# Adoption Level and Constraints in Scientific Oyster Mushroom Cultivation among Rural Women in Bihar

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## ABSTRACT

*A study was conducted at District Banka, Bihar through Krishi Vigyan Kendra, Banka which comes under the jurisdiction of Bihar Agricultural University, Sabour Bhagalpur. The KVK is working with ICAR mandates for scientific knowledge for agriculture and its allied sectors. It can be transmitted through effective extension means to the farmers. Rural women can use this knowledge to improve their livelihood. KVK's are playing a major role across the rural economy especially for women empowerment. KVK's role in this sector is crucial as it is ideally placed to disseminate field-tested proven technologies with appropriate modulations which addressed location specific problems and concerns on the prevailing natural and socio- economic conditions. In this study, extent of adoption of twelve selected scientific cultivation of oyster mushroom practices were measured. To measure the extent of adoption and to compare the impact of training on the extent of adoption, 75 number of respondents were selected from trained farm women and the same number of respondents were selected from surrounding area who had not been trained. Study was conducted in three different ways- firstly; all respondents were interviewed and categorized into three groups of high, medium and low category of farmers for adoption of scientific cultivation practices of oyster mushroom. Secondary, overall adoption for both categories of respondents was measured and lastly difference between the adoptions of both categories of respondents was measured in terms of adoption of different practices of mushroom cultivation. High level of adoption was seen in adopting knowledge of sanitation (80% in trained categories) and (44% in untrained categories), whereas minority of farmers were falling under medium adaptors. Majority of the respondents (45.33 % in trained category) found to be high level of adoption, while (40 % in un trained category) found to be low level of adoption for scientific cultivation of mushroom. T test found to be highly significant for all the cultivation practices, except purchase of spawn from other sources. Unavailability of fresh spawn had highly significant and positive correlation (0.324**) with overall constraints.*

***Key words**: Oyster mushroom; Adoption; Production; Cultivation;*

The sustainable rural livelihood implies that any developmental intervention for the rural people should be congruent with their existing livelihood strategies and ability to adopt. Mushroom cultivation being an indoor activity, labour intensive and high profit venture provides ample opportunities for gainful employment of small marginal farm women, landless labourers and unemployed youth in rural areas. Therefore commercial utilization of mushroom cultivation shall a step to meet nutritional and medicinal needs to reduce malnutrition and providing livelihood to rural poor farm women. Oyster mushroom *(Pleurotus sp.)* belonging to class Basidiomycetes and family Agricaceae is properly known as "dhingri" in India and grows naturally in the temperate and tropical forests on dead and decaying wooden logs or sometimes on dying trunks of deciduous or coniferous woods. It may also grow on decaying organic matter. It is one of the most suitable fungal organisms for producing protein rich food from various agro-wastes or forest wastes without composting.

Cultivation of a oyster mushroom was initiated on experimental basis in Germany during the year 1917 on tree stumps and wood logs (*Conte, et al., 2008*).

Oyster mushrooms are the third largest cultivated mushroom in the world. China is the world leader in oyster production, contributes nearly 85 per cent of the total world production of about a million tons (*Das and Kalita, 2006*). The present production of this crop in India is only around 48000 tons per annum, APEDA Agricultural and Processed Food Products Expert Development Authority reports, 2007. The economic importance of the mushroom lies primarily in its use a food for human consumption. It is rich in vitamin C and B complex and the protein content varies between 1.6 to 2.5 per cent. It has most of the mineral salts required by the human body. The niacin content is about ten times higher than any other vegetables. It has been reported by *Rop et al. (2009)* and *Manikandan (2010).*

Oyster mushrooms are low in sodium, starch and fat. It has folic acid and low sodium potassium ratio. It helps to cure anemia and suitable for people with hypertension, obesity and diabetes (*Shu-Ting and Miles, 2004 and Dubost, 2006*). In Bihar, mushrooms are a high liking food items on several occasions and celebrations in rural areas now-a- days. There have been regular systematic plan at present to promote domestic cultivation of mushrooms. In general, recommended oyster mushroom cultivation technologies are not accepted by all the farmers at a time and also to full extent. In this context the study was conducted with the objective to ascertain adoption level of recommended oyster mushroom cultivation technologies by the farmers, find out the relationship between institutional and socioeconomic constraints and adoption of oyster mushroom production technologies to mark out the constraints experienced by the rural women farmers.

Keeping view in mind, the present study has been under taken to find out the adoption level and constraints faced by the farm women in improved oyster mushroom cultivation techniques with the following objectives:

i. To identify the commercial utilization or adoption of oyster mushroom with improved cultivation practices.

ii. To assess the various constraints faced by the rural women in improved oyster mushroom cultivation practices.

## METHODOLOGY

The study was conducted during 2014-15 at Jhirwa, Belatikar, Saijpur, Punsia, Ballikitta, Baniakura, Kaniket and Nunhari villages of Banka district in Bihar. The study was conducted in 8 villages of Banka district including SC and ST villages. A sample of 150 mushroom growing farmers (75 trained and 75 untrained) was drawn using proportionate random sampling technique. Based on the judge's opinion, oyster mushroom production technology was selected for studying level of adoption by the rural women. Personal interviews were conducted using a pretested structured interview schedule. The responses received were coded, processed and tabulated.

## RESULTS AND DISCUSSION

It is found from Table 1 the majority (53.33%) of the respondents from trained category had high use of fresh spawn, while 21.33 per cent had low use of fresh spawn. In untrained category majority 66.67 per cent had low use of fresh spawn. It indicates untrained respondents were not aware about he quality of spawn. They do not know about the problems or losses found by the use of old mushroom seed. Thus, it can be inferred that the respondents from trained category showed high extent of adoption for fresh spawn in case of using fresh spawn as compared to the respondents from untrained category.

In case of recommended seed rate, it is evident from Table 1, that majority (78.67%) of trained respondents were using recommended appropriate seed rate, while 14.67 per cent had medium and 6.67 per cent had low use of recommended seed rate but in case of untrained respondents only 8.00 per cent were using the appropriate seed rate and 26.67 per cent had medium adoption of recommended seed rate. Adoption rate was high in trained respondents, instead of 65.33 per cent had low adoption of recommended seed rate of untrained respondents.

The adoption of wheat straw in bagging was concerned, majority (73.33%) of the respondents from trained category had high use of wheat straw in bagging, while 20 per cent had medium use of wheat straw in mushroom bag and 6.67 per cent had low use of wheat straw. In the untrained category, majority (60.00%) of the respondents had high use of wheat straw; while

**Table1. Distribution of respondents according to their adoption of oyster mushroom cultivation practices.**

| Oyster mushroom cultivation practices | A* | Trained | Untrained |
|---|---|---|---|
| Use of fresh spawn | L | 16 (21.33) | 50 (66.67) |
| | M | 19 (25.33) | 16 (21.33) |
| | H | 40 (50.33) | 9 (12.00) |
| Recommended | L | 05 (6.67) | 49 (65.33) |
| Seed rate | M | 11 (14.67) | 20 (26.67) |
| | H | 59 (78.67) | 6 (8.00) |
| Use of wheat straw | L | 05 (6.67) | 9 (12.00) |
| | M | 15 (20.00) | 21 (28.00) |
| | H | 55 (73.33) | 45 (60.00) |
| Use of Paddy straw | L | 57 (76.00) | 34 (45.33) |
| | M | 12 (16.00) | 25 (33.33) |
| | H | 06 (8.00) | 16 (21.33) |
| Knowledge of | L | 04 (5.33) | 7 (9.33) |
| sanitation | M | 11 (14.67) | 35 (46.67) |
| | H | 60 (80.00) | 33 (44.00) |
| Private agency | L | 35 (46.67) | 7 (9.33) |
| | M | 25 (33.33) | 13 (17.33) |
| | H | 10 (13.33) | 55 (73.33) |
| Through govt. | L | 06 (8.00) | 37 (49.33) |
| agency | M | 24 (32.00) | 28 (37.33) |
| | H | 45 (60.00) | 10 (13.33) |
| Source of spawn | L | 43 (57.33) | 21 (28.00) |
| from other sources | M | 22 (29.33) | 24 (32.00) |
| | H | 15 (20.00) | 34 (45.33) |
| Use of chemicals in | L | 07 (9.33) | 45 (60.00) |
| congenial media | M | 12 (16.00) | 17 (22.67) |
| (Wheat straw) | H | 56 (74.67) | 13 (17.33) |
| Boiling of congenial | L | 46 (61.33) | 10 (13.33) |
| media (wheat straw) | M | 21 (28.00) | 7 (9.33) |
| | H | 8 (10.67) | 58 (77.33) |
| Control of disease | L | 16 (21.33) | 37 (49.33) |
| (fungal & bacterial | M | 24 (32.00) | 25 (33.33) |
| infection) | H | 35 (46.67) | 13 (17.33) |
| Work through SHG,s | L | 39 (52.00) | 61 (81.33) |
| Cluster or Federation | M | 21 (28.00) | 9 (12.00) |
| | H | 15 (20.00) | 5 (6.67) |

*Figures in parentheses indicate percentages;*
**A=Categories of adoption, L=Low, M=Medium, H=High*

28.00 per cent had medium use of wheat straw and 12.00 per cent had low use of wheat straw. Thus, it can be concluded that respondents from trained category showed higher extent of adoption of wheat straw, i.e. congenial media for the mushroom production. Similar findings concluded by (*Sharma and Kumar, 2010*).

It is found from the Table 1, that the majority (76.00%) of the respondents from trained category had low use of paddy straw, while 16.00 per cent had maximum use of paddy straw and 8 per cent had low use of paddy straw. In the untrained category, majority (45.33%) of the respondents had low use of paddy straw, while 33.33 per cent had medium use of paddy straw and 21.33 per cent were having low use of paddy straw from other sources

Thus, it can be inferred that the respondents from trained category showed low adoption of paddy straw as compared to the respondents from untrained category . Similar findings reported by (*Dudi and Meena, 2012*)

It is evident from the Table 1, majority (80.50%) of the respondents had high knowledge of sanitation; while 14.67 per cent had maximum knowledge of sanitation and 5.33 per cent had low knowledge of sanitation. In the untrained category, majority 46.67 per cent of the respondents had maximum knowledge of sanitation, while 44.00 per cent were found high knowledge of sanitation and 9.33 per cent had low knowledge of sanitation.

Thus, it can be concluded that respondents from the trained category showed higher knowledge of sanitation and it showed they have good adoption in respect of oyster mushroom cultivation as compared to the respondents from the untrained category.

Majority (46.67%) of the respondents from trained category had low purchase of spawn from private agency; while 33.33 per cent respondents showed medium purchasing of spawn from private agency and 13.33 per cent had high level of high purchase of spawn from private agency. In the untrained category, majority 73.33 per cent of the respondents showed high purchase of spawn through private agency; while 17.33 per cent respondents showed medium purchase of spawn through private agency and 9.33 per cent were found low level of purchase of spawn through private agency.

Thus, it can be concluded that respondents from the trained category showed low adoption of purchase of spawn from the private agency. They were not shown interest to purchase the seed from the private agency, while untrained category respondents showed higher adoption for purchasing of spawn from private agency.

It is evident from the Table 1 that the majority (60.00%) of the respondents from trained category had

high purchase of spawn through govt. agency; while 32 per cent had medium purchase of spawn through govt. agency and 8.00 per cent had low purchase of spawn from the govt. agency. In the untrained category, majority (49.33%) of the respondents had low purchase of spawn through govt. agency; while 37.33 per cent had medium purchase of spawn through govt. agency and 13.33 per cent had low purchase of spawn from govt. agency. Thus, it is observed the respondents from trained category showed high adoption of purchase of spawn through govt. agency as compared to the respondents from untrained category. In case of purchase of spawn from other sources both trained and untrained respondents showed the medium purchase of spawn through other agency. Thus, it can be concluded both the respondents have low adoption to purchase the spawn through other agency or sources. Both are inclined towards the private and govt. agency.

It is evident from Table 1 majority (74.67%) of the respondents from the trained category had high use of chemical in congenial media (wheat straw), while 16.00 per cent showed the medium use of chemical in congenial media and 9.33 per cent shown low use of chemical in congenial media. In untrained category, majority (60.00%) respondents had shown low use of chemical in the congenial media; while 22.67 per cent had medium use of congenial media and 17.33 per cent had low use of chemicals in congenial media.

Thus, it can be concluded that the respondents from the trained category showed higher extent of adoption towards use of chemicals in congenial media in commercial oyster mushroom production as compared to the respondents of untrained category. The similar observation recorded by *Siddhant et al. (2013).*

It is mentioned in Table 1 that majority (61.33%) of respondents from trained category had low use of boiling of congenial media (wheat straw),while 10.67 per cent had high use of boiling of congenial media and 28.00 per cent had medium use of boiling of congenial media (Wheat straw).

In the untrained category, majority (77.33%) of the respondents had high use of boiling of congenial media (wheat straw); while 13.33 per cent had low use of boiling of congenial media and 9.33 per cent had medium use of boiling of congenial media. Thus, it can be inferred that the respondents from untrained category had high adoption of boiling of congenial media as compared to trained respondents.

It is clear from Table 1 that majority (46.67%) of the respondents from trained category had maximum market linkage, while 21.33 per cent had low market linkage. In the untrained category respondents, majority (49.33%) had low market linkage; while 17.33 per cent had high per cent age of market linkage. In the both category respondents medium market linkage were at least same i.e. 32.00 per cent trained and 33.33 per cent untrained category, respectively. Thus, it can be concluded that the adoption of market linkage were high in trained category respondents; while medium adoption level of market linkage were same in both category respondents.

In the evident from Table 1, majority (52.00%) of respondents from trained category had shown low work through SHG's, Cluster or federation; while 28.00 per cent of the respondents had shown medium work through SHG's, cluster or federation. In the untrained category majority (81.00%), respondents had shown low work through SHG's, Cluster or Federation; while 12.00 per cent had shown medium work through SHG's, clusters or federation and 6.67 per cent had high work through SHG's, cluster or federation. Thus, it can be concluded that trained category respondents had high adoption of work through SHG's, cluster or federation as compared to untrained category respondents.

**Table 2. Distribution of respondents according to their overall extent of adoption of mushroom cultivation practices among the rural women (N=150)**

| Categories | Trained | Untrained |
|---|---|---|
| Low | 23 (30.67) | 30 (40.00) |
| Medium | 18 (24.00) | 20 (26.67) |
| High | 34 (45.33) | 25 (33.33) |
| Total | 75 (100.0) | 75 (100.0) |

As for as over all adoption was concerned it is evident from Table 2 that, majority (45.33%) of the respondents were having high level of adoption of scientific cultivation of oyster mushroom and 30.67 per cent as well as 24.00 per cent were found in low and medium adoption level in respect of technology, under trained respondents category. The respondents from the trained category also showed higher overall extent of adoption of mushroom cultivation technologies. From

**Table 3. Difference in adoption of improved mushroom cultivation practice between trained and untrained respondents**

| Mushroom cultivation practices | Mean Score | | "t" value |
|---|---|---|---|
| | T | UT | |
| Use of fresh spawn | 72.02 | 30.35 | 88.02** |
| Seed rate of spawn in bagging | 63.46 | 32.98 | 51.62** |
| Use of wheat straw | 66.97 | 58.38 | 38.82** |
| Use of Paddy straw | 8.02 | 27.04 | 38.82** |
| Knowledge of sanitation | 67.88 | 25.84 | 47.60** |
| Private agency | 07.22 | 53.97 | 101.12** |
| Through govt. agency | 52.89 | 5.7 | 107.19** |
| Other sources | 15.12 | 14.98 | 0.868* |
| Use of chemicals in congenial media (Wheat straw) | 50.85 | 24.38 | 42.09** |
| Boiling of congenial media (wheat straw) | 23.85 | 50.61 | 40.36** |
| Market linkage | 32.14 | 5.22 | 31.94** |
| Work through SHG,s Cluster or Federation | 20.50 | 1.64 | 80.26** |

**Significant at 0.01% level;
*Non significant at 0.01% level;
Degree of freedom=74;
T=Trained, UT=Untrained;

the above discussion, it can be concluded that the farmers of the trained category showed higher extent of adoption of oyster mushroom cultivation practices technology is pertaining to all twelve mushroom cultivation practices than those of the untrained category.

Thus, the trained farmers showed an increasing trend in the scientific cultivation of oyster mushroom.

It is evident from the Table 3 that the t- test was obtained highly significant for all parameters i. e. cultivation practices, except purchasing of spawn from other sources i.e. 0.87 at 0.01 level of probability.

Highest significant value (107.19) was obtained for purchasing of spawn through government agency. It showed that adoption for purchasing of spawn from Govt. agency was high. Farmers preferred to purchase the spawn from these agencies.

*Constraints in adoption of technology:* On perusal of the Table 4, it could be noticed that out of 17 variables studied, 6 variables namely lack of awareness of technology, Weak extension work at village level, Inappropriate fund to strengthen the technology, no market linkage, Unavailability of fresh spawn and Non-availability of bank linkage had highly significant and positive correlation with overall constraints.

**Table 4. Correlation coefficient (r) between different variables and overall constraints in empowerment of rural women through adoption of improved cultivation practices of oyster mushroom. Trained and untrained (N=150)**

| Constraints variables | (r) |
|---|---|
| *Technological Constraints* | |
| Lack of awareness of technology | 0.278** |
| Insufficient training programme | 0.0192 |
| Unavailability of trained experts | 0.015 |
| *Institutional constraints* | |
| Lack of information sharing of state govt. & central govt. | 0.0345 |
| Weak extension work at village level | 0.288** |
| Inappropriate fund to strengthen the technology | 0.299** |
| Lack of transport facilities | 0.0132 |
| No market linkage | 0.243** |
| Lack of proper communication | 0.0102 |
| *Socio-economic constraints* | |
| High cost of input and low purchasing power of women | 0.0122 |
| Unavailability of fresh spawn | 0.324** |
| Illiteracy among rural women | 0.001 |
| Unavailability of trained labour | 0.043 |
| Non-availability of bank linkage | 0.211** |
| Lack of subsidy for inputs | 0.016 |
| Lack of support price | 0.0023 |
| Lack of SHG,s and Cluster approach | 0.0148 |

* Significant at 0.05 probability level = 0.188
** Significant at 0.01 probability level = 0.264

## CONCLUSION

Majority of the trained women farmers showed high level of adoption of recommended technology. Use of fresh spawn and recommended seed rate were not adopted by the majority of the untrained farmers. Results obtained for t test was highly significant for the both the respondents. Lack of awareness of technology, unavailability of fresh spawn, weak extension work at village level was the major constraints faced by the farmers. Therefore, it was necessary to intensify the extension efforts to increase the knowledge level and adoption of recommended mushroom cultivation technologies, which would help in increasing the adoption of scientific cultivation of oyster mushroom at village level among rural, poor women farmers.

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