



Influence of different nutrient sources on the growth of white button mushroom (*Agaricus bisporus*) in Kerala

Lishma N. P.¹ and Lulu Das²

^{1,2}Department of Plant Pathology, College of Agriculture, Vellayani, Kerala

Abstract

This study was aimed to find out the nutritional requirements of the Agaricus bisporus. Six media were prepared namely potato dextrose agar, oat meal agar, malt extract agar, carrot agar, potato dextrose yeast agar- and Czapeck's Dox agar were used to find out the best medium for the growth of Agaricus bisporus. Broths of the above media were also prepared with the omission of the agar. In both solid and liquid media, the fastest growth was found in potato dextrose yeast media and least growth was in carrot media. Of the carbon sources tested glucose exhibited maximum mycelial growth and of the nitrogen sources tested beef extract showed the highest mycelial growth.

Keywords- *Agaricus bisporus; media; carbon; nitrogen*

I. INTRODUCTION

Agaricus bisporus is popularly known as white button mushroom. *Agaricus* spp. is cultivated throughout the world and contributes about 40% of the total world production of mushrooms. Button mushroom is cultivated on a composted substrate both seasonally as well as round the year under controlled environmental condition in the country. Button mushroom production and consumption increases every day, and it accounts for approximately 40% of total edible mushroom production in the world (Chang, 1999). An experiment was conducted by Uddin et al. (2012) to investigate the mycelial colony proliferation of different mushroom species Oyster (*Pleurotus florida*), Milky (*Calocybe indica*) and Button (*Agaricus bisporus*) in different media (viz. PDA, YPDA and MEA; the best mycelial growth was found in YPDA (Yeast Potato Dextrose Agar). Kumar and Munjal (1980) recorded maltose, glucose and fructose as better carbon sources than sucrose for *Agaricus bisporus*.

II. MATERIALS AND METHODS

The experiment was carried out in Kerala Agricultural University, College of Agriculture, Vellayani, Kerala.

Six different solid media namely Potato dextrose agar (PDA), Oat meal agar, Malt extract agar, Carrot agar, Potato dextrose yeast agar (PDYA) and Czapeck's Dox agar were used to find out the best medium for the growth of *Agaricus bisporus*. The media were prepared and sterilized using autoclave at 15 lbs pressure for 15-20 min. After cooling it was poured into sterile petri dishes of nine centimetre diameter and allowed to solidify. The culture disc of five mm diameter cut out from seven day old culture of fungus was used for inoculation. The inoculated petridishes were incubated at 25±2°C. Four replications were maintained for each treatment and colony diameter, nature of mycelia growth was measured at weekly intervals for 14 days.

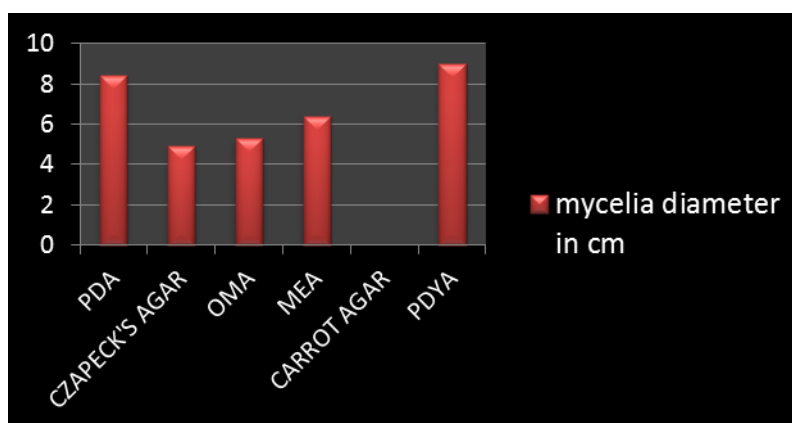
The six different media viz., potato dextrose, oat meal, malt extract, carrot, potato dextrose yeast and Czapeck's Dox broths were used to find out the best liquid media. The composition was

same as used in the previous experiment except for the omission of agar. The liquid media were prepared and 50 ml of each medium was dispensed in 100 ml conical flask and autoclaved at 1.02 kg cm⁻² pressure for 20 min. The media were then inoculated with 5 mm culture disc of fungus, taken from actively growing culture under aseptic condition. The flasks were kept at 25±2°C for 20 days. After 20 days the mycelia were filtered through a Whatman No: 1 filter paper and dried at 60°C. The dry weights were taken until a constant weight was obtained.

Agaricus bisporus was grown in media with different carbon sources viz., sucrose, glucose, xylose, mannose and fructose. These were substituted for dextrose, in potato dextrose yeast medium with agar. Four replications were maintained for each treatment and colony diameter, nature of mycelia growth etc. were measured at weekly intervals of 14 days.

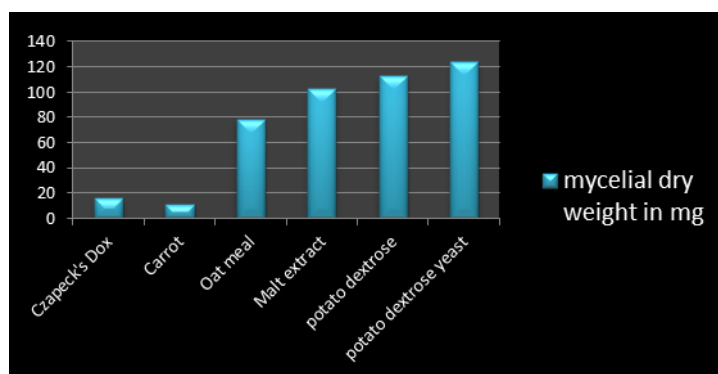
Different forms of nitrogen as potassium nitrate, ammonium carbonate, ammonium chloride, sodium nitrate, beef extract and peptone were substituted in Czapeck's medium so as to give the same per cent of nitrogen in each case.

III. RESULTS AND DISCUSSION



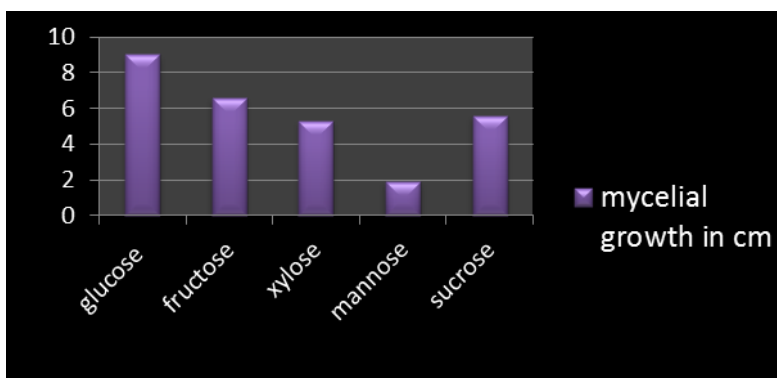
Growth of *Agaricus* culture in different solid media (Diagram 1)

The above diagram showed that the potato dextrose yeast agar exhibited highest growth of mycelium of *Agaricus bisporus* followed by potato dextrose agar, malt extract agar, oat meal agar, Czapeck's Dox agar and there was no any growth in carrot agar media. This is in accordance with the findings of Uddin *et al.* (2012), the best mycelial growth was found in YPDA (Yeast Potato Dextrose Agar) and is contradictory to the results of experiments conducted by Kannan and Eswaran (2010) and Kinjo and Miyagi (2006).



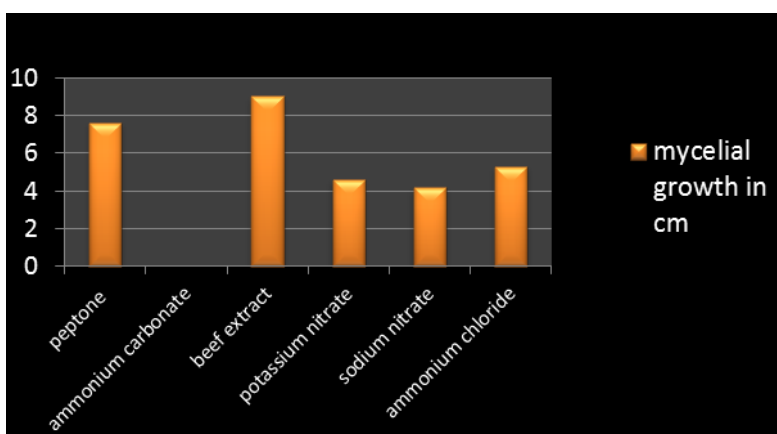
Growth of *Agaricus* culture in different liquid media (Diagram 2)

Diagram 2 showed the result obtained in the different liquid media. As in the case of solid media the potato dextrose yeast agar gave the maximum growth and the least growth was in carrot broth.



Growth of *Agaricus* culture in different carbon sources (Diagram 3)

The above diagram revealed the effect of different carbon sources on the growth of *Agaricus bisporus*. It showed that the best carbon source was glucose which is followed by fructose, sucrose, xylose and mannose. This is in agreement with the findings of Kumar and Munjal (1980) and Thirumalvalavan *et al.* (2005 a), recorded glucose as better carbon sources than others. This is contradictory to the results of experiment conducted by Tang *et al.* (2008).



Growth of *Agaricus* culture in different nitrogen sources (Diagram 4)

According to the above diagram the best nitrogen source was beef extract which is followed by peptone, ammonium chloride, potassium nitrate and sodium nitrate. There was not any significant growth with ammonium carbonate. This is in accordance with the results of Kikon and Rao (1980) while it is contradictory to the findings of Gbolagade *et al.* (2006) and Khanna and Garcha (1983).

IV. CONCLUSION

In this study the best media for the growth of *Agaricus bisporus* was found to be potato dextrose yeast both in the case of solid and liquid media. The best carbon source found was glucose and nitrogen source was beef extract

BIBLIOGRAPHY

- [1] Chang, S.T. 1999. World production of cultivated edible and medicinal mushrooms in 1997 with emphasis on *Lentinus edodes* (Berk.) Sing, in China. *Int. J. Med. Mushrooms*, 1: 291-300.
- [2] Gbolagade, J. S.; Fasidi, I.O.; Ajayi, E. J. and Sobowale, A. A. 2006. Effect of physico- chemical factors and semi-synthetic media on vegetative growth of *Lentinus subnudus* (Berk.), an edible mushroom from Nigeria. *Food Chem.*, 99: 742-747.
- [3] Kannan, C. and Esawaran, A. 2010. Evaluation of different media and additives for the cultivation of *Lentinus edodes* (berk.). *J. Plant Dis. Sci.*, 5(1): 8 – 9.
- [4] Khanna, P. and Garcha, H.S. 1983. Physiological studies on *Pleurotus* spp. I. Nitrogen utilization. *Mush. Newsl. Tropics* 5: 16-19.
- [5] Kikon, Z. and Rao, A.V. 1980. Physiological studies of the strains of edible mushroom *Pleurotus ostreatus* (jacq.) Fr. *Indian J. Mush.* 6: 24-27.
- [6] Kinjo, K. and Miyagi, T. 2006. Nutritional requirements for mycelial growth and artificial cultivation of *Tricholoma giganteum*. *J. Japan Wood Res. Soc.*, 52(5) : 320-326.
- [7] Kumar, S. and Munjal, R.L. 1980. Studies on the physiology of different single spore isolates of *Agaricus bisporus* (lange) Imbach. *Indian J. Mush.*, 6: 36-47.
- [8] Tang, Y. J.; Zhu, L. L.; Li, D. S.; Mi, Z. Y. and Li, H. M. 2008. Significance of inoculation density and *Tuber* polysaccharides production by submerged fermentation of Chinese truffle *Tuber sinense*. *Process Biochem.* 43: 576-586.
- [9] Thirumalvalavan, M., Eswaran, A., Renganathan, P. and Mathan, A. 2005a. Effect of various spawn substrates on *pleurotus florida*. National Seminar on Emerging Trends in Plant Pathology and their Social Relevance (ETPPSR). 7-8 march 2005. Annamalai University, Annamalai Nagar. *Abstract*: 143.
- [10] Uddin, M. J., Nasiruddin, K. M., Haque, M. E., Biswas, A. K. and Islam, M. S. 2012. Influence of Different Media Variety and Growth Regulator on Mycelial Colony Proliferation of Mushroom. *J. Environ. Sci. & Nat. Resour.*, 5(1): 223 – 227.