

Mushroom-challenges and opportunities in 21st century

SURJYA KANTA BEURA



J. Mycopathol, Res, 55(2) : 129-133, 2017;
ISSN 0971-3719
© Indian Mycological Society,
Department of Botany,
University of Calcutta,
Kolkata 700 019, India

This article is protected by copyright and all other rights under the jurisdiction of the Indian Mycological Society. The copy is provided to the author(s) for internal non-commercial research and educational purposes.

Mushroom-challenges and opportunities in 21st century

SURJYA KANTA BEURA*

Department of Plant Pathology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar 751003, Odisha

Received : 19.04.2017

Accepted : 19.04.2017

Published : 31.07.2017

Various aspects of mushroom like benefits of mushroom cultivation, mushroom as a functional food, its national and state scenario and four types of edible mushrooms e.g. straw mushroom, oyster mushroom, milky mushroom, button mushroom and economics of mushroom cultivation, mushroom cultivation and rural development, women empowerment through mushroom cultivation, use of spent mushroom substrate (SMS), mushroom spawn (seed) production, post-harvest care, processing and preservation and training facilities on mushroom production have been discussed in detail.

Key words: mushroom, food, cultivation, women empowerment, training

INTRODUCTION

India is a country of about 1200 million human population; seventy per cent of human population lives in about 7 million villages and is mainly engaged in agricultural and allied activities. Government of India is giving lot of emphasis on agro-based industries due to advantage of rural employment generation and gainful utilization of natural and farm resources. Large quantities of renewable agro-residues are generated every year as a result of extensive agricultural practices. Their direct use as food is non-existent. Mushrooms have the ability to transform nutritionally useless waste into highly acceptable nutritious food. In addition, the cultivation of mushrooms is labour intensive and provides employment opportunities to the weaker section of the society in our country. Recently, mushroom cultivation has gained popularity in India. The varied climatic conditions in different parts of the country help in growing mushroom without artificial temperature and humidity control. At present four edible mushroom varieties i.e., white

button mushroom, oyster mushroom, straw mushroom and milk mushroom are commercially cultivated and have been standardized suited to the local climate.

Benefits of mushroom cultivation

- Mushrooms have got unique flavor and exotic taste. Hence, they were considered to be a luxury food, especially among the rich, many years ago.
- The popularity of mushrooms is due not only to their culinary value but also to their potential as a source of protein and other vital nutrients that can enrich human diets especially in developing countries where fish and meat are expensive.
- Mushrooms are pro-biotic. They keep our body healthy and ward-off diseases by strengthening the immune system.
- Mushroom cultivation is easy and simple with a short crop cycle.
- Mushroom cultivation is labour intensive and offer vast employment opportunities in rural areas.

14th Professor S. R. Bose Memorial Lecture delivered by the author on 24th March, 2017 organized by Indian Mycological Society at the University of Calcutta

*Email: jayasurya_bbsr@yahoo.co.in

- Mushrooms are grown, not directly on soil, but on organic substrates, either raw or composted. Hence, it is a good enterprise for small farmers and landless labourers.
- Mushroom cultivation is a good enterprise for farm ladies. About 80 % of the work force engaged in mushroom cultivation worldwide mainly of ladies.
- Farm wastes are recycled to produce additional food in form of mushrooms. In the process, environmental pollution is minimized.
- The spent mushroom substrate (SMS) can be utilized for manuring and fertilizing the horticultural crops.
- Water productivity can be scaled-up through mushroom cultivation.
- Mushrooms do not compete with other crops for planting space.
- Mushrooms have huge potential for export; hence they are a potential foreign exchange earner.

Mushroom: a functional food

It is well recognized that mushroom contains all essential components of a balanced food. In fact, being rich in highly digestible lysine rich protein, vitamins and minerals, mushrooms lacks fats and is low in carbohydrate (low calorie food). They are rich in folic acid, phosphorus, potassium, calcium, copper, iron and vitamin-B complex. They are excellent sources of thiamine, riboflavin, niacin, pantothenic acid, biotin, folic acid and vitamin B-12. Mushrooms are also reported to have high medicinal attributes. A large number of mushrooms contain biologically active polysaccharide protein complex having anti-tumor, immune-modulating and anti-oxidant properties. The interesting fact is that the K: Na ratio is very high and it is suitable for people who suffer from hypertension. Besides its nutritional and medicinal values, mushrooms are relished as a source of food due to the pleasant aroma, taste and its fleshy nature.

National and state scenario

Mushroom production in the country started in the 70s but growth rate, both in terms of productivity as well as production has been phenomenal.

Mushroom production shot up from mere 5,000 tonnes in 1990 to over 1, 00,000 tonnes in 2010. At present the total mushroom production of the country stands at 1,20,000 tonnes per annum. Commercially grown species are button and oyster mushrooms followed by other tropical mushrooms like straw mushroom, milk mushroom etc. Around 60 per cent of the button mushroom produced in the country is shared by few environmentally controlled units located across the country and the rest is grown seasonally in the temperate regions of the country. Oyster, straw and milk mushrooms are popularly grown seasonally in the states of Odisha, Maharashtra, Tamil Nadu, Kerala, Andhra Pradesh, Karnataka and North-Eastern region of the country. However, the button mushroom is about 80 per cent of the total production of mushrooms in the country.

Commercial production of mushroom started in Odisha in the year 1991-92 with the establishment of Centre of Tropical Mushroom Research and Training, Orissa University of Agriculture and Technology, Bhubaneswar. At present the total mushroom production of the state has reached an all time high of 15,986 tonnes/annum contributing to over 10 per cent of the country's production.

Straw mushroom

Straw mushroom or the Chinese mushroom or tropical mushroom is considered as one of the easiest mushrooms to cultivate. It is the sixth largest mushroom of the world in terms of production. The flavor is excellent and the cropping cycle is short (21 days). However, this variety has low productivity (15 per cent) and poor keeping quality (12 hours). Straw mushroom has been very popular among the farmers of Odisha. This is the only state where straw mushroom is grown commercially 10 months a year (February-November) involving poor farmers. The cultivation has spread rampantly as a cottage industry involving spawn (seed) production in low cost units in villages and outdoor cultivation under the coconut plantations. The rice farmers of the coastal region in particular have demonstrated a practical way to transform the agro-wastes directly into a highly acceptable, nutritious and delicious food for the people. Odisha produces 9550 tonnes of straw mushroom per annum contributing to 60 per cent of the total mushroom of the state.

Oyster mushroom

Oyster mushroom has species suitable for both temperate and sub-tropical regions. It is the third largest cultivated mushroom of the world. In Odisha, cultivation is limited to winter months (No-



Straw mushroom

vember-February) and the production stands at 6310 tonnes/annum contributing to 39 per cent of total mushroom production of the state. Grey and blue oyster mushrooms are the ruling species of

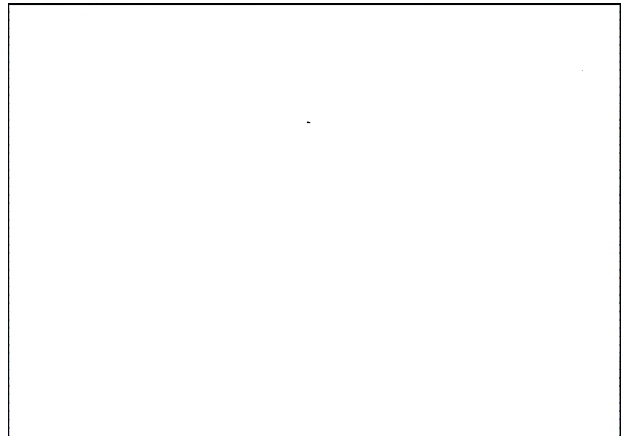


Oyster mushroom

the state. However, for small scale semi-urban and urban units pink oyster mushroom is gaining popularity owing to its attractive colour along with good taste and flavor. The productivity of oyster mushroom is very high (100 per cent) and the keeping quality is better (24 hours) than straw mushroom. Production cost is low with little longer cropping cycle (45 days). Further, it is suitable for post-harvest processing.

Milky mushroom

Milky mushroom is the indigenous tropical mushroom of the country. The mushroom is attractive white with excellent keeping quality (3-4 days). The productivity is also very high (80-100 per cent). However, this mushroom is not being grown commercially in Odisha probably because the cropping



Milky mushroom



time for both straw and milky mushrooms is same and the consumer demand for straw mushroom is more.

Button mushroom

The button mushroom is most popular variety of mushroom in the country. At global level it ranks first in terms of production. Punjab is the leading state contributing to 60 per cent of total production of the country. Being a temperate mushroom, production can be taken-up year round in controlled

environment or seasonally during winter months. Odisha has just entered into commercial production with 126 tonnes/annum and it is likely to grow further in near future.

Economics of mushroom cultivation

Mushroom cultivation is a profitable enterprise. The cost involved in raising one bed of straw mushroom of 1.5' x 1.5' x 1.5' size comes to Rs.50/- with a production of one kilogram mushroom within a crop cycle of 21 days. The net return is Rs.50/- per bed assuming the market rate at Rs.100/- per kilogram likewise the cost involved in raising one bag of oyster mushroom is Rs.30/- with a production of 1.5 kilogram mushroom within a crop cycle of 45 days. The net return is Rs.30/- per bag assuming the market rate at Rs.40/- per kilogram. A model small mushroom production unit (300 sq. ft.) with the investment of Rs.25,000/- accommodating 120 beds of straw mushroom per month during summer and rainy season and 225 bags of oyster mushroom per two months during winter season gives an estimated net income of Rs. 6,000/- per month.

Mushroom cultivation and rural development

Agriculture has been at the focal point of rural life for centuries. The performance of agriculture is much more important than other sectors for inclusive growth and for reducing poverty which determines the food and nutrition security of the population of the country. Mushroom cultivation, being a low-cost enterprise with farm-women as the preferred target groups can easily spread across the social structure resulting in a good income with upliftment of their economic standards. In this context, mushroom has got an edge over other vegetable crops because of its short duration, simple and easy crop raising procedure with very handsome return. Our effort has been to sensitize rural folk on the benefits of mushroom over years and this has yielding good results. In Odisha, a number of farm women have done tremendously well in this sector and earned recognition at national/international levels. If this trend continues, the rural economy of our state would find a new dawn soon and the miseries in the farm sector would be minimized.

Women empowerment through mushroom cultivation

Mushroom has been appropriately said as a

women-friendly crop. The crop is grown in-door with little space without fertile soils and minimum inputs. Mushroom, being a sensitive crop, requires lot of patience during nourishment. Further, harvest and post harvest operations are extremely delicate in nature. Mushroom value addition (drying, pickling, canning etc.) would be another women-friendly job. The Mushroom Research Centre at Orissa University of Agriculture and Technology, Bhubaneswar is trying hard to bring as many farm women as possible into the mushroom fold for attaining the required degree of women empowerment.

Use of Spent Mushroom Substrate (SMS)

Mushrooms are known for their delicacy and nutritional values but the substrate released after mushroom crop harvest, better known as "Spent Mushroom Substrate" is also the subject of great importance. It possesses all essential attributes of organic manure for majority of the vegetables and the field crops. The other utilities of spent mushroom substrate, like in vermicomposting, bioremediation and as organic-mineral fertilizer are boon to the country's farming system. We would like to encourage the farmers to start using of spent mushroom substrate for integrated farming and to obtain better revenue, out of the agro-waste available at their door step and to make contribution towards a clean environment.

Mushroom spawn (seed) production

Use of quality spawn has a direct influence on mushroom productivity. At present Odisha is having the highest number of spawn production units (255) in the country. The entrepreneurs are often advised to produce quality spawn during monitoring and their problems are addressed. In spite of the phenomenal growth of the mushroom industry in the state, constraints do exist in the areas of production; spawn making and processing that need addressal for the benefit of the growers.

Post-harvest care, processing and preservation

Mushrooms are living entities and are governed by a number of factors that lead to post-harvest spoilage and losses. Mushrooms contain about 90 % moisture are highly perishable and cannot be stored for more than 24 hours at the ambient temperature. Once the fruiting body matures and harvested, degradation process starts and it be-

comes un-consumable after sometime if not properly handled. Sound post-harvest practices have since been developed to extend the shelf life of mushrooms. Processing technology including dehydration, pickling and canning are in practice in India. However, development and introduction of new products with wider acceptability and comparatively at low price will further increase the demand and consumption of mushroom products.

Training facilities on mushroom production

The Centre of Tropical Mushroom Research and Training operating under the aegis of Orissa University of Agriculture and Technology, Bhubaneswar is imparting two training programmes regularly on 'Mushroom cultivation and processing' and 'Mushroom spawn production' for five and ten days duration respectively. The interested persons are required to contact the Officer-in-Charge, Centre of Tropical Mushroom Research and Training, Department of Plant Pathology, Orissa University of Agriculture and Technology, Bhubaneswar 751003 for the purpose. They can also send their requests to ctmrt92@gmail.com/aicrpbbsr@gmail.com. Besides, the Krishi Vigyan Kendras located in each and every district of Odisha are also imparting training on 'Mushroom

cultivation and processing.

CONCLUSION

Mushrooms are truly health foods and promising nutraceuticals. Odisha has tremendous potential for mushroom production owing to the availability of agricultural wastes in abundance, manpower and suitable climate. Further, there is increasing demand for quality products both in domestic and export markets. Mushroom being a women friendly crop, could be facilitated well with a strong 'Mission Shakti' existing in the state. To be successful in both domestic and export market, it is essential to produce quality fresh mushrooms and processed products devoid of pesticide residues at competitive rates. It is also important to commercially utilize the spent mushroom substrate left after cultivation for making manure or vermin-compost for additional income and total recycling of agro-wastes. It is worthwhile to mention here that few of our entrepreneurs have got recognition at the national/international levels owing to their excellence in mushroom production and allied activities. With the untiring efforts of all concerned, possibly Odisha mushroom industry will see a new dawn in the near future.