

NewsLetter

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MEGHA FOOD COOPERATIVE SOCIETY

Inside THE ISSUE

SPECIALITY MUSHROOMS

- Mushroom Life Cycle
- Common terms in Mushroom Farming
- History of Mushroom Cultivation in India
- Farmer Training & Exposure Visit
- Mushroom's – In News
- Progress in Pictures
- Upcoming Issue

For a Healthier Future –
Where Passion meets Taste

Science of Mushroom & Sustainable Development Goals

Addressing unemployment and malnutrition in tribal region of North Garo Hills, Meghalaya

PROJECT FUNDED UNDER SFURTI SCHEME OF MINISTRY OF MICRO SMALL & MEDIUM ENTREPRISES (MSME), GOVERNMENT OF INDIA



Megha Food – The CFC – Progress so far (In Pictures)

Oyster mushroom cultivation in Meghalaya- building the foundation step-by-step



Speciality Mushrooms

Cultivating the UNUSUAL - Speciality Mushrooms – Possibilities Unlimited. Transforming a small-scale agricultural switch into a large-scale Opportunity



Mushroom Cultivations – Booming in India

OYSTER MUSHROOM – The next high value agriculture crop transforming the lives of small and marginal farmers.

The term "**SPECIALTY**" refers to any mushroom except White button mushroom commonly found in supermarkets

SPECIALTY MUSHROOMS



In North America, button, crimini, and portobello (*Agaricus bisporus*) are the most commonly cultivated mushrooms, making up 92% of mushroom production (USDA-NASS, 2018) while in India, button is the most commonly cultivated mushroom, making up 95% of the mushroom production (KSoMS, 2018). All other species of "edible" mushrooms are considered specialty mushrooms.

SPECIALTY MUSHROOMS INCLUDE SHIITAKE, OYSTER, ENOKI, WINE CAP, MAITAKE, MILKY WHITE, RICE STRAW AND POMPOM AMONG MANY OTHERS

THE HISTORY OF SPECIALTY MUSHROOM – PAST

Still a young Industry, Specialty Mushroom cultivation started in USA by Ostrom Farm in Washington State with in 1980's with Shiitake and Oyster production on log and Enoki in bottle. Very limited information was then available. Psilocybin: The Magic Mushroom Grower's Guide, published in 1975 and 8 years later The Mushroom Cultivator opened the door for many small scale specialty mushroom cultivators in United States.

In India, First experiment to cultivate Paddy straw mushroom was done during 1939-45 and Oyster Mushroom in 1962. However, commercial production started much later.

THE PRESENT

As consumers seek out more foods that are healthy, nutritious, and medicinal, demand for specialised mushrooms is constantly increasing. As per the study conducted by Lucier et al, 2003. annual mushroom consumption was higher in suburban (1.95 Kg per capita) than metropolitan (1.49 Kg per capita) locations and highest among Asian (2.76 kg per capita) and non-Hispanic white (1.36 kgs per capita) groups.

In India, presently the per capita consumption is about 90 gms only when compared to USA (1.49 Kgs per capita) and China (1.16 kgs per capita) as per the study conducted by Directorate of Mushroom Research ICAR, Solan (India) 2011.

THE FUTURE

Specialty mushroom growing is a skill that may be honed and expanded over time to accomplish a variety of tasks. The following are some of the fields that are beginning to incorporate specialist mushrooms and fungal growth:

- Supplements containing mushrooms
- Textiles made by myco
- Food additives made from fungi
- Psychology of Mycoremediation

These sectors are still in their early stages, and much work need to be done in order for them to mature into healthy industries.

MEGHA FOOD IS AN ATTEMPT TO BUILD A HEALTHY FUTURE



FROM THE EDITOR'S DESK

Dear Readers,

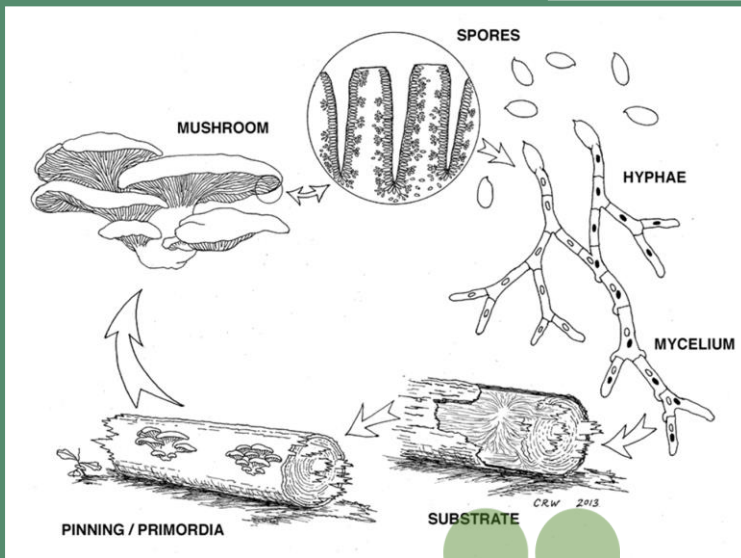
2021 ended on several high notes for Megha Food Cooperative Society and we hope to continue with the same efforts and zeal.

This year, we are pleased to launch a new section in our newsletter called "**The Knowledge Series**". This series will come on half-yearly basis covering significant data, vignettes, snippets, related to the Oyster Mushroom that will discuss and define solutions based on the ever-evolving perspective and dynamics of our cooperative society. We have new initiatives and collaborations in store, and are as much excited, as you are for the journey ahead! Once again, we are extremely grateful to all our readers for the support and encouragement in every step of our journey

With Thanks & Best Wishes

Editor in-Chief

MUSHROOM LIFE CYCLE



DID YOU KNOW ...

Fungi, has an estimated 1.5 - 5 million species. Only about 5% of these species have been named. Mushroom is a Fungi. Fungi's are classified by three unique factors:

- Cell walls contain Chitin (ie. fibrous substance);
- Mode of digestion is absorption;
- They are heterotrophic, (i.e they cannot produce their own food.)

Mushroom (a subset of this kingdom)- has around 140,000 species.

About 20,000 species have been identified,

Off those only 200 species have been cultivated, with only about 20 species reaching large scale cultivation around the world.

A LOT CAN BE DONE IN THE FIELD OF MUSHROOM TAXONOMY AND CULTIVATION



OYSTER MUSHROOM

A SPECIES FOR BEGINNERS

Oyster mushrooms (*Pleurotus* species) is an excellent choice for new mushroom growers as, it is easier to cultivate than many other species and may be grown on a modest scale with a low initial expenditure.

They will grow on a broad variety of high-cellulose waste materials but are most usually produced on sterile wheat or rice straw. Some of these materials simply require pasteurisation, which is less expensive than sterilisation.

Another benefit of producing oyster mushrooms is that a large portion of the substrate turns to fruiting bodies, boosting the potential profit. Oyster Mushroom can grow on any type of clean agricultural or wood waste (including hardwoods, paper, cereal straw, coffee grounds, wheat & rice straw, corn cobs and sugarcane bagasse).



These mushrooms cover a range of sizes, colors, and textures. Oyster mushrooms can come in brown, pink, yellow, blue, white or other colors. This allows the small scale grower to offer 4 or 5 different products while only growing oyster mushrooms. Most of the strains and species of this variety can be cultivated using the same systems.

MEGHA FOOD – OYSTER MUSHROOM CLUSTER

MUSHROOM FARMING FOR A REASON: MEGHA FOODS, supporting the inquisitiveness and hard work of its mushroom growers with newer practices, cultivation methods, technology support, value addition & market linkages by bringing in technologically advanced systems with support from MoMSME, GoI.

A PLATFORM BEING CREATED FOR BETTER & IMPROVED LIVELIHOODS

With technological support from:

- NIPRD, Guwahati (Farmer Training)
- Mushroom Development Foundation, Assam (LSP Training)
- Innotech Agropositkam, Guwahati (Vitamin D enhancement technology support)

FEW COMMONLY USED TERMS IN MUSHROOM FARMING*



AGARICUS BISPORUS: Common cultivated mushrooms, in a variety of lines.

AMMONIA: Necessary by-product of Phase I produced during the fermentation and decomposition processes. Should be converted to microbial protein and eliminated during Phase II composting. Free ammonia at the end of Phase II composting is toxic to the mushroom mycelium.

BIOLOGICAL EFFICIENCY (BE): One way to express the productivity of a substrate. BE = lbs of fresh weight of mushrooms/ lbs of dry weight of substrate at spawning time. The range of BE for a commercial farm varies between 60-120%.

BLENDED COMPOST: A mixture of wheat straw bedded horse manure and other materials such as hay, wheat straw, corncobs, cotton seed hulls, etc. in several formulations, i.e., 80% H.M., 20% hay and cobs, etc

BREWERS GRAIN: Grain hulls, residue from breweries, having a nitrogen content of 4.0 to 4.3%.

CARBON DIOXIDE (CO₂): A by-product of the microorganisms during fermentation in both Phase I and II. It is also a very important by-product of spawn run, casing and later in production.

CASING: The casing operation is the fourth step in mushroom farming and is a top-dressing placed directly on spawn- run compost from 14 to 21 days after the spawning operation.

COLONIZE: The process of the thread-like strands of growth, called mycelium, that develop in the compost after having grain spawn applied.

COMPOSTED SUBSTRATE (COMPOST): A mixture of organic and inorganic substances, managed specifically to produce nutrients (food) selectively, favorable to the growing of the common cultivated mushroom.

CROPPING, CROPPING CYCLE: The sixth step in mushroom farming begins 16-20 days following casing when the first mushrooms are harvested.

FIRST BREAK: The time when the first mushrooms of each crop are harvested, usually 16-20 days following casing.

HEPA FILTER: A filter used in the laboratory to produce a sterile stream of air to perform culture work within.

INOCULATING: The act of mixing/adding in the spawn/mushroom culture into the bulk substrate.

MOISTURE: In mushroom growing, refers to a certain amount of water diffused in the compost, casing layer, etc. Moisture is one of the most important, measurable elements to be monitored during the entire mushroom growing process.

NUTRIENTS: Those ingredients added at the beginning of Phase I composting that are directed at feeding the microbial population.

PINNING: The fifth step in mushroom farming and is initiated when rhizomorphs form in the casing and then emerge at the surface of the casing.

POULTRY MANURE: Phase I compost supplement used in two forms, i.e., mechanically dried & pulverized or raw, uncured.

RELATIVE HUMIDITY (RH): The ratio of the amount of water vapor actually present in the air to the greatest amount possible at the same temperature.

SPAWN: Rye, wheat, millet, or sorghum grain cooked with water and chalk, then sterilized. Mycelium is added and allowed to grow for 10-17 days.

STERILIZE: In mushroom farming, all equipment, such as utensils, knives, etc., that will come in contact with the mushroom or substrate after Phase II, must be sterilized to clean and free it from harmful pathogens.

THERMOPHILES: These are heat loving organisms that survive and multiply in temperatures up to 150°F (65.5°C).

VEGETATIVE: The growth of mycelium from spawning through to pinning. To cause fruiting (form mushroom initials), all vegetative growth must cease.

YIELD: The Kg of mushrooms harvested per square foot. Mushroom growers manage and make economic and cultural decisions based on variations yield.

* Source: Beyer, D.M., *Glossary of Commonly Used Terms for Mushroom Farming, Mushroom Science & Technology*, Department of Plant Pathology, Pennsylvania State University

HISTORY OF MUSHROOM FARMING IN INDIA*

The cultivation of edible mushrooms in India is relatively new, yet some methods of cultivation have been known for a long time. The following are significant historical developments in the cultivation of edible mushrooms:

1886: specimens of mushrooms were grown by N.W. Newton and exhibited at the annual show of Agriculture, Horticulture Society of India.

1896-97: Dr. B.C. Roy, Calcutta Medical College carried out chemical analysis of the local mushrooms prevalent in caves or mines.

1908: A thorough search of edible mushroom was initiated by Sir David Pain.

1921: Bose successfully cultured two agarics on a sterilized dung medium, details of which were published in the Indian Science Congress held at Nagpur during 1926.

1939-45: Experimental cultivation of paddy straw mushroom (*Volvariella*) was first undertaken by the Department of Agriculture, Madras.

1941: Padwick reported successful cultivation of *Agaricus bisporus* from various countries but without much success in India.

1943: Thomas et al. gave the details of cultivation of paddy straw mushroom (*V. diplasia*) in Madras.

1947: Asthana reported better yields of paddy straw mushroom by adding red powdered dal to the beds. It was suggested that April-June as the most suitable period for cultivating this mushroom in central Provinces and further carried out the chemical analysis also.

1961: H.P. state Govt. launched a scheme, "Development of mushroom cultivation in Himachal Pradesh" in collaboration with I.C.A.R. This was the first serious attempt on cultivation of *Agaricus bisporus* in the country.

1962: Bano et al. obtained increased yield of *Pleurotus* (Oyster Mushroom) on paddy straw.

1964: Experimental cultivation of Mushroom was started by CSIR and State Govt. at Srinagar in J&K.

1965: Dr. E.F.K. Mantel, F.A.O., Mushroom Expert, guided and assisted Department of Agriculture (for over 7 years) on construction of modern spawn laboratory and a fully air-conditioned mushroom house. Further research on evaluation of different strains and use of various agricultural wastes, organic manures and fertilizers for preparing synthetic compost were also undertaken during that period.

1974: Dr.W.A. Hayes, F.A.O., Mushroom Expert, guided on improving the method of compost preparation, pasteurization, and management of other parameters in the mushroom house. New compost formulations, casing materials and important parameters like nitrogen content in the compost, moisture in the casing mixture, air movements and maintenance of proper environmental factors were also standardized which raised the mushroom yields from 7 to 14 kg/m².

1977: Department of Horticulture (H.P.) with funding support (tune of INR 1.27 Cr) from UNDP designed & developed a Mushroom Development Project. Mr. James Tunney, technical advisor for the project supported in design, development & construction of bulk pasteurization chamber and made available readymade compost and casing material for small growers of H.P. Five-year project ended in 1982 and is being managed by Department of Horticulture (H.P) since then.

1982: National Centre for Mushroom Research and Training (NCMRT) was sanctioned by The Indian Council of Agricultural Research (ICAR) during VIth Five-Year Plan in 1982.

1983: All India Coordinated Project on Mushroom (AICRPM) was initiated during VIth Five-Year Plan in 1983, headquartered at National Research Centre (NRC) for Mushroom, presently known as Directorate of Mushrooms.

At present there are 10 co-ordinating and one co-operating centres working under AICRPM located in 11 states. Off these, 9 centres are based at State Agricultural Universities while 2 at the ICAR institutes

LSP TRAINING & EXPOSURE VISIT – IN PHOTOS



Exposure visit to: Livelihood Ashram, Bakhrapara, Rani, Assam (Training & Demonstration Unit – An initiative by Mushroom Development Foundation)

25 LSPs Exposure cum Training Visit

SPV (Megha Food) Members along with its President & Secretary join for the Exposure visit

40% women participants

Discussion & Demonstration on the mushroom production, Crop management & protection, Spawn production, Value addition and marketing along with benefits of Vermi Composting were the focus areas during the visit



MUSHROOM'S – IN NEWS

Sep 18, 2021: Gujarat Engineer Earns Rs 2 Lakh By Growing Mushrooms in Parking Shed¹
Anjana Gamit from Gujarat began oyster mushroom cultivation three years ago and her profits have increased by 40% since then.

Sep 01, 2021: Oyster mushroom farming picking up in Bihar's Katihar district²
KVK Katihar, The KVK, Katihar, is the 'biotech kisan hub' from where farmers of Araria, Prunia and Khagaria districts are getting training & support in variety of mushroom cultivation. At least 1,000 families and self-help groups in Katihar have been engaged in the production.

Jan 02, 2021: DRDO boost to mushroom farming for income generation in northeast²
Defence Research Laboratory (DRL), under Defence Research and Development Organisation (DRDO), has identified mushroom farming technology as a potential source of income generation for unemployed people in the northeast.

Jul 23, 2020: Dang women overcome lockdown blues with mushroom cultivation²
An experiment with oyster mushroom cultivation made 217 landless women from a far-flung tribal village of Dang rich with exotic moolah. BAIF Institute of Sustainable Livelihoods and Development has been instrumental in supporting these women in tough times

FUTURE OUTLOOK ON MUSHROOM CULTIVATION

India's population is growing, while area available for crop cultivation is shrinking, posing a challenge to adequate food production. Malnutrition in the form of "protein" deficiency is also becoming a major health issue, but because of the varied environment in India, mushroom cultivation is proving to be extremely rewarding especially in regions where land is a scarce resource and clean agricultural wastes are plentiful. As a source of income diversification and a high-yielding, nutritious crop with high therapeutic value, mushroom production has immense potential to increase food security and revenue generation.

Further, demand for oyster mushrooms is increasing as customers are becoming more aware of the extra culinary qualities given by a range of mushrooms.



An excellent source of several vitamins, including:

Niacin (providing 21% of your recommended daily intake),
Riboflavin (18%), &
Pantothenic acid (11%)



1- <https://www.thebetterindia.com/238254/gujarat-oyster-mushroom-cultivation-earns-lakhs-at-home-civil-engineer-how-to-steps-india-gop94/>
2- <https://timesofindia.indiatimes.com/topic/oyster-mushroom-production>



PROJECT PARTNERS



Funding Agency: SFURTI Scheme of Ministry of Micro Small & Medium Enterprises (MSME), GoI

State Support Agency: Meghalaya Basin Development Authority (MBDA), GoM

Nodal Agency: Indian Institute of Entrepreneurship (IIE), Guwahati

Technical Agency: Madhukar Livelihood Foundation, New Delhi

Implementing Agency: Mendipathar Multipurpose Cooperative Society, NGH, Meghalaya