

NOTE

Bioproduction of Alcohol by Ascomycetous Yeast Exposed to Some Chemical Mutagens

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Mutagenic actions of *o*-, *m*-, *p*-tolyl hydrazine hydrochloride and 2,3,5,6-tetrafluorophenyl hydrazine were studied on fermentative production of alcohol by *S. cerevisiae* Am-38. It was found that *ortho* and *meta*-tolyl hydrazine hydrochloride greatly influences the production of alcohol while *para*-tolyl hydrazine hydrochloride and 2,3,5,6-tetrafluorophenyl hydrazine was not encouraging and could increase a slight alcohol in comparison to control.

There has been a considerable interest in the chemistry of mutagenic chemicals and related compounds, because of their biological importance in fermentation process.¹⁻¹⁴ Recently Singh *et al.*^{15, 16} studied the influence of a few chemicals on alcoholic ferment *S. cerevisiae* and observed that some chemicals were of great significance for alcoholic fermentation. The present study was undertaken to assess and analyse the bioproduction of alcohol by ascomycetous yeast *S. cerevisiae* Am-38 exposed to some chemical mutagens.

Composition of the production medium for 100 mL flask each was as follows: Molasses: 25% (w/v), Malt-extract: 0.375%, Yeast-extract: 0.375%, Peptone: 0.515%, pH: 4.9 ± 0.1 . Temperature: $29 \pm 1^\circ\text{C}$. (pH of the medium was adjusted by adding requisite amount of lactic acid.)

Assay methods: Estimation of the alcohol formed and molasses left unfermented was made colorimetrically by McCloskey & Replogle¹⁷ method and Dubois¹⁸ method respectively.

Sterilization: In an autoclave at 15 lbs. steam pressure for 30 min.

Inoculum: 0.05 mL yeast suspension of *S. cerevisiae* Am-38.

Age of the Inoculum: 36 h (0.05 mL dose).

Incubation periods: 25, 45 and 75 h.

Optimum incubation period: 45 h.

The results obtained in the study of the influence of some mutagenic chemicals on bioproduction of alcohol by *S. cerevisiae* Am-38 are tabulated in Table-1.

The results obtained are tabulated in Table-1. From the data shown in Table-1, it is evident that all the mutagens under trial have different action on bioproduction of alcohol by ascomycetous yeast *S. cerevisiae* Am-38. It was observed that *ortho* and *meta*-tolyl hydrazine hydrochloride greatly influences the bioproduction of alcohol and increases the yield 8.943% and 8.196% respectively in comparison to control in 45 h of optimum incubation period. *p*-tolyl hydrazine

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hydrochloride also enhances the bioproduction of alcohol but up to 4.368% only while 2,3,5,6-tetrafluorophenyl hydrazine was not encouraging and could increase a slight *i.e.* 2.278% alcohol in comparison to control in the same experimental conditions and optimum incubation period.

TABLE-1
COMPARATIVE ASSESSMENT OF THE INFLUENCE OF DIFFERENT CHEMICAL
MUTAGENS ON BIOPRODUCTION OF ALCOHOL BY *S. cerevisiae* Am-38 AFTER 45h.
OF OPTIMUM INCUBATION PERIOD

Mutagens used	Optimum concentration of mutagens	Max. yield of alcohol* in mL/100 mL in control	Max. yield of alcohol* in the presence of different mutagens in mL/ 100 mL	% Difference in the yield of alcohol after 45 h of optimum incubation period.
<i>o</i> -tolyl hydrazine hydrochloride	4.0×10^{-5} M	6.15	6.70	+ 8.9430
<i>m</i> -tolyl hydrazine hydrochloride	3.0×10^{-5} M	6.10	6.60	+ 8.1967
<i>p</i> -tolyl hydrazine hydrochloride	2.0×10^{-5} M	6.18	6.45	+ 4.3689
2,3,5,6-tetrafluoro-phenyl hydrazine	4.0×10^{-5} M	6.16	6.30	+ 2.2727

*mean of triplicate

+ve values indicate % increase in the yield of alcohol. Experimental deviation: ± 1.5 –2.5%.

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