



वार्षिक प्रतिवेदन ANNUAL REPORT 2012-13

अखिल भारतीय समन्वयित खुम्ब
अनुसंधान परियोजना

All India Coordinated Research Project
on Mushroom

खुम्ब अनुसंधान निदेशालय
Directorate of Mushroom Research



(भारतीय कृषि अनुसंधान परिषद)
(Indian Council of Agricultural Research)
चम्बाघाट, सोलन-173 213 (हि.प्र.), भारत
Chambaghat, Solan-173 213 (H.P.), India



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ANNUAL REPORT 2012-13
All India Co-ordinated Research Project on Mushroom
Directorate of Mushroom Research
Solan - 173 213, India

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Cover Page : **Top to bottom**
Brown Button mushroom crop at Nauni
White button mushroom crop at Murthal
Paddy straw mushroom crop at Ludhiana
Macrocybe mushroom crop at Bhubaneshwar
Oyster mushroom crop at Samastipur
Shiitake mushroom crop at Udaipur
Oyster mushroom crop at Raipur

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Preface

India has achieved food security by producing over 257 million tonnes of food grains per annum. To feed the ever-increasing population of the country and for gainful employment/livelihood agriculture will continue to be the main strength of Indian economy. However, our struggle for nutritional security is still on. During coming decades, the increasing population, depleting agricultural land, environmental issues, water shortage and need for quality food are going to be the vital issues. To meet these challenges, to mitigate poverty and to provide nutritional security to our people, it is important to diversify the agricultural activities in areas like horticulture. Mushrooms are one such component that not only uses vertical space but also addresses above issues. Trade in Mushrooms has gained importance in recent years for two main reasons, namely; (i) the global shift towards vegetarian food, and (ii) recognition of mushroom as a functional food. Mushroom cultivation offers an added advantage to recycle agro-waste as carbon pool in to good quality protein, much of which otherwise is burnt in the field. Though Chinese were the first to do the artificial cultivation of the tropical and subtropical mushrooms about thousand years ago but the real commercial ventures started when Europeans started cultivation of button mushroom in caves during mid 16th century. High demand for mushrooms in Europe and America makes them an important horticultural crop and foreign-exchange earner. Indian mushroom industry is of recent origin and started in late 1960s with cultivation of button mushroom but at present number of other mushroom species has been brought under cultivation in the country.

Our country has varied agro-climate, massive biodiversity, colossal amount of agricultural wastes and cheap labour. India produces around 700 million tonnes agricultural residues, which can profitably be utilized for mushroom cultivation. Currently, we are using only 0.03% of these residues for producing around 1.2 lakh tons of mushrooms. India contributes less than 1% of the total world mushroom production. Even if we use 2% of the total residues for mushroom production, we can produce around 6.0 million tonnes of fresh mushrooms, which will be almost equal to current global button mushroom production (current world mushroom production as per FAO Stat. is 6.54 million tons and mushroom as per FAO Stat. code 0449 is *Boletus*, *Agaricus*, *Morchella* and *Tuber*).

To promote mushroom cultivation and multilocation testing the varieties and technologies, All India Coordinated Research Project on Mushroom (AICRPM) came into existence during VI Five-Year Plan on 01.04.1983 with its Headquarters at Directorate of Mushroom Research, Solan (HP). The Director, DMR, Solan (HP) also functions as the Project Coordinator of the project. Initially the AICRP on Mushroom started with six Centres viz., PAU, Ludhiana; GBPUA&T; Pantnagar; CSAUA&T, Kanpur; BCKVV, Kalyani; TNAU, Coimbatore and MPAU, Pune. During VII Plan, two existing Centres at Kanpur (UP) and Kalyani (West Bengal) were dropped and IGKV, Raipur was added as new centre. Three new Centres during VIII Five Year Plan while 3 Coordinating and one cooperating Centres during IX Five Year Plan were added by dropping one at Goa. Four Coordinating and one Cooperating Centres were added during XI Plan. These were: OUAT, Bhubaneswar; HAU, Hisar; RAU, Samastipur; CAU, Pasighat (coordinating centres); and HAIC, Murthal (Cooperating Centre). Presently, 14 Coordinating and two Cooperating Centres are part of AICRPM programme.

All the Coordinating Centres work for a common mandate of germplasm collection of native edible flora, multilocation testing of the varieties and technologies, trainings and supply of spawn to the growers. The technical programme for conducting participatory research during 2012-13 was finalized in the annual workshop organized at OUAT, Bhubaneswar on 31 May – 1 June 2012.

During the year under report, attempts were made to collect edible mushrooms in different parts of the country, evaluate promising varieties/ strains of white button mushroom, paddy straw mushroom, milky mushroom, oyster mushroom, etc. and evaluate locally available agro-industrial wastes as casing materials for button mushroom and standardize cultivation technology of specialty mushrooms, which are needed to diversify the mushroom cultivation scenario in the country.

During the year 2012-13, three strain evaluation trials of white button mushroom were: (i) Advance varietal trial on newly developed white strains, (ii) Advance varietal trial on newly developed brown strains, and (iii) Initial varietal trial for newly developed white strains. In the pooled data of first AVT experiment over 6 locations AVT-2 and AVT-4 performed well. The overall average showed the maximum fruit body weight in the strains AVT-2 and AVT-5 indicating good quality fruit body in all the climatic conditions. In another set of experiment on evaluation of *A. bisporus* strain (AVT for brown strains) maximum yield of 21.45 kg /100 kg of compost was recorded in the strain AVT-10 followed by strain AVT-9. The average fruit body weight was the maximum in strain AVT-8 followed by AVT-10. 15 newly developed button mushroom strain were also evaluated under initial varital trial for their yield potential and climatic adaptability. Amongst all maximum yield of 21.70 kg /100 kg of compost was recorded in the SSI-6 closely followed by SSI-4 at the Pantnagar centre. The maximum fruit body weight of 17.1 g was recorded in SSI-6. Amongst three strains of *Volvariella volvacea* tested, the maximum biological efficiency of 17.49 kg/100 kg of dry substrate was recorded in strain Vv-11. Amongst six high yielding strains of *Pleurotus* spp., the maximum yield of 122.6 kg /100 kg of dry substrate was obtained in strain Pl-12-05 followed by strain Pl-12-02 (122.5 kg). A total of five high yielding strains of *Lentinula edodes* were under evaluation trial. The maximum yield of 103.4 kg /100 kg of dry substrate was obtained in strain OE-388 followed by OE-16 with a yield of 31.7 kg. The experiment on total indoor composting was assigned to four different centres where tunnel facility was available. However, only two centres have reported the successful results. At Ludhiana centre as well as the Solan centre significant yield increase was recorded.

The results of various experiments exhibited a vast scope of commercialization of mushroom farming as secondary agriculture. Depending upon the climatic conditions and availability of raw materials, the mushroom varieties and raw materials can be identified to promote mushroom cultivation in a particular region.



(Manjit Singh)

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SUMMARY

All India Coordinated Research Project on Mushroom functions in a coordinated manner in association with fourteen coordinating and two cooperating centres located in different agro climatic zones of India to test and validate the technologies or to identify varieties, developed at Directorate of Mushroom Research, Solan and other centres in various regions of India to promote climate-wise mushroom cultivation in India so as to reduce the cost of cultivation. During the year under report (2012-13), the research trials were conducted at all the sixteen centres based on technical programme finalized during the annual group meeting of AICRPM workers held on 31st May – 1st June, 2012 at OUAT, Bhubaneshwar.

During the year 2012-13, six experiments were conducted on strainal evaluation of four different mushrooms i.e. white button mushroom (*Agaricus bisporus*), oyster mushroom (*Pleurotus* spp.), paddy straw mushroom (*Volvariella volvacea*) and shiitake mushroom (*Lentinula edodes*) at various centres. Strain evaluation trials of white button mushroom was given three experiments, (i) Advance varietal trial on newly developed white strains, (ii) Advance varietal trial on newly developed brown strains, and (iii) Initial varietal trial for newly developed white strains. In the first experiment of AVT, the maximum yield of 23.3 kg per 100 kg of compost was recorded in the strain AVT-4 at Pantnagar Centre followed by strain AVT-5 at the headquarter. The strain AVT-2 and AVT-3 also performed very well at Pantnagar centre with a yield of 19.21 and 19.10 kg per 100 kg compost. Overall best average productivity was recorded in AVT-2 with 15.26 kg followed by AVT-4 with 14.31 kg per 100 kg compost. The time taken in first harvest (days post casing) was in the range of 18 to 24 days. The lowest first harvest time (18 days) was recorded at headquarter in AVT-4 strain followed by 19 days in AVT-1 at Pune centre and AVT-5 at Ludhiana Centre. Overall the lowest first harvest time was recorded in AVT-5 and AVT-5. Average fruit body weight also varied at different centres and was recorded maximum (17.5 g) at Pune centre in the strain AVT-1 and AVT-5 (14/8 g) at Ludhiana centre (Table 4.5). At headquarters the average fruit body weight ranged between 11-13 g in almost all the strains. The overall maximum fruit body weight was recorded in AVT-5 and AVT-2.

In another set of experiment on evaluation of brown strains of *A. bisporus* using short method of compost, maximum yield of 21.45 kg /100 kg of compost was recorded in the strain AVT-10 at Pantnagar centre followed by strain AVT-9 at the same centre (20.98 kg). The minimum yield of 5.66kg/100 kg compost was recorded in strain AVT-9 at Ludhiana centre. Overall average of all the strains at all the centres showed that AVT-8 closely followed by AVT-9 and AVT-7 with an average yield of 14.6, 13.5 and 13.4 kg were the performing strain in all the conditions. The lowest time taken for first harvest was 18 days post casing in strain AVT-8 at Pune Centre. The strains in the trial have shown first harvest period of 20 days in different strains at different centres. The maximum time taken for first harvest was 26 days in strain AVT-9 at Solan centre. The overall average of all the centres showed the minimum time taken for first harvest was 20 days in strain AVT-7 while maximum time of 23 days was recorded in strain AVT-9. The average fruit body weight ranged from 9.03 to 18.3 g with maximum in strain AVT-7 at Pune centre followed by AVT-8 at the same centre.

Another experiment was conducted with 15 newly developed button mushroom strain for assessing their yield potential and climatic adaptability through multilocal trials. Evaluation of selected accessions of white strains using short method of compost, maximum yield of 21.7 kg /100 kg of compost was recorded in the SSI-6/12 at Pantnagar centre closely followed by the strain SSI-4/12 at the same centre (19.13 kg). The strain

SSI-4/12 yielded at par with SSI-6/12 at DMR, Solan centre with a yield of 18.97 kg/100 kg compost. The minimum yield of 2.37 kg/100 kg compost was recorded in SSI-13/12 at Murthal centre. Overall average of all the strains at all the centres showed that all the selections have performed well over the control with maximum yield of 17.02 kg in SSI-4/12. The accessions were also assessed for their first harvest time and average fruit body weight for the assessment of quality of the fruit body. All the strains showed first harvest time in the range of 20-24 days at all the centres. The quality parameters of all the strains were also evaluated in terms of average fruitbody weight. Amongst the test strains the maximum fruit body weight of 17.1 g was recorded in SSI-6/12 at DMR, Solan followed by SSI-9/12 (15.1 g) at Ludhiana centre.

A total of five strains of *Volvariella volvacea* were tested at five different locations. The trial was assigned at six centres and a total of five strains of *Volvariella volvacea* were tested. The biological efficiency of various strains varied in the range of 4.05 to 17.49 kg /100 kg of dry substrate at various centres in different strains. The maximum biological efficiency of 17.49 kg/100 kg of dry substrate was recorded in strain Vv-11 at Bhubaneswar centre followed by 17.1 kg in the same strain at the Coimbatore centre. It was also recorded that the maximum biological efficiency for all the test strain was achieved at the Coimbatore and Bhubaneswar centre. The minimum biological efficiency at Raipur centre was recorded in Vv-09 with an average yield of 4.02 kg /100 kg of dry substrate.

The minimum time taken for the first harvest was 8 days in strain Vv-11 at Ludhiana centre and 10 days in strain Vv-10 at the same centre. The average fruit body weight varied at different centres with a maximum of 21.6 g at Coimbatore centre in the strain Vv-11 while the minimum fruit body weight was recorded to be 6.28 g at Ludhiana centre in the strain Vv-09. All the strains have recorded the maximum fruit body weight at Coimbatore centre followed by Bhubaneswar centre.

This trial was conducted at 12 different centres. A total of six high yielding strains of *Pleurotus* species were under evaluation trial. The maximum yield of 122.6 kg /100 kg of dry substrate was obtained in strain Pl-12-05 at Udaipur Centre followed by strain Pl-12-02 (122.5) at the same centre. All the strains performed very well at Udaipur centre with high biological efficiency. At Raipur centres the best performer strain was Pl-12-01 with an yield of 99.83 kg per 100 kg dry substrate. Rest all the strains performed at par with very good biological efficiency. Strain P-12-01 performed well at Raipur, Coimbatore, Bhubaneswar, Pusa, Udaipur and Pune centres. All. Cumulative average of the yield showed that all the strains have performed well on all the centres.

The minimum time of 15 days for first harvest of the crop was recorded in strain Pl-12-06 closely followed by Pl-12-05 at the same centre. The maximum time taken was 41 days in strain Pl-11-05 at Raipur and Udaipur centre in Pl-12-03 and Pl-12-04 strains. Average fruit body weight of all the strains at different centre ranged between 3.61 to 27 g. The maximum fruit body weight of 27 g was recorded in Pl-12-01 strain at Pantnagar centre while the minimum of 3.61 g was recorded in Pl-12-05 strain at Raipur centre.

A total of five high yielding strains of *Lentinula edodes* were under evaluation trial. At Udaipur and Pantnagar centres, the experiment was conducted on Sawdust and Wheat straw both supplemented with 20% wheat bran while at Coimbatore centre, the experiment was conducted on wheat straw and saw dust supplemented with 20% wheat bran. Maximum yields were obtained at Pantnagar centre with an yield of 137.34 kg per 100 kg dry substrate in strain OE-388. At Coimbatore centre, the maximum yield of 31.7 kg per 100 kg dry substrate was obtained in strain OE-16 with Paddy straw and saw dust. The minimum yield was

obtained in strain OE-28 and OE-22 at Udaipur centre with a yield of 7.40 and 7.82 kg per 100 kg dry substrate. Average fruit body weight of all the strains at different centre ranged from 13.83 to 41.61 g. The maximum fruit body weight of 41.61 g was recorded in OE-28 strain at Pantnagar centre while the minimum of 13.83 g was recorded in strain OE-28 at Udaipur centre.

The second experiment on total indoor composting was assigned to four different centres where tunnel facility was available. The trial was assigned to five different centres i.e. Murthal, Ludhiana, Pune, and Solan. A new method of compost preparation inside the tunnel was developed at DMR, Solan, which do not cause any air pollution neither causes any noxious gas emission. The technology as such was put for multilocation trials alongwith traditional short method technology as check. Out of five centres Murthal centre could not do it as the cultures of thermophiles did not multiplied. Out of four centres at Murthal and Pune, experiment was not successful due to incidence of yellow mould and non-availability of tunnel, respectively. However, at Ludhiana centre increase of yield was recorded. Nevertheless, at all the centres the crop could be grown satisfactorily without emission of foul gases. At DMR, Solan also very good yields could be recorded with slight modification of the technique. Overall average yield showed 16.9 kg /100 kg compost in indoor composting technology.

The trial on *Macrocybe* cultivation technology was assigned to seven different centres i.e. Murthal, Pantnagar, Coimbatore, Udaipur, Pune, Bhubaneshwar, Raipur and Vellayani centres. The mushroom *Macrocybe giganteum* is a new entry in the list of cultivated mushroom portfolio of the country and resembles very much to button mushroom. This mushroom requires a higher temperature of 28-35°C. The experiment is under progress at this time and results are awaited by the end of June 2013. The results of the experiment will be included in the next year's annual report. Only two centres could partially complete the experiment i.e. Vellayani and Bhubaneshwar. At Vellayani MA-1 strain could not fruit while at Bhubaneshwar only MA-1 strain gave fruiting. Good yield could be obtained at both the two centres.

Different Centres have reported the collection of 393 specimens of wild mushrooms during the year and about 53 collections have been deposited at the DMR Gene Bank with passport data. During the last workshop of AICRPM, it has been decided that different mushrooms collected and consumed locally by the people of different regions will be collected and we should take advantage of the ITK available on mushrooms and utilize this germplasm instead of going for random collection of wild germplasm. In this regard it was decided that the Centres will survey the local markets for collecting the germplasm in addition to forest forays, collect the data, make cultures and deposit these with DMR along with their photographs, dried samples and passport data.

All the Centres carried out the extension activities by participating in State/National level Exhibition, Melas, Kisan Goshthies, mass communication through AIR/TV programmes, replying to letters, telephones, emails and on the spot guidance during farm visits. Almost all the Centres have conducted trainings for different durations for farmers, farmwomens, unemployed youths and entrepreneurs of their areas. The Centres have also supplied the spawn and pure culture to promote the mushroom cultivation practice in their respective areas.

1. INTRODUCTION

With a view to test and disseminate the technology developed at Directorate of Mushroom Research and its Centres in different agro-climatic regions of the country and popularize mushrooms as secondary agriculture along with the existing farming system, the All India Coordinated Research Project on Mushroom (AICRPM) was launched during VI Five-Year Plan on 01.04.1983 with its Headquarters at Directorate of Mushroom Research, Solan (HP). The Director of DMR, Solan (HP) also functions as the Project Co-ordinator of the project.

Initially, the All India Coordinated Mushroom Improvement Project started with six Centres. At present, 14 Coordinating and two co-operating Centres are working under AICRPM. These are:

ICAR Institute based

- ICAR Research Complex for NEH Region, Barapani (Meghalaya)
- ICAR Research Complex for Eastern Region Research Centre, Ranchi (Jharkhand)

State Agricultural Universities based

- Punjab Agricultural University, Ludhiana (Punjab)
- Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)
- G.B. Pant University of Agriculture and Technology, Pantnagar (Uttarakhand)
- CoA, Mahatma Phule Agricultural University, Pune (Maharashtra)
- N.D. University of Agriculture and Technology, Faizabad (UP)
- Indira Gandhi Krishi Vishwa Vidyalaya, Raipur (Chhattisgarh)
- Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan)
- CoA, Kerala Agricultural University, Vellayani (Kerala)
- C.C.S. Haryana Agricultural University, Hisar (Haryana)
- Orissa University of Agriculture and Technology, Bhubaneswar (Orissa)
- Rajendra Agricultural University, Samastipur, Pusa (Bihar)
- College of Horticulture and Forestry, Central Agricultural University, Pasighat (Arunachal Pradesh)

Co-operating Centres

- Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan (HP).
- Haryana Agro-Industrial Corporation Research and Development Centre, Murthal (Haryana)

The last Group meeting of workers of AICRPM was held on 31st May and 1st June 2012 at Orissa University of Agriculture and Technology, Bhubaneswar. During the meeting the progress of last year was monitored and technical programme for 2012-13 was finalized.

2. MANDATE AND OBJECTIVES



Geographical location of different Centres of AICRP on Mushroom

The mandate of AICRP (Mushroom) is to coordinate and monitor multilocation trials with improved mushroom varieties / hybrids, cultivation practices related to crop production, crop protection measures and post harvest technology, all aimed at increasing production, productivity and utilization of mushroom in the country. Major activities under the project are:

1. To conduct survey of naturally occurring wild mushrooms, catalogue the edible/ medicinal species and explore possibilities of cultivation of promising species.
2. To evaluate the promising and high yielding strains for regional adaptability.
3. To carry multi-location trial for finalization of standard production techniques for different mushrooms.
4. To explore possibility of selection of cheaper locally available substrates for mushroom cultivation.
5. To supply good quality spawn to the mushroom growers.
6. Popularization of mushroom cultivation in different agro-eco-regions.

3. TECHNICAL PROGRAMME OF WORK FOR 2012-13

I. CROP IMPROVEMENT

Expt. 01: Collection, identification and conservation of wild edible mushrooms

- a) Participating centres All
- b) Data to be recorded
- Rainfall and temperature data coinciding with the appearance/arrival of wild edible mushrooms in local markets.
 - ITK, exact location of collection, method of consumption and other uses along with photographs/video of the natural habitat/market and soil sample of the location.
 - Do not include the accessions in annual report for which DMR accession numbers are not allotted.
 - Send information of market, ITKs, method of consumption, any other uses etc.
 - Supply sun dried fruit bodies/spore prints along with cultures.
 - Supply GPS data of the region from where mushroom was collected
 - Fill the enclosed proforma as much as possible. Please send the above information within two-three weeks of collection.
 - Do not send the cultures without adequate supplementary information
 - **Please ensure that the culture should not be exposed to >35°C temperature during transit. If need be, any staff may be sent along with the culture and other information.**
- c) Area of operation • Each Centre may select five districts inhabiting variable mushroom flora
- d) Proforma for market data on mushroom collected

Sl. No.	Informations to be recorded	Observation/data
1.	Name/market/District	
2.	Date of collection	
3.	Sale price (Rs./kg)	
4.	Mode of consumption (fresh/dried/both/raw/cooked as vegetable/with rice etc.)	
5.	Any association with tree(s)/soil type etc.	
6.	ITK if any	
7.	Temperature range during the collection period (15-20, 20-25, 25-30, 30-35°C)	

* Report to be sent by the end of December and for the accessions collected between Jan to March, report to be sent by 15th April.

Proforma for mushroom identification (AICRP-Mushroom)

Collected ByLocal Name of Mushroom.....

Date of collection	Specimen No.		Culture No.	Locality and GPS Data	
Habitat Dung Leaf litter Lignicolous	Smell	Taste	Vegetation community		Spore Print colour

A. PILEUS

Diameter	Colour	Shape	Margin
Surface on touch (Sticky/non sticky)	Hygrophanous/non hygrophanous		Scales

B. STIPE

Attachment Central Lateral Excentric	Colour	Stipe size & length	Stipe shape	Stipe base
--	---------------	--------------------------------	--------------------	-------------------

C. RING

D. VEIL

E. VOLVA

F. BASAL ASSOCIATION

--	--	--	--

G. LAMELLAE

Gill attachment (free, adnate, adnexed, decurrent)	Gill colour	Gill edges
Edible / non edible/medicinal		

Any other information

Note: Good photographs showing pileus, stipe, lamellae, ring, volva & base of stipe.

Expt. 02: Advanced varietal trial-1 for selected white accessions of *Agaricus bisporus*

- | | |
|---|---|
| a) Participating centres | Pantnagar, Murthal, Nauni, Pune, Solan |
| b) Substrate | <ul style="list-style-type: none"> • Substrate quantity- 10 kg compost/bag • No. of replications- 4 replications each with 10 bags of 10 kg compost/replicate for each strain in RBD. |
| c) Strains to be evaluated | <ul style="list-style-type: none"> • Short method compost (SSI-01, SSI-02, SSI-03, SSI-04, SSI-05) |
| d) Methodology to be adopted | <p>Short Method</p> <ul style="list-style-type: none"> • Preparation of compost by short method in 2 phases (phase-I and phase-II) by following standard procedure (-6, -4/0, 2,4,6,8 (fill)/phase-II (6-7 days). Compost will be ready in 18 days. • Ingredients to be used are wheat straw - 1000 kg, poultry manure-500 kg, urea-15 kg, wheat bran-70 kg, gypsum-40 kg. • Data for compost N, colour, pH, moisture, ammonia, bulk density (kg per m³) may be reported for each trial |
| e) Spawning rate to be used | 0.7% of wet compost |
| f) Data to be recorded during 4 weeks cropping | <ul style="list-style-type: none"> • The yield data should be recorded in tabulated form replication wise. • The replicates should be randomized in cropping rooms in different tiers in RBD. Lay out enclosed. • Watering should be restricted to wetting of casing material. • Casing material: FYM + SMS (2:1, v/v) both two years old (pH to be adjusted in the range of 7.2-7.5 with CaCO₃). • The casing material should be water leached for 8 hours before treatment with steam/chemicals. Uniform layer of casing to be applied on mycelia impregnated compost, with use of 4cm wide metal rings (4cm thick). • Harvest mushrooms in button form, removing the soiled stem end with knife before weighing. Do not discard the weight of open mushrooms, but the number of mushrooms opened in each harvest should be recorded to determine the quality of the fruit body produced by a particular strain. • Average fruiting body weight to be recorded in each treatment (Total weight of mushrooms harvested divided by No. of mushrooms harvested) to determine the quality of mushrooms produced and ultimately the dry weight of the mushroom. • Every effort should be made to strictly adhere to the above instructions for this experiment. This will facilitate generation of uniform data for assessment and final recommendation. • A transverse section of fruit body may be cut and may be rated on a hedonic scale of 1-5 (1 for poor and 5 for excellent). The rating may be done on the basis of gill size, pileus length, stipe thickness, firmness of fruit body etc. Photographs of TS of each strain must be supplied. |
| g) Environmental conditions to be maintained inside cropping room | <ul style="list-style-type: none"> • Spawn run: Bed Temp-24±1⁰C, RH-90-95%, CO₂>10,000 ppm. • Case run: Bed Temp-24±1⁰C, RH-90-95%, CO₂- >10,000 ppm. • Cropping: Bed Temp 16-18⁰C, RH 80-85%, CO₂<1000ppm |
| h) Bag size | 20"x24" (polythene - 150 gauge) |

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. Shwet Kamal.

Expt. 03: Advance varietal trail-2 for selected brown accessions of *Agaricus bisporus*

- | | |
|---|--|
| a) Participating centres | Pantnagar, Murthal, Nauni, Pune, Solan |
| b) Substrate | <ul style="list-style-type: none">• Substrate quantity- 10 kg compost/bag• No. of replications- 4 replications each with 10 bags of 10 kg compost/replicate for each strain in RBD. |
| c) Strains to be evaluated | <ul style="list-style-type: none">• Short method compost (SSI-06, SSI-07, SSI-08, SSI-09, SSI-10) |
| d) Methodology to be adopted | <ul style="list-style-type: none">• As given in expt – 02 |
| e) Spawning rate to be used | 0.7% of wet compost |
| f) Data to be recorded during 4 weeks cropping | <ul style="list-style-type: none">• As given in expt – 02 |
| g) Environmental conditions to be maintained inside cropping room | <ul style="list-style-type: none">• As in expt- 02 |
| h) Bag size | 20"x24" (polythene - 150 gauge) |

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. Shwet Kamal.

Expt. 04: Initial varietal trail for selected white accessions of *Agaricus bisporus*

- | | |
|---|---|
| a) Participating centres | Pantnagar, Murthal, Nauni, Pune, Solan |
| b) Substrate | <ul style="list-style-type: none">• Substrate quantity- 10 kg compost/bag• No. of replications- 3 replications each with 4 bags of 10 kg compost/replicate for each strain in RBD. |
| c) Strains to be evaluated | <ul style="list-style-type: none">• Short method compost 15 strains |
| d) Methodology to be adopted | <ul style="list-style-type: none">• As given in expt – 02 |
| e) Spawning rate to be used | 0.7% of wet compost |
| f) Data to be recorded during 4 weeks cropping | <ul style="list-style-type: none">• As given in expt – 02 |
| g) Environmental conditions to be maintained inside cropping room | <ul style="list-style-type: none">• As in expt- 02 |
| h) Bag size | 20"x24" (polythene - 150 gauge) |

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. Shwet Kamal.

Expt. 05: Advance varietal trial for strains of Paddy Straw Mushroom, *Volvariella volvacea*

- a) Participating centres Raipur, Coimbatore, Bhubaneswar, Ranchi, Ludhiana, Faizabad
- b) Substrate 1.5% CaCO_3 mixed water soaked for 12-14 hours paddy straw bundles (45 cm × 15 cm)
- c) Method Bundle method (5 bundles × 4 layers + 2 bundles opened at the top) with plastic sheet covering for whole cropping period (tight during spawn run and loosely during cropping) with intermittent water spray on mushroom beds
- d) Strains Three strains of *Volvariella volvacea*
- e) Replication 8 replications each with 6 beds for each strain
- f) Data to be recorded
- Substrate moisture
 - Substrate temperature during spawn run, pinning and cropping
 - Relative humidity during cropping
 - Time taken for mycelial colonization of the substrate
 - Time taken for first harvest (days post-spawning)
 - Mushroom yield weekly (kg/100 kg dry substrate) for 2 weeks cropping period
 - Average fruiting body weight
 - Incidence of diseases/insect-pests, if any
 - Fruiting body quality of unopened mushroom (length, breadth, shape, colour and dry weight)
 - Enclosure of Anova with data sheet

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com; ahlawat22op@gmail.com. Reporting of the experiments and results to be done to and cultures may also be obtained from Dr. O P Ahlawat.

Expt. 06: Evaluation of high yielding varieties/strains of Oyster Mushroom (*Pleurotus* spp)

- a) Participating centres Pune, Raipur, Pusa, Faizabad, Pasighat, Pantnagar, Vellayani, Coimbatore, Bhubaneswar, Udaipur, Hisar, Ranchi
- b) Substrate
- Wheat straw or paddy straw
 - Substrate treatment: Chemical pasteurization (7.5 g Bavistin and 125 ml Formalin in 100 lt water)
 - pH to be adjusted to 7.50 with CaCO_3
 - Substrate quantity: 1 kg dry wt. (with 70 % moisture)/bag
 - No of replications: 5 replication each with 6 bags and all bags of one replication to be placed in one tier (RBD)
- c) Containers Polybag (45x30cm)
- d) Season for laying trials
1. Temp range - $\leq 20^\circ\text{C}$
 2. Temp range - $\geq 30^\circ\text{C}$
- e) Spawn rate 500g spawn for 5 kg dry substrate
- f) Varieties Six strains of *Pleurotus* (Coded as PL-11-01 to PL-11-06) will be provided by the Project Coordinator

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- g) Data to be recorded
- Days taken for spawn run.
 - Days taken for pinhead formation.
 - Yield data (number and weight up to 4 weeks).
 - Time taken for I, II and III flush
 - Data of maximum and minimum temp and dry and wet bulb thermometer readings of the morning 10.00AM must be supplied with yield data. Results will not be considered without this data.
 - Fruit body observations of individual hybrid strain
 - Pileus size, colour, stipe length, stipe thickness, organoleptic tests - liking of the consumers and coloured photograph of each strain.
 - The data on pileus and stipe size/thickness are to be recorded for at least 10 fruit bodies
 - Pest and disease incidence (as per proforma)
 - Photographs of each hybrid
- h) Information to be provided
- Substrate used and substrate preparation method
 - Date of spawning
 - Date of opening bags
 - Max. and minimum temperature and RH% in the cropping rooms
 - (Separate sheet is enclosed for recording)
 - Daily yield record (replication wise)

Table 1. Cropping room temperature and RH (%) Data

Date	Temperature (°C)		RH (%)	Remarks (bag opening, pinhead formation, 1 st harvest, etc)
	Maximum	Minimum		

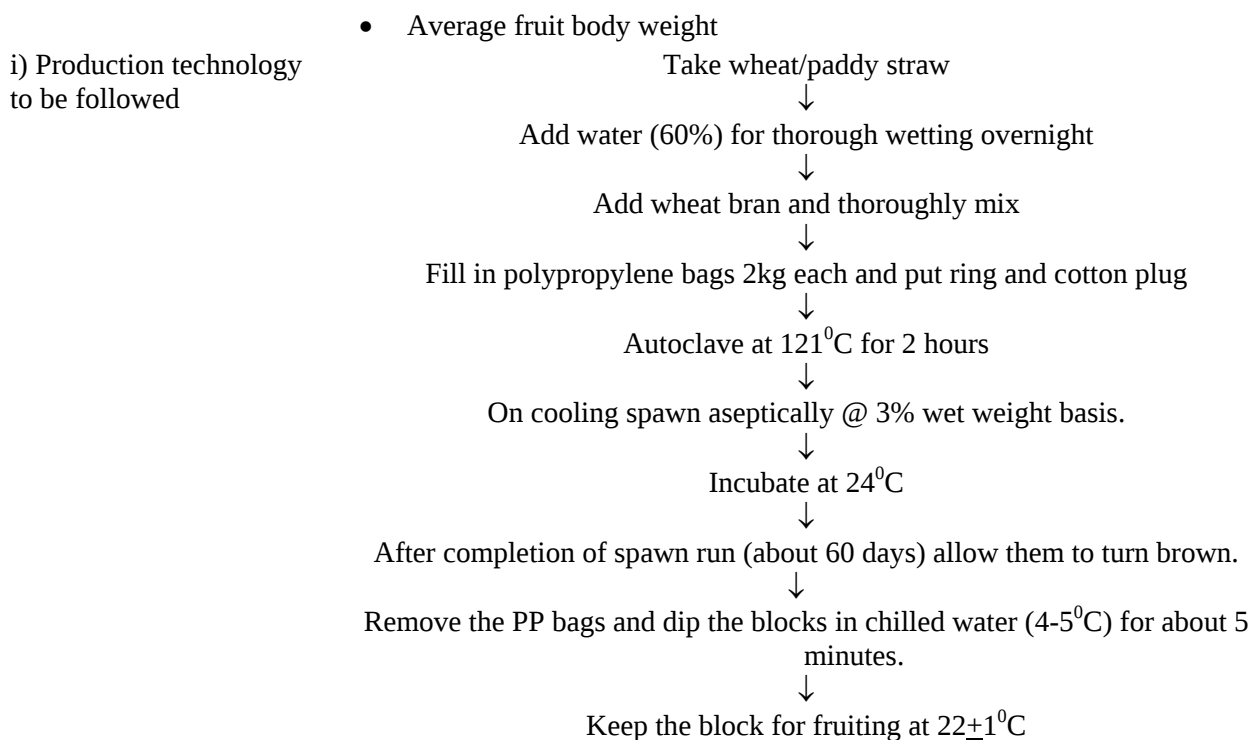
Table 2. Mushroom yield data

Strain	Replication	Yield (g) of each bag								Total Yield (g)
PF-1	R-1R5									

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com; rc_upadhyay@hotmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. R. C. Upadhyay.

Expt. 07: Evaluation of high yielding strains of Shiitake mushroom (*Lentinula edodes*)

- a) Participating centres Coimbatore, Raipur, Pantnagar, Udaipur
- b) Strain OE-16, OE-22, OE-28, OE-38, OE-388 (strains will be recoded and evaluated for one more year)
- c) Substrate
- Wheat straw/paddy straw
- d) Supplement Wheat bran @ 20% dry weight basis
- e) Method of substrate preparation Autoclaving
- f) Spawn rate 3% on wet weight basis
- g) No. of replication 6 replications of 6 bags each (2kg/bag) in RBD design
- h) Bag size 8inches x 15 inches
- h) Observation to be recorded
- Time taken for primordial formation and total yield
 - Total number of fruit bodies



Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com; sharma_vp93@rediffmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. V P Sharma.

II. CROP PRODUCTION

Expt. 08: Total indoor compost production using thermophilic fungi

- | | |
|----------------------------------|---|
| a) Participating centres | Ludhiana, Murthal, Pune |
| b) Substrate | Wheat straw - 1000 kg
Poultry manure - 700 kg
Wheat bran - 70 kg
Urea - 12 kg
Gypsum - 40 kg
* Cold N level should be 1.6 to 1.75 |
| c) Inoculum | <ul style="list-style-type: none"> • Inoculum needed: <i>Scytalidium thermophilum</i> (X-21 strain) + <i>Humicola Insolens</i> (I-33) @ 0.4% on dry wt. basis of the straw i.e. 2.0 kg each • Inoculum has to be added at 2 stages • Culture will be provided by DMR, Solan • Inoculum to be grown on wheat grains (usual spawn bottles with sterilized wheat grain) and incubated at 45°C for 7-10 days • Later mix half of both the inoculum on a polythene sheet. Take two buckets of water and pour both the inoculum in it. Stir it properly with hands so that spores of fungi are distributed in water properly. • Inoculum solution is now ready. |
| d) Method of compost preparation | <ul style="list-style-type: none"> • 0 day : Properly wet wheat straw and bring it up to 75% moisture level. Later thoroughly mix the ingredient in to it along with half of inoculum and make a heap of 4 ft height • +1 day: break open the heap, add water if required, mix the ingredients properly, again make a heap (temp around 58-60°C) • +2 day: Again turn the compost ingredient and make a heap (temp 62-65°C) |

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- +3 day: Again turn the compost ingredient and make a heap (temp 70°C)
 - +4 day: Transfer the entire mass to phase-II tunnel after adding the left over half of the inoculum and equalize at 45-48°C)
 - +5 day: Maintain the compost temp at 45-52°C (pre-pasteurization conditioning)
 - +6 day: -do-
 - +7 day: Kill at 59°C for 6 h (either through self heat generation or through steam), later post pasteurization conditioning (POPC) at 48-52°C.
 - +8 day: Post pasteurization conditioning (POPC) continues
 - +9 days: POPC
 - +10 days: POPC and cool down at night
 - +11 day : Spawn
- * Minimum 10% fresh air during entire operation even during killing
 * Spawning can be done on 10th day if ammonia below 10 ppm

e) Substrate quantity	As in expt-2
f) Spawn rate	As in expt-2
g) Strain to be used	U-3
h) Temperature for spawn run and cultivation	As in expt-2
i) Relative humidity	As in expt-2
j) No. of replication	16 replication of 10 bags each
k) Control	May be compared with average yield of U-3 in other trial for same cropping period (The data of 50 bags each should be submitted for unpaired T test analysis)
l) Casing	As in expt-2
m) Observation to be recorded:	• Physical parameter of compost like pH, Nitrogen, Moisture etc • Quantity of total compost produced • Days required to complete phase-II • Yield per 100 kg compost • Time (days) taken for spawn run • Time (days) taken for case run • Time (days) taken for primordial formation • Total No. of fruit bodies/bag • Total mushroom yield/bag • Fruit body weight • Disease incidence
n) Cost benefit ratio	

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com; bvijay2@hotmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. B. Vijay.

Expt. 09 Evaluation of the cultivation technology of *Macrocybe giganteum*

a) Participating centres	Murthal, Pantnagar, Coimbatore, Udaipur, Pune, Bhubaneswar, Raipur, Vellayani
Strains	4 strain (1-Dr. RC Upadhyay; 1-Dr. V. Prakasham; 2- Dr. Lulu Das)
b) Season for cultivation	September to October and April to June

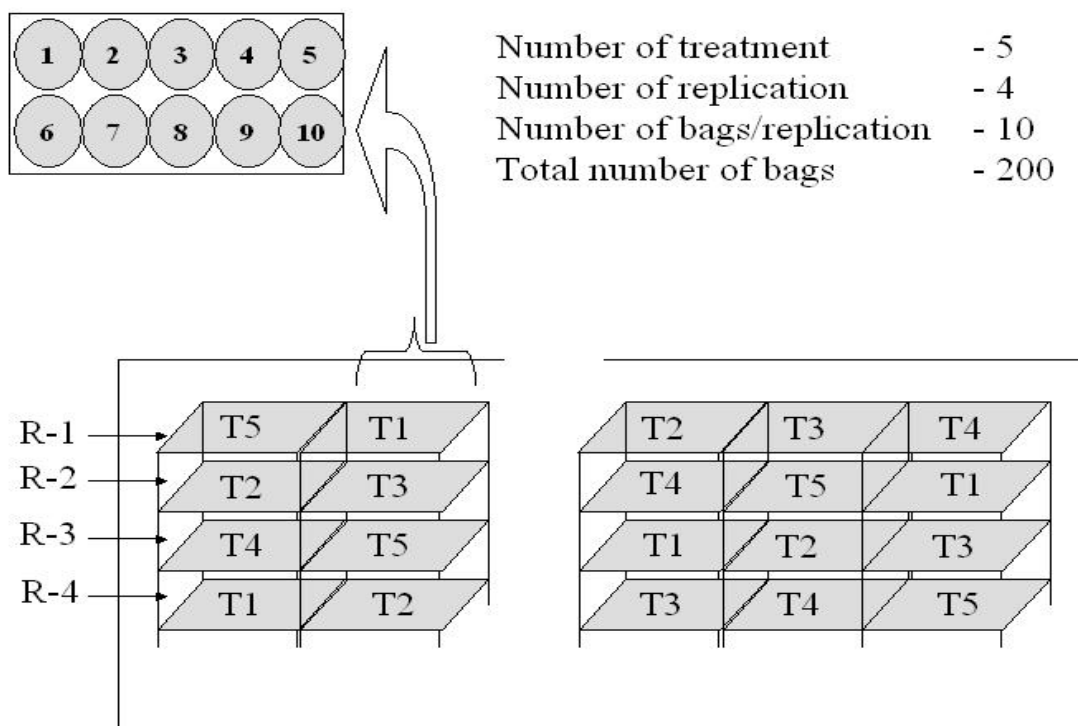
- | | |
|---|---|
| c) Substrate | i) Wheat straw
ii) Paddy straw
iii) Wheat and paddy straw 1:1
* Substrate is to be supplemented with 1 kg lime/100kg dry straw after wetting |
| d) Method of substrate preparation | i) Autoclaving at 22 p.s.i. for 60 minutes
ii) Outdoor composting for 9 days (minimum 3 quintal straw)
Wet wheat or chopped paddy straw and mix 1% lime on the basis of dry weight of the substrate. Prepare a pile of 100-110 cm high and same width. Turn the pile on 3 rd and 6 th day. On 9 th day break open the pile and cool down then spawn. |
| e) Substrate quantity | 2 kg /bag wet wt. basis |
| f) Spawn rate | 1 kg spawn for 20 kg wet wt. of straw |
| g) Temperature for spawn run and cultivation | 28-35°C |
| h) Light | 100 lux for 6-8 h |
| i) Relative humidity | 70-80% |
| j) No. of replication | 5 replications each with 10 bags in RBD |
| k) Casing | Garden soil + sand (1:1 v/v) treated with 2% formaldehyde for 48 h.
Casing depth – 3 cms |
| l) Observation to be recorded separately for wheat, paddy straw and combination | <ul style="list-style-type: none">• Substrate Moisture• Substrate Nitrogen• Substrate pH• Temperature and RH during cropping• Time (days) taken for spawn run• Time (days) taken for primordial formation• Total No. of fruit bodies/bag• Total mushroom yield/bag• Storage at room temperature |
| m) Cost benefit ratio | |

Note: The project coordinator, Scientist Incharge-AICRP and the concerned scientist must be informed 15 days before the start of the experiment at these emails: directordmr@gmail.com; shwetkamall@gmail.com; rc_upadhyay@hotmail.com. Reporting of the experiments and results to be done to and Cultures may also be obtained from Dr. R C Upadhyay.

IV. EXTENSION ACTIVITIES

1. Organization of at least 3 training programmes of 3-7 days duration each preferably in March, August and October months of the year.
2. Involvement of women in training programmes to empower them and help in creation of self held groups and candidates from lower.
3. Organization of two field days at the farm of the progressive farmer.
4. Active participation in Workshops, Kisan-mela and Demonstration etc.
5. Development of mushroom museum
6. Supply of quality mushroom spawn to mushroom growers mentioning the quantity.
7. Feedback on diseases of respective areas
8. Impact analysis of training programmes and spawn supply data in kg instead of packet

Experimental design for Experiment 02, 03 and 04



R4 (lower tier)	R3(lower middle tier)	R2 (upper middle tier)	R1 (uppermost tier)
5	2	4	1
1	3	5	2
2	4	1	3
3	5	2	4
4	1	3	5

4. RESEARCH PROGRESS

1. CROP IMPROVEMENT

1.1 Advanced varietal trial-1 for selected white accessions of *Agaricus bisporus*

This experiment was conducted on short method pasteurized compost at Pune, Pantnagar, Nauni, and Murthal. The sample size of the experiment was four replication of ten bags each of 10 kg compost in RBD. The parameters of compost i.e. pH, Nitrogen, moisture and colour were also recorded. In trials conducted using the long method compost, the maximum yield of 23.3 kg per 100 kg of compost was recorded in the strain AVT-4 at Pantnagar Centre followed by strain AVT-5 at the headquarter. The strain AVT-2 and AVT-3 also performed very well at Pantnagar centre with a yield of 19.21 and 19.10 kg per 100 kg compost. The lowest yield was recorded in all the strains at Murthal centre. Overall best average productivity was recorded in AVT-2 with 15.26 kg followed by AVT-4 with 14.31 kg per 100 kg compost (Table 4.1 and Fig. 4.1, 4.2 and 4.3). Overall all the strains have performed well at pantnagar centre.



Fig.4.1. Crop of AVT-02 at Nauni Centre

Table 4.1 Yield of different strains of white button mushroom on long method compost in four weeks cropping

<i>A. bisporus</i> strain	Mushroom yield (kg/100kg compost) at different centres in 30 days cropping period						
	Pune	Pantnagar	Murthal	Ludhiana	Solan	Nauni	Average
AVT-1	17.52	17.80	11.53	5.16	19.03	11.65	13.31
AVT-2	13.92	19.21	7.70	17.48	18.50	11.85	15.36
AVT-3	16.21	19.10	5.41	9.10	16.60	10.63	13.28
AVT-4	-	23.23	3.17	11.90	18.95	9.56	14.31
AVT-5	12.40	17.58	8.18	8.74	20.03	9.98	13.39
AVT-06	11.77	13.70	4.70	14.02	11.75	11.35	11.19
CD (0.05)	0.82	1.077	2.19	1.18	1.36	1.22	



Fig. 4.2. Crop of AVT-1 at Murthal Centre

The compost parameters recorded at various centres have clearly indicated that the pH of the compost ranged from 7.2 to 7.6 while nitrogen percent was varied from 1.5 to 2.7. The moisture percent was 63-67% (Table 4.2). Colour of compost was invariably dark brown at all the centres. The parameters indicated that there was slight variation in the values but overall the parameters were well within the recommended range. The time taken in first harvest (days post casing) was in the range of 18 to 24 days. The lowest first harvest time (18 days) was recorded at headquarter in AVT-4 strain followed by 19 days in AVT-1 at Pune centre and AVT-5 at Ludhiana Centre. Overall the lowest first harvest time was recorded in AVT-5 and AVT-5 (Table.5).

Average fruit body weight also varied at different centres and was recorded maximum (17.5 g) at Pune centre in the strain AVT-1 and AVT-5 (14/8 g) at Ludhiana centre (Table 4.3). At headquarters the average fruit body weight ranged between 11-13 g in almost all the strains. The overall maximum fruit body weight was recorded in AVT-5 and AVT-2.

Table 4.2 Compost parameters for long method compost

Centres	pH	Nitrogen (%)	Moisture (%)	Colour
Pune	7.2	2.2	63	Dark brown
Pantnagar	7.3	2.1	64.5	Dark brown
Murthal	--	--	--	--
Ludhiana	7.4	2.7	67	Dark brown
Solan	7.6	1.8	62	Dark brown

Table 4.3. Time taken to first harvest and average fruit body weight in *A. bisporus* strains

<i>A. bisporus</i> strain	Time taken for first harvest (days post casing) and fruit body wt (g)													
	Pune		Pantnagar		Murthal		Ludhiana		Nauni		Solan		Average	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b
AVT-1	19	17.5	--	11.05	--	10.19	22	14.5	39	15.00	20	11.20	21.0	12.9
AVT-2	21	13.9	--	10.76	--	11.44	21	13.3	40	13.30	22	13.03	21.5	13.2
AVT-3	20	1.21	--	11.55	--	11.72	21	12.5	39	14.90	20	11.95	20.5	12.2
AVT-4	-	-	--	11.68	--	11.91	22	11.8	41	12.20	18	11.28	20.0	11.5
AVT-5	22	12.4	--	11.95	--	12.01	19	14.8	44	13.70	20	11.86	19.5	13.3
AVT-06	21	11.6	--	11.05	--	11.22	20	13.7	41	16.80	24	11.95	22.0	12.8
CD (0.05)	1.7	--	--	0.62	--	0.76	1.21	2.4	1.86	0.68	2.26	0.81	--	--

a. First harvest (days post casing); b. average fruit body wt (g)



Fig.4.3. Crop of AVT at Ludhiana

1.2 Advanced varietal trial-2 for selected brown accessions of *Agaricus bisporus*

In another set of experiment on evaluation of brown strains of *A. bisporus* using short method of compost, maximum yield of 21.45 kg /100 kg of compost was recorded in the strain AVT-10 at Pantnagar centre followed by strain AVT-9 at the same centre (20.98 kg). The minimum yield of 5.66kg/100 kg compost was recorded in strain AVT-9 at Ludhiana centre (Fig 4.4 and 4.5). At DMR Solan, the best performing strain was observed to be AVT – 8 followed by AVT-7 with an average yield of 19.30 and 19.16 kg /100 kg compost. Both the strains performed equally well at DMR. At Pune centre the best performing strain was observed to be the AVT-7 with an average yield of 18.36 kg /100 kg compost. Overall average of all the strains at all the centres showed that AVT-8 closely followed by AVT-9 and AVT-7 with an average yield of 14.6, 13.5 and 13.4 kg were the performing strain in all the conditions (Table 4.4).



Fig.4.4. Brown strain crop at Nauni Centre

Table 4.4 Yield of different strains of white button mushroom on short method compost in four weeks cropping

<i>A. bisporus</i> strain	Mushroom yield (kg/100kg compost) at different centres in 30 days cropping period						
	Pune	Pantnagar	Murthal	Ludhiana	Solan	Nauni	Average
AVT-7	18.36	18.16	11.50	--	19.16	9.45	13.4
AVT-8	15.45	20.27	9.59	8.30	19.30	11.00	14.6
AVT-9	12.05	20.98	13.10	5.66	15.50	8.37	13.5
AVT-10	11.72	21.45	11.71	6.56	15.36	8.61	13.4
AVT-11	14.28	17.80	--	11.35	13.96	8.28	11.5
CD (0.05)	1.12	0.89	1.12	2.10	1.22		

The analysis of the compost at different centres showed that all the parameters varied in a narrow range like pH (7.2-7.6), nitrogen (1.8-2.7%) and moisture (63-67%) (Table 4.5).

Table 4.5 Compost parameters for short method compost

Centres	pH	Nitrogen (%)	Moisture (%)	Colour
Pune	7.2	2.2	63	Dark brown
Pantnagar	7.3	2.1	64.5	Dark brown
Murthal	--	--	--	--
Ludhiana	7.4	2.7	67	Dark brown
Solan	7.6	1.8	62	Dark brown

The lowest time taken for first harvest was 18 days post casing in strain AVT-8 at Pune Centre. The strains in the trial have shown first harvest period of 20 days in different strains at different centres. The maximum time taken for first harvest was 26 days in strain AVT-9 at Solan centre. The overall average of all the centres showed the minimum time taken for first harvest was 20 days in strain AVT-7 while maximum time of 23 days was recorded in strain AVT-9.

The average fruit body weight ranged from 9.03 to 18.3 g with maximum in strain AVT-7 at Pune centre followed by AVT-8 at the same centre. At Pantnagar centre the maximum fruit body weight recorded was 10.43 in the strain AVT-8 while at Murthal centre maximum fruit body weight was recorded to be 11.44 g in AVT-8 strain. Overall average of the fruit body weight showed maximum 12.37 g in strain AVT-8 followed by 12.25 g in strain AVT-11 while the minimum fruit body weight was 10.08 g in strain AVT-7. Quality of fruit body in general was good in all the strains of *A. bisporus* (Table 4.6).

**Fig. 4.5.** Brown button mushroom crop at Ludhiana**Table 4.6** Time to first harvest and average fruit body weight of *A. bisporus* strains on short method compost

<i>A. bisporus</i> strain	Time taken for first harvest (days post casing) and fruit body wt (g)													
	Pune		Pantnagar		Murthal		Ludhiana		Nauni		Solan		Average	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b
AVT-7	20	18.3	--	9.28	--	10.62	--	--	39	13.50	20	12.2	20.0	10.08
AVT-8	18	15.4	--	10.43	--	11.44	20	13.5	41	11.33	24	11.1	20.6	12.37
AVT-9	21	12.0	--	9.49	--	11.21	22	13.3	38	10.00	26	9.6	23.0	11.12
AVT-10	20	11.7	--	10.30	--	11.26	21	12.8	42	11.20	24	12.3	21.6	11.67
AVT-11	21	14.2	--	9.03	--	10.62	20	13.2	45	10.05	22	14.2	21.0	12.25
CD (0.05)	1.7	--	--	--	--	0.76	1.21	2.4	2.12	0.81	2.26	0.81	--	--

a. First harvest (days post casing); b. average fruit body wt (g)

1.3. Initial varietal trail for selected white accessions of *Agaricus bisporus*

This experiment was planned for multilocation trials of newly developed accession of *A. bisporus*. The accessions comprised of fifteen high yielding strains of button mushroom. The accessions were evaluated on short method pasteurized compost. The experiment was assigned to centres, Pune, Pantnagar, Nauni, Solan, Ludhiana and Murthal (Fig. 4.6, 4.7 and 4.8). The sample size of the experiment was three replications of four bags of 10 kg compost. The parameters of compost i.e. pH, Nitrogen, moisture and colour were also recorded.

Evaluation of selected accessions of white strains using short method of compost, maximum yield of 21.7 kg /100 kg of compost was recorded in the SSI-6/12 at Pantnagar centre closely followed by the strain SSI-4/12 at the same centre (19.13 kg). The strain SSI-4/12 yielded at par with SSI-6/12 at DMR, Solan centre with a yield of 18.97 kg/100 kg compost. The minimum yield of 2.37 kg/100 kg compost was recorded in SSI-13/12 at Murthal centre. Overall average of all the strains at all the centres showed that all the selections have performed well over the control with maximum yield of 17.02 kg in SSI-4/12 (Table.4.7).



Fig 4.6. IVT trials at Ludhiana



Fig 4.7. IVT Trial at Nauni Centre



Fig 4.8. IVT trial at Murthal

Table 4.7 Yiled data of seleceted accessions of white button mushroom

<i>A. bisporus</i> strain	Mushroom yield (kg/100kg compost) at different centres in 30 days cropping period					
	Nauni	Pantnagar	Murthal	Ludhiana	Solan	Average
SSI- 1/12	7.80	17.87	7.51	13.46	16.48	13.83
SSI- 2/12	9.10	15.87	7.50	14.80	15.17	13.34
SSI- 3/12	7.55	16.00	10.02	5.64	12.18	10.96
SSI- 4/12	8.90	19.13	11.77	18.22	18.97	17.02
SSI- 5/12	8.05	14.25	13.46	5.44	14.79	11.99
SSI- 6/12	10.05	21.70	14.73	13.20	17.33	16.74
SSI- 7/12	9.90	18.30	9.74	10.14	17.34	13.88
SSI- 8/12	10.65	15.09	9.74	17.94	15.33	14.53
SSI- 9/12	9.45	16.76	9.69	5.40	15.77	11.91
SSI- 10/12	11.25	13.86	--	7.20	13.94	8.75
SSI- 11/12	10.70	17.84	7.22	6.54	16.48	12.02
SSI- 12/12	12.50	16.10	--	7.70	13.43	9.31
SSI- 13/12	8.90	15.54	2.37	7.62	13.99	9.88
SSI- 14/12	6.50	13.37	6.51	10.64	12.18	10.68
SSI- 15/12	11.85	12.74	6.77	5.04	11.75	9.08
CD (0.05)		1.59	1.26	1.22	1.28	

The accessions were also assessed for their first harvest time and average fruit body weight for the assessment of quality of the fruit body. All the strains showed first harvest time in the range of 20-24 days at all the centres. The quality parameters of the all the strains were also evaluated in terms of average fruitbody weight. Amongst the test strains the maximum fruit body weight of 17.1 g was recorded in SSI-6/12 at DMR, Solan followed by by SSI-9/12 (15.1 g) at Ludhiana centre. Good fruit body weight was also recorded at murthal Centre in almost all the strains with a maximum of 12.18 g in SSI-14/12. Overall average maximum fruit body weight in all strains was found to be 13.41 g in SSI-6/12 at all the centres (Table 4.8).

Table 4.8 Time taken for first harvest and fruit body weight in selected accessions of button mushroom

A. <i>bisporus</i> strain	Time taken for first harvest (days post casing) and fruit body wt (g)											
	Nauni		Pantnagar		Murthal		Ludhiana		Solan		Average	
	a	b	a	b	a	b	a	b	a	b	a	b
SSI- 1/12	--	11.2	--	8.51	--	11.25	20	10.8	20	13.3	20.0	10.97
SSI -2/12	--	10.4	--	11.05	--	11.09	20	12.3	20	12.4	20.0	11.71
SSI- 3/12	--	13.2	--	8.92	--	11.56	22	12.8	20	11.2	21.0	11.12
SSI -4/12	--	11.4	--	8.96	--	11.34	23	11.3	22	11.5	22.5	10.78
SSI- 5/12	--	14.4	--	7.20	--	11.60	20	14.5	20	11.1	20.0	11.10
SSI -6/12	--	11.8	--	10.48	--	11.27	22	14.8	20	17.1	21.0	13.41
SSI- 7/12	--	15.5	--	8.56	--	11.10	22	14.5	24	11.5	23.0	11.42
SSI -8/12	--	16.7	--	7.45	--	11.87	21	12.8	24	13.9	22.5	11.51
SSI- 9/12	--	17.7	--	7.35	--	11.31	21	15.1	20	12.8	20.5	11.64
SSI -10/12	--	13.2	--	5.89	--	--	22	14.2	20	14.7	21.0	11.60
SSI- 11/12	--	16.7	--	7.94	--	11.00	22	14.0	22	11.8	22.0	11.19
SSI -12/12	--	15.3	--	6.68	--	--	22	12.5	22	13.1	22.0	10.76
SSI- 13/12	--	13.8	--	9.11	--	12.12	23	14.0	22	11.9	22.5	11.78
SSI -14/12	--	14.0	--	6.27	--	12.18	22	14.3	20	14.1	21.0	11.71
SSI- 15/12	--	18.0	--	5.41	--	11.42	22	12.5	20	12.2	21.0	10.38
CD (0.05)	--	11.2	--	0.82	--	0.21	0.26	1.1	0.42	0.62		

a. First harvest (days post casing); b. average fruit body wt (g)

Centres	pH	Nitrogen (%)	Moisture (%)	Colour
Pune	7.6	2.1	67	Dark brown
Pantnagar	7.2	1.85	68	Dark brown
Murthal	--	--	--	--
Ludhiana	7.4	2.7	67	Dark brown
Solan	7.6	1.8	62	Dark brown

1.4 Advance varietal trial for strains of Paddy Straw Mushroom, *Volvariella volvacea*

The trial was assigned at six centres and a total of five strains of *Volvariella volvacea* were tested (Fig. 4.9, 4.10 and 4.11). The biological efficiency of various strains varied in the range of 4.05 to 17.49 kg /100 kg of dry substrate at various centres in different strains. The maximum biological efficiency of 17.49 kg/100 kg of dry substrate was recorded in strain Vv-11 at Bhubaneswar centre followed by 17.1 kg in the same strain at the Coimbatore centre. It was also recorded that the maximum biological efficiency for all the test strain was achieved at the Coimbatore and Bhubaneswar centre. The minimum biological efficiency was recorded in Vv-09 at Raipur centre with an average yield of 4.02 kg /100 kg of dry substrate. Low biological efficiency was also recorded at Ludhiana centre in Vv-09 and Vv-10 strains. The overall average showed that the maximum BE (11.72 kg) was recorded in Vv-11 strain while the minimum BE (10.42 kg) was in strain Vv-10 (Table 4.9).

**Fig 4.9.** *V. Volvacea* crop at Faizabad**Fig 4.10.** *V. Volvacea* crop at Ludhiana**Fig 4.11.** *V. Volvacea* crop at Raipur

Table 4.9. Yield of different strains of Paddy Straw Mushroom, *Volvariella volvacea*

Strain	Mushroom yield (kg/100kg dry substrate)						Average
	Faizabad	Coimbatore	Raipur	Ludhiana	Bhubaneswar	Solan	
Vv-09	7.95	15.6	4.02	5.54	14.90	--	11.64
Vv-10	9.80	16.0	7.64	8.93	15.80	--	10.42
Vv-11	11.08	17.1	10.37	15.42	17.49	--	11.72
CD(0.05)	0.70	15.6	0.78	2.23	0.83	--	--

The average fruit body weight varied at different centres with a maximum of 21.6 g at Coimbatore centre in the strain Vv-11 while the minimum fruit body weight was recorded to be 6.28 g at Ludhiana centre in the strain Vv-09. All the strains have recorded the maximum fruit body weight at Coimbatore centre followed by Bhubaneswar centre. The maximum fruit body weight recorded at Bhubaneswar centre was 16.98 g in strain Vv-11. At Faizabad centre the maximum fruit body weight (12.95 g) was recorded in strain Vv-11. Overall average showed that the maximum fruit body weight (14.9 g) was recorded in strain Vv-09 while minimum (12.9 g) in Vv-10 strain.

The minimum time taken for the first harvest was 8 days in strain Vv-11 at Ludhiana centre and 10 days in strain Vv-10 at the same centre. The overall average also indicated the minimum time taken for the first harvest was in strain Vv-11 while the maximum time in strain Vv-10 (Table 4.10).

Table 4.10 Average fruit body weight (g) and time taken to first harvest in strains of paddy straw mushroom

Strain	Average fruit body weight (g) and time taken for first harvest (days)											
	Faizabad		Coimbatore		Raipur		Bhubaneswar		Ludhiana		Average	
	a	b	a	b	a	b	a	b	a	b	a	b
Vv-09	10.83	15	20.0	12.8	-	17	15.36	13.62	6.60	12	14.9	13.3
Vv-10	12.74	15	20.0	13.5	-	13	15.76	15.25	7.02	10	12.9	13.5
Vv-11	12.95	14	21.6	13.6	-	13	16.98	14.75	6.28	8	14.5	12.7
CD (0.005)	0.98	0.70	1.20	4.17	-	1.1	0.87	0.75	--	--	--	--

a: average fruit body wt (g); b: time taken for first harvest (days)

1.5 Evaluation of high yielding varieties/strains of Oyster Mushroom (*Pleurotus* spp)

This trial was conducted at 12 different centres. A total of six high yielding strains of *Pleurotus* species were under evaluation trial (Fig 4.12). The maximum yield of 122.6 kg /100 kg of dry substrate was obtained in strain Pl-12-05 at Udaipur Centre followed by strain Pl-12-02 (122.5) at the same centre. All the strains performed very well at Udaipur centre with high biological efficiency. At Raipur centres the best performer strain was Pl-12-01 with an yield of 99.83 kg per 100 kg dry substrate. Rest all the strains performed at par with very good biological efficiency. Strain P-12-01 performed well at Raipur, Coimbatore, Bhubaneswar, Pusa, Udaipur and Pune centres. All. Cumulative average of the yield showed that all the strains have performed well on all the centres (Table 4.11).

Table 4.11. Strain evaluation of oyster mushroom species

Strain/ Hybrid	Mushroom yield (kg/100kg of dry substrate)												
	Raipur	Pasig hat	Coimb atore	Faiza bad	Vellay ani	Bhubn eswar	Pusa	Pantn agar	Ranchi	Udaip ur	Hisar	Pune	Avg
Pl-12-01	99.83	7.8	83.8	40.55	60.7	82.55	81.6	67.78	60.9	107.7	46.28	80.19	68.31
Pl-12-02	88.70	9.3	78.1	44.87	--	74.99	63.9	26.34	56.1	122.5	68.04	79.05	65.58
Pl-12-03	89.43	11.6	85.0	53.18	64.8	81.66	78.5	67.54	45.3	104.2	53.9	93.61	69.06
Pl-12-04	95.3	5.1	75.6	46.12	60.7	81.21	74.1	50.02	66.7	93.83	63.24	85.73	66.47
Pl-12-05	78.23	--	80.4	40.67	74.5	63.88	77.4	13.06	48.5	122.6	43.26	78.27	65.52
Pl-12-06	89.36	--	71.8	34.58	80.9	67.10	88.5	49.88	37.6	116.1	51.26	80.23	69.76
CD 5%	6.2	--	--	5.8	--	4.97	0.9	7.78	--	0.89	4.2	4.82	--

The minimum time of 15 days for first harvest of the crop was recorded in strain Pl-12-06 closely followed by Pl-12-05 at the same centre. The maximum time taken was 41 days in strain Pl-11-05 at Raipur and Udaipur centre in Pl-12-03 and Pl-12-04 strains. The overall average of all the centres showed the time taken in first harvest ranged between 27.58 to 34.27 days in all the strains (Table 4.12).



Fig. 4.12. Oyster mushroom evaluation trial at different centres (Udaipur, Vellayani, Raipur, Bhubaneshwar, Samastipur and Pasighat)

Table 4.12 Time taken for first harvest in different strains of *Pleurotus*

Strain/ Hybrid	Time taken for first harvest (Days post spawning)												Average
	Raipur	Pasig hat	Coimb atore	Faiza bad	Bhubn eswar	Pusa	Hisar	Ranchi	Uda ipur	Nauni	Vella yani	Pune	
Pl-12-01	36.6	33	25.0	--	30.4	29	32.8	--	37	--	32	27	31.42
Pl-12-02	36.3	33	26.2	--	32.6	26	35.2	--	39	--		28	32.04
Pl-12-03	36.2	40	26.2	--	32.6	30	34.2	--	41	--	30	26	32.91
Pl-12-04	39.0	38	26.8	--	33.8	24	42.8	--	41	--	33	30	34.27
Pl-12-05	41	--	25.0	--	21.2	25	34.4	--	32	--	16	26	27.58
Pl-12-06	36.5	--	25.0	--	23.6	20	39.2	--	39	--	15	30	28.54
CD 5%	1.6		--	--	0.99	2.1		--	--	--	--	--	--

Average fruit body weight of all the strains at different centre ranged between 3.61 to 27 g. The maximum fruit body weight of 27 g was recorded in Pl-12-01 strain at Pantnagar centre while the minimum of 3.61 g was recorded in Pl-12-05 strain at Raipur centre. Overall average showed the maximum fruit body weight of 11.93 g in strain Pl-12-02 and the lowest of 6.28 g in Pl-12-05 strain (Table 4.13).

Table 4.13 Average fruit body weight in different strains of *Pleurotus*

Strain/ Hybrid	Average fruit body weight (g)							
	Raipur	Pantnagar	Coimbatore	Faizabad	Bhubaneshwar	Udaipur	Pune	Average
Pl-12-01	8.87	27.00	5.8	9.75	6.79	5.98	9.78	10.57
Pl-12-02	8.14	10.23	5.9	10.35	7.56	6.60	6.73	7.93
Pl-12-03	9.13	26.22	6.1	10.46	7.04	8.72	15.85	11.93
Pl-12-04	8.38	13.61	7.2	9.57	6.90	8.72	11.70	9.44
Pl-12-05	3.61	5.77	7.3	10.26	5.68	6.10	5.25	6.28
Pl-12-06	4.51	12.79	7.2	9.65	6.46	7.49	7.83	7.99
CD 5%	--	--	--	--	1.03	0.77	--	--

1.6 Evaluation of high yielding strains of Shiitake mushroom (*Lentinula edodes*)

This trial was conducted at four different centres viz., Pantnagar, Coimbatore, Udaipur and Raipur (Fig. 4.13). A total of five high yielding strains of *Lentinula edodes* were under evaluation trial. At Udaipur and Pantnagar centres, the experiment was conducted on Sawdust and Wheat straw both supplemented with 20% wheat bran while at Coimbatore centre, the experiment was conducted on wheat straw and saw dust supplemented with 20% wheat bran. Maximum yields were obtained at Pantnagar centre with an yield of 137.34 kg per 100 kg dry

substrate in strain OE-388. At Coimbatore centre, the maximum yield of 31.7 kg per 100 kg dry substrate was obtained in strain OE-16 with Paddy straw and saw dust. The minimum yield was obtained in strain OE-28 and OE-22 at Udaipur centre with an yield of 7.40 and 7.82 kg per 100 kg dry substrate. Overall average yield at all the centres showed that the strain OE-388 performed the best both on with an average yield of 43.91 kg per 100 kg dry substrate (Table 4.14).



Fig. 4.13. Shiitake evaluation trail at Udaipur (Left) and Pantnagar centres (right)

Table 4.14 Strain evaluation of Shiitake mushroom

Strain/ Hybrid	Mushroom yield (kg/100kg of dry wheat straw)			
	Udaipur	Pantnagar	Coimbatore	Average
OE-16 (WS/PS +WB)	12.92	9.52	31.7	18.05
OE-22 ((WS/PS +WB)	7.82	7.61	28.4	14.61
OE-28 (WS/PS +WB)	7.40	28.61	17.1	17.70
OE-38 (WS/PS +WB)	9.6	16.69	18.6	14.96
OE-388 (WS/PS +WB)	9.9	103.34	18.5	43.91
CD 5%	0.77	14.46	1.7	

Average fruit body weight of all the strains at different centre ranged from 13.83 to 41.61 g. The maximum fruit body weight of 41.61 g was recorded in OE-28 strain at Pantnagar centre while the minimum of 13.83 g was recorded in strain OE-28 at Udaipur centre. Overall average showed the maximum fruit body weight of 23.59 g in strain OE-28 and the lowest of 15.33 g in strain OE-388 (Table 4.15).

Table 4.15 Average fruit body weight in different strains of Shiitake

Strain/ Hybrid	Average fruit body weight (g)			
	Udaipur	Pantnagar	Coimbatore	Average
OE-16 (WS/PS +WB)	20.58	16.33	15.75	17.55
OE-22 ((WS/PS +WB)	15.18	36.51	15.66	22.45
OE-28 (WS/PS +WB)	13.83	41.61	15.33	23.59
OE-38 (WS/PS +WB)	16.71	28.61	15.58	20.30
OE-388 (WS/PS +WB)	14.55	15.70	15.75	15.33
CD 5%	0.58	--	1.12	--

2. CROP PRODUCTION

2.1. Total indoor compost production using thermophilic fungi

The trial was assigned to five different centres i.e. Murthal, Ludhiana, Pune, and Solan (Fig. 4.14). A new method of compost preparation inside the tunnel was developed at DMR, Solan, which do not cause any air pollution neither causes any noxious gas emission. The technology as such was put for multilocation trials alongwith traditional short method technology as check. Out of five centres Murthal centre could not do it as the cultures of thermophiles did not multiplied. Out of four centres at Murthal and Pune, experiment was not successful due to incidence of yellow mould and non availability of tunnel, respectively. However, at Ludhiana centre increase of yield was recorded. Nevertheless, at all the centres the crop could be grown satisfactorily without emission of foul gases. At DMR, Solan also very good yields could be recorded with slight modification

of the technique. Overall average yield showed 16.9 kg /100 kg compost in indoor composting technology (Table 4.18).



Fig. 4.14. Indoor compost experiment at Ludhiana centres (Un-inoculated conventional compost (Left); Indoor compost (Right))

Table 4.18 Yield of white button mushroom by total indoor composting technology

Treatment	Mushroom yield (kg/100kg compost) at different centres				
	Ludhiana	Murthal	Pune	Solan	Average
Total Indoor composting using thermophile	14.8	Not successful	Not successful	19.0	16.9
Traditional short method compost	13.8	--	--	14.5	14.2
CD (0.05)	--	--	--	--	--

The time taken for first harvest and average fruit body weight was also recorded during the experiment. The minimum time taken for first harvest was 23 days in indoor compost at Ludhiana centre while the time taken for first harvest was lower in indoor compost (Table 4.19). Average fruit body weight was also found to be lower in indoor compost than check where the average fruit body weight was at par in both the composts.

Table 4.19 Average fruit body weight (g) and time taken to first harvest

Treatment	Time taken for first harvest (days post casing) and fruit body wt (g)									
	Ludhiana		Murthal		Pune		Solan		Average	
	a	b	a	b	a	b	a	b	a	b
Total Indoor composting using thermophile	23	12.5	--	--	--	--	24	--	28.5	13.2
Traditional short method compost	27	13.1	--	--	--	--	24	--	25.7	13.9
CD (0.05)	--	0.69	--	--	--	--	--	--	--	--

a. First harvest (days post casing); b. average fruit body wt (g)

The analysis of the total indoor compost at different centres showed that all the parameters varied in a range like pH (7.3-7.7), nitrogen (1.68-2.8%) and moisture (27-69%) (Table 4.20). This analysis showed that the compost made by Indoor method of composting tend to have more moisture and nitrogen content. The pH remains in acceptable range. The low yields obtained in the experiment may be due to the higher moisture content in the compost.

Table 4. 20 Compost parameters in total indoor compost

Centres	pH	Nitrogen (%)	Moisture (%)	Colour
Ludhiana	7.7	2.8	67.0-69.0	Dark brown
Murthal	--	--	--	--
Pune	--	--	--	--
Solan	7.3	1.68	57	black

2.2 Standardization of cultivation technology of *Macrocybe giganteum*

The trial was assigned to seven different centres i.e. Murthal, Pantnagar, Coimbatore, Udaipur, Pune, Bhubaneshwar, Raipur and Vellayani centres. The mushroom *Macrocybe giganteum* is a new entry in the list of cultivated mushroom portfolio of the country and resembles very much to button mushroom. This mushroom requires a higher temperature of 28-35°C. The experiment is under progress at this time and results are awaited by the end of June 2013. The results of the experiment will be included in the next year's annual report. Only two centres could partially complete the experiment i.e. Vellayani and Bhubnaeshwar. At Vellayani MA-1 strain could not fruit while at Bhubaneshwar only MA-1 strain gave fruiting (Fig 4.15). Good yield could be obtained at both the two centres (Table. 4.21)

Table 4.21. Cultivation trial of *Macrocybe giganteum*

Strain	Yield (kg/100 kg wet substrate)/days taken for primordial formation					
	Bhubaneshwar		Vellayani		Average	
	Yield	Days	Yield	Days	Yield	Days
MA-1	26.97	29.52	--	--	26.97	29.52
MA-2	--	--	62.6	27	62.6	27
MA-3	--	--	71.8	27	71.8	27
CD (5%)	--	--	2.13	--	--	--



Fig. 4.15. Cultivation of *Macrocybe giganteum* at Bhubaneshwar (MA-1) (Left) and Vellayani (Middle and right)

5. COLLECTION, IDENTIFICATION AND CONSERVATION OF WILD EDIBLE GERMPLASM FROM LOCAL MARKET

Different Centres have reported the collection of 393 specimens of wild mushrooms during the year and about 53 collections have been deposited at the DMR Gene Bank with passport data. During the last workshop of AICRPM, it has been decided that different mushrooms collected and consumed locally by the people of different regions will be collected and we should take advantage of the ITK available on mushrooms and utilize this germplasm instead of going for random collection of wild germplasm. In this regard it was decided that the Centres will survey the local markets for collecting the germplasm in addition to forest forays, collect the data, make cultures and deposit these with DMR along with their photographs, dried samples and passport data. The outcome has been summarized in table 5.1.

Table.5.1. Germplasm and passport data collected and supplied to DMR, Solan by AICRP Centres

Centres	No. of mushroom species collected	No. of cultures/dried specimens /spore prints submitted	Identification sheet/Photographs /Passport data supplied
ICAR RC for NEH, Barapani	0	0	0
ICAR RC for ER, Ranchi	8	0	0
PAU, Ludhiana	4	0	0
TNAU, Coimbatore	13	0	13
GBPUA&T, Pantnagar	40	0	0
MPUA&T, CoA Pune	176	29	29
NDUA&T, Faizabad	20	0	0
IGKV, Raipur	24	8	8
MPUA&T, Udaipur	67	9	67
KAU, CoA, Vellayani	7	7	7
CCSHAU, Hisar	3	0	0
OUA&T, Bhubaneswar	15	0	0
RAU, Samastipur, Pusa	16	5	0
CAU, CoH&F, Passighat	8	0	0
YSPUH & F, Nauni, Solan (HP).	0	0	0
HAIC, Murthal (Haryana)	0	0	0

Udaipur Centre

Collection from the wild: During monsoon season of 2012 for collection of wild fleshy fungi total of 7 forays were Conducted in Sirohi, Pratapgarh and Udaipur districts of Rajasthan. The surveys were carried out during pre- monsoon, monsoon and post- monsoon Season to collect the wild fleshy fungi occurring in different period and in different areas. Moreover, Sabji markets of above listed districts were also visited to find out the mushroom sold in the local market. Total of 67 different samples of wild fleshy fungi were collected, cultured, preserved and identified (Fig 5.2). Some important genera are *Polypores morri*, *Auricularia* (Redish), *Podaxis pistillaris*, *Volvariella* spp., *Psathyrella* spp., *Pisolithus tinctorius*, *Laetiporus*, *Termitomyces microcarpus*, *Psathyrella*, *Gepiototus*, *Pleurocybella porrigens*, *Pleurotus pink*, *Volvariella*, *Macrolepiota*, *Procera*, *Clavariadelphus truncatus*, *Leucocoprinus cepaestipes*, *Volvariella*, *Ganoderma lucidum*, *Lenzites*, *Polypore*, *Agaricus*, *Auricularia auriculae zudae*, *Tricholoma* spp., *Crepidotus marasmius*, *Auricularia light* *Lepiota* *Leucocoprinus cepaestipes* *Agaricus* *Agaricus trisulphuratus* *Macrocybe* *Termitomyces clypeatus* *Agaricus*, *Scleroderma citrinum*, *Gymnopilus*, *Calvatia cyathiformis*, *Schizophyllum commune*, *Volvariella minnata*, *Lepiota*, *Lycoperdon pyriforme*, *Termitomyces heimu*, *Agaricus*, *Termitomyces globules*, *Agaricus plaecomys*, *Calocybe* sp, *Cortinarius*, *Lepiota*, *Agaricus augustus*, *Boletus*, *Termitomyces albuminosa*, *Calocybe* sp, *Laccaria ochropurpurea*, *Colotricha*, *Clitocybe*, *Pleurotus* spp., *Clavaria*, Tube bearing fungi. A total of 9 cultures have been submitted to DMR culture collection (Table 5.2).

Table 5.2. Culture submitted to DMR gene bank

<i>Polypores morri</i>	DMRO-520	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD01-12	28-02-13
<i>Tricholoma</i> sp	DMRO-521	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD25-12	28-02-13
<i>Macrocybe</i> sp	DMRO-522	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD33-12	28-02-13
<i>Unidentified</i>	DMRO-523	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD49-12	28-02-13
<i>Calocybe</i> sp.	DMRO-524	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD52-12	28-02-13
<i>Calocybe</i> sp	DMRO-525	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD59-12	28-02-13
<i>Agaricus</i> sp	DMRA-142	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD46-12	28-02-13
<i>Agaricus</i> sp	DMRA-143	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD47-12	28-02-13
<i>Pleurotus</i> sp	DMRP-250	Dr Anila Doshi, MPAUT,Udaipur(RAJ), UD64-12	28-02-13



Fig 5.2. Some mushroom specimens collected from wild by Udaipur Centre.

Hisar centre

Wild edible mushrooms were collected and majority of these were *Gandoderma* spp. Wild edible mushrooms sold in the market of Hisar, Rohtak and Bhiwani were *Podoxis* spp. One wild *Pleurotus* spp. collected from Hisar was cultured and its pure culture has been obtained.

Bhubaneswar Centre

Surveys were conducted at different locations of the state during kharif, 2012. Mushrooms have been collected and identified based on available information. Important genera were *Agaricus campestris*, *Boletus* sp., *Calocybe* sp., *Cantharellus* sp., *Coprinus* spp., *Ganoderma lucidum*, *Lycoperdon* sp., *Rassula* sp. and *Termitomyces* spp (Fig 5.3). Besides, five isolates of *Volvariella volvacea* collected from different agro-ecological situations of the state are maintained in pure culture. Molecular characterization of 10 isolates collected earlier has been undertaken. Wild mushroom germplasm collected at Bhubaneswar centre (2012-13).

Coimbatore

Due to failure of both the monsoons, survey work could not be taken in other parts of Tamil Nadu. About 13 mushroom flora were collected from the TNAU Coimbatore.



Fig 5.3. Some mushroom specimens collected from wild by Bhubaneshwar Centre

Ludhiana Centre

In Punjab, survey of field area was conducted during the rainy season (July-August, 2012). Four mushrooms were collected namely, *Coprinus* sp., *Ganoderma* sp., *Schizophyllum commune* and *Volvariella* sp. (Fig.5.4). *Volvariella*, being edible, was further characterized. *Volvariella* was collected from the paddy straw piles in Hoshiarpur. The mushroom was bitter with a typical mushroom smell. Pileus was off white, companulate, non sticky, non hygrophanous with scales, measuring 3-5 cm in diameter. Stipe was white centrally attached round with volva at the base, measuring 5-7cm in length. Gills were white and adnexed. The spore print was creamy white in color. Tissue culture has been prepared for cultivation trials.



Fig 5.4. Mushroom specimens collected from Punjab by Ludhiana Centre

Vellayani Centre

At vellayani centre a total of 7 specimens were collected and cultured. The culture along with the passport data has been submitted to DMR culture collection (Table. 5.3 and Fig 5.5).

Table. 5.3 Specimens collected and Culture deposited to DMR culture collection

Mushroom collected	DMR Accession number	Collected by and original number
<i>unidentified</i>	DMRO-511	Dr L Dass KAU, Vellayani, Kerala (VLYN-12-40)
<i>Laccaria</i>	DMRO-512	Dr L Dass KAU, Vellayani, Kerala (VLYN-12-42)
<i>Chanterellus</i> sp	DMRO-513	Dr L Dass KAU, Vellayani, Kerala (VLYN-12-430)
<i>Volvariella</i> sp	DMRO-514	Dr L Dass KAU, Vellayani, Kerala (VLYN-12-45)
<i>Unidentified</i>	DMRO-515	Dr L Dass KAU, Vellayani, Kerala (VLYN-12-47)
<i>Pleurotus</i> sp	DMRP-287	Dr L Dass KAU, Vellayani, Kerala (VLYN 12-44)
<i>Pleurotus squarrosulus</i>	DMRP-288	Dr L Dass KAU, Vellayani, Kerala (VLYN 12-48)



Fig 5.5. Mushroom specimens collected from Kerala by Vellayani Centre

Samastipur Centre

The survey was conducted during the year 2012 raining season in Samastipur Vaishali, East Champaran, Madhubani, Sheohar. A total of 16 germplasm were collected and identified, which included *Calocybe indica* and *Ganoderma lucidum* (Fig 5.6).



Fig 5.6. Mushroom specimens collected from Bihar by Samastipur Centre

Pantnagar Centre

Total 40 specimens of wild mushrooms were collected during the season. Few species could be identified (Fig 5.7).



Fig 5.7. Mushroom specimens collected from Uttarkhand by Pantnagar Centre

Pune Centre

During 2012-13, a total of 176 mushroom specimens were collected by Pune centre. A total of 29 cultures were submitted to DMR culture collection and accession numbers were obtained (Table 5.4, Fig. 5.8).

Table 5.4 List of wild fleshy fungi collected during Monsoon 2012-13 by Pune centre

Sample No. and Isolate No.	Location	DMR Accession Number	Habitat	Identification
PP-12-176	Pune University	DMRA – 137	Leaf litter	<i>Agaricus</i> sp.
P-12-27	Tapola	DMRA - 138		
PP-12-175	Pune University	DMRO – 285	Leaf litter	<i>Pleurotus</i> sp.
P-12-01	Panchgani	DMRO - 484	Leaf litter	<i>Calvatia</i> sp.-1
P-12-03	Guheghar	DMRO - 485	Dung	
P-12-05	Panchgani	DMRO - 486	Leaf litter	
P-12-08	Gutad	DMRO - 487	Leaf litter	
P-12-14	Mahabaleshwar	DMRO - 488	Leaf litter	
P-12-16	Mahabaleshwar	DMRO - 489	lignicolous	
P-12-23	Khind tapola	DMRO - 490	Leaf litter	<i>Clavaria</i> sp.
P-12-25	Tapola	DMRO - 491	-	<i>Clavaria</i> sp. -2
P-12-31	Tapola	DMRO - 492	Dung	
P-12-32	Dudhoshi	DMRO - 493		
P-12-37	Juma pati	DMRO - 494	Dung	
P-12-56	Sugve	DMRO - 495	-	
P-12-58	Sugve	DMRO - 496	Leaf litter	<i>Gyroporus</i> sp.
P-12-61	Sugve	DMRO - 497	Dung	
PP-12-78	Sakhore	DMRO - 498	Leaf litter	
PP-12-88	Varle	DMRO - 499	Leaf litter	<i>Hypholoma</i> sp.
PP-12-90	Varle	DMRO - 500	Lignicolous	<i>Inonotus</i> sp. -1 *
PP-12-107	Dalwat	DMRO - 501	Leaf litter	<i>Clitopilus prunulus</i>
PP-12-137	Radhanagari	DMRO - 502	Grass land	<i>Hygrophorus limacinus</i>
PP-12-149	Amboli	DMRO - 503	Termite heap	<i>Termitomyces</i> sp.
PP-12-168	Uttur / Bahirewadi	DMRP – 280	On follow tree /Lignicolous	<i>Pleurotus</i> sp.
PP-12-169	Uttur/ Bahirewadi	DMRP – 281	On follow tree /Lignicolous	<i>Pleurotus</i> sp.
PP-12-171	Uttur / Bahirewadi	DMRP – 282	On follow tree /Lignicolous	<i>Pleurotus eous</i>
PP-12-172	Uttur / Bahirewadi	DMRP – 283	On follow tree /Lignicolous	<i>Pleurotus eous</i>
PP-12-174	Uttur / Bahirewadi	DMRP – 284	On follow tree /Lignicolous	<i>Pleurotus</i> sp.

Raipur

An extensive survey was made to collect the mushroom flora from different locality and local markets of Chhattishgarh state. The mushroom collected were *Pleurotus* spp. (strains IGKVm-1-12), Paddy Straw mushroom (*Volvariella* spp: VvR-1-12, VvR-2-12, VvR-3-12, VvR-4-12, VvR-5-12), *Tricholoma* spp-1-12 *Tricholoma* spp-2-12, *Termitomyces* spp, Sarai boda black and white *Scleroderma* spp., *Bans Futu*, *Russula* spp (pink), *Russula* spp. (black), *Russula* spp. (red), . *Amanita* spp. *Coprinus* spp. *Ganoderma* spp (Fig 5.9and Table 5.5).

Table.5.5. Cultures deposited to DMR Culture bank

Name of fungi	Habitat/ Substrates	Place	Edibility
<i>Volvariella</i> spp. (blue)	On leaf litter of Sarai forest	Pali Forest, Bilaspur	edible
<i>Volvariella</i> spp. (white)	Leaf litter of Sarai forest	Pussaur, Raigarh	edible
<i>Volvariella</i> spp. (brown)*	Rotten heap of paddy straw	Tamnar, Raigarh	edible
<i>Volvariella</i> spp. (brown)*	Rotten heap of paddy straw	Tamnar, Raigarh	edible
<i>Volvariella</i> spp. (brown)*	Rotten heap of paddy straw	Tamnar, Raigarh	edible
<i>Volvariella</i> spp. (brown)*	Rotten heap of paddy straw	Tamnar, Raigarh	edible
<i>Volvariella</i> spp.* (brown)	Rotten heap of paddy straw	Tamnar, Raigarh	edible
<i>Tricholoma</i> spp. 1*	On the base of trunk of Sisham Tree	CoA Raipur	edible
<i>Tricholoma</i> spp. 2*	Sarai and Sagwan mixed forest	Bhootnath Temple, Gariabandh	edible
<i>Pleurotus florida</i> *	Rotten twigs of Mango tree	Champa	edible



Fig 5.8. Some mushroom specimens collected from Maharashtra by Pune Centre



Fig 5.9. Mushroom specimens collected from Chattishgarh by Raipur Centre

Ranchi

Local edible mushroom was collected, identified and conserved during 2012. The following local germplasms were collected and preserved. Some of view of the local mushroom sale in market is shown in fig 5.10. The sample of *Polypore* sp. has been deposited to DMR, Solan.



Fig 5.10. Mushroom specimens collected from Jharkhand by Ranchi Centre

6. EXTENSION ACTIVITIES

Udaipur Centre

a. Training

A total of 11 on campus trainings were organised during the year and a Total of 794 farmers, students and entrepreneurs attended the trainings on Button, Oyster and Milky mushroom cultivation technology (Fig.6.1a). The details of trainings are given in Table.6.1. Besides, 7 awareness generation programmes were also organised on oyster mushroom cultivation, which was attended by a total of 382 farmers (Table. 6.1b). yw long duration training wre also oragnized during the year (Table 6.1c). A total 101 tribal women participated in the training programmes.

Table 6.1a On Campus Training programmes held from April 2012 to March 2013

S.No.	Date & duration	Mushroom cultivation	No. of Trainees	Native of Trainees
1	11-04-12 (3 days)	Oyster	Student 16	Udaipur
2	18-07-12 (3 days)	Oyster	Entrepreneurs 7	Jaipur
3	29-08-12 (3 days)	Oyster	Entrepreneurs 7	Udaipur
4	28-09-12 (3 days)	Oyster	Farmers 4	Udaipur and Sirohi
5	01-11-12 (3 days)	Oyster	Farmers 5	Mavli(Udaipur)
6	11-01-13 (3 days)	Oyster	Farmers 7	Udaipur
7.	05-02-13 (3 days)	Oyster, Button & Milky	Farmers 150	Tribal Belt of Udaipur(Raj.)
8.	11-02-13 (3 days)	Oyster, Button & Milky	Farmers 150	Tribal Belt of Udaipur(Raj.)
9.	05-03-13 (3 days)	Oyster, Button & Milky	Farmers 150	Tribal Belt of Udaipur(Raj.)
10.	08-03-13 (3 days)	Oyster, Button & Milky	Farmers 150	Tribal Belt of Udaipur(Raj)
11.	13-03-13 (3 days)	Oyster, Button & Milky	Farmers 150	Tribal Belt of Udaipur(Raj)

Table 6.1b Awareness generation programmes held from April 2012 to March 2013

S. no.	Date & duration	Mushroom cultivation	No. of Trainees	Native of Trainees
1	21-09-12 (One day)	Oyster	Farmers 45	Gujrat
2	29-01-13 (One Day)	Oyster	Farmers 44	Tonk
3	22-02-13 (One Day)	Oyster	Farmers 30	Nimuch (M.P.)
4.	05-03-13 (One Day)	Oyster	Farmers 85	Kota
5.	12-03-13 (One Day)	Oyster	Farmers 108	Bikaner ,Jabua(M.P.)
6	15-03-13 (One Days)	Oyster	Farmers 35	T.S.P
7	15-03-13 (One Days)	Oyster	Farmers 35	T.S.P

Table 6.1c Long duration training programmes held from April 2012 to March 2013

S. No.	Date & duration	Type of mushroom	Name of trainees	Native of Trainees
1.	15-06-12 (1 Month)	Oyster, Button & Milky	Ms. Arshiya Jahan	Amity University, Jaipur
2.	04-02-13 (1 Week)	Button	Mr. Parvat Singh	Mount Abu

b. Mushroom Mela and Exhibition

1. RCA, Campus Udaipur 04-03-2013 Farmers : 5000
2. Badgaon KVK, Udaipur 09-03-2013 Farmers : 6000

c. Development of Mushroom museum: A small mushroom museum is developed in AICRP having Five hundred wild mushroom flora and all cultivated mushrooms in dry as well as in wet form.

d. Supply of quality Mushroom Spawn

550 kg



Fig 6.1. Extension activities of Udaipur Centre

Bhubaneswar Centre

a. Training and Exhibition

During 2012-13, 11 trainings on mushroom cultivation and processing with a total number of 306 trainees and six trainings on mushroom spawn production with a total number of 95 trainees were conducted at the centre (Fig 6.2). The detail of the trainings is given in Table 6.2. Off-campus training programmes were attended at four locations involving 1346 trainees on mushroom cultivation out of which 480 were ladies of different Self Help Groups (SHGs). The centre participated in three Krishi-exhibitions. Besides, five TV programmes and one AIR programme were done during the period. The scientist also participated in two farmers-scientist interaction programmes.

Table 6.2 Details of extension services extended by OUAT, Bhubaneswar centre (2012-13)

Date	Venue	Particulars	No. of participants
A. Training			
7.5.12-11.5.12	OUAT, Bhubaneswar	Mushroom cultivation and processing	33
4.7.12-13.7.12	OUAT, Bhubaneswar	Mushroom spawn production	11
17.7.12-21.7.12	OUAT, Bhubaneswar	Mushroom cultivation and processing	27
24.7.12-28.7.12	OUAT, Bhubaneswar	Mushroom cultivation and processing	27
13.8.12-22.8.12	OUAT, Bhubaneswar	Mushroom spawn production	10
9.9.12-18.9.12	OUAT, Bhubaneswar	Mushroom spawn production	16
11.9.12-15.9.12	OUAT, Bhubaneswar	Mushroom cultivation and processing	20
16.10.12-20.10.12	OUAT, Bhubaneswar	Mushroom cultivation and processing	24
15.11.12-24.11.12	OUAT, Bhubaneswar	Mushroom spawn production	25
21.11.12-23.11.12	OUAT, Bhubaneswar	Mushroom cultivation	18
11.12.12-15.12.12	OUAT, Bhubaneswar	Mushroom cultivation and processing	22

Date	Venue	Particulars	No. of participants
7.1.13-16.1.13	OUAT, Bhubaneswar	Mushroom spawn production	18
28.1.13-1.2.13	OUAT, Bhubaneswar	Mushroom cultivation and processing	37
4.2.13-8.2.13	OUAT, Bhubaneswar	Mushroom cultivation and processing	50
18.2.13-27.2.13	OUAT, Bhubaneswar	Mushroom spawn production	15
10.3.13-14.3.13	OUAT, Bhubaneswar	Mushroom cultivation and processing	25
12.3.13-16.3.13	OUAT, Bhubaneswar	Mushroom cultivation and processing	23
B. Exhibition			
28.8.12-24.8.12	OUAT campus	Large numbers of farmers from all over the state visited the stall	
27.1.13	Community centre, OUAT	Large number of people from the city visited the stall	
7.2.13-9.2.13	OUAT campus	Large numbers of farmers from all over the state visited the stall	

b. Distinguished visitors

- 3.5.12: Dr. Ramanuj Banerjee, Scientist-D, DSIR, New Delhi
 27.7.12: Mr. R.S. Gopalan, Director, Agriculture and Food Production, Government of Odisha
 30.8.12: Mr. Sudhansu Sekhar Mishra, DIG, ITBPF, Govt. of India

c. Revenue generation

A quantity of 2611 packets of spawn (524.2 kg) of paddy straw and oyster mushroom were distributed to the farmers @8.50/packet with a resource generation of Rs.22, 278.50.

d. T.V./Radio talks delivered

Date	Topic	Broadcasted in
14.7.12	Mushroom spawn production	DD6, Bhubaneswar
19.10.12	Commercial oyster mushroom cultivation	DD-6, Bhubaneswar
13.12.12	Improving productivity of oyster mushroom	DD-6, Bhubaneswar
17.1.13	Improving oyster mushroom productivity in Odisha	ETV (Oriya), Hyderabad
9.2.13	Cultivation prospects of mushroom in Koraput district of Odisha	AIR, Jeypore
23.2.13	Summer cultivation of paddy straw mushroom	DD-6, Bhubaneswar

e. Farmers' exposure visit

One thousand three hundred ninety farmers, Government functionaries, scientists, school and college students from all over the state and neighbouring states, visited the centre during 2012-13.



Fig. 6.2. Extension activities by Bhubaneswar centre

Ludhiana Centre

a. Trainings, Demonstrations and Kisan melas

A total of four training programmes of 3-4 days duration were organized which was attended by 195 farmers of adjoining areas. Besides, 9 lecture cum demonstrations and 18 kisan melas or exhibitions were organized during the year 2012-13 (Fig 6.3). The details of which is given in table 6.3.

Table. 6.3 Trainings, Lecture cum demonstrations and kisan melas organized by Ludhiana centre

Date	Venue	No. of participants
15-17.05.12	Training course on cultivation and processing of tropical mushrooms, PAU, Ludhiana	58
10-14.09.12	Mushroom training course for rural farmers, PAU, Ludhiana.	52
8-12.10.12	Mushroom training course for rural farmers, PAU, Ludhiana.	55
6-7.12.12	Mushroom training course for field functionaries of PAU, PAU, Ludhiana	30
Lecture-cum-Demonstrations		
3.7.12	Mushroom production technology for trainees from KVK, Bahawal	
7.8.12	Mushrooms processing at Workshop on value addition in agril. Produce at PAMETI, Ludhiana	
6.9.12	Mushroom production technology at KBD Mushroom Centre, Hambran, Ludhiana	
9.10.12	Mushroom production technology at KVK, Langroya	
4.10.12	Mushroom production technology at Kisan Club Meet, PAU, Ludhiana.	
1-4.12.12	Agrotech 2012 at Parade Ground, Chandigarh	
20-21.12.12	PAU Alumni Meet, PAU, Ludhiana	
1.2.13	Lecture cum Demonstration at Village Chakdesraj, Ludhiana	
7.2.13	Annual Function, Punjab Kisan Club, PAU, Ludhiana	
Kisan Melas/Exhibitions		
29.4.12	Exhibition at Military Base, Baddowal	
02.05.12	National seminar on women and rural development, PAU, Ludhiana	
05.09.12	Regional Kisan Mela at KVK, Amritsar	
11.09.12	Regional Kisan Mela at Bathinda	
14.09.12	Regional Kisan Mela at Rauni	
21-22.09.12	Kisan Mela at PAU, Ludhiana	
25.09.12	Regional Kisan Mela at Gurdaspur	
27.09.12	Regional Kisan Mela at Faridkot	
17.10.12	PAU Foundation Day Exhibition	
20-22.11.12	7 th National conference on KVKs, PAU, Ludhiana	
27-29.11.12	International Conference on sustainable agriculture for food and livelihood, PAU, Ludhiana	
01.03.13	Regional Kisan Mela at Ballawal	
05.03.13	Regional Kisan Mela at KVK, Amritsar	
07.03.13	Regional Kisan Mela at Gurdaspur	
11.03.13	Regional Kisan Mela at Rauni	
15-16.03.13	Kisan Mela at PAU, Ludhiana	
19.03.13	Regional Kisan Mela at Faridkot	
21.03.13	Regional Kisan Mela at Bathinda	
b. Visits		
29.4.12	Visit of Mushroom Research Center, PAU by students and faculty of Kerala Agril Univ., Kerala	40 students
14.7.12	Visit of Mushroom Research Center, PAU by Acharya NG Ranga Agril Uni. SD Agril. College, Tirupati, AP faculty and students	20 girls, 20 boys & 2 Faculty
1.9.12	Visit of The Director, DMR, Solan and Principal Scientist	-
13-9-12	Visit of Mushroom Research Center, PAU by CoA, OUAT, Arkahalipur, Odisha faculty and students	19 girls, 26 boys & 2 Faculty
4.10.12	Visit of The Director, DMR, Solan	-
7.10.12	Visit of Mushroom Research Center, PAU by Univ of Hortl Sci, College of Horticulture, Kolar Bagalkot, Karnatka faculty and students	13 girls, 17 boys & 3 faculty
17.10.12	Visit of Mushroom Research Center, PAU by Anbil Dharamlingam Agril College and Res Institute, Navalur, Kuttapattu, Tiruchirapalli, TNAU, TN faculty and students	78 students & 4 Faculty
1.11.12	Visit of Mushroom Research Center, PAU by College of Agriculture, Anand Agril Uni., Anand Gujrat faculty and students	14 girls, 65 boys & 4 Faculty
3.11.12	Visit of Mushroom Research Center, PAU by Uttar Banga Krishi Vishawavidyalaya, Pindibari, Cooch Bihar, W Bengal faculty and students	10 girls, 40 boys & 3 Faculty

22.11.12	Visit of Mushroom Research Center, PAU by Univ. Of Agril Sci, GKVK, Bangalore faculty and students	35 girls, 20boys & 2 Faculty
29.12.12	Visit of Mushroom Research Center, PAU by faculty and students from GHG Khalsa College Gurur, Sadhar	44 students, 2 Faculty
16.1.13	Visit of Mushroom Research Center, PAU by Secretaries of Primary Agri Cooperative Societies of Punjab	22
31.1.13	Visit of Mushroom Research Center, PAU by Secretaries of Primary Agri Cooperative Societies of Punjab	30
1.2.13	Visit of The Director, DMR, Solan	-
14.2.13	Visit of Mushroom Research Center, PAU by students and faculty of Univ. of Agril sci., Dharwal, Bijapur	80
18.2.13	Visit of The Director, DMR, Solan	-

c. Seminar/Workshop

31.05.12-01.06.12	XIV Workshop of All India Research Project on Mushrooms at OUAT, Bhubneshwar
27-29. 1.12	International Conference on sustainable Agriculture, PAU, Ludhiana
22-23.1.13	Horticulture Development officers Workshop, PAU, Ludhiana

TV Talk

10-4-12	Khumban di kasht, DDK, Jalandhar
13.09.12	Garam rutt dian khumban di kasht, DDK, Jalandhar

d. Spawn supply

During the year 2012-13, 1024 kg mushroom spawn belonging to *Agaricus bisporus*, *Calocybe indica*, *Pleurotus* spp. and *Volvariella volvacea* was supplied to the mushroom growers of Punjab.



Fig 6.3. Extension activities of Ludhiana Centre

Vellayani Centre

a. Training and Kisan Melas

During 2012-13 Vellayani centre has organized five training programmes of two days duration and a total of 88 participants attended the training (Table. 6.4). The centre has also organized a one-day Kisan mela on 4th March 2013, which was attended by almost 150 farmers from all over the Kerala (Fig 6.4).

Table. 6.4. Training programmes and Kisan mela organized by Vellayani centre

Topic	Category	Date	Days	Participants
Spawn production and mushroom cultivation	Educated unemployed youth	17 th -18 th April 12	2	13
Spawn production and mushroom cultivation	Educated unemployed youth	28 th -29 th June 12	2	27
Spawn production and mushroom cultivation	Educated unemployed youth	20 th -21 st July 12	2	17
Spawn production and mushroom cultivation	Educated unemployed youth	19-20 Oct 2012	2	19
Spawn production and mushroom cultivation	Educated unemployed youth	7-8 Feb 2013	2	20
Mushroom Mela organized at College of Agriculture Vellayani	Mushroom growers from all over Kerala	4 th March	1	150



Fig. 6.4. Extension activities of Vellayani Centre

Pune Centre

a. Trainings and Exhibitions

The different types of extension activities were undertaken by the scientists working at AICRP on Mushroom, Pune Centre in order to promote and popularize the mushroom cultivation technology in Maharashtra state during 2011-12 (Table 6.5). To transfer the technology of mushroom cultivation, the scientists of this project conducted twelve (12) training programmes on first Saturday of every month. Total 149 trainees were participated in these trainings (Fig 6.5).

Table. 6.5 Training programmes organized by Pune Centre

Sr. No.	Name of training	Date	No. of Participants
1	Oyster Mushroom Cultivation Training Programme	07.04.2012	08
2	Oyster Mushroom Cultivation Training Programme	05.05.2012	07
3	Oyster Mushroom Cultivation Training Programme	02.06.2012	07
4	Oyster Mushroom Cultivation Training Programme	07.07.2012	07
5	Oyster Mushroom Cultivation Training Programme	04.08.2012	10
6	Oyster Mushroom Cultivation Training Programme	01.09.2012	14
7	Oyster Mushroom Cultivation Training Programme	06.10.2012	28
8	Oyster Mushroom Cultivation Training Programme	03.11.2012	23
9	Oyster Mushroom Cultivation Training Programme	01.12.2012	11
10	Oyster Mushroom Cultivation Training Programme	05.01.2013	09
11	Oyster Mushroom Cultivation Training Programme	02.02.2013	17
12	Oyster Mushroom Cultivation Training Programme	02.03.2013	08

b. Mass Demonstration

Three mass demonstrations cum trainings were organized by this project to popularize oyster mushroom among rural women.

1. Village – Kasurde, Tal- Bhore, Dist: Pune, on 13.07.2012.
2. Village – Mandawgan Pharatha, Tal- Shirur, Dist: Pune, on 16.07.2012.
3. Village – Pargaon, Tal- Daund, Dist: Pune, on 14.09.2012.

The technology of mushroom cultivation was also transferred by sending pamphlets by post as well as by participating in exhibitions and attending farmers rallies organized by different agencies at different places.

1. Agril Exhibition, organized by AGROONE at College of Agriculture, Pune.
2. KISSAN an international Agril. Exhibitionat at Village Moshi, Dist– Pune

c. Other Activities

- | | |
|--|---|
| 1. Postal quires | 24 |
| 2. Quires by e-mail | 18 |
| 3. Radio programme/s | 05 |
| 4. Visitors to mushroom project | 2150 |
| (Including school/college students, farmers/mushroom growers/ research workers, teachers etc.) | |
| 5. Spawn production | 713 kg |
| 6. Radio Talks | Dr. D. B. Shinde (1), Dr. A. M. Tirmali (2), Mr. V. K. Bhalerao (2) |

e. Academic activities

In addition to mandatory research activities the staffs of mushroom project were also engaged in teaching activities for undergraduate and postgraduate students. A total four M.Sc. students were guided during the year.



Fig. 6.5. Extension activities of Pune Centre

Samstipur Centre

a. Trainings and Exhibitions

During the year 2012-13, a total of four trainings of 5-6 days were organized by Samastipur centre in collaboration of ATMA of different districts of Bihar (Fig 6.7). The trainings were attended by 45 male and 66 female participants (Table. 6.6). Besides, three one-day awareness programmes were conducted for under trial prisoners to give them self-employment opportunity. Out of 31 Jail inmates trained, one prisoners Sri Uday Singh

released in Nov. 2012. He adopted mushroom production as profession and earned Rs. 75,980.00 by Oyster and Button mushroom production. Four radio talks were also delivered through All India Radio.

Table 6.6 Trainings organized by Samastipur centre

Date	Venue	days	No. of Participants			Sponsored by
			Male	Female	Total	
10.10.12 to 14.10.12	RAU, Pusa	5 days	8	17	25	ATMA, Darbhanga
02.01.13 to 07.01.13	RAU, Pusa	6 days	13	21	34	Self Financed
07.01.13 to 10.01.13	RAU, Pusa	5 days	24	1	25	ATMA, Sitamarhi
20.03.13 to 24.03.13	RAU, Pusa	5 days	-	27	27	ATMA, Nalanda
One day awareness cum Training programme						
08.01.12	Darbhanga Mandal Jail	1 day	50	-	50	AICRP, RAU
11.02.13	Central Jail, Muzaffarpur	1 day	46	23	89	AICRP, RAU
12.02.13	Pusa Campus	1 day	40	-	40	AICRP, RAU
Spawn Production Training						
18.03.13 to 23.03.13	RAU, Pusa	6 days	1	8	9	AICRP, Pusa

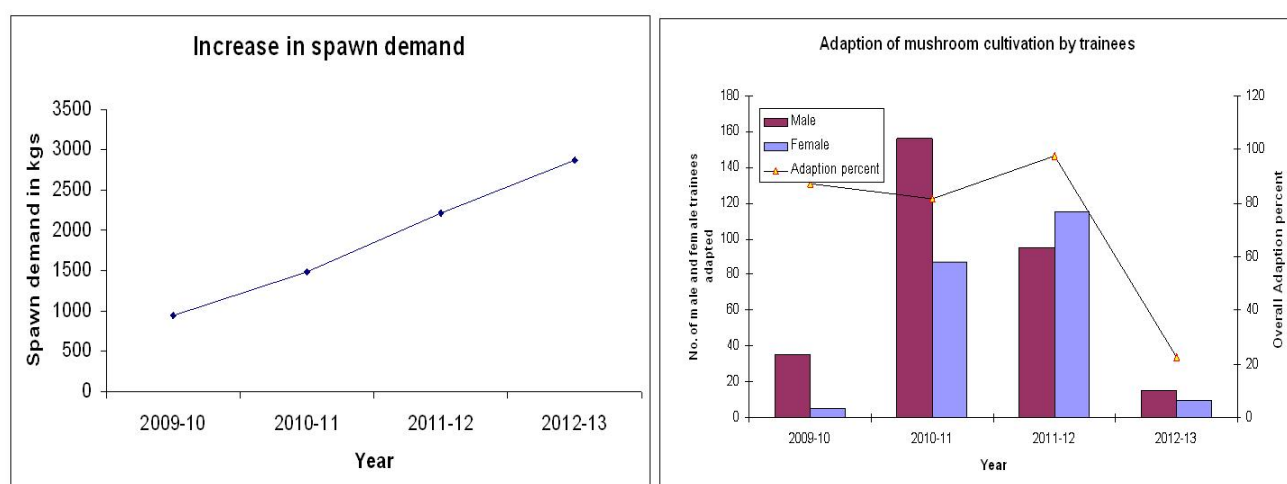


Fig 6.6. Increase in spawn demand and adaption per cent for mushroom cultivation by training given by Samastipur centre

b. Kisan Melas and Gosthi

1. One Kisan Gosthi was organized at Pokharia Village of Samastipur District on 17.05.12 and more 600 farmers participated the kisan gosthi out of which 400 were women participants.
2. Mushroom stall was placed in State level **Kisan Mela** organised by RAU from 02nd to 4th March 2013. A large number of farmers from Bihar, Jharkhand and UP and West Bengal were visited Mushroom Hub. Growers from all over Bihar placed Mushroom Stall.
3. Mushroom stall was placed in Samastipur "**Bihar Diwas**" organized from March 22-24 March at Samastipur. A large number of visitors exposed mushroom production and consumption technology. Two hundred women growers trained from RAU were also placed the mushroom stalls. They were honoured by District administration with a certificate. Dr Shwet Kamal, DMR Solan also interacted with these growers and given the tips for higher yield of mushroom (Fig 6.7).

c. VIP Visitors

1. Dr. C. Prasad, Ex-DDG Extension, visited mushroom production programme.
2. NAIP National Coordinator visited mushroom production programme.
3. Commissioner, Darbhanga visited mushroom production programme on 04.02.2013.
4. Hon. Union Agriculture Minister State Mr. Tariq Anwar visited on 2nd March 2013 at RAU, Pusa, visited Kisan Mela – Mushroom Hub.
5. National Monitoring Team (Pulses) visited mushroom production programme on 20.03.2013.

6. Ex-Vice Chancellor, Vidhan Chand Agricultural University, WB visited mushroom production programme on 21.03.2013.

d. Recognition

1. Project financed by Govt. of Bihar Twelve farmers sanctioned 15 Lakhs (each) for spawn lab establishment, 15 farmers 20 lakhs each for compost production and 8 farmers, 50 lakhs for integrated mushroom unit establishment at 90 % subsidy.



Fig 6.7. Extension activities of Samastipur centre

Pantnagar Centre

a. Trainings and exhibitions

During the year 2012-13, Pantnagar centre has organized a total of 9 training programmes, which were attended by 250 farmers (Table 6.7). Besides, ten demonstrations for button mushroom cultivation were also organized at farmers field (Table. 6.8 and Fig 6.8).

Table. 6.7. Training programmes organized by Pantnagar centre during 2012-13

Venue	Date and duration	No. of beneficiaries
MRTC, Pantnagar	Sept. 24-30, 2012	18
Shantipuri No. 2	Dec. 27, 2012	32
Raghavnagar	Dec. 29, 2012	30
Shantipuri No. 4	Jan. 10, 2013	30
Jawaharnagar	Jan 12, 2013	29
Gadarpur	Jan. 29, 2013	30
Faujimatikota	Jan 31, 2013	30
MRTC, Pantnagar	March 04-06, 2013	19
MRTC, Pantnagar	March 21-23, 2013	32
Total		250

Table. 6.8. Front line demonstration for button mushroom by Pantnagar centre

Name	Place	Spawning date	Casing date	Yield Per bag (g)	B.E. (%)
Kamal Kumar	Chandipur	21.12.2012	11.01.2013	1525	15.25
Sukhdev Singh	Chandipur	21.12.2012	11.01.2013	1575	15.75
Ashok Rai	Chandipur	21.12.2012	11.01.2013	1650	16.50
Prakash Tewari	Shantipuri-2	28.12.2012	15.01.2013	1550	15.50
S.S. Karki	Shantipuri-2	28.12.2012	15.01.2013	1630	16.30
Lakshman Singh	Shantipuri-2	28.12.2012	15.01.2013	1560	15.60
Sher Singh	Shantipuri-2	28.12.2012	15.01.2013	1450	14.50
Harish Singh	Bindukhatta	30.12.2012	17.01.2013	1800	18.00
Raaju Pandey	Bindukhatta	30.12.2012	17.01.2013	1750	17.50
Amarjeet Bajaj	Gadarpur	30.12.2012	17.01.2013	1840	18.40

b. Kisan Mela

570 farmers were visited the centre during Kisan Mela w.e.f. Oct 04-07, 2012 and 179 farmers during Kisan mela w.e.f. March 08-11, 2013. They were informed the mushroom production technology. Looking the standing crops of mushrooms at the centre also experienced them. During the Kisan Gosthi program of the Kisan Mela, scientists answered the mushroom related queries of the farmers.

c. Mushroom Museum

Mushroom museum has been developed at the centre and is being updated time to time.

d. Spawn and Compost Supply

Mushroom spawn (1183.5 Kg.), master spawn (16 bottles) and culture tubes (39 Nos.) of different species/strains supplied to the growers and spawn producers during the year 2012-13. The centre has supplied 332.4 Qtl. of compost and 3702 kg casing soil to farmers during the year 2012-13.



Fig 6.8. Extension activities of Pantnagar Centre

Faizabad Centre

a. Training

In order to promote mushroom cultivation in eastern Uttar Pradesh concerted efforts were made through trainings, demonstrations, advisory services, participation in Kisan Mela, Kisan Gosthi and by supplying spawn to growers for cultivation of various species of mushroom in different seasons (Fig 6.9).

1. Number of growers trained	125
2. Number of trainings organized	04
3. Gosthis organized/participated	03
4. Demonstration in Kisan Mela	02
5. Demonstrations	02
6. Number of visitors	885

b. Resource generation

1. Fruiting bodies sale	102 kg
2. Spawn sale	354 kg



Fig. 6.9. Extension activities of Faizabad centre

Raipur Centre

a. Training

A total of 18 training programme on mushroom cultivation technology was organized during the year by Raipur centre, which was attended by 520 farmers (Table. 6.12). Also three mushroom day/exhibitions were organized, which was participated by more than 26000 farmers (Table. 6.13). Besides, seven visits of school children were also organized and about 397 students participated (Table. 6.14). In experiential learning programme a total of 8 students were trained in spawn and mushroom production technology (Fig 6.10).

Table 6.12 Farmers training organized on various aspects of mushroom by Raipur Centre

Sl. No.	Activities	Organizing center	No. of Training	Participation	Funding agency
01	Mushroom Cultivation & Processing Technology	Mushroom Res Lab. IGKV Raipur	07	223	RKVY (7)
02	Spawn Production Technology.	-do-	05	117	AICRP (2), RKVY, Raipur (2) and Self financed (1)
03	Mushroom cultivation, Processing and spawn production Technology	KVK s of IGKV Raipur	06	180	RKVY, AICRP and TSP
TOTAL			18	520	

Table 6.13 Farmers training through, mushroom day; exhibitions; farmer and students group visits

Sl. No.	Activity	No.	Duration	Organized by	Participation	Funded by
01	University Kisan Mela of IGKV CoA, Raipur	01	03 days	IGKV Raipur and State Govt. Chhattisgarh	20000	IGKV Raipur and State Govt.
02	Rajyotsav Exhibition	01	05 days	Govt. of Chhattisgarh	5000	IGKV Raipur
03	Farmers group visit	10	01 day each	IFFCO; NHM and State Agril Dept. CG, MP, MH and Orissa	738	--
Total					26.083	

Table. 6.14 Students visit to the Mushroom Research Lab IGKV, Chhattisgarh

1.	Goel International School Raipur	70	1 day	Organized by Respective School Administration
2.	Multipurpose High School, Raipur,	52	1 day	Organized by Respective School Administration
3.	Govt. High School, Jora, Raipur	55	1 day	Organized by Respective School Administration
4.	Girls Higher Secondary School Shantinagar	56	1 day	Organized by Respective School Administration
5.	Mahila Mahavidyalaya Bhillai	97	1 day	Organized by Respective School Administration
6.	Govt. Science College, Raipur	32	1 day	Organized by Respective School Administration
7.	G. D Central University, Bilaspur	35	1 day	Organized by Respective School Administration
Total		397		

b. Revenue generation

Mushroom Spawn Produced	29 Quintals
Mushroom spawn (Self Use)	10 Quintals
Sale of Mushroom Spawn	19 Quintals

c. Developmental Works

Mushroom Museum, Installation of Semi- Automatic Spawn Production Machine, Training facilities (Hall, Corridor).

d. VIPs Visit

1. Hon'ble Vice Chancellor Dr. S.K. Patil, IGKV, Raipur visited mushroom research lab on November 2011 and obtained informations regarding mushroom cultivation, processing and marketing activities.
2. Dr. Manjit Singh, Director, DMR, Solan, H.P. (ICAR)
3. Dr. V. P. Sharma, Principal Scientist DMR, Solan, H.P. (ICAR)
4. Dr. S. A. Sarnaik, Director Research , IGKV, Raipur visited mushroom research lab on time to time and obtained informations regarding mushroom cultivation, processing and marketing activities.
5. Dr. O.P. Kashyap, Dean, CoA, Raipur visited mushroom research lab on time to time and obtained informations regarding mushroom cultivation, processing and marketing activities.
6. Dr. Motiramani, Dean, CoA, Kawardha visited mushroom research lab on time to time and obtained informations regarding mushroom cultivation, processing and marketing activities
7. Joint Secretary, RKVY Dr. R.K. Singh visited mushroom research lab and obtained informations regarding mushroom cultivation, processing and marketing.

8. University Accreditation Team
9. Ic A.D.G. Horticulture
10. Director Forest Services, Chhattisgarh
11. Padmshree Samsad Begum, Gunderdehi, Chhattisgarh
12. Dr. Humbarde, Director General CGCOST, Raipur, Chhattisgarh
13. Shri Rajesh Mishra D. G. Central Jail, Raipur



Fig 6.10. Extension activities of Raipur Centre

e. TV / Radio Talks

1. Awadhiya G.K (2012). Mushroom beej Utpadan kaise kare. Bhueian ke goth. Doordarshan Raipur 24 Oct.2012
2. Awadhiya G.K (2012). Mushroom Utpadan Ghar bhaithe Rojgar 5 Dec.2012 Krishi darshan Doordarshan Raipur
3. Chandravanshi S.S. (2012). Mushroom ke Utpadan Vidhi Evm Samasya. Bhueian ke goth. Doordarshan Raipur
4. Awadhiya G.K (2012). Oyster mushroom ke kheti kab aur kaise lagat evam kharch. Z 24 Chhattisgarh. 18 May 2012
5. Awadhiya G.K (2012). Mushroom ki kheti and Arthik visleshan Akashwani Raipur.
6. Awadhiya G.K (2012). Mushroom ke Aushadhiy evam Pushtic gun. Krishi Pricharcha , Akashwani Raipur.
7. Awadhiya G.K (2012). 'Oyster Mushroom ki kheti kaise karen' recorded at our laboratory for micro telecast in three district districts i.e. Bilaspur, Janjgir, Korba by All India Television
8. Awadhiya G.K (2012). 'Oyster Mushroom beej (Spawn) utpadan taknik" recorded at our laboratory for micro telecast in three districts i.e. Bilaspur, Janjgir korba by All India Television

Ranchi Centre

a. Trainings

Mushroom training was conducted in May to September in which fifty farmers have participated in campus (3days) sponsored by SIRD, Ranchi and 170 farmers were trained in button mushroom cultivation in outside campus organized by KGVK Rukka (2days).

b. Supply of Spawn

A total of 3260 Kg spawn was made out of which 2439.8 kg spawn was sold to farmers and 329.6 kg spawn were used for experimentation/demonstration. Hence total of 2769.4 kg spawn were used during six months from

April to September 2012(Table 3).The total of 85.0 kg milky mushroom under demonstration was obtained and 5 cultures were sold to farmers from May to August 2012.

Coimbatore Centre

a. Trainings

A total of 12 one day training and 4 five day training programmes were organized by the Coimbatore centre (Table. 6.15) in which a total of 699 farmers participated. Out of trainees 528 male farmers and 173 female farmers participated the training programme (Fig 6.11). In addition 25 training classes were organized for school children and a total of 2250 students participated (Table. 6.16). 19 special training programmes were organized for college students and 18 for self help groups (Table. 6.17).

Table. 6.15. Training programmes organized by Coimbatore centre during 2012-13

S.No	Date	Men participated	Women participated	Total Participant	Total amount
1.	09.04.2012	30	7	37	9250.00
2.	07.05.2012	24	9	33	8250.00
3.	05.06.2012	17	10	27	6750.00
4.	05.07.2012	48	20	68	17000.00
5.	06.08.2012	81	15	81	20250.00
6.	05.09.2012	23	10	33	8250.00
7.	05.10.2012	39	23	62	15500.00
8.	05.11.2012	44	6	50	12500.00
9.	05.12.2012	43	11	54	13500.00
10.	07.01.2013	60	10	70	17500.00
11.	05.02.2013	40	35	75	18750.00
12.	05.03.2013	61	13	74	18500.00
Total		510	169	679	1,69,750

Five Day Training programmes				
S.No	Date	Men Participant	Women Participant	Total Participant
1.	11.06.2012 to 15 .06.2012	5	1	6
2.	06.08.2012 to 10.08.2012	4	3	7
3.	08.10.2012 to 12.10.2012	6	-	6
4.	17.12.2012 to 21.12.2012	3	-	3
Total		18	4	22

Table. 6.16. Special training classes for school children organized by Coimbatore centre

S.No	Date	Name of the school	No.of.Staff	No.of. Students	Total
1.	19-4-2012.	The Earnest Academy (CBSE), Pazhangarai, Tirupur	10	116	126
2.	20-4-2012.	KIDS Club School, Sheriff Colony, Tirupur	10	120	130
3.	30-4-2012.	St. Joesph Matric HSS, Trichy road, Coimbatore	3	49	52
4.	01-08-2012	GRG School, Coimbatore	1	3	4
5.	07-08-2012	ELGI Matric. and HSS, Vellalore	3	96	99
6.	28-08-2012	Subbiah Central school, Tirupur	4	84	88
7.	28-08-2012	Agaram Public Scholl, Dharapuram	3	50	53
8.	28-08-2012	Govt. HSS, Kannukudi, Thanjavur	1	19	20
9.	28-08-2012	Govt. HSS,Uranthairayarkudikadu, Thanjavur	2	35	37
10.	27-09-2012	Jothi High School, R. Reddiapatti, Rajapalayam	4	114	118
11.	09-10-2012	GD Matriculation School, Coimbatore	5	53	58
12.	12-10-2012	Vivekalaya Matriculation School, Coimbatore	6	250	256
13.	19-11-2012	Corp Higher Sec. School, RS puram Coimbatore	2	10	12
14.	04-12-2012	Govt. Higher Sec. School, Kinathukadavu	1	39	40
15.	05-12-2012	Govt. Higher Sec. School, Vettaikkranpudur	3	32	35
16.	06-12-2012	Govt. Higher Sec. School, Kalkulam, KK district	3	90	93

17.	10-12-2012	Govt. Higher Sec. School, Mettupalayam	3	43	46
18.	11-01-2013	SSVM World School. Singanallur, Coimbatore	3	40	43
19.	11-01-2013	S.F.V Higher Sec. School, Coimbatore	2	28	30
20.	11-01-2013	Govt. Boys Higher Sec. School, Coimbatore	2	36	38
21.	28-01-2013	PSBB Millenium School, Somayampalayam, Coim	6	220	226
22.	29-01-2013	PSBB Millenium School, Coimbatore	8	174	182
23.	06-02-2013	Perks Matriculation higher Sec School, Coimbatore	6	230	236
24.	15-03-2013	St..Antony matric HR.sec.school, erode	6	54	60
25.	19-03-2013	Century foundation matric higher sec school, Tirupur	8	160	168
Total					2250

Table. 6.17. Special training classes for college students and self help groups organized by Coimbatore centre

S.No	Date	Name of the College	Staff	Student	Total
1.	17-4-2012	Thanathai Roever Institute of Agril and Rural Devel, Perambalur	2	47	49
2.	17-4-2012	II year Diploma in Agriculture from ARS, Kovilpatti	2	36	38
3.	20-04-2012	Diploma in agricultural students from ORS, Tindivanam	2	55	57
4.	12-09-2012	St. Thomas College, Kozhenchery	2	23	25
5.	03-10-2012.	P.M. Thevar College, Usilampatti, Madurai	3	51	54
6.	03-10-2012.	II yr Diploma course of ARS, Bhavanisagar	2	47	49
7.	20-11-2012	PS MU College, Tiruranyedi, Malapuram Kerala	6	39	45
8.	28-11-2012	Farook college ,Calicut	4	29	33
9.	05-12-2012	Govt. College, Madavilly, Calicut	2	25	27
10.	29-01-2013	M.Sc (Industrial Biotech) of Bharathia University, Coimbatore	2	19	21
11.	30-01-2013	Ethiraj College for Women, Pl Biol and Pl Biotech, Chennai	3	34	37
12.	07-02-2013	Sri venkateswara University, Dept. of Botany,Tirupati	3	32	35
13.	14-02-2013	B.Sc. (Forestry), Forest College and Res. Instt, Mettupalaym	1	15	16
14.	19-02-2013	I B.S (ABM) students of Applied Microbiology,TNAU	2	38	40
15.	19-02-2013	Instt. of Agriculture, ARS, Kovilpatti	2	42	44
16.	20-02-2013	B.Tech. (FPE) students of Food Microbiology, TNAU	2	52	54
17.	25-02-2013	III and IV B.Sc(Ag.) of PAJANCOA and RI, Karaikkal	2	26	28
18.	07-03-2013	Diploma II year students ,CSIA,ORS,Tindivanam	2	46	48
19.	16-03-2013	Kongunadu arts and science college Coimbatore	2	21	23
Total					725

Special training classes to Self Help Groups /Farmer groups

S.No	Date	Name of the visitors	Staff	Farmer	Total
1.	29-03-2012	Farmers from CENDECT KVK, Theni.	2	13	15
2.	10-5-2012	Farmers from KVK, Belgaum, Karnataka	1	21	22
3.	13-07-2012	Farmers from D.W.D.A district watershed development agency	2	90	92
4.	17-7-2012	Farmers from Dist Watershed Development Agency (Dindugal)	4	90	94
5.	24-07-2012	Farmers from Dist Watershed Development Agency (Dindugal)	3	70	73
6.	26-07-2012	Farmers from vellore	-	4	4
7.	10-8-2012.	SHG members from Sathyamangalam	2	38	40
8.	11-09-2012	ATMA farmers of Edappadi taluk of Salem district	1	25	26
9.	25-09-2012.	Farmers from DWDA, Project Officer, Dindigul	2	90	92
10.	04-10-2012	Farmers from ATMA scheme of ADA, Bodinayakanoor	5	50	55
11.	06-11-2012	Farmers from Sakthi Trust, Madurai	-	34	34
12.	27-12-2012	Farmers from ATMA scheme of Avudayarkoil -Pudukkottai	2	37	39
13.	04-01-2013	Farmers from ATMA scheme of Chengam,-Thiruvannamalai	3	40	43
14.	05-01-2013	B.tech students of Distance Learning (ODL) from TNAU	-	53	53
15.	20-02-2013	CAFTA Training of the Dept. of Agronomy, TNAU, Coimbatore	-	10	10
16.	26-02-2013	Kerala farmers from Idukki	1	42	43
17.	02-03-2013	Farmers from ATMA scheme of ADA, Cuddalore	1	14	15
18.	20-03-2013	Farmers from Karunya university ,Coimbatore	1	22	23
19.		Total			773

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b. VIP/Foreign visitors

14.12.2012	Th.Kumar J Pandiyan, Board Member Of TNAU
21.03.2013	Dr.Manjit singh, Director DMR, Solan
22.03.2013	Dr.Manjit singh, Director DMR, Solan

c. Special events

1. Doordharsan Kendra Chennai videographed spawn production and mushroom cultivation and the programme was telecasted on 01.02.13.
2. Mushroom mela was jointly organized by Mushroom Research and Training Centre, Dept. of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore and Directorate of Muhsroom Research, Solan, Himachal Pradesh at VG Mushroom Farm, Kamamalpuram Village, Salem district of Tamil Nadu on 22-03-2013. Dr. Manjit Singh, Director, DMR, Solan inaugurated the mela and the mela was attended by more than 150 farmers.

d. Revenue generation

1. Mother spawn	68 kg
2. Mushroom book	45
3. Culture tube	5
4. Spawned bed	7665



Fig. 6.11. Extension activities of Coimbatore centre

Pasighat Centre

1. A total of ten trainings have been conducted, in which a total of 160 farmers were trained (Table 6.18).
2. Mushroom production technology was exhibited during Northeast agrifair Dura, mehalaya 2013 and Arunachal Horti Expoin pasighat 2012, in auditorium inaugural function stall (Fig 6.12).
3. A total of 212 kgs of quality mushroom spawn to mushroom growers were supplied.
4. 5 bottles of mother spawn were supplied.
5. A total of 39.4 kg fresh mushroom was sold.
6. Monthly visited the progressive Mr Taimur Jamoh. Mrs Oti Sitang and Gekong Pertin production unit. Major problem is rat caused yield lose upto 50 %. This year Mr Gekong Pertin started the mushroom production unit.

7. Director Genral, ICAR visited the mushroom lab at CAU, Pasighat.



Fig. 6.12. Extension activities of Pasighat Centre

Table. 6.18. Training programmes conducted by Pasighat centre

S.No	Date	Place/Village	No of participants
1	5-12-12	REMI VILLAGE, PASIGHAT	25
2	15-3-13	CHF, PASIGHAT	15
3	20-3-13	GTC, Pasighat	40
4	20-3-13	CHF, Pasighat	30
5	25-3-13	CHF, Pasighat	30
6	26-3-13	CHF, Pasighat	20
7	Spawn production training	CHF,CAU, Pasighat	one
8	Spawn production training	CHF,CAU, Pasighat	One
9	Spawn production training	CHF,CAU, Pasighat	One
10	Spawn production training	Mebo, east siang district	One

Barapani Centre

a. Training

Four trainings were conducted on mushroom cultivation, which included farmers, entrepreneurs and students. Spawn was also distributed to farmers under Tribal Sub Plan (Table 6.19).

Table 6.19. Training organized by Barapani Centre during 2012-13

S. No.	Activity	Duration	No. of Participants
1.	Seven days training programme on mushroom cultivation	4.12.12 to 10.12.12	20
2.	Ten days Training (spawn production and mushroom cultivation) to students from Doon PG College	16.03.13 to 25.03.13	2
3.	Two days training program on mushroom cultivation	31.10.12 to 01.11.12	29
4.	One day training program on mushroom cultivation	09.08.12	3

b. Demonstrations, Exhibitions etc.

S. No.	Activity	Date	No. of Participants
1.	Demonstration to students from Rolling stone school	21.11.12	16
2.	Demonstration to farmers from Mizoram	21.11.12	22
3.	Display of mushrooms in Exhibition on Foundation day of the Institute	09.01.13	Many farmers

c. Revenue generation

S. No.	Commodity	Quantity	Amount (Rs.)
1.	Spawn sale	712.2 kg	35,610
2.	Fresh Mushroom	159.6 kg	7,980
3.	Culture tubes	38	1900
	Total		45,490

d. Visitors

1. Dr. Manjit Singh, Director DMR, Solan on 26.02.13.

Nauni Centre

a. Training

1. Delivered lecture on 'Khumb Ki Kheti' in the Training programme on "Sabzion ki sanrakshit kheti" at Nauni w.e.f.2-5 July 2012 (Fig 6.13).
2. Delivered lecture on 'Mushroom Production' in the Training programme on "Sabzion ki kam paidavar:karan evam nidan" at Nauni w.e.f. 16-20 July 2012
3. Delivered lecture on 'Mushroom Cultivation' in the Training programme on "Training on watershed management for the user groups, SHGs and Farmers of Basantpur Block,Distt.Shimla at KVK,kandaghat w.e.f.26-31 Aug.2012
4. Delivered lecture on 'Khumb Utpadan evam praksehtra bhraman' in the Training programme on "Ekikrit Jalagam prabandhan karyakram ke anterगत Bagvani,pashupalan,sabzi utpadan evam tikau azibika hetu anya chote byabsaye tatha gatividhiyan" at Nauni,w.e.f.4-6 Sep.2012
5. Delivered lecture on 'Khumb Utpadan Hetu compost tayar karne ke liye laghu evam lambi vidhi ka vyabharik pradarshan' in the Training programme on "Khumb Utpadan" at Nauni w.e.f. 10-14 Sep.2012
6. Delivered lecture on 'Khumb Utpadan Hetu compost tayar karne ke liye laghu evam lambi vidhi ka vyabharik pradarshan' in the Training programme on "Khumb Utpadan" at Nauni w.e.f. 10-14 Sep.2012
7. Delivered lecture on 'Khumb Ki Kheti evam Prakshetra Bhraman' in the Training programme on "Ekikrit jalagam vikas prabandhan ke antragat bagvani,vaniki evam sambandhit vishyon par kisano hetu prasikshan shivir" at Nauni w.e.f. 29 Sep.-1 Oct.2012
8. Delivered lecture on 'Mushroom Cultivation' in the Training programme on "Training on watershed management for the user groups,SHGs and Farmers of Basantpur Block,Distt.Shimla at Nauni w.e.f.7-10 Oct.2012

b. TV / Radio talks

- a. TV talks delivered: Dr.Dharmesh Gupta delivered TV talk on "Button khumb ka Utpadan" on 30/10/12 and telecasted on 2/11/12.
- b. Radio Talks Delivered:Dr.Dharmesh Gupta delivered Radio talk on "Button Khumb Utpadan" on 20/11/12 and telecasted on 24/11/12



Fig 6.13 Extension activities of Nauni Centre

7. PUBLICATIONS

Udaipur Centre

1. R.S. Ratnoo and Anila Doshi. 2012. Effect of Base Material, Different Strains on Pattern of Flushes and yield of *Agaricus Bisporus* (Lange) Sing. J. PL. Dis. Sci. Vol 7(1) 73-76
2. R.S. Ratnoo and Anila Doshi. 2012. Use of vermicompost as casing material for cultivation of *Agaricus bisporus* (Lange) Sing. International journal of Agricultural Sciences, Volume 8/ Issue 2/June, 2012/390-392
3. R.S. Ratnoo and Anila Doshi. Steeping treatments and their effect on keeping quality of white button mushroom (*Agaricus bisporus*). Pl. Dis. Res. 27(1):94-96
4. Rajesh kumar Meena, Anila Doshi, B.L. Meena and M.K. Khokhar. Compatibility and hybridization between edible and wild *Pleurotus* mushroom species for evolving new strains by dual culture technique. 2012. Green Farming Vol. 3(5):590-593 (September-October, 2012)
5. Birendra Kumar Mehta, Sanjay Kumar Jain, Gyanendra Prakash Sharma, Vishvambhar Dayal Mudgal, Radha Charan Verma, Anila Doshi, Hemant Kumar Jain. Optimization of Osmotic Drying Parameters for Button Mushroom (*Agaricus bisporus*) 2012. Applied Mathematics, 2012, 3, 1298-1305.
6. Anila Doshi, S.S. Sharma and R.S. Ratnoo-2012. Evaluation of Bio-Industrial Waste as Casing Material in *Agaricus bisporus* Cultivation in Rajasthan. J Mycol Plant Pathol, Vol. 42, No. 2, 2012
7. R.S. Ratnoo and Anila Doshi. 2012. Evaluation of different casing materials and casing in *Agaricus bisporus* Cultivation. International journal of plant protection/volume 5/Issue 1/April, 2012/136-140.
8. Button Mushroom Ka Prasanskaran Avam mulya samwardhan: Aak Garalu Udhhyog.
9. Dr. Sanjay Kumar Jain, Dr. Vijay Kumar Chaher, Dr. Anila Doshi and Dr. G.P. Sharma, Rajasthan Kheti-Pratap, March, 2013

Thesis

1. Narayan Lal Meena. 2012. Epidemiology and Management of Charcoal Rot (*Rhizoctonia bataticola* (Taub.) Butler (Macrophomina phaseolina (Tassi) Goid) of Groundnut in Southern Rajasthan. Ph.D Thesis, Department of Plant Pathology, Rajasthan College of Agriculture, MPUAT, Udaipur.

Inspire Fellowship for Ph.D.

1. Renu Kumari Gupta. Bioremediation of Heavy Metals through Cultivated and Wild Mushroom. Department of Plant Pathology, Rajasthan College of Agriculture, MPUAT, Udaipur. Fellowship amount 18000 per month + 20000 per year contingency for 5Yr
2. Vinod Kumar. Epidemiology and integrated management of *Rhizoctonia* root rot of cotton in Rajasthan. Department of Plant Pathology, Rajasthan College of Agriculture, MPUAT, Udaipur. Fellowship amount 18000 per month + 20000 per year contingency for 5Yr

Bhubaneswar Centre

1. Mohapatra, K.B. and Behera, B. 2012. Effect of substrate management on biological efficiency of paddy straw mushroom, *Volvariella volvacea*. Paper presented in the Global Conference on Horticulture for Food, Nutrition and Livelihood Options, May 28-31, 2012, Bhubaneswar, Odisha, India.
2. Sahoo, A.K., Mohapatra, K.B. and Behera, B. 2012. Management of competitor moulds and diseases in paddy straw mushroom (*Volvariella volvacea*) beds. *Journal of Plant Protection and Environment* 9(1): 39-42.
3. Rout, M.K., Mohapatra, K.B., Mohanty, L.K. and Swain, S.K. 2012. Effect of six substrates on growth, yield and economics of Oyster mushroom, *Pleurotus sajor-caju*. *Environment and Ecology* 30(4): 1299-1300.
4. Behera, B. and Mohapatra, K.B. 2012. Standardization of white button mushroom (*Agaricus bisporus*) production technologies in Odisha following long method of composting. *Environment and Ecology* 30(4): 1354-1356.
5. Sahoo, A.K., Mohapatra, K.B. and Behera, B. 2012. Effect of substrate processing and bed dimension on production of straw mushroom (*Volvariella volvacea*) following conventional method of cultivation. *Environment and Ecology* 30(4A): 1413-1415.

6. Mohapatra, K.B. and Behera, B. 2012. Management of competitor moulds in oyster mushroom (*Pleurotus sajor-caju*) bags. Paper presented in the National Seminar on Eco-friendly approaches to pest management for sustainable agriculture, November 24-25, 2012, Bhubaneswar, Odisha, India.

Participation in conference/seminar/workshop/symposium

1. Global conference on 'Horticulture for food, nutrition and livelihood options', 28-31 May, 2012 at OUAT, Bhubaneswar.
2. XIV Annual Workshop of AICRP-Mushroom, 31 May-1st June, 2012 at OUAT, Bhubaneswar.
3. IV Annual Conference of Odisha Mushroom Growers' Federation, 18 November, 2012 at the OUAT premises, Bhubaneswar.
4. National symposium on 'Eco-friendly approaches to pest management for sustainable agriculture' 24-25 November, 2012 at OUAT, Bhubaneswar.

Popular articles

1. Mohapatra, K.B. 2012. Mushroom Research in India: An overview. *Krushak Bandhu Annapurna* XX(VII): 32-33.
2. Mohapatra, K.B. 2012. Oyster mushroom cultivation in Odisha: Opportunities and constraints. *Krushak Bandhu Annapurna* XX(XI): 12-13.
3. Mohapatra, K.B. 2013. Cultivation of *Macrocybe giganteum*. *Krushak Bandhu Annapurna* XXI(I): 13-14.
4. Mohapatra, K.B. 2013. Problems associated with summer straw mushroom cultivation and their management. *Krushak Bandhu Annapurna* XXI(II): 13-15.

Theses

1. Competitor moulds of paddy straw mushroom and their management.
2. Studies on improvement of biological efficiency of paddy straw mushroom, *Volvariella diplasia*

Ludhiana Centre

1. T M Zenebe, S Kapoor and Y Vikal (2012). Development of hybrids of *Pleurotus florida* and *Volvariella volvecea* through protoplast fusion. *Crop Improvement (Spl Issue)*: pp461-462.
2. Aparna Sabharwal, S Kapoor and Mohini P Singh (2012). Optimization of pH for the growth of *Mycogone perniciosa* – causal organism for wet bubble disease of white button mushroom under laboratory conditions. *Crop Improvement (Spl Issue)*. p1089.
3. J Kaur and HS Sodhi (2012). Molecular characterization of mutant strains of *Calocybe indica* using RAPD-PCR. *The Bioscan* 7(3): 527-532

Vellayani Centre

1. Lulu Das and Prathibha P. R. 2012. Mushrooms and Cashewnuts- a gourmet's delight. Paper presented at the International Conference on Cashew at Goa from 11th to 12th October 2013.
2. Lulu Das and Prathibha P.R. 2013. An insight into global and domestic mushroom marketing and trade. Paper presented at the National seminar on WTO and FTO on 17th and 18th January 2013.
3. Lulu Das and Prathibha P. R. 2013. Medicinal mushroom – scope for cultivation in Kerala. Paper presented at the National Symposium on Medicinal Mushrooms on 24th and 25th January 2013.
4. Lulu Das and Prathibha P. R. 2012. *Tricholoma giganteum* – a new introduction to the edible mushroom flora of Kerala sent for publication to *Mushroom Research*.
5. Reni Krishna and Lulu Das. 2012. Growth behaviour and yield attributes of five *Pleurotus* spp. On varying cereal grains. Poster presented at the National Biodiversity congress held at Trivandrum from 27th -30th December 2013.
6. Lulu Das and Prathibha P.R. 2013. Alternative substrates to casing layer for assessing the productivity of *Tricholoma giganteum*. Accepted for Poster presentation to Indian Mushroom Conference on 16th and 17th April.
7. Lulu Das and Prathibha P.R. 2013. Standardization of value added products of *Tricholoma giganteum*. Accepted for poster presentation to Indian Mushroom Conference on 16th and 17th April.

Technical bulletin

1. Lulu Das. 2012. Koonukalude lokam. Published by F.I.B

Book

1. Dr. Lulu Das and Dr. K. Prathapan. 2013. Manam Mayakunna Koon Vibhavangal. Released on 4th March 2013 during Mushroom Mela.

Thesis submitted under the guidance of Dr. Lulu Das

1. Dominic 2012 M.Sc. Biotechnology student of M.G. University. Efficacy of spawning materials on growth and yield of two isolates of oyster mushrooms
2. Reni Krishna 2012. Impact of cereal grains on spawn production and growth of five *Pleurotus* spp

Pune Centre

Research article

1. Tirmali A.M.and S.J.Kolte (2012). Resistance to blight (*Alternaria brassicae*) in mustard induced by plant defence activators. J. Agric.Res.Technol. **37 (2)**: 237-243
2. Tirmali A.M.and S.J.Kolte (2012). Induction of host resistance in mustard with non -conventional chemicals against white rust (*Albugo candida*). J. Pl. Dis. Sci. **7(1)**: 27-31

Book Chapters

1. Narute T. K. Introduction and status of mushroom production in India. Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 1-3.
2. Tirmali A.M., V.K.Bhalerao and D.B.Shinde. Nutritional and Medicinal properties of Mushroom Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 4-10.
3. D. B. Shinde., V.K.Bhalerao and Tirmali A.M. Laboratory techniques in mushroom production Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 11-14.
4. Tirmali A.M., V.K.Bhalerao and D. B. Shinde. Spawns production technology Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 15-17.
5. D. B. Shinde., V.K. Bhalerao and Tirmali A.M. Oyster mushroom (*Pleurotus* sp.) cultivation technology Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 18-23.
6. V.K. Bhalerao, Tirmali A.M. and D. B. Shinde. Milky Mushroom (*Calocybe indica*) production technology. Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 24-30.
7. Tirmali A.M., V.K. Bhalerao and D. B. Shinde. Button Mushroom (*Agaricus bisporus*) production technology. Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 31-38.
8. Jadhav S.W. Strain improvement and compost formulations for button mushroom production Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb 2012. pp 39-40.
9. Narute T. K. Value addition and Marketing of different types of mushrooms. Training Programme manual "Mushroom production Technology" organized at AICRP on Mushroom on 6th - 8th Feb. 2012. pp 41-42.
10. Mahajan P. D., A. M Tirmali. and V.K.Bhalerao. Diseases and pests of mushroom and their management. Training Programme manual "Mushroom production Technology" organized at AICRP,on Mushroom on 6th - 8th Feb. 2012. pp 43-49.
11. V.K.Bhalerao., Tirmali A.M. and D. B. Shinde. Post harvest management and different recipes of mushroom. Training Programme manual "Mushroom production Technology" organized at AICRP,on Mushroom on 6th - 8th Feb. 2012. pp 50-53. 50-53

12. Shinde D. B., A. M. Tirmali, T. K. Narute, and V. K. Bhalerao. Evaluation of different strains of milky mushroom *Calocybe indica*. Paper presented in First International Conference on “Bio-Resource And Stress Management” organized at Bose Institute, Kolkata, on 6th - 9th Feb., 2013.

Technical Bulletins

1. A. M. Tirmali V.K.Bhalerao and Sapkal, R.T. Dhingari Aalimbichi Lagwad. NSS Bulletin 2012
2. T. K. Narute, V.K.Bhalerao, and S.J.Waghmare. Dhingari Aalimbichi Lagwad. Dainik Agrova 2012
3. V.K.Bhalerao, and D. B. Shinde. Dudhi Aalimbichi Lagwad. Dainik Agrova. January 2013

Samastipur Centre

- Dayaram (2013) भविष्य की चुनौतियों के लिये मशरूम उत्पादन। Adhunik Kisan (Jan. Kisan Mela Viseshank).
- Dayaram (2013) कटाई उपरान्त मशरूम का रखरखाव एवं उसके मूल्यवर्धन उत्पाद (Pamphlet).

Newspaper clipping: 32

Pantnagar Centre

Book

1. Kushwaha KPS and Mishra KK (2013). व्यावहारिक मशरूम उत्पादन 2nd edition. ATIC, GBPUAT Pantnagar 112p.

Research papers

1. Mishra K.K., Mishra Prachi, and Kushwaha K.P.S. (2012). Cultural, morphological and yield attributes of winter mushroom *Flammulina velutipes* (Curt. Fr.) Sing. J. Mycol. Plant. Pathol. 42(1):167-171.
2. Geeta Sharma and KPS Kushwaha (2013). Performance of black poplar mushroom on different substrate. Abstract and Souvenir 7th Uttarakhand State Science and Technology Congress. p24.
3. Punetha, H; Jeena G.S. Om Prakash and Kushwaha KPS. (2013). Antioxidative potential and element profiling of some edible *Pleurotus* species (oyster or Dhingri mushroom) of Uttarakhand. Abstract and Souvenir 7th Uttarakhand State Science and Technology Congress. p54.
4. Neelam and K.P.S. Kushwaha (2012) Evaluation of High Yielding Strains of Shiitake Mushroom (*Lentinula edodes*) on Wheat Straw and Saw Dust. Abstract of Int. Symposium on Agricultural Communication and Sustainable Rural Development: From Information to Knowledge to Wisdom – Envisioning a Food Sovereign World in the Third Millennium, held at GBPUA&T Pantnagar w.e.f. Nov. 22-24, 2012. p230.

Popular article (Hindi)

1. Mishra S.K. Kushwaha KPS and Neelam (2013). Laghu evam seemant star par batton mushroom ki utpadan vidi. *Kisan Bharti* 44(5):10-13.
2. Kushwaha KPS; Sharma Geeta and Divakar (2013) Dhingri ya oyster mushroom ki kheti. *Kisan Bharti* 44(5):13-15.
3. Neelam, Kushwaha, KPS and Divakar (2013). Mushroom ke pramukh keet-rogon kh pahchan evam roktham. *Kisan Bharti* 44(5):15-17.
4. Divakar and Sharma Geeta and Kushwaha KPS (2013). Mushroom ke lajeej vyanjan. *Kisan Bharti* 44(5):17-20.

Faizabad Centre

Abstracts

1. Evaluation of Different Strains of white button mushroom (*Agaricus bisporus*). Pradip Kumar, L. P. Awasthi and Sushil Kumar Singh. & Presented in National Conference on Managing Threatening Diseases of Horticultural, Medicinal, Aromatic and Field Crops in Relation to Changing Climatic Situation.&Zonal Meeting Indian Phytopathological Society (Mid Eastern Zone), held at IISR,Lucknow, from November 3-5,2012.

2. Studies on the evaluation of high yielding strains of Oyster Mushroom (*Pleurotus* Spp.) Pradip Kumar and Vivek Kashyap. Presented in Symposium of AEB and National Seminar on Emerging Pollutants and Pathogens due to Climate change: Challenges and risk reduction organised at NDUAT, Kumarganj, Faizabad on 08-09 March 2013
3. Studies on Biodiversity of Wild Edible Mushroom of Eastern Uttar Pradesh. Pradip Kumar and L.P. Awasthi. Send to Indian Mushroom Conference Organised by Mushroom Society of India in collaboration with DMR, Solan and PAU, Ludhiana at PAU, Ludhiana on 16-17 April, 2013

Newspaper coverage

1. Mushroom Uganye Aur Laabh Kamanye. Jansandesh times. Date, 14-06-2012.
2. Poshak Tatton Se Bharpoor Hai Mushroom. Dainik Jagran. Date 10-9-2012.
3. Krishi Sah Udhaymo Se Aayege Aarthiak Samradhi. Dr. Kureel. Date, 28-12-2013. Page, 6
4. Vaigyanik Kisano Ko De Prayogik gyan: KULPATI. Dainik Jagran, Date 28-12-2012. Page, 8.
5. Kishano Ko Mushroom Utpadan Ka Laabh Bataya Gaya. Dainik Jagran, Date 29-12-2012 p18.
6. Mushroom Utpadan Takneek Par Krashak Avam Grameen Berojgaron Ka Prashikshan Sampann. Janmorcha, Date, 30-12-2012.
7. Mushroom Utpadan Takneek Par Diya Gaya Prashikshan. Hindustan. Date, 30-12-2012.
8. Karyashala Me Bataye Gaye Mushroom Utpadan Ke Gur. Dainik Jagran, Date 30-12-2012 p12.
9. Adhiak Labh Ke Liye Kare Mushroom Ki Kheti. Amarujala Date 18-01-2013, Page 3.
10. Munaphe ke Liye Mushroom Ki Kheti Behtar. Dainik Jagran, Date 18-01-2013, Page 16.
11. Mushroom Kee Khetee Se Badhanye Aay. Hindustan. Date, 17-1-2013. Page, 06.
12. Mushroom Utpadan Par Prashikshan Prarambh. Janmorcha, Date, 17-1-2013
13. Mushroom Ki Kheti Ke Anek Phayde. Dainik Jagran. Date 12-03-2013 Page 17.

Popular article

1. Mushroom Kee Poustikta Avam Aushdheeya Gun. Purvanchal Kheti. Feb 2013, Page, 18-20.

Raipur Centre

1. Awadhiya G.K (2012). Prospects of Mushroom Production in Chhattisgarh.” National Seminar/ Workshop on Mushroom Cultivation and it’s Post Harvest Management” 2-5 Nov. 2012 Mahilla College, Bhilai, C.G.
2. Awadhiya G.K. (2012). “ Oyster Mushroom Production Technology ” State Agriculture Department under ATMA Project
3. Awadhiya G.K (2012). “Mushroom spawn production” State Agriculture Department under ATMA Project
4. Awadhiya G.K (2013). Mushroom spawn production: A guide to methods and applications. “*Orientation Course in Plant protection and Mushroom Cultivation Technology*” Department of Plant Pathology IGKV, Raipur
5. Awadhiya G.K (2013). Post Harvest And Value Addition of Mushrooms “*Orientation Course in Plant protection and Mushroom Cultivation Technology*” Department of Plant Pathology IGKV, Raipur

Thesis guided

1. “Biology and Cultivation Technology of *Pleurotus eous*” - Santosh Kumar Sahu (M.Sc.)
2. Fleshy Fungi of Chhattisgarh with special reference to *Pleurotus* Diversity and standardization of their Cultivation Technology. Md. Ansari (M. Sc.)

Ranchi Centre

1. Sharma, J.P., Kumar, S. and Upadhyay, R.C. (2012). Biodiversity of wild and cultivated mushroom in Jharkhand state. In Book of Abstract .National Seminar on plant genetic research for eastern and North eastern India held at ICAR Research Complex for NEH Region (May 11-12). IC: 5 P7.
2. Sharma, J.P., Kumar, S. and Upadhyay, R.C. (2012). Diversity of mushroom in Jharkhand. *Technical Bulletin* No. /RAN-40: Page 16.

3. Sharma, J.P. and Kumar, S. (2013) मशरूम उत्पादन तकनीक | *Technical Bulletin* No.TR-2 /RCR-1: (in press)

Coimbatore Centre

1. Prakasam, V. 2012. Current Scenario of Mushroom Research in India. *Indian Phytopathology*. 65(1) 1-11
2. Prakasam, V. 2012. Underexploited mushroom species of India. A lead paper presented in National Symposium on Heading towards Molecular Horizons in Plant Pathology: Host Resistance, Pathogen Dynamics, Diagnostics and Management, November, 16-17, 2012 at Sugarcane Breeding Institute, Coimbatore. 77-78
3. Prakasam, V. 2012. Open field cultivation of oyster mushroom in Bamboo plantations of Tamil Nadu. A lead paper presented in National Symposium on Blending Conventional and Modern Plant Pathology for sustainable Agriculture, December, 406, 2012 at Indian Institute of Horticultural Research, Bangalore.

Guest lectures

1. A Guest lecture “Mushroom Research in India- an over view” was delivered in UGC sponsored One-day State level Seminar on : Future Prospects of Agricultural Biotechnology” organized by Mahajana First Grade College, University of Mysore, Mysore on 30-1-13.
2. A Guest lecture “Mushroom Culture” was delivered in the NSS Special camp of the Park College, Tirupur(Affiliated to Bharathiar University, Coimbatore) at Poomalur Pallipalayam village, Palladam taluk of Tirupur district. About 90 participants including farmers and students attended the programme.

Pasighat Centre

1. Bulletin 1 (Oyster mushroom cultivation, P.Raja, 2012)
2. Manual 1 (Spawn production technology.P.Raja, 2012)

Nauni Centre

Research papers

1. Sharma Manju, PD Thakur, Dharmesh Gupta and AK Thakur.2012.Sources of resistance in squash germplasm against viral diseases.*Pl.Dis.Res.*27(2): 239-241.
2. Suman BC, Dharmesh Gupta and Manju Sharma.2012.Casing in button mushroom beds(*Agaricus* spp.)-A review of research work done in India. *Indian Journal of Mushrooms*.Vol.30(No.II):1-4.
3. Jarial RS,CL Sharma, BC Suman and Dharmesh Gupta.2012.Evaluation of various locally available plant materials as substrates for the cultivation of different *Pleurotus* spp. in Spiti valley of Himachal Pradesh. *Indian Journal of Mushrooms*.Vol.30(No.II):34-40.
4. Suman BC, Manju Sharma and Dharmesh Gupta.2012.Khumb ki kheti mein lagne wale rog,pratiyogi fafund va ajaivik vyadhiyan tatha unki roktham. *Indian Journal of Mushrooms*.Vol.30(No.II):41-

Paper presented in National symposium

1. Verma Shalini,Sharma JN,Gupta Dharmesh and NC Sharma.2012.Occurrence of *Alternaria* leaf blight on apple in Himachal Pradesh and its management.pp.63-64.In:National Symposium on “Emerging Issues in Plant Health Management” and Annual meeting of IPS(NZ),Sep.28-29,2012 at Nauni,Solan,HP.
2. Gupta Dharmesh,Suman BC and Manju Sharma.2012.Diversity of Macrofungi in Sirmour District of Himachal Pradesh,India.pp.105. In:National Symposium on “Emerging Issues in Plant Health Management” and Annual meeting of IPS(NZ),Sep.28-29,2012 at Nauni,Solan,HP.
3. Suman BC ,Gupta Dharmesh and Manju Sharma.2012.Evaluation of selected white and brown strains of *Agaricus bisporus*.pp.107. In:National Symposium on “Emerging Issues in Plant Health Management” and Annual meeting of IPS(NZ),Sep.28-29,2012 at Nauni,Solan,HP.
4. Chauhan Praneet and Dharmesh Gupta.2012.Effect of different grain substrates on spawn growth and yield of *Pleurotus djamor*.pp.108. In:National Symposium on “Emerging Issues in Plant Health Management” and Annual meeting of IPS(NZ),Sep.28-29,2012 at Nauni,Solan,HP.

5. Jarial RS, Sharma CL and Dharmesh Gupta.2012.Comparative yield performance of different species of oyster mushroom on locally available substrates under cold conditions of Himachal Pradesh.pp.107. In:National Symposium on “Emerging Issues in Plant Health Management” and Annual meeting of IPS(NZ),Sep.28-29,2012 at Nauni,Solan,HP.
6. Gupta Dharmesh, B C Suman, Manju Sharma and R.S.Jarial.2012.Evaluation of high yielding varieties/strains of Oyster Mushroom. pp. 23.In the National Symposium on “Emerging Trends in Plant Pathology” being held at SKUAST, Jammu w.e.f. 19-20 Dec.2012.
7. Jarial RS, Kumud Jarial, D Gupta and CL Sharma.2012.Efficacy of different fungicides against powdery mildew and yield of pea in dry temperate zone of Himachal Pradesh.pp.24.In the National Symposium on “Emerging Trends in Plant Pathology” being held at SKUAST, Jammu w.e.f. 19-20 Dec.2012.
8. Verma Shalini, IM Sharma, Dharmesh Gupta and NC Sharma.2012.Fungicidal management of powdery mildew of apple.pp.39.In the National Symposium on “Emerging Trends in Plant Pathology” being held at SKUAST, Jammu w.e.f. 19-20 Dec.2012.

Book Chapter

1. Gupta Dharmesh,Suman BC and Manju Sharma.2012.Solan mein badlte jalvayu ke parivesh mein khumb utpadan ek aayam.pp.122-126.In: “Solan mein mausam ke badlte parivesh mein fasal utpadan”Eds. Satish Bhardwaj,Sudhir Verma,Subhash Chand Verma,Somdev Sharma,Ramesh Kumar Bhardwaj.141 pp.

8. PERSONNELIA

Staff position at various AICMIP Centres during 2012-13

Sl.No	AICRP Centre	Name of staff	Designation
A. ICAR Institute based Centre			
1.	ICAR Research Complex for NEH Region, Umiam 793 103, Meghalaya	Dr Pankaj Baiswar	Sr. Scientist, Plant Pathology
2.	ICAR Research Complex for Eastern Region, Research Centre, Plandu, Ranchi 834010 (Jharkhand)	Dr. J.P. Sharma (upto Jan 13) Dr. Sudarshan Maurya	Principal Scientist, Plant Pathology Sr. Scientist, Plant Path
B. SAU based Centre			
1	Dept. of Plant Pathology, Centre for Plant Protection studies, Tamil Nadu Agricultural University, Coimbatore - 641 003	Dr.V.Prakasam Dr. G.Thiribhuvanamala Th.P.Arumugam Th.P.Karuppusamy Th.C, Sundararajan Th.Venkatesan Th. P.Selvaraj	Mycologist Assistant Professor Laboratory Assistant Lab Assistant Lab.Tecnician Skilled mazdoor
2.	Centre for Tropical Mushroom Research and Training, Dept. of Plant Pathology, Orissa Agricultural University, Bhubaneswar, Orissa	Dr. K.B. Mohapatra	Associate Professor
3.	Department of Plant Pathology N. D. University of Agriculture & Technology, Kumarganj, Faizabad – 224 229 (U.P.) India	Dr. Pradeep Kumar Sri Vijay Kant Sri G.P. Gautam Sri Brij Bhushan Sri Lalta Prasad	Mycologist Field Man Technician L.D.C./Typist Beldar
4.	Dept. of Plant Patholgy, College of Agriculture, CCS Haryana Agricultural Univ., Hisar - 124 005	Dr. Surjit Singh	Professor
5.	Department of Microbiology, College of Basic Sciences and Humanities, Punjab Agricultural University, Ludhiana – 144 001.	Dr (Mrs) S. Dhanda Dr. H. S. Sodhi Dalip Singh Mr. Gurdev Singh Harminder Kr Ram Kumar	Sr. Mycologist Sr. Mycologist Sr Laboratory Assist. (Technician) Fieldman Typist-cum-Clerk Beldar
6.	Mushroom Research and Training Centre, G.B. Pant University of Agri. & Tech., Pantnagar – 263 145 (Uttarakhand)	Dr. KPS Kushwaha Mr. Himanshu Joshi Sh. Ramakant Singh Shri Santosh Kumar Sh. Deo Kumar	Mycologist Technical Assist. Jr. Assist./Fieldman Typist/clerk Beldar

7.	Dept of Plant Pathology, Collage of Horticulture and Forestry, Central Agricultural University, Pasighat – 791 102 (Arunachal Pradesh)	Dr. P. Raja	Assistant Professor
8.	Plant Pathology Section, College of Agriculture, Mahatma Phule Krishi Vidyapeeth, Pune-411 005	Dr. D.B.Shinde Dr. A. M. Tirmali Shri V. K. Bhalerao Shri. N. G. Desai Shri.S. G. Hingmire Shri. Y.S. Bhawe	Mycologist Jr. Mycologist Jr. Res. Asstt Agril. Asstt. LDC/Typist Beldar
9.	Mushroom Research Laboratory, Dept. of Plant Pathology, Indira Gandhi Krishi Vishwavidyalya, Raipur – 492 006 (Chhattisgarh)	Dr. G. K. Awadhiya Dr. Harvinder Singh Shri B. L. Sinha Shri R. K. Pandey Shri A. R. Sahu	Mycologist Assistant Mycologist Field Assistant LDC Peon (Beldar)
10.	Department of Microbiology, Faculty of Basic Sciences and Humanities, Rajendra Agricultural University, Pusa (Samastipur) - 848 125 (Bihar)	Dr. Dayaram	Associate Professor
11.	Dept. of Plant Pathology, Rajasthan Collage of Agriculture, Maharana Pratap University of Agric. & Tech., Udaipur – 313 001 (Rajasthan)	Dr. Anila Doshi Mrs. Kala Nath Mr. Nathu Singh Mr. Kishan Singh	Mycologist Field Supervisor L.D.C. Beldar
12.	Department of Plant Pathology College of Agriculture Vellayani – 695 522 Thiruvananthapuram, (Kerala)	Dr. Lulu Das Ms. Deepa Rani	Mycologist Technical Assistant
C. Cooperating Centre			
1.	Mushroom Research & Production Unit, Department of Mycology and Plant Pathology, Dr. Y.S. Parmar Univ. of Horticulture and Forestry, Nauni – 173 230, Solan (HP)	Dr. Dharmesh gupta	Jr. Mycologist
2.	Haryana Agro Industrial Corperation R & D Centre, Opp. DCR University, G.T. Road, Murthal, Sonapat (Haryana)	Dr. Ajay Yadav	Scientist

9. BUDGET / RELEASED 2012-13

Centre	Recurring Contingency (Rs. Lakh)						HRD		15% repair		Non-Recurring Contingency (Rs. Lakh)				Total (Rs. Lakh)	
	Estt. Charges		T.A.		Contingency including FLD						Equipments		Works			
	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
MPUAT, Udaipur	15.00	15.00	0.75	0.75	2.75	2.75	0.25	0.25	--	--	--	--	-	--	18.75	18.75
NDUAT, Faizabad	8.00	8.00	0.50	0.50	2.50	2.50	0.15	0.15	--	--	--	--	-	--	11.15	11.15
IGKV, Raipur	19.45	19.45	0.60	0.60	1.00	1.00	--	--	--	--	--	--	-	--	21.05	21.05
MPKV, Pune	23.35	23.35	0.50	0.50	8.10	8.10	0.60	0.60	--	--	--	--	-	--	32.55	32.55
TNAU, Coimbatore	20.15	20.15	1.10	1.10	3.75	3.75	0.25	0.25	--	--	--	--	-	--	25.22	25.22
GBPUAT, Pantnagar	9.55	9.55	0.75	0.75	4.75	4.75	0.50	0.50	1.70	1.70	--	--	-	--	17.25	17.25
PAU, Ludhiana	34.50	34.50	0.75	0.75	2.10	2.10	0.65	0.65	--	--	--	--	-	--	38.00	38.00
KAU, Kerala	10.00	10.00	0.80	0.80	4.70	4.70	0.50	0.50	--	--	--	--	-	--	16.00	16.00
RAU, Pusa (Bihar)	--	--	0.75	0.75	4.75	4.75	0.50	0.50	3.00	3.00	--	--	-	--	9.00	9.00
CCSHAU, Hisar	5.00	5.00	0.75	0.75	4.75	4.75	0.50	0.50	0.50	0.50	--	--	-	--	11.50	11.50
OUAT, Bhubaneswar	5.00	5.00	0.75	0.75	2.50	2.50	0.25	0.25	--	--	--	--	-	--	8.50	8.50
UHF Nauni	--	--	0.50	0.50	2.50	2.50	0.10	0.10	--	--	--	--	-	--	3.10	3.10
HAIC Murthal	--	--	0.50	0.50	4.75	4.75	0.50	0.50	--	--	--	--	-	--	5.75	5.75
ICAR RC ER, Ranchi	--	--	0.50	0.50	2.50	2.50	0.15	0.15	--	--	--	--	-	--	3.15	3.15
CAU, Pasighat (Arunachal Pradesh)	--	--	0.50	0.50	2.00	2.00	0.50	0.50	--	--	--	--	-	--	3.00	3.00
ICAR RC NER, Barapani	--	--	--	--	1.00	1.00	--	--	--	--	--	--	-	--	1.00	1.00

a- sanctioned amount

b- actual release



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