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Augmenting income and employment through mushroom production: A micro level study of Samastipur district of Bihar (India)

KM Singh, Nasim Ahmad, DK Sinha and RR Mishra

Abstract
Mushroom is considered as future vegetable. The present investigation was carried out in Pusa and Kalyanpur blocks of Samastipur district of Bihar to assess the income and employment pattern of mushroom cultivators. Simple tabular analysis was done to fulfill the objective of the investigation. Results revealed that, on an average, comparatively large portion of income (37.74%) was obtained from mushroom production followed by crop production (22.59%). Farm category wise analysis revealed that mushroom production was most important source of income to the mushroom growing households contributing 13.18%, 16.30%, 19.16% and 15.31% of total income of small, medium, large and for overall mushroom growing households respectively. The result reflected that average per household income was Rs. 72492.02. Farm size wise income was also computed and it was estimated to be Rs. 53167.91 for small, Rs. 63491.34 for medium and for large farm it was Rs. 100816.8. The results indicated that with increase in farm size the income also increased. Further, it was also observed that, on an average, total employment days of mushroom growers was comparatively large, that is 106.62 man days (42.09%) in crop production followed by mushroom cultivation (38.80 man days i.e. 15.31 percent). Mushroom production emerged as the next most important activity occupying second rank in providing employment. Mushroom is efficient means for conversion of agricultural wastes into valuable protein and presents huge potential for generating additional income and employment. In India, the full potential of mushroom cultivation is yet to be explored. Creating awareness among the farmers about the benefits of mushroom production, creating awareness among the consumers about the nutritional and health benefits of mushroom and imparting training to the farmers may go a long way in promoting mushroom production.

Keywords: Mushroom, Income, employment

Introduction
Indian Agriculture has witnessed many changes and has come out from its image of traditional and non-commercial method of farming. Shift of Indian farming from rural set-up to urban set-up and linking cultivators to super markets will be key drivers in improving financial conditions of the farming community of the country. The recent trend in consumer behavior for quality product has forced the farmers to change their farming commercially, technically, economically and make farming a consumer friendly business venture. Various factors have been responsible for increasing the demand for quality produce in the country. The factors like urbanization, increasing per capita income, health consciousness, increasing number of working women and shift of farmers from traditional crops to high value crops in expectation of higher returns have forced the cultivators to treat farming as an agribusiness venture. Favorable income elasticity of demand has also contributed in improving the quality of agricultural production in the country. Mushroom is a nutritious vegetarian delicacy and a good source of high quality protein (20-35 per cent dry weight) and it is increasingly considered as future vegetable. Presently three varieties of mushroom are cultivated namely, white mushroom (*Agaricus bisporus*), the paddy-straw mushroom (*Volvariella vovvacea*) and oyster mushroom (*Pleurotus sajor-caju*). Agaricus species is the mostly cultivated mushroom globally, contributing 35-40 per cent of the world production. Mushroom is consumed as delicacy and possesses several medicinal properties. Mushroom contains many vitamins and minerals, like B- Complex and iron, and is good source of quality proteins like lysine. Mushroom is completely fat (cholesterol) free and also rich in anti–oxidants. According to Chang and Miles (1991), the amount of protein in mushroom is much more than that in any other vegetable. So, it is called vegetable protein. In fact, mushroom also contains low fat,

low calories and good vitamins. Mushroom is the source of extra ordinary power and virility and is used in the preparation of many continental dishes. It is a good source of protein, vitamins and minerals (Khan *et al.,* 1981) [2] and contain about 85-95% water, 3% protein, 4% carbohydrates, 0.1% fats and 1% minerals and vitamins (Tewari, 1986) [4]. It will provide the people with an additional vegetable of high quality, and enrich the diet with high quality proteins, minerals and vitamins which can be of direct benefit to the human health and fitness (Alam and Manjur, 2005) [3]. India's per capita consumption of mushroom (20-25g) is comparatively low as compared to Europe and USA (2 to 3kg). The domestic demand is growing at a rate of 25 per cent. Half of the mushroom cultivated in the world is consumed as fresh. The processed products for mushroom are in dried, canned and frozen form. Half of the processed mushroom is in canned form. Mushroom has short shelf-life due to high moisture content (85-90%) and is needed to be processed within 24 hours. The postharvest damages are browning, veil-opening, weight-loss and microbial spoilage. Agriculture is considered as backbone of the economy of Bihar. The percentage of population, employed in agricultural production system in Bihar, is estimated at 77 per cent, which is much higher than the national average 67 per cent. The increasing population has put extra pressure on scarce and fixed land resource with a consequence that about 1.61 crore of farm holdings and about 91 per cent of the total number of holdings have become marginal in the state (Anonymous 2017). The average size of land holding in Bihar is 0.39 ha. As a result income generation from farms has been going down continuously. The limited availability of land has made extension of farm limits almost impossible. The only viable alternative is the introduction of non-land based activities having good income generation capacity. Recently, unemployment is increasing rapidly both in developed and developing countries. In this situation, self-employment can be one important way to increase employment and income of small and marginal farm households. They can easily grow mushroom in their home yards because it requires a small piece of land for cultivation. Mushroom cultivation might serve as an important means of generating employment, for rural women and youths which in turn, will raise their social status. By practicing mushroom cultivation farmers can contribute significantly to the economic development of the society. In this way, mushroom cultivation can play a vital role in socio-economic development of mushroom growers. Considering the above mentioned facts the present study was undertaken to study the impact of mushroom production on income and employment of the mushroom growers.

Materials and Methods

As the prime objective of the investigation was to study the income and employment pattern of the mushroom cultivators, the first requirement was to select a representative study area where mushroom cultivation was practiced. Mushroom growers from two blocks of Samastipur district i.e. Pusa and Kalyanpur who were trained in mushroom production by Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar) were selected purposively for the study. The district accounts for large scale production and marketing of mushroom. Five villages from each block were selected randomly and a list of mushroom cultivators of each village was prepared with the help of *Krishi Salahkars*. Ten respondents from each village were selected randomly thus a total of 100 respondents were selected for the investigation. The selected mushroom growers were categorized on the basis of use of paddy straw into three groups viz.; small growers (less than 60kg), medium growers (60-80kg) and large growers (80kg and above). Finally, the total sample size of 100 mushroom growers consisted of 47 small, 41 medium and 12 large mushroom growers.

Results and discussion

Distribution of income

The annual income of the mushroom growers from all sources has been shown in Table 1. All the mushroom grower households were categorized into six income groups on the basis of their annual income, that is less than Rs. 20 thousand, Rs. 20 to 40 thousand, Rs. 40 to 60 thousand, Rs. 60 to 80 thousand, Rs. 80 to 100 thousand and more than Rs. 100 thousand. The analysis of related data revealed that average per household income was Rs. 72492.02. Farm size wise income was also computed and it was estimated to be Rs. 53167.91 for small, Rs. 63491.34 for medium and for large farm it was Rs. 100816.8. The results indicated that income of mushroom growing household increased with increase in farm size.

Table 1: Annual income of mushroom growing households (Rs/household)

Level of income	Small (<60kg straw)	Medium (60-80kg straw	Large (>80kg straw)	Average
Less than Rs. 20000	17506.60	-	-	17506.60
Rs. 20 to 40 thousand	33433.50	24380.00	-	28906.75
Rs. 40 to 60 thousand	51240.00	53277.76	-	52258.88
Rs. 60 to 80 thousand	78418.66	68123.18	77840.00	74793.95
Rs. 80 to 100 thousand	85240.77	84045.50	96086.60	88457.62
Rs.1 Lakh and above	-	87630.27	128523.70	108077
Average income	53167.91	63491.34	100816.8	72492.02

Income of the sample households of mushroom growers

Income level indicates the economic status of households. The income of sample of mushroom grower households from various sources has been presented in Table 2.

Table 2: Income of mushroom growing households from various sources (Rs/year)

S. No.	Source of Income	Small (<60kg straw)	Medium (60-80kg straw)	Large (>80kg straw)	Average
1.	Crop production	14756.22 (26.68)	16755.00 (22.03)	18428.57 (18.18)	16070 (22.79)
2.	Mushroom production	18822.81 (34.03)	31483.05 (41.40)	39715.02 (37.74)	26607.72 (37.74)
3.	Agricultural labour	3860.00 (6.98)	3637.59 (4.78)	-	3231.00 (4.58)
4.	Non-Agricultural labour	8312.00 (15.03)	4350.00 (5.72)	-	5564.00 (7.89)
5.	Sale of dairy and livestock product	9015.65 (16.30)	7232.12 (9.51)	-	7040.04 (9.99)
7.	Business	538.04 (0.97)	1726.25 (2.27)	3942.85 (3.89)	1490.00 (2.11)
8.	Service	-	10869.56 (14.29)	39285.71 (38.75)	10500 (14.89)
Total		56678.63 (100)	65183.92 (100)	101372.15 (100)	71134.76 (100)

Figures in parentheses indicate percentage to the total

It may be observed from the table that mushroom production was the most important source of income as comparatively large proportion of income was obtained from this activity. Crop production was the next most important source which had a share of 22.79 per cent in total income of mushroom growing households. Service occupied third rank in terms of importance as it contributed 14.89 per cent of the total income of mushroom growing households. Mushroom growing households earned a considerable proportion of their income from sale of dairy and livestock products (9.99 per cent) and hiring out of non-agricultural labour (7.89 per cent) which reflected the importance of these activities to mushroom growing households.

Farm category wise analysis of the related data revealed that the mushroom production was a major source of income and contributed 33.21 per cent, 48.29 per cent and 39.17 per cent to the total income on small, medium and large farms, respectively. Small farm household earned more than one fifth of their annual income by hiring out their labour and income from hiring out labour constituted around 12 percent of the total income of medium households indicating that hiring out labour was an important source of income in case of small and medium mushroom growing households because of their relatively poor resource base. Service was the most important source of income for large mushroom growers and contributed 38.75 per cent of their total annual income. Among different farm groups, small farmers earned more income by hiring out labour (agricultural and on-agricultural labour) and sale of dairy and livestock product in comparison to medium and large farmers. More than three fourth of annual income of large mushroom growers came from service and mushroom production whereas, medium size mushroom growers were mainly dependent on mushroom, crop production and service.

Employment of mushroom growers in different activities

Recently, income enhancement of farmers and unemployment among youth of the nation are debatable issue among the political parties, policy makers and stakeholders in the country. Employment is an indicator of economic prosperity in general. Income and employment are mutually interlinked. Again, it is the pattern of employment which indicates the nature and character of the economy as such. An analysis of main and allied occupations and employment pattern throws sufficient light on different aspects of the efficiency of human force engaged in the production process of the economy.

Table 3: Annual employment of mushroom growers in different activities (Man days/farm/year)

S. No.	particulars	Small (<60kg straw)	Medium (60-80kg straw)	Large (>80kg straw)	Overall
1.	Crop production	105.95 (42.49)	104.45 (41.49)	115 (42.47)	106.62 (42.09)
2.	Agricultural labour	25.73 (10.32)	24.25 (9.63)	-	21.54 (8.50)
3.	Non-agricultural labour	41.56 (16.67)	21.75 (8.64)	-	27.82 (10.98)
4.	Mushroom production	32.86 (13.18)	41.05 (16.30)	51.87 (19.16)	38.8 (15.31)
5.	Dairying	37.77 (15.15)	20.62 (8.21)	-	15.65 (6.81)
6.	Business	5.44 (2.18)	8.24 (3.27)	24.71 (9.06)	9.73 (3.84)
7.	Service	-	31.32 (12.43)	79.14 (29.30)	33.11 (13.07)
Total		249.31 (100)	251.7 (100)	270.72 (100)	253.28 (100)

Unemployment is increasing rapidly both in developed and developing countries. In this situation, self-employment can be one important way to increase employment rate for small, marginal poor farm households for generating employment and earning extra money.

Level of employment is an indicator of economic prosperity in general. Income and employment are mutually interlinked. Again, it is the pattern of employment which indicates the nature and character of the economy as such. An analysis of main and allied occupations and employment pattern of farm households indicate the importance of different activities in employment generation for them. An attempt was made to examine the employment pattern of mushroom growers in different activities and results have been presented in Table 3. Providing rural people with opportunities for self-employment may prove helpful to them in earning additional income. Mushroom production is a venture which has the potential to generate employment for rural people especially for marginal and small farmers.

It may be observed from the table that, on an average, total employment days of mushroom growers was comparatively large, that is 106.62 days (42.09%) in crop production followed by other activities like mushroom cultivation (38.80 man days i.e. 15.31 percent), service (33.11 man days i.e. 13.07%), hiring out non-agricultural labour (27.82 man days i.e. 10.98%), hiring out agricultural labour (21.54 man days i.e. 8.50%), dairying (15.65 man days i.e. 6.81 per cent) and business (9.73 man days i.e. 3.84%). It may be concluded that from the point of view of employment generation crop production was the most important activity for mushroom growers. Mushroom production emerged as the next most important activity occupying second rank, service and hiring out non-agricultural and agricultural labour were other important activities for mushroom grower's employment generation.

Across the farm size, it was clearly evident that crop production was the activity creating larger employment for mushroom growers. However, it was observed that hiring out agricultural and non-agricultural labour, dairying and mushroom production were important employment generating activities for small mushroom growers. Similarly, hiring out agricultural and non-agricultural labour and mushroom cultivation also played an important role in generating employment for medium size mushroom growers. The only difference was that apart from these activities, the medium size mushroom growers were engaged in service for considerable number of man days. In case of large mushroom growers, service emerged as the second most dominant activity in terms of number of man days of employment generated followed by mushroom cultivation which created employment for 51.87 man days accounting for 19.16 per cent of total annual employment.

Conclusion

It may be concluded that, on an average, comparatively large portion of income (37.74%) was obtained from mushroom production followed by crop production (22.59%). Farm category wise analysis revealed that mushroom production was most important source of income to the mushroom growing households contributing 13.18%, 16.30%, 19.16%

and 15.31% of total income of small, medium, large and for overall mushroom growing households respectively.

All the mushroom grower households were categorized into six income groups, that is less than rs. 20 thousand, Rs. 20 to 40 thousand, Rs. 40 to 60 thousand, Rs. 60 to 80 thousand, Rs. 80 to 100 thousand and more than Rs. 100 thousand. The result reflected that average per household income was Rs. 72492.02. Farm size wise income was also computed and it was estimated to be Rs. 53167.91 for small, Rs. 63491.34 for medium and for large farm it was Rs. 100816.8. The results indicated that with increase in farm size the income also increased. This trend indicated that mushroom production may be adopted for augmenting the income of the farmers.

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Policy implications

Mushroom is efficient means for conversion of agricultural wastes into valuable protein and presents huge potential for generating additional income and employment. In India, the full potential of mushroom cultivation is yet to be explored. Creating awareness among the farmers about the benefits of mushroom production, creating awareness among the consumers about the nutritional and health benefits of mushroom and imparting training to the farmers may go a long way in promoting mushroom production.

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