TECHNICAL & PROGRESS REPORT
MUSHROOM BIO-TECHNOLOGY LABORATORY

Team

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DEPARTMENT OF AGRICULTURE

AZAD GOVERNMENT OF THE STATE OF JAMMU & & KASHMIR

S.#	Contents	Page. No

INTRODUCTION

Agriculture sector aims to increasing crop production and productivity through involvement of improved technology. Azad State of Jammu and Kashmir has only 13% area under cultivation out of its total Geographical area. Agriculture is traditional because of small land holdings, scarcity of irrigation facilities and poor farm mechanization. The mountain ecosystems of Azad Jammu & Kashmir are relatively unstable and environmentally fragile. With an estimated population of approximately 4.5 million. AJ &K faces increasing food insecurity driven by small landholdings, limited access to quality agricultural inputs, reliance on traditional farming practices, and a lack of interest of people toward agriculture. Ensuring food security for the growing population is becoming a great challenge in the state. Production of cash is not only step towards the modification of traditional agriculture practices but also can set a trend for production of crops for higher economic value.

Mushroom is one of those non-conventional cash crop that can be easily grown without land and even on agricultural waste at low cost. Mushrooms can be easily grown in houses, huts, or sheds, making them accessible to small-scale farmers. Cultivation of Mushroom holds significant potential to improve the livelihoods of the farming community by increasing the per capita income of low-income groups of people in AJ&K. To cope the climatic challenges and ensure the food security of growing population Department of Agriculture submitted proposal to TIKA (**Turkish Cooperation And Coordination Agency**) with an objective to ensure the availability of Mushroom in the State throughout the year and to maintain a production chain in the market and to improve the living standard of community.

TIKA supported the Department of Agriculture in establishing a Mushroom Biotechnology Laboratory in November 2024 at Agricultural Complex, Muzaffarabad. The mandate of Mushroom Bio-Tech laboratory is to production, multiplication and ensuring a steady supply of mushroom spawn for AJ&K communities to sustain production and contribute to improving the living standards of communities across the state.

Objective of this report is to present a detailed account of activities undertaken and summarize the progress made in promoting mushroom cultivation within the state.

DISCRIPTION

A. Establishment of Mushroom Bio Technology Laboratory

TIKA assisted project titled **"Promotion of Mushroom Production as a Cottage Industry in AJ&K through Semi-Commercial Scale Production"**, and a duration spanning for one year, was implemented to promote mushroom cultivation technology. As part of the project, necessary infrastructure, equipment, and logistics were provided and Mushroom Biotechnology Laboratory was established in November 2024 at the Directorate of Agriculture Research, Gojra Complex, Muzaffarabad**.**

B. Inauguration

Mushroom Bio technology Laboratory was inaugurated by Honorable Minister for Agriculture, Livestock ESMA & Small Dams Sardar Ameer Akabar Khan, and Secretary Agriculture, GoAJK Muhammad Imtiaz Hussain and along with TIKA country Head in Pakistan on December 2024.

C. Methodology

During reporting period a healthy fruiting culture were selected from the different sources like Tissue culture, spore culture and fresh culture etc and grownup mycelium in petri plates.

Subsequently the mycelium from mushroom culture used to inoculate in sorghum grains under aseptic controlled environment conditions details mentioned in table below

S.#	Activities	Unit	Status
1	Media Preparation	ml	5000
2	Inoculation (Petri plates)	No	150
3	Spawn Preparation (Bottle/Bags)	Bag/Bottles	150
4	Spawn Produced	Kg	37

Steps Involved in Preparation of Spawn of oyster mushroom

Preparation of Media

1. **Boiled Distilled water (500ml) on hot plate**
2. **Added PDA(Potato , Dextrose Agar) 15 Gm**
3. **Add Malt 5 Gam and it mix well**
4. **Sterilized media in autoclave up to 21'oC and cool it.**
5. **Cool media in laminar air flow cabinet in UV light**
6. **Pouring media in Petri plates**
7. **Cool plates for solidification**

Preparation of Pure Culture (Mycelia)

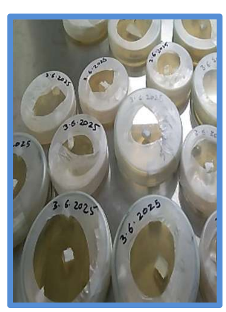
1. **Inoculation of petri plates with mycelium of oyster**
2. **Airtight plates with Para film**
3. **Keep all plates in incubator at 24 to30 'c temperature and cover with carbon paper**

Preparation of Spawn

1. **Soaked Sorghum overnight**
2. **Dry sorghum with 10% moisture content and add gypsum 10gm and mix well**
3. **Sterilized bottles in autoclave**
4. **Add sorghum in bottles**
5. **Sterilized bottles along with sorghum**
6. **Cool them in laminar air flow cabinet**
7. **Take mycelia from pert plats and pour them in bottles @ of one petri plate one bottle**

1. Media Preparation

2. Pure Culture of Mushroom



3. Grain Spawn Production

Grain spawn is prepared on sterilized grains of sorghum, millet or wheat

4. Substrates Preparation

Wheat straw is soaked, mixed with lime, wheat bran and filled in plastic bags

5. Sterilization and Innoculation of Spawn into bags and Incubation

The compost filled bags are sterilized at 121 ^{C} for one hour at 15 psi. after cooling of bags at 25 c the bags are inoculated with graing spawn of mushroom and incubated in darkroom

6. Fruiting & Harvesting

After 3-45 days fruiting from bags begins kept in dark and under moisture at 60-70 RH. The maturity of mushroom is highest under controlled temperature and high ,i.e 70-90 RH moisture. The mature fruits are harvested.

D. Number of Individuals visited

In addition to the training sessions, a significant number of individuals including government representatives from Education, local government, Public Service Commission, national and international organizations, local leaders, and influential community members visited the Mushroom Biotechnology Lab.

The visitors not only appreciated the innovative efforts undertaken to promote mushroom cultivation at the state level, but also expressed keen interest in this high-value cash crop. Many of them went on to initiate mushroom cultivation in their respective areas. Furthermore, they played a crucial role in inspiring others in their communities by sharing their experiences and promoting the benefits of mushroom farming.

E. Capacity Building

To ensure sustainable agricultural development, the active involvement of local communities is essential. Empowering local populations to participate in the development process is key to addressing persistent challenges such as small landholdings, poor-quality agricultural inputs, and the ongoing conversion of agricultural land for non-agricultural purposes. A successful development strategy must be rooted in the socio-economic realities of these communities and must focus on capacity building and inclusive participation. In line with this approach, The Directorate of Agriculture Research (Mushroom Section) organized a series of training sessions and practical demonstrations aimed to promoting mushroom cultivation across various locations. These initiatives were designed to raise awareness, build skills and provide hands-on experience in mushroom farming as a viable and sustainable agricultural practice. A total of 75 local participants were trained during these sessions. The participants included community activists, students and agricultural staff. Their active engagement reflects the growing interest in alternative and high-value crops such as mushrooms, which offer income-generating potential even on small landholdings.

F. Mushroom Cultivation at field

Mushroom farming is a successful agricultural enterprise with limited-space technique that needs very less expenditure. In different districts of AJ&K following individuals adopted technology of mushroom production and making money.

S.No	Name of Farmers	District	Location
1	Demonstration	Muzaffarabad	Directorate of Agriculture Research
2	Khadam Hussain	Muzaffarabad	Gojra
3	Zahid Hussain	Muzaffarabad	Gojra
4	Muhammad Farooq	Muzaffarabad	Chattar
5	Saqib	Bagh	Dirkot
6	Raja Shakeel	Bagh	Chimyati
7	Arbab Abbasi	Bagh	Dirkot

G. Cost Benefit ratio of Mushroom cultivation

Item	Unit	Unit cost(Rs)	Total cost (Rs)
Wheat straw(for 50 bags)	**No**	**800**	**2(800)=1600**
Spawn	**kg**	**2 kg**	**2(1000)=2000**
Plastic bags	**kg**	**700**	**0.5(700)=700**
Wheat bran	**kg**	**100**	**1(100)=100**
Lime	**kg**	**100**	**1(100)=100**
Thread	**L/S**	**50**	**1(50)=50**
Woods or gas	**kg**	**300**	**2(300)=600**
Labour Cost	**L/S**		**3000**
Plastic sheet(one time)	**L/S**		**500**
Total Expenditure(A)			**=8650**
Income(I bag yields (avg) kg of fresh mushroom in two flushes	**Total Production 50 bags(kgs)**	**Price /kg 1500**	**Total income**
Total Income (B)	**50**		**50(1500)=75,000**
Net Income	**B-A**		**75000-8650=66,350**

I. Recommendation

Mushroom is rapidly grown business, people with low economic condition and no land area can cultivate it and get more profit in a short period of time, and it can be grown throughout the year under natural condition under precribed modified environment.

Food security is alarming issue with the growing population of AJ&K so, it is recommended to educate the farmers in Monday training programme to cultivate mushroom for their livelihood improvement and overcome the issue of small landholding and food insecurity.