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## Anurag Kerketta

College of Horticulture and  
Research Station, Jagdalpur,  
Chhattisgarh, India

## HK Singh

Department of Plan Pathology,  
CoA, IGKV, Raipur,  
Chhattisgarh, India

## CS Shukla

Department of Plan Pathology,  
CoA, IGKV, Raipur,  
Chhattisgarh, India

## Varsha Kerketta

Department of Plan Pathology,  
CoA, IGKV, Raipur,  
Chhattisgarh, India

## Studies on strains evaluation of button mushroom *Agaricus bisporus* (L.) Sing

Anurag Kerketta, HK Singh, CS Shukla and Varsha Kerketta

### Abstract

Three strain (CG-I, CG-II and CG-III) of Button mushroom were evaluated during 2017, 2018 in October and February month respectively on long method prepared compost. The results revealed that the spawn run was differed significantly during both years. During October 2017, the quickest (20.4 days) spawn run was noticed in strain CG-I and the spawn run during the February month of 2018 was significantly fastest (25.9 days) in CG-III. On an average of both years, days required for spawn run was less (23.25 days) in CG-I. The pinhead initiation did not differed significantly in different strain during the October month of 2017 and varied from 14.0-15.8 days. While, during the February month of 2018, the significantly less time (14 days) recorded in CG-II. The average of two years indicated that CG-II took minimum period (14 days) for pinhead initiation. Stalk length was differed significantly in both the years. Highest (3.48 cm) average stalk length was noticed in CG-II. Stalk circumference showed significant difference during the month of October, 2017 and it was insignificant during the February month of 2018. The average stalk circumference was found maximum (2.11 cm) in CG-III. Pileus diameter was found significant in both the year, average pileus diameter was highest (4.96 cm) in CG-I. The number of fruiting bodies differed significantly during the October month of 2017 while it did not found significant during the February month of 2018. During October month of 2017, significantly more number (37.83) of fruiting bodies were obtained in CG-II and same trend was observed during February month of 2018 and average of two years (30.83) in CG-II. The weight of sporophores did not found significant during both year and it was varied from 174.15-238.35g. The fresh yield of three strain of button mushroom differed significantly during October month of 2017 and during February moth of 2018 it did not differed significantly. During the October month of 2017, the highest (566.67g) fresh yield was recorded in CG-II with 11.33% biological efficiency and during the February month of 2018, fresh yield varies from 389.25-525.43g with 7.42-9.62% biological efficiency. The pooled data of two year clearly indicate that strain CG-II gave maximum yield with highest biological efficiency.

**Keywords:** *Agaricus bisporus*, strain, month, composting and yield

### Introduction

White button mushroom, *Agaricus bisporus* (L.) Sing, has long been targeted by humans foraging for food (Chang and Miles 2004) [1]. Mushrooms are the fruiting bodies of macro fungi devoid of leaves, and of chlorophyll containing tissues. Yet, they grow and produce new biomass year after year. It was used as a food and drug (Safwat and Al Kholi, 2006) [2] by the Romans who also used various species of mushroom in decorating their buildings and places of worship (Al-Bahadli and Al-Zahron, 1991) [3]. Mushrooms are very nutritious and serve as food, tonic as well as medicine. Mushroom cultivation has great scope in India because of the cheap and easily available raw materials needed for this activity. The white button mushroom (*Agaricus bisporus*) is very popular throughout the world and is the most important mushroom of commercial significance in India. It can be successfully cultivated in places where the environmental conditions are favourable, optimum temperature for mycelial growth is 22 - 25°C and that for fruit body formation 14°C -18°C with high relative humidity and it is cultivated on specially prepared compost (Maheshwari, 2013) [4].

In Chhattisgarh, white button mushroom (*A. bisporus*) was cultivated for the first time during 1994 (Anonymous 1994) [5]. Later on many experiments were conducted on button mushroom and strain evaluation also done by Pal *et al.* (2006) [6]. In present experiments three strains were evaluated for growth behaviour, yield attributing characters and yield potential of button mushroom.

### Materials and methods

Pure culture of button mushroom (CG-I, CG-II and CG-III) strains was procured from AICRP

### Corresponding Author:

Anurag Kerketta

College of Horticulture and  
Research Station, Jagdalpur,  
Chhattisgarh, India

on mushroom, Department of Plant Pathology, CoA, IGKV, Raipur, Chhattisgarh. And other required materials and articles for experiment were obtained from mushroom Research Laboratory of the Department of Plant Pathology. For spawn preparation, wheat grain spawn was prepared using the standard methodology of Garcha (1994) [7]. Wheat grains were washed boiled for 35-40 minutes and then excess water was drained. The grains were then mixed with 2% CaCO<sub>3</sub> and 4% CaSO<sub>4</sub> powder, filled in bottles and steam sterilized at 20 psi for 120 minutes. After cooling overnight, the bottles were inoculated using 7 days old culture bit of size 3 x 1 cm, incubated at 25±1 °C until the mycelial growth impregnated the grain (@ 20 days incubation).

Wheat straw based compost was prepared using long method of composting (Khanna and Kapoor, 2007) [8]. The spawning was done using polythene bags (20 x 24 ) filling 5 kg compost in each bag and spawned @ 50 g/ bag by layer method. Casing soil was prepared by mixing well decomposed (2 yrs old) Vermicompost and garden soil in 1:1 (v/v) ratio. Bags fully impregnated with mycelium were covered with the casing soil to make 4 cm thick uniform layer. The mushrooms were harvested by gentle twisting of the fruit body. A record of spawn run, pinhead initiation, size of fruiting bodies and total yield, number of fruiting bodies in each harvest and average fruit body weight was made to determine the best strain for yield potential of button mushroom.

## Results and discussion

### Growth behaviour of button mushroom

Spawn run was quickest in CG-I followed by CG-III and CG-II during October 2017 while it was found significantly quickest in CG-III and delayed in CG-II followed by CG-I during February 2018. On an average of both years the fastest spawn run was recorded in CG-I and it was delayed in CG-II. Pinhead initiation did not differed significantly during October 2017 and varied from 14.0-15.6 days. Whereas, during February 2018, less time taken by CG-I and it took more time by CG-III and CG-I. On an average the less time required for pinhead initiation was noticed in CG-II followed by CG-I and CG-III. This result is very close to the findings

of Pal *et al.* (2006) [6] evaluated five strains for yield potential and result revealed that spawn run and pinhead initiation varied from 14.33-16.33 days and 28.66-32 days respectively. Kumar *et al.* (2017) [9] studied of growth behavior and yield potential of different strains (U-3, Delta, A-15, NCS-459, NCS-465 and Portbella). Among various strains of *Agaricus bisporus*, fastest spawn run was noticed in NCS-465 which took 14 days whereas, it was delayed in two strain NCS-459 and U-3 which took 17 days to complete spawn run. Pinhead initiation was found quickest in U-3 which took 15 days.

**Table 1:** Growth behaviour of button mushroom

Strain	Spawn run (days)*			Pinhead initiation (days)*		
	2017	2018	Average	2017	2018	Average
CG-I	24.0	26.1	23.25	15.8	15.2	15.5
CG-II	23.1	29.8	26.45	14.0	14.0	14.0
CG-III	21.3	25.9	23.60	15.6	16.6	16.1
SEm±	0.254	0.282		0.32	0.38	
CD (5%)	0.741	0.821		NS	1.12	

(\*)- Average of ten replication

### Yield attributing characters

During October 2017, stalk length of button mushroom was recorded significantly highest in CG-II followed by CG-I and CG-III. During February 2018, it showed same trend and recorded highest in CG-II while lowest stalk length was recorded in CG-I followed by CG-III. On an average highest stalk length was found in CG-II followed by CG-III and CG-I. Likewise stalk diameter was recorded maximum in CG-III followed by CG-I and CG-II during October 2017. While, it was not found significant and varied from 1.66-1.78 cm. during February 2018. On an average, maximum stalk diameter was recorded in CG-III followed by CG-I and CG-II. Pileus diameter was recorded maximum in CG-I followed by CG-I and CG-II during October 2017. Same trends found during February, 2018 and maximum pileus diameter was recorded in CG-I followed by CG-II and CG-III. The average of both years indicated that maximum pileus diameter was recorded in CG-III whereas; it was minimum in CG-II followed by CG-III.

**Table 2:** Yield attributing characters

STRAIN	Stalk length (cm)**			Stalk Diameter (cm)**			Pileus Diameter (cm)**		
	2017	2018	Average	2017	2018	Average	2017	2018	Average
CG-I	2.37	2.37	2.37	2.40	1.66	2.03	4.97	4.95	4.96
CG-II	3.66	3.30	3.48	1.20	1.76	1.48	3.41	4.11	3.76
CG-III	2.28	3.26	2.77	2.45	1.78	2.11	4.64	4.10	4.37
SEm±	0.23	0.19		0.08	0.08		0.26	0.15	
CD (5%)	0.69	0.57		0.26	NS		0.75	0.44	

(\*\*)- Average of ten fruiting bodies

**Table 3:** Yield attributing character

STRAIN	Number of fruiting bodies***			Weight of sporophores (g)**		
	2017	2018	Average	2017	2018	Average
CG-I	16.50	20.17	18.33	213.30	166.70	190.00
CG-II	37.83	23.83	30.83	175.00	173.30	174.15
CG-III	17.50	19.00	21.00	231.70	245.00	238.35
SEm±	4.11	2.04		23.13	19.55	
CD (5%)	12.51	NS		NS	NS	

(\*\*)- Average of three replication

(\*\*\*)- Average of six replication

Number of fruiting bodies during October 2017 differed

significantly and found more in CG-II followed by CG-III and CG-I and it varied from 19.0-23.83 during February 2018. On an average the more fruiting bodies recorded in CG-II and it was less in CG-I followed by CG-III. Weight of sporophores found insignificant in both years and varied from 175.0-231.70g and 166.70-245.00g respectively. On an average the highest sporophore weight found in CG-III and followed by CG-I and CG-II. This result is confirmative with the findings of Kumar *et al.* (2017) [9] studied of growth behavior and yield potential of different strains (U-3, Delta, A-15, NCS-459, NCS-465 and Portbella). The average fruiting body weight was observed to be significantly higher in case of strain Portbella (12.00 gm). In the growth behavior, U-3 gave the

best performance followed by the other strains. Maximum average length, width of stalk and average width, length of cap was observed in Portbella followed by A-15, U-3, Delta, NCS-459 and minimum was observed in NCS-465.

### Yield and biological efficiency

Fresh yield of button mushroom was differed significantly in the month of October, 2017 and did not found significant during February 2018. Maximum yield was obtained in CG-II with highest biological efficiency 11.33% followed by CG-III with biological efficiency 10.51% and CG-I with biological efficiency 8.15% during October 2017. Whereas, during February 2018, it varied from 371.50-484.20g with biological efficiency 7.42-9.68%. Based on pooled data of both years the maximum biological efficiency was recorded in CG-II followed by CG-III and CG-I. Present finding is accordance with results of Pal *et al.* (2006)<sup>[6]</sup> were screened five strains of button mushroom and reported that the biological efficiency was 12-15%.

**Table 4:** Yield potential of button mushroom

STRAIN	Yield (g)***			BE %		
	2017	2018	Average	2017	2018	Average
CG-I	407.50	371.00	389.25	8.15	7.42	7.78
CG-II	566.67	484.20	525.43	11.33	9.68	10.50
CG-III	525.83	430.00	477.91	10.51	8.60	9.55
SEm±	35.74	32.21				
CD (5%)	108.72	NS				

(\*\*\*)- Average of Six replication

### Conclusion

According to present experiment it can be conclude that the strain CG-II found best in yield potential and based on other earlier reports and experiments conducted by researchers of India, maximum biological efficiency of button mushroom varies from 10-15%. But it is most consumed mushroom among edible mushrooms in country. Hence it is a very good source of monetary benefits as well as nutritious food and medicine.

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