## **Adoption of mushroom cultivation technology by the beneficiaries of Krishi Vigyan Kendras of Manipur**

**Abstract**

The main purpose of Krishi Vigyan Kendra (KVK) is to impart learning by ‘work experience’ and they tailor the training and programs according to the needs of the farmers of the specific region. They organize trainings for the capacity development of the farmers by methods of ‘teaching by doing’ and ‘learning by doing’. North East India consists of eight states, *viz*.; Meghalaya, Assam, Arunachal Pradesh, Sikkim, Nagaland, Tripura, Mizoram and Manipur. The study was conducted with the beneficiaries of KVK, Imphal East and KVK, Senapati under the administrative control of Central Agricultural University, Imphal, Manipur and Foundation for Environment and Economic Development Services (FEEDS) NGO, Senapati, Manipur respectively to identify the adoption of mushroom cultivation technology by the farmers. The study revealed that 33.4 per cent of the respondents had high level of adoption in KVK, Imphal East whereas, 16.7 per cent of the respondents belonged to high adoption category in KVK, Senapati. Further, the percentage of farmers belonging to medium adoption category were 48.3 per cent and 53.3 per cent and in low adoption category were 18.3 per cent and 30 per cent for KVK, Imphal East and Senapati respectively.

***Keywords: Adoption, Mushroom cultivation, Beneficiary, KVK and Manipur***

**Introduction**

Krishi Vigyan Kendras (KVK) are grass root level institutions designed for the rapid transfer of technologies to the farmer’s field on a continuous basis. It was introduced by the Indian Council of Agricultural Research (ICAR) to aid the poor socio-economic conditions of youths, women and farmers residing mostly in rural areas by improving the employment, income generation and productivity of farms by introducing them to new and innovative technologies generated at research stations. They act as the canters for transfer of technology and aim to lessen the gap between the generation of the technologies and their transfer to the farmers. These institutes test, train and transfer novel and innovative technologies to the farmer's field for their advancement (Nath *et. al.,* 2017 & 2023). The main purpose of KVK is to impart learning by ‘work experience’ and they tailor the training and programs according to the needs of the farmers of the specific region. They organize trainings for the capacity development of the farmers by methods of ‘teaching by doing’ and ‘learning by doing’. Krishi Vigyan Kendra is a vital component of the National Agricultural Research System (NARS). Its primary objective is to evaluate location specific technological modules applicable to agriculture and related sectors. This evaluation process encompasses technology assessment, improvement and practical showcases. KVKs serve as Knowledge Resource Centers for agricultural technology, aiding endeavors from public, private and voluntary sectors aimed at enhancing the agricultural economy of the district. Additionally, KVKs play a critical role in connecting the National Agricultural Research System with the extension system and farmers, thus facilitating the exchange of knowledge and innovations (kvk.icar.gov.in).

On the recommendation of the Education Commission during the year 1964-66, ICAR proposed the idea of establishing innovative institutions to provide vocational training to rural youth, self employed farmers and extension functionaries known as KVKs or Farm Science Centers. In August 1973, the Standing Committee of the ICAR recognized the potential benefits of establishing KVKs. These centers were envisioned not only to enhance agricultural production but also to uplift the socio economic conditions of the farming community (Nath *et. al.,* 2016). In order to effectively implement the KVK scheme, the involvement of all relevant institutions was deemed essential by the ICAR. Consequently, in 1973, ICAR formed a committee chaired by Dr. Mohan Singh Mehta from Udaipur, Rajasthan, to develop a comprehensive plan for the implementation of the scheme. The first KVK was established in Pondicherry in 1974 on pilot basis under the administrative control of Tamil Nadu Agricultural University, Coimbatore (Jadhav, 2019). The Govt. of India fully finances the KVK scheme and sanctions the KVK to ICAR institutes, Agricultural Universities, Non-Government Organizations (NGOs) and Government Departments working in the Agriculture sector. For the testing of new agricultural technologies, a KVK must own about 20 hectares of land. The KVK is managed by a variety of host institutions including ICAR Institutes, State line departments, Agricultural Institutes, NGOs and other educational institutions (kvk.icar.gov.in). The primary objective of KVK is Technology Assessment and Demonstration for wider Application and Capacity Development (TADA-CD) (Nath, 2016). KVKs play a major role in the transfer of technology though they are categorized by different managing administrative units like ICAR, State Agricultural Universities, Central Agricultural Universities, State line Department and NGO (Nath & Sharma, 2022).

**Methodology**

Multistage sampling method was used for the present study. There are a total of 9 KVKs in Manipur under different managerial control at present. Out of the 9 KVKs; 2 are under the control of NGOs, 5 are under the control of ICAR, 1 is under the control of CAU, Imphal and 1 is under the control of the State Department of Agriculture (icarzcu3.gov.in). KVK, Imphal East managed by Central Agricultural University, Imphal while KVK, Senapati managed by an NGO, *viz*.; Foundation for Environment and Economic Development Services (FEEDS), Senapati was selected purposively for the study. To diversify the sample, KVK, Imphal East was selected as it comes under plain area and KVK, Senapati was selected as it falls under hilly area. 60 respondents were selected from each KVK randomly, thus making the total sample size of 120 respondents.

Adoption of mushroom cultivation technology was measured with the help of a structured schedule which was prepared in consultation with subject matter specialists and relevant review of literature. The schedule consisted of 15 statements on the recommended package of practices of mushroom cultivation technology. The responses of the respondents were recorded as “Full adoption”, “Partial adoption” and “No adoption” with scores of 3, 2, and 1 respectively. The total score of the respondents was determined by summing up the scores of the response categories against each statement. The respondents were categorized based on their scores into “Low”, “Medium” and “High”. For the computation of adoption of each practice, based on the responses obtained, frequency and percentage were calculated. The socio personal characteristics, *viz*., Age, Education, Landholding, Annual income, Occupational engagement, Farming experience, Social participation, Source of information, Extension contact and Mass media exposure were also studied. The correlation analysis was computed in order to find out the relationship between the socio-personal characteristics and adoption of mushroom cultivation technology.

**Results and Discussion**

# The socio- personal characteristics of the respondents are presented in Table 1 and the distribution of respondents based on their level of adoption of mushroom cultivation technology is presented in Table 2. It can be observed from the Table 2 that majority of the total respondents (50.8%) had medium level of adoption. It was clear that higher percentage (33.4%) of respondents of KVK, Imphal East were found in high adoption category with respect to mushroom cultivation technology, whereas small percentage of respondents (16.7%) belonged to high adoption category in KVK, Senapati. Further, the percentage of farmers belonging to medium adoption category were 48.3 per cent and 53.3 per cent and in low adoption category were 18.3 per cent and 30 per cent for KVK, Imphal East and Senapati respectively. The findings from the Table 2 illustrates that KVK, Imphal East had higher level of adoption than KVK, Senapati. This might be because the respondents of KVK, Imphal East were more educated and had realization of the benefits of using new technologies and also had higher income to adopt newer technologies. The findings were similar with the findings of Kumbhare and Khonde (2009) and Dobariya *et al*. (2017).

# Package of practice wise adoption pattern of mushroom cultivation technology by the respondents is presented in Table 3. Practices like cutting the clean straw into 3-5 cm length (100% and 100%), soaking of the straw overnight in cold water (90% and 90%), tying the open end of the bag with a piece of jute thread and keep it as such for spawn running (88.3% and 80%), making perforated holes for good aeration (96.7% and 66.7%) and harvesting by twisting the stipe between thumb and fingers (100 % and 75%) were fully adopted by the respondents in case of KVK, Imphal East and Senapati, respectively. Further, it was observed that practices like substrate sterilization using hot water treatment (10% and 15%), putting the removed bags in a pit for composting to use after one year as farm compost (18.3% and 30%) and labelling with the species name and date of spawning (36.7% and 51.7%) were least adopted by the respondents of both KVKs. As indicated in Table 3, the respondents of KVK, Imphal East had fully adopted more practices than respondents of KVK, Senapati. The higher level of adoption by the respondents of KVK, Imphal East might be due to resource availability and higher social participation. As discussed earlier, respondents of KVK, Imphal East were more educated and had more knowledge which could have contributed to overall better adoption. The partial adoption of practices was comparatively higher in KVK, Senapati. It might be due to lack of proper knowledge and non-availability of spawns.

**Table 1: Socio personal characteristics of the respondents (N= 120)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **Age** | **KVK, Imphal East** **n₁=60** | **KVK, Senapati** **n₂=60** | **Total****(F)** | **Total****(%)** |
| **F** | **%** |
| **F** | **%** |
| 1. | Young (up to 35 years) | 6 |  10 | 3 |  5 | 9 | 7.5 |
| 2. | Middle age (36 to 50 years) | 43 |  71.7 | 49 |  81.7 | 92 | 76.7 |
| 3. | Old age (above 50 years) | 11 |  18.3 | 8 |  13.3 | 19 | 15.8 |

|  |  |  |
| --- | --- | --- |
| **B** | **Education** |  |
| 1. | Illiterate | 0 | 0 | 0 | 0 | 0 | 0 |
| 2. | Read-only | 0 | 0 | 1 | 1.7 | 1 | 0.8 |
| 3. | Read and Write | 0 | 0 | 2 | 3.3 | 2 | 1.7 |
| 4. | Primary (V standard) | 1 | 1.7 | 13 | 21.7 | 14 | 11.7 |
| 5. | Middle school ( up to VII standard) | 7 | 11.7 | 15 | 25 | 22 | 18.3 |
| 6. | High School ( up to X standard) | 25 | 41.6 | 16 | 26.6 | 41 | 34.2 |
| 7. | Senior Secondary and above | 27 | 45 | 13 | 21.7 | 40 | 33.3 |
| **C.** | **Land holding** |  |  |  |  |
|  |
| 1. | Marginal (<1 ha) | 49 | 81.6 | 41 | 68.3 | 90 | 75 |
| 2. | Small (1-2 ha) | 9 | 15 | 15 | 25 | 24 | 20 |
| 3. | Medium (2-4 ha) | 1 | 1.7 | 3 | 5 | 4 | 3.3 |
| 4. | Large (4 ha and above) | 1 | 1.7 | 1 | 1.7 | 2 | 1.7 |
| **D** | **Annual income** |  |
| 1 1. | Low (<Rs. 33,750) | 2 | 3.4 | 11 | 18.3 | 13 | 10.8 |
| 2 | Medium (Rs. 33,751-Rs. 1,44,000) | 29 | 48.3 | 41 | 68.3 | 70 | 58.4 |
| 3 | High (>Rs. 1,44,000) | 29 | 48.3 | 8 | 13.4 | 37 | 30.8 |
| **E** | **Occupational engagement** |  |
|   1 | Farming + Agricultural labour | 1 | 1.7 | 19 | 31.7 | 20 | 16.7 |
|   2 | Farming + Business | 32 | 53.3 | 17 | 28.3 | 49 | 40.8 |
|   3 | Farming + Service | 13 | 21.7 | 5 | 8.3 | 18 | 15 |
|   4 | Farming | 14 | 23.3 | 19 | 31.7 | 33 | 27.5 |
| **F** | **Farming experience** |  |
|   1 | Low(5-10) | 5 | 8.3 | 6 | 10 | 11 | 9.2 |
|   2 | Medium(11-15) | 40 | 66.7 | 37 | 61.7 | 77 | 64.2 |
|   3 | High(16 and above) | 15 | 25 | 17 | 28.3 | 32 | 26.6 |
| **G** | **Social participation** |  |
|   1 | No member of any organization | 10 | 16.7 | 20 | 33.4 | 30 | 25 |
|   2 | Member of one organization | 36 | 60 | 32 | 53.3 | 68 | 56.7 |
|   3 | Member of more than one organization | 14 | 23.3 | 8 | 13.3 | 22 | 18.3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **H** | **Source of information** | **KVK, Imphal East****n₁=60** | **KVK , Senapati****n₂=60** | **Total****(F)** | **Total****(%)** |
| **F** | **%** | **F** | **%** |
|   1. | Low use (less than Mean + S.D) | 11 | 18.3 | 15 | 25 | 26 | 21.6 |
|   2. | Medium use ( between Mean ± S.D) | 34 | 56.7 | 38 | 63.3 | 72 | 60 |
|   3. | High use ( more than Mean + S.D) | 15 | 25 | 7 | 11.7 | 22 | 18.4 |
| I | Extension contact |  |
| 1. | Low (less than Mean – S.D) | 10 | 16.7 | 15 | 25 | 25 | 20.8 |
| 2. | Medium (between Mean ± S.D) | 36 | 60 | 37 | 61.7 | 73 | 60.9 |
| 3. | High (more than Mean + S.D) | 14 | 23.3 | 8 | 13.3 | 22 | 18.3 |
| J | **Mass media exposure** |  |
| 1. | Low (less than Mean - S.D) | 7 | 11.7 | 13 | 21.7 | 20 | 16.7 |
| 2. | Medium (between Mean ± S.D) | 38 | 63.3 | 35 | 58.3 | 73 | 60.9 |
| 3. | High (more than Mean + S.D) | 15 | 25 | 12 | 20 | 27 | 22.4 |

# Table 2: Distribution of the respondents according to their adoption of mushroom cultivation technology (N= 120)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Categories** | **KVK , Imphal East****n₁=60** | **KVK , Senapati****n₂=60** | **Total****(F)** | **Total****(%)** |
| **F** | **%** | **F** | **%** |
| 1. | Low (less than Mean – S.D) | 11 | 18.3 | 18 | 30 | 29 | 24.2 |
| 2. | Medium (between Mean ± S.D) | 29 | 48.3 | 32 | 53.3 | 61 | 50.8 |
| 3. | High (more than Mean + S.D) | 20 | 33.4 | 10 | 16.7 | 30 | 25 |
|  | **Mean** | **38** |  | **37.1** |  | **40** |  |
|  | **S.D** | **3.5** |  | **3.6** |  |  |  |

# Fig. 1: Distribution of the respondents according to their adoption of mushroom cultivation technology

# Table 3: Package of practice wise distribution of respondents according to their level of adoption of mushroom cultivation technology N=120

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Package of practices** | **KVK, Imphal East****n₁=60** | **KVK, Senapati****n₂=60** |
| No adoption | Partial adoption | Full adoption | No adoption | Partial adoption | Full adoption |
| **F** | **%** | **F** | **%** | **F** | **%** | **F** | **%** | **F** | **%** | **F** | **%** |
| 1 | Selection of quality paddy straw (golden yellow in colour, rain and mould free). | 0 | 0 | 5 | 8.3 | 55 | 91.7 | 4 | 6.7 | 6 | 10 | 50 | 83.3 |
| 2 | Cutting the clean straw into 3-5 cm length with the help of a chop cutter or sickle.  | 0 | 0 | 0 | 0 | 60 | 100 | 0 | 0 | 0 | 0 | 60 | 100 |
| 3 | Soaking of the straw overnight (6-8 hours) in cold water.   | 0 | 0 | 6 | 10 | 54 | 90 | 0 | 0 | 6 | 10 | 54 | 90 |
| 4 | Substrate sterilization using Hot water treatment by soaking the straw in the hot water (750C) for 30 minutes. | 49 | 81.6 | 5 | 8.3 | 6 | 10 | 27 | 45 | 24 | 40 | 9 | 15 |
| 5 | Chemical sterilization of substrate using Carbendazim 50% wp @ 5-7gm/100 litres of water. | 12 | 20 | 7 | 11.7 | 41 | 68.3 | 10 | 16.7 | 20 | 33.3 | 30 | 50 |
| 6 | Spawning the straw layer with 200 gm/ bag. | 0 | 0 | 7 | 11.7 | 53 | 88.3 | 5 | 8.3 | 14 | 23.3 | 41 | 68.3 |
| 7 | Making perforated holes with size 1/2 to 1 cm diameter having a distance of 10 cm between the hole for good aeration. | 0 | 0 | 2 | 3.3 | 58 | 96.7 | 0 | 0 | 20 | 33.3 | 40 | 66.7 |
| 8 | Filling the polythene bag by making a total of five layers of straw and four layers of spawn in between. | 0 | 0 | 6 | 10 | 54 | 90 | 0 | 0 | 23 | 38.3 | 37 | 61.7 |
| 9 | Once the bag is filled up, tying the open end of the bag with a piece of jute thread and keep it as such for spawn running.  | 0 | 0 | 7 | 11.7 | 53 | 88.3 | 0 | 0 | 12 | 20 | 48 | 80 |
| 10 | Labelling with the species name and date of spawning or preparation of the bed should be tagged to the bed for the record. | 33 | 55 | 5 | 8.3 | 22 | 36.7 | 3 | 5 | 26 | 43.3 | 31 | 51.7 |
| 11 | Incubation in a dark cropping room for 15 days till mycelium colonizes the straw. | 0 | 0 | 0 | 0 | 60 | 100 | 2 | 3.3 | 29 | 48.3 | 29 | 48.3 |
| 12 | Mushroom bed opening -Taking out the blocks from polythene bags & keeping them in a well-ventilated room. | 8 | 13.3 | 11 | 18.3 | 41 | 68.3 | 3 | 5 | 30 | 50 | 27 | 45 |
| 13 | Cropping Room-Putting the mushroom bed on racks or hanging it in the mushroom house. Keeping the bed moist by spraying water 2-3 times a day or when necessary. | 0 | 0 | 6 | 10 | 54 | 90 | 0 | 0 | 25 | 41.7 | 35 | 58.3 |
| 14 | Harvesting by twisting the stipe between thumb and fingers and cutting the stipe base to remove adhering straw etc. | 0 | 0 | 0 | 0 | 60 | 100 | 2 | 3.3 | 13 | 21.7 | 45 | 75 |
| 15 | Removing the bags from cropping rooms and putting them in a pit for composting to use after one year as farm compost. | 39 | 65 | 10 | 16.7 | 11 | 18.3 | 23 | 38.3 | 19 | 31.7 | 18 | 30 |

# Relationship of socio personal characteristics with adoption of mushroom cultivation technology

# Correlation analysis was computed in order to find out the relationship and significance between the socio-personal characteristics and adoption of mushroom cultivation technology. The findings of the correlation analysis are presented in Table 4. As observed from the results out of 10 independent variables, *viz.*; age, education, landholding, annual income, occupational engagement, farming experience, social participation, source of information, extension contact and mass media exposure. 6 variables were found to be significant, *viz.,* education, annual income, social participation, source of information, extension contact and mass media exposure. It is observed from the Table that, education, social participation, source of information, extension contact and mass media exposure were significant at 1 per cent level of significance while annual income was significant at 10 per cent level of significance. All of the six significant variables, *viz*.; education, annual income, social participation, source of information, extension contact and mass media exposure had positive relationship with adoption of mushroom cultivation technology. The positive sign on the variables implies that with the increase in the significant variables, respondents are likely to have more adoption of mushroom cultivation technology. Further, age, landholding, occupational engagement and farming experience were non significant to the dependent variable. Results indicated in Table 4 reveals that with respect to KVK, Senapati, out of 10 independent variables, *viz*.; age, education, landholding, annual income, occupational engagement, farming experience, social participation, source of information, extension contact and mass media exposure. 5 variables were found to be significant which were education, social participation, source of information, extension contact and mass media exposure. Out of them, social participation, source of information, extension contact and mass media exposure were significant at 1 per cent level of significance while education was significant at 5 per cent level of significance. All of the 5 significant variables, *viz.;* education, social participation, source of information, extension contact and mass media exposure had positive relationship with adoption of mushroom cultivation technology. The positive sign on the variables implies that with the increase in the significant variables, respondents are likely to have more adoption of mushroom cultivation technology. Further, age, annual income, landholding, occupational engagement and farming experience were non significant to the dependent variable.

# Table 4: Relationship between socio-personal characteristics and adoption of mushroom cultivation technology N=120

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Independent variables** | **KVK, Imphal East****n₁=60** | **KVK, Senapati****n₂=60** |
| **r-value** | **p-value** | **r-value** | **p-value** |
| 1. | Age | .069(NS) | 0.600 | .043(NS) | 0.741 |
| 2. | Education | .425\*\*\* | 0.001 | .288\*\* | 0.025 |
| 3. | Landholding | .054(NS) | 0.684 | .098(NS) | 0.457 |
| 4. | Annual income | .246\* | 0.059 | .087(NS) | 0.507 |
| 5. | Occupational engagement | .050(NS) | 0.706 | .089(NS) | 0.498 |
| 6. | Farming experience  | -.030(NS) | 0.822 | -.077(NS) | 0.558 |
| 7. | Social participation  | .873\*\*\* | 0.001 | .787\*\*\* | 0.001 |
| 8. | Source of information | .830\*\*\* | 0.001 | .687\*\*\* | 0.001 |
| 9. | Extension contact  | .810\*\*\* | 0.001 | .578\*\*\* | 0.001 |
| 10. | Mass media exposure  | .868\*\*\* | 0.001 | .664\*\*\* | 0.001 |

# \*\*\* Indicates association at 0.01 level of significance, \*\* Indicates association at 0.05 level of significance

# \*Indicates association at 0.10 level of significance, NS- indicates non-significant

**Conclusion**

It may be concluded that the respondents of KVK, Imphal East had fully adopted more practices than respondents of KVK, Senapati and had higher level of adoption of mushroom cultivation technology. It was observed that education, annual income, social participation, source of information, extension contact and mass media exposure were the important factors which had significant relationship with the adoption of mushroom cultivation technology in KVK, Imphal, whereas, education, social participation, source of information, extension contact and mass media exposure were the important factors which had significant relationship with the adoption of mushroom cultivation technology in KVK, Senapati. The findings that majority of the total respondents had medium level of adoption showcases the progressiveness of the farmers. Further, it was revealed that unawareness of govt. subsidy programmes, non availability of seeds of recent varieties at KVK and recent release varieties are not included in frontline demonstration were the major constraints encountered by the beneficiaries.

Therefore, it may be concluded that arrangement of transportation facility for the beneficiaries of KVK, Imphal East could increase the attendance and adoption of mushroom cultivation technology. Most of the beneficiaries of KVK, Senapati had comparatively less income. So, creating awareness about Govt. subsidy programmes could help them to avail better technology and increase the adoption of mushroom cultivation. Provision of spawn to the beneficiaries by the KVKs might encourage more beneficiaries to take up mushroom cultivation technology. Most of the beneficiaries had no knowledge of the common disease infestation of mushroom cultivation. Therefore, trainings on the identification of common diseases and the management of those diseases should also be organized.

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