

वार्षिक प्रतिवेदन
ANNUAL REPORT
2013-14

अखिल भारतीय समन्वयित खुम्ब अनुसंधान परियोजना

All India Coordinated Research Project on Mushroom

खुम्ब अनुसंधान निदेशालय
Directorate of Mushroom Research

(भारतीय कृषि अनुसंधान परिषद्)
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All India Coordinated Research Project on Mushroom
Directorate of Mushroom Research
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PREFACE

India being a land of small and marginal farmers, it is important to mobilize them and help them to diversify to meet the increasing domestic demand of horticulture products. Small farmers are key to initiate the horticultural revolution. Linking small farmers with high value urban and export markets would lead to development and growth of the rural sector. Horticultural crops including mushroom, will yield more food, more income, and better soil health. There is a need to strengthen research on mushrooms to develop demand driven technology by developing improved varieties, pest management, etc. These technologies should be quickly disseminated through government institutions, NGOs and even private participants by encouraging farmers' participation and upgrading their technical capabilities.

In the scenario where more than 650 million people are dependent in our country and more than 300 million people are malnourished while millions of people are below poverty line, there is a need for improving quality of life through food and nutritional security, employment opportunity, poverty alleviation and gender equality. In this context also, mushroom cultivation has been recognized as a gainful approach. With increase in per capita income and accelerated growth of health conscious population, demand for mushroom is on increase which is expected to further accelerate.

Mushroom production represents one of the most commercially important step towards diversification of agriculture based on microbial technology for large-scale recycling of agro-wastes. It relieves the pressure on arable land, because its cultivation is indoors, and is also highly suited to the women folk. Mushrooms supplement and complement the nutritional deficiencies and are regarded as the highest producers of protein per unit area and time. Endowments with respect to abundant and cheap raw materials, low cost labour, varied agro-climate for production of various mushrooms may make India a future mushroom producer. However, against world production of about 25 million tonnes, India's present contribution is meagre but the way the commercial units and unorganized mushroom growers are coming up, our production is likely to increase exponentially.

To promote mushroom cultivation and multilocation testing of 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 2013-14 was finalized in the annual workshop organized at PAU, Ludhiana on 17-18 April 2013.

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 standardize cultivation technology of specialty mushrooms, which are needed to diversify the mushroom cultivation scenario in the country.

During the year 2013-14, two strain evaluation trials of white button mushroom were: (i) Advance varietal trial-1 having six accessions of *Agaricus bisporus* and initial varietal trial having six selected hybrids of *Agaricus bisporus*. In the pooled data of AVT experiment over 5 locations AVT-6 and AVT-1 performed well. The overall average showed the maximum fruit body weight in the strains AVT-1 and AVT-2 indicating good quality fruit body in all the climatic conditions. In IVT experiments, IVT-13-07 proved to be the best strain. Amongst six strains of *Volvariella volvacea* tested, the maximum biological efficiency of 30.76 kg/100 kg of dry substrate was recorded in strain Vv-13-03 at Solan. Amongst seven high yielding strains of *Pleurotus* spp., the maximum average yield of 72.57 kg /100 kg of dry substrate was obtained in strain PI 13 03 followed by strain PI-13-06 (67.75 kg). A total of six high yielding strains of *Calocybe indica* were under evaluation trial. The maximum average yield of 486.5 g/kg of dry substrate was obtained in strain CI-13-06 followed by CI-13-01 with a yield of 478.4g/kg of dry substrate.

The results of various experiments exhibited a vast scope of commercialization of mushroom farming depending upon the climatic conditions and availability of raw materials the mushroom varieties in a particular region.

(Manjit Singh)

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. During the year under report (2013-14), 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 17-18 April, 2013 at PAU, Ludhiana.

During the year 2013-14, six experiments were conducted on strain evaluation of four different mushrooms i.e. white button mushroom (*Agaricus bisporus*), oyster mushroom (*Pleurotus* spp.), paddy straw mushroom (*Volvariella volvacea*) and milky mushroom (*Calocybe indica*) at various centres. There were two experiments for strain evaluation of white button mushroom viz., (i) Advance varietal trial -1 for selected white accessions of *Agaricus bisporus* (ii) Initial varietal trial for selected hybrids of *Agaricus bisporus*. In the first experiment of AVT, the maximum yield of 21.03 kg per 100 kg of compost was recorded in the strain AVT-1 at Pantnagar Centre followed by 20.34 kg at Nauni centre. The strain AVT-06 performed very well at Pantnagar centre and headquarter with a yield of 20.46 and 20.07 kg per 100 kg compost. Overall best average productivity was recorded in AVT-6 with 16.18 kg followed by AVT-01 with 15.82 kg per 100 kg compost. The time taken to first harvest (days post casing) was in the range of 19 to 28 days. The lowest first harvest time (19 days) was recorded in AVT-1 at Pune centre and AVT-6 at Pantnagar centre. Overall the lowest first harvest time was recorded in AVT-1 and AVT-2. Average fruit body weight also varied at different centres and was recorded maximum (17.13 g) in the strain at Pantnagar centre followed by AVT-2 (17.1 g) at headquarter. The average fruit body weight ranged between 11.15- 12.96g in almost all the strains. The overall maximum fruit body weight was recorded in AVT-1 and AVT- 2.

In another set of experiment on initial varietal trial for selected hybrids of *A. bisporus* using short method of compost, maximum yield of 20.27 kg /100 kg of compost was recorded in the strain IVT-13- 07 at Pantnagar centre followed by strain IVT-13-02 at the same centre (19.79 kg). At Ludhiana centre 16.35kg/100 kg compost yield was in strain IVT-13-07. Overall average of all the strains at all the centres showed that IVT-13-07 with an average yield of 18.27 was the performing strain in all the conditions.

A total of six strains of *Volvariella volvacea* were tested at five different locations. The trial was assigned at five centres and a total of six strains of *Volvariella volvacea* were tested. The biological efficiency of various strains varied in the range of 1.76 to 30.76 kg /100 kg of dry substrate at various centres in different strains. The maximum biological efficiency of 30.76 kg/100 kg of dry substrate was recorded in strain Vv-13-03 at headquarter followed by 19.2 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 centre. No Yield was recorded at Bhubneshwar centre in strain Vv-03-01. Average yield of different strains varied from 6.85 – 17.72 kg /100 kg of dry substrate at different centres. The minimum time taken for the first harvest was 10 days in strain Vv-1-13-06 at Ludhiana centre and 11.75 days in strain Vv-13-02 at the Bhubneshwar centre. The average fruit body weight varied at different centres with a maximum of 19.63 g at Faizabad centre in the strain Vv-13-04 while the minimum fruit body weight was recorded to be 6.2 g at Ludhiana centre in the strain Vv-03-05. All the strains have recorded the maximum fruit body weight at Faizabad centre followed by Bhubaneshwar centre.

The trial on evaluation of high yielding varieties/ strains of oyster mushroom was conducted at 11 different centres. A total of seven high yielding strains of *Pleurotus* species were under evaluation trial. The maximum yield of 94.50 kg /100 kg of dry substrate was obtained in strain PI 13-03 at Vellayani Centre followed by strain PI-13-06 (91.60) at the same centre. All the strains performed very well at different centre with high biological efficiency. At Raipur centres the best performer strain was PI 13-05 with an yield of 86.93 kg per 100 kg dry substrate. Rest all the strains performed at par with very good biological

efficiency. Strain P-13-06 performed well at Vellayani, Bhubaneswar, Pusa and Pasighat centres. All Cumulative average of the yield showed that all the strains have performed well on all the centres.

The minimum time of 11 days for first harvest of the crop was recorded in strain PI 13 02 at Vellayani and Bhubaneswar centres. The maximum time taken was 42 days in strain PI-13-07 at Vellayani. Average fruit body weight of all the strains at different centre ranged between 3.43 to 9.41 g. The maximum fruit body weight of 16.45 g was recorded in PI-13-06 strain at Raipur centre while the minimum of 1.48 g was recorded in PI-13-03 strain at Bhubaneswar centre.

Initial varietal trial for high yielding strains of milky mushroom was conducted at four centres. A total of six high yielding strains of *Calocybe indica* were under evaluation trial. Maximum yields were obtained at Udaipur centre with an yield of 839.5b/kg dry substrate in strain OE-388. No fruiting was recorded in the strains CI-13-03, 04,05 and 06 at the headquarter. The minimum yield was obtained in strain CI-13- 04 and CI-13-06 at Coimbatore centre. Average yield of all the strains at different centre ranged from 409.0 to 486.5g/kg of substrate.

The experiment on total indoor composting using thermophilic fungi was assigned to five different centres where tunnel facility was available. The trial was assigned to five different centres i.e. Nauni, Murthal, Ludhiana, Pantnagar and Solan. The technology as such was put for multilocation trials alongwith traditional short method technology as check. Total yield varied at different centres. At Nauni Centre, maximum yield of 18.92 kg was recorded as compared to 12.60kg in traditional short method. At DMR, Solan also very good yields could be recorded. Lowest yield was recorded at Murthal under both methods of composting. Overall average yield showed 14.72 kg /100 kg compost in indoor composting technology.

Experiment on evaluation of zero energy poly tunnel (ZEPT) technology was assigned to three centres viz. Hisar, Murthal and Samastipur (Pusa). At Hisar Centre, maximum yield of 14 kg was recorded. At Murthal very low yield (7.81kg) was recorded which was very low as compared to other Centres. However, at Murthal and Pusa, control out yielded ZEPT.

The trial on *Macrocybe* cultivation technology was assigned to six different centres i.e. Pantnagar, Coimbatore, Udaipur, Bhubaneswar, Vellayani and Solan centres. However, yield data recorded at different Centres were not up to the mark.

Different Centres have reported the collection of 393 specimens of wild mushrooms during the year and about 137 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 levelExhibition, 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 Centreshave 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.

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अखिल भारतीय समन्वित खुम्ब अनुसंधान परियोजना के अंतर्गत 14 समन्वित तथा दो सहयोगी केंद्र हैं जो देश के विभिन्न जलवायु क्षेत्रों में स्थित हैं। ये मशरूम की विभिन्न तकनीकियों तथा उन्नत किस्मों का सत्यापन करने के लिए प्रयोग करते हैं ताकि मशरूम का उत्पादन विभिन्न जलवायु के आधार पर विभिन्न क्षेत्रों में किया जा सके। वर्ष 2013-14 में विभिन्न केन्द्रों पर किये गए अध्ययन 17-18 अप्रैल 2013 को पंजाब कृषि विश्वविद्यालय लुधियाना में आयोजित कार्यशाला में तह किये गए थे।

वर्ष 2013-14 के दौरान फसल उन्नयन में 6, 4 विभिन्न मशरूम श्वेत बटन मशरूम, ओयस्टर मशरूम, पुआल मशरूम व दुधिया मशरूम पर प्रयोग किये गए।

श्वेत बटन मशरूम प्रजातियों के मूल्यांकन के लिए 2 प्रयोग किये गए। एक प्रयोग श्वेत बटन मशरूम की चयनित प्रजाति व दूसरा संकर प्रजाति पर किया गया। पहले प्रयोग में सर्वाधिक उपज 21.03 कि.ग्राम/100 कि.ग्राम खाद प्रजाति ऐ.वी.टी.-1 में पंतनगर तथा नोह्नी केंद्र पर प्राप्त की गई। ऐ.वी.टी.-06 प्रजाति ने पंतनगर तथा खुम्ब अनुसंधान निदेशालय में सर्वाधिक उपज 20.46 तथा 20.07 कि.ग्राम/100 कि.ग्राम खाद में प्राप्त की गई। सर्वाधिक औसत उपज प्रजाति ऐ. वी.टी.-06 में 16.18 कि.ग्राम तथा ऐ.वी.टी.-1 में 15.82 कि.ग्राम/100 कि.ग्राम खाद में प्राप्त की गई। प्रथम तोड़ाई का समय 19 से 28 दिनों तक रहा। प्रथम तुड़ान का समय सब से कम 19 दिन प्रजाति ऐ.वी.टी.-1 तथा ऐ.वी.टी.-06 में पंतनगर केंद्र पर दर्ज किया गया। कुल मिला कर सब से कम तुड़ान प्रजाति ऐ.वी.टी.-01 तथा ऐ.वी.टी.-02 में पाया गया। फलान्कायो का औसत भारत 17.3 ग्राम पंतनगर में व खुम्ब अनुसंधान निदेशालय में 17.1 ग्राम प्रजाति ऐ.वी.टी.-01 तथा ऐ.वी.टी.-02 में दर्ज किया गया। सभी प्रजातियों में फलंकाए का औसत भारत 11 से 12.96 ग्राम तक पाया गया। कुल मिला कर फलंकाए का अधिकतम भारत प्रजाति ऐ.वी.टी.-01 तथा ऐ.वी.टी.-02 में दर्ज किया गया।

एक अन्य प्रयोग में टन मशरूम की चयनित संकर प्रजाति की लघु विधि द्वारा तैयार खाद के साथ किये गए प्रजाति मूल्यांकन में अधिकतम उपज 20.27 तथा 19.79 कि.ग्राम/100 कि.ग्राम खाद प्रजाति आई.वी.टी.-13-07 तथा आई.वी. टी.-13-02 प्रजाति में पंतनगर केंद्र पर पाई गई। लुधियाना केन्द्र पर सबसे ज्यादा उपज (16.35 कि.ग्राम) प्रजाति आई. वी.टी.-13-07 में लुधियाना केंद्र पर प्राप्त की गई। कुल मिलाकर आई.वी.टी.-13-07 प्रजाति ने औसतन सभी केन्द्रों पर अच्छा प्रदर्शन किया।

पुआल मशरूम की 6 प्रजातियों का 5 अलग-अलग केन्द्रों पर मूल्यांकित किया गया। सर्वाधिक जैविक क्षमता 30.76 कि.ग्राम./100 कि.ग्रा. सूखे पेशाधार पर प्रजाति वी.वी. 13-03 सोलन केंद्र तथा 19.2 कि.ग्रा. कोइम्बतोर केंद्र पर दर्ज की गई। यह भी दर्ज किया गया कि अधिकतम जैविक क्षमता सभी प्रजातियों की कोइम्बतोर केंद्र में देखी गई। भुवनेश्वर केंद्र में वी.वी. 13-01 प्रजाति से कोई भी उपज प्राप्त नहीं की गई। विभिन्न प्रजातियों की औसत उपज 6.85 से 17.72 कि.ग्रा./100 कि.ग्रा. सूखे पोशाधार से विभिन्न केन्द्रों पर प्राप्त की गई।

प्रथम तुड़ान का सब से कम समय 10 दिन प्रजाति वी.वी. 13-02 में तथा 11.75 दिन वी.वी. 13-02 में लुधियाना तथा भुवनेश्वर केंद्र पर देखा गया। फलंकायों का औसत भार अलग-अलग केंद्रों पर अलग-अलग दर्ज किया गया। फलंकायों का सर्वाधिक वजन 19.3 ग्रा. वी.वी. 13-04 प्रजाति में फैजाबाद केंद्र पर तथा सब से कम वजन 6.2 ग्रा. वी.वी 13-05 प्रजाति से लुधियाना केंद्र में प्राप्त हुआ।

ओयस्टर मशरूम की 7 उच्च उत्पादन क्षमता वाला प्रजातियों का मूल्यांकन 11 विभिन्न केन्द्रों पर किया गया। सर्वाधिक उपज 94.50 कि.ग्रा./100 कि.ग्रा. सूखे पोशाधार पर प्रजाति पी.एल. 13-03 तथा पी.एल. 13-06 में वेल्यानी केंद्र

में प्राप्त की गई। सभी प्रजातियों ने विभिन्न केन्द्रों पर उच्च जैविक क्षमता दिखाई। रायपुर केंद्र पर सर्वाधिक उपज 83.93 कि.ग्रा./100 कि.ग्रा. सूखे पोशाधार पर प्रजाति पी.एल. 13-05 से प्राप्त की गई। बाकी की प्रजातियों में भी काफी अच्छी जैविक क्षमता का प्रदर्शन किया। वेल्यानी, भुवनेश्वर तथा पासीघाट केंद्र पर सर्वाधिक उपज प्रजाति पी.एल. 13-06 से प्राप्त की गई। औसत उपज के आधार पर यह देखा गया कि सभी केन्द्रों पर सभी प्रजातियों से अच्छी उपज प्राप्त हुई है।

प्रथम तुड़ान में सब से कम समय दिन प्रजाति पी.एल. 13-02 में वेल्यानी तथा भुवनेश्वर केंद्र में दर्ज किया गया। प्रथम तुड़ान में सब से अधिक समय 42 दिन प्रजाति पी.एल. 13-07 में वेल्यानी केंद्र में दर्ज किया गया। फलंकायों का औसत वजन 3.43-9.41 ग्रा तक पाया गया। फलंकायों का सर्वाधिक वजन 16.45 ग्रा प्रजाति पी.एल. 13-06 में रायपुर केंद्र में तथा सब से कम वजन 1.48 ग्रा. प्रजाति पी.एल. 13-03 में भुवनेश्वर केंद्र में दर्ज किया गया।

दुधिया मशरूम की उच्च उत्पादन क्षमता वाली 6 प्रजातियों के मूल्यांकन हेतु 4 केन्द्रों पर प्रयोग किये गए। सर्वाधिक उपज 839.5 ग्रा./कि.ग्रा. सूखे पोशक पर प्रजाति ओ.इ.-13-02 से उदैपुर केंद्र में प्राप्त की गई। सोलन केंद्र में प्रजाति सी.आई. 13-03, 04, 05 तथा 06 से कोई भी फलन प्राप्त नहीं हुआ। विभिन्न केन्द्रों पर औसत उत्पादन 409.0 से 486.5 ग्राम तक रहा।

पूरंता अंदरूनी खाद बनाने की विधि का मूल्यांकन 5 केन्द्रों पर किया गया। यह प्रयोग नौणी मुरथल, लुधियाना, पंतनगर तथा सोलन केन्द्रों पर लगाये गए। सर्वाधिक उपज 18.92 कि.ग्रा. नौणी केंद्र पर दर्ज की गई जबकि परम्परागत लघु विधि द्वारा तैयार खाद में 12.60 कि.ग्रा. उपज प्राप्त हुई। सब से कम उपज मुरथल केंद्र में दर्ज की गई। औसत उपज 14.72 कि.ग्रा./100 कि.ग्रा. खाद से प्राप्त हुई। जीरो एनर्जी पाली टनल तकनीक के मूल्यांकन हेतु 3 केन्द्रों हिसार, मुरथल तथा पूसा में प्रयोग किये गए। हिसार केंद्र पर सर्वाधिक उपज 14 कि.ग्रा. दर्ज की गई। मुरथल केंद्र में सब से कम उपज 7.81 कि.ग्रा. दर्ज की गई जो कि बाकी केन्द्रों से काफी कम थी।

मक्रोसैबी प्रजाति के मूल्यांकन हेतु प्रयोग 6 केन्द्रों पंतनगर, कोइम्बटोर, उदैपुर, भुवनेश्वर, वेल्यानी तथा सोलन में लगाये गए लेकिन दर्ज किया उपज विभिन्न केन्द्रों में मानको के अनुसार नहीं थे।

जंगली खुम्बो के कुल 396 नमूने विभिन्न केन्द्रों में एकत्रित किये गए। वर्ष के दौरान निदेशालय के जीन बैंक में 137 नमूने जमा करवाए गए। अखिल भारतीय समन्वित खुम्ब अनुसंधान परियोजना की कार्यशाला के दौरान यह निर्णय लिया गया था कि जो मशरूम किसी क्षेत्र विशेष की जनता द्वारा आज तौर पर खाए जाते हैं उन्हें भी एकत्र व संरक्षित किया जाये। इन नमूनों से शुद्ध संवर्धन तैयार किया जाये तथा इन नमूनों को चित्र सहित निदेशालय में जमा करवाया जाये।

सभी परियोजना केन्द्रों ने राष्ट्रीय/राज्य स्तरीय प्रदर्शनियों एवं मेलों में भाग लिया तथा आकाशवाणी एवं दूरदर्शन पर मशरूम से संभावित वार्ताओं को प्रसारित कर प्रसार की गतिविधियों को बढ़ाया। इसके अतिरिक्त किसानों एवं मशरूम उत्पादकों को पत्रों, दूरभाष ई-मेल व फार्म भ्रमण द्वारा सलाह मशवरा दिया गया। सभी केन्द्रों ने अपने क्षेत्र में मशरूम उत्पादन को बढ़ावा देने हेतु शुद्ध संवर्धन एवं खुम्ब बीज किसानों को उपलब्ध करवाया।

1

INTRODUCTION

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 Coordinator 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

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

State Agricultural University based

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

Co-operating Centres

- ❶ Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan (HP).
 - ❷ Haryana Agro-Industrial Corporation Research and Development Centre, Murthal (Haryana)
- The last Group meeting of workers of AICRPM was held on 17-18 April 2013 at Punjab Agricultural University, Ludhiana. During the meeting the progress of last year was monitored and technical programme for 2013-14 was finalized.

2

MANDATE AND OBJECTIVES

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 2013-14

I. CROP IMPROVEMENT Expt. 01: Collection, identification and conservation of

wild edible mushrooms

a) Participating centres All centres except Murthal b) Data to be recorded ⑥ Rainfall and temperature data coinciding with the appearance/arrival

of wild edible mushrooms in local markets.

⑥ 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.

⑥ Do not include the accessions in annual report for which DMR accession numbers are not allotted.

⑥ Send information of market, ITKs, method of consumption, any other uses etc.

⑥ Supply sun dried fruit bodies/spore prints along with cultures.

⑥ Supply GPS data of the region from where mushroom was collected.

⑥ Fill the enclosed proforma as much as possible. Please send the above information within two-three weeks of collection.

⑥ Do not send the cultures without adequate supplementary information.

⑥ 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 ⑥ 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

o Specimen no. o Date of collection o Locality o GPS Data o Longitude o Latitude o Altitude o Single, in groups or connate (United) o Habitat (Humus, wooden stumps or trees, dung, sand, or any other) o Smell (Y/N) o Spore print colour o Cap o Colour o Diameter o Shape o Hygrophorus (water soaked) or non-hygrophorus: o Scales o Stipe o Central, lateral or excentric o Colour o Stipe size and length o Stipe base o Ring, Volva or veil present or absent o Basal association o Lamellae o Attachement: Free, adnased (just tocuching stem), adnate

(broad by attached), Shortly decurrent (running on the stem apex) o Gill colour o Gill Edges o Edibility (edible/non-edible/medicinal/ poisnous) o Any Other information, ITK o Photograohs of natural specimen showing habitat and after taking

out from the soil showing cap, stem, ring, gills, volva and stem base

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

a) Participating centres Pantnagar, Murthal, Nauni, Pune, Ludhiana and Solan b)

Substrate ⑥ Substrate quantity-8 kg compost/bag

⑥ No. of replications-4 replications each with 8 bags of 10 kg compost/replicate for each strain in RBD.

c) Strains to be evaluated ⑥ Short method compost (AVT-13-01, AVT-13-02, AVT-13-03, AVT-13-04, AVT-13-05, AVT-13-06)

d) Methodology to be adopted Short Method

⑥ 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.

⑥ Ingredients to be used are wheat straw - 1000 kg, poultry manure- 500 kg, urea-15 kg, wheat bran-70 kg, gypsum-40 kg.

⑥ Data for compost N, colour, pH, moisture, ammonia, bulk density (kg/m³) may be reported for each trial ⑥ Spawning rate to be used 0.7% of wet compost

f) Data to be recorded ⑥ The yield data should be

during 4 weeks cropping recorded in tabulated form replication wise.

⑥ The replicates should be randomized in cropping rooms in different tiers in RBD. Lay out enclosed.

⑥ Watering should be restricted to wetting of casing material.

⑥ 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).

⑥ 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).

⑥ 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.

⑥ 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.

⑥ 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.

⑥ 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) EC, RH 90-95%, CO₂ maintained inside spawning room Bed Temp 24±1 °C, RH 90-95%, CO₂ <10,000 ppm. cropping room

- Case 10,000 ppm CO₂ cropping: Bed Temp 24±1 °C, RH 90-95%, CO₂ <1000ppm h) Bag size 20"x24" (polythene - 150 gauge) °C, RH 80-85%, CO₂

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: Initial varietal trail for selected hybrids of *Agaricus bisporus*

- a) Participating centres Pantnagar, Murthal, Nauni, Pune, Ludhiana and Solan b)

Substrate • Substrate quantity- 8 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 • Short method compost 6 hybrids + 1 Control d)

Methodology to be adopted • As given in expt – 02 e) Spawning rate to be used

0.7% of wet compost f) Data to be recorded during • As given in expt – 02

4 weeks cropping g) Environmental conditions • As

in expt- 02

to be maintained inside
cropping room

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 trial for strains of Paddy Straw Mushroom, *Volvariella volvacea*

- a) Participating centres Raipur, Coimbatore, Bhubaneshwar, Ranchi, Ludhiana, Faizabad b)

Substrate 1.5% CaCO₃ 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 Six strains of *Volvariella volvacea*; 2 from OUAT; 1 from TNAU; 2 from Solan and control will be Vv-11.

e) Replication 4 replications each with 3 beds for each strain

f) Data to be recorded ⑥ Substrate moisture

- ⑥ Substrate temperature during spawn run, pinning and cropping
- ⑥ Relative humidity during cropping
- ⑥ Time taken for mycelial colonization of the substrate
- ⑥ Time taken for first harvest (days post-spawning)
- ⑥ Mushroom yield weekly (kg/100 kg dry substrate) for 2 weeks cropping period
- ⑥ Average fruiting body weight-Incidence of diseases/insect-pests, if any
- ⑥ Fruiting body quality of unopened mushroom (length, breadth, shape, colour and dry weight)
- ⑥ 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. 05: Evaluation of high yielding varieties/strains of Oyster Mushroom (*Pleurotus* spp)

a) Participating centres Pune, Raipur, Pusa, Faizabad, Pasighat, Pantnagar, Vellayani, Coimbatore, Bhubaneshwar, Udaipur, Hisar, Ranchi, Barapani

b) Substrate ⑥ Wheat straw or paddy straw

- ⑥ Substrate treatment: Chemical pasteurization (7.5 g Bavistin and 125 ml Formalin in 100 lt water)
- ⑥ pH to be adjusted to 7.50 with CaCO_3
- ⑥ Substrate quantity: 1 kg dry wt. (with 70 % moisture)/bag
- ⑥ 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 Two trials of all the strains 1. Temp range - <20°C 2. Temp range - >30°C e) Spawn rate 500g spawn for 5 kg dry substrate f) Varieties Seven new strains of *Pleurotus*; 2 from TNAU; 1 from MPUAT; 3 from

DMR, and PI-12-03 will be control g) Data to be recorded ⑥ Days taken for spawn run.

- ⑥ Days taken for pinhead formation.
- ⑥ Yield data (number and weight up to 4 weeks).
- ⑥ Time taken for I, II and III flush

⑥ 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.

⑥ Fruit body observations of individual hybrid strain

⑥ Pileus size, colour, stipe length, stipe thickness, organoleptic tests - liking of the consumers and coloured photograph of each strain.

⑥ The data on pileus and stipe size/thickness are to be recorded for at least 10 fruit bodies

⑥ Pest and disease incidence (as per proforma)

⑥ Photographs of each hybrid h) Information to be provided ⑥ Substrate used and substrate preparation method

⑥ Date of spawning

⑥ Date of opening bags

⑥ Max. and minimum temperature and RH% in the cropping rooms. (Separate sheet is enclosed for recording)

⑥ Daily yield record (replication wise)

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

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

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. 06: Initial varital trial for high yielding strains of Milky mushroom (*Calocybe indica*)

a) Participating centres Coimbatore, Raipur, Udaipur, Samastipur b) Strain 2 strains by DMR; 2 strains by RAU, Pusa; and 1 strain by Raipur c) Substrate Wheat straw/paddy straw d) Supplement e) Method of substrate Chemical sterilization

preparation f) Spawn rate 4% (on wet weight basis) g) No. of replication 4 replication of 6 bag each h) Bag size 5 kg wet weight

h) Observation to be recorded Days to spawn run; days to first harvest, no. of fruit bodies and total yield per bag; total yield per 100 kg dry substrate

i) Production technology to ⑥ Treat the substrate with 75 ppm bavistin and 500 ppm formaline for be followed 16-18 h

- ⑥ Method of spawning – layer spawning 4% wet weight basis
- ⑥ Spawn run temp – 25-32°C; RH – 80%; Light – Nil. Takes 20 days for substrate colonization and then casing is to be done.
- ⑥ Casing – 75% soil and 25% sand
- ⑥ Thickness – 3-4 cm; pH – 7.8-7.9 to be adjusted with chalk powder
- ⑥ Casing autoclaved or treated with formaline (2%) about a week in advance.
- ⑥ Temp – 30-35°C ; RH – 80-90% maintained throughout cropping cycle
- ⑥ Cropping – It takes about 10 days for case run and then minimum 3-4 air exchanges per hour required.
- ⑥ Light to be provided for maximum duration during entire cropping cycle.

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. 07: Total indoor compost production

using thermophilic fungi

a) Participating centres Ludhiana, Murthal, Nauni, Solan, Pantnagar 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 ⑥ Inoculum needed: *Scytalidium thermophilum* (X-21 strain) +

Humicola Insolens (I-33) @ 0.4% on dry wt. basis of the straw i.e. 2.0 kg each

- ⑥ Inoculum has to be added at 2 stages
- ⑥ Culture will be provided by DMR, Solan
- ⑥ Inoculum to be grown on wheat grains (usual spawn bottles with sterilized wheat grain) and inoculated at 45°C for 7-10 days

⑥ 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.

⑥ Inoculum solution is now ready. d) Method of compost ⑥ 0 day : Properly wet wheat straw and bring it up to 75% moisture

preparation level. Later thoroughly mix the ingredient in to it along with half of inoculum and make a heap of 4 ft height

⑥ +1 day: break open the heap, add water if required, mix the ingredients properly, again make a heap (temp around 58-60°C)

⑥ +2 day: Again turn the compost ingredient and make a heap (temp 62-65°C)

⑥ +3 day: Again turn the compost ingredient and make a heap (temp 70°C)

⑥ +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)

⑥ +5 day: Maintain the compost temp at 45-52°C (pre-pasteurization conditioning)

⑥ +6 day: -do-

⑥ +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.

⑥ +8 day: Post pasteurization conditioning (POPC) continues

⑥ +9 days: POPC

⑥ +10 days: POPC and cool down at night

⑥ +11 day : Spawn * Minimum 10% fresh air during entire operation even during killing * Spawning can be done on 10

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 As in expt-2

run and cultivation 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: ⑥ Physical parameter of compost like pH, Nitrogen, Moisture etc

- ⑥ Quantity of total compost produced
- ⑥ Days required to complete phase-II
- ⑥ Yield per 100 kg compost
- ⑥ Time (days) taken for spawn run
- ⑥ Time (days) taken for case run
- ⑥ Time (days) taken for primordial formation
- ⑥ Total No. of fruit bodies/bag
- ⑥ Total mushroom yield/bag
- ⑥ Fruit body weight

⑥ Disease incidence n) Cost benefit ratio * The compost, not used in the trial may be given to farmers for farmer's field trial.

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. 08 Evaluation of the cultivation technology of *Macrocybe gigantea*

a) Participating centres Murthal, Pantnagar, Coimbatore, Udaipur, Pune, Bhubaneshwar, Vellayani Strains 4 strain (1-Dr. RC Upadhyay; 1-Dr. V. Prakasham; 2- Dr. Lulu Das)

b) Season for cultivation September to October (2013) and April to June (2014) c) Substrate i) Wheat straw ii) Paddy straw iii) Wheat and paddy straw 1:1 * Substrate is to supplemented with 1 kg lime/100kg dry straw after

wetting d) Method of substrate i) Autoclaving at 22 p.s.i. for 60 minutes

preparation ii) Wet wheat or chopped paddy straw, allow the substrate to dry for 2-3 h to achieve 65-70% moisture level and mix 1% lime on the basis of dry weight of the substrate. Fill in polypropylene bags (40x20cm) 2 kg substrate and autoclave at 22 psi for 60 min.

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 28-35°C

run and cultivation h) Light 200 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 Or coir pith l) Observation to be recorded

⑥ Substrate Moisture

separately for wheat, paddy ⑥ Substrate Nitrogen straw and combination ⑥ Substrate pH· Temperature and RH during cropping

- ⑥ Time (days) taken for spawn run
- ⑥ Time (days) taken for primordial formation
- ⑥ Total No. of fruit bodies/bag
- ⑥ Total mushroom yield/bag

⑥ 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.

Expt. 09: Evaluation of zero energy poly tunnel technology

a) Participating centres Hisar, Murthal, Pusa, Solan b) Strain U-3 c) Substrate and Supplement Wheat straw - 1000 to 1200 kg Chicken manure - 600 kg Wheat bran - 100 kg Gypsum - 76 kg Urea - 24 kg d) Method of substrate Pre-wetting : Two days preparation 0 day : Mixing of fine ground chicken manure, wheat bran,

urea and gypsum for 6-8 h and Pile formation using ZEPT structure and covering with polythene cover

1st -5th day : compost pile as such : First three days, fully covered with polythene sheet

1st pasteurization, average temperature 66-78°C) : fourth day onwards, side cover need to be opened

(1st conditioning, average temperature 50-60°C) 6th day : first turning; pile formation using ZEPT structure and polythene cover 6th – 10th day : compost pile as such : Seventh and eighth day, fully covered with polythene

sheet (2nd pasteurization, average temperature 60-68°C)

: 9th day onwards, side cover need to be opened (2nd conditioning , average temperature 50-56°C)

11th day : Second turning; pile formation using ZEPT structure and polythene cover without closing side cover

: (3rd conditioning, average temperature 48-52°C) 13th day : pile break up and over night cooling 14th day : Spawning e) Spawn rate 0.7% of wet compost f) No. of replication 3 replications each with 4 bags of 10 kg g) Bag size 8 kg compost per bag h) Production technology • The yield data should be recorded in tabulated form replication wise.

to be followed • The replicates should be randomized in cropping rooms in different tiers in RBD.

• 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 CaCO_3).

• 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

• 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.

h) Observation to be recorded • Composting: Daily temperature profile

• Finished compost

• Moisture content

• pH

• EC

• N

• Spawn run

• Days required for spawn run completion

• Presence of pest and disease if any

• Case run

• Days required for case run completion

• Presence of pest and disease if any

- ⑥ The number of mushrooms opened in each harvest should be recorded to determine the quality of the fruit body produced by a particular strain.
- ⑥ 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.
- ⑥ 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.

Design of the Structure ⑥ For design either visit DMR, or contact Dr. Goraksha C Wackchure at email goraksha.wakchaure@gmail.com

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

Notes

1. The experiments may be laid by following proper randomization and the randomization plan may be attached with results.
2. The daily temperature and humidity data may be submitted in excel sheet. 3. The replicationwise rough data may be submitted within 15 days after completion of the trial. 4. Cultures supplied are coded differently each year. Please do not use the old cultures for trials. Material transfer agreement will be supplied and the same may be returned after signing. 5. Please go through the contents above and in case of any modifications or suggestions, you may write to satish132@gmail.com . 6. In case of no comments from your side, the technical programme may be treated as final.

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, Ludhiana, Solan and Murthal. The design 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 short method compost, the maximum yield of 21.03 kg

per 100 kg of compost was recorded in the strain AVT-1 at Pantnagar Centre followed by strain AVT-6 at the headquarter. AVT-1 was the high yielder at Nauni (20.34) and AVT-6 was high yielder at Pune (19.40) and at Solan (20.07). AVT-2 also performed well at Ludhiana (16.69) and Nauni (19.49). Overall best average productivity was recorded in AVT-6 with 16.18 kg followed by AVT-1 with 15.82 kg per 100 kg compost (Table 4.1). Overall all the strains have performed well at Nauni centre.

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

A. <i>bisporus</i> Original strain culture Pune Pantnagar Ludhiana Solan Nauni Average															
AVT-1	S-11-12	17.40	21.03	12.70	15.91	20.34	15.82	AVT-2	S-11-5	14.30	13.98	16.69	14.35	19.49	14.66
AVT-3	S-11-11	16.60	10.29	9.22	12.30	16.36	12.31	AVT-4	A-6-C	00.89	0.00	11.22	13.75	4.90	AVT-5
		17.10	10.36	10.48	14.25	17.42	13.19	AVT-06	U-3-58	19.40	20.46	16.20	20.07	17.22	16.18
														CD (0.05)	1.32
														6.76	
														0.96	2.17
														2.37	

The compost parameters recorded at various centres have indicated that the pH of the compost ranged from 7.2 to 7.6 while nitrogen percent was varied from 1.8 to 2.7. The moisture percent 63-70% (Table 4.2). Colour of compost was invariably dark brown. The parameters indicated that there was slight variation in the values but overall the parameters were well within the recommended range.

Table 4.2. Compost parameters for short method compost for AVT

Centres	pH	Nitrogen (%)	Moisture (%)	Colour
Pune	7.2	2.2	63	Dark brown
Pantnagar	7.3	2.1	64.5	Dark brown
Murthal	7.0	2.0	70	Dark brown
Ludhiana	7.4	2.7	67	Dark brown
Solan	7.6	1.8	62	Dark brown

The time taken in first harvest (days post casing) was in the range of 19-28 days. The lowest first harvest time (19 days) was recorded at Pune in AVT-1 (Table 4.3). Average fruit body weight also varied at different centres and was recorded maximum (17.13 g) at Pantnagar centre in the strain AVT-1 (Table 4.3).

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

<i>A. bisporus</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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a. First harvest (days post casing); b. average fruit body wt (g)

1.2 Initial varietal trial for selected hybrids of *Agaricus bisporus*

In another set of experiment on evaluation of selected white accessions of *A. bisporus* using short method of compost, maximum yield of 20.27 kg /100 kg of compost was recorded in the strain IVT-13- 07 at Pantnagar centre followed by strain IVT-13-02 at the same centre (19.79 kg). At DMR Solan, the

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

<i>A. bisporus</i>															
strain (Code)		Original culture		Pantnagar		Ludhiana		Solan		Average					
IVT-13-01	A-15-102XU	3-3	12.30	8.88	14.64	11.94	IVT-13-02	S-11-105XU	3-117	19.79	10.54	15.50	15.28		
IVT-13-03	S-11-105X	U3-22	15.34	9.12	10.65	11.70	IVT-13-04	A-94-7XU	3-22	16.10	1.23	11.34	9.55	IVT-13-05	
W1-11XU	3-8	19.65	11.38	15.14	15.39	IVT-13-06	U-3	18.81	0.00	17.06	11.95	IVT-13-07	U-3-58	20.27	
16.35															
18.19	18.27	CD (0.05)	5.83	1.38	3.66										

best performing strain was IVT-13-07 followed by IVT-13-06 with an average yield of 18.19 and 17.06 kg /100 kg compost. Overall average of all the strains at all the centres showed that IVT-13-07 followed by IVT-13-05 and IVT-13-02 with an average yield of 18.27, 15.39 and 15.28kg were the best performing strain (Table 4.4).

Strain evaluation trial at Ludhiana Centre

Compost parameters varied at different centres (IVT). The pH ranged between 7.2-7.8. Nitrogen percentage ranged between 1.8-2.7. Except Murthal compost was dark brown in colour at all the centres (Table 4.5).

The lowest time taken for first harvest was 17 days post casing in all the strains at Pantnagar Centre. The strains in the trial have shown variation in first harvest at different centres. The time taken for first harvest ranged between 37-41 days at Solan centre. The average fruit body weight ranged from 11 to 13.59 g with maximum in strain IVT-13-02 (Table 4.6).

Table 4.5. Compost parameters at different centres (IVT)

Centres	pH	Nitrogen (%)	Moisture (%)	Colour
Pune	7.6	2.1	67	Dark brown
Pantnagar	7.2	1.8	68	Dark brown
Murthal	7.8	1.8	69	Light brown
Ludhiana	7.4	2.7	67	Dark brown
Solan	7.6	1.8	62	Dark brown

Table 4.6. Time to first harvest and average fruit body weight of *A. bisporus* strains on short method compost

<i>A. bisporus</i> s t r a i n												L u d h i a n a																				
P a n t n a g a r												S o l a n																				
Average a b a b a b a b												IVT-13-01	28	13.6	17	12.88	25	14.3	23.33	13.59	IVT-13-02	28	12.7	17	13.11	29	11.1	24.66	12.30			
												IVT-13-03	28	12.7	17	11.78	29	13.3	24.66	12.59	IVT-13-04	28	12.0	18	10.91	26	11.0	24.00	11.30			
												IVT-13-05	28	12.7	18	11.80	26	11.2	24.00	11.90	IVT-13-06	28	12.0	18	10.51	25	13.5	23.66	12.00			
												IVT-13-07	28	12.0	18	10.51	25	13.5	23.66	12.00												

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

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

The trial was assigned at six centres and a total of seven strains of *Volvariella volvacea* were tested. The biological efficiency of various strains varied in the range of 1.76 to 30.76 kg /100 kg of dry substrate at various centres in different strains. The maximum yield of 30.76 kg/100 kg of dry substrate was recorded in strain Vv-13-03 at Solan. It was also recorded that the maximum biological efficiency for all the test strain was achieved at the Solan centre. The minimum biological efficiency was recorded in Vv-13-01 at Solan centre with an average yield of 1.76 kg /100 kg of dry substrate. Overall average showed that the maximum BE (17.72 kg) was recorded in Vv-13-02 strain while the minimum BE (6.85 kg) was in strain Vv-13-01 (Table 4.7).

Table. 4.7. Yield of different strains of Paddy Straw Mushroom, *Volvariella volvacea*

Strain	Original culture	Faizabad	Coimbatore	Ludhiana	Bhubaneswar	Solan	Average
Vv-13-01	Vv-09	6.52	23.9	2.1	0.00	1.76	6.85
Vv-13-02	Vv-07	9.28	21.4	17.7	15.30	24.92	17.72
Vv-13-03	Vv-03	8.54	19.2	11.1	9.33	30.76	15.78
Vv-13-04	OSM-11	12.93	20.5	7.1	5.95	10.88	11.47
Vv-13-05	OSM-12	16.70	20.8	3.8	8.90	20.20	14.08
Vv-13-06	<i>Volvariella</i>	5.14	19.0	10.4	14.48	-	12.23
(TNAU) CD(0.05) 6.37 - 3.1 12.32 -							

The average fruit body weight varied at different centres with a maximum of 19.63 g at Faizabad centre in the strain Vv-13-04 while the minimum fruit body weight was recorded to be 6.2 g at Ludhiana centre in the strain Vv-09. All the strains have recorded the maximum fruit body weight at Coimbatore centre followed by Bhubaneshwar centre. The maximum fruit body weight recorded at Bhubaneshwar centre was 16.98 g in strain Vv-13-05. At Bhubaneshwar centre the maximum fruit body weight (15.43 g)

was recorded in strain Vv-13-05. Overall average showed that the maximum fruit body weight (14.4 g) was recorded in strain Vv-13-03 while minimum (9.34 g) in Vv-13-06 strain.

The minimum time taken for the first harvest was 10 days in strain Vv-13-02 and Vv-13-05 at Ludhiana centre. The overall average also indicated the minimum time taken for the first harvest was in strain Vv-13-02 while the maximum time in strain Vv 13-01 (Table 4.8).

Table 4.8. Average fruit body weight (g) and time taken to first harvest in strains of paddy straw mushroom

Strain Faizabad Bhubaneswar Ludhiana Average													
	a	b		a	b		a	b		a	b		a
Vv-13-01	12.58	18	0.00	0.00	11.8	15	12.19	16.5	Vv-13-02	12.40	17	15.32	11.75
	10.7	10	12.80	12.91	Vv-13-03	15.49	17	14.81	13.25	12.9	12	14.4	14.08
	15.43	14.25	6.2	13	13.44	14.41	Vv-13-04	19.63	15	13.76	12.75	8.3	12
	13.89	13.25	Vv-13-05	18.69	16	15.43	14.25	6.2	13	13.44	14.41	Vv-13-06	11.30
	18	6.67	12.00	10.1	10	9.34	13.33	Vv-11	10.67	8.5	10		

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

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

This trial was conducted at 11 different centres. A total of seven high yielding strains of *Pleurotus* species were under evaluation trial (Table 4.9). At Raipur Centre, strain PL-13-05 gave the highest BE of 86.93% whereas, strain PI-13-03 at Barapani, Udaipur, Hisar, Pasighat and Vellayani, strain PI-13-06 at Bhubneshwar and Pusa, strain PI-13-01 at Pantnagar, PI-13-02 at Ranchi and strain PI-13-04 performed best at Pune Centre. On an average basis strain PI-13-03 gave highest yield.

Table 4.9. Strain evaluation of oyster mushroom species

Strain/ Original Hybrid culture	Raipur	Barapani	Vella-	Bhub-	Pusa	Pant-	Ranchi	Udaipur	Hisar	Pasighat	Pune	Avg
yani neswar nagar												
PI-13-01 DMRP-218	64.38	64.58	47.55	70.64	81.6	67.78	69.25	55.20	46.52	52.76	77.44	63.43
PI-13-02 DMRP-219	67.56	73.30	82.95	71.40	63.9	26.34	84.30	69.10	46.82	46.64	64.05	63.30
PI-13-03 PI-H-25	67.92	76.92	94.50	49.26	78.5	67.54	69.85	89.65	60.02	74.86	69.33	72.57
PI-13-04 Ud-25/08	73.68	69.58	45.90	64.18	74.1	50.02	75.12	70.63	50.5	64.78	80.44	65.35
PI-13-05 Oyster-1	86.93	55.33	64.50	59.98	77.4	13.06	62.07	78.23	57.96	59.30	70.20	62.26
(TNAU) PI-13-06 PIXPI-50-H-3	63.30	56.70	91.60	84.14	88.5	49.88	64.75	66.23	53.44	67.96	58.80	67.75
(control) PI-13-07 Oyster-2	41.12	-	54.70	-	55.20	59.73	44.98	50.10	76.21	54.58		
(TNAU) CD 5%	16.66	15.48	12.32	2.78	2.98	2.31	9.49	10.1				

Time taken for first harvest varied at different centres

At Raipur Centre, strain PI-13-07 took maximum time of 36 days, whereas, PI-13-05, PI-13-03, PI-13-01, PI-13-07 and PI-13-05 took maximum time at Bhubneshwar, Pusa, Hisar, Vellayani and Pune Centre, respectively (Table 4.10). On an average strain PI-13-05 took maximum time of 29.54 days. Similarly fruit body weight varied at different Centres. At Raipur centre, maximum fruit body weight of 17.80g was recorded in strain PI-13-03. Minimum fruit body weight of 1.48g was recorded in strain PI-13-01 at Bhubneshwar Centre. On an average, highest fruit body weight of 9.41 (Table 4.11) was recorded in strain PI-13-07.

Table 4.10. Time taken for first harvest in different strains of *Pleurotus*

Strain/ Hybrid	Raipur	Bhubneswar	Pusa	Hisar	Vellayani	Pune	Pantnagar	Average
PI-13-01	17	13.10	29	31.0	15	23	25	21.87
PI-13-02	23	11.23	26	24.0	11	23	24	20.32
PI-13-03	29	24.20	30	28.6	21	27	26	26.54
PI-13-04	31	28.30	24	29.8	13	30	31	26.72
PI-13-05	21	36.80	25	30.0	33	34	27	29.54
PI-1-06	30	35.43	20	29.2	25	34	27	28.66
PI-13-07	36	23.63	-	-	42	33	27	23.09

Table 4.11. Average fruit body weight in different strains of *Pleurotus*

Strain/ Hybrid	Raipur	Pantnagar	Bhubaneshwar	Udaipur	Pune	Pantnagar	Average
PI-13-01	5.42	1.76	1.48	6.97	6.63	1.76	3.43
PI-13-02	4.83	1.93	2.41	7.55	5.93	1.93	3.51
PI-13-03	17.8	4.80	4.72	7.09	11.96	4.80	7.31
PI-13-04	9.89	6.25	2.84	6.77	10.15	6.25	6.02
PI-13-05	8.12	3.16	6.07	8.29	12.42	3.16	5.88
PI-13-06	16.45	8.03	8.95	6.68	10.35	8.03	8.35
PI-13-07	10.01	13.01	9.61	8.18	12.10	13.01	9.41
CD	5%						

1.5 Initial varietal trail for high yielding strains of milky mushroom

This trial was conducted at four different Centres and six strains of milky mushroom was evaluated. At Solan Centre, strain CI-13-01 gave highest yield of 586.0g followed by CI-13-02. However, no fruiting was recorded in rest of the strains. Strain CI-13-02, CI-13-06, CI-13-01 performed best at Coimbatore, Udaipur and Samastipur, respectively (Table 4.12). On an average maximum yield of 486.1g was recorded in strain CI-13-06.

Table 4.12. Initial varietal trail for high yielding strains of milky mushroom (g/1.5kg dry sub)

Strain Original culture Solan Coimbatore Udaipur Samastipur Average													
CI-13-01	CIP-4 (Pusa)	586.0	219.0	508.8	600.0	478.4	CI-13-02	CIP-12 (Pusa)	490.7	265.5	535.1	420.0	427.8
CI-13-03	CIR-2(Raipur)	NF	248.9	652.8	340.0	413.9	CI-13-04	CIR-4 (Raipur)	NF	207.3	579.7	440.0	409.0
CI-13-05	APK-2 (DMR)	NF	213.3	784.7	430.0	476.0	CI-13-06	OE-355(DMR)	NF	210.0	839.5	410.0	486.1

NF= no fruiting

2. CROP PRODUCTION 2.1. Total indoor compost production

using thermophilic fungi

The trial was assigned to four different centres i.e. Nauni, Murthal, Ludhiana, Panthnagar 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. Yield varied at all the Centres. At Nauni Centre, maximum yield off 18.92kg was recorded as compared to 12.60kg in traditional short method. Yield of 12.20 and 13.52 kg was recorded at Ludhiana and Panthnagar, respectively. At DMR, Solan 19.96kg yield was recorded as compared to 14.50kg in traditional short method. No significant difference in yield was recorded at Murthal which was quite low as compared to other Centres. Overall average yield showed 14.72 kg /100 kg compost in indoor composting technology (Table 4.13) as compared to traditional short method compost.

Table 4.13. Yield of white button mushroom by total indoor composting technology

Treatment Mushroom yield (kg/100kg compost) at different centres Nauni Murthal Ludhiana Pantnagar Solan Average									
Total Indoor composting using	18.92	9.0	12.20	13.52	19.96	14.72	thermophile		
Traditional short method compost	14.97	8.9	10.40	12.78	14.50	12.31			

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 (57-69%) (Table 4.14). 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 4.14. Compost parameters in total indoor compost Centres pH Nitrogen Moisture Colour

(%)(%)									
Ludhiana	7.7	2.8	67.0-69.0	Dark brown	Murthal	7.8	2.0	64.0	Light brown
Solan	7.3	1.68	57	black					

2.2 Evaluation of zero energy poly tunnel technology

The trial was assigned to three different centres i.e. Hisar, Murthal, and Pusa . A new method of compost preparation using perforated pipes inside the compost pile was developed at DMR, Solan, which do not cause any air pollution by using passive aeration. The technology as such was put for multilocation trials alongwith traditional short method technology as check. Yield varied at all the Centres. At Hisar Centre, maximum yield off 14 kg was recorded. At Pusa 12.33 kg yield was recorded. No significant difference in yield was

recorded at Murthal which was quite low as compared to other Centres. Overall average yield showed 11.38 kg /100 kg compost in indoor composting technology (Table 4.15).

Table 4.15. Evaluation of zero energy poly tunnel technology (KG/q)

Strain Hisar Murthal Pusa Average									
ZEPT	14.00	7.81	12.33	11.38	control	13.98	8.98	13.00	10.99

2.2 Standardization of cultivation technology of *Macrocybe giganteum*

The trial was assigned to six different centres i.e. Pantnagar, Coimbatore, Udaipur, Bhubaneshwar, Solan 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. Yield data recorded at different Centres were not up to the mark.

5

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

Different Centres have reported the collection of specimens of wild mushrooms during the year and about 137 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	Date	Accession	No species deposited
ICAR RC for NEH, Barapani	0 0 0	ICAR RC for ER, Ranchi	26.2.14	DMRO-615-616 PAU, Ludhiana
19.11.13	DMRO-568-586	TNAU, Coimbatore	0 0 0	GBPUA&T, Pantnagar
19.11.13	DMRP-293	DMRO-564-567	MPUA&T, CoA Pune	19 23.12.13
	DMRA-150, DMRO-	592-599,		
DMRP- 297-306	NDUA&T, Faizabad	6 23.12.13	DMRO-600-605	IGKVV, Raipur
12 20.9.13	DMRO-552-563	MPUA&T, Udaipur	29 5.12.2013	DMRP-294-296
DMRP-144, 149				
DMRO-588-591	KAU, CoA, Vellayani	25 22.4.13&10.3.14	DMRO-532-548	DMRO-617-624
CCSHAU, Hisar	0 0 0	OUA&T, Bhubaneswar	7 5.1.14	DMRO-608-614
0 0 0	DMRO-6140	RAU, Samastipur, Pusa	8 22.4.13&2.8.13	
DMRO-527-531	DMRO-549-551	CAU, CoH&F, Passighat	0 0 0	YSPUH & F, Nauni, Solan (HP).
0 0 0	HAIC, Murthal (Haryana)	0 0 0		

Bhubaneswar Centre

Surveys were conducted in six districts under three agro-climatic situations of the state during Kharif, 2013. Twenty two indigenous mushrooms have been collected and identified based on available information. However, cultures of eight mushrooms have been deposited at the Directorate of Mushroom Research, Solan. They were *Calocybe indica*, *Coprinus comatus*, *Lentinus polychrous*, *Lentinus tuber regium*, *Marasmius candidus*, *Pleurotus* sp., two strains of *Volvariella volvacea* (Fig.1).

Lentinus tuber-regium Lentinus polychrous Marasmius candidus

Termitomyces clypeatus Termitomyces heimii Russula brevipes

Tuber rufum Clavaria sp. Russula rosea

Fig. 1. Wild Mushroom Germplasm Collected At Bhubaneswar Centre (2013-14)

Table 5.2. Cultures deposited at Directorate of Mushroom Research by OUAT, Bhubaneshwar SI.

Scientific Name	Local Name	Habitat/ Locality	Date of edibility
No.	Substrate	collection	
1.	<i>Lentinus tuber regium</i>	Amba chhatu Decaying Telkoi, 17.08.2013 Edible wood Keonjhar	2. <i>Calocybe indica</i>
	Dudha chhatu Soil Betnoti, 18.06.2013 Edible Mayurbhanj	3. <i>Lentinus polychrous</i>	Salakhunti Dry twig Telkoi, 17.08.2013 Edible chhatu Keonjhar
	4. <i>Pleurotus</i> sp.	Kadamba Decaying Soro, 7.07.2013 Edible chhatu wood Balasore	5. <i>Marasmius candidus</i> - Tree trunk Bhubaneswar, 22.08.2013 Not known Khurda
	6. <i>Coprinus comatus</i>	Gobar chhatu Rotten Bhubaneswar, 21.10.2013 Edible straw Khurda	7. <i>Volvariella volvacea</i>
	Pala chhatu Straw piles Pipli, Puri 15.07.2013 Edible	8. <i>Volvariella volvacea</i>	Pala chhatu Straw piles Pipli, Puri 15.07.2013 Edible

Other species collected during the same period were *Auricularia auricula*, *Coprinus* sp., *Ganoderma lucidum*, *Pleurotus* spp., *Russula nigricans*, *Russula virescens*, *Russula brevipes*, *Russula rosea*, *Termitomyces clypeatus*, *Termitomyces heimii*, *Termitomyces albuminosus* and *Tuber rufum*. Photographs from the natural habitats have been taken and mushrooms conserved (Table.2).

Table 5.3. Wild Mushroom Germplasm reported from OUAT, Bhubaneswar Centre (2013-14) Sl.

Scientific Name	Local Name	Habitat/ Locality	Date of edibility	No. Substrate collection		
1. <i>Russula nigricans</i>	Angari chhatu	Leaf litter Jhumpura	17.08.2013	Edible Keonjhar		
2. <i>Termitomyces clypeatus</i>	Badabali chhatu	Moist grass Jhumpura	16.08.2013	Edible land Keonjhar		
3. <i>Termitomuces heimi</i>	Sraban chhatu	Shady moist Bansapal,	17.08.2013	Edible		
	place Keonjhar	4. <i>Russula virescens</i>	Jamu chhatu	Moist Jhumpura 16.08.2013	Edible	
				deciduous Keonjhar forest		
5. <i>Termitomyces clypeatus</i>	Bihuduni chhatu	Moist grass Bansapal,	17.08.2013	Edible land Keonjhar	(highly priced)	
6. <i>Russula brevipes</i>	Patra chhatu/	Leaf litter Jhumpura	16.08.2013	Edible khai chhatu Keonjhar		
7. <i>Termitemyces</i>	Mayurchulia	Leaf litter Jhumpura	16.08.2013	Edible		
<i>albuminosus</i>	chhatu Keonjhar	8. <i>Russula rosea</i>	Nalikukuda	Black soils Jhumpura	16.08.2013	Edible
	chhatu of hilly areas Keonjhar	9. <i>Tuber rufum</i>	Rutka chhatu	Moist Telkoi,	17.08.2013	Edible
				deciduous Keonjhar sal forest		
10. <i>Ganoderma lucidum</i>	Reishi chhatu	Living hard Soro,	7.07.2013	Inedible wood Balasore		
11. <i>Auricularia auricula</i>	Kalakan chhatu	Fallen log Bhubaneswar,	26.08.2013	Edible Khurda		
12. <i>Pleurotus</i> sp.	Tentuli chhatu	Wooden Soro,	7.07.2013	Not known stump Balasore		
13. <i>Pleurotus</i> sp.	Salma chhatu	Wooden Baudpur,	7.07.2013	Not known stump Bhadrak		
14. <i>Coprinus comatus</i>	Gobar chhatu	Rotten straw Bhubaneswar,	21.10.2013	Inedible Khurda		

Ludhiana Centre

Wild mushroom flora was surveyed in the districts Ludhiana, Hoshiarpur, Gurdaspur and Amritsar during the months from July to September, 2013. Five mushrooms were collected from Ludhiana, four

from Hoshiarpur, one from the district Amritsar and two from Gurdaspur. The culture of wild mushrooms were deposited and accessioned at The Directorate of Mushroom Research, Chambaghat, Solan. Detailed account of wild mushrooms is given below:

DMRO-568 (*Chlorophyllum molybdites*)

Wild mushroom DMRO-568 was collected from village Ayali Kalan, district Ludhiana, from the roadside leaf litter area in July, 2013. The GPS location was recorded as 30°53'40"N 75°11'10"E. The typical smell on its taste, the pileus was creamish brown with 110 mm diameter which was round and flattened at top. The pileus was non-sticky, non-hygrophanous and bear scales. The stipe was centrally attached, which was 205 mm long. Annulus type ring was also present, but veil and volva were absent. Gills underneath the pileus were free, light greenish colored giving sea green spores on filter paper. A tissue culture of the same had been prepared for further study.

DMRO-569 (*Agaricus* sp.)

The wild mushroom DMRO-569 was collected from the forest area of district Ludhiana, near village Hambran on GPS location 30°56'20"N 75°40'13"E, during the month of August, 2013. The mushroom was collected from decomposed cattle dung mixed with soil. The pileus was creamish brown with 23 mm diameter; it was ovate in shape and curved along the margin without scales. The pileus surface was non-sticky and non-hygrophanous in nature. The centrally attached stipe was also creamish colored with 38 mm in length, slender shape and swollen base. An annulus type ring was present on the stipe near to pileus but veil and volva were not present. The lamellae underneath the pileus were freely attached to stipe with pinkish coloration which later on maturation gave brown spores on filter paper.

DMRO-570 (*Agaricus silvicola*)

It was collected from leaf litter surrounded by grass at village Ladowal, district Ludhiana on GPS location 30°59'28"N 75°48'51"E during the month of September, 2013. The pileus was creamish brown with 58 mm diameter, which was depressed from top, scaleless and its margin was wavy. The pileus surface was non-sticky and non-hygrophanous in nature. The centrally attached stipe was also creamish colored with 50 mm in length, slender shape and swollen base. An annulus type ring was present on the stipe near to pileus but veil and volva were not present (Plate 4.3). The lamellae underneath the pileus were freely attached to stipe with greyish coloration which later on maturation showed grayish black spores. Tissue culture of this mushroom was prepared for further study.

DMRO-571 (*Agaricus silvicola*)

DMRO-571 was collected from same locality as DMRO-570 during the month of September, 2013. Soil around the mushroom was collected and analyzed for physico-chemical properties. This wild mushroom sample showed similar morphological characteristics to DMRO-570 except pileus diameter (50 mm), shape (ovate) and margin (curved). The stipe was 44 mm long. This wild mushroom sample could be considered as young stage of sample DMRO-570. The lamellae underneath the pileus were freely attached to stipe with creamish coloration which on maturation showed grayish black spores.

DMRO-572 (*Agaricus arvensis*)

Wild mushroom sample DMRO-572 was collected from PAU campus, Ludhiana city on GPS location 30°54'10"N 75°48'51"E on leaf litter underneath a tree, during the month of September, 2013. Smell of this wild mushroom sample was typical and taste was not distinct. The convex pileus was of greyish cream color with 49 mm diameter with curved margin. Nature of pileus surface was scaleless, non-sticky and non-hygrophanous. Cream colored slender shaped stipe (45 mm length) was centrally attached to the pileus with swollen base. An annulus type of ring was also present but veil and

volva were absent. Gill attachment was not visible due to fusion of ring with lamellae, its color was creamish and edges were closed, but on maturation gave chocolate brown color spores.

Fig. 5.4. Detailed account of wild mushrooms collected from the district Ludhiana

Mushroom	DMRO-568(1)	DMRO-569(7)	DMRO-570 (10)	DMRO-571 (11)	DMRO-572 (14)
Collection	10-07-2013	5-08-2013	11-09-2013	21-09-2013	22-09-2013
date					
Location	Ayali kalan Hambran Ladowal Ladowal Ludhiana City	GPS data (Ludhiana)	(Ludhiana)	(Ludhiana)	30°
(Ludhiana)	30° 30' 14" N	30° 53' 40" N	30° 56' 20" N	59' 28" N and 75° 48'	19'
	E 75° 45' 37" E	75° 40' 13" E	75° 44' 10"		51"
E Habitat	Leaf litter, Cattle Dung, Leaf litter, Leaf litter, Leaf litter, Leaf litter				
Vegetation	Road side	Road side	Grass	Grass	community
Smell, Taste	Typical	Typical	Mushroom	Mushroom	Mushroom, Mushroom, like, like, like, Tasteless
Spore print	Sea green	Brown	Brown	Brown	Pileus 110mm, 23mm, 58mm, 50mm, 49mm, Greyish
diameter	Creamish	Creamish	Creamish	Creamish	Color brown brown brown Cream
Pileus	Flattened	Ovate	Depressed	Ovate	Convex, shape, Round Curved Wavy Curved Curved Margin
Pileus	Non-sticky	Non-sticky	Non-sticky	Non-sticky	Non-sticky, Surface Non- Non- Non- Non- Non-hygrophanous
Scales	Present	Fine scales	Fine scales	Fine scales	No Stipe Central Central Central Central Central
attachment	Stipe size, 205mm, 38mm, 50mm, 44mm, 45mm, Greyish				
Color	Creamish	Creamish	Creamish	Creamish	Cream Stipe shape, Slender, Slender, Slender, Slender, Slender,
Base	Swollen	Swollen	Swollen	Swollen	Swollen Ring Present Present Present Present Presentr Veil No No No
No	No	No	No	No	Basal No No No No Mycorrhizal
association	Gill	Free	Free	Free	Free Not visible
attachment	Gill color, Light green	Pinkish	Greyish	Creamish	Creamish,
edges	Closed	Edibility	Poisonous	Edible	Edible Edible Inedible Similarity <i>Chlorophyllum Agaricus</i> sp.
	<i>Agaricus</i>	<i>Agaricus</i>	<i>Agaricus</i>		
with	<i>Molybdites silvicola</i>	<i>silvicola</i>	<i>arvensis</i>		

DMRO-574 (*Leucocoprinus cepaestipes*)

N 75° 19' 56" E was collected from village Mehtiana, district Hoshiarpur on GPS location 31° 23' 54" E from leaf litter underneath a tree, during the month of July, 2013. Soil around the mushroom was collected and analyzed for physico-chemical properties. Ubonate shaped pileus (40 mm diameter) with wavy margin, had scaleless, non-sticky and non-hygrophanous surface. A 93 mm curved, long, slender stipe with normal base was centrally attached to the pileus. Ring, veil and volva were absent. The mushroom showed mycorrhizal basal association with the roots of tree. White colored gills were freely attached to the stipe with free edges. Spore color was white. Smell was typical mushroomy but taste was not distinct. Gills were free from the stem, white colored and crowded. Spore print and whole fruit body were also white in color.

DMRO-575 (*Cantharellus minor*)

DMRO-575 was grown on leaf litter between grass community was collected from village Mukhlana, district Hoshiarpur on GPS location 31° 24' 55" E. Smell and taste were not distinct. Yellow colored pileus of diameter 10 mm with infundibuliform shape with wavy margin was having non-sticky, non-hygrophanous and scaleless surface. A 15 mm long flattened orange yellow colored stipe was centrally attached to the pileus. Annulus ring, veil and volva were absent. Stipe had mycorrhizal basal association with tree roots. Free edged lamellae of yellow color were decurrently attached and bear yellow spores.

DMRO-577 (*Lactarius* sp.)

Wild mushroom sample DMRO-577 was grown on leaf litter underneath tree was collected from village Mukhlana, district Hoshiarpur on GPS location 31° 24' 55" E. Smell and taste were not distinct. Creamish pileus was 60 mm in diameter of convex shape with curved margin had non-sticky, non-hygrophanous and scaleless surface. Stipe was 80 mm long, showed central attachment to the pileus and its shape was slender with swollen base. Ring, veil and volva were absent on stipe. Lamellae showed adnate gill attachment along with closed edges, cream color spores on it and droplet like emergence.

DMRO-578 (*Agaricus* sp.)

N 75° 19' 56" E It was collected from village Dwidda Aharana, district Hoshiarpur from GPS location 31° 24' 45" E. Mushroom was present on leaf litter underneath Bougainvillea plant. It contained a typical mushroom smell but taste was not distinct. Pileus was 105 mm long with creamish appearance. The shape of the pileus was umbiliccate and margin was wavy. Touch of surface was non-sticky, non-hygrophanous and scales were absent. Very short creamish brown 50 mm length, slender stipe was laterally to excentric attached to the pileus. Base of the stipe was slightly swollen but ring, veil and volva were absent. Brown spores bearing on smooth gills showed decurrent attachment with free edges.

Detailed account of wild mushrooms collected from the district Hoshiarpur

Mushroom	DMRO-574 (18)	DMRO-575(20)	DMRO-577(29)	DMRO-578(31)
Collection date	17-07-2013	27-08-2013	27-08-2013	15-09-2013
Location, GPS data	Mehtiana	Mukhlana	Dwidda Aharana	
	(Hoshiarpur)	(Hoshiarpur)	(Hoshiarpur)	(Hoshiarpur)
	31° 23' 54" N	31° 24' 55" N	31° 24' 45" N	31° 24' 45" N
	75° 19' 56" E	75° 30' 54" E	75° 31' 24" E	75° 31' 24" E
Habitat, Vegetation	Leaf litter, Leaf litter	Leaf litter, Leaf litter	Leaf litter, Leaf litter	Leaf litter, Leaf litter
	community	Tree Grass	Tree	Bougainvillea plant

DMRO568 DMRO569 DMRO570

DMRO571 DMRO572 DMRO573

DMRO574 DMRO575 DMRO577

Wild mushrooms collected from the district Gurdaspur

DMRO-582 (*Lentinus sajor-caju*)

The wild mushroom DMRO-582 was collected in July 2013 from the Desh Bhagatnagar, District Gurdaspur. GPS location was 32°2'27"N 75°22'43"E. The mushroom was growing on dead tree bark. The mushroom had no taste and no smell. The pileus of this mushroom was 4-6 cm in diameter, depressed, non-sticky, non-hygrophanous with no scale and curved margin. The stipe was centrally attached, white colored thick and round with no ring, veil and volva. Length of stipe was 3-5cm. The gills were white and decurrent. The mushroom showed similarity with *Lentinus sajor-caju*, which is an edible species.

DMRO-584 (*Psathyrella candolleana*)

The wild mushroom DMRO-584 was collected from the forest area of district Gurdaspur during the month of July, 2013, GPS location was 32°3'36"N 75°30'13"E (village Talibpur Pandori). The mushroom was collected from the decomposed leaf litter mixed with soil. The pileus was greyish white, 3-5cm in diameter. It was smooth but sticky showing hygrophanous surface with no scales. The stipe was also white 4-7 cm long, round and attached centrally with no ring, veil and volva. The lamellae underneath the

pileus were free, smooth, brownish in color. Spore print color was brown. This mushroom showed similarity with *Psathyrella candolleana*.

Wild mushroom collected from the district Amritsar

DMRO-585 (*Collybia* sp.)

The wild mushroom DMRO-585 was collected in September, 2013 from the village Verka, District Amritsar on GPS location was 31°39'50"N 74°55'54"E. The mushroom was collected from the decomposed

Wild Mushrooms collected from the district Amritsar and Gurdaspur

Mushroom DMRO-582 (R-24) DMRO584 (R-26) DMRO585 (R-27)									
Date of collection 2/7/13 2/7/13 19/8/13 Locality &GPS data 32°2'27"N 75°22'43"E 32°3'36"N 75°30'13"E 31°39'50"N									
(Desh Bhagat nagar (talibpur Pandori 74°55'54"E(Verka Gurdaspur) Gurdaspur) Amritsar)									
Habitat Lignocolous Leaf litter Leaf litter+soil Smell No — Typical mushroom									
like Taste — — Vegetation community Tree No Grass Pileus dimention 4-6cm 3-5cm 3-6cm Pileus colour White Greyish white Reddish									
Brown Pileus shape, Margin Depressed,decurved Hemispherical, smooth Depressed, decurved Pileus sticky/non sticky Non sticky Sticky Non sticky Hygrophanous/non Non hygrophanous Hygrophanous No Hygrophanous									
hygrophanous Scales No No No Stipe Size, color 2-4cm, white 4-7cm, white 3-5cm Stipe attachment, shape, Central,round Central,round Central, round base Ring No no No Veil No no No Volva No no No Basal association No no No Lamellae attachment Decurrent Free Adnexed Gills color, edges White, enrolled Brown, Smooth Creamish, free Spore print colour Grayish brown Brown Light Brown Edible/non edible/ Edible May be edible May be edible									
Medicinal Similarity with <i>Lentinus sajor-kaju</i> <i>Psathyrella candolleana</i> <i>Collybia dryophilla</i>									

leaf litter mixed with soil. The pileus was light brown, 3-6cm in diameter, smooth, non-sticky, non-hygrophanous surface with no scales and curved margin. The stipe was centrally attached, thin, round with no ring, veil, and volva. Gills were adnexed, creamish in color. Spore print color was creamish white. This Mushroom showed similarity with *Collybia* sp. .

DMRO582 DMRO584

DMRO585

Pune Centre

During the survey, in all 124 samples were collected and 76 specimens are identified on the basis of mycological characters. Among the identified samples, some species viz. *Agaricus* sp., *Pleurotus* sp., *Tricholoma* sp., *Termitomyces* sp., *Polyporus* sp., *Boletus* sp., *Clitocybe* sp. etc. were found to be edible. The tissue isolation of the collected samples was done and in all 42 pure cultures of mushroom were successfully derived and maintained.

Total 42 pure cultures of wild mushroom were deposited in the Gene Bank of Directorate of Mushroom Research, Chambaghat, Solan for accession numbers and 18 cultures obtained the DMR Accession Codes.

[illegible]

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AICR	Sr.	59°14.4	55°33.7	55°56.4	55°56.0	55°56.0	55°55.7	55°59.5	55°59.7	55°59.5	55°59.7	56°2.8"	56°3.1"	56°2.9"
Sample	P	"N	"N Tree	"N Tree	"N	"N	"N	"N	"N Leaf	"N Leaf	"N	N Tree	N	N Leaf
Location	M	Tree	White	Red	Woode	Woode	Humus	Mango	"N Leaf	"N Leaf	Tree	Blackis	Termito	Brown
Location	re	"N Leaf	Grey	3.9	"N Tree	n	Yellow	Dark	Golden	Dark	White	h 10.1	ria	14.3
Location	re	White	28.5	Umbrell	Blackis	Yellow	Umbrel	7.6	6.4	red 8.1	Umbrell	Oyster	White	Funnel
Location	re	3.5	Oyster	r Pachy n	h 1.2	5.4 Cup	4.2 Ear	Oyster	Excen	a	la	Oyster	4.5	Central
Location	re	Umbrell	Excent	- -	Button	Central	la	Excen	Central	Central	Excen	ted 0.9	Initially	13.5 -
Location	re	a	ric 11.5	50°46'29	Central	1.5 -	Central	ric 3.6	Central	Central	ric 1.5	Honey	Central	Thelep
Location	re	Central	Decurr	erium	Adnasc	Scutelli	Adnasc	Decurr	8.6	8.9	Decurr	comb	9.8	hora
Location	re	7.2	ent	Funnel	Free *	nia sp.	a sp.	ent	Shortly	Shortly	ent	Tramet	Adnasc	sp.
Location	re	Free *	Pleurot	9.5nt	mius			Pleurot	Unkno	Unkno	Pleurot	es sp	Unkno	
Location	re		us sp.	Shortly	sp.			us sp.	wn	wn	us sp.		wn	
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Survey and Collection of wild edible mushrooms

Wild *Pleurotus* sp

Wild *Pleurotus* sp

Wild *Termitomyces* sp.

Wild *Agaricus* sp.**Raipur**

Situation : CG forests Scheme :

AICRP-mushroom

Mushroom collection, identification and conservation

Sl. No.	Name of fungi	Habitat/ Place	Month of collection	Edibility	Designation No.	Substrates	collection
1	<i>Calocybe indica</i> *	On the base of CoA	Raipur Aug, 2013	edible	DMRO-552	Milky mushroom of	Peepal tree
2	<i>Calocybe indica</i> *	On the base of Dharampura	Aug, 2013	edible	DMRO-553	Milky mushroom of	Peepal tree
3	<i>Calocybe indica</i> *	On the base of Dharampura	Aug, 2013	edible	DMRO-554	Milky mushroom of	Peepal tree
4	<i>Calocybe indica</i> *	On the base of Dharampura	Aug, 2013	edible	DMRO-555	Milky mushroom of	Neem tree
5	<i>Calocybe indica</i> *	On the base of Fundhar	Aug, 2013	edible	DMRO-556	Milky mushroom of	Peepal tree
6	<i>Calocybe indica</i> *	On the base of Fundhar Raipur	Aug, 2013	edible	DMRO-557	Milky mushroom of	Peepal tree
7	<i>Calocybe indica</i> *	On the base of Temari Raipur	Aug, 2013	edible	DMRO-558	Milky mushroom of	Peepal tree
8	<i>Calocybe indica</i> *	On the base of Temari Raipur	Aug, 2013	edible	DMRO-559	Milky mushroom of	Peepal tree
9	<i>Volvariella</i>	Leaf litter of Tamnar,	Aug 2012	edible	DMRO-560		
10	<i>volvacea</i> *	Sarai forest Raigarh	Aug 2012	edible	DMRO-561		
11	<i>White Volvariella</i> /	Sarai forest Marod	Aug 13	Non edible	DMRO-562		
12	<i>Amanita</i> spp	Gariyaband	Aug 13	Non edible	DMRO-563		
	<i>Amanita</i> spp	leaf litter Gariyaband					

Pantnagar

(a) Period : Rainy Season (July to August, 2013). (b) Area surveyed : Khatima, Tanakpur, Banbasa, Almora, Kausani, Kotabagh, Ramnagar, Pantnagar and adjacent forest area. (c) Progress : 19 no. of specimens were collected during the season as giving in table below

Table 1. List of wild germplasm collection

Sl. No.	Name	Location	Sl. No.	Name	Location
1(a)	<i>Polyporus</i> spp.	pantnagar	10(a)	<i>Amanita</i> spp.	Ranikhet
1(b)	<i>Polyporus</i> spp.	pantnagar	10(b)	<i>Amanita</i> spp.	Ranikhet
2	<i>Auricularia</i> spp.	Pantnagar	11	<i>Tremates versicolor</i>	Ranikhet
3	<i>Auricularia</i> spp.	Pantnagar	13(a)	Jelly fungus	Ranikhet
4(a)	Tuber spp.	Khateema	13(b)	Jelly fungus	Ranikhet
4(b)	Tuber spp.	Khateema	14	<i>Flammulina</i> spp.	Kotabagh
5	<i>Rossula</i> spp.	Ranikhet	15(a)	Unidentified	Kotabagh
6	<i>Polyporus</i> spp.	Ranikhet	15(b)	Unidentified	Kotabagh
7	unidentified	Ranikhet	16	Unidentified	Kotabagh
8(a)	<i>Amanita</i> spp.	Ranikhet	17	Unidentified	Kotabagh
8(b)	<i>Amanita</i> spp.	Ranikhet	18	<i>Boletus</i> spp.	Ranikhet
8(c)	<i>Amanita</i> spp.	Ranikhet	19	Unidentified	Kotabagh
9	<i>Boletus</i> spp.	Ranikhet			

Results Passport data and dried sample submitted: 19 specimens as above submitted to DMR

Spore print submitted: spore print of *Auricularia* spp. (sample No. 2 & 3), *Pleurotus* spp. (Sample No. 7), *Amanita* spp. (sample No. 10 a & b), *Tremates versicolor* (Sample No. 11), *Flammulina* spp. (No. 13), Unidentified (No.16), *Lentinus* spp. (No.19) were submitted to DMR, Solan.

Culture submitted: Culture of *Polyporus* (Sample No. 1 a & b), Tuber (*Scleroderma*) (Sample No.4 a & b), *Pleurotus* spp. (Sample No. 7), *Amanita* spp. (Sample No. 8 a, b & c), *Lentinus* spp. (sample 19) was submitted to DMR, Solan.

Accessions number: DMR Solan allotted respective accession number of five wild mushroom samples out of nine cultures and 19 photographs submitted.

Table 2. List of accessions number allotted

Sample no.	Species	ACC No.	Allotment Date
GBPUAT Pantnagar sp. no. 7/13	<i>Pleurotus</i> sp.	DMRP-293	19.11.13
GBPUAT Pantnagar sp. no. 1/13	<i>Polypore</i>	DMRO-564	19.11.13
GBPUAT Pantnagar sp. no. 4/13	<i>Scleroderma</i> sp.	DMRO-565	19.11.13
GBPUAT Pantnagar sp. no. 8/13	<i>Amanita</i> sp.	DMRO-566	19.11.13
GBPUAT Pantnagar sp. no. 19/13	<i>Lentinus</i>	DMRO-567	19.11.13

Udaipur

C and D) Relative humidity in the range of 70-85% and temperature range of 30-35 °C

2. 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.

3. GPS data of the region from where mushroom was collected.

C) Area of operation: Total eight surveys were conducted for collection, identification and conservation of wild edible mushrooms during monsoon season of 2013 in the month of July, August and September. Total of 102 different wild mushrooms specimens were collected from Kamalighat forest, Anadara forest, Sitamata forest, Pipalkhut forest, Kumbalgarh forest, Balotara, Sirohi, Rajsamand, Pratapgarh and Udaipur district. Some important edible mushrooms collected were *Nematoloma*, *Leucopaxillus giganteus*, *Auricularia*, *Pleurotus*, *Termitomyces*, *Agaricus* and *Lepotia* spp.

From local market of Mokalsar, Sivana, Balotara, Jasol, Jalore, and Badmer district khumbi mushroom *Phellorinia* spp were collected in tones by local peoples and sold in local market in wet and dry form in Balotra and Barmer district at the rate of Rs 120/Kg. In Balotra district the Madan Meherban Journal store has sold dried powder of *Phellorinia* spp. This powder is used for the bone diseases.

D) (A) Performa for market data on mushroom collected

1.

S. No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Sivana Ji, Badi Mandi Aahor, Jalore.
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs.120/Kg
4.	Mode of consumption (fresh/dried/both/raw/cooked)	cooked as vegetable
5.	Any association with tree(s)/soil type etc.	as vegetable/with rice etc.)
6.	ITK if any	sand
7.	Temperature range during the collection period	35
		C (15-20, 20-25, 25-30, 30-35°C)
8.	Actual rainfall & Temp.(min.-max.)	35-38 C

2.

S.No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Jataram ji, Sabji Mandi Takatgarh, Jalore.
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs.120/Kg
4.	Mode of consumption (fresh/dried/both/raw/ cooked)	cooked as vegetable
5.	Any association with tree(s)/soil type etc.	cooked as vegetable/with rice etc.)
6.	ITK if any	type etc. -
7.	Temperature range during the collection period	35
		C (15-20, 20-25, 25-30, 30-35°C)
8.	Actual rainfall & Temp.(min.-max.)	

3.

S.No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Mithalal ji, Sabji Mandi Takatgarh, Jalore.
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs.120/Kg
4.	Mode of consumption	(fresh/dried/both/raw/ cooked as vegetable
		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
		35
		C (15-20, 20-25, 25-30, 30-35°C)
		0
8.	Actual rainfall & Temp.(min.-max.)	

4.

S.No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Babulal ji, Sabji Mandi Takatgarh, Jalore.
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs.120/Kg
4.	Mode of consumption	(fresh/dried/both/raw/ cooked as vegetable
		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
		35
		C (15-20, 20-25, 25-30, 30-35°C)
		0
8.	Actual rainfall & Temp.(min.-max.)	

5.

S.No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Bhavar Lal Sunga Ji.Gaur ka chouk, Balotra
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs.120/Kg
4.	Mode of consumption	(fresh/dried/both/raw/ cooked as vegetable
		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
		35
		C (15-20, 20-25, 25-30, 30-35°C)
		0
8.	Actual rainfall & Temp.(min.-max.)	

6.

S.No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Bheru Lal Ji. Gaur ka chouk, Balotra
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs.120/Kg
4.	Mode of consumption (fresh/dried/both/raw/ cooked as vegetable	
	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	35
	C (15-20, 20-25, 25-30, 30-35°C)	0
8.	Actual rainfall & Temp.(min.-max.)	

7.

S.No.	Item to be recorded	Observation/data
1.	Name/market/District	Sh. Bhaver Lal Ji. M/S Madan Meherban General Store Gaur ka chouk, Balotra
2.	Date of collection	06-09-2013
3.	Sale price (Rs./Kg)	Rs. 320/Kg
4.	Mode of consumption (fresh/dried/both/raw/ Dried powder	
	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	35
	C (15-20, 20-25, 25-30, 30-35°C)	0
8.	Actual rainfall & Temp.(min.-max.)	

Table No. 1 Culture's (8) Deposited to DMR Solan.

<i>Agaricus sp</i>	DMRA-149	Dr Anila Doshi, AICRP, Udaipur, UD-21-13	23-12-13
<i>Pleurotus sp.</i>	DMRP-294	Dr Anila Doshi, MPAUT, Udaipur(Raj)	UD-04/13 23-12-13
<i>Pleurotus sp.</i>	DMRP-295	Dr Anila Doshi, MPAUT, Udaipur(Raj)	UD-35/13 23-12-13
<i>Pleurotus sp</i>	DMRP-296	Dr Anila Doshi, MPAUT, Udaipur(Raj)	UD-68/13 23-12-13
<i>Podaxis</i>	DMRO-588	Dr Anila Doshi, AICRP, Udaipur, Ud	-02-13 23-12-13
<i>Mycena</i>	DMRO-589	Dr Anila Doshi, AICRP, Udaipur, Ud	-24-13 23-12-13
<i>Unknown</i>	DMRO-590	Dr Anila Doshi, AICRP, Udaipur, Ud	-30-13 23-12-13
<i>Leucopaxillus</i>	DMRO-591	Dr Anila Doshi, AICRP, Udaipur, Ud	-32-13 23-12-13

Table No. 2 Specimens (29) Deposited to DMR Solan.

S.No.	Specimens No.	Name of Mushroom
1	UD-02/13	<i>Podaxis pistrillaris</i>
2	UD-04/13	<i>Pleurotus</i>
3	UD-05/13	<i>Clitocybe</i>
4	UD-08/13	<i>Auricularia polytricha</i>
5	UD-12/13	<i>Leucocoprinus</i>
6	UD-16/13	<i>Termitomyces</i>
7	UD-20/13	<i>Lepiota</i>
8	UD-30/13	<i>Collybia</i>
9	UD-32/13	<i>Leuxopillus giganteus</i>
10	UD-33/13	<i>Polypore</i>
11	UD-42/13	<i>Polypore morri</i>
12	UD-47/13	<i>Ganoderma lucidum</i>
13	UD-49/13	<i>Pleurotus</i>
14	UD-51/13	Unidentified
15	UD-52/13	<i>Calocera</i>
16	UD-54/13	<i>Ganoderma applanatum</i>
17	UD-59/13	<i>Mycenia</i>
18	UD-61/13	<i>Pleurotus</i>
19	UD-67/13	<i>Polypore</i>
20	UD-71/13	Unidentified
21	UD-72/13	<i>Tricholoma sulphureum</i>
22	UD-73/13	<i>Pleurotus</i>
23	UD-77/13	<i>Polypore</i>
24	UD-89/13	Unidentified
25	UD-90/13	<i>Gymnopilus</i>
26	UD-93/13	<i>Hexagonia hirata</i>
27	UD-94/13	<i>Pluteus</i>
28	UD-98/13	Unidentified
29	UD-102/13	Unidentified

Table No 3. Collection, Identification and Conservation of Wild Edible Mushrooms

S.No. Name of Date of Locality Substrate GPS Data Mushroom Collection			
Ud-01/13	<i>Termitomyces microcarpus</i>	06-07-2013 RCA, On termite nest N-25 Udaipur E-073	12.204' 33.360' Elevation-615m
Ud-02/13	<i>Podaxis pistrillaris</i>	26-07-2013 Thoor On Soil N-24 E-073	34.815' 42.492' Elevation-720m
Ud-03/13	<i>Termitomyces eurhizus</i>	26-07-2013 Thoor On Termite Soil N-24 E-073	34.815' 42.492' Elevation-720m
Ud-04/13	<i>Pleurotus</i>	26-07-2013 Kadia losin Bueta frondosa N-24 E-073	50.502' 35.039' Elevation-736m
Ud-05/13	<i>Clitocybe</i>	26-07-2013 Kadia losin On dead N-24 E-073 47.750' eucalyptus	37.645' Elevation-765m
Ud-06/13	<i>Unidentified</i>	26-07-2013 Kadia losin On Soil N-24 E-073	50.156' 36.539' Elevation-796m
Ud-07/13	<i>Termitomyces</i>	26-07-2013 Kathar area On Soil N-24 E-073	53.476' 33.587' Elevation-687m
Ud-08/13	<i>Auricularia polytricha</i>	26-07-2013 Lakhamato Mango log N-24 ka Guda E-073	55.502' 32.569' Elevation-762m
Ud-09/13	<i>Polypore</i>	26-07-2013 Lakhamato Babool N-24 ka Guda E-073	55.502' 32.569' Elevation-762m
Ud-10/13	<i>Stropharia</i>	26-07-2013 Lakhamato On Soil N-24 ka Guda E-073	55.502' 32.569' Elevation-762m
Ud-11/13	<i>Cyathus spp.</i>	26-07-2013 Lakhamato On Dung N-24 ka Guda E-073	55.502' 32.569' Elevation-762m
Ud-12/13	<i>Leucocoprinus</i>	26-07-2013 Kanoja Khirni, dung N-25 E-073	00.273' 33.013' Elevation-846 m
Ud-13/13	<i>unidentified</i>	26-07-2013 Aoda-Kelvara On Soil N-25 02.325' road E-073	34.194' Elevation-947 m
Ud-14/13	<i>Auricularia auricula</i>	26-07-2013 Charbuja On Mango N-25 road E-073	08.832' 39.471' Elevation-854 m
Ud-15/13	<i>Boletus</i>	26-07-2013 Charbuja road Mycorrhizal N-25 E-073	08.832' 39.471' Elevation-854 m

S.No.	Name of	Date of	Locality	Substrate	GPS Data	Mushroom	Collection
Ud-16/13	<i>Termitomyces</i>	26-07-2013	Charbuja road/ 15.965' N, 83.51' E	Desuri ki Nal Khirni	E-073		
						0	
						37.746°	
						Elevation-571 m	
Ud-17/13	unidentified	26-07-2013	Desuri ki Nal	Humus	N-25	15.065' E-073	
						37.746°	
						Elevation-571 m	
Ud-18/13	unidentified	26-07-2013	Desuri ki Nal	On Soil	N-25	15.065' E-073	
						37.746°	
						Elevation-571 m	
Ud-19/13	unidentified	26-07-2013	Desuri ki Nal	On Humus	N-25	15.065' E-073	
						37.746°	
						Elevation-571 m	
Ud-20/13	<i>Lepiota</i>	26-07-2013	Desuri ki On Soil N-25	16.327' Nal road	E-073	0	
						34.989°	
						Elevation-435 m	
Ud-21/13	<i>Agaricus</i>	26-07-2013	Thandi bari	On Soil	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-22/13	<i>Agaricus</i>	26-07-2013	Thandi bari	On Soil	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-23/13	<i>Bovista</i>	26-07-2013	Thandi bari	On Soil	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-24/13	unidentified	26-07-2013	Thandi bari	On Soil	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-25/13	<i>Agaricus</i>	26-07-2013	Thandi bari	On Soil	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-26/13	<i>Lepiota</i>	26-07-2013	Thandi bari	On Soil	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-27/13	<i>Laetiporus</i>	26-07-2013	Thandi bari	Wooden stumps	N-25	12.196' E-073	
						33.311°	
						Elevation-451 m	
Ud-28/13	<i>Volvariella bombycina</i>	29-07-2013	AICRP On Soil N-25			12.204'	
						33.360°	
						Elevation-615 m	
Ud-29/13	<i>Psathyrella</i>	30-07-2013	Jhadoli-Udaipur Living Mahua tree			0	
						33.360°	
						Elevation-971 m	
Ud-30/13	<i>Collybia</i>	30-07-2013	Jhadoli On Mahua N-25	12.204' living root	E-073	0	
						33.360°	
						Elevation-971 m	

S.No.	Name of	Date of	Locality	Substrate	GPS Data	Mushroom	Collection
Ud-31/13	<i>Agaricus</i>	30-07-2013	Khokharianal	On Soil	N-24	45.038' E-073 20.484° Elevation-666 m	
Ud-32/13	<i>Leuxopillus giganteus</i>	30-07-2013	Khokharianal	Wooden stumps	N-24	42.737' or tree E-073 0 14.809° Elevation-598 m	
Ud-33/13	<i>Polypore</i>	30-07-2013	Near Bakaria	On dead wood	N-24	42.609' E-073 14.365° Elevation-590 m	
Ud-34/13	<i>unidentified</i>	30-07-2013	Near Bakaria	On Soil	N-24	42.609' E-073 14.365° Elevation-590 m	
Ud-35/13	<i>Pleurotus</i> spp.	30-07-2013	Near Bakaria	On dead wood	N-24	42.609' of zetropha E-073 0 14.365° Elevation-590 m	
Ud-36/13	<i>Tricholoma</i>	30-07-2013	Abu road Collar region	N-24		24.588' 46.577° Elevation-343 m	
	<i>flaviovirens</i>		of Dhak	E-072			
Ud-37/13	<i>Agaricus</i> spp.	30-07-2013	Ambaji road	On Soil	N-24	24.588' E-072 46.577° Elevation-343 m	
Ud-38/13	<i>Polypore</i>	30-07-2013	Abu road	On Dhak	N-24	24.566' E-072 46.522° Elevation-449 m	
Ud-39/13	<i>Auricularia</i>	30-07-2013	Abu road	On Ratanjot	N-24	24.566' E-072 46.522° Elevation-449 m	
Ud-40/13	<i>unidentified</i>	30-07-2013	Abu road	On living tree	N-24	24.566' of Dhak E-072 0 46.522° Elevation-449 m	
Ud-41/13	<i>unidentified</i>	30-07-2013	Abu road	On dead wood	N-24	24.566' of Ratanjot E-072 0 46.522° Elevation-449 m	
Ud-42/13	<i>Polypore morri</i>	30-07-2013	Abu road	On dead wood	N-24	24.566' of Dhak E-072 0 46.522° Elevation-449 m	
Ud-43/13	<i>unidentified</i>	30-07-2013	Abu road	On living tree	N-24	24.566' of kajoor E-072 0 46.522° Elevation-449 m	
Ud-44/13	<i>Agaricus</i>	30-07-2013	Abu road	Leaf litter	N-24	24.566' E-072 46.522° Elevation-449 m	

S.No.	Name of	Date of	Locality	Substrate	GPS Data	Mushroom	Collection
Ud-45/13	<i>Agaricus</i>	7/8/2013	AICRP on Soil/ N-25				
	<i>augustus</i> (Mushroom)		leaf litter E-073	33.360' RCA	Elevation-615 m		12.204' 0
Ud-46/13	unidentified	13-08-2013	Duthtalai, Coller N-25	12.204' UDR	region E-073		0
							33.360 ⁰ Elevation-615 m
Ud-47/13	<i>Ganoderma</i>	22-08-2013	Kanode Sisham, N-24				20.980'
	<i>lucidum</i> road		Euclyptus E-072				49.895 ⁰ Elevation-559 m
Ud-48/13	<i>Ganoderma</i>	22-08-2013	Kanode In living N-24				20.980'
	<i>lucidum</i> road		plants E-072				49.895 ⁰ Elevation-559 m
Ud-49/13	<i>Pleurotus</i>	22-08-2013	Bansi Ratanjot N-24	18.484' forest	E-074		0
							23.837 ⁰ Elevation-523 m
Ud-50/13	<i>Polypore</i>	22-08-2013	Bansi forest On Soil N-24				18.484' E-074
							23.837 ⁰ Elevation-523 m
Ud-51/13	unidentified	22-08-2013	Bansi forest On dead N-24	18.484' wood	E-074		0
							23.837 ⁰ Elevation-523 m
Ud-52/13	<i>Calocera</i>	22-08-2013	Sitamata Living N-24	16.683' forest	wood E-074		0
							24.706 ⁰ Elevation-519 m
Ud-53/13	<i>Coltricia</i>	22-08-2013	Sitamata On root N-24	16.683' forest	E-074		0
							24.706 ⁰ Elevation-519 m
Ud-54/13	<i>Ganoderma</i>	22-08-2013	Sitamata On root N-24				16.683'
	<i>applanatum</i> forest		living tree E-074				24.706 ⁰ Elevation-519 m
Ud-55/13	unidentified	22-08-2013	Sitamata On dead N-24	16.683' forest	wood E-074		0
							24.706 ⁰ Elevation-519 m
Ud-56/13	<i>Polypore</i>	22-08-2013	Sitamata On dead N-24	16.683' forest	wood E-074		0
							24.706 ⁰ Elevation-519 m
Ud-57/13	<i>Ulnicola</i>	22-08-2013	Sitamata On humus N-24	16.683' forest	E-074		0
							24.706 ⁰ Elevation-519 m
Ud-58/13	<i>Lenzites</i>	22-08-2013	Sitamata On Dead N-24	16.683' forest	wood E-074		0
							24.706 ⁰ Elevation-519 m

S.No.	Name of	Date of	Locality	Substrate	GPS Data	Mushroom	Collection
Ud-59/13	<i>Mycena</i>	22-08-2013	Sitamata	On Soil N-24	16.683' forest E-074	0 24.706° Elevation-519 m	
Ud-60/13	<i>Lepiota</i>	22-08-2013	Sitamata	On Soil N-24	16.683' forest E-074	0 24.706° Elevation-519 m	
Ud-61/13	<i>Pleurotus</i>	22-08-2013	Sitamata	On Dead N-24	16.683' forest twig E-074	0 24.706° Elevation-519 m	
Ud-62/13	<i>Lepiota</i>	22-08-2013	Sitamata	On Soil N-24	16.683' forest E-074	0 24.706° Elevation-519 m	
Ud-63/13	<i>Leucopaxillus</i>	22-08-2013	Sitamata	On Bamboo N-24	16.683' forest E-074	0 24.706° Elevation-519 m	
Ud-64/13	<i>Termitomyces</i>	22-08-2013	Sitamata	On Termit N-24	16.683' forest nest E-074	0 24.706° Elevation-519 m	
Ud-65/13	<i>Clitocybe</i>	22-08-2013	Sitamata	On Soil N-24	16.683' forest E-074	0 24.706° Elevation-519 m	
Ud-66/13	Unidentified	22-08-2013	Sitamata	On dead N-24	16.683' forest wood of Teak E-074	0 24.706° Elevation-519 m	
Ud-67/13	<i>Polypore</i>	22-08-2013	Sitamata	On Dead N-24	16.683' forest wood E-074	0 24.706° Elevation-519 m	
Ud-68/13	<i>Pleurotus</i>	22-08-2013	Sitamata	forest On dead N-24	16.683' wood E-074	0 24.706° Elevation-519 m	
Ud-69/13	<i>Schizophyllum</i>	22-08-2013	Sitamata	On dead N-24	16.683' forest wood E-074	0 24.706° Elevation-519 m	
Ud-70/13	<i>Ganoderma</i>	22-08-2013	Sitamata	On root of N-24	16.683' forest dead wood E-074	0 24.706° Elevation-519 m	
Ud-71/13	unidentified	22-08-2013	Sitamata	On dead N-24	16.683' forest wood E-074	0 24.706° Elevation-519 m	
Ud-72/13	<i>Tricholoma sulphureum</i>	22-08-2013	Sitamata	forest On root's N-24	16.683' E-074	0 24.706° Elevation-519 m	

S.No.	Name of	Date of	Locality	Substrate	GPS Data	Mushroom	Collection
Ud-73/13	<i>Pleurotus</i>	26-08-2013	Kamalighat	Dead wood	N-24 13.954'	forest of Ratanjot	E-074
							0
							25.589°
							Elevation-620 m
Ud-74/13	Unidentified	26-08-2013	Kamalighat	Leaf	N-24 13.954'	forest litter	E-074
							0
							25.589°
							Elevation-620 m
Ud-75/13	<i>Calocera</i>	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m
Ud-76/13	<i>Lipista</i>	26-08-2013	Kamalighat	On dead	N-24 13.954'	forest wood	E-074
							0
							25.589°
							Elevation-620 m
Ud-77/13	<i>Polypore</i>	26-08-2013	Kamalighat	On dead	N-24 13.954'	forest wood	E-074
							0
							25.589°
							Elevation-620 m
Ud-78/13	<i>Agaricus</i> spp.	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m
Ud-79/13	<i>Geaster</i> spp.	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m
Ud-80/13	<i>Fomes</i> spp.	26-08-2013	Kamalighat	On dead	N-24 13.954'	forest wood	E-074
							0
							25.589°
							Elevation-620 m
Ud-81/13	<i>Pycnoporus</i>	26-08-2013	Kamalighat	On dead	N-24 13.954'	forest wood	E-074
	<i>cinnabarinus</i>						
							0
							25.589°
							Elevation-620 m
Ud-82/13	<i>Tricholoma</i>	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m
Ud-83/13	<i>Marasmius</i>	26-08-2013	Kamalighat	Leaf	N-24 13.954'	forest litter	E-074
	<i>ranealis</i>						
							0
							25.589°
							Elevation-620 m
Ud-84/13	<i>Polypore</i>	26-08-2013	Kamalighat	Dead	N-24 13.954'	forest wood	E-074
							0
							25.589°
							Elevation-620 m
Ud-85/13	<i>Flammulina</i>	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m
Ud-86/13	<i>Lepiota</i>	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m
Ud-87/13	<i>Agaricus</i>	26-08-2013	Kamalighat	On Soil	N-24 13.954'	forest	E-074
							0
							25.589°
							Elevation-620 m

S.No.	Name of	Date of	Locality	Substrate	GPS Data	Mushroom	Collection
Ud-88/13	<i>Tricholoma</i>	26-08-2013	Kamalighat forest	On Soil	N-24	13.954° E-074 25.589° Elevation-620 m	
Ud-89/13	Unidentified	30-08-2013	Aaspur	Dead wood of	N-24	13.954° Mango tree E-074° 25.589° Elevation-251 m	
Ud-90/13	<i>Gymnopilus</i>	30-08-2013	Ganoda	On dead	N-24	13.954° road wood kajoor E-074° 25.589° Elevation-251 m	
Ud-91/13	<i>Pycnoporus</i> spp.	30-08-2013	Pipalkhoot	On dead	N-23	45.946° wood E-074° 15.549° Elevation-291 m	
Ud-92/13	<i>Entoloma</i>	30-08-2013	Pipalkhoot	On Soil	N-23	45.946° E-074° 15.549° Elevation-291 m	
Ud-93/13	<i>Hexagonia hirata</i>	30-08-2013	Pipalkhoot	On dead	N-23	45.946° wood E-074° 15.549° Elevation-291 m	
Ud-94/13	<i>Pluteus</i>	30-08-2013	Pipalkhoot	On dead	N-23	45.946° wood of E-074° 15.549° Mahua Elevation-291 m	
Ud-95/13	unidentified	30-08-2013	Pipalkhoot	On living	N-23	45.946° bamboo E-074° 15.549° Elevation-291 m	
Ud-96/13	<i>Pleurotus</i>	30-08-2013	Pipalkhoot	Ratanjot	N-23	45.946° E-074° 15.549° Elevation-291 m	
Ud-97/13	<i>Hericium</i>	30-08-2013	Ganoda	Mango tree	N-24	13.954° E-074° 25.589° Elevation-251 m	
Ud-98/13	unidentified	7/9/2013	Rajpura	On dead	N-25	09.930° forest, Bamboo E-073° 29.732° Kumbalgarh Elevation-412 m	
Ud-99/13	<i>Lepiota</i>	7/9/2013	Rajpura	On	N-25	09.930° forest, bamboo E-073° 29.732° Kumbalgarh Elevation-412 m	
Ud-100/13	<i>Mutinus elegans</i>	7/9/2013	Rajpura	On Soil	N-25	09.930° forest, E-073° 29.732° Kumbalgarh Elevation-412 m	
Ud-101/13	<i>Innotus</i>	7/9/2013	Sadri Road	Dead wood	N-25	09.913° E-073° 29.742° Elevation-450 m	
Ud-102/13	unidentified	7/9/2013	Kamba	On dead	N-25	07.512° wood of E-073° 28.542° Mango Elevation-950 m	

Vellayani

Surveys were conducted before and after Southwest monsoons in 6 different districts. A total of 76 specimens were obtained. Cultures of 31 specimens were sent to DMR in 2 sessions. Accession numbers were obtained for 25 cultures as follows.

Macrolepiota Tricholoma Calocybe

Termitomyces Marasmius Ganoderma

Ranchi

During the year 2013-2014, three strain of mushroom were isolated from the district of Jharkhand (Ranchi and Lahardaga). Pure culture of mushrooms were taken by hyphal tip isolation technique and on the basis of their morphological characteristics isolated mushrooms were identified as strains were isolated and purified and sent through registered speed post to DMR, Solan on 30.01. 2014 along with their Passport data.

Ganoderma sp. Boletus sp. (Jamun Khukhari) Termitomyces sp.

6

EXTENSION ACTIVITIES

Bhubaneswar Centre

a. Training and Exhibition Training, Demonstration

and Mass communication

During 2013-14, eighteen trainings including seven of AICRP on Mushroom with a total of 507 trainees have been conducted on mushroom cultivation and processing and mushroom spawn production at OUAT, Bhubaneswar. Lecture-cum-demonstration programme were attended at 10 locations involving 1461 trainees on mushroom cultivation, out of which 658 were ladies belonging to different self help groups. The centre participated in two Krishi exhibitions. Besides, seven TV programmes were under taken during the period on mushroom cultivation and processing and spawn production. The scientist also participated in seven farmer-scientist interaction programme.

Table 6.1. On-campus Training: AICRP on Mushroom, Bhubaneswar

Sl.	Date	Venue	No. of Particulars	No. of lady	No. farmers participants participated
1.	3.06.2013-7.06.2013	OUAT	39 Mushroom cultivation and processing	7	2.
	20.08.2013-29.08.2013	OUAT	16 Mushroom spawn production	6	3.
	21.09.2013-30.09.2013	OUAT	19 Mushroom spawn production	4	4.
	11.11.2013-20.11.2013	OUAT	17 Mushroom spawn production	1	5.
	16.12.2013-20.12.2013	OUAT	45 Mushroom cultivation and processing	9	6.
	13.01.2014-22.01.2014	OUAT	20 Mushroom spawn production	6	7.
	17.02.2014-21.02.2014	OUAT	26 Mushroom cultivation and processing	5	Total 182 32 (21%)

Table 6.2. On-campus Training: CTMRT, Bhubaneswar

Sl.	Date	Venue	No. of Particulars	No. of lady	No. farmers participants participated
1.	23.04.2013-27.04.2013	OUAT	38 Mushroom cultivation and processing	6	2.
	9.05.2013-18.05.2013	OUAT	9 Mushroom spawn production	1	3.
	12.06.2013-16.06.2013	OUAT	29 Mushroom cultivation and processing	6	4.
	15.07.2013-19.07.2013	OUAT	35 Mushroom cultivation and processing	1	5.
	7.09.2013-21.09.2013	OUAT	27 Mushroom cultivation and processing	9	6.
	17.09.2013-21.09.2013	OUAT	36 Mushroom cultivation and processing	5	7.
	22.10.2013-26.10.2013	OUAT	29 Mushroom cultivation and processing	0	8.
	26.10.2013-30.10.2013	OUAT	42 Mushroom cultivation and processing	1	9.
	3.12.2013-7.12.2013	OUAT	28 Mushroom cultivation and processing	9	10.
	6.20.2014-15.02.2014	OUAT	12 Mushroom spawn production	3	11.
	10.03.2014-14.03.2014				
OUAT 40 Mushroom cultivation and processing 5 Total 325 46 (14%)					

*Training has been fixed

Table 6.3. Lecture-cum-demonstrations

Sl. No.	Date	Venue	No. of Male participants	No. of Female participants	Composition of participants
1.	1.04.2013	Jagadeipur,	100	50	50 Farmers of Kendrapara Kendrapara
2.	23.04.2013	PPL Training centre,	25	25	0 Farmers of Khandapada, Bhubaneswar Nayagarh
3.	27.04.2013	PPL Training centre,	33	0	33 Lady farmers of Niali, Bhubaneswar Cuttack
4.	6.05.2013	PPL Training centre,	25	25	0 Farmers of Nayagarh Bhubaneswar
5.	9.05.2013	OUAT, Bhubaneswar	29	20	9 Students of School of Horticulture, Khurda
6.	12.05.2013	Banapur, Khurda	50	0	50 SHG members of Karanjipur, Banapur, Khurda
7.	14.05.2013	OUAT, Bhubaneswar	25	0	25 Lady farmers of Niali, Cuttack
8.	18.05.2013	Minor Irrigation office,	50	50	0 Farmers of Kalahandi and Bhubaneswar Sundargarh
9.	20.05.2013	PPL Training centre,	25	25	0 Farmers of Dhenkanal Bhubaneswar
10.	26.05.2013	Banapur, Khurda	50	0	50 Lady farmers of Galua, Banapur, Khurda
11.	12.06.2013	PPL Training centre,	25	25	0 Banka, Bihar Bhubaneswar
12.	13.06.2013	OUAT, Bhubaneswar	20	15	5 Officers of UBI, Bhubaneswar
13.	19.06.2013	Minor Irrigation office,	32	32	0 Farmers of Sambalpur, Bhubaneswar Bargarh, Keonjhar and Dhenkanal
14.	22.06.2013	OUAT, Bhubaneswar	25	25	0 Farmers of Nimapara, Puri
15.	30.06.2013	Tangi, Khurda	35	0	35 Lady farmers of Khurda
16.	12.07.2013	Soro, Balasore	100	0	100 Lady farmers of Soro,
17.	11.09.2013	Tamando, Khurda	30	0	30 SHG members of Khurda
18.	15.09.2013	Tamando, Khurda	30	0	30 SHG members of Khurda
19.	27.09.2013	CYSD training centre,	25	25	0 Farmers of Gajapati
20.	28.09.2013	Soro, Balasore	50	0	50 SHG members of Soro,
21.	30.09.2013	OUAT, Bhubaneswar	25	10	15 Farmers of Gajapati
22.	4.10.2013	OUAT, Bhubaneswar	25	25	0 Farmers of Gajapati
23.	22.10.2013	IMAGE, Bhubaneswar	25	25	0 Farmers of Gajapati
24.	10.11.2013	OUAT, Bhubaneswar	25	25	0 Farmers of Bhadrak
25.	12.11.2013	PPL Training centre,	25	25	0 Farmers of Balipatna,
26.	14.11.2013	OUAT, Bhubaneswar	25	25	0 Farmers of Gajapati

Table 6.4. Mass communication

Sl.No. Item Number
1. Participation in Krishi-exhibition 02 2. TV programme 08 3. Popular articles 02 4. Publication of leaflets/ booklets 03 5. Farmers-scientist interaction 07

Exposure visit of farmers

A total number of 1247 farmers, Govt. functionaries, teachers, scientist, school, college students and media personnel visited the centre during 2013-14 and were apprised of the activities of the centre.

Table 6.5. Exposure visit of farmers (state wise break-up)

Sl. No. State No. of visitors Share (%)
1. Odisha 1045 84 2. Jharkhand 106 9 3. Chhatisgarh 40 3 4. Bihar 20 2 5. Andhra Pradesh 20 2 6. Kerala 16 1 Total 1247 100

Table 6.6. Composition of domestic visitors

Sl. No. Composition No. of visitors Share (%)
1. Farmers 856 82 2. Bank officers 20 2 3. Students of School of Horticulture, Khurda 89 9 4. ABM students of Utkal University 60 6 5. NSS programme officers 20 1 Total 1045 100

*13% of the total visitors were ladies

Monitoring of spawn production units

Eleven spawn production centres have been monitored during the period under report on quality of the planting materials produced and necessary addressal of problems if any.

Table 6.7. monitoring of spawn production units

Sl.No Date of visit Spawn production units
1. 1.04.2013 Utkal Mushroom Spawn Production Unit 2. 1.04.2013 OMDC Spawn Centre, Kendrapara 3. 25.06.2013 Global Biotechnology, Tamando

Sl.No Date of visit Spawn production units

4. 30.06.2013 CARD Spawn Unit, Tangi, Khurda 5. 12.07.2013 Spawn Production Unit, KVK, Bhadrak
 6. 19.01.2014 Sambhab Mushroom Spawn Unit, Nirakarpur, Khurda 7. 6.02.2014 Spawn Production
 Unit, KVK, Kalahandi 8. 12.02.2014 Spawn Production Unit, KVK, Kendrapara 9. 18.02.2014 Spawn
 Production Unit, KVK, Mayurbhanj 10. 18.02.2014 Ruchi Mushroom, Baripada, Mayurbhanj 11.
 20.02.2014 Rashmirekha Mushroom, Pipli, Puri

Consultancy services

- Dr. K.B.Mohapatra is working as a member of technical team of the Agriculture Consultancy Support Service Cell (ACSSC), OUAT.
- Consultancy services extended to Gangotree Social Organisation, Bhubaneswar and Chetana, Dhenkanal for promotion of mushroom cultivation in Jajpur and Dhenkanal districts respectively.

Involvement of NGOs

- Sixty NGOs from Odisha and outside are involved in promotion of mushroom cultivation, processing and spawn production.

Visit of dignitaries**Table 6.8. Visit of dignitaries to Bhubaneswar centre Date Visitors**

7.12.2013 : Dr. P.K. Das, Director, Kalinga Institute of Social Sciences, Bhubaneswar 4.02.2014 : Dr. V.P. Sharma, Principal Scientist, Directorate of Mushroom Research, Solan

Quality spawn supply

A quantity of 2089 packets spawn (417.80kg) of Paddy straw and Oyster mushroom were distributed to the farmers @Rs.8.50/packet with a resource generation of Rs.17,757.00.

Experiential Learning Programme

Fourteen numbers of final year B.Sc (Ag) students were trained in mushroom cultivation, processing and spawn production from 10.11.2013 to 02.01.2014.

Farm Advisory Services

Advisory services were extended to large number of farmers through telephone calls/ personal contacts throughout the year on different aspects of mushroom cultivation.

Status of Mushroom in Odisha

Table 6.9. Information on different mushrooms and mushroom spawn of Odisha

Sl.No.	Particulars	Information/ Production % of total production (t/year)
1.	Paddy straw mushroom	8128.85 66
2.	Oyster mushroom	4094.85 33
3.	Button mushroom	109.50 1
4.	Total mushroom production	12333.20 100
5.	No. of spawn production units	207 - 6.
6.	Total spawn production	2317.75 - 7.
7.	No. of processing units	2 -

*Updated till 28.02.2014

Farmers' achievement

- Sri Sanjit Kumar Mohanty, Pipli, Puri was facilitated at the Mushroom Mela, organized by Directorate of Mushroom Research, Solan on 10.11.2013 as a progressive mushroom farmer.
- Sri Sanjit Kumar Mohanty, Pipli, Puri was facilitated as "Man of Mushroom" by Govt. of Malaysia on 23.04.2013 under exchange visit programme of young farmers.
- Sri Sunil Kumar Pattnaik, Baripada Mayurbhanj was facilitated in the National Symposium on Mushroom held at UHF, Nauni from 27-28th, December, 2013 as a progressive mushroom farmer.

Pune Centre

The various 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 2013-14. These activities are as follows.

Table 6.10. Extension activities of AICRPM, Pune Centre

Sr.No.	Activities	Number
1.	Participation in Agril. Exhibition/s	02
2.	Oyster Mushroom Cultivation training/s	11
3.	Mass Demonstration/s	03
4.	Postal queries	22
5.	Queries by e-mail	32
6.	Radio programme/s	02
7.	Visitors to mushroom project (Including school/college students, 2412 farmers/mushroom growers/ research workers, teachers etc.)	
8.	Sale of spawn	865.5 kg
9.	Sale of fresh oyster and button mushrooms	304.9 kg

1. Mushroom cultivation trainings

To transfer the technology of mushroom cultivation, eleven (11) training programmes were conducted by the scientists of this project on first Saturday of every month. Total 193 trainees were participated in these trainings.

Sr.No.	Name of training	Date	No. of Participants
1	Oyster Mushroom Cultivation Training Programme	06.04.2013	19
2	Oyster Mushroom Cultivation Training Programme	04.05.2013	06
3	Oyster Mushroom Cultivation Training Programme	01.06.2013	11
4	Oyster Mushroom Cultivation Training Programme	06.07.2013	21
5	Oyster Mushroom Cultivation Training Programme	03.08.2013	20
6	Oyster Mushroom Cultivation Training Programme	07.09.2013	17
7	Oyster Mushroom Cultivation Training Programme	05.10.2013	18
8	Oyster Mushroom Cultivation Training Programme	02.11.2013	02
9	Oyster Mushroom Cultivation Training Programme	07.12.2013	33
10	Oyster Mushroom Cultivation Training Programme	04.01.2014	21
11	Oyster Mushroom Cultivation Training Programme	01.02.2014	25
Total			193

2. Mass communication

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 AGROWON at College of Agriculture, Pune. 2) KISSAN international Agril. Exhibition at Pimpri, Dist– Pune.

3. Mass Demonstration

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

- 1) Village – Kasurdi, Tal- Bhore, Dist: Pune, on 11.07.2013. 2) Village – Gokawadi, Tal- Bhore, Dist: Pune, on 12.08.2013. 3) Village – Nhavi (Bk), Tal- Bhore, Dist: Pune, on 16.08.2013.

Faizabad Centre

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.

1. Number of growers trained : 197
2. Training programme organised : 06

S.No.	Title	Date	Place	No. of Farmers
1	Mushroom production Technique	23-2-2014	On campus	25
3	Rural youth training	21-01-2014	On campus	15
2	Farmers Training	17-11-2013	On campus	50
5	mushroom production	18-09-2013	On campus	50
4	Button mushroom production	13-09-2014	On campus	25
6	Milky mushroom production	06-06-2013	Off campus	18

3. Gosthies organized/participated: 03
4. Demonstration of mushroom stall in Kisan Mela: 02

Sr.No.	Date	Organized by	Place
1.	8-10-13 to 10-10-13	NDUAT ,Faizabd	NDUAT, Campus
2.	15-02-14 to 17-02-2014	Deptt. Of Ag. , Gov. of Uttar Pradesh	NDUAT, Campus

5. Number of visitors: 645
6. Demonstrations: 06

- ⑥ Demonstration trial of milky mushroom at mushroom laboratory for visitors-01
- ⑥ A demonstration trial of white button mushroom (*Agaricus bisporus*) has been conducted for demonstration, training and farmers visitors to mushroom lab-01
- ⑥ Village–Matera, Post ,Khandasa, Distt. Faizabad –Milky mushroom & Button Mushroom-02
- ⑥ Village –Bahadurganj, Post ,Khandasa, Distt. Faizabad –Milky mushroom& Button Mushroom-02

7. Radio Talk

- ⑥ Mushroom Ki Vaysaik kheti, Aakashwani Faizabad, Dated 19-11-2013
- ⑥ Mushroom Ki Vaysaik Kheti, Akashwani Faizabad on 13-01-2014

5. Mushroom Field Visit -10

Other activities 1. Revolving

Fund (Spawn)

O.B: 1,76,429 ON 1.04.2013 - C.B 1,87,981 –on 7.02.2014

2. Fruiting bodies sale : 92 Kg 3.

Spawn Production : 291 Kg

- ⑥ Participated in review and progress of RKVY projects by DG, UPCAR, Lucknow on 21-06-2013
- ⑥ Vocational trainings for rural youth.

- ⑥ Kharif Action Plan formulation meeting of NDUAT, Kumarganj.
- ⑥ Rabi Action Plan formulation meeting of NDUAT, Kumarganj.
- ⑥ Visited Directorate of mushroom research, Chambaghat, Solan and deposited wild mushroom cultures along with their dried specimen, photographs and filled proforma of mushroom identification from 19-12-2013 to 23-12-2013.
- ⑥ Involved in teaching of mushroom courses.

Participation in Seminars/Symposia/Congress/ Workshop

1. First UP Agricultural Science Congress on "Emerging Challenges and Resource Management for food Security" held at main campus of N. D. University of Agriculture and Technology, Kumarganj, Faizabad from 17-19 August, 2013.
2. Participated in Indian Mushroom Conference-2013 Organised by Mushroom Society of India in collaboration with Directorate of Mushroom Research, Chambaghat, Solan and PAU, Ludhiana at PAU, Ludhiana on 16-17 April, 2013.
3. Participated in annual workshop of All India Coordinated Research project on Mushroom and presented annual progress report of the centre held at PAU, Ludhiana from 17-18 April, 2013.

Raipur Centre

Trainings conducted

Table 6.11. Farmers training Organized on various aspects of mushroom

Sl.	Date of	Duration	No. of trainees	Training title	Venue	No. trainings	of training	M	FM	Total										
01	22.06.13	01 day	13 00	13 Spawn Production Technology	Mushroom Res & Training centre (IGKV), Raipur															
02	19-23.07-13	05 days	10 01	11 Mushroom and Spawn Production —do— Technology																
03	27.7.13	01 day	11 00	11 Mushroom Production Technology —do—	04 24.08.13	01 day	12 00	12 Mushroom Production Technology —do—	05 28.09.13	01 day	07 02	09 Mushroom Production Technology —do—	06 26.10.13	01 day	06 00	06 Mushroom Production Technology —do—	07 6.11.13	01 day	00 44	44 Mushroom Production Technology Village Bhansoj
08	7.11.13	01 day	00 48	48 Mushroom Production Technology Village Arang	09 8.11.13	01 day	00 48	48 Mushroom Production Technology Village Bhansoj	10 23.11.13	01 day	04 00	04 11 25-29.11.13	05 days	03 00	03 Mushroom and Spawn Production	Mushroom Res & Technology Training centre (IGKV), Raipur				

Sl.	Date of	Duration	No. of trainees	Training title	Venue	No. trainings	of training	M	FM	Total
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Sl. No.	Activity	No.	Duration	Organized by	participation	Funded by
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01 National Agriculture 01 04 days IGKV Raipur and 15000 IGKV Raipur Science Kisan Mela State Govt. organized by IGKV, Chhattisgarh Raipur

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

1. Girls & boys school Fingeshwar 112 One day block
 2. Deaf & mute School Raipur 12 1 day Organized by Respective School Administration
 3. Govt. High School, Jora, Raipur 45 1 day Organized by Respective School Administration
 4. Holy Cross School Shankarnagar 55 1 day Organized by Respective School Administration
 6. Columbia College of Engineering 60 1 day Organized by Respective School Administration and Management Raipur
 7. G. D Central University, Bilaspur 30 1 day Organized by Respective School Administration
- Total 314

Table 6.13. Students Training on mushroom and spawn production technology through experiential learning and Rural Agricultural Work Experience (RAWE).

Activity Programme Student No
Mushroom production technology and their diseases RAWE/ Experiential 72 and pests control Learning Spawn production Technology precaution and importance. -Do- Total Planting spawn produced 30 q Planting spawn sold 17 q Planting spawn self use 13 q Mother spawn sold 150 bottle Pure culture tube sold 31 Fresh mushroom produced 445 kg Pickles produced 10kg

VIPs Visit

- ⑥ Hon'ble Vice Chancellor Dr. S.K. Patil, IGKV, Raipur visited mushroom research lab on Jan 2014 and obtained information's regarding mushroom cultivation, processing and marketing activities.
- ⑥ Dr. S. S. Shaw Director Research IGKV Raipur
- ⑥ Dr. J. S. Urkurkar Director Extension Services IGKV Raipur
- ⑥ Dr. S. A. Sarnaik, DSW , IGKV, Raipur visited mushroom research lab on time to time and obtained informations regarding mushroom cultivation, processing and marketing activities.
- ⑥ 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
- ⑥ Joint Secretary, RKVY Dr. R.K. Singh visited mushroom research lab and obtained informations regarding mushroom cultivation, processing and marketing.
- ⑥ Director Forest Services, Chhattisgarh

- Padmshree Samsad Begum, Gunderdehi, Chhattisgarh
- Dr. Humbarde, Director General CGCOST, Raipur, Chhattisgarh
- Shri Rajesh Mishra D. G. Central Jail, Raipur

TV Talks/ Radio

Awadhiya G.K (2013). Mushroom Utpadan kaise kare live telecast and audience question & answers. Awadhiya G.K (2013). Mushroom Utpadan Kaise Kare Radio tald 5 Dec.2013 Awadhiya G.K (2013). Mushroom Utpadan- A rojgar tool. Radio Broadcast

As Resource person

Awadhiya G.K (2013). Mushroom Production Technology an effective tool of Agribusiness.” University Seminar” IGKV Raipur.

Awadhiya G.K. (2014). “ Oyster Mushroom Production Technology “ State Agriculture Department under ATMA Project SAMITI Raipur 24 Feb 14

Projects Submitted for approval

Sl.No.	Project title	Duration	Funding agency	Budget
01	Establishment of commercial models units production (1/8; ¼; 1/2 acre India of land)	2014-17	RKVY Govt. of India	124.55 lakh of oyster mushroom

DOCUMENTARY FILM Awadhiya G. K (2014). Documentary film on “Mushroom

Production Technology”

Nauni Centre

- Lectures delivered in specialized training programmes, including farmers camps, short duration training courses -40
- No. of farmers benefitted- more than 600
- One day location specific training programmes organized on Medicinal Mushrooms

Place	Date	No. of participants
Baag pashog, Kwagdhar, Sirmour	25 Sep.2013	57
Tikker, Sarahan, Sirmour	25 Sep.2013	50
Redhi Gusan, Rajgarh, Sirmour		5
Oct.2013	45	Shamrod, Nauni 31 th
Oct. 2013	41	Daro Deoria, Pachhad, Sirmour 31 st
		^s Oct. 2013 46
Spawn production during the year 2013-14: 9505 Kg (9.5 tons) Mushroom production during the year 2013-14: 3450 Kg (34.5 Qts.) Button mushroom 102 kg Dhingri		

Murthal

1. Number of mushroom training : 15 2. Number of mushroom participants : 620 3. Number of women trainees : 55 4. Active participant in workshop a. IIT DELHI b. Delhi university 5. Kisan mela 6. Jajjhar 7. Solan 8. Purkash 9. kisan Aayog 10. .Demonstration a. Indian international horticulture expo.(Chandigarh) b. Indian international Fruit &vegetable mandi (Sonipat) 11. Supply of mushroom spawn : 45762 kg. 12. Supply of mushroom compost :290753 kg.

Pusa

2012-13 2013-14 1. Spawn sold : 2875 kg 3370 kg 2. Revenue generated (Rs.) a. Spawn sale (Rs.) : 201250.00 303300.00 b. Training (Rs.) : 19800.00 63000.00 Total Rs. : 221050.00 366300.00

Training on Mushroom / Spawn Production**Table 6.14. Training programme on Mushroom Production**

Sl.	Date	Venue	No. of Participants	Adoption No.	days	Male	Female	Total	Impact
1.	02.04.12 to 07.04.13	RAU, Pusa	6	26	32	17+30	2.	14.05.13 to 19.10.13	Central Jail, Muzaffarpur
3.	12.09.13 to 14.09.13	RAU, Pusa	3	33	3	36	29	4.	30.09.13 to 05.10.13
5.	22.10.13 to 27.10.13	RAU, Pusa	6	30	-	30	30+7	7.	20.01.14 to 25.01.14
8.	25.01.14 to 30.01.14	6 days	22	8	30	30+10	8.	25.01.14 to 30.01.14	6 days
									Total
									180 53 279 195

Table 6.15. Off campus One day awareness cum Training programme on Mushroom Production

Sl.	Date	Venue	No. of Participants	Sponsored	Adoption No.	Male	Female	Total	by Impact
1.	21.07.13	Pakhopali Gopalpur	64	20	84	AICRP, RAU	15	2.	11.08.13 Gopalpur Samastipur
3.	12.08.13	Malpur Maha Dalit Tola,	-	35	35	AICRP, RAU	24		
4.	01.09.13	Dalsingsarai Jail	52	-	52	AICRP, RAU	13	5.	02.10.13 Gaunpur Samastipur
									Total
									176 90 266 89

Table 6.16. Kisan Gosthi organized in Samastipur district

Sl.	Date	No. of Participants	Sponsored by	No.	Male	Female	Total				
1.	19.05.2013	64	23	87	Kanti (Muzaffarpur)	2.	08.09.2013	44	34	78	Gaunpur, Ujiarpur (Samastipur)
3.	27.02.2014	90	8	98	Mohanpur (Patori), Samastipur	Total	198	65	263		

Visitors

a. Students

- Primary level to Matric class : under Chief Minister Educational Tour from all district of Bihar : 1723.

b. Farmers

- A total of 4409 farmers were visited from Bihar, Jharkhand, UP and West Bengal.

• VIP Visitors

- Dr V.K. Singh, Dean Faculty of Science VB Singh Purvanchal Vishva Vidhyalay Jaunpur (UP) visited mushroom centre on April 3rd 2013. He appreciated the efforts made by the centre regarding popularizing mushroom production in Bihar

- Dr P.B. Jha, Ex-Chairman, PBG, RAU and Consultant Maize Crop Govt. of Bihar visited mushroom centre on April 10th 2013.

- Dr V.P. Singh, Director Research, RAU, Patna visited the centre on May 30th 2013.

- District Judge along with family and other officials of Judiciary, Samastipur visited mushroom centre and know the activates of mushroom production programme on June 5th 2013.

- SDM, Samastipur visited Mushroom production programme on May 7th 2013

- Dr. Umesh Srivastava, Ex-DDG (Hort.), ICAR., New Delhi and Dr. SD Sharma VC, Deo Sanskriti, Haridwar visited Mushroom centre on June 14th 2013. He appreciated the efforts made in the popularization of mushroom. He also critically examine the *Calocybe indica* cultivation technology (CIP-4 and CIP-12).

- Dr. AK Singh, ZPD, East Zone and Dr. Viahath Nath, Director, NRC, Litchi, Muzaffarpur visited mushroom centre on June 18th 2013

- Dr. S.K. Karmali, Scientist, DWR, Solapur visited activities of the centre. He also visited impact of training in Shahid Khudiram Bose Central Jail Muzaffarpur and village Kothia block Kanti Muzaffarpur. He also tested mushroom pakaura (Milky white mushroom).

- Joint Secretary, Finance, Govt. of Bihar, Patna visited mushroom centre on June 19th 2013. He also tested mushroom pakaura (Milky white mushroom).

He also tested mushroom pakaura (Milky white mushroom).

- Dr AP Srivastava, National Co-ordinator, NAIP visited mushroom centre on June 24th 2013 and learnt the production technology of different mushroom during summer.

- APC, Govt. of Bihar on July 6th 2013.

- Dr C. Prasad, Ex-DDG Extension Education, ICAR, New Delhi visited mushroom centre on June 26th 2013 and learnt the production technology of CIP-4 and CIP-12. He also tested

the pakaura of both strain and compared with meat. He suggested that technology must be commercialized.

- Dr. Ravikesh Srivastava, Prof. & Chairman, PG Programme of Management, New Delhi on Aug. 25th 2013.
- Dr, P. C Gupta Eminent Scholar & Ex- Prof. CCS University, Meerut on Aug. 26th 2013.
- Dean Agriculture, BAU Kanke Ranchi (Jharkhand) on Sept. 13th 2013.
- Dr. ZA Haider, Mentor Biotechnology Programme of RAU Pusa on Sept. 21st 2013.
- Dr. KDN Singh, Co-ordinator, Biotechnology, NDUAT, Kumarganj, Faizabad (UP) on Sept. 23rd 2013.
- District Judge Samastipur on Feb. 27th 2014.

Participation in Kisan Mela

- Mushroom Stall was placed in State level Kisan Mela, organised by RAU Pusa and West Bengal on March 2014. A large number of growers from Bihar, Jharkhand, UP and West Bengal were visited Mushroom Hub. Growers from all over Bihar placed Mushroom Stall and awarded 1st prize.

• IMPACT OF TRAINING/AWARENESS

- Out of 9 trainees (spawn Production) trained during March 2013, one Smt. Manorma Singh from Lalganj, Vaishali started spawn production and produced 15 kg oyster spawn. She has also sanctioned financial assistance Rs. 15 lakh for spawn lab establishment to Govt. of Bihar under NHM.

❶ Sri Parveen Kumar Village- Thahara, Samastipur trained from RAU Pusa during 2011-12 was used as resource person by Union Bank of India Branch-Ghogoria Dustt. Khagaria Bihar under Rural Self Employment Programme for mushroom production from July 25th to Oct. 31st, protection, consumption and marketing of Oyster mushroom.

❷ Out of 452 mushroom growers/entrepreneurs participant in National seminar on “Mushroom Utpadan, Parisanrankshan, Gunvatta, Samvardhan. Pakeging and Vipanana : Avasyktaye aur Sambhavanye” 183 master trainer, trained by RAU and 103 growers trained by these master trainers are involved in mushroom production.

❸ During Feb. 2013 a total of 8 women and 1 man trained for mushroom spawn production.

❹ Out of 52 Jail inmates (Participated in one day exposure on 1st Sept. 2013) 25 inmates showed interest for mushroom and requested for 6 days training.

❺ All 36 trainees have prepared 5-6 bags 1 kg spawn at their house. Order of 50 kg spawn was placed from Muzaffarpur trainees.

❻ On Campus training cum awareness programme was organized on Sept. 25th 2013.

Pantnagar

1. Training on mushroom cultivation

Sl.No. Training Date and duration No. of beneficiaries	
1. MRTC Extension Education Sept. 24-28, 2013 36	2. Organized by NABARD, Oct.22, 2013 50
3. MRTC- AICRP Oct.29-31,2013 19	4. MRTC AICRP Nov. 19-21,2013 22
5. Aatma Project Jan. 07-09, 2014 27	6. MRTC AICRP Jan. 29-31,2014 18
7. MRTC AICRP Feb. 05-07, 2014 30	Total 184

Oct.29-31,2013 Nov. 19-21,2013

Jan. 29-31, 2014 Feb 05-07, 2014

3. Kisan Mela: 535 no. of farmers were visited the centre during Kisan Mela w.e.f. Oct 04-07, 2013 and 215 no. of farmers during Kisan mela w.e.f. Feb 28 to March 03, 2014. They were informed the mushroom production technology. During Kisan Mela Gosthi was organized 3.00 – 6.00pm and the scientist answered their queries.

4. Mushroom Museum has already been developed at the centre and is being updated time to time 5.

Workshop – Annual workshop of AICRP on Mushroom held at PAU, Ludhiana w.e.f. April 16-17, 2013 was attended by Dr. SK Mishra and Dr. Geeta Sharma. 6. Training attended: Training on capacity building programme for University teachers on essential

teaching skills organized by Educational Technology Cell College of Agriculture, GBPUAT Pantnagar w.e.f. July 15-20, 2013.

7. Cultures, master spawn, comm. Spawn, fresh mushroom and compost casing Supply (2013-14)

Cultures (No.) Master spawn(No.) Comm. Spawn (Kg) Compost Casing (Ton) soil (Qtl)																		
B	P	M	S	B	P	M	B	P										
M	S																	
07	08	02	06	04	09	05	901	483	102	03	47.37	84.8	23	No.	18	No.	1489	kg

Barapani

Seven trainings were conducted on mushroom cultivation which included farmers, entrepreneurs etc. Trainings were oriented towards spawn production, mushroom cultivation and postharvest management. Spawn was also provided to KVK's.

Sr.	Activity	Date	Duration	No. of	No. Participants
1.	Training on spawn production and post harvest management	Sept 20 to 22	3 days	25	04
	Oct 2013 for women empowerment				

Sr.	Activity	Date	Duration	No. of	No. Participants
2.	Training programme for women "Spore production"	February, 2014	10 days	1	15 th to 15 th
3.	Training programme for women "Spore production"	February, 2014	7 days	1	15 th to 15 th
4.	Oyster Mushroom cultivation	04.05.13	1 day	7	5.
5.	Oyster Mushroom cultivation	04.06.13	1 day	15	6.
6.	Oyster Mushroom cultivation	15.05.13	1 day	7	7.
7.	Training programme on Mushroom cultivation	05.11.13	1 day	21	

(Oyster Mushroom) at Fernando Speech and Hearing centre, Meghalaya

b. Demonstrations, Exhibitions etc.

S.No.	Activity	Date	No. of Participants
1.	Oyster Mushroom cultivation	08.11.13	32
2.	Demonstration on oyster mushroom cultivation	30.05.13	
3.	Oyster Mushroom cultivation in low cost mushroom house	07.01.14	13
4.	Oyster Mushroom cultivation	11.11.13	2

c. Revenue generation

S.No.	Commodity	Quantity	Amount (Rs.)
1.	Spawn sale (including mother spawn)	601.4 kg	45,700
2.	Fresh Mushroom	66.1 kg	3,856
3.	Culture tubes	38 nos.	7,600
	Total		57,156

Udaipur**Training Programme****Table 6.16. On Campus Training programmes held from April 2013 to March 2014**

S.No.	Date & duration	Type of Mushroom	No. of Trainees	Native of Trainees
1	21-04-13	Three days Oyster mushroom cultivation	Entrepreneurs 6	35, Gokul Village Udaipur
2	25-04-13	Three days Oyster mushroom cultivation	Entrepreneurs 7	H.M. Sec-08, Udaipur
3	01-06-13	Three days Oyster mushroom cultivation	Entrepreneurs 7	Pasvan ji ki Gali, Ravji ka hata, Udaipur
4	25-10-13	Three days Oyster mushroom cultivation	Farmers 4	Near Power house, Sec-04 Udaipur

S.No.	Date & duration	Type of Mushroom	No. of Trainees	Native of Trainees
5	16-11-13	Three days Oyster, Button Mushroom	Student 29	Anand Agriculture cultivation University, Gujrat
6	20-12-13	Three days Oyster mushroomcultivation	Farmers 777	Jawahar Nagar, Udaipur
7	09-01-14	Three days Oyster Mushroom cultivation	Farmers 0414	Verma Colony, Sec-09, Udaipur
8	12-02-14	Three days Oyster Mushroom cultivation	Farmers 12606	Dwarika Apartment, Opp. Manva Kheda, Udaipur
9	06-03-14	Oyster Mushroomcultivation	Farmers 23	Mandoser, M.P. Total 99

Table 6.17. Awareness Camp

S.No.	Date & duration	Type of Mushroom	No. of Trainees	Native of Trainees
1	20-11-13	One day Oyster mushroomcultivation	Farmers 45	Bhilwara (Raj.)
2	21-11-13	One Day Oyster mushroom cultivation	Farmers 44	Bhopalpura, Udaipur
3	05-12-13	One Day Oyster mushroom cultivation	Farmers 30	H.M. Sec 05, Udaipur (Raj.)
4	26-12-13	One Day Oyster mushroom cultivation	Farmers 85	H.M.Sec-5, Udaipur (Raj.)
5	01-01-14	One Day Oyster mushroom cultivation	Farmers 108	Kheroda, Teh. Vallabnagar, Udaipur
6	17-01-14	One Days Oyster mushroom cultivation	Farmers 35	Teh. Ranivara, Jalore (Raj.)
7	22-01-14	One Days Oyster mushroom cultivation	Farmers 35	Udaipur (Raj.)
8	28-01-14	One Days Oyster mushroom cultivation	Farmers 4	A-09, Janakpuri, Chittorgarh
9	29-01-14	One Days Oyster mushroom cultivation	Farmer 04	Bagidora, Banswara
10	30-01-14	One Days Oyster mushroom cultivation	Student 29	St. Xavier College, Mumbai
11	05-02-14	One Days Oyster mushroom cultivation	Farmer 34	B.T.M. Atma, Neemuch (M.P.)
12	12-02-14	One Days Oyster mushroom cultivation	Student 40	Gogunda, Udaipur (Raj.)
13	26-02-14	One Days Oyster mushroom cultivation	Farmer 10	Jodhpur (Raj.)
14	05-03-14	One Days Oyster mushroom cultivation	Student 30	P.D. Agriculture. University, Akola
15	06-03-14	One Days Oyster mushroom cultivation	Entrepreneurs 4	Chirwa, Udaipur
16	07-03-14	One Days Oyster mushroom cultivation	Entrepreneurs 2	Udaipur (Raj.)
Total 539				

(2) Involvement of women in training programmes: -125

(3) Mushroom Mela and Exhibition: 2

(A) Banswara 28-02-2014 Farmers : 4000 (B)

KVK Bhiwara 01-03-2014 Farmers : 5500

(4) Development of Mushroom museum

A small mushroom museum is developed in AICRP having five hundred twenty five wild mushroom flora and allcultivated mushrooms in dry as well as in wet form were preserved.

(5) Supply of quality Mushroom Spawn: 475 Kg

Ludhiana

Training Courses Date Venue No. of participants

15-17.05.13 Training course on cultivation and processing of tropical 38 mushrooms, PAU, Ludhiana
09-13.09.13 Mushroom training course for rural farmers, PAU, Ludhiana. 41 23-27.09.13 Mushroom training course for rural farmers, PAU, Ludhiana. 47
Lecture-cum-Demonstrations
9.5.13 Mushroom production technology at specialized training course on establishment of agro based small industry (6-5-13 to 10-5-13)
23-24.8.13 Demonstraion at Research and extension specialist workshop for rabi crops
7.10.13 Mushroom production technology at PAMETI, Ludhiana

Date	Venue	No. of participants
10.11.13	Mushroom production technology at Bharat Nirman Campaign, Dakha	
14.12.13	Mushroom production technology at PAU, Ludhiana for Pakistan Delegation	
23-24.12.12	PAU Alumni Meet, PAU, Ludhiana	
06.01.14	Lecture cum Demonstration on Mushroom production technology at PAU Kisan Club Meet, Ludhiana	
Kisan Melas/Exhibitions		
02.9.13	Regional Kisan Mela at KVK, Amritsar	04.09.13
	Regional Kisan Mela at Ballawal	06.09.13
	Regional Kisan Mela at Gurdaspur	10.09.13
	Regional Kisan Mela at Faridkot	
13-14.09.13	Kisan Mela at PAU, Ludhiana	18.09.13
	Regional Kisan Mela at Rauni	20.09.13
	Regional Kisan Mela at Bathinda	5-7.12.13
	Exhibition for Accreditation team	
19-20.12.13	HDO workshop at PAU, Ludhiana	16-19.02.14
	Progressive Punjab Agri. Summit, Mohali	04.03.14
	Regional Kisan Mela at Faridkot	06.03.14
	Regional Kisan Mela at KVK, Amritsar	10.03.14
	Regional Kisan Mela at Ballawal	12.03.14
	Regional Kisan Mela at Gurdaspur	14-15.03.14
	Kisan Mela at PAU, Ludhiana	19.03.14
	Regional Kisan Mela at Rauni	
21.03.14	Regional Kisan Mela at Bathinda	
Visits		
1.5.13	Visit of Mushroom Research Center, PAU by students and 30B, 14G, 2 faculty	faculty of College of Agriculture, SK Rajasthan Agril. Uni., Bikaner
8.5.13	Visit of The Director, DMR, Solan	- 17.5.13 Visit of Dr RC Upadhya, DMR, Solan
	- 27.6.13 Visit of Mushroom Research Center, PAU by farmers from KVK, 30	
	Abohar	18.7.13 Visit of Dr OP Ahlawat, DMR, Solan
	- 26.7.13 Visit of The Director, DMR, Solan	
	- 30-7-13 Visit of Mushroom Research Center, PAU by Horticulture 60	
	growers of Punjab	14-8-13 Visit of Mushroom Research Center, PAU by farmers from 30
	Himachal Pradesh	21-8-13 Visit of Mushroom Research Center, PAU by students and 29G, 24B, 2 faculty
	faculty from Thanthai	Rover Instt. of Agri. And Rural Development, Parabalus, TN

Date Venue No. of participants
9.9.13 Visit of Mushroom Research Center, PAU by Mushroom trainees 12 from KVK, Bathinda
16.9.13 Visit of Mushroom Research Center, PAU by Delegates from 14 Afghan and America
16.9.13 Visit of Mushroom Research Center, PAU by AD Agri College 60G, 21B, 4 faculty and Res Instt., Tiruchirappalli faculty and students
26.9.13 Visit of Mushroom Research Center, PAU by Mushroom trainees 31 from KVK, Sangrur
27.9.13 Visit of Mushroom Research Center, PAU by Mushroom trainees 10 from KVK, Samrala
5.10.13 Visit of Mushroom Research Center, PAU by students and faculty 18B, 13G, 3 faculty of College of Horticulture, Mysore Univ. Hort. Sci., Bagalkot, Karnatka
17.10.13 Visit of Mushroom Research Center, PAU by students and faculty 24B, 26G, 3 faculty of College of Horticulture, Mudigere
18.10.13 Visit of Mushroom Research Center, PAU by students and faculty 53B, 14G, 3 faculty of College of Agriculture, Raidur, Karnatka
18.10.13 Visit of Mushroom Research Center, PAU by students and faculty 43B, 18G, 3 faculty of College of Agriculture, Bijapur Univ. of Agri. Sci., Dharwal (Group I)
19.10.13 Visit of Mushroom Research Center, PAU by students and faculty 46B, 18G, 3 faculty of College of Agriculture, Bijapur Univ. of Agri. Sci., Dharwal (Group II)
28.10.13 Visit of Mushroom Research Center, PAU by students and faculty 13B, 19G, 3 faculty of College of Horticulture, Mysore Univ. Hort. Sci., Bagalkot, Karnatka
20.11.13 Visit of Mushroom Research Center, PAU by faculty and Biotech. 30G, 2 Faculty students from Guru Nanak Girls College, Ludhiana
21.11.13 Visit of Mushroom Research Center, PAU by College of Agriculture, 17G, 79B, 4 Faculty Anand Agril Uni., Anand Gujrat faculty and students
28.11.13 Visit of Mushroom Research Center, PAU by Smt. Karamjit Kaur, - Member, PAU Board of Management
6.12.13 Visit of Mushroom Research Center, PAU by Accreditation Team - 24.1.14 Visit of Mushroom Research Center, PAU by students from the 19, 2 faculty Deptt. Of Food Technology, IVST, Avantipur, Kashmir 7-2-14 Visit of Mushroom Research Center, PAU by farmers from 28 Bihar State 21.2.14 Visit of Mushroom Research Center, PAU by faculty and students 26, 2 Faculty from Greenland Convent School, Ludhiana
Seminar/Workshop
16.04.13-17.04.13 Indian Mushroom Conference 2013 at PAU, Ludhiana
17.04.13-18.04.13 XV Workshop of All India Research Project on Mushrooms at PAU, Ludhiana 19-20.12.13 Horticulture Development officers Workshop, PAU, Ludhiana
TV Talk
13-08-13 Khumban di kasht, DDK, Jalandhar 29.10.13 Garam rutt dian khumban di kasht, DDK, Jalandhar

Spawn supply

During the year 2013-14, 1188 kg mushroom spawn of *Agaricus bisporus*, *Calocybe indica*, *Pleurotus* spp. and *Volvariella volvacea* was supplied to the mushroom growers of Punjab.

Vellayani

Training programme organized at AICRP mushrooms

Topic	Name of	Category	Date	No of	No of scientist	days	participants
Spawn production and mushroom	Dr Lulu Das	Educated	7 th and 8 th	13	13	2	0
Spawn production and mushroom	Dr Lulu Das	Educated	11 th and 12 th	13	13	2	0
Spawn production and mushroom	Dr Lulu Das	Educated	23 rd and 24 th	13	13	2	0
Spawn production and mushroom	Dr Lulu Das	Educated	27 th and 28 th	13	13	2	0
Outreach Extension Activities							
Spawn production and mushroom	Dr Lulu Das	Educated	16 th	13	13	2	0
November 16, 2013 Technology for Mushroom Production The Way Ahead for Kerala Trivandrum							

Award

Dr Lulu Das , Professor & PI, AICRP Mushrooms won the Dr RadhaKrishnan Memorial Gold Medal and Award of Global Economic Progress & Research Association for scoring a string of achievements in Agriculture & Research in December 2013

Hisar

Three years extension activities data for impact analysis at Hisar centre

Sr.No Extension activities 2011-12 2012-13 2013-14																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
1	Number of training at KVK's (linkage trainings)	9	27	22	2	Number of 3-5 days trainings	1	3	4	3	Number of 10-15 days trainings	2	2	-	4	Number of Radio talks	2	2	1	5	Number of TV talks	2	1	2	6	Number of extension lectures delivered	20	18	25	7	Extension literature published	2	1	1	8	Number of Farmer fair / Kisan Divas exhibitions	2	3	3	9	One day training programme on mushroom cultivation	1	1	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	for RAWE and SET students of B,Sc.(Hons) Ag	10	Commercial spawn supplied (Kg)	661.0	1210.0	1725.0	11	Publications	9	4	6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					</

No. of (1-3 days) trainings: 8 Training's conducted at KVK's (3-5 days): 20

❶ Mushroom stalls during *Krishhi Mela* at CCS HAU, Hisar on - Sept. 11-12, 2013 - Dec. 23, 2013 - March 12-13, 2014

❶ Lectures and demonstration on button, oyster and milky mushroom cultivation at FTC PNB, Sachchakhera (Jind).

❶ Lecture on mushroom cultivation at KVKs.

❶ Farm Advisory service both at the campus as well as mushroom growers farm.

❶ Answered farmers'/mushroom growers' questions during buzz sessions in *Krishhi Mela's* and *Kisaan Divas*.

❶ Extension literature on mushroom cultivation was printed and provided to the farmers.

❶ Commercial spawn supplied = 1725 kg

Other activities

❶ Taught UG and PG courses.

❶ RAWE and SET classes of UG students

- Motivated mushroom grower for the construction of controlled condition mushroom house
- Attended T&V and ZAREAC meetings at KVK's.
- Mushroom growers were felicitated during *Kisaan Divas* and Alumni meet.

Ranchi

Four (five days residential) trainings were conducted at our Research centre during the year 2013- 2014

Visitors

Mushroom growers turned up for seeing technology demonstration and purchasing of mushroom spawn during the year, 2013-2014. During the year under report, 653 persons visited the centre.

Television Talk

1. Jharkhand me Mushroom ki Kheti. 2.

Jharkhand me Oyster mushroom ki kheti.

7

PUBLICATIONS

Bhubaneswar Centre

Research articles

Mohapatra, K.B. 2012. Influence of substrates, substrate pasteurization methods and organic supplements on the biological efficiency of *Pleurotus florida*. Indian Journal of Mushroom. 30(2):25-28. Mohapatra, K.B., Chinara, N. and Behera, B. 2013. Low cost cultivation techniques for *Volvariella volvacea* grown in Odisha. Proceedings of National Symposium on Mushroom for Medicinal value and Nutritional security under changing climatic conditions, 27-28, December 2013, UHF, Nauni, Solan (HP), pp 11. Mohanty, G. and Mohapatra, K.B. 2013. Indoor cultivation of *Volvariella volvacea* in Odisha. Proceedings of National Symposium on Mushroom for Medicinal value and Nutritional security under changing climatic conditions, 27-28, December 2013, UHF, Nauni, Solan (HP), pp 10. Mohapatra, K.B., Behera, B. 2013. Management of competitor moulds in oyster mushroom bags. Journal of Plant protection and environment. 10(1):93-94. Mohapatra, K.B., Behera, B. 2013. Influence of plant growth regulators on biological efficiency of straw mushroom, *Volvariella volvacea*. Proceeding of Indian mushroom conference, 16-17, April, 2013, PAU, Ludhiana, Punjab. Pp.55. Mohapatra, K.B., Behera, B. 2013. Comparative performance of *Pleurotus* spp in East and South eastern coastal Plain of Odisha. Proceeding of Indian mushroom conference, 16-17, April, 2013, PAU, Ludhiana, Punjab. Pp.50. Thakur, M.P. and Mohapatra, K.B. 2013. Tropical mushrooms: Present status, constraints and success story. Lead lecture presented in the Indian mushroom conference, 2013 held from 16-17 April, 2013 at PAU, Ludhiana, Punjab. Mohapatra, K.B. and Dora, D.K. 2014. Protected cultivation of mushroom- the intervention needed. Paper presented in the workshop on protected cultivation in Odisha, May 1, 2014, Bhubaneswar, Odisha, India.

Participation in conference/ seminar/ workshop/symposium

XV workshop of AICRP on Mushroom and Indian Mushroom Conference-2013, 16-18 April, 2013 at PAU, Ludhiana, Punjab. V annual conference of Orissa Mushroom Grower's Federation, 20 November, 2013 at Dhenkanal, Odisha. One day workshop on Virus diseases of vegetable crops and their management, 5 December, 2013 at OUAT, Bhubaneswar, Odisha. State level workshop on protected cultivation, 1 March, 2014 at Bhubaneswar, Odisha. National symposium on mushroom for medicinal value and nutritional security under changing climatic conditions, 27-28, December, 2013 at UHF, Nauni, Solan (HP).

Popular articles

Mohapatra, K.B., 2013. Indian mushroom conference: an overview. Krushak Bandhu Annapurna XXI(V): 31-32. Mohapatra, K.B., 2013. Success of mushroom cultivation in Odisha. Jeebika. 5:18-21.

Thesis

Evaluation of substrates and growing techniques for improvement of biological efficiency of paddy straw mushroom (*Volvariella volvacea*) in Odisha.

Pune Centre**Faizabad Centre****Thesis**

Mr. Vivek Kashyap. I.d. No.A-6225/11, student of M.Sc. (Ag), worked under my supervision and awarded degree thesis entitled on "Effect of Substrates and Supplementation on the yield of Oyster mushroom (*Pleurotus florida*)" Mr. Amit Kumar Maurya I.d.No.: A-6881/12 M.Sc. (Ag.) Plant Pathology, was supervised as a major advisor and chairman for his M.Sc. (Ag.) thesis research work "Studies on Substrates for enhancing the productivity of Paddy Straw Mushroom (*Volvariella volvacea*)".

Research papers

Kumar, P., Awasthi, L.P. and Maurya, A.K. (2013). Evaluation of high yielding strains of Oyster Mushroom (*Pleurotus* Spp.) "Presented in First UP Agricultural Science Congress on "Emerging Challenges and Resource Management for food Security" held at main campus of N. D. University of Agriculture and Technology, Kumarganj, Faizabad from 17-19 August, 2013 (Abstract No. O.P.19, pp.309). Kumar, P. and Awasthi, L. P. (2013). Studies on Biodiversity of Wild Edible Mushroom of Eastern Uttar Pradesh. Presented in 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. (Abstract 11, p.8)

डा. प्रदीप कुमार, डा. भगवान सिंह , एवं डा. बी.पी.चौधरी (2013) वर्ष भर मशरूम उगायें : अधिक लाभ कमायें |, Purvanchal Kheti, Nov.- Dec., 2013

Raipur Centre

Thakur M P and Awadhiya G K (2013). Oyster Mushroom: Beej (Spawn) Evm Fasal Utpadan. Extension bulletin No 2013/2 pages 41 Awadhiya G. K (2014). Swalanban Ka Jariya Ban Mushroom. Chhattishgrh daily newspaper of Feb 2014. Mushroom Knowledge of Chhattisgarh Tribes as food and ethno medicines. Poster presentation in National symposium on Medicinal and aromatic plant held at IGKV Raipur in month of Jan 2014 Sahu Santosh K & Awadhiya G.K (2014). Evaluation of different substrates against pink oyster mushroom

Pleurotus eous for their yield and it attributing characters. Poster presentation in National symposium on Medicinal and aromatic plant held at IGKV Raipur in month of Jan 2014

Nauni Centre**Research papers**

Suman BC and Dharmesh Gupta. 2013. Pathogens and competitors moulds in mushroom production and their management. *Ind. J. Mush.* 31(1):24-30. Suman BC, Dharmesh Gupta and Manju Sharma. 2013. Cultivation of *Pleurotus eryngii* on various agricultural wastes. *Ind. J. Mush.* 31(1):39-42. Jarial RS, Jarial K, Sharma CL and Gupta D. 2013. Evaluation of locally available plant materials as substrates for growth and yield of different species of oyster mushroom under cold desert conditions of Himachal Pradesh. *J Mycol Pl Pathol* 43(2): 182-186

Books and manuals published

Suman BC, RC Sharma and Dharmesh Gupta. 2013. Manual on commercial mushroom and spawn production. 34p. Suman BC, Satish Kumar and Dharmesh Gupta. 2013. Khumb Ki Kheti. Published by: Indian Mushroom Growers Association, Chambaghat, Solan.

Research Papers presented in National symposium

Gupta Dharmesh, Shalini Verma and BC Suman.2013.Occurrence of *Sparassis crispa*- a wild edible mushroom in temperate zone of Himachal Pradesh. pp.5. In: National Symposium on “ Mushrooms for medicinal value and nutritional security under changing climatic conditions” at UHF,Nauni w.e.f.27- 28 Dec.2013. Gupta Dharmesh, BC Suman, Manju Sharma and RS Jarial.2013.Bioconversion of low quality lignocellulosic agricultural waste and weed plants into edible protein by *Pleurotus ostreatus* .pp.14. In: National Symposium on “ Mushrooms for medicinal value and nutritional security under changing climatic conditions” at UHF,Nauni w.e.f.27-28 Dec.2013. Jarial RS, CL Sharma,Kumud Jarial and Dharmesh Gupta.2013.Effect of supplementation of waste paper in different locally available substrates for the cultivation of *Pleurotus sajor-caju* under cold desert conditions of Himachal Pradesh.pp.14.In: National Symposium on “ Mushrooms for medicinal value and nutritional security under changing climatic conditions” at UHF,Nauni w.e.f.27-28 Dec.2013. Chauhan Praneet, Dharmesh Gupta and BC Suman.2013.*Pleurotus djamor*: Cultural requirements and fruit body production on different substrates.pp.17. In: National Symposium on “ Mushrooms for medicinal value and nutritional security under changing climatic conditions” at UHF,Nauni w.e.f.27- 28 Dec.2013. Narwal Vijay, BC Suman and Dharmesh Gupta.2013.Evaluation of various strains of *A.bisporus* and their molecular characterization.pp.18. In: National Symposium on “ Mushrooms for medicinal value and nutritional security under changing climatic conditions” at UHF,Nauni w.e.f.27-28 Dec.2013. Patyal Sucheta, Devina Vaidya, Dharmesh gupta and Nilakshi Chauhan. 2013. Development and evaluation of *Pleurotus* mushroom flour for value addition.pp.25. In: National Symposium on “ Mushrooms for medicinal value and nutritional security under changing climatic conditions” at UHF,Nauni w.e.f.27-

28 Dec.2013.

Pantnagar

Gajendra Singh Jeena, H. Punetha, Om Prakash, Dinesh Pandey and KPS Kushwaha (2013). Investigation of nutritional characterization and element profiling of some *Pleurotus* species (Dhingri ~~Mushroom~~) *Journal of Research* 11(3): 405-408. Neelam, KPS Kushwaha, Geeta Sharma and SK Mishra (2013). Effect of drying on the quality of milky mushroom (*Calocybe indica*). (abs.): In National seminar on Technological interventions for sustainable hill development w.e.f. June 17-19, 2013 College of Technology, GBPUA&T Pantnagar. 98p. SK Mishra, Geeta Sharma, Neelam and KPS Kushwaha (2013). Washing treatment for improving whiteness of mushroom fruits. (abs.): In National seminar on Technological interventions for sustainable hill development w.e.f. June 17-19, 2013 College of Technology, GBPUA&T Pantnagar. 99p. Geeta Sharma, SK Mishra, Neelam and KPS Kushwaha (2013). Construction of low cost mushroom houses (huts. For sustainable development of mushroom industry. (abs.): In National seminar on Technological interventions for sustainable hill development w.e.f. June 17-19, 2013 College of Technology, GBPUA&T Pantnagar. 99p. Geeta Sharma, Mishra Prachi, Kushwaha KPS and Mishra SK (2013). Estimation of protein and phenol from Sporocarps of *Flammulina velutipes*. Proceeding of Indian Mushroom Conference: Abstract of lead, oral and poster presentation held at PAU, Ludhiana w.e.f. April 16-17, 2013. p22. Neelam and Kushwaha KPS (2013). Morphological and yield attributes of different strains of *Lentinula edodes*. Proceeding of Indian Mushroom Conference: Abstract of lead, oral and poster presentation held at PAU, Ludhiana w.e.f. April 16-17, 2013. p54. KPS Kushwaha and Geeta Sharma (2013). Performance of black poplar mushroom on different substrate. Proceeding of Indian Mushroom Conference: Abstract of lead, oral and poster presentation held at PAU, Ludhiana w.e.f. April 16-17, 2013. p56. S.K. Mishra, Kushwaha, KPS; Varshney Anjum and Sharma Geeta (2013). Yield performance of *Calocybe indica*. Proceeding of Indian Mushroom Conference: Abstract of lead, oral and poster presentation held at PAU, Ludhiana w.e.f. April 16-17, 2013. p56

Omveer Singh and SK Mishra (2013). Value added delicacies of mushroom. *Indian Farmer Digest*. 46(4): 27-28.

Barapani Centre

Baiswar. P, Ngachan SV. 2014. Training manual on Spawn production for livelihood improvement. pp 1-28. Baiswar P, Das A, Kumar A, Ngachan SV. 2013. Training manual on Mushroom cultivation, spawn production and post harvest management for women empowerment. pp 1-22.

Pusa Centre

Book

Dayaram (2013) Mushroom utpadan RAU publication 3rd edition

Popular articles

बिहार में मशरूम उत्पादन : वर्तमान एवम भविष्य दयाराम (2013) वृहद्

दुधिया मशरूम की खेती। आधुनिक किसान

दयाराम (2013) ओयस्टर मशरूम संरक्षण एवम भण्डारण, कृषक सन्देश

Broucher

कटाई उपरांत मशरूम का रखरखाव एवम उसके मुलायवर्धन उत्पाद वृहद् दुधिया मशरूम की खेती

Book Chapter

RC Ram and Dayaram (2013). Mushrooms nutritional and medicinal properties in microbial bio-diversity of natural ecosystem. (Sinha, A, Sharma, BC and Srivastava, M eds): Scientific Publication

Udaipur Centre

S.K. Jain, Vijay Kumar Chaher, Dr. Anila Doshi & Dr. G.P. Sharma 2013. Button Mushroom Ka Prasanskaran Avam mulya samwardhan: Aak Garalu Udhdyog. Rajashthan Kheti- Pratap, March, 2013
S.K.Singh, Anila Doshi, Anjly Pancholy & Rakesh Pathak.2013.Biodiversity in wood-decay macro-fungi associated with declining arid zone trees of India as revealed by nuclear rDNA analysis.European journal of Plant Pathology.ISSN 0929-1873.DOI 10.1007/s10658-013-0172-0 R.S. Ratnoo & Anila Doshi.2013.Effect of different washing treatment and duration on keeping quality of white button mushroom *Agaricus Bisporus*.J.Pl.Dis.Sci.Vol 8(1):70-76 Rajesh Kumar Meena and Anila Doshi.2013.Mycelial growth and fruit body production of new hybrid cultures of different *Pleurotus* species. Journal of Plant Development Sciences Vol.6(1) : 79-83.2014 Rajesh Kumar Meena and Anila Doshi.2013. Comparative growth characteristic of different parent monoculture and new hybrid cultures of *Pleurotus* species. Journal of Plant Development Sciences Vol.6(1): 61-64.2014

Coimbatore Centre

Krishnamoorthy, A. S., S.Nakkeeran, T.Raguchander and C.Ponniah. 2013. Training Manual on "Fascinating Microbial Biomolecules for Plant and Human Health". ICAR-NAIP-National Training organized between 24th Feb and 15th March, 2013 in the Directorate of Food and Fisheries Development, TNAU. Krishnamoorthy, A.S., K.Kalpana, G.Amutha and M.Ragul.2013. Commercial Prospects of Milky mushroom (*Calocybe indica* var.APK2) and its Chitosan Biopolymer for Plant and Human Health. In: Proc. of the 7

Aug.2013, Beijing, China. pp.453-459. Krishnamoorthy, A.S., A..Kandan and S.Mohan.2013 Effect of *Ganoderma lucidum* in Indian HIV carriers. In: Proc. of the 7

Aug.2013, Beijing, China. pp.626-631. Srinivasan, A, S. Krishnamoorthy, S. Kuttalam, T.Raguchander and C.R.Chinnamuthu. 2014. Performance Evaluation of Azoxystrobin in the control of *Phytophthora infestans* (Mont.) de Bary in potato. Pestology XXXVIII : 52-55.

Vellayani Centre

Lulu Das and Prathibha P. R. 2013. *Tricholoma giganteum* – a new introduction to the edible mushroom flora of Kerala Accepted for publication in Mushroom Research Lulu Das and Prathibha P.R. 2013. Alternative substrates to casing layer for assessing the productivity of *Tricholoma giganteum*. Poster presented at Indian Mushroom Conference on 16 April. 2013. Lulu Das and Prathibha P. R. 2013. Standardization of value added products of *Tricholoma giganteum*. Poster presented at Indian Mushroom Conference on 16 April. 2013. Lulu Das 2014 Effective utilisation of coconut bioresidue for mushroom cultivation. Paper accepted for publication in the Souvenir to be released in connection with the launching of Neera

Books

‘Manam Mayakkum koon vibhavangal “ authored by Dr Lulu Das and Dr K Prathapan was released during Mushroom Mela on March 4th 2013.

Popular Article

“KAU to promote new varieties of mushrooms” in Hindu daily.

Ranchi

Sharma, J.P., Kumar, S. and Upadhyay, R.C. (2012). Biodiversity of wild and cultivated mushroom in Jharkhand state. 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. Sharma, J.P., Kumar, S. and Upadhyay, R.C. (2012). Diversity of mushroom in Jharkhand. *Technical Bulletin* No. /RAN-40: Page 16. S. Maurya, R. Kumar, J. P. Sharma and S. Kumar, 2013. ‘Effect of some common fungicides for the management of substrate diseases of mushroom and mycelial proliferation of *P. florida*’ National conference on Mushroom at PAU, Ludhiana S. Maurya, R. Kumar, J. P. Sharma and S. Kumar, 2014. ‘Effect of some common fungicides for the management of substrate diseases of mushroom and mycelial proliferation of *P. florida*’. Accepted

in ‘Vegetose’

Hisar

Singh, S. and Kumar, A. 2013. Effect of incorporation of different bacterial cultures in casing mixture during seasonal cultivation of button mushroom. Indian Mushroom Conference, PAU Ludhiana, April 16-17. Abs. 62. p51. Kumar, A. and Singh, S. 2013. Evaluation of paddy and wheat straw based compost during seasonal cultivation of button mushroom. *Indian Mushroom Conference, PAU Ludhiana, April 16-17*. Abs. 63. p51-52. Singh, J., Kumar, A., Singh, S. and Singh, N. 2014. Variations in cultural characteristics of *Ganoderma lucidum* collected from different tree species. 35

Annual Conference and symposium of Indian society of Mycology and Plant Pathology. Udaipur, Jan. 8-10. Abs. BP-28. p47. Verma, S., Kumar, A., Singh, S. and Rana, R.S. 2014. Isolation of *Trichoderma* species from spent mushroom substrate and its *in vitro* antagonism against *Rhizoctonia solani*. 35

Annual Conference and symposium of Indian society of Mycology and Plant Pathology. Udaipur, Jan. 8-10. Abs. DM-83. p103. Yadav, N. K., Yadav, N. S., Kumar, A. and Singh, S. 2014. *Khumb ki kheti se le atirict aaye*. Krishi Samvad. January, 14. 22-25. Kumar, R. K. and Singh, S. 2014. *Dhingri Khumb ki unnat kheti*. Krishi Samvad. January, 14. 28-30.

8

PERSONNELIA

Staff position at various AICMP Centres during 2013-14

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

SI.No AICRP Centre Name of staff Designation
7. Dept of Plant Pathology, Dr. RC Shakywar Assistant Professor Collage of Horticulture and Forestry, Central Agricultural University, Pasighat – 791 102 (Arunachal Pradesh) 8. Plant Pathology Section, College of Dr. D.B.Shinde Mycoligist Agriculture, Mahatma Phule Krishi Dr. Jadhav Jr. Mycologist Vidyapeeth, Pune-411 005 Shri V. K. Bhalerao Jr. Res. Asstt Shri. N. G. Desai Agril. Asstt. Shri.S. G. Hingmire LDC/Typist Shri. Y.S. Bhave Beldar 9. Mushroom Research Laboratory, Dr. G. K. Awadhiya Mycologist Dept. of Plant Pathology, Indira Dr. Harvinder Singh Assistant Mycologist Gandhi Krishi Vishwavidyalya, Shri B. L. Sinha Field Assistant Raipur – 492 006 (Chhattisgarh) Shri R. K. Pandey LDC Shri A. R. Sahu Peon (Beldar) 10. Department of Microbiology, Faculty Dr. Dayaram Associate Professor of Basic Sciences and Humanities, Rajendra Agricultural University, Pusa (Samastipur) - 848 125 (Bihar) 11. Dept. of Plant Pathology, Rajasthan Dr. Anila Doshi Mycologist Collage of Agriculture, Maharana Mrs. Kala Nath Field Supervisor Pratap University of Agric. & Tech., Mr. Nathu Singh L.D.C. Udaipur – 313 001 (Rajasthan) Sh. Kesulal Mali Beldar 12. Department of Plant Pathology Dr. Lulu Das Mycologist College of Agriculture Ms. Deepa Rani Technical Assistant Vellayani – 695 522 Thiruvananthapuram, (Kerala)
C. Cooperating Centre
1. Mushroom Research & Production Dr. Dharmesh gupta Scientist Unit, Department of Mycology and Plant Pathology, Dr. Y.S. Parmar Univ. of Horticulture and Forestry, Nauni – 173 230, Solan (HP) 2. Haryana Agro Industrial Corperation Dr. Ajay Yadav Scientist R & D Centre, Opp. DCR University, G.T. Road, Murthal, Sonapat (Haryana)

9

BUDGET / RELEASED 2013-14

AICRP on Mushroom, Chambaghat, Solan (HP)

R.E. & Grant release 2013-14

Sr. Name of Propos- Grant Grain in HRD 15% Grant for NEH TSP Total No. University ed RE in aid aid National of creation of 2013-14 Salaries general repairs capital assets RA
Recont Equipt. Works Equipt. Cont. 30.95

1 MPUAT, Udaipur 30.95 27.00 0.70 1.00 - - 2.25 - - - 18.43 2 NDUAT, Faizabad 18.43 17.23 0.20 1.00 - - - - - 33.75 3 IGKV, Raipur 33.75 20.00
0.75 3.50 0.10 - 9.40 - - - 31.25 4 MPKV, COA, Pune 31.25 20.00 1.25 3.50 1.25 1.50 3.75 - - - 24.15 5 TNAU, Coimbatore 24.15 20.25 0.50 1.75
0.50 1.00 0.15 - - - 20.05 6 GBPAUT, Pantnagar 20.05 15.50 0.15 0.50 - - 3.90 - - - 51.65 7 PAU, Ludhiana 51.65 36.00 0.65 3.50 1.25 2.00 8.25 - - -
22.45 8 KAU, Vellayani 22.45 11.00 0.50 3.50 1.25 2.00 4.20 - - - 4.90 9 RAU, Pusa 4.90 - 0.25 - 4.65 - - - 9.07 10 CCSHAU, Hisar 9.07 3.02 - 0.65 -
5.40 - - - 6.33 11 OAU, Bhubneshwar 6.33 - - 0.25 - - 6.08 - - -

Co-operating Centres - - 3.20 12 UHF, Nauni 3.20 - 0.12 3.00 0.08 - - - 4.25 13 HAIC, Murthal 4.25 - 1.00 3.00 0.25 - - -

Instt. Based Centres - - - 6.10 14 ICAR-RCER, Ranchi 6.10 - 0.25 0.35 - - 3.50 - - 2.00 -

NE Allocation - - - 15 CAU, COH&F, Pasighat 5.00 - - 1.00 - - 4.00 - -
- 5.00 16 ICAR Res. Comp. 21.47 - - - - 14.47 - 7.00 - 21.47

NEH Region, Barapani Total 293.00 170.00 6.07 26.75 4.68 6.50 70.00 - 7.00 2.00 293.00

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