



ECONOMICS OF PRODUCTION AND MARKETING OF GOURD (BITTER AND BOTTLE) IN WESTERN MAHARASHTRA

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Distt. Ahmednagar, Maharashtra

Received: 24/01/2017

Edited: 30/01/2017

Accepted: 09/02/2017

Abstract: *The present investigation was attempted to study the resource use structure, to estimate the cost of cultivation and to study the marketing of bottle and bitter gourd in western Maharashtra. In all, 90 farmers were selected from western Maharashtra. The data related to the Agricultural year 2015-16 was taken for the present study. The per hectare cost of cultivation for bottle gourd was ₹ 197354.01 and bitter gourd was ₹ 212748.93. The per quintal cost of cultivation for bottle gourd and bitter gourd were to the tune of ₹ 519.35 and ₹ 1251.46., respectively. The benefit cost ratio was 1.73 and 1.68 for bottle and bitter gourd cultivation.*

Three channels were observed in marketing of gourds. At the overall level, the marketing cost observed ₹ 184.16 and ₹ 305.20 per quintal for bottle and bitter gourd respectively. The highest marketing costs were observed in channel –III. i.e. ₹ 321 and ₹ 474 for bottle and bitter cultivars.. The major items of marketing cost were commission and transport charges. The major problems faced by the gourd growers were costly seeds and non-availability of university seeds, attack of sucking pests, powdery mildew and blight, labour shortages, high cost of liquid fertilizer, costly and low quality of insecticides and high transport and commission charges. Hence There is scope to increase the use of manures as per recommendations by farm yard manure, green manuring, vermin-compost etc and reduce the use of fertilizer as per recommendation for augmenting the average productivity of gourds.

1. Introduction

Bottle gourd (*Lagenaria siceraria*) and Bitter gourd (*Momordica charantia*) are the most important crops in the cucurbitaceous family, although it is considered as a poor man's crop due to the socio economic restrictions governing its production and use. Bottle and Bitter gourd founds in every kitchen of the Indian household.

Bottle gourd locally known as "Lauki" (Hindi) or "Dudhya Sweet" (Marathi). Indian traditional medicine claims that bottle gourd acts as a nerve tonic and can help improve obsessive-compulsive disorder (OCD), this claim has been confirmed by a study published in the journal Pharmacognosy Research. It has 96 percent water and provides just 12 calories per 100g of serving and is rich in thiamin, vitamin C, zinc, iron and magnesium. Because of its fiber and low fat content, Ayurveda highly recommends this food for diabetic patients and young children and also recommends the juice of this gourd in the treatment of acidity, indigestion and ulcers as it serves as an alkaline mixture.

Bitter gourd locally known as "Karle" (Marathi) has been used in various herbal medicine systems for a long time because of its disease preventing and health promoting phyto chemical compounds like dietary fiber, minerals, vitamins, flavonoids and antioxidants. It is also used for reduction of blood sugar levels in the treatment of type-2 diabetes. It is a good source of niacin (vitamin B3), ascorbic acid (vitamin B5), vitamin B6 and minerals such as iron, zinc, potassium, manganese and magnesium.

The area, production and productivity of bottle gourd in India during the year 2013-14 was 1.03 lakh hectare, 18.18 lakh tonnes and 17.60 tonnes, respectively. During the year 2015-16, it has reached to 1.31 lakh hectare and 20.83 lakh tonnes. Whereas, in case of bitter gourd area and production was 0.79 lakh hectare and 8.07 lakh tonnes, during the year 2013-14, respectively. During the year 2015-16, it was 0.81 lakh hectare and 8.30 lakh tonnes, respectively (Source: Ministry of Agriculture, Government of India).

In Maharashtra state area under bottle and bitter gourd crop during 2013-14 was 4.11 and 3.80 thousand hectares and the production was about 38.40 and 26.50 thousand metric tones, respectively. Whereas, during the year 2014-15 it was 1.427 and 1.019 thousand hectares and 37.192 and 21.647 thousand metric tonnes, respectively. The bottle gourd production is mainly concentrated in Kolhapur, Nasik, Pune, and Satara districts and bitter gourd production was concentrated more in Kolhapur, Nasik, Pune, and Satara, districts of Western Maharashtra. In view of the socio-economic importance of gourds the present study entitled, "Economics of production and marketing of gourds (Bottle gourd and bitter gourd) in western Maharashtra was undertaken with the following specific objectives.

2. Objectives

1. To study the resource use pattern of bottle and bitter gourds.
2. To estimate per hectare costs and returns of gourds.

3. To estimate marketing cost of gourds.
4. To ascertain the problems faced in production and marketing of gourds.

3. Methodology

3.1 Selection of Study area

The Western Maharashtra region was selected for study. The primary data regarding gourds production and marketing were collected by predesigned schedule.

3.2 Sampling

10 districts of Western Maharashtra were considered for collection of sample. The purposive selection of gourd growers was made as there is no specific area of gourd cultivation. In all 90 samples irrespective of size groups were selected for two gourds crop separately. i. e. bottle gourd (45) and bitter gourd (45).

3.3 Analysis of data

In the present investigation, the data was compiled and analyzed. Simple statistical tools such as arithmetic mean average, percentage and ratios were used.

Cobb Douglas production function was used for estimating factors influencing total production.

$$Y = a x_1 b^1 \cdot x_2 b^2 \cdot x_3 b^3 \cdot x_4 b^4 \cdot x_5 b^5 \cdot x_6 b^6 \cdot x_7 b^7 \cdot x_8 b^8 \cdot x_9 b^9 e^u$$

Where.

Y= Yield (qtls)

x_1 = Total human labour (man/days)

x_2 = Bullock labour in pair days

x_3 = Manures (qtls)

x_4 = Machine labour (hrs.)

x_5 = N fertilizer (kg/ha)

x_6 = P fertilizer (kg/ha)

x_7 = K fertilizer (kg/ha)

x_8 = Irrigation (°)

x_9 = Plant protection (°)

a = constant

u = error term

b_i 's= regression coefficients of respective explanatory variable

4. Results and Discussion

4.1 Composition of family members - The composition of family members is presented in the Table 1.

Table 1 Composition of family members on sample farms (Nos.)

Sr. No.	Particulars	Bottle gourd	Bitter gourd
1	Male	1.93 (38.53)	2.09 (43.54)
2	Female	1.64 (32.73)	1.69 (35.21)
3	Children	1.44 (28.74)	1.02 (21.25)
4	Total	5.01 (100.00)	4.80 (100.00)

(Figures in parentheses are the percentages to the total)

The total members of family were 5.01 for bottle gourd growers and 4.80 for bitter gourd growers. The proportion of male was 39 and 44 per cent respectively, on the sample farms. The proportion of female was 33 and 35 per cent on both sample farms. The percentage of children ranged from 21 to 28 per cent.

4.2 Land use pattern

The land use pattern of sample farms is presented in Table 2. From the table it is observed that, total land holding was 1.55 and 1.84 hectares for bottle and bitter gourd growers. The gross cropped area was 1.68 and 1.97 hectares, respectively. The percentage of operational holding was 94 to 97 per cent. The net irrigated cultivated area was 83 and 82 per cent for bottle and bitter gourd growers, respectively.

Table 2 Land use pattern of sample farms (ha.)

Sr. No.	Particulars	Bottle gourd	Bitter gourd
1	Total holding	1.55 (100.00)	1.84 (100.00)
2	Permanent fallow	0.05 (3.22)	0.11 (5.97)
3	Operational holding	1.50 (96.77)	1.73 (94.02)
4	Current fallow	---	---
5	Net Cultivated Area	1.50 (96.77)	1.73 (94.02)
	a) Irrigated	1.29 (83.23)	1.51 (82.06)
	b) Unirrigated	0.21 (13.54)	0.22 (11.96)
6	Gross Cropped Area	1.68	1.97
7	Cropping Intensity	112.00	113.87

(Figures in parentheses are the percentages to the total)

4.3 Capital assets

The capital assets of sample household are presented in Table 3. From the table it is revealed that per farm capital assets were ` 25, 79, 347 for bottle gourd and ` 30, 55, 701 for bitter gourd

growers. The major share was of residential buildings constituting 63 to 67 per cent. Irrigation structure made share of 27 to 31 per cent. Next to follow was animal and poultry making it 2 to 4 per cent contribution.

Table 3 Capital assets of sample households

(/)

Sr. No.	Particulars	Bottle gourd	Bitter gourd
1	Residential and farm buildings	1635893.33 (63.42)	2057729.11 (67.29)
3	Irrigation structures	806465.98 (31.26)	825344.44 (26.99)
4	Implements	7528.99 (0.30)	6070.22 (0.20)
5	Hand tools	1652.82 (0.07)	1568.07 (0.06)
6	Machinery	78803.78 (3.05)	58422.67 (1.91)
7	Animals/Poultry	49002.22 (1.90)	108566.71 (3.55)
9	Total	2579347.12 (100.00)	3057701.22 (100.00)

(Figures in parentheses are the percentages to the total)

4.4 Cropping pattern

The cropping pattern of sample farms is presented in Table 4. From the table it is observed that, the gross cropped area was 1.68 and 1.97 hectares for bottle and bitter gourds growers, respectively. The share of vegetables 33 to 36 per

cent along with onion crop. The share of bottle and bitter gourds was 17 and 13 per cent respectively, in the gross cropped area. Next to follow cash crops which shared 23 to 27 percent. The share of cereals ranged from 21 to 24 per cent.

Table 4 Cropping pattern of sample cultivators

(ha.)

Sr. No.	Particulars	Bottle gourd/ farm		Bitter gourd/ farm	
		Area	Percent (%)	Area	Percent (%)
1	Bajra	0.08	4.77	0.08	4.06
2	Jowar	0.06	3.57	0.18	9.14
3	Wheat	0.14	8.34	0.09	4.56
4	Maize	0.07	4.16	0.12	6.09
5	Paddy	0.01	0.59	---	--
	Total Cereals	0.36	21.43	0.47	23.85
6	Gram	0.02	1.20	0.03	1.52
7	Moong	0.01	0.59	0.01	0.50
8	Tur	0.01	0.59	0.06	3.04
	Total Pulses	0.04	2.38	0.10	5.07
9	Groundnut	0.03	1.78	0.03	1.53
10	Soybean	0.08	4.76	0.02	1.01
	Total Oilseeds	0.11	6.54	0.05	2.53
11	Sugarcane	0.36	21.43	0.37	18.79
12	Cotton	0.09	5.36	0.09	4.57
	Total Cash Crops	0.45	26.79	0.46	23.36
13	Jowar Fodder	0.01	0.59	0.05	2.53
14	Lecurine	0.02	1.19	0.03	1.52
	Total Fodder crops	0.03	1.78	0.08	4.06
15	Grapes	0.09	5.36	0.08	4.06
16	Pomegranate	0.03	1.79	--	--
17	K.lime	--	--	0.02	1.02
	Total fruits crops	0.12	7.15	0.10	5.08

18	Zendu	0.01	0.59	--	--
	Total Flowers	0.01	0.59	--	--
19	Onion	0.20	11.91	0.28	14.73
20	Bottle	0.28	16.66	0.03	1.52
21	Bitter	0.01	0.59	0.25	12.69
22	Potato	---	--	0.08	4.07
23	Other vegetables	0.07	4.16	0.06	3.04
	Total Vegetables	0.56	33.34	0.71	36.04
	GCA	1.68	100.00	1.97	100.00

4.5 Resource Use level

The per hectare resource use levels of bottle and bitter gourd cultivation is presented in Table 5

Table 5 Resource use levels and gaps of bottle and bitter gourd (Per ha.)

Sr. No.	Particulars	Bottle gourd			Bitter gourd		
		Inputs and Recommended Levels	Actual use	% Gap	Inputs and Recommended Levels	Actual use	% Gap
1	Total human labour (Days)	--	216.34	--	--	265.43	--
	a) Male	--	101.84	--	--	106.43	--
	b) Female	--	114.50	--	--	159.00	--
2	Bullock labour (pairdays)	--	0.97	--	--	2.36	--
3	Machine power (hrs)	--	107.52	--	--	108.87	--
4	Seed/(Kgs)	2.00	1.75	12.50	1.50	1.46	2.84
5	Manures (qtls)	200	45.00	77.50	170	56.62	66.69
6	Fertilizers (Kgs)						
	N	100.00	112.56	-12.56	100	88.92	11.08
	P	50.00	79.50	-59.00	50	77.50	-55.00
	K	50.00	105.55	-111.10	50	98.84	-97.68
7	Yield (qtl/ha)	450.00	380.00	15.56	200.00	170.00	15.00

It can be revealed that, per hectare total human labour use was more for bitter gourd cultivation i.e. 265 days and 216 days in case of bottle gourd cultivation. The use of machine was at par for both gourd cultivation. In case of manure application 77 and 66 per cent gap was observed in both gourd cultivation, respectively. The per cent gap in the use of seed was 12.50 and 2.84 in bottle and bitter gourd cultivation, respectively. The chemical fertilizers, especially N, P,K for bottle gourd cultivation were

used excessively i.e. 12.56, 59.00 and 111.10 per cent, respectively. The excess use of P and k fertilizer of 55.00 and 97.68 per cent were observed in case of bitter gourd cultivation. This is mainly because of the use of mixed fertilizers and water soluble fertilizer instead of straight fertilizer. The yield gap of both the gourd to the tune of 15 per cent.

4.6 Cost of cultivation

The per hectare cost of cultivation of bottle and bitter gourd is presented in Table 6

Table 6 Cost of cultivation of bottle and bitter gourds (₹/ha)

Sr. No.	Item	Bottle gourd			Bitter gourd		
		Qty	Value	%	Qty	Value	%
1	Total human Labour						
	a) Male	61.73	16492.91	8.36	61.43	15640.51	7.35
	b) Female	80.00	12720.00	6.45	117.00	18568.28	8.43
2	Bullock labour (Pair days)	0.97	956.24	0.48	2.36	2106.48	0.99
3	Machine power (hrs)	107.52	16360.00	8.29	108.87	16977.78	7.98
4	Seed (Kgs)	1.75	6431.00	3.26	1.46	9596.76	4.51
5	Manures (Qtls)	45.00	10800.00	5.47	56.62	11770.37	5.53
6	Fertilizer (kgs)						
	N	112.56	4379.34	2.22	88.92	3509.07	1.65
	P	79.50	5510.00	2.79	77.50	5148.00	2.42
	K	105.55	4034.36	2.04	98.84	2897.04	1.36
7	Irrigation charges (₹)		1780.14	0.90		2115.40	0.99
8	Plant protection		31623.58	16.02		32944.44	15.49
9	Incidental and bower charges		5395.00	2.73		5376.86	2.53
10	Repairs		398.31	0.20		395.28	0.19
	Working capital		116880.87	59.22		127046.27	59.72
11	Int. on working capital		7012.85	3.55		7622.78	3.58
12	Depreciation		850.60	0.43		757.18	0.36
13	Land revenue and taxes		70.94	0.04		69.39	0.03
	Cost-A		124815.26	63.24		135495.62	63.69
14	Rental value of land		56929.06	28.85		59430.61	27.93
15	Int on fixed capital		1326.87	0.67		1310.70	0.62
	Cost-B		183071.19	92.76		196236.93	92.24
16	Family labour						
	a) Male	40.11	9211.91	4.64	45.00	10800.00	5.08
	b) Female	34.50	507091	2.57	42.00	5712.00	2.68
	Cost-C		197354.01	100.0		212748.93	100.00
17	Output						
	Main -produce (qtls)	380.00	342000.00		170.00	357000.00	
	Bye-produce (qtls)	0.00	0.00		0.00	0.00	
18	Cost-C net Bye-produce		197354.01			212748.93	
19	Per Quintal cost		519.35			1251.46	

It was revealed from table that, the per hectare cost of cultivation for bottle gourd and bitter gourd were `197354.01` 212748.93, respectively. The per quintal cost of cultivation for bottle gourd and bitter gourd were to the tune of `` 519.35 and ` 1251.46. The yield obtained was 380.00 and 170.00 quintals per hectare for bottle and bitter gourds, respectively. The share of rental value of land was about 29 to 28 per cent. The vegetable production being labour intensive the share of hired labour was to the tune of 15 to 16 per cent. The another item of

cost of cultivation was on insecticides and pesticides which was about 15 to 16 per cent and the share of hired machine was 8 per cent. The remaining items of cost of cultivations bullock labour, manure, fertilizers and interest on fixed capital were observed to be less percentage i.e 1 to 8 per cent in both crops.

4.7 Costs and returns of bottle and bitter gourd

The per hectare costs, returns, gross income and B:C ratio for bottle and bitter gourd is presented Table 7.

Table 7 Costs and returns of bottle and bitter gourds (₹/ha)

Sr. No.	Particulars	Bottle	Bitter
1	Total cost		
	i) Cost A	124815.26	135495.62
	ii) Cost B	183071.19	196236.93
	iii) Cost C	197354.01	212748.93
2	Profit at		
	i) Cost A	217184.74	221504.38
	ii) Cost B	158928.81	160763.07
	iii) Cost C	144645.99	144251.07
3	Production (Qtls)	380.00	170.00
4	Gross Income (₹)	342000.00	357000.00
5	B:C Ratio		
	i) Cost A	2.74	2.63
	ii) Cost B	1.87	1.82
	iii) Cost C	1.73	1.68

From the table, it was observed that, the per hectare cost of cultivation of bottle gourd was ₹ 197354.01 and for bitter gourd was ₹ 212748.93. The gross returns obtained were to the tune of ₹ 342000 and ₹ 375000 with B:C ratio of 1.73 and 1.68 , respectively.

4.8 Production function analysis for bottle and bitter gourd cultivation

The result of Cobb-Douglas production is depicted in table 8. The proportion of total variations explained jointly by the resource variables was 73 and

71 per cent in bottle and bitter gourd, respectively. The regression coefficient of human labour, manure, were positively significant at 1 per cent level, plant protection at 5 per cent and irrigation at 10 per cent for bottle gourd. In case of bitter gourd the regression coefficient of human labour and manure at 1 per cent, N and irrigation cost at 5 per cent and plant protection at 10 per cent were positive and significant which indicated the major contribution of these variables on the output. The regression coefficients of bullock labour, machine.

Table 8 Results of Cobb-Douglas production function for bottle and bitter gourd

Sr. No.	Item	Variables	Bottle gourd (N=45)	Bitter gourd (N=45)
1	Constant	(a)	2.5962	3.6558
2	Human Labour	(X ₁)	0.9069*** (0.2050)	1.0505*** (0.1902)
3	Bullock Labour	(X ₂)	0.1238NS (0.8751)	0.0088NS (0.1238)
4	Machine Labour	(X ₃)	0.1416NS (0.8693)	0.0329NS (0.1316)
5	Manures	(X ₄)	0.0809*** (0.0231)	0.0406*** (0.0102)
6	N	(X ₅)	0.1047NS (0.2460)	0.2460** (0.1046)
7	P	(X ₆)	0.0853NS (0.0518)	0.0418NS (0.0853)
8	K	(X ₇)	0.0678NS (0.0410)	0.0410NS (0.0678)

9	Plant Protection	(X_8)	0.6226** (0.2460)	0.5000* (0.2611)
10	Irrigation Cost	(X_8)	0.5837* (0.3010)	0.8858** (0.3477)
11	R ²		0.73	0.71

(Figure in the parentheses are standard errors of respective variable)

Note:- ***, **, * indicates the level of significance at 1, 5 and 10 per cent.

labour, P and k fertilizers were non significant indicated low influence on the gourd production yield.

4.9 Marketing of gourds

The channel wise marketing of bottle and bitter gourd is presented in table 9(a) and 9 (b). The

three channels were observed in marketing of gourds especially

- i) Channel-I Producer-Consumer
- ii) Channel-II Producer- Wholesaler-retailer-Consumer
- iii) Channel-III Producer- Distant market-Commission agent Wholesaler-retailer-Consumer

Table 9 (a) Channelwise marketing cost for bottle gourd

($\text{₹}/\text{q}$)

Sr. No	Particulars	I	II	III	Overall
1	Grading	0.00 (0.00)	18.4 (10.19)	29.4 (9.13)	15.93 (8.65)
2	Pakaging	0.00 (0.00)	10.23 (5.67)	15.66 (4.87)	8.63 (4.69)
3	Transport	44.18 (87.33)	79.43 (43.95)	171.26 (53.29)	98.26 (53.36)
4	Weighing	0.00 (0.00)	3.46 (1.92)	6.95 (2.16)	3.47 (1.89)
5	Loading/Unloading	0.00 (0.00)	1.52 (0.84)	8.85 (2.76)	3.46 (1.88)
6	Commission	0.00 (0.00)	60.24 (33.37)	77.00 (23.96)	45.75 (24.84)
7	Hamali	6.41 (12.67)	7.32 (4.05)	12.24 (3.81)	8.66 (4.70)
8	Total marketing cost	50.59 (100.00)	180.51 (100.00)	321.37 (100.00)	184.16 (100.00)

The marketing cost of marketing of bottle gourd for channel-I, II and III were `50.59/-, `180.51/- and `321.37/- respectively. The share of commission charges for channel-II and III were 33 and 24 per cent in total marketing cost for marketing

of bottle gourd. Transport charges were to tune of 44 and 53 per cent of the total marketing cost for channel-II and III, respectively At the overall level, the marketing cost of bottle gourd was Rs 184.16 per quintal.

Table 9 (b) Channelwise marketing cost for bitter gourd

($\text{₹}/\text{q}$)

Sr. No	Particulars	I	II	III	Overall
1	Grading	0.00 (0.00)	20.46 (5.93)	35.18 (7.41)	18.55 (6.08)
2	Pakaging	10.30 (10.75)	15.45 (4.48)	25.60 (5.39)	17.12 (5.61)
3	Transport	75.29 (78.58)	114.70 (33.22)	188.91 (39.81)	126.30 (41.38)
4	Weighing	0.00 (0.00)	8.39 (2.43)	12.35 (2.60)	6.91 (2.27)

5	Loading/Unloading	0.00 (0.00)	7.86 (2.28)	26.97 (5.68)	11.61 (3.80)
6	Commission	0.00 (0.00)	164.61 (47.68)	170.00 (35.82)	111.54 (36.55)
7	Hamali	10.22 (10.67)	13.78 (3.99)	15.53 (3.27)	13.18 (4.32)
8	Total marketing cost	95.81 (100.00)	345.25 (100.00)	474.54 (100.00)	305.20 (100.00)

(Figures in parentheses are the percentages to the total marketing cost)

The marketing cost for marketing of bitter gourd for channel-I, II and III were ` 95.81, ` 345.25 and ` 474.54 respectively. The share of commission charges 48 and 36 per cent in total marketing cost for channel II and III of bitter gourd respectively. Transport charges were to tune of 33 and 40 per cent of the total marketing cost for channel-II and III respectively. At the overall level, the marketing cost of bitter gourd was ` 305.20 per quintal. The marketing cost for channel-I was less as compared to channel –II and IIIrd for both the crops.

4.10 Problems faced by cultivators in gourd cultivation and marketing

The problems faced by the cultivators in gourd cultivation and marketing is the presented in Table 10. The major problems faced by the gourd growers were costly seeds of private company and non-availability of university seeds, attack of sucking pests on bottle gourd, powdery mildew and blight on bitter gourd, labour shortages, high cost of liquid fertilizer, costly and low quality of insecticides and cheating of farmers through hidden charges, high transport and commission charges.

Table 10 Problems faced by cultivators in gourd cultivation and marketing.

Sr. No.	Problem	Per cent (%)
1)	Production	
a)	Economical problem	
1.	Seeds are costly of private company and non-availability of university seed to farmers.	85.00
2.	Labour shortages at the time of harvesting season.	80.00
3.	High cost of liquid fertilizer.	75.00
4.	Non-availability of manure and costly.	70.00
5.	Costly insecticides and pesticides	60.00
b)	Technical problem	
1.	Attacks of sucking pest on bottle gourd are more.	82.00
2.	Attack of powdery mildew and blight are more on bitter gourd.	80.00
2)	Marketing	
a)	Economical problem	
1.	Low and fluctuations in prices.	70.00
2.	High Commission charges	70.00
3.	High transport charges	65.00
b)	Other problem	
1.	Cheating of farmers through hidden charges by traders.	80.00

5. Conclusions

- The total members of family were 5.01 for bottle gourd growers and 4.80 for bitter gourd growers.
- The total land holding was 1.55 for bottle gourd growers and 1.84 hectares for bitter gourd growers.. The gross cropped area was 1.68 and 1.97 hectares, respectively.

- The cropping pattern was dominated by cash crops and vegetables crops which ranged 27 and 36 per cent. The share of bottle gourd and bitter gourd in cropping pattern was 17 and 13 per cent, respectively.

- The per farm capital assets were ₹ 25,79,347 on bottle gourd growers and ₹ 30,55,701 for bitter gourd growers.
- The per hectare human labour use was 216 and 265 mandays, machine labour use 108 hours per hectare for bottle and bitter gourd cultivation. The expenditure on plant protection was around ₹ 31000 to ₹ 32000 per hectare.
- The per hectare cost of cultivation for bottle gourd was ₹ 197354.01 and bitter gourd was ₹ 212748.93. The per quintal cost of cultivation for bottle gourd and bitter gourd were to the tune of ₹ 519.35 and ₹ 1251.46., respectively. The benefit cost ratio was 1.73 and 1.68 for bottle and bitter gourd cultivation.
- The production function indicated that, human labour, manure, plant protection and irrigation for bottle gourd cultivation and human labour, manure, N, plant protection and irrigation for bitter gourd cultivation, were the most important variables influencing on the yield.
- Three channels were observed in marketing of gourds. At the overall level, the marketing cost observed ₹ 184.16 and ₹ 305.20 per quintal for bottle and bitter gourd respectively. The highest

marketing costs were observed in channel –III. i.e. ₹ 321 and ₹ 474 for bottle and bitter cultivars. The major items of marketing cost were commission and transport charges.

9. The major problems faced by the gourd growers were costly seeds and non-availability of university seeds, attack of sucking pests, powdery mildew and blight, labour shortages, high cost of liquid fertilizer, costly and low quality of insecticides and high transport and commission charges.

6. Suggestions

1. There is scope to increase the use of manures as per recommendations by farm yard manure, green manuring, vermin-compost etc and reduce the use of fertilizer as per recommendation for augmenting the average productivity of gourds
2. In order to reduce the expenditure on plant protection and fertilizers the integrated pest management and integrated nutrient management may be followed by the gourd cultivars.
3. There is need to reduce the unhidden charges from traders for the benefit of farmers.

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