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RESEARCH ARTICLE

Impact of Mushroom Cultivation on Farm Women under Farmer FIRST Programme Implemented in Jorhat District of Assam

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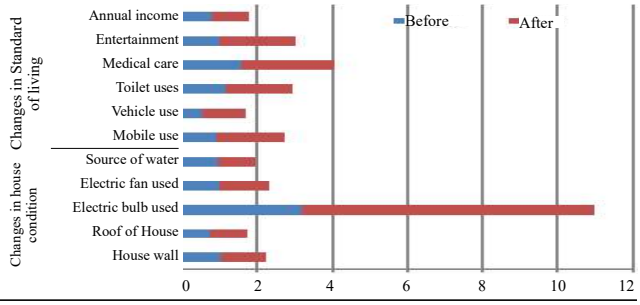
HIGHLIGHTS

- Effect of mushroom cultivation in income and socio-economic condition of farm women
- Key characteristics of farmwomen adopting mushroom cultivation as income generating activities.
- Problems faced by resource poor farm women in cultivation of mushroom as income generating activities

GRAPHICAL ABSTRACT



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ABSTRACT

Context: Women play crucial role to fight against poverty. With the adoption of suitable ventures farm women are getting benefitted both in economically and socially. Mushroom cultivation was introduced as income generating activities among the farm women of Farmer FIRST project areas for upliftment of socioeconomic condition of family

Objectives: The present study was planned to assess the impact of mushroom cultivation on socio economic condition of farm women and problems faced by them in mushroom cultivation during 2018-19 to 2020-21.

Methods: All total 80 farm women practicing mushroom cultivation in four villages of project area were selected randomly as respondents for present study. Experimental research design (before and after) was followed for assessing the impact. Appropriate statistical techniques were used for analysis and interpretation of data.

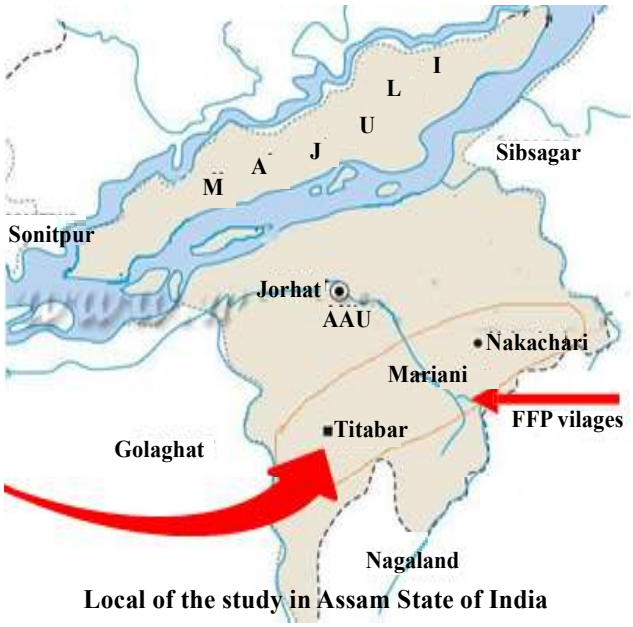
Result & Discussion: The result reveals that mean age of farm women was 41.4 years with formal education experiences 6.9 years; average land holdings of 0.38 ha with family size about four having membership for more than one organization with extension contact one per month. Farmwomen had average 2.5 years mushroom cultivation experiences and attended training on an average 1.57 days per year. The mean production of mushroom was 87.67 kg per month and income Rs. 2967.51 per month indicates subsistence level of cultivation. For assessing impact of mushroom cultivation, the mean annual income before and after cultivation of mushroom was recorded as Rs. 80100.30 and Rs. 98`827.50 and found significant difference at 5% level of probability (T: 1.654). There was no significant difference on standard of living and house hold condition before and after cultivation of mushroom. 'Non-availability of spawn in time', 'lack of spawn source locally', 'poor quality (contaminated) spawn' were major problem faced by them. Promotion for large scale mushroom production among farm women may be initiated along with provision for quality spawn supply by establishing spawn laboratory in the locality. Special skill development training for mushroom spawn production among rural youth may also be organized for promotion of mushroom cultivation in rural areas.

Women constitute about half of our country's population and a major component of workforces engaged in agriculture. Their contribution to the economic growth of the nation has been quite substantial. Women hold the key to building a world free from hunger and poverty. They not only contribute to food security of the nation but also play significant contribution in household level food and nutrition security. Beside women play crucial role to fight against poverty. They are the most affected in the family by food insecurity and poverty. Though women have been playing major part in agriculture, her role in the decision making process related agricultural activities is seen to be minimal. But history is proof to show that women if given an opportunity can be very effective agents of change for a better home and better society. (Goudappa et.al., 2012). Now a days, in rural areas majority of the male members of the farm families go elsewhere specially in lean period in search of employment and earning money. In such situation female members of the farm families remain at house and take care of agricultural activities along with other house hold activities (Mishra & Mishra,2012). Besides, they try to utilize their lousier time to organize themselves into small groups called SHGs in per suite in different economic activities (Behera, 2015).

Proper motivation and skill development of farm women in some entrepreneurial ventures may significantly help in uplift the family economic condition. Moreover, some agricultural ventures which are easy for operation and suitable for farm women and thus they are getting benefitted both in economically and socially. Animal husbandry and dairy based, agri based and food-based enterprises were the most preferred income generating sources for farm women (Thaker and Ahlawat, 2012). Mushroom cultivation as a subsidiary occupation in rural area constitute an important and crucial segment which provide extra income to the grower (Yadav and Sharma, 2005). Considering this fact in mind, mushroom cultivation as an income generating activities was undertaken as intervention for farm women in Farmer FIRST project. Training, demonstration and critical inputs along with regular advisory services were provided to the farm women since 2018 to 2021. Hence, the present study was conducted to assess the impact of mushroom cultivation on socio economic status of participants' farm women and problem faced by them.

METHODOLOGY

The study was carried out in four project villages of farmer FIRST project by following experimental research design (before and after). All total 80 participating farm women from four different project villages were selected randomly from the participating farm women in mushroom cultivation. The latitude and longitude of village Khamjogia and Paninora is 26.5967° N, and 94.2686° E while for the village of Dangdhora and Eragaon 26.7448° N and 94.4316° E respectively in district Jorhat of Assam. Eight profile characteristics of farm women were selected for the study. Production and income status of mushroom cultivation were analysed as variable of the study. The socio-economic condition was measured in terms of annual income, standard of living and household condition of farm women cultivating mushroom. The socio-economic condition of farm women was measured by following the methodologies of Tanni *et. al*. (2012) with slight modification. The standard of living of the respondents was determined based on the use of /on exposure to some of the selected household item. The selected household items were possessing of mobile, type of vehicle possessed, type of toilet used, medicare and exposure to entertainment media. In order to assess the changes regarding household condition some selected items were considered. The items were wall of the house, roof of the house, no. of bulbs in the house, use of electric fans and source of drinking water. Appropriate statistical techniques like mean, T-test etc. are used for analysis and interpretation of data.



Local of the study in Assam State of India

RESULTS

Project intervention on mushroom cultivation and farm women participation: As a part of activities of Farmer First project mushroom cultivation was introduced as an income generating activities for farm women in project villages. As a part of extension activities for mushroom cultivation, awareness programme, exposure visit to successful mushroom growers training and demonstration on mushroom cultivation, advanced training on state of art mushroom cultivation practices, advisory services and market linkage programme were organized during 2018-19, 2019-20 and 2020-21 for motivation and skill development of farm women. All total six awareness programmes were conducted in project villages, where about 137 farm women participated. During that period nine training and demonstration on mushroom cultivation was conducted by covering around 244 farm women for enhancing knowledge and skill of farm women about scientific cultivation of mushroom. One exposure visit was organized during 2019-20 for motivating farm women for commercial cultivation of mushroom, where 15 selected farmwomen participated. Around 47 farm advisory service and market linkage programme organized during the production period in the project villages covering about 153 farm women.

Profile of farm women practicing mushroom cultivation: Table 2 reveals that average age of farm women practising mushroom cultivation as an income generating activities was 41.37 years with a variation from minimum age of 25 years to maximum age of 62 years. In case of formal education experience the average formal education experience of farm women was 6.90 years with a variation from one year to 15 years. It may be interpreted that education level of farmwomen was ranging from primary school level to graduation level. It is indicated that educated farm women were cultivating mushroom for income generation. The average land holdings of farmwomen were 0.38 ha with variation from minimum 0.13 ha to maximum 0.80ha. This indicates that farmwomen practicing mushroom cultivation were categorized as marginal farmers. Average family size of farm women was 3.58, indicating small and nucleolus family are dominated among the mushroom growers in the project areas. Farm women were participated in different social organization on an average they were acted as member of more than two organizations. This indicates that most of the farm women are willing to be a part of social organization. The average frequency of extension agent contact per month was 0.58, which indicates there is least accessible of extension agents for farm women. Experience on mushroom cultivation was found 2.5 years as average for farm women, but experiences in mushroom cultivation of farm women was vary from one to eight years. Average training days attended by the participating farm women was 1.57 days, which is very low.

Mushroom production and income status in the project villages: The Table 3 reveals that majority of respondents (48.75%) produced fresh mushroom in the range of 50-100 kg per month. Around 27.50 per cent respondents were producing up to 50 kg fresh mushroom per month and that is followed by 17.50 per cent farm women who produced fresh mushroom 100-150 kg per month. Only few farm women (6.25%) started to produce mushroom above 150 kg per month. The average production of fresh mushroom among the farm women was 87.67 kg per month. This indicates that mushroom production in project villages is still in

Table 1. Project interventions on Mushroom cultivation and farm women participation

Interventions	2018-19		2019-20		2020-21		Total	
	Nos	No. of FW covered	Nos	No. of FW covered	Nos	No. of FW covered	Nos	No. of FW covered
Awareness programme on mushroom cultivation	4	95 (69.34)	2	42 (30.66)	0	0	6	137
Training and demonstration on mushroom cultivation	5	130 (53.27)	2	60 (24.59)	2	54 (22.13)	9	244
Exposure visit	0	0	1	15 (100)	0	0	1	15
Advanced training on state of art mushroom cultivation practices	0	0			1	20 (100)	1	20
Advisory services and marketing linkages	12	36 (23.53)	20	65 (42.48)	15	52 (33.98)	47	153
Total								569

Table 2. Profile of farm women participated in mushroom cultivation (N=80)

Profile characteristics	Max Score	Mini Score	Mean
Age (years)	62	25	41.37
Formal Educational experiences (years)	15	1	6.90
Operational land holdings (ha)	0.80	0.13	0.38
Members of social organization (Nos)	3	0	1.58
Family Size (Nos)	6	3	3.58
Frequency of extension contact/ month (Nos)	3	0	0.58
Experience of Mushroom farming (years)	8	1	2.5
Training attended (days)	3	1	1.57

Table 3. Distribution of respondents according to quantity of mushroom production per month (N=80)

Fresh mushroom Production (Kg/month)	%	%	Mean	SD
Up to 50	22	27.50		
50- 100	39	48.75	87.67	74.80
100- 150	14	17.50		
Above 150	5	6.25		
Total	80	100.00		

Table 4. Distribution of respondents according to the annual income from mushroom cultivation (Rs/month) (N=80)

Categories of income	%	%	Mean
Less than Rs 3000	57	71.25	
Rs 3000 - Rs. 6000	18	22.50	2967.51
Above Rs 6000	5	6.25	
Total	80	100.00	

subsistence level with average production per day 2.9 kg. Though little proportion of farm women started to cultivate mushroom in commercial basis but it was in small scale.

In case of monthly income received from mushroom production, it is cleared from Table 4 that on an average Rs. 2967.51 was earned per month by farm women through selling of mushroom. Majority of farm women (71.25%) engaged in mushroom cultivation were earning less than Rs 3000.00 per month that was followed by 22.50 per cent of farmwomen were earning in between Rs 3000.00 to Rs. 6000.00 in a month. The remaining 6.25 per cent farm women were earning more than Rs. 6000.00 per month. It may be

Table 5. Impact of Mushroom cultivation on socio-economic condition of farm women

Variables	Mean		t- values	p value
	Before	After		
Annual income (Rs/annum)	80100.30	98827.50	1.654*	0.04
Standard of leaving	5.2	9.25	12.531^{NS}	1.26
Household condition	8.57	11.26	12.872^{NS}	9.12

interpreted that a marginal income was earned by the farm women by producing mushroom. Only few farm women started mushroom cultivation in commercial basis while more than 90 per cent farm women were cultivating mushroom as an household activities.

Impact of mushroom cultivation on socio economic condition of farm women: In order to assess the impact of mushroom cultivation changes of annual income, standard of living and household condition was calculated before and after cultivation of mushroom. The Table 5 reveals that the mean annual income before and after cultivation of mushroom was found Rs. 80100.30 and Rs. 98827.50 respectively. The difference between mean annual income of before and after mushroom cultivation was found statistically significant at 5 per cent level of probability (T: 1.654). This may be interpreted that income rises after cultivation of mushroom is significantly difference than the annual income before mushroom cultivation. This indicates that there is possibility to take up mushroom cultivation as an income generating activities for resource poor farm women. The similar findings reported by Tanni *et al.* (2012) and Singh *et al.* (2019).

In relation to standard of living, the mean values (Before: 5.2; After: 9.25) was found higher in the case of after than before cultivation of mushroom. The p value is found more than 0.05 which indicates statistically non-significant (T-12.531) differences of mean. Though the mean values of standard of living after mushroom cultivation is higher than the mean value of standard of living before cultivation of mushroom but not statistically significant. This may be due to marginal increase of income as most of the farm women were cultivated mushroom in subsistence level not in commercial level. The wider gap in terms of medical care was found in between before and after (Fig-1), which indicates farm women are more concern about health issues. Almost similar gap was observed in terms entertainment also i.e. uses of TV and radio

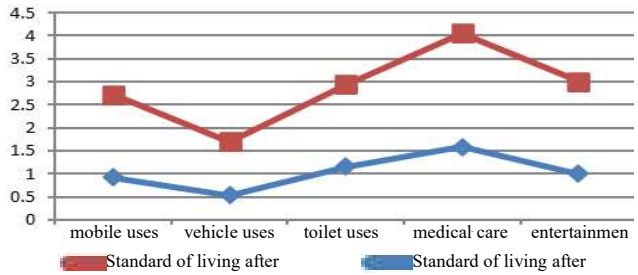


Fig.1. Changes of standard of living after mushroom cultivation

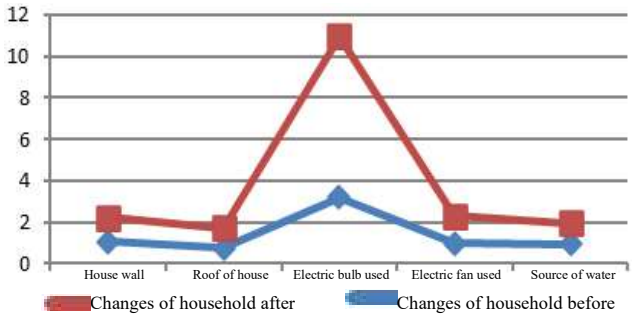


Fig-2: Changes of household condition after mushroom cultivation

(Fig-1) indicated that farm women willing to spend more money in entertainment purpose next to health sector.

In case of changes occurs in household condition the Table 5 reveals that there is no statistically significant differences between the mean of before (8.57) and after (11.26) with respect to household condition (T-12.872). But there is increase of household condition after cultivation of mushroom. The Fig 2 reveals that maximum difference in between before and after cultivation of mushroom was observed in terms of electric bulb use while for rest of the dimension of household condition was found similar kind of differences. This may be due to that farm women want to spend money for electric bulb as government stop the supply of kerosene as alternative sources of power and feel it essential for day-to-day activities.

Problems faced by the farm women in cultivation of mushroom in project villages : Around 96.25 per cent farm women reported that "Lack of spawn supply in time' and 'lack spawn laboratory in the locality' was the major problem in mushroom cultivation 'Supply of contaminated spawn' and 'social taboos for mushroom consumption' were reported as major problem by 87.50 per cent farmwomen. Around 83.75 per cent farm women reported that 'pest infestation during February to April' was major problem in mushroom cultivation. 'High temperature even in winter' was a problem for mushroom cultivation for 80 per cent farmwomen. 'Lack of availability of packaging materials in their locality' and 'Time consuming process for cutting of straw' were 75 per cent and 72.50 per cent of farm women reported respectively. 'Lack of proper knowledge and skill in technical aspect on mushroom cultivation' was reported by 68.75 per cent respondents as problems in mushroom cultivation. 'Lack of established market (65%)', 'Low storage life of fresh mushroom (61.25%)', 'Lack of processing technologies of fresh mushroom (60%)', 'Lack of mushroom species for cultivation in summer season (58.75%)', 'Lack of awareness about nutritional values of mushroom (56.25) and 'Unorganized marketing channel leads to distress sale (56.25%)' were other major problem faced by the mushroom grower. Similar findings reported by Kushwah, and Chaudhary (2015) and Yadav & Sharma, (2005)

Table 6. Distribution of farm women according to the problem faced by them during the cultivation of mushroom (N=80)

Problem faced by farm women	No.	%
High temperatures even in the winter season	64	80.00
Lack of mushroom species for cultivation in the summer season	47	58.75
Lack of Spawn supply in time	77	96.25
Supply of contaminated spawn	70	87.50
Lack of availability of packaging materials in their locality	60	75.00
Lack spawn laboratory in the locality	77	96.25
Lack of proper knowledge and skill in technical aspects on mushroom cultivation.	55	68.75
Social taboos for mushroom consumption	70	87.50
Lack of awareness about the nutritional values of mushroom	45	56.25
Lack of established market	52	65.00
Unorganized marketing channel leads to distressed sale	45	56.25
Lack of processing technologies of fresh mushroom	48	60.00
Low storage life of fresh mushroom	49	61.25
Pest infestation during February to April month	67	83.75
Time consuming process for cutting of straw	58	72.50

DISCUSSION

Mushroom cultivation is the important subsidiary income sources for farmwomen. But proper awareness, capacity building and constant hand holding in the form of farm advisory services are essential for sustaining

the mushroom cultivation among farm women (Gogoi, *et.al*., 2018; Singh *et al*., 2008) Again, it has been observed that middle aged and educated farm women were cultivating mushroom as an income generating activities. Middle aged and educated farmwomen possess the qualities of entrepreneurs (Reddy, 2012; Bihari, *et al.* 2012) and can forecast the scope and importance of mushroom cultivation in their localities. Mushroom cultivation was practiced by marginal farmer category which having small family. It was also observed that farm women who are willing to be a part of social organization were adopting mushroom cultivation (Barman, *et al.,* 2017). This indicates that informal social network are important and preferred channel in rural areas for dissemination of new farm information.

Although farm women were continuing scientific cultivation of mushroom but it is still in subsistence level and earning a marginal level of income. This may be due to low exposure to training programme on mushroom cultivation (Kushwah and Chaudhary, 2015; Gogoi, *et al.*, 2018). Few proportion of farm women started to cultivate mushroom in commercial basis indicates the scope for large scale cultivation. Proper government policies and handholding support to farm women may be encouraged them for cultivation of mushroom in business mode (Singh *et.al,* 2008; Gogoi *et. al.*, 2018)

In term of changes of annual income of farm women after cultivation of mushroom was found significant. Farm women have to perform triple role (reproductive role, production role and nurturing role) in their family. By completing all the roles in their family farm women can engage them in mushroom cultivation by utilizing their leisure time and earned extra income. This indicates that there is possibility to take up mushroom cultivation as an income generating activities for resource poor farm women. Tanni *et al.* (2012) and Singh *et al.* (2019) also reported that annual income of farm women was increased significantly after cultivation of mushroom.

The difference of mean value with respect to standard of living after and before mushroom cultivation is more but not statistically significant. This finding is in confrontation with the findings of Tanni e**t al.** (2012). This may be due to marginal increase of income from mushroom cultivation as most of the farm women were cultivated mushroom as subsistence level. However, farmwomen incurred expenditure in medical purposes as because of mass awareness programme and lack of proper health facilities.

In case of changes of household condition of farm women was found statistically insignificant after cultivation of mushroom. But in case of electrical light used found major differences which may be due to non availability of other options like kerosene oil or easy accessibility of electricity.

Lack of proper supply chain in case spawn and other raw materials may hinder the process mushroom cultivation. Some private agencies supply spawn in some selected areas with higher price which were found contaminated. Further, increases in temperature during winter may create difficulties in cultivation of oyster mushroom. Proper cultivation technology for summer mushrooms needs to be developed by the research system so that mushrooms can be grown around the year.

CONCLUSION

The resource-poor middle-aged farm women had participated in the mushroom cultivation for income generation. The impact of mushroom cultivation was recorded in the case of annual income, but no impact was recorded for the standard of living and household conditions of farmwomen after the cultivation of mushrooms. The most prominent problems faced by farm women were Lack of spawn supply in time', 'lack of spawn laboratory in the locality', supply of contaminated spawn' 'social taboos for mushroom consumption', and pest infestation during February to April' and 'high temperature even in winter'. Promotional intervention may be undertaken by FFP teams for large-scale mushroom production among farm women along with provision for quality spawn supply by establishing a spawn laboratory in the project localities. The establishment of small laboratory at the village level for quality mushroom spawn production as well as making provision for skill development for farm women on spawn production will enhance mushroom cultivation in rural areas.

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Appendix: The supplementary data, table, graph in jpeg format for online visibility to the readers are submitted as an appendix

Authors' contribution: The first conceptualized, analysed and interpreted the data. The second author encouraged, supervised the findings and finalized the manuscript. The third, fourth and fifh authors collected and tabulated data. The sixth and seventh authors analysed data and preparation draft manusript. All authors discussed the results and contributed to the final manuscript. The authors approve of the content of the manuscript and agree to be held accountable for the work.

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