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Centre for Environmental Studies (CES)
Dept. of Forest & Environment, Govt. of Odisha



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MUSHROOM CULTIVATION IN ODISHA: CHALLENGES AND OPPORTUNITIES



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From the Director's Desk...



Odisha ENVIS Centre is always trying to bring out environmental issues those are most vital in the State in newsletters. We have covered many issues of environment of the State in our previous publications. The objective is to disseminate information to the users and bring awareness among the society and policy makers.

This time we are covering an issue of **Mushroom Cultivation in Odisha: Challenges and Opportunities**. I hope the information contained in the issue will be useful to users.

Dr. Sailabala Padhi, M.Phil, Ph.D., D.Sc.
Director, CES-cum- ENVIS Co-ordinator

Mushroom Cultivation in Odisha: Challenges and Opportunities

Agriculture continues to be the main strength of Indian economy. With the variety of agricultural crops grown today, the country has achieved food security by producing about 260 million tonnes of food grains. However, the struggle to achieve nutritional security is still on. In future, the ever increasing population, depleting agricultural land, climate changes, water shortage and need for quality food products at competitive rates are going to be the vital issues. To meet these challenges and to provide food and nutritional security to our people, it is imperative to diversify the agricultural activities in areas like horticulture. Mushrooms are one such component that not only uses vertical space but also help in addressing the issues of quality food, health and environmental sustainability. There is need to promote both mushroom production as well as consumption for meeting the changing needs of food items. Fortunately, mushroom trade has gained importance in recent years possibly for the global shift

towards vegetarian food and recognition of mushroom as a functional food. Mushroom cultivation offers an added advantage to recycle agro-waste as carbon pool into good quality protein, much of which otherwise is wasted in the field. This hi-tech horticulture venture has a promising scope to meet the food shortages without undue pressure on land.

Mushroom farming today is being practiced in more than 100 countries and the production is increasing at an annual rate of 6-7 per cent. Present world production of mushrooms is around 3.5 million tonnes as per FAO statistics. China alone is reported to grow more than 20 different types of mushroom at commercial scale and mushroom cultivation has become China's sixth largest industry. In India, mushroom production shot-up from mere 5000 tonnes in 1990 to over 1,20,000 tonnes in 2013. Today commercially grown species are button and oyster mushrooms,

followed by other tropical mushrooms like paddy straw mushroom, milky mushroom, etc. However, the production of white button mushroom is about 70 per cent of the total production of mushrooms in the country.

The research on edible mushroom in Odisha made its humble beginning in the Department of Plant Pathology, College of Agriculture, OUAT, Bhubaneswar in 1972 with a view to generate profitable and sustainable production technology. Having achieved success in developing mushroom cultivation and spawn production technology, research efforts were further strengthened and transfer of technology was initiated with the establishment of 'Centre of Tropical Mushroom Research and Training' in the University with the financial support of Government of Odisha in 1991-92. This research organization paved the way for initiation of commercial mushroom cultivation in the state within two years of its establishment.

In depth study on production of spawn and mushroom cultivation particularly paddy straw mushroom, oyster mushroom, milky mushroom and button mushroom were undertaken. Farmers training programmes and demonstrations on spawn production and mushroom cultivation were then extended to all over the state. Technical assistance was provided for development of individual/group/private sectors in establishing spawn production units and mushroom production farms. At present, the total mushroom production of the state stands at 12,334 tonnes/annum contributing to over 10 per cent of the country's production.

Paddy straw mushroom (*Volvariella volvacea*), commonly known as the straw mushroom or the Chinese mushroom is considered as one of the easiest mushrooms to cultivate (Fig.1).



Fig. 1. Paddy straw mushroom

It is the 6th 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 biological efficiency (15 per cent) and poor keeping quality (12 hours). The production of straw mushroom is very popular in Odisha. Odisha is the only state where straw mushroom is grown commercially for 10 months a year (February-November) involving poor farmers. The cultivation has spread rampantly as a cottage industry involving spawn production in low cost units in villages and outdoor cultivation under the plantations. The rice farmers of the coastal agro-ecological situation in particular have demonstrated a practical way to transform the ligno-cellulosic wastes directly into a highly acceptable, nutritious and

delicious food for the people. Odisha produces 8129 tonnes of straw mushroom per annum contributing to 66 per cent of the total mushroom production of the state.

Oyster mushroom (*Pleurotus spp.*) has species suitable for both temperate and sub-tropical regions (Fig.2).



Fig. 2. Oyster mushroom

It is the 3rd largest cultivated mushroom of the world. The production figure for the country is 15,000 tonnes/annum. In Odisha, cultivation is restricted to winter months (November-February) and the production stands at 4095 tonnes/annum contributing to 33 per cent of total mushroom production of the state. Its biological efficiency is very high (100 per cent) and the shelf life 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. However, the consumer demand is limited in the state.

Milky mushroom (*Calocybe indica*) is indigenous tropical mushroom of the country (Fig. 3). However, the commercial cultivation is restricted to south Indian states only. The mushroom is attractive white with excellent keeping quality (3-4 days). Its biological efficiency is also very high (about 100 per cent). The mushroom is not being grown commercially in Odisha probably because the cropping time for both straw and milky mushrooms is same.



Fig. 3. Milky mushroom

The button mushroom (*Agaricus bisporus*) is most popular variety of the country (Fig. 4). At global level it ranks first in terms of production. Punjab is the leading state contributing to 60 per cent of the 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 started the commercial production with 110 tonnes/annum at present and it is likely to grow further in future.



Fig. 4. White button mushroom

Mushroom cultivation is a profitable enterprise. The cost for raising one bed of straw mushroom 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 for 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/- having 90 beds of paddy straw mushroom per month during summer and rainy season and 225 bags of oyster mushroom per 1.5 month during winter season, gives an estimated net income of Rs.4,500/- per month.

Odisha leads the country in terms of production of straw and oyster mushrooms. Indoor cultivation of button mushroom has been initiated successfully in the recent past and it is expected to grow further. Moreover, the cultivation method of the low temperature

tolerant variety of straw mushroom (*Volvariella bombycina*) for winter season it being worked out in the research centre (Fig. 5). Possible introduction of the shiitake mushroom (*Lentinus edodes*) in the state is being explored (Fig. 6). Cultivation of straw mushroom in controlled environment with higher biological efficiency (30-45 per cent)



Fig. 5. A new species of paddy straw mushroom (*Volvariella bombycina*)



Fig. 6. Shiitake mushroom

has already been initiated in the state with profound success (Fig. 7). Preservation of straw mushroom through canning has been done successfully in Odisha for the first time in the country. The state is having the highest number (207) of spawn production units in the country. In spite of the phenomenal growth



Fig. 7. Indoor cultivation of paddy straw mushroom

rate of the mushroom industry in the state, constraints do exist, that need addressal for the benefit of growers.

Mushroom crop needs to be recognized as a horticultural crop in the state. An appropriate mechanism should be developed for effective monitoring of the spawn production units for ensuring spawn quality, as production gets deteriorated owing to use of spawn bottles having inferior quality. Like other horticultural commodities, mushroom marketing ought to be streamlined in order to avoid distress sale. Above all, establishment of processing units with FPO license requires to be encouraged in order to facilitate the export potential of mushroom products.

The Centre of Tropical Mushroom Research and Training alongwith All India Coordinated Research Project on Mushroom are making concerted efforts in pushing Odisha ahead of other states in mushroom production. This would probably be the appropriate way to search for alternative nutritional sources for our huge population and help achieve non-green revolution.

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 in domestic and export market. Mushroom being a women friendly crop, could be facilitated well with a strong Mission Sakti existing in the state (Fig. 8).



Fig.8. Women empowerment through mushroom cultivation

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 and international levels owing to their excellent endeavor in mushroom production. With the untiring efforts of all concerned, possibly Odisha mushroom industry will see a new dawn in the near future.

A REPORT ON THE CELEBRATION OF "WORLD ENVIRONMENT DAY" on 5th June 2015

The WED theme selected by UNEP for the year 2015 was "Seven Billion Dreams. One Planet. Consume with Care".

Centre for Environmental Studies (CES) organized the World Environment Day Function on 5th June 2015 at Rabindra Mandap, Bhubaneswar. Also CES organized an eco-model exhibition on the theme of WED-2015. 64 models from eco-clubs of different districts in exhibited by students.



Exhibition inaugurated by Shri U. N. Behera, IAS, Additional Chief Secretary, Forest & Env. Deptt.

The students from various eco-clubs participated in state level model exhibition in Rabindra Mandap at 8.00 am on 5th June 2015. After valuation 1st prize winning model awarded with cash prize of Rs.3,000/-, 2nd model awarded with cash prize of Rs.2,000/- and 3rd model awarded with cash prize of Rs.1,000/-. Besides, all participants received Rs.1,000/- as model fee. The best three models



Shri Bikram Keshari Arukha, Hon'ble Minister, Forest & Environment, Odisha visiting the exhibition

received certificates from Shri Bikram Keshari Arukha, Hon'ble Forest & Environment Minister of Odisha. Dr. Sudarsan Panda, IFS, Director, Nandankanan Zoological Park, Mr. S.C. Paul, IFS, Chief Executive, RPRC, Mr. Rajiv Kumar, IFS, Member Secretary, OSPCCB were the judges for model exhibition.

Chief Guest Shri Bikram keshari Arukha, Hon'ble Minister, Forest & Environment, Odisha addressed the audience. Shri Upendra Nath Behera, IAS, Additional Chief Secretary, Forest & Environment Department, Shri Sashi Bhusan Samant, IFS, Director, Environment-cum-Special Secretary and Dr. Sailabala Padhi, Director, Centre for Environmental Studies also addressed the audience relating to the theme and shared about the activities being undertaken by the Government for combating climate change.

Hon'ble Forest & Environment Minister of Odisha distributed "Prakruti Mitra" prizes to 238 organisations. Dignitaries from all



Shri Bikram Keshari Arukha, Hon'ble Minister, Forest & Environment, Odisha releasing the Newsletter

Departments, all Forest Officers, Retired Officers, all staff of Environment Department, State Pollution Control Board, Chilika Development Authority, Regional Plant Resource Centre, students and general public attended this function.

Celebration of World Earth Day - 2015

Centre for Environmental Studies (CES), Bhubaneswar organized a meeting at Munda Muhan High School, Baranga, Cuttack on the occasion of World Earth Day on 22nd April 2015 to spread awareness among the people through environmental protection. Dr. Sailabala Padhi, Director, Centre for Environmental Studies inaugurated this function planting a tree inside the School campus. She told that “we all should take care of our environment properly”.

Sri Pravat Mohan Dash, Programme Officer; Sri Smruti Ranjan Pattnaik, Headmaster; Sri Pramod Kumar Dash, Teacher-in-charge of Eco-club; all teachers of this school and staff of the CES were present.



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