J. Mycopathol. Res. **38**(2) : 133–135 (2000) *Printed in India*

Effect of hydrogen-ion concentration on mycelial growth of some tropical mushrooms under submerged culture

A. K. MANNA AND N. SAMAJPATI

Department of Botany, Dinabandhu Mahavidyalaya, Bongaon, 24-Parganas (N) and Department of Botany, Calcutta University, Calcutta 700 019

The effect of different hydrogen-ion-concentration on the mycelial growth of four edible mushrooms were studied. The data revealed that 5.5 pH was optimum for *Leucocoprinus cepaestipes* and *Collybia dryophila* and pH 6.0 was optimum for *Lepista sordida* and *Collybia diminuta.*

Key words : Mycelial growth, pH, *Leucocoprinus cepaestipes, Collybia dryophila, Lepista sordida, Collybia diminuta*

INTRODUCTION

The hydrogen-ion concentration of the medium plays an important role on the growth of the fungi, though it varies according to the nature and components of the medium. Reusser *et al.* (1958) have shown that *Tricholoma nudum* can grow best at a medial pH, varying from 2.0-6.5 of which 4.5 found to be the best one. *Volvariella volvacea* has been found to produce the best mycelial yield at an optimum pH 5.0 as reported by Atacador *et al.* (1967) where as it was pH 4.0 according to Ghosh and Sengupta (1977). Hong *et al.* (1981) have reported that a range of pH value varies from 6.0 to 6.5 and from 5.0 to 6.5 respectively for the best mycelial growth of *Agaricus bitorquis* and *Pleurotus ostreatus* in the synthetic medium. An initial pH of 5.0 has been reported to be the optimum for the best mycelial growth of *Pleurotus membranaceous* and *Sarcoxylon compunctum* (Sarwal *et al.*, 1982). According to Martin (1983) *Agaricus campestris* prefers pH 6.0 for best growth in submerged medium.

In this study attempts have been made to evaluate the role of pH on the mycelial growth of *Leucocoprinus cepaestipes, Collybia dryophila, Lepista sordida* and *Collybia diminuta.*

MATERIALS AND METHODS

Tissue cultures were prepared from the collected basidiocarps of *Leucocoprinus cepaestipes* (Sow. ex Fr.) Pat., *Collybia dryophila* (Bull. ex Fr.) Kummer, *Lepista sordida* (Fr.) Singer and *Collybia diminuta* (Berk & Fr.) Sacc, and used in the study. To determine the role of pH on the mycelial production by *L. cepaestipes. Lepista sordida. Collybia diminuta and Collybia dryophila,* nine sets of media with different pH were prepared with 0.2M phosphate buffer. Different pH of the media were adjusted to 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5 and 8.0 respectively. After inoculation, the flask sets were maintained at the respective optimum temperature of 30°C (± 0.5°C) for *L. cepaestipes* and *Collybia dryophila* while the flasks were kept at 25°C for *Lepista sordida* and *Collybia diminuta* for different incubation periods.

The other experimental procedure are same as described in Manna and Samajpati (1997).

RESULTS AND DISCUSSION

The data obtained during the experimental period are given in Tables 1-3.

The data resulted from the experiment indicate

that the test organisms are able to grow within a wide range of pH i.e. 4.0 to 8.0 excepting *Lepista sordida*. This fungus fails to grow in the acidic medium with pH 4.0 and again very slow growth is observed in the alkaline medium having pH 8.0, up to 14 days of incubation period. The optimum pH for the vegetative growth of *Leucocoprinus cepaestipes* and *Collybia dryophila* is found to be 5.5, while for that of *Lepista sordida* and *Collybia diminuta* the pH is 6.0. Of the four test organisms *Leucocoprinus cepaestipes* can grow well in the medium with acidic range (i.e. 4.0-6.5) than in alkaline one, and *Collybia dryophila* is also able to grow in a wide range of pH from 4.0-7.5. The mycelial growth of *Lepista sordida* is well accelerated in a short range of pH i.e. 5.5 to 7.0, which indicates that the nature of the growth medium would be neither too acidic nor alkaline. However, in case of *Collybia diminuta*, the mycelial biomass production is appreciably good within the pH range of 4.0 to 7.0. The data on the optimum pH of the test-fungi also coincide with the reports of Hong *et al.* (1981) and Martin (1983).

Table 1 : Data (mean)* showing the effect of different hydrogen-ion concentration on the vegetative growth of the test fungi under submerged conditions

Hydrogen-ion concentration	Dry weight of mycelium (mg/30 ml) Test fungi				pH mean
	Leucocoprinus cepaestipes	*Collybia dryophila*	*Lepista sordida*	*Collybia diminuta*	
4.0	124.5	136.5	13.5	110.5	96.2
4.5	113.5	144.6	29.1	124.4	102.9
5.0	125.9	132.0	71.7	121.3	112.7
5.5	184.2	245.9	173.1	147.3	187.6
6.0	182.1	222.1	181.7	154.3	185.0
6.5	113.5	205.6	120.9	96.7	134.2
7.0	126.9	200.1	108.3	105.4	135.2
7.5	124.3	154.0	91.3	104.1	118.4
8.0	109.5	110.1	24.1	80.9	81.1
Fungus mean	133.8	172.3	90.4	116.1	

* Average of three replicates

L. S. D. at 5% level : Fungus (F) = 2.552 ; pH (T) = 3.828 ; F x T = 7.657

Table 2 : Data (mean)* showing the effect of different incubation periods on the vegetative growth of the test fungi under submerged conditions

Incubation period (days)	Dry weight of mycelium (mg/30 ml) Test fungi				Incubation period mean
	Leucocoprinus cepaestipes	*Collybia dryophila*	*Lepista sordida*	*Collybia diminuta*	
7	140.8	177.2	34.8	120.5	118.3
14	164.0	213.3	61.3	148.2	146.7
21	126.1	167.4	135.9	110.3	134.9
28	104.2	131.3	129.2	85.3	112.5
Fungus mean	133.8	172.5	90.3	116.0	

* Average of three replicates

L. S. D. at 5% level : Fungus (F) = 2.552 ; Incubation period (I) = 2.552 ; F x I = 5.105

Table 3 : Data (mean)* showing the effect of different pH on the vegetative growth of the test fungi under submerged conditions at different incubation period level

Hydrogen-ion concentration	Dry weight of mycelium (mg/30 ml) Incubation period (days)				pH mean
	7	14	21	28	
4.0	112.3	135.9	76.6	60.1	96.2
4.5	105.2	116.6	107.0	82.7	102.9
5.0	107.7	116.2	126.8	98.0	112.7
5.5	165.9	215.0	196.7	172.9	187.6
6.0	153.8	203.0	198.6	184.8	185.0
6.5	106.9	149.6	156.3	123.9	134.2
7.0	132.5	146.7	145.0	116.4	135.1
7.5	103.5	133.7	131.5	104.9	118.4
8.0	77.4	101.7	76.0	68.6	80.9
Incubation period mean	118.3	146.7	134.9	112.5	

* Average of three replicates

L. S. D. at 5% level : Incubation period (I) = 2.552 ; Hydrogen-ion concentration (T) = 3.828 ; I x T = 7.657

REFERENCES

Atacador-Ramos, M., Palo, M. A., Villadolid, D. V., and Cruz, D. S. (1967). A study of submerged culture production of banana mushroom (*Volvariella volvacea)* mycelium as a source of protein, B-vitamins and food flavour. *Phillip. J. Sci.*, **96** : 191-211.

Ghosh, A. K. and Sengupta, S. (1977). Studies on biochemistry of higher fungi. I. Submerged growth of *Volvariella volvacea* in synthetic medium. *J. Fd. Sci. Technol.*, **14**(1) : 6-10.

Hong, J., Lee, K. S. and Dong, S. C. (1981). Studies on Basidiomycetes : I. Mycelial growth of *Agaricus bitorquis* and *Pleurotus ostreatus*. *Kor. J. Mycol.* **9**(1) : 19-24.

Manna, A. K. and Samajpati, N (1997). Effect of temperature on the mycelial growth of some tropical mushrooms under submerged culture. *J. Natl. Bot. Sec.* **51** : 43-46.

Martin, A. M. (1983). Adaptation of *Agaricus campestris* (NRRL 2334) to a peat extract medium. *Can. J. Microbiol.* **29**(1) : 108-110.

Reusser, F., Spencer, J. F. T. and Sallans, H. R. (1958). *Tricholoma nudum* as a source of microbiological protein. *App. Microbiol.* **6** : 5-8.

Sarwal, B. M., Sethi, J. K. and Singh, R. (1982). A comparative physiological account of two wood rotting fungi. 1. Carbon nutrition. *Biovigyanam* **8**(2) : 141-143.

(Accepted for publication August 29 2000)