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Economics of Snake gourd production in Konkan region

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Abstract

India is the second largest producer of vegetables and the diverse agro-climatic conditions in the country make it possible to grow almost all varieties of fresh vegetables in the country. In this paper, an attempt has been made to study the economic analysis of snake gourd production in Raigad district of Maharashtra pertained to the years 2015-16 with a view to analyse cost, returns, profitability and resource use efficiency. The study was based on the primary data collected from 120 snake gourd growers from selected villages in Pen and Panvel tehsils of Raigad district. The analysis of per hectare profitability of snake gourd crop indicated that, the snake gourd cultivation was a profitable enterprise at all levels of costs with a benefit-cost ratio of 1.51. The MVP to MFC ratio was more than one and this indicated that the snake gourd crop had further advantage in expanding the output level under given conditions of production.

Keywords: Cost, production, returns, resource use, utilization

Introduction

Vegetables constitute an important item of human diet. The daily minimum requirement of vegetables according to Indian Council of Medical Research (ICMR) is 280 gm per head (i.e. about 20 per cent of the daily requirement of the total food of an adult). Snake gourd may not be a unique type of vegetable that is well-known around the world, but certain cultures have been utilizing this unique food variety for hundreds, and perhaps thousands of years. They are native to Southeast Asia, including Myanmar, India, Indonesia, Sri Lanka, and other neighbouring countries, as well as some parts of Australia and Africa. Maharashtra is bestowed with variety of edaphic agro climatic conditions. Hence, it is suitable for growing wide range of vegetables successfully, among which tomato, onion, brinjal, okra, cabbage, chillies and gourd crops are the prominent ones. The area under snake gourd cultivation in India is 12.79 thousand hectares with a production of 169.46 thousand MT (National Horticulture Board database 2014-15).

The area under vegetables in Maharashtra is about 4.94 lakh hectares with a production of 63.01 lakh tonnes. Maharashtra ranks fifth in area and seventh in production of vegetables. The Konkan region occupies area of about 2,766 hectares under vegetables with a production of about 30,753 tonnes and with a productivity of around 14.12 t/ha (Anonymous, 2013). Cultivation of snake gourds is reported mostly in Raigad, Thane, Palghar and Ratnagiri districts. Generally snake gourd is grown commercially in *kharif* and summer season and their area of cultivation is more in Pen, Panvel tahsils of Raigad district. Considering the income and employment generating capacity of this crop, many farmers had started growing snake gourd in Konkan region.

Snake gourd contains many nutrients, vitamins, and minerals that are essential for human health, including significant levels of dietary fibre, a small amount of calorie, and high levels of protein. In terms of vitamins, snake gourd possess vitamin A (9.8 %), vitamin B-6 (11.3%), vitamin C (30.5 %), as well as manganese (12.5%), magnesium (6.7%), calcium (5.1%), and iron (5.7%). Snake gourd has been used as a diuretic in traditional medicine for many years, as it stimulates the liver and increases urination, thereby speeding up the elimination of toxins from the body. Some research has shown that snake gourd have antibiotic properties and when combined with the levels of antioxidants carotenes and vitamin C, this vegetable can significantly boost overall health.

Materials and Methods

The maximum area under snake gourd cultivation is concentrated in Raigad district of Konkan region, therefore Raigad district was selected purposively for the study. The Pen and Panvel tehsils were selected on the basis of maximum area under snake gourd cultivation as per

secondary data obtained from office of the TAO (Taluka Agriculture Officer), Alibag. Then five villages from each tehsils were selected. From each selected villages, a sample of twelve (12) snake gourd cultivators was selected randomly. Thus the final sample consisted of 10 villages and 120 snake gourd cultivators from both Pen and Panvel tehsils. The farms were classified as small, medium and large respectively. The information and data for present study are pertained to year 2015-2016. Simple statistical tools such as arithmetic mean, average, percentage, ratios and frequency distribution were worked out. For working out cost of production, standard cost concepts viz., cost-A₁, cost-A₂ cost-B₁, cost-B₂, cost-C₁, cost-C₂, cost-C₃ were used. The MPP of different inputs were estimated by taking 1st order partial derivative of output (Y) with respect to concerned input appearing in Cobb-douglas production function.

$$Y = b_0 x_1^{b_1} x_2^{b_2} x_3^{b_3} x_4^{b_4} x_5^{b_5} x_6^{b_6} x_7^{b_7} e^u$$

MPP of x₁ is

$$dy/dx_1 = b_0 b_1 x_1^{b_1-1} x_2^{b_2} x_3^{b_3} x_4^{b_4} x_5^{b_5} x_6^{b_6} x_7^{b_7} e^u$$

i) Marginal Physical Product (MPP)

$$MPP_{xi} = b_i \frac{\bar{Y}}{\bar{X}_i}$$

Where,

dy/dx₁ = MPP of X₁ input

b_i = Production elasticity's of ith input

\bar{Y} = Geometric mean of output

X_i = Geometric mean of ith input

ii) Marginal Value Product (MVP)

MVP_{xi} = Price per unit of output.

iii) Marginal Factor Cost (MFC)

MFC = Price per unit of the input.

Resource use Efficiency

After estimating the MVP, the resource use efficiency of different resources will be judged with the help of MVP to factor price (P_x) ratio ie,

MVP/MFC = 1 Optimum use of resource,

MVP/MFC < 1 Excess utilization of resource,

MVP/MFC > 1 Underutilization of resource

Results and Data Analysis

The production and productivity are the important economic indicators deciding the profitability of the crop. The results obtained from the present investigation as well as relevant discussion have been summarized below.

It was observed from the Table 1 that, total cost of cultivation (cost 'C₃') of snake gourd was worked out to ₹.171330, ₹.170825 and ₹.174792 in small group, medium group and large group, respectively, and at the overall level, it was worked out to be ₹.170888. In the case of the small size farms out of total cost (cost 'C₃'), the input cost comprised of 34.26 per cent, cost 'A₁' was worked out to be 36.91 per cent and cost 'B₂' was found to be 72.46 per cent.

Table 1: Per hectare cost of cultivation of snake gourd (Figures in ₹.)

S. No.	Particulars	Small	Medium	Large	Overall
1.	Hired labour				
	a) Male	10810 (6.31)	14610(8.55)	16598 (9.50)	14006 (8.20)
	b) female	4198 (2.45)	10122 (5.93)	17244 (9.87)	10522 (6.16)
	Total	15008 (8.76)	24732 (14.48)	33842(19.36)	24528(14.35)
2.	Machine	7836 (4.57)	8520 (4.99)	9228 (5.28)	8526 (4.99)
3.	Supporting poles	4500(2.63)	4990 (2.92)	5500 (3.15)	4980 (2.91)
4.	Seed	6242 (3.64)	6555 (3.84)	6745 (3.86)	6498 (3.80)
5.	Fertilizers N	998(0.58)	1031(0.60)	1112(0.64)	1043(0.61)
	P	1039(0.61)	1090(0.64)	1194(0.68)	1102(0.65)
	K	449(0.26)	508(0.30)	557(0.32)	502(0.29)
6.	FYM	18695(10.91)	19810(11.60)	21345(12.21)	19865(11.62)
8.	Mulching materials	1067(0.62)	938(0.55)	892(0.51)	970(0.57)
9.	Irrigation charges	511(0.30)	565(0.33)	622(0.36)	563(0.33)
10.	Plant protection	310(0.18)	368(0.22)	490(0.28)	376(0.22)
	Input cost	58694(34.26)	71580(41.90)	84411(48.29)	71438(41.80)
11.	Land revenue and cesses	150(0.09)	150(0.09)	150(0.09)	150(0.09)
12.	Depreciation	2636(1.54)	3548(2.08)	3473(1.99)	2882(1.69)
13.	Interest on working capital @ 6% for six months	1761(1.03)	2147(1.26)	2532(1.45)	2143(1.25)
	Cost A ₁	63240 (36.91)	77426 (45.32)	90567 (51.81)	76613 (44.83)
14.	Interest on fixed capital @ 10 per cent	10734 (6.26)	12729 (7.45)	13685(7.83)	12382(7.25)
	Cost B ₁	73974 (43.18)	90155 (52.78)	104252(59.64)	88996(52.08)
	Rental value of owned land	50165 (29.28)	42304 (24.76)	39167(22.41)	42928(25.12)
	Cost B ₂	124138(72.46)	132459 (77.54)	143418(82.05)	131924(77.20)
15.	Family labour				
	a) Male	23400 (13.66)	17494 (10.24)	12854 (7.35)	17916 (10.48)
	b) Female	17922 (10.46)	13714 (8.03)	10078 (5.77)	13904 (8.14)
	Total	41322 (24.12)	31208(18.27)	22932(13.12)	31820(18.62)
	Cost C ₁	115296 (67.29)	121363(71.04)	127184(72.76)	120816(70.70)
	Cost C ₂	165460(96.57)	163667(95.81)	163350(95.17)	163744(95.82)
17.	Supervision charges	5869(3.43)	7158(4.19)	8441(4.83)	7144(4.18)
	Cost C ₃	171330(100)	170825(100)	174792(100)	170888(100)

(Figures in parentheses indicates percentage to cost 'C₃')

It was observed that, out of the total cost (cost 'C₃') in the medium size farm group the working capital, cost 'A1' and cost 'B2' were incurred as 41.90 per cent, 45.32 per cent and 77.54 per cent respectively.

In the case of large farms, out of the total cost C₃, the input cost, cost 'A1' and cost 'B2' were found to be 48.29 per cent, 51.81 per cent, 82.05 per cent respectively.

At the overall level, out total cost of cultivation the maximum implicit cost was incurred on rental value of land (25.12) followed by family labour (18.62%) hired labour (14.35%), cost of FYM and fertilizers (13.17%), rent of machine hrs. (4.99%), cost of seed (3.80%), cost of supporting materials (2.91%), netting materials (1.45%), cost of irrigation (0.33%) and cost of plant protection (0.22%) in snake gourd cultivation. Out of the total cost (cost 'C₃') at overall level the input cost, cost 'A1' and cost 'B2' comprises were 41.80 per cent, 44.38 per cent and 77.20 per cent respectively.

The per hectare snake gourd production was worked out to be 111.81 q, 110.75 q and 117.95 q, in small group, medium group and large group, respectively, with an overall average production of 114.03 q per hectare. The price realized by producer was ₹ 2267/q, whereas the per hectare gross return obtained from snake gourd was ₹ 253436, ₹ 251034, ₹ 267354 and ₹ 258468 in small, medium, large group and at

overall level respectively. The net profit (at cost 'C₃') was worked out to be ₹ 82107, ₹ 80209 and ₹ 92562 and ₹ 87581 in small, medium, large and at overall level, respectively. However, the per quintal cost of snake gourd production was worked out to be ₹ 1532, ₹ 1542, ₹ 1482 and ₹ 1499 in small, medium, large farms and at overall level, respectively.

Per hectare profitability of snake gourd cultivation

The per hectare profitability of snake gourd cultivation and benefit-cost ratio was worked out as per cost concept and which is presented in Table 2.

The benefit-cost ratio of small size, medium size and large size farm at overall level were estimated to be 1.48, 1.47, 1.53, and 1.51, respectively. This indicated that, in kharif season snake gourd production was profitable in the study area. The net returns at cost 'A1', cost 'B1' and cost 'C1' were also worked out and it was ₹190196, ₹179462 and ₹138140 at small size farm respectively. Whereas it was ₹173608, ₹160879 and ₹129671 respectively in medium size farms. Similarly ₹176787, ₹163102 and ₹140170 respectively in large farms and ₹ 181855, ₹ 169473 and ₹ 137653 respectively at overall level.

Table 2: Group-wise per hectare profitability of snake gourd cultivation

Sr. No	Items	Small	Medium	Large	Overall
1.	Production (q/ha)	111.81	110.75	117.95	114.03
2.	Price received (₹./q)	2267	2267	2267	2267
3.	Gross returns (₹)	253436	251034	267354	258468
	a) Cost 'A1' (₹)	63240	77426	90567	76613
	b) Cost 'B1' (₹)	73974	90155	104252	88996
	c) Cost 'C1' (₹)	115296	121363	127184	120816
	d) Cost 'C ₃ ' (₹)	171330	170825	174792	170888
4.	Net return at				
	a) Cost 'A ₁ ' (₹)	190196	173608	176787	181855
	b) Cost 'B ₁ ' (₹)	179462	160879	163102	169473
	c) Cost 'C ₁ ' (₹)	138140	129671	140170	137653
	d) Cost 'C ₃ ' (₹)	82107	80209	92562	87581
5.	Per quintal cost of cultivation (₹)	1532	1542	1482	1499
6.	Benefit-cost ratio	1.48	1.47	1.53	1.51

Table 3: Efficiency of resource use in snake gourd production

Resources	Cat. of farm	MPP	MVP	Factor price (Px)	MVP/PX Ratio	Level of resources used
Human labour days (X ₁)	S	0.44116	1191.122	200	5.9556	Under utilization
	M	0.85905	1975.822	200	9.8791	Under utilization
	L	0.06143	122.857	200	0.6143	Excess utilization
	O	0.56491	1280.454	200	6.4023	Under utilization
Machine labour hrs (X ₂)	S	-7.75312	-20933.421	600	-34.8890	Excess utilization
	M	8.88279	20430.410	600	34.0507	Under utilization
	L	-3.70016	-7400.314	600	-12.3339	Excess utilization
	O	-1.17584	-2665.235	600	-4.4421	Excess utilization
Fertilizer Kg. (X ₃)	S	0.81881	2210.797	8.5	260.0937	Under utilization
	M	-0.45941	-1056.637	8.5	-124.310	Excess utilization
	L	0.56190	1123.791	8.5	132.2107	Under utilization
	O	-0.08589	-194.674	8.5	-22.9029	Excess utilization
Irrigation hrs. (X ₄)	S	4.01562	10842.172	15	722.8114	Under utilization
	M	3.79617	8731.190	15	582.0793	Under utilization
	L	2.06688	4133.765	15	275.5843	Under utilization
	O	0.55263	1252.631	15	83.5087	Under utilization
Seed kg (X ₅)	S	-45.7062	-123406.86	950	-129.902	Excess utilization
	M	-14.7761	-33985.080	950	-35.7738	Excess utilization
	L	-27.9306	-55861.346	950	-58.8014	Excess utilization
	O	-12.8689	-29169.410	950	-30.7046	Excess utilization
FYM (q) (X ₆)	S	-0.73856	-1994.124	500	-3.9882	Excess utilization
	M	4.59719	10573.530	500	21.1471	Under utilization

	L	-3.26909	-6538.189	500	-13.0764	Excess utilization
	O	0.98524	2233.196	500	4.4664	Under utilization
Supporting materials Kg.(X ₇)	S	0.94934	2563.214	100	25.6321	Under utilization
	M	0.83820	1927.856	100	19.2786	Under utilization
	L	-0.15751	-315.019	100	-3.1502	Excess utilization
	O	0.91843	2081.761	100	20.8176	Under utilization

S- small, M-medium, L-large, O-overall

Resource use efficiency in production of snake gourd

The resource use efficiency was studied with the help of MVP to factor price ratio (P_x) to see whether the input resources utilised in the production of snake gourd have been efficiently or not.. The result of this analysis is presented in Table 3.

It was seen from the Table 3 that, among the inputs used for production of snake gourd, which have positive and significant influences at the overall level, the MVP to factor price P_x ratio were more than one for human labour days (6.4023), irrigation hrs. (83.5087), farm yard manure (4.4664) and supporting materials (20.8176) indicated underutilization of these resources in cultivation of snake gourd. Whereas, the MVP to P_x ratio was less than one for machine labour days (-4.4421), fertilizers (-22.9029) and seeds in kg (-30.7046) which indicated excess utilization of these resources in the cultivation of snake gourd.

In small sized farms, among the various inputs used for production of snake gourd, the MVP to P_x ratio were more than one for human labour days (5.9596), fertilizer kg. (260.0937), irrigation hrs (722.8114) and supporting materials (25.6321) which indicated underutilization of these resources in cultivation of snake gourd. Whereas, the MVP to P_x ratio was less than one for machine labour days (-34.8890), seed in kg (-129.9020) and farm yard manure (-3.9882) which indicated excess utilization of these resources in the cultivation of snake gourd. In case of medium size farms, among the inputs used for production of snake gourd the MVP to P_x ratio was more than one for human labour days (9.8791), machine labour days (34.0507), irrigation hrs (582.0793), farm yard manure (21.1471) and supporting materials (19.2786) which indicated underutilization of these resources in the cultivation of snake gourd. Whereas, the MVP to P_x ratio was less than one for fertilizers kg. (-124.3103) and seed in kg (-35.7738) indicated excess utilization of these resources in cultivation of snake gourd. In large sized farms, among the inputs used for production of snake gourd the MVP to P_x ratio were more than one for fertilizers kg (132.2107) and irrigation hrs. (275.5843) which indicated underutilization of these resources in the cultivation of snake gourd. Whereas, the MVP to P_x ratio was less than one for human labour days (0.6143), machine labour (-12.3339), seed in kg (-58.8014), farm yard manure (-13.0764) and supporting materials (-3.1502) there by indicating excess utilization of these resources in the cultivation of snake gourd. This indicated that, farmers in the study area were lacking scientific knowledge in the cultivation of snake gourd especially in reallocating the resources to increase the profit from cultivation of snake gourd.

Summary and Conclusions

Vegetables are store house of nutrients. The analysis of per hectare profitability of snake gourd crop indicated that the snake gourd cultivation was a profitable enterprise at all the levels of cost, resulting benefit-cost ratio of 1.51. The Cobb-Douglas production function analysis revealed that, the intensive use of fertilizers (kg), irrigation (hrs.), farm yard manure and supporting materials (No.) had positive and

significant influence on production. Further, they were having MVP to MFC ratio more than one. This revealed that, the snake gourd crop had further advantage in expanding output level under given conditions of production.

The MVP to factor price P_x ratio was more than one for human labour days (6.4023), irrigation hrs (83.5087), farm yard manure (4.4664) and supporting materials (20.8176) which indicated underutilization of these resources in cultivation of snake gourd. Whereas, the MVP to P_x ratio was less than one for machine hrs (-4.4421), fertilizer (-22.9029), seed in kg (-30.7046) which indicated excess utilization of these resources in the cultivation of snake gourd

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