



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Review On Mushroom Farming In Jharkhand

K.K.Vikrant¹, Bina Pandey², Anand Kumar³, A.C. Dubey⁴ & Anmol Krishnan⁵

^{1,2,3,4}, Department of Agriculture, Sai Nath University, Ranchi, Jharkhand, India ⁶Department of Agriculture, AISECT, HazariBagh, Jharkhand, India

Abstract:

In Jharkhand state, naturally grown mushrooms are consumed widely by the local people. However, due to the short period of availability of naturally growing mushrooms, their commercial cultivation has lots of potential in the state. Mushroom cultivation is one of the most efficient farming systems. In current scenario; environmental pollution is the major problem of our earth. The wastes generated from various sources exceeds the manageable limits and using vertical system of mushroom cultivation it is recycled and at the same time producing proteinaceous food for the sustenance of livelihood. Mushroom cultivation can help to reduce vulnerability of poverty and strengthens the community through generation of fast yielding and nutritious food and reliable source of income. The present article is an attempt to aware the people from both rural farmers and pre-urban dwellers to cultivate mushroom by providing necessary idea about species used for beginners.

Keywords: Mushroom cultivation, livelihood, Nutritional Value, Economy

Introduction:

Today, rural entrepreneurship is very essential for the economic and social upliftment of the villagers. Mushroom farming is an enterprise of high profit at low cost and farmers of Jharkhand region (Mishra, 2021). In Jharkhand, naturally grown Mushrooms are also consumed widely by the local people. However, due to the short period of availability of naturally growing mushrooms, their commercial cultivation has lots of potential in the state (ICAR-Research Complex for Eastern Region, 2024). Mushrooms are a remarkable gift from nature, prized for their versatility and wide range of uses. They can be seamlessly incorporated into various food preparations or processed to create innovative products. The market today offers an array of mushroom-based products, including mushroom pickles, seasonings, beverages, extracts, dried and canned mushrooms, mushroom supplements, and even cosmetics. The versatility of mushrooms extends beyond the food industry, as they are increasingly being utilized in other sectors. Innovative applications include mushroom-based building materials, medicinal products, mycelium-based platforms, biodegradable packaging, and even mycelium-based leather alternatives. Cultivating mushrooms is relatively straight forward, and they exhibit rapid growth with minimal carbon emissions and waste generation. This makes mushroom cultivation an environmentally friendly practice. Moreover, mushroom farming offers a sustainable source of income for growers, providing economic benefits in addition to their inherent nutritional and medicinal value. As research and development in the mushroom industry continue to progress, new possibilities for utilizing mushrooms in various sectors are constantly emerging. The future of mushrooms looks promising in every aspect due to their diverse properties and numerous applications. From food products to innovative materials and solutions, mushrooms hold great potential. Their ease of cultivation, quick growth, and environmental sustainability make them a valuable resource. As more industries explore the unique attributes of mushrooms, we can expect continued growth and innovation, creating a bright future for these fascinating fungi. The state of Jharkhand is equipped with adequate amount of surface and ground water, well fertile land and moderate climate. All of them create a well-defined platform for agriculture sector. The major crops of Jharkhand are maize, rice, wheat and chickpea. The land of Jharkhand is embedded with mineral and core. In fact, Chota Nagpur Plateau accounts for richest mineral belt in India. Apart from core and

minerals, the land of Jharkhand grows variety of mushroom. (Kumar, 2020). The main objective of this study is to review the mushroom cultivation which is sustainable sustenance of livelihood in Jharkhand.

Variety of Mushroom in Jharkhand

Rugra (*Astraeus hygrometricus*)

Land of Jharkhand nurtures a rare mushroom called as Rugra or Putu in common language. Rugra, a variety of edible mushroom grows naturally in some places of Jharkhand. Rugra is found in the forests of Bundu, Tamar, Pithoria and some other areas in and around the state capital. Tribal women go to these forests early in the morning and collect the mushrooms, found primarily under the sal trees. So this mushroom is indigenous to Jharkhand. In Ranchi, the capital of Jharkhand, one can easily spot Rugra in local markets. The tribal Santhali and Oraon women gather at these local markets to sell this palatable mushroom. Rugra externally looks oval in shape as small white camphor ball, rough textured, consisting of an outer covering shell and a soft yolk like black inner material which gives a unique taste to this mushroom. The month of monsoon is considered to be a holy month (Shravan) of Lord Shiva and people abstain from eating non-vegetarian. So, people love to buy it as an alternative option to meat because it tastes like a non-vegetarian dish. Rugra is washed well before cooking to remove the coating of soil. People make curry from it and enjoy with chapatti or rice (Kumar, 2020)



Fig: Rugra Mushroom

Marketing Value:

Rugra is certainly a gift of nature for food lover. The local vendor sells it at a cost of Rs 150-200 per kg. The season of Rugra is limited to few days and it comes only in a year. This is primarily the reason why people are ready to pay whatever price asked. The selling of Rugra is drastically dropped due to pandemic. According to ICAR Research Complex for Eastern Region, Palandu, local vendor used to sell upto 6-8 quintal of Rugra per day. Rugra seller earns Rs 2000-4000 per day (Kumar, 2020)

Nutritive Value:

Rugra is not only tasty but also constitutes higher protein, vitamins and minerals than other mushroom with almost zero carbohydrates. It is highly recommended for heart and diabetic patients (Kumar, 2020)

Cultivation Practices:

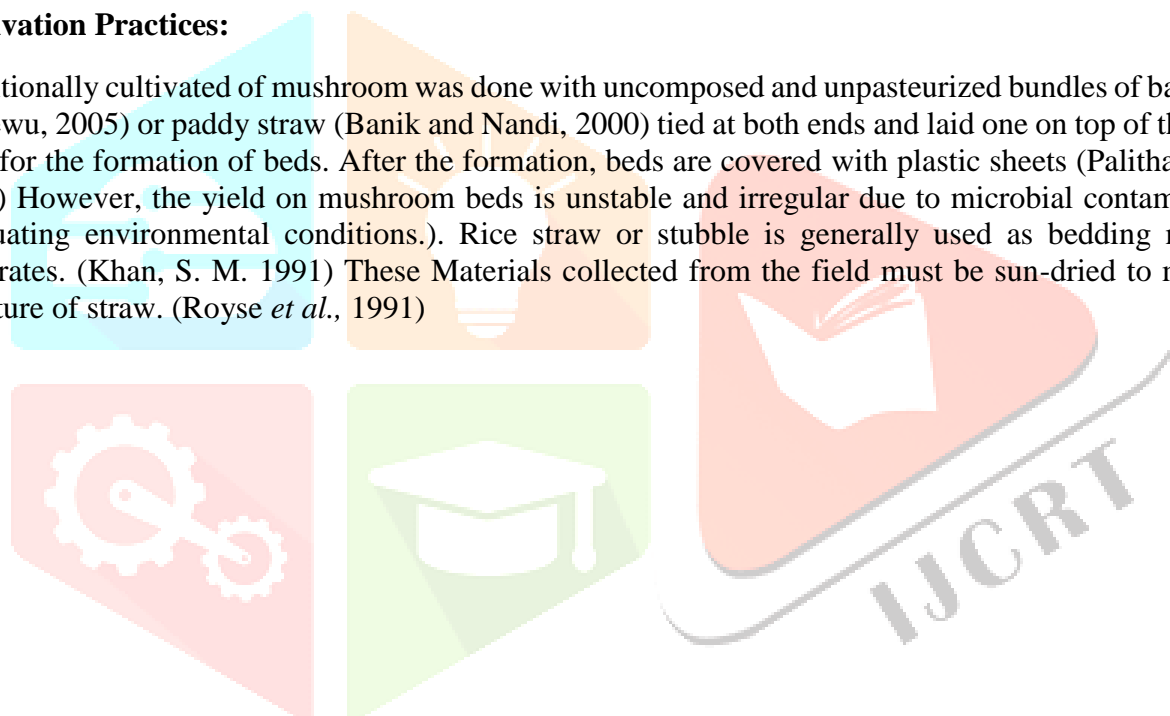
A very interesting fact about Rugra is that it is not cultivated in any region commercially. It grows naturally well on the onset of first monsoon around Sal tree. But in recent years, due to change in climatic conditions, decrease in rainfall and rise in temperature, the production is declining year by year. Additionally, much of the forests are now being destroyed due to mining and construction activities resulting in its less availability (Kumar, 2020).

Paddy Straw Mushroom

Paddy straw mushroom (*Volvariella volvacea*) commonly known as the straw mushroom, or the Chinese mushroom, belongs to the family Pluteaceae (Kotl. & Pouz) of the Basidiomycetes (Singer, 1961). Paddy straw mushroom is also known as “warm mushroom” as it grows at relatively high temperature. It is a fast growing mushroom and under favourable growing conditions total crop cycle is completed with in 4-5 weeks time. It has been considered as one of the easiest mushrooms to cultivate. Paddy straw mushroom was first cultivated in India in 1940, however, its systematic cultivation was first attempted in 1943. Mushroom farming is an enterprise of high profit at low cost and farmers of Jharkhand region can successfully obtain the yield of paddy-straw mushroom throughout the year. Cultivation of paddy straw mushroom from March to September is favourable for our state. (Singer, 1961).

Cultivation Practices:

Traditionally cultivated of mushroom was done with uncomposed and unpasteurized bundles of banana leaves (Belewu, 2005) or paddy straw (Banik and Nandi, 2000) tied at both ends and laid one on top of the other two ends for the formation of beds. After the formation, beds are covered with plastic sheets (Palitha Rajapakse, 2011) However, the yield on mushroom beds is unstable and irregular due to microbial contamination and fluctuating environmental conditions.). Rice straw or stubble is generally used as bedding materials or substrates. (Khan, S. M. 1991) These Materials collected from the field must be sun-dried to maintain the moisture of straw. (Royse *et al.*, 1991)



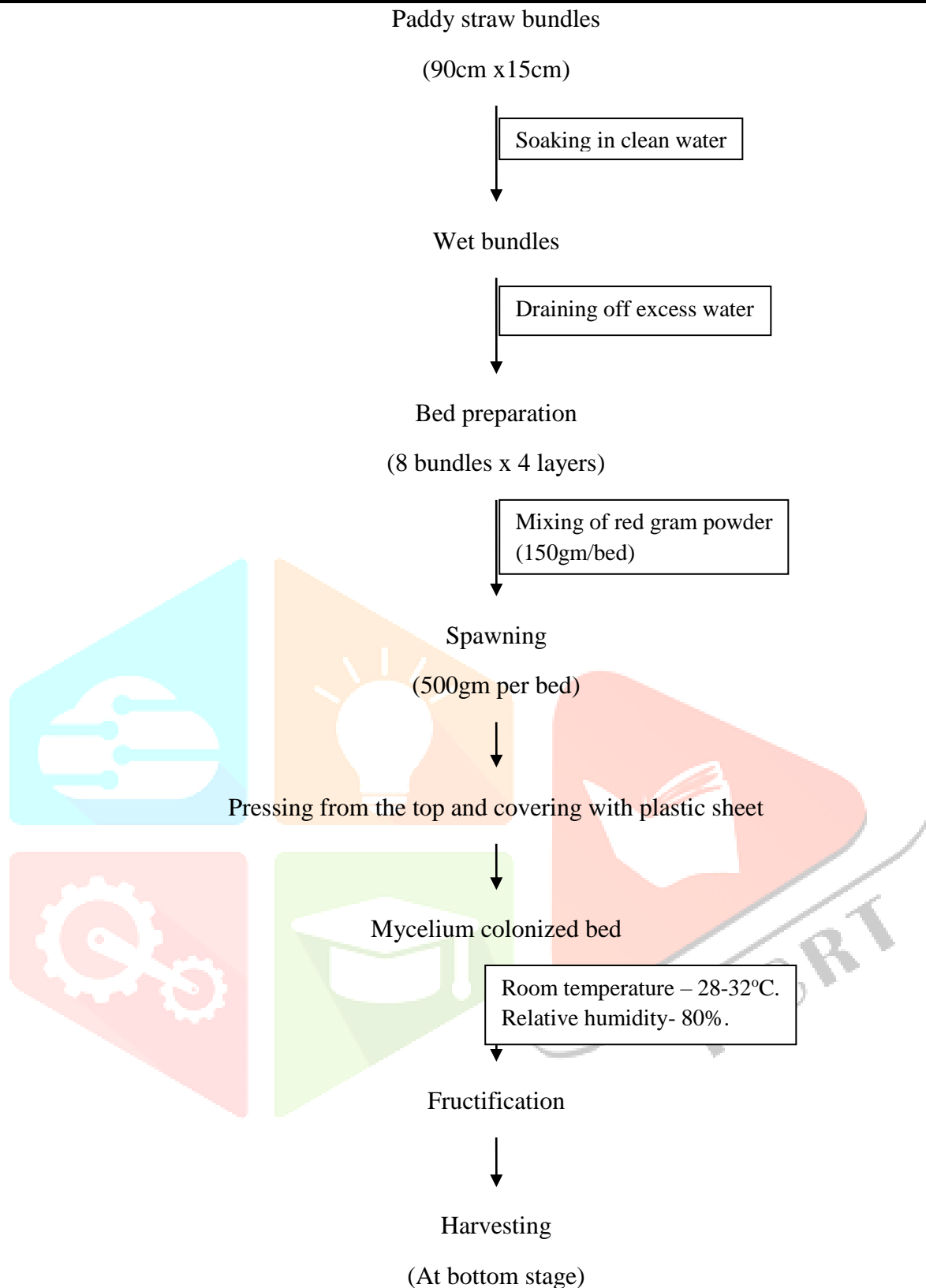


Fig.1. Conventional method of paddy straw mushroom

They are tied into bundles then cut into the required size. There are mainly three methods which improve the productivity of mushroom cultivation. (Fig. 1)

Soaking

Required size bundles are taken and soaked in water for 8-10 hours. Some amount of lime is added to the solution to maintain the pH. Bundles are taken out of solution and then kept in an inclined manner to remove excess water. Then the process of formation of beds starts after 2 hours (Renato Reyes, 2016) (Fig. 2)

Composting

The composting period generally takes 14 days. During the first seven days of composting, the bed is covered with plastic sheets to induce the growth decomposers. (Choudhary *et al.*, 2009) In this period, mycelia growth started. 8-10 days time period there is the growth of pinheads of mushroom. (Knisa *et al.*, 2019) (Fig. 2)

Fruiting and harvesting

Mainly three stages of fruiting are seen. These are at bottom stage, egg stage and elongation or mature stage. Harvesting of mushroom generally done at the bottom stage. Profitability is more when mushrooms are harvested at bottom stage (Tripathy and Sahoo, 2010) (Fig. 2)

Nutritional value of paddy straw mushroom

Mushrooms are good sources of sugars, fibers, minerals and also contain some essential amino acids. Mushrooms contain 80-90% water, 3% protein, 4% carbohydrates, 0.1% fats, 1% minerals and some quantity vitamins (Bolton and Blair, 1982). The straw mushroom is known to be rich in minerals such as potassium, sodium and phosphorus. Potassium constitutes the major fraction of major elements followed by sodium and calcium (Table 1).

Table 1. Proximate composition of paddy straw mushroom

Content	Composition (quantity/100g fresh mushroom)
Fat	0.25 (g)
Protein	3.90 (g)
Crude fibre	1.87 (g)
Ash	1.10 (g)
Phosphorus	0.10 (g)
Potassium	0.32 (g)
Iron	1.70 (g)
Calcium	5.60 (mg)
Thiamine	0.14 (mg)
Riboflavin)	0.61 (mg)
Niacin	2.40 (mg)
Ascorbic acid	18.00 (mg)

Source: Verma, 2002



Fig.2: Paddy straw Mushroom

Marketing Value of Paddy straw Mushroom

Marketing is not the problem in the region where it is popular and is being sold mainly as fresh. The price of straw mushrooms can vary depending on the type of mushroom, the quantity, and the packaging. The overall total cost incurred in cultivating paddy straw mushroom was Rs. 83.52 per kg which was sold at Rs. 300 per kg which gave gross income of 300 per kg and 199.94 Rs per kg of net return. (Krishna *et al.*, 2024)

Oyster Mushroom (*Pleurotus Ostreatus*):

Oyster mushroom can be grown on various substrates including paddy straw, maize stalks/cobs, vegetable plant residues, bagasse etc. (Hassan, 2011). Oyster mushroom cultivation can play an important role in managing organic wastes.



Fig: Oyster Mushroom

Method of Cultivation of Oyster Mushroom:

Preparation of straw:

In a drum or tub, take 100 liters of water, mix Bavistine and 100 ml formaldehyde medicine in it. In this, keep 20 kg straw small pieces of 2 " - 3 " size for 12 hours. On the second day, wash it 2-3 times with water and leave it on a sloping or shady surface to drain. For the treatment, the straw should have moisture up to 75-80%. (Fig. 2)

Preparation of polythene bag:

Also wash polythene bags with mildew and insecticides per gram solution and wash them with clean water and dry them. Make small holes in the bag for air circulation. Spawn Preparation: Take out the spawn in a clean, clean vessel and break it into small pieces. Divide it into three equal parts (Fig. 2)

Sowing or spawning method:

Spread a 4 " high fold in a polythene bag and sprinkle a handful of spawn on it. Now make a straw fold and spawning on it again. In this way, spawning can be done 2-3 times. After this, tie the mouth of the polythene bag to the rope. Place this prepared bundle at a distance of 12 " from each other on the pre-prepared room rack so that air circulation is maintained in the polythene as well. On proper temperature and humidity, in 10-12 days, the fungus trap spreads into the entire polyethylene straw and binds the straw properly. The entire straw

starts to look white. At this time, polythene is cut and removed and irrigated 1-3 times a day to control temperature and humidity with the help of a sprayer. White grains pinheads will be seen on the straw on 20-22 days, then stop irrigation. Umbrellas with small stalks of almond color will emerge in bunches. Its stalks rotate between two fingers near the straw and irrigate again after plucking, and then stop irrigation when pinheads are seen. Umbrellas with small stalks of almond color will emerge in bunches. Its stalks rotate between two fingers near the straw and irrigate again after plucking, and then stop irrigation when pinheads are seen. Like this up to 2- 5 kg of mushroom can be done from an each straw bundle(Fig.2)

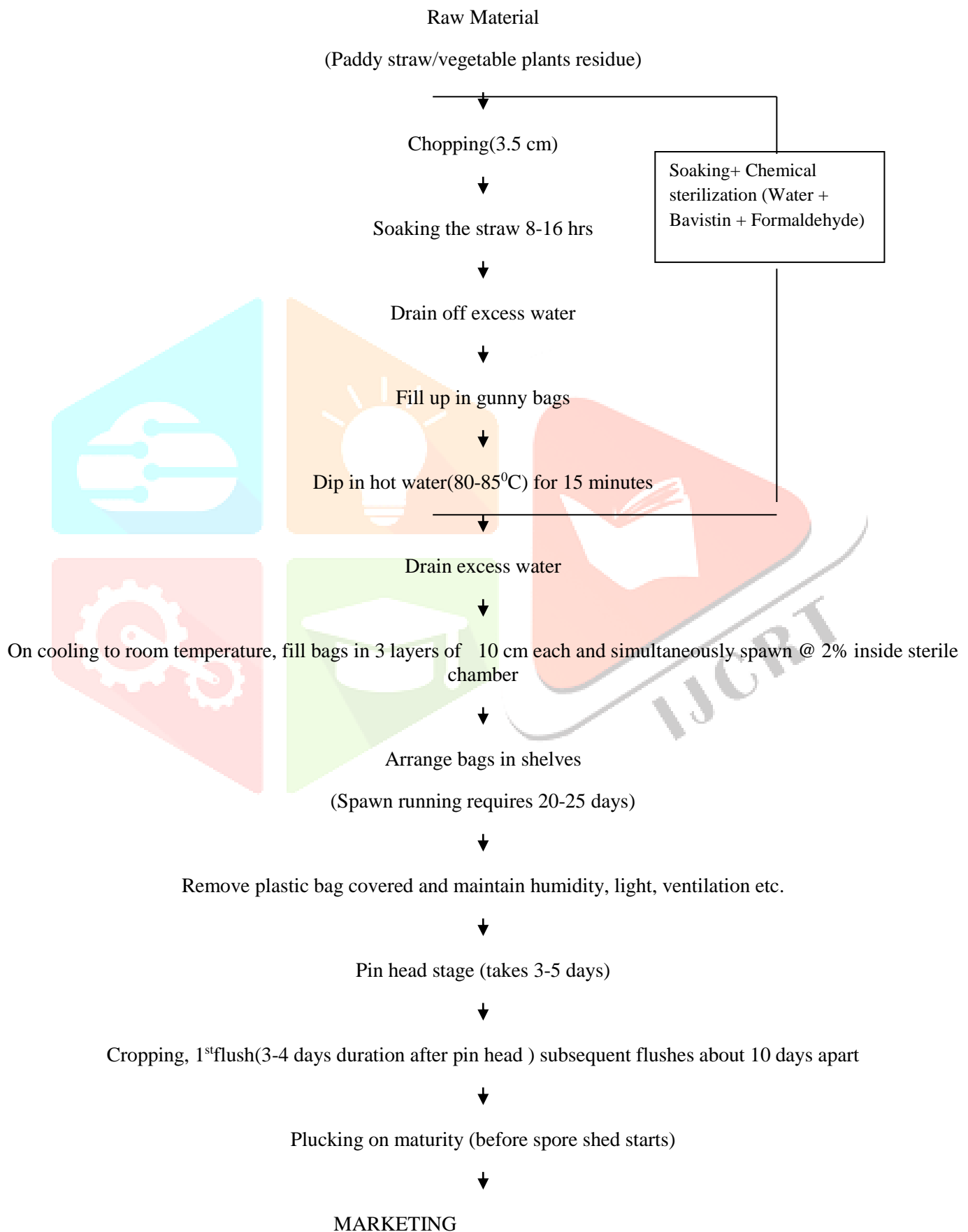


Fig. 2: Oyster Mushroom Cultivation

Nutritious Value of Oyester Mushroom

The percentage content of carbohydrate, moisture, ash, lipid, crude fiber and crude protein has been shown in table 1. Carbohydrate content is highest ($43.42 \pm 0.01\%$), followed by crude fiber ($23.63 \pm 0.01\%$), crude protein (17.06 ± 0.17), ash ($8.22 \pm 0.04\%$) and moisture ($6.46 \pm 0.04\%$) as the least (Effiong *et al.*, 2024) (Table 1).

Content	Nutrional value
Moisture (fresh mushroom) (%)	91.01 ± 0.08
Moisture (Dry mushroom) (%)	6.46 ± 0.04
Ash (%)	8.22 ± 0.04
Carbohydrate (%)	43.42 ± 0.01
Calorific value (Kj/100 g)	1199.08 ± 1.77
Lipid (%)	1.21 ± 0.025
Crude fiber (%)	23.63 ± 0.01
Crude protein (%)	17.06 ± 0.1

Source: Effiong *et al.* 2024

Marketing Value of Oyester Mushroom

The marketing value of oyster mushrooms in Jharkhand depends on the price of the mushrooms and the demand for them in the local market. In 2019, oyster mushrooms sold for ₹120–₹150 per kg in the local market. In 2020–2021, oyster mushrooms were produced in the Sarwal Village area of Jharkhand. In Ranchi, oyster mushrooms have been sold for ₹180–₹1,000 per kg. In Jamshedpur, dry oyster mushrooms have been sold for ₹1,000 per kg (www.indiamart.com)

Conclusion:

It is concluded that Mushrooms are a rich, low calorie source of protein, fiber and antioxidants. The main reason for the prevalence of these three species in our state is simple technique of production, working capital, quick production, tasteful, full of costume elements. It is characterized by aromatic and temperamental properties, as well as being similar to a naturally grown mushroom. Rugda mushrooms are an underutilized yet highly popular tribal food. Its uses include both culinary and therapeutic. Paddy straw mushroom is a sustainable option for adding value to rice production and reducing environmental harm through avoiding the burning of rice straw in the field. Now a day's oyster mushroom is cultivated on a very vast ratio. Oyster mushroom is very economical crop easy to cooperate and grow but having high ratio of yield. It is having high amount of nutritive and medicinal values and content the macronutrients which is required for human body.

Acknowledgement

The authors acknowledge the Head of Department for providing facilities utilised at the Department of Agriculture for completion of this work

Author Contributions

Kundan K.Vikrant: Investigation, writing—original draft. Bina Pandey: writing—reviewing. A.K.Singh: review and editing Ananad Kumar: writing—review and editing. Abinav Dubey: collection of Review of literature. Anmol Krishnan: Review and editing.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests

Reference

- Belewu, M. A., and Belewu, K. Y. 2005. Cultivation of mushroom (*Volvariella volvacea*) on banana leaves. *African Journal of Biotechnology*, 4(12). DOI:[10.4314/ajb.v4i12.71441](https://doi.org/10.4314/ajb.v4i12.71441)
- Bolton, W., and Blair, R. 1982. Poultry nutrition (Ministry of agriculture, fisheries and food reference book 174). London: Her Majesty's Stationery Office <http://dx.doi.org/10.3382/ps.0541833a>
- Choudhary, M., Dhanda, S., Kapoor, S., and Soni, G. 2009. Lignocellulolytic enzyme activities and substrate degradation by *Volvariella volvacea*, the paddy straw mushroom/Chinese mushroom. *Indian Journal of Agricultural Research*, 43(3), 223- 226
- Effiong, ME., Umeokwochi, CP., Afolabi, I.S. and Chinedu, S.N. 2024. Assessing the nutritional quality of *Pleurotus ostreatus* (oyster mushroom). *Front. Nutr.* 10:1279208. doi: 10.3389/fnut.2023.1279208
- Hassan, S., Mohammad, A. Y. And Kiramat, K. 2011. Cultivation of the oyster mushroom (*Pleurotus ostreatus*) in two different agro ecological zones of Pakistan. *African Journal of Biotechnology*, 10 : 183 - 188.
- Jharkhand fresh oyster mushroom, www.indiamart.com, accessed on 30th January 2025
- Khan, S. M. 1991. Some studies on the cultivation of Chinese mushroom (*Volvariella volvacea* (Fr.) Singer) on sugarcane industrial by-products. *Science and cultivation of edible fungi*. AA, 579-584.
- Krishna and Verma, P.K. 2024. Cost benefit analysis of paddy straw mushroom in Bilaspur district of Chhattisgarh, *Inter J of Res. in Agron*, <https://doi.org/10.33545/2618060X.2024.v7.i6Sg.928>
- Kumar, A. 2020. Rugra: A rare Mushroom of Jharkhand, https://krishijagran.com/featured/rugra-a-rare-mushroom-of-jharkhand/#google_vignette, Accessed on 14 February 2025.
- Mishra, A.K. 2021. Mushroom Cultivation Scope in Jharkhand State, Vol.1 Issue-9,1-4pp
- Rajapakse, P. 2011. New cultivation technology for paddy straw mushroom (*Volvariella volvacea*). In *Proceedings of the 7th International Conference on Mushroom Biology and Mushroom Products (ICMBMP7)* (pp. 446-451).
- Reyes, R. G. 2000. Indoor cultivation of paddy straw mushroom, *Volvariella volvacea*, in crates. *Mycologist*, 14(4), 174-176.
- Royse, D. J., Fales, S. L., and Karunanandaa, K. 1991. Influence of formaldehyde-treated soybean and commercial nutrient supplementation on mushroom (*Pleurotus sajor-caju*) yield and in-vitro dry matter digestibility of spent substrate. *Applied microbiology and biotechnology*, 36 (3), 425-429.
- Singer, R. 1961. *Mushroom and Truffles: Botany, Cultivation and Utilization*, Leonard Hill, London.
- Tripathy, A., and Sahoo, T. K. 2010. Yield evaluation of paddy straw mushrooms (*Volvariella* spp.) on various lignocellulosic wastes. *Int J Appl Agric Res*, 5(3), 317-326
- Verma, R.N. 2002. Cultivation of paddy straw mushroom (*Volvariella* spp.). In *Recent Advances in the Cultivation Technology of Edible Mushrooms*. (Verma, RN and Vijay B, Eds.) pp. 221-220, National Research Centre for Mushroom, Solan (HP), India