

## Economics of Production of Bitter Gourd (*Momordica Charantia L*) in Raigad District (M. S.)

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**Abstract:** The present study entitled "Economics of production of bitter gourd (*Momordica charantia L*) in Raigad District (M.S.)" was undertaken to estimate resource use pattern, cost, returns and profitability of bitter gourd cultivation with a cross sample of 120 bitter gourd cultivators. Results revealed that, the per hectare physical input utilization indicated that, the proportion of family labour days was more (53.50%) than hired labour days (46.00%) with per hectare average of 267.84 labour days. Regarding other inputs Rs.5045.00 of supporting and shading materials, 148.90 kg. N, 116.60 kg. P, 19.88 kg. K, 34.58 q, FYM, 637.07 kg. mulching materials, and netting materials Rs.1242.40 wire and Rs.1200.00 net and 13.40 hrs. /ha of machine labour were used. At the overall level the per hectare cost of cultivation of bitter gourd worked out to Rs. 129582.24 in which, cost 'A' and cost 'B' shared (49.31%) and (72.53%), respectively. The per hectare gross returns were Rs.172888 and realizing net return of Rs. 41962.30 with benefit-cost ratio of 1.33.

**Keywords:** Resource use pattern, Cost, returns and Profitability of bitter gourd cultivation

### INTRODUCTION

India is the second largest producer of vegetable and accounts for about 15 percent of the world's production of vegetables. As per National Horticulture database published by National Horticulture Board, India produced 170 MT of vegetables during 2013-14. The areas under cultivation of vegetables were cultivated at 9.21 million hectares which is about 3 percent of the total area under cultivation in the country. Vegetables are important constituents of Indian agriculture and nutritional security due to their short duration, high yield, nutritional richness, economic viability and ability to generate on-farm and off-farm employment. Now a day's vegetables are considered as cash crops and can play important role in providing economics status to small and marginal farmers. In Konkan region cultivation of bitter gourds mostly in Raigad, Thane, Ratnagiri districts. The area under Bitter gourd vegetable in Raigad district is 551 ha with

producing about 6444 tonnes of Bitter gourd with productivity of 10.52 t/ha. Generally bitter gourd commercially grown in Rabi season and their area of cultivation is more in Pen, Panvel tehsil's 280ha and 50ha respectively with higher production 3250 tonnes, 524 tonnes respectively of Raigad district. Considering the income and employment generating capacity of this crop many farmers had started growing bitter gourd. But the cost of production and cultivation practices followed changes according to region and even within the region which ultimately affect the profitability of the crop. Therefore to understand the economics of the cultivation practices followed by the bitter gourd cultivators, the present investigation is to be undertaken in Pen and Panvel tehsil's of Raigad district.

### METHODOLOGY

The present study is based on primary data obtained from farmers. However, a sampling frame was

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constructed and pre-tested scheduled was used to gather data by personal interview method during month of February, 2015. Multistage sampling technique (*i.e.*, three stage sampling technique) was used for selection of bitter gourd cultivators included tehsil as primary unit, village as secondary unit and bitter gourd cultivators as a final unit. Bitter gourd is cultivated as a commercial vegetable on large scale in Pen and Panvel tehsil's of Raigad district were selected purposively. For the selection of villages, 10 villages were selected according to agriculture officer of Pen and Panvel tehsil's. From the selected villages, the list of commercial bitter gourd cultivators was prepared. From each selected village, a sample of 12 commercial bitter gourd cultivators was selected randomly. Thus the final sample was consisted of 10 villages and 120 bitter gourd cultivators from Pen and Panvel tehsil's. The cost of cultivation was worked out by using standard cost concept.

## RESULTS AND DISCUSSION

### Production and productivity

The production and productivity are the important economic indicators deciding the profitability of crop and farm. The group-wise details regarding production and productivity of bitter gourd are shown in Table 1.

**Table 1**  
Production pattern and productivity of bitter gourd on sample farms

Sr. no	Category	No. of farmers	Avg. area per farm (ha)	Avg. production per farm (q)	Productivity (q/ha)
I	Small	42	0.16	13.30	83.00
II	Medium	44	0.29	23.80	82.00
III	Large	34	0.48	38.40	80.00
IV	Overall	120	0.31	26.45	82.00

At overall level the productivity of bitter gourd was 82 q/ha. The per farm group-wise productivity was worked to be 83.00 q, 82.00 q and 80.00 q for small, medium and large farm size level, respectively. At small size farm level the average

farm production of bitter gourd was found to be 13.30 q from average size of bitter gourd farm 0.16 ha, while in case of medium size of farm group the average production of bitter gourd was estimated to 23.80 q from average 0.29 ha farm size, whereas it was 38.40 q production received from 0.48 ha of average farm size at large size farm level.

However at overall level the average production of bitter gourd were worked to be 26.45 q from 0.31 ha of average farm size, therefore, the production of bitter gourd has indirect relationship with farm size in the study area.

### Disposal pattern for bitter gourd production

It was observed from the Table 2; per farm production was found to be 13.30 q, 23.80 q, 38.40 q at the small, medium and large size group level respectively. Out of the total production 3.30 per cent, 2.85 per cent and 2.39 per cent production of bitter gourd was retain on farm and remaining 96.70 per cent, 97.14 per cent and 97.60 per cent production of bitter gourd would be marketable surplus and marketed through different market intermediaries at small, medium and large size farm level respectively.

From Table 2 that, at the overall level, per farm production was found to be 26.45 q out of which 0.22 per cent produce was utilized for home consumption, 0.32 per cent produce utilized for gift purpose and 1.62 per cent produce was found to be losses due to spoilage and improper handling at the time of harvesting and therefore, total quantity retain on farm was 2.19 per cent and marketable surplus was 97.84 per cent of total production. Therefore it was indicated that, almost more than 96.00 per cent of production of bitter gourd was found to be marketable surplus and subsequently as marketed surplus, this is a most common phenomenon with all types of vegetables.

### Per hectare labour, Input utilization and cost structure of bitter gourd

#### Per hectare labour and physical input utilization

The group-wise detail information about per hectare input utilization for bitter gourd is presented in Table 3.

**Table 2**  
**Production and Disposal pattern of bitter gourd**

(Figures in q)

<i>Sr.no</i>	<i>Particulars</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Overall</i>
	Per farm Area (ha)	<b>0.16</b>	<b>0.29</b>	<b>0.48</b>	<b>0.31</b>
<b>A)</b>	Per farm production (q)	<b>13.30</b>	<b>23.80</b>	<b>38.40</b>	<b>26.45</b>
		<b>(100)</b>	<b>(100)</b>	<b>(100)</b>	<b>(100)</b>
<b>B)</b>	Quantity retained on farm				
	i) Home consumption	0.043	0.075	0.087	0.06
		(0.32)	(0.31)	(0.22)	(0.22)
	ii) Gift to relatives	0.075	0.083	0.097	0.085
		(0.56)	(0.34)	(0.25)	(0.32)
	iii) Losses due to spoilage and improper handling at the time of harvest	0.33	0.53	0.74	0.43
		(2.48)	(2.22)	(1.92)	(1.62)
	Sub-Total	0.44	0.68	0.92	0.57
		(3.30)	(2.85)	(2.39)	(2.19)
<b>C)</b>	<b>Marketable surplus (A-B)</b>	<b>12.86</b>	<b>23.12</b>	<b>37.48</b>	<b>25.88</b>
		<b>(96.70)</b>	<b>(97.14)</b>	<b>(97.60)</b>	<b>(97.84)</b>

(Figures in parentheses indicate percentage to total production)

Per hectare total human labour utilized were 267.84 man-days for cultivation of bitter gourd at overall level, out of which 155.37 human days and 112.47 human days were found to be male and female, respectively, however, out of the total labour man-days 117.72 man-day were found to be hired labour, and remaining 150.12 man-days found to be family labours. Similarly, the per hectare machine hrs were worked out to be 13.40 hrs. of power tiller and quantity of fertilizer utilized was 148.90 kg of N, 116.60 kg of P, 19.88 kg of K, at overall level. The FYM utilization was 34.58 q/ha along with that of 637.07 kg of mulching materials. The per hectare netting material utilized for supporting of bitter gourd was estimated to 11.29 kg of wire and 3.30 kg net.

Per hectare total human labour utilized were 291.28 days, 270.89 days and 241.09 days for cultivation of bitter gourd at small, medium and large size farm level respectively. Out of which 180.05 days, 155.16 days, 130.89 days and 110.86 days, 115.73 days, 110.20 days were found to be male and female labour days at small, medium and large size farm level, respectively. However, out of the total labour man-days 76.12 day, 115.89 days, 165.20 days were found to be hired, and remaining 215.16

days, 155.00 days, 75.89 days found to be family labours at small, medium and large size farm level, respectively.

The per hectare machine hrs were estimated 11.56 hrs, 13.65 hrs and 15.00 hrs while per hectare quantity of chemical fertilizer were worked out 135.12 kg; 146.42 kg; 165.41 kg of N, 100.52 kg; 120.26 kg; 130.61 kg of P, 15.36 kg; 20.15 kg; 24.15 kg of K, Similarly FYM utilization worked out to be 30.23 q/ha; 35.12 q/ha; 38.41 q/ha and that of 710.15 kg; 620.61 kg; 580.45 kg of mulching materials were also used at small, medium and large size farm level, respectively.

The per hectare 9.23 kg; 11.45 kg; 13.21 kg of wire and 11.23 kg; 13.25 kg; 15.52 kg of net were utilized as netting materials for supporting of bitter gourd. However, it was observed that, the pesticides utilization was very negligible (0.60 lit; 1.00 lit and 1.50 lit) at small, medium and large size farm level, respectively. Amongst the all size groups, it was indicated that, quantity of chemical fertilizers (NPK) and netting materials were increasing and mulching materials utilization were declined with size of farm increased and the utilization of FYM increased as the farm sized increased.

**Table 3**  
**Per hectare physical input utilization for bitter gourd cultivation**

<i>Sr.no</i>	<i>Particulars</i>	<i>Unit</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Overall</i>
1.	Hired human labour					
	a) Male	Days	56.02	70.16	90.20	72.25
	b) Female	Days	20.10	45.73	75.00	45.47
	<b>Sub total</b>	<b>Days</b>	<b>76.12</b>	<b>115.89</b>	<b>165.20</b>	<b>117.72</b>
2.	Family human labour					
	a) Male	Days	124.03	85.00	40.69	83.12
	b) Female	Days	90.76	70.00	35.20	67.00
	<b>Sub total</b>	<b>Days</b>	<b>215.16</b>	<b>155.00</b>	<b>75.89</b>	<b>150.12</b>
3.	Total human labour					
	a) Male	Days	180.05	155.16	130.89	155.37
	b) Female	Days	110.86	115.73	110.20	112.47
	<b>Total</b>	<b>Days</b>	<b>291.28</b>	<b>270.89</b>	<b>241.09</b>	<b>267.84</b>
4.	Machine labour	Hrs.	11.56	13.65	15.00	13.40
5.	Supporting poles	No.	1800.00	2000.00	2255.00	2018.00
6.	Netting materials					
	a) Wire	Kg	9.23	11.45	13.21	11.29
	b) Net	Kg	11.23	13.25	15.52	13.30
7.	Fertilizer					
	a) N	Kg	135.12	146.42	165.41	148.90
	b) P	Kg	100.52	120.26	130.61	116.60
	c) K	Kg	15.36	20.15	24.15	19.88
8.	Farm Yard Manure	Q	30.23	35.12	38.41	34.58
9.	Seed	Kg	6.70	7.70	8.70	7.70
10.	Mulching materials	Kg	710.15	620.61	580.45	637.07
11.	Plant protection	Lit	0.60	1.00	1.50	1.00

### Per hectare cost of cultivation of bitter gourd

It was observed from the Table 4 that, total cost of cultivation (cost 'C') of bitter gourd was worked out to Rs.128316.79, Rs.129349.33 and Rs.130004.62 in small, medium and large group, respectively. And at the overall level, it was worked out to be Rs.129582.24. This indicated that, the cost of cultivation of bitter gourd showed an increasing trend with respect to different size of farm.

In case of the small size group, out of the total cost of cultivation the cost was worked out to be maximum for total human labour days (45.40%) which was followed by cost of seed (8.35%), cost of FYM and fertilizers (5.43) in bitter gourd cultivation. Out of total cost (cost 'C'), the input cost comprises

35.97 per cent, cost 'A' was 39.12 per cent and cost 'B' was worked to be 62.92 per cent and the role of family was maximum (33.47%) with respect to total cost of cultivation.

At the medium size group, out of total cost of cultivation (cost 'C'), share of family labour was maximum (23.96%) followed by rental value of land (21.65%), hired labour (17.87%). It was revealed that, working capital, cost 'A' and cost 'B' were incurred 45.04 per cent, 48.97 per cent and 71.52 per cent respectively.

In case of large size group, out of the total cost of cultivation (cost 'C') maximum cost (25.38%) was incurred on hired labour, which was followed by family labour (23.96%), cost of seed (10.03%).

**Table 4**  
**Per hectare cost of cultivation of bitter gourd**

Sr.no	Particulars	Small	Medium	Large	Overall
1.	Hired labour				
	a) male	11300.00 (8.80)	14000.00 (10.08)	18000.00 (13.84)	14433.00 (11.13)
	b) female	4020.00 (3.13)	9000.00 (6.95)	15000.00 (11.53)	9340.00 (7.20)
	Total	15320.00 (11.93)	23000.00 (17.78)	33000.00 (25.38)	23773.00 (18.34)
2.	Machine	4046.00 (3.15)	4777.00 (3.69)	5250.00 (4.03)	4690.00 (3.61)
3.	Supporting poles	4500.00 (3.50)	5000.00 (3.86)	5637.00 (4.33)	5045.00 (3.89)
4.	Seed	10720.00 (8.35)	12320.00 (9.52)	13050.00 (10.03)	12320.00 (9.50)
5.	Fertilizers				
	a) N	1026.00 (0.79)	1112.00 (0.85)	1257.00 (0.96)	1131.00 (0.87)
	b) P	683.50 (0.53)	817.30 (0.63)	898.80 (0.69)	792.80 (0.61)
	c) K	1689.00 (1.31)	2216.00 (1.71)	3743.25 (2.87)	2186.00 (1.68)
6.	FYM	3597.00 (2.80)	4179.00 (3.23)	4569.00 (3.51)	4115.00 (3.17)
7.	Netting materials				
	a) wire	1015.60 (0.79)	1259.20 (0.97)	1453.00 (1.11)	1242.40 (0.95)
	b) net	1010.50 (0.78)	1192.70 (0.92)	1369.80 (1.05)	1200.00 (0.92)
8.	Mulching materials	1065.00 (0.82)	930.00 (0.71)	870.00 (0.66)	955.00 (0.73)
9.	Irrigation charges	1261.20 (0.98)	1225.00 (0.94)	985.10 (0.75)	1123.90 (0.86)
10.	Plant protection	235.10 (0.18)	330.40 (0.25)	850.00 (0.65)	471.80 (0.36)
	<b>Input cost</b>	<b>46167</b> <b>(35.97)</b>	<b>58261</b> <b>(45.04)</b>	<b>72950</b> <b>(56.11)</b>	<b>59054</b> <b>(45.57)</b>
11.	Land revenue and cesses	100.00 (0.07)	100.00 (0.07)	100.00 (0.07)	100.00 (0.07)
12.	Depreciation on implements, machinery, hand tools and irrigation structure	2555.60 (1.99)	3241.30 (2.50)	3137.10 (2.41)	2978.00 (2.29)
13.	Interest on working capital for six months	1385.01 (1.07)	1747.83 (1.35)	2155.91 (1.65)	1771.62 (1.36)
	<b>Cost "A"</b>	<b>50207.61</b> <b>(39.12)</b>	<b>63350.13</b> <b>(48.97)</b>	<b>78376.16</b> <b>(60.28)</b>	<b>63903.62</b> <b>(49.31)</b>

contd. table 4

Sr.no	Particulars	Small	Medium	Large	Overall
14.	Interest on fixed capital @ 10 per cent	1025.60 (0.79)	1156.40 (0.89)	1253.40 (0.96)	1278.40 (0.98)
15.	Rental value of owned land (1/6 <sup>th</sup> of the gross return)	29506.50 (22.99)	28016.00 (21.65)	28000.00 (21.53)	28814.00 (22.23)
	<b>Cost "B"</b>	<b>80739.71 (62.92)</b>	<b>92522.53 (71.52)</b>	<b>107629.56 (82.78)</b>	<b>93996.02 (72.53)</b>
16.	Family labour				
	a) Male	24800.00 (19.32)	17000.00 (13.14)	8080.00 (6.21)	16626.00 (12.83)
	b) Female	18160.00 (14.15)	14000.00 (10.82)	7000.00 (5.38)	13053.00 (10.07)
	Total	42960.00 (33.47)	31000.00 (23.96)	15080.00 (11.59)	29680.00 (22.90)
17.	Supervision charges @ 10 per cent of input cost	4616.00 (3.59)	5826.00 (4.50)	7186.00 (5.52)	5905.00 (4.55)
	<b>Cost "C"</b>	<b>128316.79 (100)</b>	<b>129349.33 (100)</b>	<b>130004.62 (100)</b>	<b>129582.24 (100)</b>

(Figures in the parentheses indicate percentage to cost 'C')

Similarly, out of the total cost, the input cost, cost 'A' and cost 'B' were comprises 56.11 per cent, 60.28 per cent, 82.78 per cent respectively.

At the overall level, the total cost of cultivation (cost 'C') of bitter gourd was worked out to be Rs.129582.24, out of which maximum cost (22.90%) was incurred on family labour followed by hired labour (18.34%), cost of seed (9.50%), cost of FYM and fertilizers (6.33%), cost of supporting materials (3.89%), and rent of machine hrs. (3.61%), netting materials (1.87%), cost of irrigation (0.86%) and cost of plant protection (0.36%) in bitter gourd cultivation. Out of the total cost (cost 'C') at overall level the input cost, cost 'A' and cost 'B' comprises were 45.57 per cent, 49.31 per cent and 72.53 per cent respectively.

#### Per hectare profitability of bitter gourd cultivation

It was seen from the Table 5 that, the per hectare bitter gourd production was worked out to be 83.00 q, 82.00 q and 80.00 q and 80.00 q, the price realized by producer was Rs.2133.00/q, Rs.2050.00/q, Rs.2100.00/q and Rs.2117.00 q/ha and per hectare gross return obtained from bitter gourd were Rs.177039.00 Rs.168100.00, Rs.168000.00 and 172888.00 in small, medium, large group and at overall level group respectively.

The net profit (at cost 'C') were worked out to be Rs.49782.10, Rs.37089.84 and Rs.40484.31 and 41962.32 in small, medium, large and at overall level group, respectively. However, The per quintal cost of bitter gourd production was worked out to be Rs.1546.20, Rs. 1577.40, Rs.1625.10 and Rs.1586.70 in small, medium, large and at overall level farm, respectively. The benefit-cost ratio on small size farm, medium size farm, large size farm and at overall level farm were estimated to 1.38, 1.30 and 1.3, and 1.33, respectively. This indicated that, in rabi season bitter gourd production was profitable in study area.

The net returns at cost 'A' and cost 'B' was also worked out to be Rs.126831.40 and 69299.30 at small size farm respectively. Whereas it was Rs.103089.00 and Rs.73915.94 respectively at the medium size farm. Similarly Rs.92671.00 and Rs. 62751.00 respectively at large size farm, and Rs.107709.34 and Rs.77547.60 respectively at overall level.

#### CONCLUSIONS

1. The study of disposal pattern of bitter gourd indicated that, 97.84 per cent of total production was available as marketable surplus.

**Table 5**  
Size group-wise per hectare profitability of bitter gourd cultivation

Sr.no	Items	Small	Medium	Large	Overall
1.	<b>Production (q/ha)</b>	<b>83.00</b>	<b>82.00</b>	<b>80.00</b>	<b>82.00</b>
2.	Price received (Rs./q)	2133.00	2050.00	2100.00	2117.00
3.	<b>Gross returns (Rs)</b>	<b>1,77,039</b>	<b>1,68,100</b>	<b>1,68,000</b>	<b>1,72,888</b>
4.	<b>Cost Rs. (Rs)</b>				
	a) Cost 'A' (Rs)	50207.61	63350.13	78376.16	63903.62
	b) Cost 'B' (Rs)	80739.71	92522.53	107629.56	93966.02
	c) Cost 'C' (Rs)	128316.79	129349.33	130004.62	129582.24
5.	<b>Net return at</b>				
	a) Cost 'A' (Rs)	126831.40	103089.00	92671.00	107709.34
	b) Cost 'B' (Rs)	96299.30	73915.94	62751.00	77547.60
	c) Cost 'C' (Rs)	49782.10	37089.84	40484.31	41962.30
6.	Per quintal cost of cultivation (Rs)	1546.20	1577.40	1625.10	1586.70
7.	<b>Benefit-cost ratio</b>	<b>1.38</b>	<b>1.30</b>	<b>1.3</b>	<b>1.33</b>

- The per hectare labour utilized for bitter gourd cultivation was 267.84 labour days, out of which family labour days were more (53.50%) than hired labour days (46.00%)
- The result pertaining to per hectare cost of bitter gourd cultivation (Rs.129582.24) indicated that, the maximum cost was incurred on human labour (41.24%).
- The analysis of per hectare profitability of bitter gourd crop indicated that, the bitter gourd cultivation was profitable enterprise at all the levels of cost, resulting benefit-cost ratio of 1.33

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