International Research Journal of Biological Sciences _____ ISSN 2278-3202
Vol. **1(8),** 85-87, December **(2012)** *Int. Res. J. Biological Sci.*

Short Communication

Effect of Different Nutrient Sources on Biomass Production of Phylloplane Yeast *Aureobasidium pullulans* (De Bary)

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Available online at: www.isca.in
Received 23rd October 2012, revised 1st November 2012, accepted 25th November 2012

Abstract

Effect of five different carbon sources namely glucose, maltose, sucrose, dextrose, starch and five different nitrogen sources viz, KNO_3, $NaNO_3$, $(NH_4)_2$ SO_2, NH_4Cl, and Peptone were evaluated for biomass production of four isolates of Aureobasidium pullulans in submerged liquid culture. Of the five sugars tested maximum biomass of isolates of A. pullulans were obtained in liquid medium containing dextrose as a carbon source, followed by glucose and sucrose. The isolates grown in maltose and starch produced less biomass as compared to other all carbon sources tested. Similarly the nitrogen sources like KNO_3, $NaNO_3$ and Peptone showed maximum biomass production in submerged liquid culture as compared to other two nitrogen sources studied. Overall results showed that dextrose and KNO_3 are the good carbon and nitrogen sources respectively.

Keywords: *Aureobasidium pullulans, b*iomass, carbon and nitrogen sources.

Introduction

Aureobasidium pullulans is a ubiquitous, polymorphic and oligotrophic black yeast-like microfungus that occurs frequently in a wide range of tropical and temperate environments[1]. *A. pullulans* is one of the most dominant colonizers of phylloplane surfaces of higher plants and is commonly isolated fungus[2,3]. This fungus is also commonly isolated from other environmental samples[4,5]. The numerous carbon compounds present on leaf surfaces offers great variety of substrate for growth of *A. pullulans*[6]. *A. pullulans* also found with fluctuating moisture in phyllosphere[7], damp indoor surfaces, degrading organic matters in soil and food and feed substances[8]. Carbon is the most important and an essential structural component of framework of the fungal cell and Nitrogen is an important component required for protein synthesis and other vital functions[9]. The carbon to nitrogen ratio (C/N) has been said to influence rapidly with a high degree of efficiency the rate of assimilation of nitrogen into microbial biomass[10,11].

All the fungi are unable to utilize exactly the same source of carbon and nitrogen, their utilization depends upon configuration of carbon compound, type of nitrogen source and the ability of certain fungus to utilize a specific source of carbon[12].

Material and Methods

Effect of various carbon and nitrogen sources on growth of *A. pullulans* were studied as per method described by Bharati, et. al.[13] and Jonathan[14]. The actively growing isolates of *Aureobasidium pullulans* were obtained from departmental culture collection and used for studying effect of different carbon and nitrogen sources. The basic Czapek's Dox Medium was supplemented with 1% various carbon sources such as glucose, maltose, sucrose, dextrose and starch and various nitrogen sources such as KNO_3, $NaNO_3$, $(NH_4)_2SO_4$, NH_4Cl, Peptone and sterilized in autoclave at 15lbs for 20 minutes separately. 2 ml inoculum of *A. pullulans* isolates containing approximately $1x10^6$ cells per ml were prepared aseptically in 10ml sterile distilled water and inoculated in 100 ml Czapek's Dox medium and the flasks were incubated at 30°C on digital shaker (MAC Scientific, Delhi) at 120 rpm for 7 days. The conical flasks without any carbon and nitrogen source were maintained separately as control. After seven days the yeasty biomass were filtered using preweighed Whatman No. 1 filter paper. The biomass were dried in an oven at 60°C for 48 hours and weighed using electronic balance. Three replicates were maintained separately and mean biomass of each isolates were recorded.

Results and Discussion

Both carbon and nitrogen sources showed maximum biomass production for all the four isolates of *A. pullulans*. Carbon and Nitrogen are the most vital nutrients required for growth and development of fungi[15]. From the results presented in table 1, it is clearly showed that maximum biomass production was recovered in dextrose followed by glucose and sucrose for all the four isolates. Minimum dry weight was recorded in starch and maltose. Out of four isolates, isolate no. I showed maximum growth in dextrose (0.421 gm) followed by glucose (0.401 gm)

and sucrose (0.320 gm). Minimum dry weight was recorded in case of isolate no. IV in presence of glucose (0.372 gm), Maltose (0.220 gm), Sucrose (0.301 gm), dextrose (0.406 gm), and starch (0.202gm). Overall results showed that all the carbon sources used more or less supported the growth of *A. pullulans* in submerged liquid culture condition.

The result presented in table 2 clearly showed that the nitrogen sources like KNO_3, $NaNO_3$, $(NH_4)_2SO_4$, NH_4Cl, and peptone supports the growth of *A. pullulans.* Out of nitrogen sources tested KNO_3 showed maximum biomass production of isolate no. I (0.318 gm), isolate no. II (0.3321 gm), isolate no. III (0.325 gm) and isolate no. IV (0.305 gm). A very poor growth of all the four isolates was recorded in case of $(NH_4)_2SO_4$ and NH_4Cl. KNO_3 was found to be best nitrogen source followed by peptone and $NaNO_3$. Out of four isolate, isolate no. III showed maximum growth in all nitrogen sources as compared to control. It is clearly observed from the results that all the isolates of *A. pullulans* showed variations in biomass production. Nitrogen is an important element for protein synthesis but all the sources of nitrogen are not equally good for growth of fungi[16].

Conclusion

It is concluded from the results that dextrose is the best carbon source for the growth of *A. pullulans.* All the carbohydrates showed maximum growth as compared to control therefore the carbohydrates can be used as carbon source for this organism. It is also concluded from the results that KNO_3 can be the potential nitrogen source for the growth of *A. pullulans.* The other nitrogen sources may recommended *for* growth of *A. pullulans* are Peptone and $NaNO_3$

Acknowledgement

Authors are thankful to Dr. G. M. Kalamse, Principal NES Science College Nanded for his inspiration and support for this investigation.

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Table-1
Effect of various carbon sources on biomass production of *Aureobasidium pullulans*

Sr No.	Isolates	Dry Mycelial wt. in gm.					
		Glucose	Maltose	Sucrose	Dextrose	Starch	Control
1	I	0.401	0.232	0.320	0.421	0.220	0.126
2	II	0.393	0.290	0.312	0.404	0.214	0.115
3	III.	0.380	0.291	0.311	0.410	0.211	0.113
4	IV	0.372	0.220	0.301	0.406	0.202	0.104

Table-2
Effect of various Nitrogen sources on biomass production of *Aureobasidium pullulans*

Sr No.	Isolates	Dry Mycelial wt. in gm.					
		KNO_3	$NaNO_3$	$(NH_4)_2SO_2$	NH_4Cl	Peptone	Control
1	I	0.308	0.301	0.201	0.281	0.307	0.196
2	II	0.321	0.294	0.288	0.273	0.302	0.212
3	III.	0.325	0.311	0.292	0.293	0.308	0.216
4	IV	0.305	0.302	0.202	0.280	0.296	0.194