.

Secondary data

The secondary source of data for area, production and productivity (2005 to 2014) were obtained from Satara district statistical office, website, district statistical office and various reports.

Selection of the Study Area

Satara district is the one of the leading district growing French bean in Maharashtra. The total area under French bean during 2012-2013 in Satara district was 12666.75 ha and production was 155547.7 quintals and productivity was 12.28 q ha⁻¹. Out of eleven tahsils in the district, the total area under French bean was found more in Koregaon and Khatav tahsils i.e 7466.75 ha and 3320.26 ha respectively. Three villages from each tahsil was selected purposively on the basis of highest area under French bean. Fifteen French bean growers from each village was selected randomly to constitute a total sample size of 90 growers.

Selection of the samples:

The list of French bean growers was prepared from each of these villages, to select sample grower. They was grouped into three size of groups on the basis of their area under French bean viz, small (0.01 to 0.40 ha), medium (0.41 to 0.80 ha) and large size of groups (0.81 ha and above). Thus total sample of 90 French bean growers was selected randomly on the basis area under French bean for the present study comprising 30 small growers, 30 medium growers and 30 large growers.

Analysis of Data

Analysis of the data on physical resource use in French bean cultivation viz; human labour, bullock labour, Machine labour, seeds, manures, fertilizers, etc. was carried out by tabular method of analysis.

Trends in Area, Production, and Productivity:

The compound growth rates of area, production, and productivity was worked out by fitting exponential Production function type.

$$y = ab^t$$

Where,

Y= Annual area/production/productivity of French bean.

t = time in years.

a = constant.

b= trend coefficient or regression coefficient.

The compound growth rate (%) = (b-1) X 100

Estimation of Production Costs, Returns,

The collected data was analysed by applying the standard cost concepts used in farm business analysis. For this simple tabular analysis was done to estimate gross returns and output-input ratio. The standard cost concepts used as follows,

Production Costs

Cost A

It is also called as paid out cost; this cost approximates the expenditure incurred by the growers in cash and kind in the cultivation of crop and includes the following items; hired human labour, owned and hired bullock labour, seeds, manures, fertilizers, plant protection measures, machineries charges, land revenue and other cases, interest on working capital, depreciation on implements and machinery, repairs of machineries and irrigation charges.

Cost B

It includes cost A plus imputed rental value of owned land and interest on fixed capital.

Cost C

It includes cost B plus imputed value of family human labour. Cost C represents the total cost of production.

4. RESULTS AND DISCUSSION:-

Objective 1:

Trends in Area, Production and Productivity of French bean in Satara District.

The year wise data on area, production and productivity of French bean in Satara District for the period of last ten year's i.e. from 2004-2005 to 2013-2014 have been analyzed and annual averages are worked out and are shown in table 1,

Table 1: Trends Area, Production and Productivity of French bean in Satara District.

Sr. No	Year	Area (ha)	Production "000"tonnes	Productivity "Qtls./ha".
1	2004-05	14230.56	11.8967	8.36
2	2005-06	14125.32	11.8652	8.4
3	2006-07	13900.45	11.7875	8.48
4	2007-08	13554.7	10.8437	9.35
5	2008-09	13045.5	9.7841	10.27
6	2009-10	12980.5	9.7353	10.56
7	2010-11	12754.67	10.8414	11.46
8	2011-12	12702.6	12.067	11.8
9	2012-13	12666.75	15.5547	12.28
10	2013-14	11778.36	14.7936	12.56
	ACGR	-1.8631 NS	2.4342NS	5.3579***

The area under French bean in Satara district was 14230.56 hectares during 2004-2005 and which was decreased to 11778.36 hectares during 2013-2014. Thus the area under French bean has decreased with negative growth rate 1.86 per cent which was non-significant.

The production of French bean was 11.89 thousand tonnes during 2004-05 and it has increased to 14.79 tonnes during the period of study. The production of French bean has increased

with growth rate of 2.43 per cent which was non-significant, While productivity increased with growth rate of 5.36 per cent which was significant at 1 per cent level. The production of French bean has increased due to increased productivity of the crop.

Objective 2:

Per hectare resource use on French bean farms.

The quantities of various inputs directly affect the cost of cultivation and therefore, the use of different inputs like human labour, bullock labour, seeds, manures, fertilizers etc. in quantitative and monetary terms have been studied in detail. The information on utilization of different resources for French bean is presented in the Table on per hectare basis.

At overall level, quantity of manures applied was worked out to be 14.89 quintals. Per hectare manures utilization by small, medium and large size groups of French bean growers were 15.32, 14.17 and 15.19 quintals, respectively. The per hectare use of bullock labour was 8.55 pair days at overall level.

Table 2: Per hectare Resource use on French bean farms.

Sr. No.	Particulars	Units	Size Groups			Overall
			Small	Medium	Large	
1	Human labour					
	a) Male	Mandays	24.70	22.28	20.47	22.48
	b) Female	Mandays	27.26	26.98	24.70	26.31
	Total		51.96	49.26	45.17	48.80
2	Bullock Labour	Pair days	8.41	8.68	8.56	8.55
3	Machine charges	Rs	3800.44	3650.48	3948.20	3799.71
4	Seeds	Kgs	40.00	39.45	39.23	39.56
5	Manures	Qtls	15.32	14.17	15.19	14.89
6	Fertilizers					
	N	Kgs	13.54	9.05	8.97	10.52
	P	Kgs	34.32	23.00	23.00	26.77

The bullock labour requirement was higher on medium size group i.e. 8.68 pair days followed by 8.41 pair days on small size and 8.56 pair days on large size groups.

At overall level, per hectare application of fertilizers in terms of N and P was 10.52 and 26.77 Kgs respectively.

Objective 3:

Per hectare cost of cultivation of French bean.

Per hectare cost of cultivation of French bean has been estimated and the same is represented in the Table 3. It is seen from the Table that, at the overall level, per hectare cost of cultivation of French bean (i.e. Cost 'C') was worked out to Rs. 32718.83.

Among the different items of costs, working capital, rental value of land, total hired human labour and bullock labour charges was the highest 58.37, 22.86, 13.73 and 13.07 per cent

respectively). The other important items of cost were seed cost, Machinery charges, hired male labour, hired Female labour and Manures (4.56 per cent), family female labour charges (4.01 per cent), interest on fixed capital (3.91 per cent), interest on working capital (3.51 per cent), Fertilizers charges i.e (N and P having 0.74 and 1.87 per cent). The cost incurred in respect of land revenue and other taxes and depreciation were negligible in the cost of cultivation.

Thus, from above forgoing discussion, it was noticed that the cost of cultivation varied among the size groups of French bean growers. As a result, the cost required for the production of one quintal of French bean was lowest in small size group (Rs.2747.72), followed by medium (Rs.3154.90) and large size groups (Rs.3373.46) of French bean grower.

Table 4: Per hectare Cost of Cultivation of French bean
(Value in Rs)

Sr. No.	Particulars	Size Groups			Overall
		Small	Medium	Large	
1	Hired human labours				
	a) Male	2830.00 (8.24)	2672.00 (8.25)	2458.00 (7.79)	2653.33 (8.10)
	b) Female	1810.80 (5.27)	1942.80 (6.00)	1778.40 (5.64)	1844.00 (5.64)
	C) Total	4640.80 (13.56)	4614.80 (14.16)	4236.40 (13.34)	4497.33 (13.73)
2	Bullock labour	4205.00 (12.24)	4340.00 (13.41)	4280.00 (13.57)	4275.00 (13.07)
3	Machinery charges	3800.44 (11.06)	3650.48 (11.28)	3948.20 (12.51)	3799.71 (11.62)
4	Seed	3931.60 (11.45)	3876.75 (11.98)	3855.13 (12.22)	3887.83 (11.88)
5	Manures	1532.00 (4.46)	1417.00 (4.38)	1519.00 (4.83)	1489.33 (4.56)
6	Fertilizers				
	N	311.42 (0.91)	208.15 (0.64)	206.31 (0.66)	241.96 (0.74)
	P	789.36 (2.30)	529.00 (1.63)	529.00 (1.68)	615.79 (1.87)
7	Incidental Charges	111.05 (0.32)	102.88 (0.32)	117.09 (0.37)	110.34 (0.34)
8	Repair Charges	165.77 (0.48)	183.41 (0.57)	150.32 (0.48)	166.50 (0.51)
	Working capital(Rs)	19487.44 (56.74)	18922.47 (58.46)	18841.45 (59.93)	19083.79 (58.37)
9	Land revenue and other taxes	77.01 (0.22)	79.15 (0.24)	76.34 (0.24)	77.50 (0.24)
10	Depreciation	454.14 (1.33)	483.27 (1.48)	502.35 (1.58)	479.92 (1.46)
11	Interest on working capital	1162.00 (3.40)	1148.00 (3.52)	1147.67 (3.62)	1152.56 (3.51)
	Cost 'A'	21187.84 (61.69)	20620.24 (63.70)	20550.63 (65.36)	20786.24 (63.58)
12	Rental value of land	8324.43 (24.24)	7392.23 (22.84)	6758.33 (21.50)	7491.66 (22.86)

13	Interest on fixed capital	1263.85 (3.68)	1278.05 (3.95)	1310.11 (4.13)	1284.42 (3.91)
	Cost 'B'	30776.11 (89.60)	29290.52 (90.49)	28619.07 (91.03)	29561.90 (90.37)
14	Family labour				
	a) Male	2110.00 (6.14)	1784.00 (5.51)	1636.00 (5.20)	1843.33 (5.62)
	b) Female	1460.40 (4.25)	1294.80 (4.00)	1185.60 (3.77)	1313.60 (4.01)
	Cost 'C'	34346.51 (100.00)	32369.32 (100.00)	31440.67 (100.00)	32718.83 (100.00)
	Main Produce	50408.63	44828.30	41008.00	45414.97
	Per quintal cost of production	2747.72	3154.90	3373.46	3092.03

(Figures in the parentheses indicate the percentages of their respective total).

family male labour charges (11.88, 11.62, 8.10, 5.64 and 5.62, per cent respectively).

The per hectare gross returns were highest in small size group (Rs.50408.63), followed by medium (Rs.44828.30) and large size groups (Rs.41008.00) respectively of French bean growers.

Per hectare costs, returns and B:C ratio for French bean cultivation.

An attempt has been made to compare the per hectare gross income, different costs and the profit at different costs with net returns and the benefit cost ratio in French bean cultivation in different size groups of French bean growers. The details are given in the Table. It is seen from the Table that, the per hectare gross income received from French bean was Rs. 50,408.63, Rs. 44,828.30 and Rs. 41,008.00 in small, medium and large size groups, respectively while, it was worked out to Rs.45,414.97 at the overall level.

It indicated that small size group has obtained more gross income followed by medium and large size groups, respectively.

Per hectare Cost 'A' was Rs. 21187.84, Rs. 20620.24 and Rs. 20550.75 in small, medium and large size groups, respectively. Per hectare profit at Cost 'A' was Rs. 29,220.79, Rs. 24208.06 and Rs. 20457.37 in small, medium and large size groups, respectively.

Whereas, per hectare Cost 'B' was Rs. 30,776.11, Rs.29,290.52, Rs. 28,619.07 in small, medium and large size groups, respectively. The profit at Cost B was Rs. 19,632.51, Rs. 15,537.78 and Rs. 12,388.93 in small, medium and large size groups, respectively. The per hectare total cost, i.e. Cost 'C' was Rs. 34,346.51, Rs. 32,369.32 and Rs. 31,440.67 in small, medium and large size groups, respectively. The profit at Cost 'C' was Rs. 16,062.11, Rs. 12,458.98 and Rs. 9567.33 in small, medium and large size groups, respectively.

**Table 5: Per hectare profitability of French bean
(Values in Rs)**

Sr. No.	Particulars	Size Groups			
		Small	Medium	Large	Overall
1	Gross income	50408.63	44828.30	41008.00	45414.97
2	Cost of Cultivation				
	Cost 'A'	21187.84	20620.24	20550.75	20786.24
	Cost 'B'	30776.11	29290.52	28619.07	29561.90
	Cost 'C'	34346.51	32369.32	31440.67	32718.83
3	Profit at				
	Cost 'A'	29220.79	24208.06	20457.37	24628.74
	Cost 'B'	19632.51	15537.78	12388.93	15853.07
	Cost 'C'	16062.11	12458.98	9567.33	12696.14
4	B:C ratio	1.47	1.38	1.30	1.39

From the above foregoing discussion, it is clear that the cultivation of French bean is profitable at every stage of production. B:C ratio was highest in small group (1.47) followed by medium (1.38) and large (1.30) size groups. It is seen that, small size group of French bean growers received more profit followed by medium and large size groups.

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