Mushrooms Contribution to Farm Income and the Socio-economic Conditions Analysis of the Growers

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

It is very important to adopt new technology for agricultural productivity and development. Farmers' socioeconomic status influenced their decision to adopt the technology. It is therefore important to study the social status of the farmer. The analysis was based on data based on a survey of 60 farm households. sample was drawn by using a simple random technique from the list of mushroom growers. A complete list of mushroom growers was prepared with the help of the Department of Horticulture, Govt. of Himachal Pradesh and from the supplier of spawn. the analysis of data all the mushroom growers were classified into three categories based on the number of bags, viz., Small Category (≤ 600), Medium Category (601-1200) and Large Category (>1200). Results of the study revealed all of the farmers and most of their families were literate. The literacy status of studied households revealed that 88.25 per cent of family members were literates at an overall level and the literacy index was found 2.69. Among all the three categories all the farmers were small farmers based on landholding. So mushroom farming was preferred by only small farmers. and most of the farmers had an orchard. It is concluded that the main source of income for the farmer is mushroom production. Mushroom contributed maximum in total farm

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income in case of medium and large category i.e., 43.44 per cent and 72.18 per cent respectively. Overall, its contribution was found 49.42 per cent to the total farm income. Mushroom producer earns more than 52 thousand every month from mushrooms with less than 1200 bags, which is much higher than the average of an Indian.

1. INTRODUCTION

Mushrooms have been recognized by Food and Agriculture Organization (FAO) as food items contributing to the protein nutrient to the diet of developing countries like India, where there is heavy dependence on cereal diets. The significant feature of mushrooms is that this nutritious and tasteful food is cultivated entirely from waste products and converts a wide spectrum of agricultural and industrial waste into the substrate on which the growth of mushrooms is supported [1]. It is cultivated mainly on hills, as it requires low temperature for its growth [2].; however, with the advent of modern cultivation technology, it is now possible to cultivate this mushroom seasonally under uncontrolled conditions and throughout the year by employing environmentally controlled conditions.

Edible mushrooms are grown commercially in over 100 countries on various scales and using various methods. Mushroom output is expanding at a 6–7% yearly pace over the world [3]. Commercial mushroom cultivation in India began in the late 1970s, but the rate of expansion, both in terms of productivity and production, has been impressive [4]. Currently, India's mushroom output is expected to reach over 201088 tonnes [5] Haryana, Maharashtra, Odisha, Punjab, and Himachal Pradesh are the main mushroom-producing states in India.

Button mushroom (*Agaricus bisporus*) is the most popular variety, still dominates the Indian and international markets. It contributes about 90 per cent of the total country's production as against its global share of about 40 per cent [2]. White Button mushroom is mainly cultivated in North India both under controlled and natural conditions. During the winter season, hundreds of seasonal growers do button mushroom production particularly in the Northern States targeting big cities like Delhi, Chandigarh [6].

2. MATERIALS AND METHODS

2.1 Selection of Study Area

The main objective of the study was to examine the socio-economic conditions of mushroom growers and mushrooms contribution to their overall income and it attempts to describe the various facets of mushroom farming in the study area. The study was conducted in the Shimla district of Himachal Pradesh as this district is the second-largest producer of mushrooms in the State.

2.2 Selection of Sample

A complete list of mushroom growers was prepared with the help of the Department of Horticulture, Govt. of Himachal Pradesh and from the supplier of spawn. A sample of 60 mushroom growers was drawn by using a simple random technique from the list of mushroom growers for the collection of data.

2.3 Stratification of Sample Households

For the construction of strata, the cumulative cube root frequency method was used [7]. For the analysis of data all the mushroom growers were classified into three categories based on the number of bags, viz., Small Category (≤ 600), Medium Category (601-1200) and Large Category (>1200). The distribution of the sampled mushroom growers according to their number of bags. It has been found that 45 per cent of farmers were small farmers and average bags per growers were 316 bags, who owned 0.63 hectares of land holding, 38.33 per cent of farmers were medium farmers with an average of 952 bags per farm and owned 1.03 hectares of average landholding whereas 16.67 per cent of farmers were large mushroom growers with an average of 2910 bags and owned an average of 0.86 hectares of landholding.

Table 1. Farm category-wise distribution of sampled households in the study area

Category of farmers	No. of Mushroom Bags	No of farmers	Percentage of farmers	Average No of bags	Average landholding size (Ha)
Small	≤600	27	45.00	316	0.63
Medium	601-1200	23	38.33	952	1.03
Large	>1200	10	16.67	2910	0.86
Total		60	100.00	992	0.82

2.4 Analytical Tools

The collected data were compiled and analyzed by using the simple tabular method. The results have been presented by working out averages and percentages.

Following formulae/expressions were used for estimation of different parameters:

2.5 Tabular Analysis

The tabular presentation was adopted to examine the socio-economic status of the sample farmers like the sex ratio, literacy rate and index were calculated using the following formulae:

2.6 Sex Ratio

Sex ratio represents the number of females per thousand males and was calculated for the total sampled households with the following formula:

$$\text{Sex Ratio} = \frac{\text{No. of females in a family}}{\text{No. of males}} \times 1000$$

2.7 Literacy Rate

Literacy is an important indicator judging the quality of the human resource, it was calculated by deducting the population below five years of age (non-school going) from the total sampled population

$$= \frac{\text{Literacy rate}}{\text{Total population} - \text{population below 5 years}} \times 100$$

2.8 Literacy Index

Literacy Index is calculated by the sum of the weighted value for literacy category (primary, middle, matric, senior secondary and graduate & above) to the number of persons to be literate.

Literacy index =

$$\frac{\sum W_i X_i}{\sum X_i}$$

Where,

W_i = Weights (0, 1,2,3,4 and 5) for illiterate, primary, middle, matric, secondary and graduate & above respectively.

X_i = Number of persons in respective category.

Dependency ratio w. r. t. total workers

$$= \frac{\text{No. of dependents in a family}}{\text{Total workers}}$$

2.9 Cropping Intensity

The cropping intensity has been worked out as the ratio of gross cropped area to the net sown area, expressed in percentage

Cropping intensity (%)

$$= \frac{\text{Gross cropped area}}{\text{Net sown area}} \times 100$$

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characters of Sampled Farmers

This section deals with various socioeconomic characteristics of mushroom growers which include their size and structure of family, educational and occupational status, etc.

3.1.1 Size and structure of family

The size and structure of sampled households in the study area has been worked out and presented in Table 2. The perusal of the table shows that the nuclear family system was observed more prominent in the studied households. At the overall level, the average family size was found 5.26 persons per household of sampled mushroom growers. The number of females per thousand of males ranged between 690 in the case of a large farmer to

1062 in medium farmer with an average of 897 females per thousand of a male at an overall level.

3.1.2 Age-wise distribution of farmers

Age is considered an important socio-economic factor that influences the decision-making capacity of a human being. Age also gives an idea for the earning and learning capacity of a person. Hence, it has been undertaken to have an idea about the age pattern of the mushroom grower's in the study areas which have been presented in Table 2. The average age of all the mushroom farmers was 44. It reveals that the majority of growers were at a young age and tends to follow the new age technologies to run their enterprises.

3.1.3 Literacy status

Education is an important factor in the development process. Thus, analysis of the general educational status of sampled farm families and the head was analyzed and presented in Table 2. All the sampled mushroom growers were found to be literate. More than 20 per cent of growers were graduates, 23.33 per cent were having education up to senior secondary level and 20 per cent were matriculated.

Table 2. Socio-economic characteristics of sample mushroom growers

	Particulars	Small	Medium	Large	Overall
1. Size and structure of the family	Number of the Family	27	23	10	60
	Joint family (%)	7.41	21.74	10	13.33
	Nuclear family (%)	92.6	78.26	90	86.67
	Average size of family	4.90	5.82	4.90	5.26
	sex ratio	833	1062	690	897
2. Age group of respondent	Below 30 Years	7.41	26.09	-	13.33
	30-40 years	33.3	30.43	40.00	33.33
	40 - 50 Years	25.9	17.39	40.00	25.00
	50 above	33.3	26.09	20.00	28.33
	Average age of respondent	46	41	45	44
3. Education	Primary	25.9	4.35	-	13.33
	Middle	25.9	13.04	30.00	21.67
	Metric	18.5	21.74	20.00	20.00
	Senior secondary	14.8	39.13	10.00	23.33
	Graduate	14.8	21.74	40.00	21.67
	Literacy rate (%)	88.8	85.27	93.62	88.25
	Literacy index	2.66	2.58	3.00	2.69
4. Occupational Pattern	Agriculture	85.6	85.42	85.00	85.34
	Service	8.25	9.38	5.00	8.23
	Business	6.19	5.21	10.00	6.43
	Average workers (No.)	3.60	4.17	4.00	3.89
5.Work force	Average No. of workers	3.60	4.17	4.00	3.89
		(73.50)	(71.64)	(81.63)	(74.14)
	Average No. of dependents	1.30	1.65	0.9	1.37
		(26.50)	(28.36)	(18.37)	(25.86)
	Average family size (No.)	4.90	5.82	4.90	5.26
		(100.00)	(100.00)	(100.00)	(100.00)
	Dependency ratio w. r. t. Total workers	0.36	0.40	0.23	0.35

Table 2 shows that the overall literacy rate was observed at 88.25 per cent which varied from 85.27 to 91.62 per cent among different categories. This highlights the fact that the literacy rate in the study areas is higher, but the quality of education is poor as indicated by the low literacy index.

3.1.4 Occupational distribution

The data reveals that on overall categories agriculture was the main occupation as 85.34 per cent of the workforce practice farming in the study area, 8.23 and 6.43 per cent worker's population was engaged in the public/ private service sector and own business respectively.

3.1.5 Workforce

The proportion of active workers was found highest (81.63%) in the case of large farmers followed by (73.48 %) in the case of small and lowest (71.64%) in the medium. It was assumed that persons in the age group of 15-65 years be actively engaged in useful economic activities and termed as an active workforce. The highest dependents were found in the case of medium farmers and the lowest in large farms. The overall dependency ratio for total workers was found to be 0.35 and among the different categories,

3.2 Existing Resource Structure

This section deals with the existing resource structure like land, cropping pattern, livestock, farm investment, etc. Category wise results in different aspects are given below:

3.2.1 Land use pattern

The land is a basic resource in the agrarian economy. Size of landholding is an important variable that directly affects the income, consumption, saving and investment of the sampled households. The landholdings were small in the study area and it attains a special status in determining the income generation opportunities, especially in rural areas. Thus, an examination of the land use pattern attains significance not only from the point of rural economy but also from the overall welfare viewpoint.

Land use pattern determines the type of farming system in an area. Mushroom growers' category wise land use pattern of sampled farmers is summarized in 1.3. The data reveals that the small and large category mushroom growers were having <1 hectare of land which means that as per the landholding categories they fall under marginal farmers, indicating that with the improvement in education these farmers opted for diversification to boost their farm income and livelihood. The average size of landholding on an overall category basis was found 0.82 hectares out of which 86.02 per cent was cultivated area.

The area under orchard was found 64.73 per cent, Large farmers had the largest proportion of area under orchard followed by small and medium. The area under Pastures land / uncultivated land (2.25%), forest land (6.59%), Area under non-agricultural use (4.06 %) and Area under the mushroom house (0.82%) was worked out. Almost a similar trend was observed across the different categories. Total operational area varied from 80.91 to 93.02 per cent among the different categories of the mushroom farm. The average size of holding on small, medium and large categories was found to be 0.63, 1.03 and 0.86 hectares respectively.

3.2.2 Cropping pattern

The cropping pattern in any region depends mainly on soil, altitude, micro-climate, availability of resources and management factors. The changes in the per cent share of area under different crops in the gross cropped area reveal the extent of agricultural diversification in sampled farms.

The cropping pattern of sampled farms was analyzed and the results have been presented in Table 4. It is evident from the table that the cropping intensity was highest in small mushroom growers (126.86%) followed by medium mushroom growers (124.26%) and large mushroom growers (122.00%). At an overall level, it was worked out to be 125.05 per cent, which indicates that there is a scope for an increase in farm efficiency. Lower cropping intensity was also recorded because of the more area under fruit crops which accounted for more than 60 per cent of the gross cropped area. However, if the cultivated area under field crop only is considered then cropping intensity is being about 1.97 per cent.

Table 3 . Land use pattern of selected mushroom growers (Area in hectare)

Land use Classes	Farm Size			
	Small	Medium	Large	Overall
Average Cultivated Area other than Orchard Area	0.15	0.20	0.18	0.18
	(24.07)	(19.59)	(20.47)	(21.28)
Irrigated	0.06	0.12	0.11	0.09
	(10.17)	(11.49)	(13.02)	(11.30)
Unirrigated	0.09	0.08	0.07	0.08
	(13.9)	(8.11)	(7.44)	(9.98)
Average Orchard Area	0.41	0.63	0.62	0.53
	(65.53)	(61.32)	(72.56)	(64.73)
Irrigated	0.24	0.49	0.22	0.33
	(38.53)	(47.64)	(26.05)	(40.73)
Unirrigated	0.17	0.14	0.40	0.20
	(27.00)	(11.99)	(46.51)	(23.19)
Total operational area	0.56	0.83	0.80	0.71
	(89.6)	(80.91)	(93.02)	(86.02)
Area under forest tree	0.04	0.09	0.02	0.05
	(6.62)	(8.28)	(1.86)	(6.59)
Pastures land / uncultivated land	0.01	0.04	0.01	0.02
	(1.89)	(3.55)	(0.93)	(2.52)
Area under non-agricultural use	0.01	0.07	0.02	0.03
	(1.51)	(6.68)	(1.86)	(4.06)
Area under mushroom bags	0.002	0.01	0.02	0.01
	(0.38)	(0.58)	(2.33)	(0.82)
Total area	0.63	1.03	0.86	0.82
	(100.00)	(100.00)	(100.00)	(100.00)

Figure in parentheses are percentage to the average total area

Table 4. Farm Category wise cropping pattern (in hectare)

Particulars	Small	Medium	Large	Overall
Kharif crop				
Tomato	0.07	0.073	0.08	0.073
	(9.82)	(7.11)	(8.2)	(8.31)
Capsicum	0.046	0.052	0.016	0.043
	(6.45)	(5.06)	(1.64)	(4.90)
Beans	0.018	0.01	0.008	0.013
	(2.52)	(0.97)	(0.82)	(1.48)
Ginger	0.018	0.059	0.072	0.043
	(2.52)	(5.74)	(7.38)	(4.9)
Maize	-	0.007	-	0.003
		(0.68)		(0.34)
Rabi crops				
Wheat	0.01	0.003	-	0.006
	(1.4)	(0.29)		(0.68)
Pea	0.043	0.057	0.08	0.055
	(6.03)	(5.55)	(8.20)	(6.26)
Cauliflower	0.03	0.05	0.02	0.03
	(3.65)	(4.58)	(1.64)	(3.76)
Garlic	0.071	0.094	0.08	0.081
	(9.96)	(9.15)	(8.2)	(9.23)
Fruit	0.411	0.632	0.624	0.531
	(57.64)	(61.54)	(63.93)	(60.48)
Gross cropped area	0.713	1.027	0.976	0.878
	(100.00)	(100.00)	(100.00)	(100.00)

Particulars	Small	Medium	Large	Overall
Net sown area	0.56	0.83	0.80	0.71
Cropping intensity	126.86	124.26	122.00	125.05

Figure in parentheses are percentage to total gross cropped area

Table 5. Farm category wise average income composition of sampled households (Amount in Rupees)

Particulars	Small	Medium	Large	Overall
Kharif crops	46500.00 (6.66)	67626.09 (4.97)	64850.00 (2.43)	57656.67 (4.50)
Rabi crops	29993.15 (4.30)	40998.91 (3.01)	34402.50 (1.29)	34946.92 (2.73)
Fruits	336681.50 (48.23)	546113.00 (40.14)	542120.00 (20.29)	451203.30 (35.22)
Mushroom	189302.80 (27.12)	591100.00 (43.44)	1928780.00 (72.18)	633237.90 (49.42)
Service/Business	95555.56 (13.69)	114782.60 (8.44)	102000.00 (3.82)	104000.00 (8.12)
Total	698033.00 (100.00)	1360621.00 (100.00)	2672153.00 (100.00)	1281218.00 (100.00)

Figure in parentheses are percentage to total

3.3 Income Structure

To highlight the relative importance of mushroom cultivation in the economy of sampled households; source wise break up of family income of different categories of sampled mushroom farms has been worked out and summarized in Table 5. The table reveals that average income from mushroom crop per annum contributed about 49.42 per cent to the total family income at the overall level of sampled mushroom growers i.e., based on average crops of 2.33 taken by the grower in a year followed by fruits 35.22 per cent, Kharif crops 4.50 per cent and rabi crops 2.73 per cent. The share of income from mushroom, in the total income among the different mushroom growers' categories, varied between 27.12 to 72.18 per cent from small to large farmers respectively indicating higher income contribution with an increasing number of mushroom bags the share of income from the mushroom in the total income in case of large mushroom growers was worked out to more than 72 per cent representing mushroom cultivation is the main vocation of their livelihood.

5. CONCLUSION

In India, mushroom farming is still regarded as an ancillary agribusiness industry but mushroom is one of the few large-scale commercial uses of microbial technology for bioconversion of agricultural and forestry waste materials to profitable foods is mushroom farming [8]. Socio-economic indicators revealed that the majority of the sample households have nuclear families. Although the family size and sex ratio do not affect the adoption of mushroom production but literacy status may encourage farmers for mushroom cultivation. As all of the farmers and most of their families were literate. The literacy status of studied households revealed that 88.25 per cent of family members were literates at an overall level and the literacy index was found 2.69.

The occupational distribution shows that 85.34 per cent of the workforce in the studied households practice farming, 8.23 per cent and 6.43 per cent workers population were engaged in the public/private service sector and own businesses respectively. This means only farmers are preferred to cultivate mushrooms.

On overall categories of mushroom growers, 74.14 per cent were total workforce; among different categories, it was found the highest per cent of active workers were reported in the large category (81.63%) and the lowest in the medium category (71.64%). The overall dependency ratio w.r.t. total worker was worked out to be 0.35 indicating that on average one worker has to support less than one family member.

Among all the three categories all the farmers were small farmers based on landholding. So

mushroom farming was preferred by only small farmers. and most of the farmers had an orchard. The average orchard area out of total holding was found 64.73 per cent at an overall level.

It is concluded that the main source of income for the farmer is mushroom production. Mushroom contributed maximum in total farm income in case of medium and large category i.e., 43.44 per cent and 72.18 per cent respectively. Overall, its contribution was found 49.42 per cent to the total farm income. Mushroom producer earn more than 52 thousand every month from mushrooms with less than 1200 bags, which is much higher than the average of an Indian.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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