



# The Effect of Population Level and Technology toward the Oyster Mushroom Production

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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

The study was conducted during the year 2018-19 in Raipur and Dhamtari district of the Chhattisgarh state. The reason for selecting the districts because Front Line Demonstration of particular oyster mushroom production was conducted in these districts. The stakeholders like researchers, progressive growers, business personnel and self-help group of oyster mushroom production were selected, in this way the total 60 stakeholders were selected for the study. The data were collected by personally interview with the help of pre-tested interview schedule. A list of variables to be dealt with was prepared based on Adoption Diffusion Outcome Prediction Tool which having four quadrants that were considered for analysis are as follows: (1) Relative advantage for the farming population, (2) Learnability characteristics of the innovation, (3) Population-specific influences on the ability to learn about the practice, and (4) Relative advantage

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of the technology [1] and collected data were classified, tabulated and analysed using descriptive statistics like mean, frequency, and percentage. Majority of respondents were oriented towards income increment and profit maximization. oyster mushroom production enterprise is coming under the 'easily trialable' category (60.00%) followed by 'moderately trialable' category (25.00%). With regarding to ease and convenience, the results from highlights that oyster mushroom production considered under 'small increase in ease and convenience' category (38.33%) followed by 'large increase in ease and convenience' category (30.00%).

**Keywords:** Front-line demonstration; adoption; diffusion; oyster mushroom; stakeholders.

## 1. INTRODUCTION

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 production is playing a vital role in helping rural community make stronger their livelihoods. It is well-organized income for change of agricultural wastes like hay, paddy straw etc. into precious protein and making added profits as well as reduce unemployment [2,3]. Mushrooms can grow successfully without land use, and can provide a daily income throughout the year. Cultivation is also weather-independent, and can recycle agricultural by-products as composted substrates which, in effect, can be used as organic mulch to grow other crops, including vegetables [4,5].

In India, cultivation of mushrooms still has not been protected as per their potential. Unemployment has been on the rise recently. In this case, self-employment can be an effective way of increasing the employment rate for farm households to build employment and earn extra income [6-9]. 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 [10-12]. 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. Mushroom is considered to be a

nutritious food, rich in protein, low in fat and carbohydrates. However, mushroom growing can help in a long way in the efficient utilization of agricultural and industrial waste [13].

It can also play a significant role to alleviate poverty and generate employment opportunity for educated unemployed youth [14]. Additionally, it can be exploited as a source of manure, and mulch for soil and others. Mushroom cultivation consumes huge quantity of organic wastes and degrades complex organic pollutants and thus helps to maintain clean environment [15].

## 2. METHODOLOGY

The study was conducted during the year 2018-19 in Raipur and Dhamtari district of the Chhattisgarh state. The reason for selecting the districts because FLD (Front Line Demonstration) of particular oyster mushroom production was conducted in these districts. The stakeholders like researchers, progressive growers, business personnel and self-help group of oyster mushroom production were selected, in this way the total 60 stakeholders were selected for the study and the details of respondents shown in Table 1. The data were collected by personally interview with the help of pre-tested interview schedule. A list of variables to be dealt with was prepared based on ADOPT (Adoption Diffusion Outcome Prediction Tool) model which having four quadrants that were considered for analysis are as follows: (1) Relative advantage for the farming population, (2) Learnability characteristics of the innovation, (3) Population-

**Table 1. Details of selected respondents from the research area**

Sl. No.	Category	Respondents
1	Researchers	15
2	Progressive farmers	20
3	Business personnel	15
4	Self Help Group	10
	<b>Total</b>	<b>60</b>

specific influences on the ability to learn about the practice, and (4) Relative advantage of the technology [1] and collected data were classified, tabulated and analysed using descriptive statistics like mean, frequency, and percentage.

### 3. RESULTS AND DISCUSSION

#### 3.1 Relative Advantage for the Population

In this study, six dimensions of relative advantage for the population were selected such as profit orientation, environmental orientation, risk orientation, enterprise scale, management horizon, short-term constraints. These dimensions for analyzing relative advantage for the population under oyster mushroom production and the results in this regard are presented in Table 2.

##### 3.1.1 Profit orientation

More annual income can be the wider scopes of bringing modernization on life. Majority of respondents were oriented towards income

increment and profit maximization. Table 2 indicates that the 45.00 per cent of respondents falls under 'majority of the growers' category followed by 'almost half of the growers' category (26.67%).

##### 3.1.2 Environmental orientation

Table 2 shows that half of the respondents came under the 'majority of the growers' category (53.33%) followed by 'almost half of the grower's category (25.00%). Majority of oyster mushroom producers' group were very conscious regarding the environmental issues.

##### 3.1.3 Risk orientation

The data regarding risk orientation for oyster mushroom growers presented in the Table 2 also shows that 46.67 per cent of respondents considered under 'majority of the growers' category followed by 'almost half of the growers' category (31.67%) and 'only a minority of the growers' category (11.67%), respectively.

**Table 2. Relative advantages for the population (N=60)**

Profit orientation	Almost half of the growers	16	26.67%
	Majority of the growers	27	45.00%
	Almost all the growers	9	15.00%
	Only a minority of the growers	8	13.33%
Environmental orientation	Almost half of the growers	15	25.00%
	Majority of the growers	32	53.33%
	Almost all the growers	8	13.33%
	Only a minority of the growers	5	8.33%
Risk orientation	Almost half of the growers	19	31.67%
	Majority of the growers	28	46.67%
	Almost all the growers	6	10.00%
	Only a minority of the growers	7	11.67%
Enterprise Scale	Almost half of the growers	23	38.33%
	Majority of the growers	19	31.67%
	Almost all the growers	8	13.33%
	Only a minority of the growers	10	16.67%
Management horizon	Almost half of the growers	11	18.33%
	Majority of the growers	9	15.00%
	Almost all the growers	5	8.33%
	Only a minority of the growers	26	43.33%
	None of the growers	9	15.00%
Short-term constraints	Almost half of the growers	15	25.00%
	Majority of the growers	12	20.00%
	Almost all the growers	9	15.00%
	Only a minority of the growers	20	33.33%
	None of the growers	4	6.67%

### 3.1.4 Enterprise scale

In the case of oyster mushroom production, the results also show that, 38.33 per cent of growers falls under 'almost half of the growers' category followed by 'majority of the growers' category (31.67%).

### 3.1.5 Management horizon

Table 2 show that 43.33 per cent respondents of oyster mushroom production falls under the 'only a minority of the growers' category followed by 'almost half of the Growers' category (18.33%) respectively. Very few respondents from the selected enterprises intended to run their enterprise as business mode. Long term management plan for enterprise needs more attention from extension agencies among the farming community. Agencies need to increase their managerial skills for business growth and development.

### 3.1.6 Short-term constraints

Similarly, 33.33 percent growers of oyster mushroom production were considered under 'only a minority of the growers' category followed by 'almost half of the growers' category (25.00%). Mushroom cultivation is low investment business for marginal & small farmers. So that production can easily practice with easy availability of base materials in cheaper rates through product recycling.

## 3.2 Learnability Characteristics of the Innovation

In this section, three dimensions of learnability characteristics of the innovation were selected such as triable, innovation complexity, observability.

### 3.2.1 Trialability

In case of trialability, oyster mushroom production enterprise is coming under the 'easily triable' category (60.00%) followed by 'moderately triable' category (25.00%). About 13.33 per cent and 1.67 per cent innovation were considered under 'very easily triable' and 'difficult to trial' categories, respectively. Hence, it can be concluded that cultivation technology of oyster mushroom was very simple and availability of substrate (paddy straw) in plenty. Oyster mushroom involve moderate risk and farmers can generate income in the shorter period of time. It is easy to grow with limited space and make use of crop residues, as compared to other species of mushrooms.

### 3.2.2 Innovation complexity

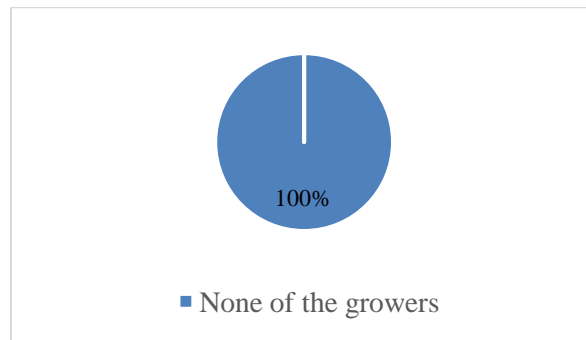
Complexity was the degree to which an innovation was perceived as being difficult to understand or use. Oyster mushroom production falls under 'moderately difficult to evaluate' category (45.00%) followed by 'slightly difficult-to-evaluate category (31.67%). It may be because oyster mushroom cultivation was easy, so there is no difficulty in evaluating them.

### 3.2.3 Observability

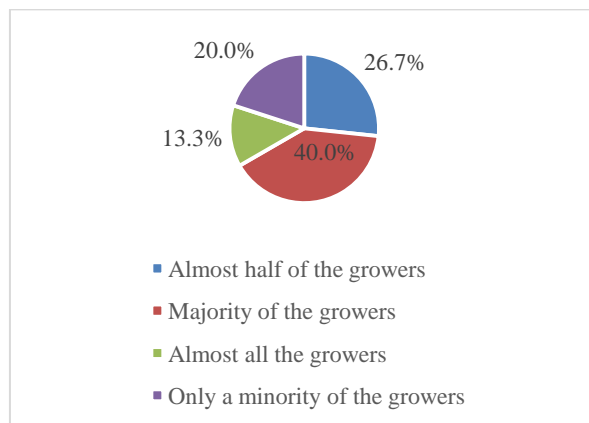
Observability was the degree to which the results of innovation were visible to others. The easier it was for others to see the benefits of an innovation, the more likely it will be adopted. Table 3 indicates that oyster mushroom production was falls under 'easily observable' (45.00%) category followed by 'moderately observable' category (36.67%). About 11.67% innovation were considered under 'very easily observable' and 'difficult to observe at all' categories.

**Table 3. Learnability characteristics of the innovation (N=60)**

Trialing ease	Easily triable	36	60.00%
	Moderately triable	15	25.00%
	Very easily trailable	8	13.33%
	Difficulty to trial	1	1.67%
Innovation complexity	Moderately difficult to evaluate	27	45.00%
	Not at all difficult to evaluate	11	18.33%
	Difficult to evaluate	3	5.00%
	Slightly difficult to evaluate	19	31.67%
Observability	Moderately observable	22	36.67%
	Easily observable	27	45.00%
	Very easily observable	7	11.67%
	Difficult to observe	4	6.67%



**Fig. 1. Pie chart showing advisory support**



**Fig. 2. Pie chart showing group involvement**

### 3.3 Population-specific Influences on the Ability to Learn about the Innovation

The four dimensions of influences on the ability to learn about the innovation were selected such as such as advisory support, group involvement, relative existing knowledge and innovation awareness.

#### 3.3.1 Advisory support

All the respondents (100%) producing oyster mushroom were also found in 'none of the growers' category to avail the paid extension service for their enterprise. Extension services for the above enterprises in study area were available free of cost to the respondents and there was no need to pay any amount to avail such services from other agencies. The main reason behind such finding was the existence of KVKs and also good coordination between KVKs and veterinary department.

#### 3.3.2 Group involvement

Fig. 3 indicates the group involvement of the farmers practicing both the technologies. On the

other hand, 40.00 per cent respondents of oyster mushroom production came under 'majority of the growers' category followed by 'almost half of the growers' category (26.67%). About 20.00 per cent and 13.33 per cent growers considered under 'only a minority of the growers' and 'almost all the growers' categories, respectively. During the study it was observed that the mushroom growers were involved in production activities with well-organized manner along with a strong support by different WSHGs/SHGs in study area.

#### 3.3.3 Relative existing skills & knowledge

In the case of oyster mushroom production, about 51.67 per cent respondents belonged to 'majority of the growers' category followed by 'almost half of the growers' (30.00%) category. The responses obtained by the mushroom growers clearly indicates that there was need of knowledge and skill upgradation of the respondents regarding spawn production and value addition of the mushroom.

#### 3.3.4 Innovation awareness

AICRP Mushroom at IGKV, Raipur is functioning since 1989. Further College of Agriculture, KVK

and ICAR-NIBSM conducting field trails periodically. The State Agriculture Department promoting mushroom cultivation, farmers were much aware of this income generating venture. With available digital and print media farmers are getting aware day to day about nutritive value of mushroom and it motivates themselves to adopt mushroom cultivation technology. Based on the findings it can be concluded that the farmers were having satisfactory awareness level about and oyster mushroom production.

### 3.4 Relative Advantage of the Innovation

In this study, nine dimensions of relative advantage of the population were selected such as relative upfront cost of an innovation, reversibility of the innovation, profit benefit in years that it is used, Profit benefit in future, time for profit benefit to be realized, environmental impact, time local environmental impacts to be realized, risk and ease and convenience.

#### 3.4.1 Relative upfront cost of the innovation

Upfront cost of oyster mushroom production required 'minor initial investment' (48.33%) followed by 'moderate initial investment' (38.33%), according to the study. It involves moderate investment for building the growing rooms and it involves less expensive base materials.

#### 3.4.2 Reversibility of innovation

The reversibility of the oyster mushroom production was presented in the Table. From the Table, it was observed that; the oyster mushroom production considered under 'easily reversed' category (51.67%) followed by 'moderately difficult to reverse' category (33.33%). About 13.33 per cent and 1.67 per cent falls under 'difficult to reverse' and 'very easily reversed' categories, respectively. Oyster mushroom production needed low initial investment cost and installing can be done with less resources.

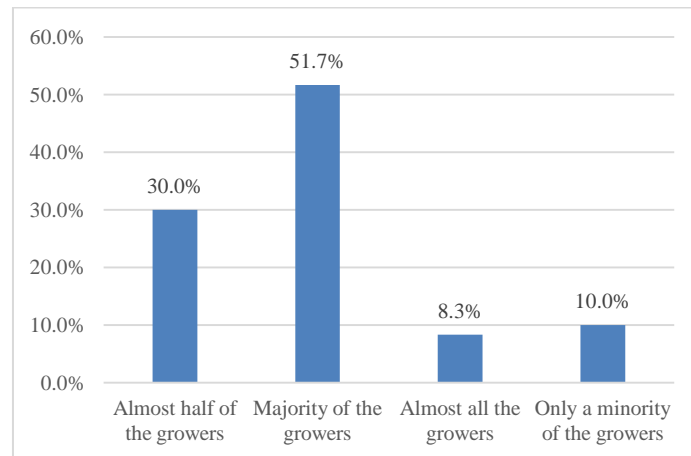


Fig. 3. Relevant existing skills & knowledge

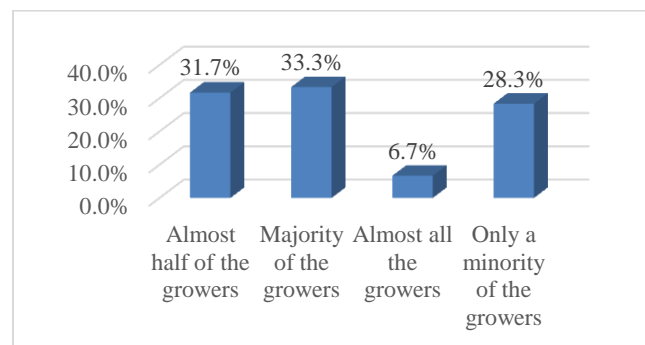


Fig. 4. Bar graph showing Innovation awareness

**Table 4. Relative advantages of the innovation (N=60)**

Relative upfront cost of the innovation	Moderate initial investment	27	45.00%
	Minor initial investment	29	48.33%
	Large initial investment	2	3.33%
	Very Large initial investment	2	3.33%
Reversibility of innovation	Easily reversed	31	51.67%
	Moderately difficult to reverse	20	33.33%
	Very easily reversed	1	1.67%
	Difficult to reverse	8	13.33%
Profit benefit in years that it is used	Moderate profit advantage	25	41.67%
	Large profit advantage	17	28.33%
	Small profit advantage	14	23.33%
	Very large profit advantage	4	6.67%
Future Income/productivity benefit	Moderate profit advantage	19	31.67%
	Large profit advantage	21	35.00%
	Small profit advantage	18	30.00%
	Very large profit advantage	2	3.33%
Profit benefit in future	1 to 2 years	39	65.00%
	3 to 5 years	17	28.33%
	6 to 10 years	1	1.67%
	Immediately	3	5.00%
Environmental impact	Large environmental advantage	15	25.00%
	Moderate environmental advantage	18	30.00%
	Very large environmental advantage	6	10.00%
	Small environmental advantage	21	35.00%
Time for environmental impacts to be realized	1 to 2 years	31	51.67%
	3 to 5 years	20	33.33%
	6 to 10 years	1	1.67%
	Immediately	8	13.33%
Risk	Small reduction in risk	28	46.67%
	Large reduction in risk	11	18.33%
	Very large reduction in risk	2	3.33%
	Moderate reduction in risk	19	31.67%
Ease and convenience	Small increase in ease and convenience	27	45.00%
	Large increase in ease and convenience	7	11.67%
	Very large increase in ease and convenience	7	11.67%
	Moderate increase in ease and convenience	19	31.67%

### 3.4.3 Profit benefit in years that it is used

The profit benefit of oyster mushroom production is presented in Fig. 4. During the study it was observed that, oyster mushroom production comes under the 'moderate profit advantage' category (46.67%) followed by 'large profit advantage' category (28.33%). It can double the farmers' income within a week if practicing oyster mushroom spawn production or 45-50 days if practicing oyster mushroom cultivation.

### 3.4.4 Profit benefit in future

The data regarding profit benefit in future of the oyster mushroom production it was observed that majority of the growers said that oyster mushroom production gives 'large profit advantage' (35.00%) in future. About 31.67 per cent and 30.00 per cent were considered under 'moderate profit benefit' and 'small profit benefit' categories, respectively. Oyster mushroom

production require low initial investment and give consistent income.

### 3.4.5 Time for profit benefit to be realized

The data related to time for profit benefit to be realized for oyster mushroom production were presented in table. It reveals that, oyster mushroom production falls under '1-2 years' category (65.00%) followed by '3-5 years' category (28.33%). It is clear that the enterprises start to give profit within 1 to 2 years from establishing the businesses which was more attractive than other farm enterprises.

### 3.4.6 Environmental impact

The data related to environmental impact of the kadaknath poultry farming are presented in Table. The results reveal that oyster mushroom production came under the 'small environmental advantage' category (35.00%) followed by 'moderate environmental advantage' category (30.00%). As per the above findings it may be concluded that the enterprise was environmentally friendly and also helps to reduce the pollution which emerges from improper disposal of crop residues (paddy straw).

### 3.4.7 Time for environmental impacts to be realized

With respect to time for environmental impacts to be realized for oyster mushroom production falls under '1-2 years' represent category (51.67%) followed by '3-5 years' category (33.33%). About 13.33 per cent and 1.67 per cent innovations were considered under 'immediately' and '6-10 years' category, respectively. The results reveal that the both of the enterprises were takes comparatively less time for their environmental impacts which was helped to take the decision regarding future action in this regard.

### 3.4.8 Risk

With respect to risk exposure dimension of oyster mushroom production, it was reported that majority of the growers said that oyster mushroom production comes under the 'small reduction in risk' category (46.67%) followed by 'moderate reduction in risk' category (31.67%). About 18.33 per cent and 3.33 per cent innovations were considered under 'large reduction in risk' and 'very large increase risk' categories, respectively. It clearly indicates that

oyster mushroom production will minimize the risk through diversification of with other enterprises.

### 3.4.9 Ease and convenience

With regarding to ease and convenience of oyster mushroom, the results from the Table highlights that oyster mushroom production considered under 'small increase in ease and convenience' category (38.33%) followed by 'large increase in ease and convenience' category (30.00%).

On the basis of the study, it was found that majority of the oyster mushroom grower agreed with oyster mushroom cultivation was practical and easily manageable.

## 4. CONCLUSION

Mushroom growing is such an enterprise in which requirement of land is not a big issue so even landless farmers can augment their income through mushroom cultivation. Majority of respondents were oriented towards income increment and profit maximization and 33.33 percent growers of oyster mushroom production were considered under 'only a minority of the growers' category followed by 'almost half of the growers' category (25.00%). Mushroom cultivation is low investment business for marginal & small farmers. So that production can easily practice with easy availability of base materials in cheaper rates through product recycling.

Oyster mushroom production enterprise is coming under the 'easily trialable' category (60.00%) followed by 'moderately trialable' category (25.00%) and it falls under 'moderately difficult to evaluate' category (45.00%) followed by 'slightly difficult-to-evaluate' category (31.67%). It may be because oyster mushroom cultivation was easy, so there is no difficulty in evaluating them. With regarding to ease and convenience, the results from highlights that oyster mushroom production considered under 'small increase in ease and convenience' category (38.33%) followed by 'large increase in ease and convenience' category (30.00%).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.



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