



COMPLETION REPORT

ON

THE PROJECT

TECHNOLOGY INTERVENTION FOR MUSHROOM CULTIVATION TO
GENERATE SELF – EMPLOYMENT OF TRIBAL WOMEN IN UKHRUL
DISTRICT, MANIPUR

Submitted to:

The Director,
Department of Biotechnology, Government of India,
Block – 2 & 7th Floor C.G.O. Complex,
Lodhi Road, New Delhi – 110006

Submitted By:

Manipur Science and Technology Council
Central Jail Road, Imphal – 795001

Sl. No.	Content	Page No.
1.	File No. and Title of the Project	2
2.	Principal Investigator & Co - Investigator	2
3.	Registration No. Date and Act under which registered	2
4.	Date of Sanction and completion of the project	2
5.	Total Approved Project Cost and Duration	2
6.	Year Wise Grants released so far	2
7.	Project Objectives as approved by DBT	3
8.	Achievements	3
9.	Deviation if any from the project objectives and reasons thereof	5
10.	Details of Field Demonstrations laid under the project (Size of plots, crops, beneficiaries and Field photographs)	5
11.	Number of Beneficiaries of the project	6
12.	Year Wise number of beneficiaries trained through the project	6
13.	Steps taken to sustain the activities after the DBT funding is over	6
14.	Summary of the Progress	7 - 10

1) File No. and Title of the Project:

No:BT/PR2579/11/223/2001 **Dated** 19.08.2003

Title: Technology Intervention for Mushroom Cultivation to generate Self – employment of Tribal Women in Ukhrul District, Manipur

2)

Principal Investigator:

Shri Th. Surendranath Singh
Executive Director,
Manipur Science and Technology Council
Central jail Road, Imphal, Manipur – 795001

Assisted by:
Shri Kh. Rakesh
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Central jail Road, Imphal, Manipur – 795001

Co-Investigator:

Smt. S. Mema Devi
Mycologist
Manipur Tribal Development Corporation,
Lamphelpat, Imphal - Manipur

3) Registration No. Date and Act under which registered: Does not rise

4) Date of Sanction and completion of the project:

Date of Sanction -19.08.2003
Date of Receipt of the Demand Draft: 17: 02: 2004
Date of Completion of the project: 16: 02: 2006
Status – Completed (Extension without additional cost sought but not permitted)

5) Total Approved Project Cost and Duration:

Project Cost: 9.84 Lakhs
Duration: 2 years

6) Year Wise Grants released so far:

- i) First Instalment: Rs.5.92 Lakhs
 - ii) Second Instalment: Rs.1.76 lakhs
- Total: Rs.7.68 Lakhs**

7) Project Objectives as approved by DBT:

- a. To involve rural masses in Scientific and organised cultivation of edible mushroom.
- b. To make rural population aware of protein malnutrition and motivate them for taking up protein rich mushroom to meet the protein demand.
- c. To train 100 women and men in production of sufficient mushrooms as fast income generating crop.
- d. To establish a mushroom spawn production unit at the project Site and provide quality spawn to the beneficiaries for ensured quality products.
- e. To establish marketing facilities of mushroom by supplying sufficient quantities for value added products.

8) Achievements:

The project was implemented at two sites i.e. 1) Technology Demonstration Unit at the premises of Science and Technology Complex at Takyelpat, Imphal and 2) Murei Village which is located in Ukhrul District (a tribal district) about 25 km from Imphal at an altitude of 800 m above msl.

The existing Solar Passive Technology Building of Manipur Science and Technology Council at Takyelpat, Imphal with a total area of 6000 sq. ft. was utilised for as the Technology Demonstration Unit of the Project. The Unit had a well-equipped Spawn Production Laboratory and a Cultivation Unit for experimental cultivation of varieties of Mushroom. The laboratory is equipped with adequate equipments like Autoclave, Laminar Flow, Refrigerator, Water Storage Tank, Chemical balance, Kitchen Balance, Gas connection and adequate glass wares for production of spawn.

Several strains of mushroom were collected some from their natural habitat and some from Manipur Tribal Development Corporation, Imphal and other Institutes of Imphal. Those were cultured in PDA media for propagation. The high yielding ones were selected for further use. A grain type spawn was developed. Mass and regular production of variety of Spawn of Oyster mushroom such as *Pleurotus flabellatus*, *P. eous*, *P. Sapidus*, *P. Ostreatus* (Phillipine), *P. Ostreatus* (PCA) was done continuously at the Technology Demonstration

Unit at Takyelpat for free supply to the beneficiaries of the Murie village as well as for experimental cultivation at the Technology Demonstration Unit. Besides the above, button mushroom spawn (*Agaricus bisporous*) and spawn for some local varieties such as *Lentinula edodes*, *Termitomyces sp.*, *Auricularia sp.*, *Schizophyllum commune*, *Volvareila sp.* were produced for experimental cultivation. Wet preservation of the above varieties was kept as museum specimen for demonstration.

Varieties of Oyster mushroom Cultivation were cultivated at the Technology Demonstration Unit for demonstration purpose. Dry raw paddy straw was cut into pieces and sterilised in boiling water and then air dried. About 250 gm of spawn was inoculated into 1 kg of air dried paddy straw which is almost equivalent to 3.5 kg wet weight. Polybags of size 18" x 12" were used for holding the substrate. Regular watering was done at least 2-3 times a day or as per requirements. After 12 – 15 days pinhead fruiting bodies developed on the outer layer of the substrate. Within 6 – 7 days the fruit bodies matured and were ready for harvesting. From a bed, 2 – 3 times were harvested in an interval of 10 days. About 500 – 700 g of mushroom was harvested from a bed of 1 kg. substrate. After this experimental cultivation, a model had been evolved for mass cultivation at the project site at Murei Village, Ukhrul district, Manipur.

Since paddy straw is abundantly available in the state, paddy straw had been selected as a material for the substrate. From the yield, it has been found that paddy straw is a good material for preparation of substrate. Laboratory was constantly producing spawn for free supply to the beneficiaries. About 600 bags of spawn with each bag weighing 550 g were producing every month for supply to the beneficiaries.

Although, there were 62 households, 55 beneficiaries had been selected under the project for mass cultivation of mushroom for consuming by themselves and for income generation. In order to enable the beneficiaries to start cultivation of Oyster mushroom, a training programme regarding cultivation of Oyster mushroom and Button Mushroom was conducted during September 14 – 15, 2004 at the project site for the 55 beneficiaries. Smt S.Mema Devi, Mycologist and Co-PI of the project imparted indepth training to the beneficiaries. The topics include history of mushroom cultivation, edible and non edible mushrooms, nutritional value of edible mushrooms, types of edible mushrooms, diseases and

pests of mushrooms, selection/maintenance of strain and spawning procedures, demonstration of laboratory equipments for mushroom production, specification of the cultivation sheds, demonstration of mushroom cultivation, processing, harvesting, consumption pattern and marketing of mushroom etc. Training on Composting and Cultivation of Oyster Mushroom was also given to some selected beneficiaries of the Murei Village.

Since January 2005, regular cultivation of Oyster mushroom was done by the 55 beneficiaries at their own sheds constructed under the project and was continued upto January 2006. An average income of Rs. 568/- per month had been generated out of the cultivation by each beneficiary.

9) Deviation if any from the project objectives and reasons thereof:

The project was implemented according to the objectives of the project. There was no deviation from the approved objectives of the project.

10) Details of Field Demonstrations laid under the project (Size of plots, crops, beneficiaries and Field photographs):

The existing Solar Passive Technology Building of Manipur Science and Technology Council at Takyelpat, Imphal with a total area of 6000 sq. ft. had been utilised for housing the Technology Demonstration Unit of the Project. The Unit had a well-equipped Spawn Production Laboratory for preparation of spawn and a Cultivation Unit for experimental cultivation. Experimental Cultivation of Oyster Mushroom at Technology Demonstration Unit was done for demonstration purposes.

Training on spawn production and cultivation of Oyster mushroom was imparted to the 55 beneficiaries. A field demonstration cum training programme on Compost preparation and cultivation of button mushroom was also conducted for 5 selected beneficiaries. 55 low cost cultivation sheds of size 10' x 15' were constructed using the locally available raw materials at the plots of the beneficiaries for cultivation of the mushroom.

11) Number of Beneficiaries of the project:

Manipur Development Agency (MDA), which is an NGO located in Murei Village is the Co – implementing Agency of the project. After a detail survey with the members of the MDA, 55 beneficiaries had been selected. The beneficiaries thus selected under the project were given training and allowed to cultivate mushroom of their own with the free supply of spawn and raw materials from the project. The list of beneficiaries with their addresses showing their approximate earning per month is at Annexure – I.

12) Year Wise number of beneficiaries trained through the project:

55 beneficiaries already selected under the project had been given training on Spawn Production and Cultivation of Mushroom. 5 selected beneficiaries from the project site were also given training on compost preparation and cultivation of button mushroom. Since the project was implemented at Murei Village, training was confined to the inhabitants of this village. However, in the interest of the people of this state, MASTEC was planning to extend training to some people in the adjoining areas of the project site; however it could not be taken up as the project period expired.

13) Steps taken to sustain the activities after the DBT funding is over:

The Technology Demonstration Unit at Takyelpat, Imphal will remain as a unit for production of spawn. Mushroom will be cultivated at this Unit throughout the year for the purpose of demonstration. Sustainability of activities will be maintained by producing spawn continuously. Quality spawn will be made available to those individuals interested in taking up mushroom farming. In this way, people who wish to cultivate mushroom for their income generation can cultivate mushroom throughout the year.

14) Summary of the Progress:

Manipur Development Agency (MDA) which is an NGO located at Murei Village was the Co-implementing Agency of the project. The management of the project at the beneficiary's Village was taken care by MDA and activities at this site were carried out under the strict supervision of MDA.

The project was implemented at two sites i.e. 1) Technology Demonstration Unit at the premises of Science and Technology Complex at Takyelpat, Imphal and 2) Murei Village which is located in Ukhru District (a tribal district) about 25 km from Imphal at an altitude of 800 m above msl.

Spawn production and packaging of the products was carried out at the Technology Demonstration Unit at Takyelpat. Experimental cultivation activity and a part of semi processing of mushroom were also taken up at the Technology Demonstration Unit. Mass cultivation activity was carried out at the project site i.e. Murei Village by the 55 beneficiaries. Some of the products were consumed by them and some were sold to the local market for their own income generation.

With the engagement of 2 project staff i.e. one Project Assistant and one Skilled Helper, the project was going on smoothly to achieve the project goals. The existing Solar Passive Technology Building of Manipur Science and Technology Council at Takyelpat, Imphal with a total area of 6000 sq. ft. was utilised as the Technology Demonstration Unit of the Project. The Unit had a well-equipped Spawn Production Laboratory and a Cultivation Unit for experimental cultivation of varieties of Mushroom. The laboratory was equipped with necessary equipments like Autoclave, Laminar Flow, Refrigerator, Water Storage Tank, Chemical balance, Kitchen Balance, Gas connection and adequate glasswares for preparation of spawn.

Several strains of mushroom were collected some from their natural habitat and some from Manipur Tribal Development Corporation, Imphal and other Institutes of Imphal. Those were cultured in PDA media for propagation. The high yielding ones were selected for

further use. A grain type spawn was developed. Mass and regular production of variety of Spawn of Oyster mushroom such as *Pleurotus flabellatus*, *P. eous*, *P. Sapidus*, *P. Ostreatus* (Phillipine), *P. Ostreatus* (PCA) was done continuously at the Technology Demonstration Unit at Takyelpat for free supply to the beneficiaries of the Murie village as well as for experimental cultivation at the Technology Demonstration Unit. Besides the above, button mushroom spawn (*Agaricus bisporous*) and spawn for some local varieties such as *Lentinula edodes*, *Termitomyces sp.*, *Auricularia sp.*, *Schizophyllum commune*, *Volvareila sp.* were produced for experimental cultivation. Wet preservation of the above varieties was kept as museum specimen for demonstration.

Varieties of Oyster mushroom Cultivation were cultivated at the Technology Demonstration Unit for demonstration purpose. Experimental cultivation of *Schizophyllum commune* tried in straw beds at a room temperature of 20°C - 25°C showed growth but the yield was less. A suitable protocol is yet to be established. Regular production of spawn for *Pleurotus flabellatus*, *P. eous*, *P. Sapidus*, *P. Ostreatus* (Phillipine) was made at Technology Demonstration Unit for free supply to the beneficiaries.

The project was implemented in close association with Manipur Development Agency which is located at the project site i.e. Murei Village. The village is not far and is located about 25 km from Imphal. Although, there are 62 households, 55 beneficiaries had been selected in consultation with the co – implementing Agency i.e. MDA. In order to enable the beneficiaries to start cultivation of Oyster mushroom, a training programme for the 55 beneficiaries was conducted during September 14 – 15, 2004 at the project site. Smt S. Mema Devi, Mycologist and Co-PI of the project imparted in-depth training to the beneficiaries. The topics include history of mushroom cultivation, edible and non edible mushrooms, nutritional value of edible mushrooms, types of edible mushrooms, diseases and pests of mushrooms, selection/maintenance of strain and spawning procedures, demonstration of laboratory equipments for mushroom production, specification of the cultivation sheds, demonstration of mushroom cultivation, processing, harvesting, consumption pattern and marketing of mushroom etc. Training on composting and cultivation of button mushroom was also given to 5 selected beneficiaries.

After proper selection of sites at the plots of the beneficiaries, 55 numbers of cultivation sheds of the size 10 ft x 15 ft had been constructed in each of the beneficiary's plot. The sheds were constructed of locally available materials i.e. bamboo and paddy straw. Racks made of Bamboo are housed inside the shed for cultivation of Oyster mushroom. Starting from January 2005, regular cultivation in phase wise manner in Polybags of size 18" x 12" having 1 kg of dry paddy straw substrate were carried out at Murei Village by the beneficiaries and continued upto January 2006.

At the initial stage of cultivation the yield was less. Inspection report showed that there was less moisture content inside the cultivation shed which was caused due to easy evaporation of moisture to the thin straw side walls of the shed. This hampered the spawn running stage which resulted into low yield.

The side walls were renovated up to the desired level to retain enough moisture inside the sheds. As there was enough moisture, the spawn were run properly and the yield of which was good.

Occurrences of Pests were seen in certain stages of the cultivation. Pests infestation took place mainly during the spawn running period, pin head stage and cropping stage. Major pests found were rats and flies. Traps were used by the villagers to avoid rat infestation. Application of insecticides and pesticides were not encouraged since these chemicals may affect the consumer's health. Up to certain level, the infestation of pest was controlled. Infestation of flies was mainly due to unhygienic mode of cultivation by the beneficiaries. Regular cleaning of the shed and spraying of the floor with accurate doses of bleaching powder was adopted by the beneficiaries to reduce infestation of flies. Infestation of flies was checked up to certain extend but the yield was not up to the desirable quantity.

Each beneficiary at Murei Village could produce 148 kg (average) of oyster mushroom out of the cultivation during the entire project period with the free supply of spawn. An average monthly income of Rs.568/- per month could be generated out of the cultivation by each of the beneficiary. With the help of MDA, marketing of the products was done by the beneficiaries themselves in the local market. However, marketing of fresh

mushroom in the local market was a problem because the villagers preferred the local varieties such as *Lentinula edodes*, *Schizophyllum commune*, *Auricularia sp.* etc.

Even though, the Demand Draft for the 1st instalment was received on February 17, 2004, the actual commencement of the project was made on May 2004. On expiry of the project period, the project was completed on 31.03.2006.

We wished to extend training programme to other parts of the state to sensitise/train people about the cultivation technique of varieties of Mushrooms. For this, extension programme, we had sought extension of the project period for duration of 6 months without additional cost; however, it was not considered.

Date:

Place: Imphal

Signature of the
Principal Investigator

Annexure - I

List of beneficiaries with their monthly income (appx.) generated out of cultivation in 13 months.

SL.No	Name	Crops cultivated	No. of Beds Cultivated (each bed = 1 kg. dry substrate)	Total production in Kg.	Monthly Income in Rs. (@Rs.50/-per kg.)
1	Mrs Chilangla Muivah	1,3,4,5	130	156	600
2	Mrs Ningreiwon Muivah	1,2,3,4,5	145	141	541
3	Mrs Ningwonla Muivah	1,3,4,5	125	156	601
4	Mrs Prety Muivah	3,4,5	200	200	769
5	Mrs. Leishiwon Muivah	1,3,4,5	135	142	545
6	Mrs. Kumtharla Muivah	1,2,3,4	120	180	692
7	Miss Pempemmi Muivah	2,3,4,5	200	178	685
8	Miss Somichon Muivah	1,4,5	105	141	541
9	Miss Areiwon Muivah	2,,3,4,5	170	213	817
10	Miss Lamchuila Muivah	1,3,5	140	182	700
11	Miss Vallyrose II	1,4,5	150	114	438
12	Miss Joyrimoon Muivah	1,2,4,	180	202	775
13	Mrs. Luishomla Muivah	1,3,4	170	162	621
14	Mrs. Pamthingla II	1,2,4,5	160	155	597
15	Miss Tharngachan Muivah	1,2,3,4	135	154	592
16	Mrs.Kanmila Ningsheng	1,2,4,5	147	151	582
17	,, Nichangwon Khamrang	3,5	154	172	663
18	,, Tammila Khamrang	2,3,4	167	134	514
19	,, Yangmila Muivah	1,3,4	185	179	690
20	,, Tharawon Jajo	2,4,5	167	144	552
21	,, Pamthingla Muivah	3,4,5	125	200	769
22	,, Luirengla ,,	2,3,4,5	105	126	485
23	,, Tharawon Muivah II	1,2,4,5	168	150	575
24	,, Leyah Muivah	1,2,3,4	145	97	374
25	,, Tampakwon Muivah	3,4,5	136	82	314
26	Miss Khathingla Muivah	2,4,5	129	206	794
27	Mrs. Ninghorla Muivah	2,3,4,5	142	148	568
28	Mrs. Tammila Muivah	1,3,4,5	140	143	549
29	Mrs. Rita Muivah	2,3,4,5	154	129	498
30	Mrs. Alice Ningsheng	2,4,5	170	160	615

Annexure – I (Contd....)

31	Mrs. Rangamla ,,	1,4,5	135	140	540
32	Mrs. TharaWon Muivah III	1,3,4,5	135	88	338
33	Mrs. Babyanah Muivah	1,3,4,5	135	140	540
34	Mrs. Ngasairei Muivah	1,3,4,5	135	68	260
35	Mrs. K S Reimichon	1,3,4,5	165	170	654
36	Mrs. K S Philashing	2,4,5	160	179	689
37	Mrs. Vallyrose Muivah I	2,3,4,5	145	126	485
38	Mrs. Rani Muivah	3,4,5	155	175	674
39	Mrs. Reginah Muivah	1,4,5	124	174	668
40	Mrs Leishimi keishing	1,4,5	125	123	471
41	Mrs. Chansaph y keishing	2,4,5	120	168	646
42	Miss Sinaton keishing	3,4,5	120	86	332
43	Mrs. Jenah Ningsheng	1,2,4,5	120	168	646
44	Mrs. Thotreiwon Ningsheng	1,4,5	136	118	455
45	Mrs. B.K Ramngamla	1,4,5	135	176	675
46	Mrs. Leishimi Muivah	3,4,5	157	162	622
47	Mrs. Maitonphy Zingkhai	2,4,5	128	111	428
48	Mrs. Halinah Keishing	3,4,5	136	126	486
49	Mrs. BK Somila	1,2,3,4	150	170	652
50	Mrs. Racy Zimik	1,3,4	155	138	531
51	Mrs. Nanrei Jajo	2,3,4	150	131	502
52	Mrs. Philayo Jajo	1,2,3,4	150	165	635
53	Mrs. Dinah Jajo	1,3,4	160	93	357
54	Mrs. Somila Muivah	1, 2, 3,4	160	131	505
55	Mrs. Mayowon Muivah	1,3,4,5	125	100	385

Crops:

Pleurotus flabellatus – 1

P. eous -2

P.Sapidus – 3

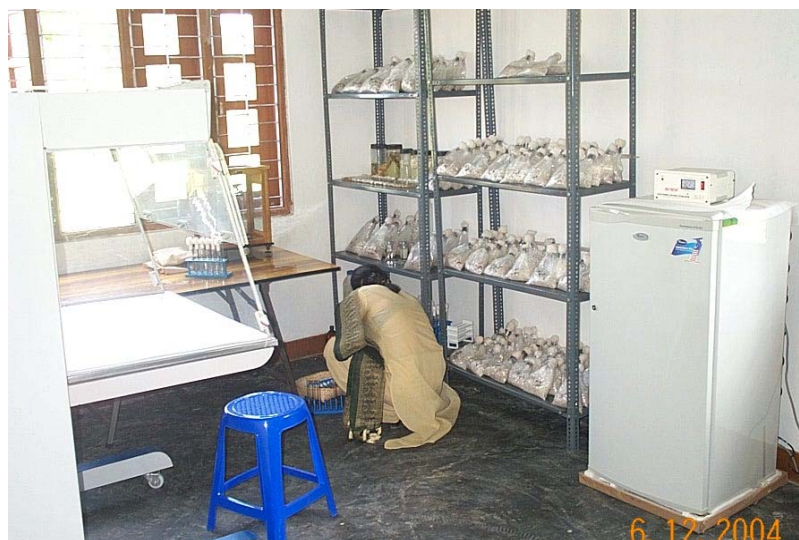
P.Ostreatus (Phillipine) - 4

P.Ostreatus (PCA) -5

No. of beds cultivated during the project period ranges from 105 – 200 beds with an average of 146 beds per beneficiary. The average production by each beneficiary is 148 kg reflecting a monthly income of Rs.568/-.



Technology Demonstration Unit(TDU) at Takyelpat, Imphal



Production of spawn at the Laboratory at TDU



Cultivation of Oyster Mushroom at the Technology Demonstration Unit



Survey at Murei Village for selection of beneficiaries



Training Programme on Spawn production and cultivation of mushroom



Spawning during the training programme



Distribution of Seed money for construction of Cultivation sheds



Distribution of spawn to the beneficiaries



Cultivation at Murei Village by the beneficiary



Cultivation at Murei Village by the beneficiary



Cultivation at Murei Village by the beneficiary



Inspection by officials at one of the cultivation shed.



A cultivation shed at Murei Village