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Research Note

Cost Benefit Analysis and Marketing of Mushroom in Haryana[§]

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Abstract

The study conducted in the districts of Sonapat and Gurgaon in Haryana during the year 2003-04, has analysed the cost, returns and break-even point of mushroom production on different categories of farms, and has investigated the existing marketing system along with marketing cost, margins and marketing efficiency. Simple tabular analysis, benefit-cost analysis, break-even level, price spread and marketing efficiency have been used to draw the inference. The study has revealed that (i) the fixed capital investment is more than double in large and medium farms as compared to the small farms, (ii) the use of compost has a positive relationship with the farm size, (iii) there exists a positive relationship between mushroom production and farm size, (iv) large farmers have lowest cost of mushroom production as compared to small and medium farms due to efficient utilization of fixed farm resources, (v) the producer share in consumer rupee is highest in channel-IV, followed by channels II, III and I, respectively. The channel-I is the least efficient due to the existence of more middlemen. The study has suggested that (a) mushroom cultivation being capital-intensive, the financial assistance through institutional agencies at cheaper interest rate would be the desirable entity, (b) mushroom being a highly perishable crop and prone to high temperature, marketing infrastructures such as cold storage facilities are of immense importance. Similarly, suitable arrangements are needed by the canning/processing units for the management of surplus mushroom.

Introduction

Haryana is a leading of mushroom-producing state of India and has potential to increase its production in the near future. More than 80 per cent of total mushroom production (\approx 4000 tonnes/year) in Haryana comes from the seasonal mushroom growers of the Sonapat district. These farmers take a crop on the compost prepared by the long method. Delhi, besides being the largest consumer, is a big market for the mushroom of Sonapat.

A mushroom grower is required to have sufficient knowledge about production technology and

understanding of economics of mushroom cultivation. Depending on the availability of manpower, infrastructure, raw materials and market, planning for a small, medium or large unit may be chalked out, yet it is crucial to determine the optimum output level which makes a farm viable. The economics of mushroom cultivation vary across regions, and also have a bearing on the benefit-cost ratio. Keeping in view all these aspects, the present study was conducted in the districts of Sonapat and Gurgaon with the following objectives:

- To analyse the cost, returns and break-even point of mushroom production on different categories of farms, and
- To study the existing marketing system along with marketing cost, margins and marketing efficiency.

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[§] This paper is drawn from the Ph. D. thesis titled “An economic analysis of production and marketing of mushroom in Haryana” submitted by Ram Singh in 2004

Methodology

The study was conducted in the districts of Sonapat and Gurgaon of Haryana during 2003-04. From each selected district, five villages, viz. Khubru, Bhadana, Byanpur, Mimarpur and Rohat from the Sonapat district and Dhaula, Khaika, Sultanpur, Bahrapur and Pathrahari from the Gurgaon district, each with highest mushroom units were purposively selected. All these mushroom growers were arranged in the ascending order of the quantity of straw used by them. Later, based on the cumulative frequency total method (Singh *et al.*, 2001), they were categorized into small (up to 120 q), medium (120-240 q) and large (more than 240 q) farmers, thus out of 350 mushroom growers in these 10 villages, 100 mushroom growers (10 from each village) were selected randomly (40 small, 30 medium and 30 large farmers). In addition, 12 wholesalers and 10 retailers of mushroom were also interviewed through a well-structured schedule. For estimating cost, the average expenditure on various inputs like straw, human labour, spawn, bran, casing soil, fertilizer and plant protection chemicals was worked out. This cost along with the interest on working capital (@ 10 % per annum) formed the total variable cost. For calculating cost, the opportunity cost for owner inputs and actual price paid by the farmers for purchased inputs were considered, interest on fixed investment and depreciation on investment on capital equipment constituted the fixed cost.

The returns were calculated based on the actual prices received by the growers. The return over variable cost, return over material cost (wheat-straw, spawn, fertilizer, plant protection chemicals, bran, casing soil, etc.) and net returns were calculated by deducting the respective cost from the gross returns.

Break-even point (BEP) of output was calculated by using the following formula (1):

$$\text{BEP} = \text{TFC} / (\text{ASP} - \text{AVC}) \quad \dots(1)$$

where,

TFC = Total fixed cost,

ASP = Average sale price of mushroom (Rs/kg), and

AVC = Average variable cost (Rs/kg)

For estimating marketing cost and margins through major channels in the study area, the data collected from different marketing functionaries were analysed.

The important channels of mushroom marketing in the study area were:

- (1) Mushroom grower→Wholesaler/Commission agent→Retailer→Consumer,
- (2) Mushroom grower→Wholesaler/Commission agent→Consumer,
- (3) Mushroom grower→Retailer→Consumer, and
- (4) Mushroom grower→Consumer.

Marketing efficiency was calculated by using formula (2):

$$\text{Marketing efficiency} = \frac{\text{Value of produce per kg}}{\text{Marketing cost per kg}} - 1 \quad \dots(2)$$

Higher the ratio, higher is the efficiency and vice versa.

Results and Discussion

The data presented in Table 1 revealed that the average initial total investment on a mushroom farm was Rs 155187. The expenditure on building including *kachcha* and *pucca* structures accounted for the maximum share, it was 91.32 per cent, 94.03 per cent and 90.03 per cent for small, medium and large farms, respectively.

Regarding investment on machinery and equipments, it was found that in small farms the investment on such items as motor, spray pump, nozzle, water pipes, exhaust fan, cooler, heater, etc., constituted about 6.24 per cent, whereas on medium farms, it was about 3.74 per cent. In the large farms, the major cost was on generator, motor, electrical fittings, trays, forks, spray pump, etc., constituting about 9.49 per cent of the total capital investment.

Cost on Mushroom Production

The cost estimates for mushroom production on different categories of farms have been presented in Table 2. The total cost of production varied from Rs 54683 on small farms to Rs 401308 on large farms, with average as Rs 195387 per farm. The fixed cost of mushroom production was worked out to be 38.39 per cent, 39.52 per cent and 29.12 per cent on small, medium and large farms, respectively. The proportion

Table 1. Initial capital investment on mushroom production in different categories of farms

(Rs)

Particulars	Category of farms			
	Small	Medium	Large	Average
1. Investment on buildings				
(a) Kuchcha	21890	43960	163401	83714
(b) Pucca	35340	112270	49205	65605
Total	57230	156230	212606	142022
2. Investment on equipments				
(i) Generator	-	-	7670	2557
(ii) Trays, forks, tubs and buckets	691	1752	3465	1969
(iii) Spray pump, nozzle and water pipes	1395	2216	3031	2214
(iv) Exhaust fan, cooler, heater, etc.	910	1412	775	1032
(v) Thermometer, basket, petis, knife, etc.	120	240	101	154
(vi) Weighing balance	140	170	265	192
(vii) Electrical fittings	581	1550	3660	1930
(viii) Motor	1605	2590	4575	3117
Total	62672	166160	236147	155187

Table 2. Break-up of cost of cultivation on different mushroom farms

(Rs/farm)

Particulars	Category of farms		
	Small	Medium	Large
A. Fixed Cost			
(i) Depreciation on buildings	12287(22.47)	29606(22.75)	85042(21.19)
(ii) Depreciation on equipments	1186(2.18)	1894(1.45)	3489(0.87)
(iii) Interest on fixed capital investment @ 12 per cent for one year	7521(13.75)	19939(15.32)	28338(7.06)
Total	20994(38.39)	51438(39.52)	116869(29.12)
B. Variable Cost			
(i) Labour charges	3549(6.49)	17995(13.82)	57550(14.33)
(ii) Electricity charges	690(1.26)	962(0.74)	1510(0.38)
(iii) Compost	19112(34.95)	38916(29.90)	135430(33.75)
(iv) Pesticides & insecticides	1535(2.82)	2790(2.14)	9945(2.48)
(v) Casing soil	1549(2.83)	2759(2.12)	9965(2.48)
(vi) Spawn	5650(10.33)	11560(8.88)	53525(13.34)
(vii) Generator fuel	-	-	2970(0.74)
(viii) Interest on variable cost for 6 months @ 10 per cent	1604(2.93)	3749(2.88)	13545(3.38)
Total	33689(61.61)	78731(60.48)	284440(70.88)
Total (A + B)	54683(100)	130170(100)	401308(100)

Note: Figures within the parentheses are the percentages to total

of fixed cost to total cost being lowest on large farms revealed the optimum use of fixed farm resources by these farms. On an average, total fixed and variable costs were Rs 63101 and Rs 132287, which constituted about 32.30 per cent and 67.70 per cent of the overall cost, respectively.

Amongst the fixed cost, the depreciation on buildings was worked out to be Rs 12287, Rs 29606 and Rs 85042 comprising of about 22 per cent, 23 per cent and 21 per cent of the total cost on small, medium and large farms, respectively. The interest on fixed capital investment varied from 7.06 per cent to 15.32 per cent across different categories of mushroom farms and was maximum on medium size farms.

Amongst the variable cost, the compost on an average, accounted for the highest share (33 %) in the total cost. It may be due to the fact that compost serves as the base material for mushroom production. Across different categories of farms, cost on compost varied between 30 per cent and 35 per cent and was highest on the small farms. The expenditures on labour and spawn were the other major items, which accounted for 13.49 per cent and 12.07 per cent of the total cost, respectively. The generator fuel and electricity charges, however, constituted the least share, 0.52 per cent and 0.54 per cent, respectively. The interest on variable cost accounted for 3.22 per cent of the total cost and varied between 2.88 per cent and 3.38 per cent across different categories of mushroom farms.

In critical inputs, compost occupied the major share of total expenditure (29.90-34.95%), followed by value of spawn (8.88-13.34%), and labour charges (6.49-14.33%). The cost on pesticides, insecticides and casing soil ranged from 4.26 per cent to 5.66 per cent across different categories of mushroom farms. On the whole, the share of compost in total cost was 33 per cent, followed by labour charges (13.49%), spawn (12.07%), interest on variable cost (3.22%), casing soil (2.43%), pesticides and insecticides (2.43%) and electricity charges (0.54%) and generator fuel (0.52 %).

Costs and Returns from Mushroom Production

The average mushroom production across small, medium and large growers was 2639 kg, 6978 kg and 21910 kg, respectively (Table 3). Thus, a positive relationship existed between mushroom production and farm size. The gross returns ranged between Rs 88202 and Rs 735100 across different categories of farms. The average gross returns were computed to be Rs 351567 from the average mushroom production of 10509 kg and average selling price of mushroom being Rs 33.37/kg. The gross returns increased with the increase in the quantity of compost used. The net returns from mushroom production, which ranged from Rs 33519 to Rs 333792 across different farm categories, depicted an increase with an increase in farm size. The analysis clearly revealed that as the farm size increased, income generation capacity of the mushroom growers also went up. As a result, the large mushroom

Table 3. Costs and returns from mushroom production on different categories of farms

(Rs/farm)

Particulars	Categories of farmers			
	Small	Medium	Large	Average
Total variable cost (Rs)	33689	78731	284440	132287
Total production cost (Rs)	54683	130170	401308	195387
Mushroom production (kg)	2639	6978	21910	10509
Average selling price (Rs/kg)	33.40	33.15	33.55	33.37
Gross returns (Rs)	88202	231400	735100	351567
Net returns (Rs)	33519	101230	333792	156180
Returns over variable cost (Rs)	54513	152669	450660	219281
Benefit cost ratio (over total production cost)	1.61	1.78	1.83	1.74
Cost of production (Rs/ kg)	20.72	18.65	18.32	19.23
Break-even point of output (kg)	1017	2352	5682	3017
Net returns (Rs/ kg)	12.70	14.51	15.23	14.15

Table 4. Marketing cost incurred by different categories of mushroom growers in channel-I

Particulars	(Rs/kg)			
	Small	Medium	Large	Average
1. Packing and weighing	0.98 (19.44)	0.97 (20.29)	0.94 (25.27)	0.96 (21.29)
2. Washing of mushroom	0.57 (11.31)	0.55 (11.51)	0.54 (14.52)	0.55 (12.20)
3. Spreading on cloth sheet	0.09 (1.79)	0.07 (1.46)	0.05 (1.34)	0.07 (1.55)
4. Transportation	1.80 (35.71)	1.46 (30.54)	0.88 (23.66)	1.38 (30.60)
5. Loading and unloading	0.12 (2.38)	0.11 (2.30)	0.10 (2.69)	0.11 (2.44)
6. Commission	1.41 (27.98)	1.57 (32.85)	1.18 (31.72)	1.39 (30.82)
7. Miscellaneous	0.07 (1.39)	0.05 (1.05)	0.03 (0.80)	0.05 (1.10)
Total	5.04 (100)	4.78 (100)	3.72 (100)	4.51 (100)

Note: Figures within the parentheses are the percentages of the total marketing cost.

growers earned more profit than small and medium growers. In fact, adoption of better management practices by the large mushroom growers ultimately benefited them and provided higher income generating capacity. The study observed that the 'economies of scale' operated very well on large-size farms. It was also supported by the benefit cost ratio, which was higher on large (1.83) than small (1.61) and medium (1.78), farms the overall figure being 1.74.

The cost of production of mushroom decreased with the increase in farm size. Thus, net returns per kilogram were Rs 12.70, Rs 14.51 and Rs 15.23 on small, medium and large farms, respectively. It is clear from the table that large growers spent the least on per kg mushroom production due to efficient utilization of fixed farm resources.

Marketing Costs and Margins

The data about marketing costs incurred by different categories of mushroom growers are depicted in Table 4. The three major cost components were transportation, packing and weighing and commission charges. The cost on packing and weighing increased while cost on transportation decreased with farm size. The commission ranged from 28 per cent to 33 per cent with average cost of 31 per cent.

The marketing costs and margins presented in Table 5, show that the share of producer in consumer rupee was minimum in channel-I (62.62%) and maximum in channel-IV (91.51%). But, the price received by the grower was highest in channel-IV (Rs 35/kg) and

minimum in channel-I (Rs 32/kg). The marketing cost of producer across different channels was noticed highest in channel-II (10.66%), followed by channel-I (9.90%), channel-IV (8.49%) and channel-III (6.56%), but in absolute terms it was maximum under channel-I (Rs 4.37/kg), followed by channel-II (Rs 4.27/kg).

The marketing cost as well net margin of wholesaler under channel-I and channel-II were almost equal. The consumers paid Rs 44/kg, Rs 40/kg, Rs 43/kg and Rs 35/kg on purchasing mushroom through channels I, II, III, and IV, respectively.

Disposal Pattern of Mushroom through Different Marketing Channels

The disposal pattern of mushroom through different channels, depicted in Table 6, reveals that the maximum quantity (more than 80 %) of mushroom was sold through channel-I, in which there was involvement of all the stakeholders, viz. grower, wholesaler, retailer and consumer. The channel-II in which retailer was absent, could attract marketing of around 10 per cent production of mushroom from all the categories of growers. The marketing of mushroom through channel-III in which wholesaler was absent, was 4-5 per cent of their produce by small and medium farmers and 10 per cent by large farmers. The direct selling of mushroom by growers to consumers was practically not followed by large farmers, but small and medium farmers did sell 2-4 per cent of their produce through this channel. Thus, the order of disposal of mushroom through different channels was:

channel-I >>> channel-II ≈ channel-III > channel-IV

Table 5. Marketing costs and margins of mushroom through different marketing channels

(Rs/kg)

Sl No.	Particulars	Channels			
		I	II	III	IV
1.	Price received by grower	32.00 (72.53)	33.25 (83.02)	33.50 (77.91)	35.00 (100.00)
2.	Marketing cost incurred by grower				
a)	Washing of mushroom	0.55 (1.25)	0.55 (1.37)	0.55 (1.28)	0.55 (1.57)
b)	Spreading on cloth sheet	0.07 (0.16)	0.07 (0.18)	0.07 (0.16)	0.07 (0.20)
c)	Packing and weighing	0.96 (2.18)	0.96 (2.39)	0.96 (2.23)	0.96 (2.74)
d)	Transportation	1.38 (3.13)	1.26 (3.15)	1.18 (2.74)	1.31 (3.74)
e)	Loading and unloading	0.11 (0.25)	0.11 (0.27)	-	-
f)	Commission	1.25 (2.83)	1.28 (3.20)		
g)	Miscellaneous	0.05 (0.10)	0.04 (0.10)	0.06 (0.14)	0.08 (0.29)
	Total (a to g)	4.37 (9.90)	4.27 (10.66)	2.82 (6.56)	2.97 (8.49)
3.	Net margin of grower	27.63 (62.62)	28.98 (72.36)	30.68 (71.35)	32.03 (91.51)
4.	Marketing cost incurred by wholesaler				
a)	Packing	0.21 (0.48)	0.26 (0.65)	-	-
b)	Handling	0.20 (0.45)	0.20 (0.50)	-	-
	Total (a to b)	0.41 (0.93)	0.46 (1.15)	-	-
5.	Net margin of wholesaler	7.03 (15.93)	6.34 (15.83)	-	-
6.	Price received by wholesaler	39.44 (89.39)	40.05	-	-
7.	Marketing cost incurred by retailer				
a)	Loading and unloading	0.11 (0.25)	-	0 (0.30).13	-
b)	Price paid by retailer (Rs)	0.14 (0.32)	-	0.12 (0.28)	-
	Total (a + b)	0.25 (0.57)	-	0.25 (0.58)	-
8.	Net margin of retailer	4.43 (10.04)	-	9.25 (21.51)	-
9.	Price paid by consumer (Rs)	44.12 (100.00)	40.05 (100.00)	43.00 (100.00)	35.00 (100.00)
10.	Marketing efficiency	10.78	9.91	6.03	5.36

Note: Figures in parentheses are the percentage to the price paid by the consumer i.e., producer to consumer rupee.

Table 6. Disposal pattern of mushroom through different marketing channels

(Quantity in kg)

Marketing channels	Small growers		Medium growers		Large growers	
	No. of growers	Average quantity sold	No. of growers	Average quantity sold	No. of growers	Average quantity sold
I. Mushroom grower-Wholesaler-Retailer-Consumer	24 (60.0)	2140 (81.0)	17 (56.7)	5792 (83.0)	19 (63.3)	17843 (81.4)
II. Mushroom grower-Wholesaler-Consumer	8 (20.0)	263 (10.0)	6 (20.0)	713 (10.2)	6 (20.0)	2053 (9.4)
III. Mushroom grower-Retailer-Consumer	5 (12.5)	131 (5.0)	4 (13.3)	263 (3.8)	5 (16.7)	2014 (9.2)
IV. Mushroom grower-Consumer	3 (7.5)	105 (4.0)	3 (10.0)	210 (3.0)	-	-
Overall	40	2639	30	6978	30	21910

Note: Figures within parentheses are the percentages to the total of respective columns

Conclusions

Following conclusions emerged from the study:

- The fixed capital investment is more than double in large and medium farms as compared to small farms.
- The fixed cost to total cost being lowest on large farms (29.12%) as compared to small (38.39%) and medium (39.52%) farms, implies the optimum use of fixed farm resources with that size of farm.
- The use of compost has a positive relationship with the farm size.
- On the whole, in total variable cost, the average share of compost is maximum (33%) followed by labour charges (13%) and spawn (12%).
- There is a positive relationship between mushroom production and farm-size. The income of mushroom growers goes up with the increase in farm size. The large growers adopt the better management practices, resulting into higher net income, that is followed by medium and small farmers. This demonstrates the applicability of “economies of scale” in mushroom cultivation.
- Of various channels, channel-I (Producer-Wholesaler-Retailer-Consumer) is the most common channel amongst different categories of mushroom growers, followed by the channel-II (Producer-Wholesaler-Consumer) in small and medium size farms, while channel-III only in case of large growers.

Policy Implications

Based on above conclusions, the following policy implications emerge:

- (i) Since mushroom cultivation is capital-intensive and increases with increase in farm-size, the financial assistance through institutional agencies at cheaper interest rate would help increase mushroom production.
- (ii) Proper institutional arrangements are required to supply the good quality of spawn at reasonable prices and in desired quantities to the mushroom growers.
- (iii) Farmers’ co-operative marketing societies and/or farmer’s organizations may be promoted to take care of surplus quantity of mushroom production.
- (iv) Mushroom being a highly perishable crop and prone to high temperature, marketing infrastructure such as cold storage facilities is of immense importance. Similarly, suitable arrangements are needed by the conning/processing units for the management of surplus mushroom.

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