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Research Article

# Production of Mushroom in Large Scale in the Chhattisgarh Region

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## ABSTRACT

The diversity of climatic condition in Chhattisgarh region and its vegetation made it a natural habitat for a number of mushrooms. Applications and market for mushrooms is growing rapidly in India because of their great nutrition values, subtle flavour and special taste. Many exotic food preparations like soup, vegetables, pickles etc. are made from them. They are also used for garnishing, to prepare many varieties of gravy and also as stuffing several food preparations. The average mushroom production in India (120,000 tonnes) remained considerably low compared to other countries and contributing only 3% of the total world production. At present only 0.03% of total agricultural residues are utilized for mushroom cultivation. If we utilize 1% of these residues for mushroom production, we can than achieve 30 million tons of mushrooms, which will be almost equivalent to current global production. Moreover, traditional methods are employed for the cultivation which is prone to many diseases and pests resulting in poor yields. Hence in this work, workers produce mushroom in the laboratory with whatever resources available to calculate the yield.

**Keywords:** Mushroom; Agricultural waste; Production; Fruiting body

## INTRODUCTION

The diverse climatic condition in Chhattisgarh region and its vegetation made a large number of mushrooms occur naturally in forests, mainly after rains and many of them are being used by tribal and other naturalists for food and medicine. Mushroom cultivation is a potential biotech processes for converting cellulosic waste into valuable food [1]. They supplement and complement the nutrient deficient cereals and are regarded as the highest producers of protein per unit time. Mushrooms have been recognized as food item by Food and Agricultural Organization. Mushrooms are contributing to ameliorate the protein malnutrition of the countries which largely depending on cereals, but awareness in common people about the mushroom consumption has not been popularized so far technology to pace with the food production for ever increasing population. Mushrooms are very popular in most of the developed countries like India. Many exotic food preparations like soup, vegetables pickles etc. are made from them. There are several reasons for such a low production of mushrooms which include, lack of awareness about mushrooms, low bio-conversion of agricultural residues to mushrooms, unavailability of high yielding strains suitable for Indian climatic conditions, traditional compost production techniques and mushroom portfolio without much diversification suiting different agro-climatic conditions. But mushrooms are still considered as up-market product and their consumption is limited to urban and semi urban areas. Fresh mushrooms have very limited self-life but processed and canned mushrooms have fairly long self-life and can be sold even at far off places. The produced mushroom is sold even in departmental stores, supermarket etc [2-5].

## METHODOLOGY

### Origin

Agriculture is the livelihood of majority of the rural population of Chhattisgarh. High labour-land ratio and alarming rate of population growth may pose a threat to our food security in the very near future. Augmentation of agricultural production through expansion, training and use of improved seeds, fertilizers, agricultural kits, etc has taken up in the state through implementation of State Plan Schemes, but rural transformation cannot be achieved without development of farmer's capability and resource mobilization for agriculture. Still a large proportion of Chhattisgarh farmers continue to be poor with low agricultural productivity. Exposition of different information and adoption of new technology are assumed to develop farmer's capability. It is important to disseminate information about new technologies so that the farmer can able to make use of the latest agricultural developments [6-8]. There exists a gap between research findings and the needs of the farmers. Cultivation of edible mushrooms is one of the most economically viable processes for the bioconversion of ligno-cellulosic wastes. Mushroom cultivation is simple, low

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costing, labour intensive and suitable for rural areas which can provide employment in both the semi-urban and rural areas. Mushroom cultivation will improve the socio-economic condition of farmers, families and solve employment problems of both literate and illiterate, especially women. It can also be a good tool for rural development. It was observed that if proper training is given to the village workers by arranging appropriate training, the gained knowledge and skill can be passed to their fellow farmers, which will give momentum to the development of agriculture [9].

## Contribution

Ample species of wild edible and medicinal mushrooms occur in all the biodiversity rich regions of Chhattisgarh during the rainy season. Chhattisgarh being the top in mega diversity has numerous mushroom species and their ethno mycological importance Though India has rich macro fungal biodiversity, most traditional knowledge about mushrooms come from the far East countries like China, Japan, Korea, Russia where mushrooms like *Ganoderma*, *Lentinus, Grifola* and others were collected and used since time immemorial. Mushroom scan be produced as a source of agriculture by Indians but for technology to be successful, it is important that it should serve a useful purpose to the end user [10-12]. Training is one of the planned processes that direct learning towards achieving specific outcomes, leading to achieve performance objectives. Empowerment in the context of women's development is a way of defining, challenging and overcoming barriers in a woman's life through which she increases the ability to shape her life and environment. It is an active, multidimensional process which should enable women to realize their full identity and power in all spheres of life [13]. In addition to their role in agricultural production, women are gainfully employed in agro-based allied activities like fruit preservation, post-harvest technology, value added food products, etc. edible and non-edible mushrooms was used for the biosynthesis of nanoparticles. However, in chemical methods the toxic substances accumulate in the processes which are harmful and non-friendly to the environment. Biological method is the most reliable method for the biosynthesis of Silver Nanoparticles (AgNPs) which are safe, cost-effective and eco-friendly. Cultivation of edible mushrooms is one of the most economically viable processes for the bioconversion of lingo-cellulosic wastes. The cultivation of this variety of mushroom is very simple and economical in rural areas where raw materials and facilities required are easily available [14].

## International status

The use of mushrooms as a food item is as old as our civilization. There were preferred only for their culinary characteristic while their nutritive value was recognized much later. The Chinese were the first to grow mushrooms for human consumption [15]. As early as in 600 AD, varieties of *Auricularia* were being cultivated. In 17 century, cultivation in France began with *Agaricus*. Mushroom production quickly spread to England and other European countries, reaching the United States by the end of the 19 century. In the last 25 years, worldwide mushroom production has increased over 300%, reaching approximately 2,961,493 tons in 2002. China has become the top-producing nation for all edible mushrooms of the world's supply. Industry expansion, in both output and diversity, is largely due to improvements in cultivation technologies and the expansion of market demand [16]. In China the majority of cultivation is done outdoors, while in the US most cultivation is indoors. Commercial product ion techniques for this edible basidiomycete are well developed and reported crude protein content, on dry weight basis, as 15.4% and 23.9% in *P.cystidiosus* and *P.ostreatus* respectively. They contain about 60% carbohydrates (dry weight), within the ranges for other edible mushrooms. The efficiency of mushroom species in producing food protein in the form of biomass or fruiting bodies from different wastes lies in their ability to degrade waste *via* secretion of a variety of hydrolyzing and oxidizing enzymes. This has attracted research attention in the field of mushroom cultivation and waste remediation. Edible mushrooms are highly nutritious compared to eggs, milk and meat. Mushroom can produce extracellular peroxidases, ligninase (lignin peroxidase, manganese dependent peroxidase and lactase), cellulases, pectinases, xylanases and oxidases. Recently, it was reported that mushroom species are able to degrade polymers such as plastics. Recently, many papers have published which reported that mushroom not only able to degrade pollutants but also able to reduce the toxicity or mutagenicity [17]. Several researchers have proved the antimutagenic and antigenotoxic power of mushroom and revealed that the highest number of primordia and fruiting bodies of Oyster mushroom was found in sterilized paddy straw. Maniruzzaman in his study found that substrate rice was the best for spawn production of Oyster mushroom. A profitable mushroom cultivation on large scale also requires close attention, experience and skill. To make Oyster mushroom cultivation more profitable and popular, different types of agro wastes, crop residues and by-products can be used with cylindrical block system, which has already been proven economically viable rather than conventional polybag method [18].

## National status

Out of 1.5 million fungi around the globe, only 50% are characterized until now and one third of total fungal diversity of the globe exists in India. Mushrooms comprise largely the group of fleshy fungi, which include bracket fungi, fairy clubs, toadstools, puffballs, stinkhorns, earthstars, bird's nest fungi and jelly fungi [19]. Generally they live as saprophytes however some are serious agents of wood decay. All types of mushrooms are important in decomposition processes, because of their ability to degrade cellulose and other plant polymers. Besides they serve as natures trash burners and soil replenishes and thus help in rejuvenating the ecosystem. Ample species of wild edible and medicinal mushrooms occur in all the biodiversity rich regions during the rainy season. India being the top ten mega diversity has innumerable mushroom species and their ethno mycological importance. The wood of living or dead trees, or the leaf litter or the soil produces mushroom through the branching mycelial infiltration. Some mushrooms are found growing in association with trees of a particular family or genus. Mushrooms produced from wide variety of habitats including different soil types and places where self-heating of plant materials results in high temperature [20]. These include compost, wood chip piles shavings, plant straw, nesting materials of birds and animals, municipal refuge, stored grains and dung of animals. They may occupy these habitats as either resting propagules or as active mycelia. Cultivated species of *in vitro* mushroom can be used for the production of silver nanoparticles. The produced Nano particles can be characterized by using different technique. In India, food value regarding information of mushroom was provided by many workers. Sharma and co-workers found that woman, landless families and other cultivars are getting part time employment in winter season [21].

# RESULTS AND DISCUSSION

Out of 1.5 million fungi around the globe, only 50% are characterized until now and one third of total fungal diversity of

the globe exists in India [22]. Mushrooms comprise largely the group of fleshy fungi, which include bracket fungi, fairy clubs, toadstools; the use of mushrooms a food item is as old as our civilization. Cultivated species of *in vitro* mushroom can be used for the production of silver nanoparticles. The produced Nano particles can be characterized by using different technique. The efficiency of mushroom species in producing food protein in the form of biomass or fruiting bodies from different wastes lies in their ability to degrade waste *via* secretion of a variety of hydrolysing and oxidizing enzymes [23-26].

Recently, many papers have published which reported that mushroom not only able to degrade pollutants but also able to reduce the toxicity or mutagenicity. Several researchers have proved the antimutagenic and antigenotoxic power of mushroom in their experiment revealed that the highest number of primordial and fruiting bodies of Oyster mushroom was found in sterilized paddy straw.

Time elapsed for mycelial running, pin head formation and maturity of fruiting body results on the overall time required for mycelial running, pin-head formation (primordium initiation), and maturity of fruiting bodies are illustrated in Figure 1.
Mycelial running is an extension and colonization of fungal hyphae throughout the substrate.

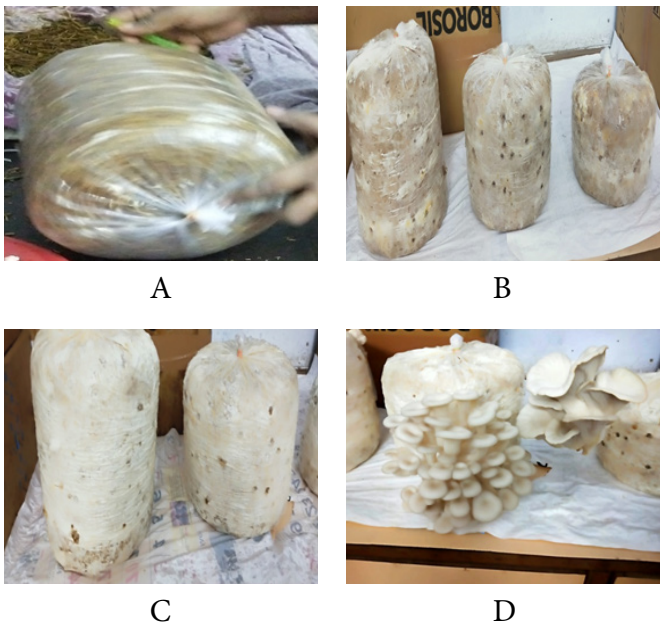


**Figure 1:** Design of cropland sites along with preciptation gradiens from east to west in Jilin.

## CONCLUSION

Mushroom cultivation is one of the efficient ways by which residues can be recycled. Mushroom grown on different substrates are nutritious with high protein, fibre and low fat. It may also offer economic incentives for agribusiness to examine these residues as valuable resources and develop new enterprises to use them to produce nutritious mushroom products. Therefore, the mushroom cultivation may become one of the most profitable agribusiness that could produce food products from different substrates and help to dispose them in an environment friendly manner.

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