



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2025.v25.supplement-1.428>

EFFECT OF DIFFERENT STRAW PREPARED COMPOST AND GROWING STRUCTURES ON GROWTH AND YIELD OF BUTTON MUSHROOM (*AGARICUS BISPORUS* L. SING)

Bhagshali Patle¹, H. K. Singh^{2*} and Anurag Kerketta³

¹Department of Plant Pathology, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur- 848125, Bihar, India

²Department of Plant Pathology, Indira Gandhi Krishi Vishwavidyalaya, Raipur-492012 Chhattisgarh, India

³Department of Plant Pathology, College of Agriculture and Research Station, Jashpur- 496225- Chhattisgarh, India

*Corresponding author E-Mail: harry0452@gmail.com

(Date of Receiving : 10-11-2024; Date of Acceptance : 20-01-2025)

ABSTRACT

Present experiment was conducted during 2020-21 in the Department of Plant Pathology, Collage of Agriculture, IGKV, Raipur, Chhattisgarh to know the effect of different straw prepared compost [Wheat straw and Wheat straw + Paddy straw (1:1)] and growing structure (Growing room and Ecofrost cold storage) on growth and yield of button mushroom. The results obtained that on the different straw prepared compost, spawn run was found significantly fastest (13.30 days) in wheat straw while, the days required for pinhead initiation was less (15.60 days) in combination of wheat straw + paddy straw. The yield attributing characters did not differed significantly and the number of fruiting bodies varied from 23.60-31.00. The fresh yield of button mushroom on different straw prepared compost, significantly maximum (560g) with 11.20 % biological efficiency was recorded in combination of wheat straw + paddy straw. Under the different growing structure, the quickest (16.80 days) pinhead initiation was recorded in Growing room and the stalk length, stalk diameter did not found significant and the pileus diameter was found significant with growing structure. The number of fruiting bodies varied from 44.60-32.80. The fresh yield of button mushroom was not differed significantly under the different growing structure and ranges from 559–662g with 11.18–13.24 % biological efficiency.

Keywords : Button mushroom, compost, straw and growing structure.

Introduction

Since ancient times, mushrooms have been consumed by humans not only as a part of the normal diet but also as a delicacy because they have a highly desirable taste and aroma (Kurbanoglu *et al.*, 2002). More than 2000 mushroom species exist in nature, but only about 22 species are cultivated (Manzi *et al.*, 2001). Around 20 genera of mushrooms are being cultivated throughout the world, only four types, viz., white button mushroom (*Agaricus bisporus*), oyster mushroom (*Pleurotus* spp.), paddy straw mushroom (*Volvariella volvacea*) and milky mushroom (*Calocybe indica*) are grown commercially in our country.

In India, mushroom cultivation has great potential due to favorable weather conditions, abundant cheaper agro wastes as well as cheaper availability of labour. Now a day's mushroom cultivation has been adopted by progressive farmers as a cottage industry, which not only provides them an additional source of income but they could also recycle the farm waste which was earlier sold by them at much low cost (Kumar *et al.*, 2017). *Agaricus bisporus* is the fourth mushroom species cultivated in the world, with 15% of global production⁴ and in India it is most popular mushroom with the contribution about 90 per cent of total country's production⁵. Mushrooms are good as

nutritious food for all ages and under all conditions of health. They are rich in good quality proteins with lysine and tryptophan that are normally deficient in cereals. The carbohydrates in the mushrooms are at a level of 4.5 to 5.0 per cent but are in the form of glycogen, chitin and hemicellulose instead of starch. The fat contain is as low as 0.3 % but is rich in linoleic acid, an essential fatty acid. Cholesterol is absent and in its place ergo-sterol is present which gets converted to vitamin D by the human body. Mushrooms are fairly good source of vitamin C and vitamin B complex, particularly thiamine, riboflavin, niacin, biotin and pantothenic acid. Folic acid and vitamin B12 which are absent in most vegetables are present in the mushrooms which also supply a range of valuable minerals especially potassium and iron.

In Chhattisgarh, white button mushroom (*A. bisporus*) was cultivated for the first time during 1994 (Anonymous, 1994). Later on, 10 strains of *A. bisporus* were cultivated successfully on experimental basis during 2000-2002 (Anonymous, 2002). Button mushroom requires low temperature than other mushroom hence it can be cultivated in winter season in Chhattisgarh but in controlled condition it can be cultivated throughout the year. In the present investigation, button mushroom was cultivated using two straw prepared compost and in different growing structure and growth and yield was recorded.

Materials and Methods

Pure culture and other materials

Pure culture of button mushroom was procured from AICRP on mushroom, Department of Plant Pathology, Collage of Agriculture, IGKV, Raipur, Chhattisgarh. And other required materials and articles for experiment were obtained from mushroom Research Laboratory of the Department of Plant Pathology.

Composting and spawning

Wheat straw and paddy straw based compost was prepared using long method of composting. Wheat straw and paddy straw 5000 kg each straw, Rice bran 12 kg straw⁻¹, Urea 9 kg straw⁻¹ and Gypsum 18 kg straw⁻¹ were used for compost preparation. The spawning was done by layer method in polypropylene bags (16"x22") filling 05 kg compost in each bag and spawned @ 50 g bag⁻¹ by layer method. After spawning, bags were shifted to the growing room for spawn run. (Khanna *et al.*, 2007).

After complete colonization of bag, casing was done for fructifications. Vermi compost + Garden soil

(1:1) were used as casing material and which was sterilized by using 5 per cent formalin and water solution. On the polythene sheet casing mixture was spread and formalin and water solution sprinkle on it and stirrer the soil for proper mixing and covered it for 24 hour by another polythene sheet. After casing, bags were kept in growing room (Air condition based) and Ecofrost cold storage (Khanna *et al.*, 2017).

Harvesting

When the cap diameter of mushroom attained a size of 2-4 cm, these were harvested with clean hands by twisting method and were collected in clean containers. First harvesting was done in 14 days after casing and second and third harvesting was done in 4-5 days of interval respectively after first harvesting. After harvesting, refilling of bag was done by casing material.

Results and Discussion

Wheat straw alone and combination of wheat straw + paddy straw (WS+PS 1:1) and two different growing structures (Growing room and Ecofrost cold storage) used for button mushroom cultivation and observations recorded for growth and yield and results are depicted in Table 1 and 2.

The spawn run was found significantly quicker (13.30 days) in alone wheat straw compost and the combination of wheat straw + paddy straw took maximum (16.50 days) days. Pinhead initiation was significantly faster (15.60 days) in the combination of wheat straw + paddy straw. Yield attributing characters like; stalk length, stalk diameter and pileus diameter did not differ significantly. Number of fruiting bodies varies from 23.60-31.00. The significantly highest (560g) yield obtained in the combination of wheat straw + paddy straw compost with biological efficiency of 11.2 %. The combination of wheat straw + paddy straw was found better then alone paddy straw for yield of button mushroom (Uddin *et al.*, 2012).

After the casing of completely colonization, bags were shifted to different growing structure (Growing room and Solar Ecofrost cold storage). Significantly quickest (16.80 days) pinhead initiation was found under the growing structure I and yield attributing characters did not found significant except pileus diameter. The yield of button mushroom was recorded maximum (662g) under the growing structure II. Researchers found the biological efficiency ranges from 13-15 % under the totally controlled condition (Kumar *et al.*, 2017).

Table 1 : Effect of different straw compost on growth and yield of button mushroom

Strain	Spawn run (days)**	Pinhead initiation (days)**	Stalk length (cm)***	Stalk Diameter (cm)***	Pileus Diameter (cm)***	Number of fruiting bodies*	Yield (g)*	BE %
WS (long method)	13.30	19.00	2.85	1.80	1.46	23.60	397	7.94
WS+PS (short method) (1:1)	16.50	15.60	2.55	1.67	4.52	31.00	560	11.2
SEm±	0.32	0.42	0.20	0.12	0.27	2.27	37.42	
CD (5%)	0.96	1.26	-	-	-	-	112.26	

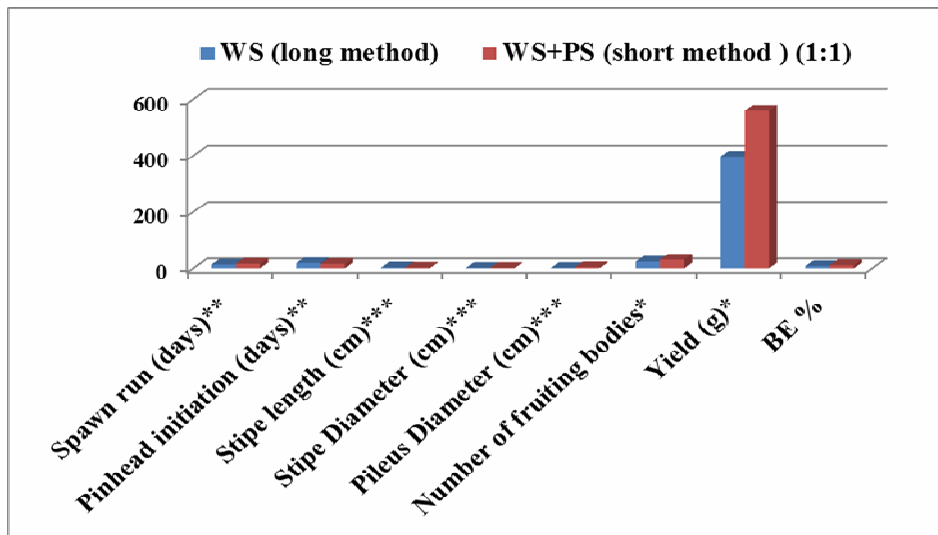


Fig. 1 : Effect of different straw compost on growth and yield of button mushroom (*A.bisporus*)

Table 2 : Effect of different growing structure on growth and yield of button mushroom

Strain	Pinhead initiation (days)**	Stalk length (cm)***	Stalk Diameter (cm)***	Pileus Diameter (cm)***	Number of fruiting bodies*	Yield (g)*	BE %
GS-I (long method)	16.80	3.17	1.65	4.66	32.80	559	11.18
GSII -(short method) (1:1)	18.70	3.65	1.70	4.05	44.60	662	13.24
SEm±	0.47	0.20	0.06	0.13	4.92	51.55	
CD (5%)	1.32	-	-	0.39	-	-	

Note: (*) – Average of five replication (**)- Average of ten replication
 (***)- Average of ten fruiting body (-) Non Significant

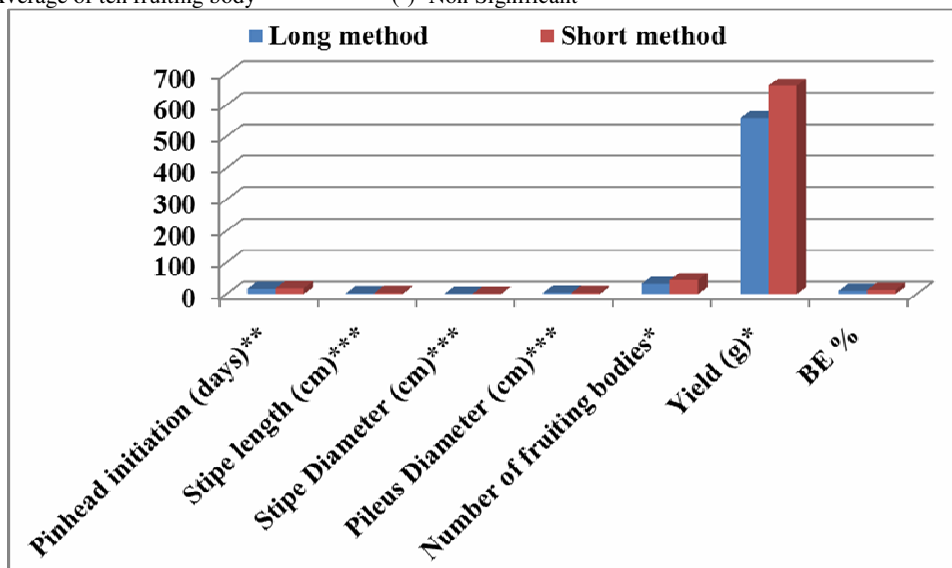


Fig. 2 : Effect of different composting method of yield and yield attributing characters of white Button mushroom.

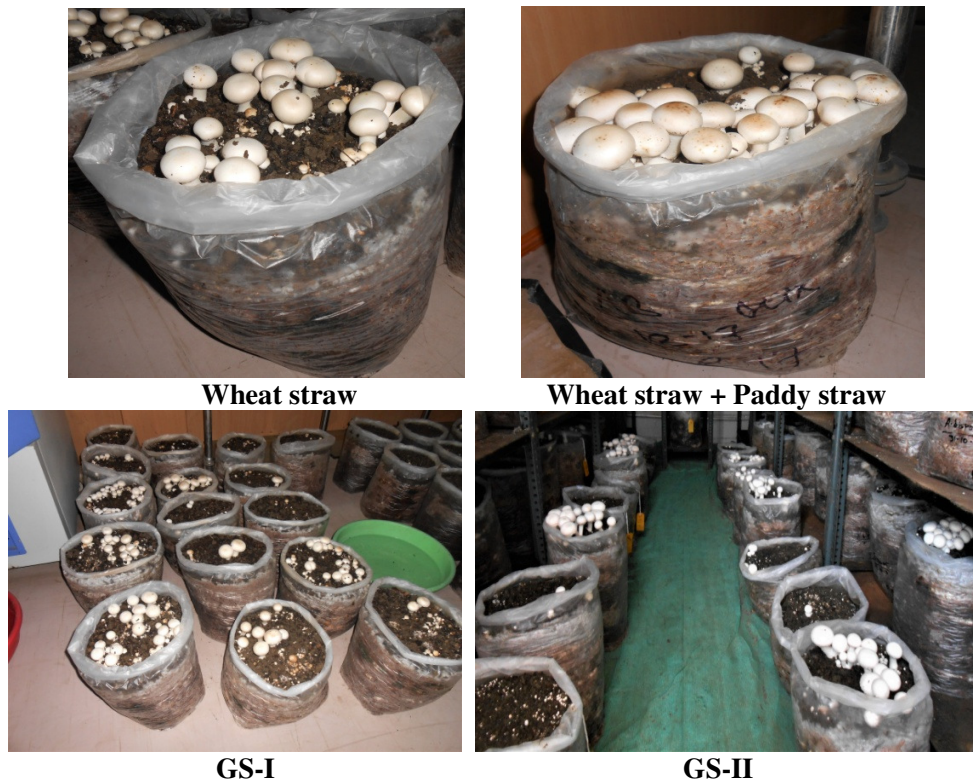


Fig. 3 : Evaluation of button mushroom for fruiting body

References

- Anonymous. (1994). Mushroom yield at different centre. Annual report. 1993-1994. All India Co-ordinated Mushroom Improvement Project National Research Centre for Mushroom, Chambaghat, Solan. pp. 36.
- Anonymous. (2002). Testing of different strains of *A. bisporus*. Annual report. 2001-2002. All India Co-ordinated Mushroom Improvement Project. Centre, Raipur (C.G.). pp. 45.
- Khanna, P.K. and Kapoor, S. (2007). A manual on mushroom production. 20Pp. 26-31.
- Khanna, P.K. and Kapoor, S. (2016). Mushroom Growing Bulletin. Punjab Agriculture University Ludhiana. pp. 78.
- Kumar, S., Doshi, A., Kumar, D. and Singh, K. (2017). Evaluation of High Yielding Strains of *Agaricus bisporus* (Lange) Sing. *Int. J. Curr. Microbiol. App. Sci.*, **6**(5): 1697-1702.
- Kurbanoglu E.B., Algur, O.F. (2002). The influence of ram horn hydrolyzate on the crop yield of the mushroom *Agaricus bisporus*. *Sci. Hortic.* **94**: 351-357.
- Manzi, P., Aguzzi, A., Pizzoferrato, L. (2001). Nutritional value of mushrooms widely consumed in Italy. *Food Chemistry.* **73**: 321-325.
- Mehta, B.K., Jain, S.K., Sharma, G.P., Doshi, A. and Jain, H.K. (2011). Cultivation of button mushroom and its processing: an techno-economic feasibility. *International J. Adv. Biotechnol. and Res.*, **2** (1), 201-207.
- Royse D.J., Baars, J., Tan, Q. (2016). Current overview of mushroom production in the world: technology and applications. Edible and medicinal mushrooms. Wiley, New York.
- Uddin, M.J., Haque, S., Haque, M.E., Bilkis, S. and Biswas, A.K. (2012). Effect of Different Substrates on Growth and Yield of Button Mushroom. *J. Environ. Sci. & Natural Res.* **5**(2): 177-180.