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Mushroom Cultivation for Increasing Income and Sustainable Development of Small and Marginal Farmers

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

A mushroom is the fleshy and spore-bearing fruiting body of a fungus and belongs to the class Basidiomycetes. Mushroom cultivation is a low-cost, high-return activity that has proven to be an additional source of income. Because the vegetarian population in our country's urban centers has adopted mushrooms in their diet due to their nutritious worth, mushroom producers in nearby rural areas have an excellent market for selling their products quickly and at a reasonable price. As a result, the mushroom benefits both producers and consumers, earning it the title of super food. Mushroom production can also be used to empower rural people, offer additional income for agricultural families, and address the issue of rural people's nutritional needs. Rural unemployed people are the most productive workforce in the economy, necessitating efforts to enhance and strengthen their socioeconomic condition. Mushroom farming all year can produce revenue from the sale of spawns as well as the sale of fresh mushrooms in a sustainable manner by using farm by-products as a raw material.

Keywords: Mushroom cultivation; mushroom production; economy; sustainable development; farmers.

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1. INTRODUCTION

Agriculture sector is one of most important sector in India it has a key position to provide the employment to unemployed peoples. It provides employment to about 72% of the working population of India. Around one-quarter of India's national income originates from the agriculture sector. The growing peoples and nutritional security are major challenge, for Agriculture scientist and Indian government. Keeping in this mind which looks for alternate crop as a source of food and nutrition. In this context, mushrooms have a great role which can be grown even by landless people that need agriculture west materials and could be a source for proteineous food [1]. A mushroom is the fleshy and spore-bearing fruiting body of a fungus and belongs to the class Basidiomycetes. It typically growing without the soil on the west agriculture material or on its food substrate. It has been globally used as a food and medicine by different peoples in universally since ancient time due to its delicious taste, flavor, dietetic qualities and several medicinal properties. Mushrooms are being grown on commercial scale in many parts of the world. Wildly, 20 species of mushroom are grown in the country, of which 5-6 are poisonous; and the recommended species for cultivation are oyster (*Pleurotus* spp.) and white button mushroom (*Agaricus bisporus*) Milky mushroom (*Calocybe indica*) are more popular mushroom [2].

The fresh mushroom contains about 85-90% moisture, 3% protein, 4% carbohydrates, 0.3-0.4% fats and 1% minerals and vitamins as well as some medicinal properties like lowering blood cholesterol level, defense against various human diseases [3]. Agriculture is the main strength of Indian economy. In India variety of agricultural crops are grown such as wheat, rice and mustard today. The production of Food grains in the country is estimated at a record 314.51 million tones which is higher by 3.77 million tones than the production of food grain during 2020-21. However, our struggle to achieve nutritional security is still on. Under these certain condition mushroom farming has been recognized as a sustainable source of farming and most profitable enterprise since per unit productivity of mushroom is several folds high than any other crop [4]. Mushroom are ideal tools for converting agricultural waste into protein rich non-conventional food items. Krishi Vigyan Kendras established under the aegis of CCS Haryana Agricultural University Hisar in Haryana are playing a significant role in technology assessment, refinement, front line demonstrations and transfer of technology in the farmers, farm women and extension personnel in their respective districts. The major emphasis of these centers is to enhance the production and productivity as well as to generate household income and provide employment of rural youth. Thus attempt was made for skill development among rural women in the field of mushroom farming so that they could start their own entrepreneurial units using low cost thatched houses. Hence MVN University, School of agriculture is growing different edible mushroom to solving the unemployment and malnutrition problem in rural masses of Palwal and also lead to rural development by increasing income and self employment particularly among women folk who constitute 70% of total women's population [5].

2. MATERIALS AND METHODS

The group B.Sc. Agriculture students from MVN University, Palwal got forty days training from Krishi Vigyan Kendra, Midcola (Haryana) under the supervision of Principal scientist Dr. D.V. Pathak HAU Hisar Agriculture University. Students gets benefited by the interventions as facilitated by Krishi Vigyan Kendra, like mushroom cultivation trainings, demonstration, farm advisory service for Button, Oyster and Milky mushroom production, value addition and marketing of these products. The spawn of mushroom, chemical, net bags, polythene bags and other accessories were provided to students. The objective of the group was to income generation and sustainable development of small and marginal farmers through Mushroom cultivation and its value addition to achieve nutritional stability at village level for consumer.

3. PRESENT STATUS OF MUSHROOM IN INDIA

Mushroom cultivation practiced all over the world and its production is increasing at an annual rate of 6-7% (Huchchannanavar et al., 2020). This is much benefited crop because it can be grown even by landless farmers, that too on waste material and could be a good source of protein [1]. From 2010 - 2017. The first attempt of mushroom cultivation is known as that by Thomas and his colleagues in Coimbatore by trying to cultivate Paddy straw mushroom. The first scientific attempt to cultivate Button

mushroom is credited to the Government of Himachal Pradesh in collaboration with ICAR under the scheme “Development of Mushroom Cultivation in Himachal Pradesh” in 1961 which was later taken up as an enterprise by the progressive farmers of Himachal Pradesh and Jammu and Kashmir in the late 1960s [6,7]. The mushroom industry in India has registered an average growth rate of 4.3% per annum. At present, the total mushroom production in India is approximately 0.13 million tons. From 2010-2017, Out of the total mushroom production, white button mushroom share is demand of nutritional security of India’s ever increasing population. In this context, many corporate houses have set up many export-oriented units encompassed with advanced technology and machinery throughout the country for enhanced mushroom production. In the past decade, there has been a many-fold increase in mushroom production in India [8] the diversified agricultural system is very much needed which includes activities such as mushroom cultivation, vermicompost cultivation, food processing, fishery, dairy etc. Amongst these, mushroom cultivation is one of the important to meet the demand of 73% followed by oyster mushroom (16%), paddy straw mushroom (7%) and milky mushroom (3%) [9].

4. PRESENT SCENARIO OF MUSHROOM CULTIVATION IN THE DIFFERENT STATES OF INDIA

There was spread of white button mushroom from Jammu and Kashmir and Himachal Pradesh to all over the country after 1980. A remarkable growth in the production has been witnessed in India [9]. The production of mushroom alone in Himachal Pradesh has crossed 8000 tonnes ever since the two commercial-oriented units have been established at Paonta Sahib and Nalagarh which jointly produce 4500 tonnes per annum of the total production. Many of the cold storages in Punjab have been transformed into the mushroom units for production an various commercial units has started at Hissar, Kalka, Panipat, and Gurugram has a total production of 8000 tonnes of fresh mushrooms from Haryana [10]. Many industries are aspiring to familiarize the production of mushrooms in Madhya Pradesh. And oyster mushroom is being cultivated in the tribal areas around the Raipur in particular with a production of more than 1500 tonnes on an annual basis. In Gujarat and Rajasthan, the cultivation of white button mushroom is on an experimental basis but the cultivation of oyster mushroom has been taken up by the cultivators. In Bihar and Jharkhand, small scale mushroom enterprises are well functional and are under progress. In Maharashtra, the cultivation of mushroom is confined to Mumbai and Pune with 8000 tonnes production on annual basis and 12- 15 tonnes annual production is from one export oriented unit in Panaji, Goa [11]. Presently, more than 85 per cent of the total mushroom production is of white button mushroom followed by the oyster mushroom. The potential of mushrooms being a multifaceted crop which can be utilized for food, medicine, diminishing environmental pollution, bridging the protein gap among vegetarians and tackling malnutrition, creating self employment especially for women and develop rural – urban agri-network for rural employment, has largely gone unnoticed. To-day when the Indian Agriculture is looking for diversification, mushrooms stand tall as one of the very important biological components which play a very vital role in finding meaningful solutions to the problem of food, health and environment.

4.1 Cultivated Species and Varieties of Mushroom in India

At present, four types of mushrooms species generally cultivated at large scale viz., button mushroom *(Agaricus bisporus),* Oyster mushroom (*Pleurotus spp.)*, Paddy straw mushroom *(Volvariella spp.)* and Milky mushroom (*Calocybe indica),* have been growing for round the year in India. Button, oyster, milky and paddy straw mushrooms are cultivated in different parts of the country, as per the control environment condition during different seasons [5]. Mushroom crops are being harvested more than three times after sowing the seed in substrate seasonally in temperate regions with minor adjustments of temperature in the growing rooms. While one crop of button mushroom is raised in the northwestern plains of India seasonally. Oyster, paddy straw and milky mushrooms are grown seasonally in the tropical/sub-tropical areas [12]. The method of cultivation have also been standardized with the help of various t research institutes and universities of India [13].

Table 1. Temperature requirements of some important mushrooms

S.N.	Scientific name	Common name	Spawn run	Temperature requirement (°C) Fruiting
01	*Agaricus bisporus*	White button mushroom	23-25	14-16
02	Auricularia spp.	Black ear/ Wood ear mushroom	20-30	20-30
03	*Lentinula edodes*	Shiitake mushroom	22-27	15-20
04	*Pleurotus eryngii*	Kabuli Dhingri	18-22	14-18
05	*P. flabellatus*	Dhingri (flabellatus)	25-30	22-26
06	*P. florida*	Dhingri (Florida)	25-30	18-22
07	*P. sajor caju*	Dhingri	5-32	22-26
08	*Vovlariella volvacea*	Paddy straw/ Parali mushroom	32-34	28-32
09	*Calocybe indica*	Milky/ Dudhiya mushroom	25-30	30-35

Source: Shirur [14]

Fig. 1. Photographs of important mushrooms

5. PROGRESS MADE

The group of students approached the university to establish the mushroom cultivation unit for production of various types of seasonal mushroom. School of Agriculture MVN University, take an initiative to develop mushroom cultivation laboratory as well spawn room and various type of seasonal mushroom are growing such as *Calocybe indica, Agaricus bisporus,* and *P. sajor caju* these days. Students are receiving good prize for mushroom and its value added products by selling it to different enterprises. Department organized various training program on mushroom cultivation for the unemployed youth, women's and Farmers. People of various villages are engaged with farming along with animal husbandry. The farmers of this region are getting good price of their product and they also start the value addition mushroom and they are enjoy with starting of mushroom cultivation because of good demand of fresh mushroom and its value added products and consumers also are satisfied with the superior quality of fresh mushroom and its other products [15].

6. CONCLUSION

Mushroom cultivation round the year can generate income through the sale of spawns, in addition to the sale of fresh mushroom in a sustainable approach by utilizing farm by-products as their raw material. From the findings it may be concluded that mushroom production through scientific and technical support it may raise the extra income of the rural youths and farm women.

7. FUTURE PROSPECTS

Mushrooms is the major source of protein and other vitamins that are need for growth and development of every men , women and child also and can make a valuable dietary and play an important role in contributing to the livelihoods of rural and peri-urban dwellers, through food security and income generation [10]. The current scenario of mushroom production in India is quite encouraging with an overall increase in 5 to 6 folds and was estimated to cross 50,000 tons [16]. India has diversity climatic conditions of edible mushrooms its need for conservation and utilization for sustained production. Further, India has diverse climatic conditions in different regions and possible to cultivate many varieties of mushrooms [9]. For the Successful mushroom business requires to working with regional agro-industries, universities or wholesalers and KVK can help reduce vulnerability [17]. The development of R&D, infrastructure facilities and distribution network provides the greater scope for marketing of fresh mushrooms. The marketing of fresh mushrooms would determine the future of the mushroom industry in India.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ambili S, Nithya TP. Oyster mushroom cultivation- A study in Palakkad district, Kerela. Int. J. Management. Soc. Sci. Res. Rev. 2014;1:104-105.
2. Bhatia JN, Mohammed S. Technological gaps in adoption of mushroom cultivation practices in Haryana. Proc. National Conference on Environment and Livelihood Security through Resource Management in Northern India held at Chandigarh from 29-31 October, 2007.
3. Dey A, Patel S, Rashid M. Small-scale mushroom production unit for the upliftment of rural economy and women empowerment in India: A Review. Curr. J. Appl. Sci. Technol. 2020;39(2):38-46.
4. Halpern GM, Miller AH. Medicinal mushrooms. Ancient remedies for modern ailments. New York: M. Evans and Company. 2002;172.
5. Singh Y, Sidhu HS. Management of cereal crop residues for sustainable rice-wheat production system in the Indo-gangetic plains of India. Proc Indian Natn Sci Acad. 2014;80:95-114.
6. Vibha Dhawan. Water and Agriculture in India, German Asia-Pacific Business Association. 2017;28.

7. Siddiqui SA, Fatima N. Indian Soils: Identification and Classification. Earth Sci India. 2017;10:1-14.
8. Prakasam V. Current scenario of mushroom research in India. Indian Phytopath. 2012;65:1-11.
9. Sharma VP, Annepu SK, Gautam Y, Singh M, Kamal S. Status of mushroom production in India. Mushr. Res. 2017; 26(2):111-120.
10. Karthick K, Hamsalakshmi. Current scenario of mushroom industry in India. Int J Commerce Manag Res. 2017;3:23-26.
11. Zadrazil F. Conversion of lignocellulose in to feed with the white rot fungi. In: Solid substrate cultivation, (eds.) H.W. Doelle. D.A. Mitchell and C.E. Rolz, Elsevier science publication, Essex, England. 1992; 321-339.
12. Singh B, Shan YH, Johnson-beeebout SE, Singh Y, Buresh RJ. Cropresidue management for lowland rice-based cropping systems in Asia. Adv Agron. 2008;98:118-199.
13. Dhar BL, Sharma SK. Medicinal mushroom product in India, present status and future trading. Proc. 5 Int. Medicinal Mushroom conference, mycological Society of China, Nantong, China. 2009;403-406.
14. Shirur M. Round the year cultivation of Mushrooms. In: Mushrooms-cultivation. Marketing and Consumption Eds. Manjit Singh, Bhuvnesh Vijay, Shwet Kamal, G.C. Wakchaure. Directorate of Mushroom Research (ICAR) Chambaghat, Solan (HP); 2011.
15. Singh J, Chahal VP, Rathee A, Singh K. Economic empowerment of scheduled caste (SC) landless rural women through mushroom cultivation- A case study. Afr. J. Agric. Res. 2014;9(52):3811-3815.
16. Verma RN. 2002. Recent Advances in the cultivation Technology of Edible Mushrooms, NRCM Solan, 1-10. Vibha Dhawan. Water and Agriculture in India, German Asia-Pacific Business Association. January 2017;28.
17. Thakur MP. Present status and future prospects of tropical mushroom cultivation in India: A review. Indian Phytopath. 2014; 67:113-125.

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