Shekhar Kumar
Research Scholar, Department of Agricultural Economics, Indira Gandhi Krishi Vishvavidyalaya University, Raipur, Chhattisgarh, India

Dr. Susila
Professor, Department of Agricultural Economics, Indira Gandhi Krishi Vishvavidyalaya University, Raipur, Chhattisgarh, India

Shubham Thakur
Ph.D. Research Scholar, Department of Agricultural Economics, Indira Gandhi Krishi Vishvavidyalaya University, Raipur, Chhattisgarh, India

Shubhi Singh
Ph.D. Research Scholar, Department of Agricultural Economics, Indira Gandhi Krishi Vishvavidyalaya University, Raipur, Chhattisgarh, India

Cost and return of oyster cultivation in Rajnandgaon district of Chhattisgarh

Shekhar Kumar, Dr. Susila, Shubham Thakur and Shubhi Singh

Abstract
The study in Rajnandgaon district of Chhattisgarh. It focused on analysing costs involved in mushroom production, estimating profits, to work out Benefit Cost Ratio (BCR) and Break Even Point (BEP), identifying the constraints of mushroom farming. 45 respondents were interviewed face to face through use of survey schedule. The net returns over total cost were Rs. 4835, Rs.5131 and Rs.5548 on small, medium and large farms, respectively. The large growers adopted the better management practices resulting into higher net return. Large farmers had lowest cost of production (Rs.37.94/kg) and medium farmer had maximum benefit -cost ratio (1:2.83) due to most efficient utilization of resources and higher production level with the given cost and physical output mushroom would remain proportion of no profit and no loss with the yield range of 26.09 to 67kg on small farm, 25.50 to 69kg on medium farm and 24.84 to 72kg on large farm. Thus, the existing cost of production and physical output of mushroom generated sufficient profit to the sample mushroom growers. Financial test ratios shows that mushroom business activity was economic feasible and profitability when produce on large scale.

Keywords: Production, cost, profitability, mushroom cultivation, BCR

Introduction
Mushroom farming today is being practiced in more than 100 countries and its production is increasing at an annual rate of 6-7 percent. Present world production of mushrooms is around 3.5 million tones. Mushroom cultivation can directly improve livelihoods through economic, nutritional and medicinal contributions. Mushrooms both add flavor to bland staple foods and are a valuable food in their own right: they are often considered to provide a fair substitute for meat, with at least a comparable nutritional value to many vegetables. Income benefits Mushroom cultivation activities can play an important role in supporting the local economy by contributing to subsistence food security, nutrition, and medicine; generating additional employment and income through local, regional and national trade; and offering opportunities for processing enterprises. Keeping in view the importance of mushroom, current study "Economic analysis of Oyster mushroom cultivation in Rajnandgaon district of Chhattisgarh" was undertaken in Rajnandgaon district of Chhattisgarh with the objective to work out the cost and returns of mushroom cultivation.

Analytical Framework
Cost Concept: all variable and fixed costs incurred during cultivation were considered.
Break – Even Analysis (BEP)

$$BEP = \frac{Fixed\ cost}{Selling\ price(per\ unit) - variable\ cost}$$

Benefit-cost ratio: It's shows the relationship between the relative cost and benefit of a mushroom cultivation, expressed in monetary.

$$B:C\ Ratio = \frac{\sum Present\ value\ of\ future\ benifits}{\sum Present\ value\ of\ future\ cost}$$

Corresponding Author:
Shekhar Kumar
Research Scholar, Department of Agricultural Economics, Indira Gandhi Krishi Vishvavidyalaya University, Raipur, Chhattisgarh, India

Result and Discussion
Cost and return of oyster mushroom
Cost of Mushroom Production

The cost estimates for mushroom production on different categories of farms have been presented in Table 1. The cost of cultivation was calculated on hundred square feet area basis for these groups of mushroom producers. It may be noted from the Table 1 that the total cost on oyster mushroom varied considerably from Rs. 2732 on large farm to Rs.2870 on small farm with an average as Rs.2802 on sample farm.

Thus, inverse trend was observed between total cost and farm size. The fixed cost of mushroom production was estimated to be 41.98 percent, 37.76 percent and 33.82 percent on small, medium and large farm, respectively. The proportion of fixed cost to total cost being lowest on large farm revealed the optimum use of fixed farm resources by these farms. On an average total fixed cost and variable cost were Rs. 1062 and Rs. 1740 which constituted about 37.90 percent and 62.09 percent of the overall total cost, respectively.

Table 1: Cost of cultivation of oyster mushroom on different size of holding (Rs/100sf)

S. No.	Particulars	Size Group		Average	
		Small	Medium	Large	
A	Variable Cost				
1.	Labour Cost				
i.	Straw preparation and treatment	80(2.79)	85(3.03)	90(3.29)	85(3.03)
ii.	Drying	55(1.92)	60(2.14)	68(2.49)	61(2.18)
iii.	Spawn mixing and filling in bag	105(3.66)	110(3.92)	112(4.09)	109(3.89)
iv.	Spraying water	100(3.48)	100(3.57)	100(3.66)	100(3.57)
v.	Picking	150(5.23)	150(5.35)	150(5.49)	150(5.35)
	Sub total	490(15.68)	505(18.00)	520(19.03)	505(18.03)
S. No.	Particulars	Size Group			
		Small	Medium	Large	Average
2.	Material Cost				
I	Paddy straw	330(11.49)	350(12.48)	360(13.18)	346(12.34)
ii.	Mushroom spawn	275(9.58)	290(10.34)	305(11.16)	290(10.35)
iii.	Poly bag	45(1.57)	48(1.27)	49(1.79)	47(1.68)
iv.	Formalin	178(6.13)	188(6.70)	198(7.21)	188(6.70)
v.	Bavistin	172(5.99)	182(6.49)	192(7.02)	182(6.50)
vi.	Rubber	28(0.97)	30(1.06)	32(1.17)	30(1.08)
Vii	Miscellaneous	40(1.39)	40(1.43)	40(1.46)	40(1.43)
	Sub total	1066(37.14)	1126(40.16)	1175(43.00)	1121(40.00)
3.	Interest on working capital (10%)	106(3.69)	112(3.99)	117(4.28)	112(3.99)
	Total Variable Cost (A)	1665(58.01)	1745(62.23)	1813(66.36)	1740(62.09)
B	Fixed Cost				
1.	Depreciation	1095(38.15)	963(34.34)	840(30.74)	966(34.47)
2.	Interest on fixed capital (10%)	110(3.92)	96(3.42)	84(3.07)	96(3.42)
	Total Fixed Cost (B)	1205(41.98)	1059(37.76)	924(33.82)	1062(37.90)
	Total cost (A+B)	2870(100)	2804(100)	2732(100)	2802(100)

Figures in parenthesis show the percentage to total.

Amongst the fixed cost the depreciation on fixed resources (mushroom house, equipment etc.) was estimated to be Rs. 1095, Rs. 963 and Rs. 840 comprising of about 38.15 percent, 34.34 percent and 30.74 percent of the total cost on small, medium and large farm, respectively. The interest on fixed capital inversely varied from 3.83 percent to 3.07 percent across different categories of oyster mushroom farms and was maximum on small farms.

Amongst the variable cost the labour cost on an average accounted for the highest share (18.03%) in the total cost which varies between 15.68 percent on small farm to 19.03 on large farms. The expenditures on paddy straw and mushroom spawn were other major items which accounted for 12.34 and 10.35 percent of the total cost respectively. It may be due to the fact that paddy straw serves as the base material for mushroom production. Across different categories of farms, cost on paddy straw varied 11.49 percent to 13.18 percent and was highest on the large farm both in absolute and relative terms. Thus, use of paddy straw had positive relationship with the farm size. The expenditure on rubber however, constituted the least share (1.08%). The interest on variable cost accounted for 4.06 percent of the total cost and varied between 3.80 to 4.32 percent across different categories of mushroom farms. The cost on formalin and bavistin together ranged from 12.12 percent to 14.23 percent across different categories of mushroom farms.

Return from mushroom production
Table 2 inferred that average oyster mushroom production across small, medium and large groups was 67 kg, 69kg and 72kg respectively. Thus, there existed a positive relationship between the mushroom production and farm size. The gross return was the highest for large farms (Rs. 8812) when compared with small (Rs. 8194) and medium farms (Rs. 8444). The average gross returns were estimated to be Rs. 8483 from the average mushroom production of 69 kg and average selling price of mushroom being Rs. 115 per kilogram. The gross returns increased with the increase in the quantity of paddy straw and spawn used. The net return of mushroom production showed an increasing trend with farm size. It was ranged from Rs. 5324 to Rs. 6080 across different farms with Rs. 5681 on overall farm. 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 grower's earned 5 more profit than small and medium growers. In fact adoption of better management practices by the large mushroom growers ultimately benefitted them and provided higher income generating capacity. The study observed that the scale economies operated very well on large size farm. Cost of production per kg also showed decreasing trend as the size of the farms increased. With the existing cost and production level cost of production of oyster mushroom per kg on sample farm was Rs. 40.84 which varied between Rs. 37.94 on large farm to Rs. 42.33 on small farm followed by Rs. 40.63 per kg on medium farm. This is probably due to increase in the efficiency in use of resources in large farms together with economies in scale in production.

Table 2: Return from mushroom production on sample farm (Rs/100sf)

S. No.	Particulars	Size Group			Average
		Small	Medium	Large	
1	Cost of production (per kg)	42.83	40.63	37.94	40.60
2	Gross income (Rs)	7705	7935	8280	7935
3	Net income (Rs)	4835	5131	5548	5133
4	Benefit-cost ratio	1:2.68	1:2.83	1:2.03	1:2.83

Break-even analysis
Break even analysis revealed that small unites if produced 26.09 kg mushroom did not gain or loss under given total cost and actual market price structure. However medium and large mushroom units producing just 25.50kg and 24.84kg of mushroom were at no profit no loss situation due to their low cost of production. At the overage of break-even output in physical terms was achieved 43.52kg of mushroom produced. Table 3 further inferred that mushroom growers are not in a losing position if mushroom price per kg decline to Rs. 40.47 provided actual production is not less than 25.48kg. Breakeven price level was much less than the actual market price of mushroom prevailed in the market. Thus sample respondents are in profit under given cost and production level.

Table 3: Break even production and price of mushroom on sample farm

S. No.	Particular	Small	Size Group Medium	Large	Average
1.	**Production (kg)**				
I.	Average production	67	69	72	69
II.	Break even production	26.09	25.50	24.84	25.48
III.	Gap	40.91(61)	43.50(63)	47.16(66)	43.52(63)
2.	**Price (Rs/kg)**				
I.	Average price	115	115	115	115
II	Break-even price	42.83	40.63	37.94	40.47
III	Gap	72.17(63)	74.37(65)	77.06(67)	74.86(65)

Figures in parenthesis show percentage increase of actual over break even.

Financial viability of mushroom production
The financial test ratios for a mushroom crop on sample farm indicating the economic viability for different units are shown in Table 4.

Table 4: Financial test ratios for mushroom production on sample farm

S. No.	Financial Ratios	Size Group			
		Small	Medium	Large	Overall
1.	Total Operating cost	1665	1745	1813	1740
2.	Total Fixed cost	1205	1059	924	1062
3.	Total Cost	2870	2804	2732	2802
4.	Gross Income	7705	7935	8280	7935
5.	**Financial test ratio**				
I.	Operating ratio	0.21	0.22	0.22	0.21
II.	Fixed ratio	0.16	0.13	0.11	0.13
III.	Gross ratio	0.37	0.35	0.33	0.35

As shown in Table 4 the operating ratio varied from 0.21 on small farm to 0.22 on medium and large farm with 0.21 on an average farm. These figures indicating the magnitudes of working expenditure incurred for a rupee of gross income. Operating ratio was found to be quite favorable across different mushroom units. The fixed ratio was estimated to be 0.11 on large farm to 0.16 in case of small farm followed by 0.13 in medium farms. Thus, fixed ratio decreases as the mushroom farm size increases. Gross ratio is obtained when both operating expenses and fixed expenses are totaled up and compared with gross income. The gross ratio ranged between 0.33 to 0.37 the highest being on small and lowest in large farm. All these ratios less than one were indicating the profitable run of the mushroom business. Large farm were found to be more economic viable revealed by lower gross ratio value.

Summary and Conclusion
Average total cost (for 100sq feet) incurred in mushroom production on sample farm was Rs. 2802. It was highest on small farm (Rs. 2870) followed by medium (Rs. 2804) and large (Rs. 2732) farms which decrease as the size group increased. The fixed cost to total cost being lowest on large farm (33.82%) as compared to medium (37.76%) and small (41.98%) farm implies the optimum use of fixed farm resources with large size of farm. Oyster mushroom production was marginally higher on large farm (72kg) compared to medium (69kg) and small farmer (67kg) due to better management of crop by large mushroom growers on account of small area under it. The net returns over total cost were Rs. 4835, Rs. 5131 and Rs.5548 on small, medium and large farms, respectively. Large farmers had lowest cost of production (Rs. 37.94/kg) and medium farmer had maximum benefit -cost ratio (1:2.83) due to most efficient utilization of resources and higher production level. With the given cost and physical output mushroom would remain proportion of no profit and no loss with the yield range of 26.09 to 67kg on small farm, 25.50 to 69kg on medium farm and 24.84 to 72kg on large farm. Financial test ratios shows that mushroom business activity was economic feasible and profitability

when produce on large scale.

References

1. Babu SK, Naidu H, Prasad YE. Studies on Price Spread and Marketing of Green Chillies - A Case Study in Andhra Pradesh. Agricultural Marketing journal. 2003;46(1):21-24.
2. Celik Y, Peker K. Benefit cost analysis of mushroom diversification of income in developing countries. Bulgarian J. of Agricultural Science. 2009;15(3):228-237.
3. Chavhal HS, Kauthekar LJ, Chavan VR, Sudewad SL. Marketing cost, marketing margin and price spread of soybean in Parbhani district of Maharashtra. Int. J. Commerce and Business Management. 2014;7(2):334-337.
4. Ghumatkar AG, Satpute TG, Khadase SZ. An economic analysis of Garlic Marketing in Pune district of Maharashtra State, department of agril. Economics, Marathwada agril. University, Parbhani; c2007.
5. Patil SS, Kulkarni LB. A study on price spread of power in Kamataka. Madras Agricultural Journal. 1990;77(3/4):176-183.
6. Singh R, Bhishoni KD, Singh A. Cost benefit analysis and marketing of mushroom in Haryana. Agricultural Economics Research Review. 2010;23(347-2016-17039):165-171.
7. Singh AK, Banafar KNS. Economic Analysis of Production and Marketing of Cauliflower in Durg District of Chhattisgarh State. Agricultural Marketing. 2006;41(1):37-39.
8. Shende VN, Mesharm RR. Cost benefit analysis and marketing of tomato. American Int. J. Research in Formal, Applied and Natural Sciences. 2015;11(1):46-54.
9. Shiyani RL, Kakadia BH. An economic analysis of production and marketing of garlic in Saurashtra region. National Horticultural Research and Development Foundation. 1998;18(4):8-14.
10. Singh AK, Banafar KNS. Economic Analysis of Production and Marketing of Cauliflower in Durg District of Chhattisgarh State. Agricultural Marketing. 2006;41(1):37-39.
11. www.rajnandgaon.gov.in