

Influence of atropine sulphate on bioconversion of molasses to ethanol

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Abstract : The efficacy of atropine sulphate on bioconversion of molasses to ethanol by *S. cerevisiae* RY-20 has been assessed. It has been found that the atropine sulphate at 4×10^{-5} M molar concentration enhances the bioconversion of molasses to ethanol to an extent of 11.572% higher in comparison to control fermentor flasks, i.e., 4.58 ml/100mL in 58 hrs of incubation period, 4.5 pH and 30°C temperature with 15% (w/v) molasses solution.

(Keywords: Molasses, ethanol, atropine sulphate *Saccharomyces cerevisiae* RY-20)

Introduction

Atropine Sulphate is the sulfate salt of atropine, a naturally-occurring alkaloid isolated from the plant *Atropa belladonna*. Atropine functions as a sympathetic, competitive antagonist of muscarinic cholinergic receptors, thereby abolishing the effects of parasympathetic stimulation. The literature is inadequate on data pertinent to the participation of alkaloids on fermentation process. The influence of alkaloids specially on microbes and microbial process have not been studied extensively¹. Since some alkaloids²⁻¹⁰ are known to be produced during some fermentation process it is obvious that such alkaloids being toxic are not toxic to the microbes involved in the fermentation bioprocess. The present study was undertaken to assess and analyse the bioconversion of molasses to ethanol by *S. cerevisiae* RY-20 exposed to atropine sulphate

Experimental

The composition of the production

medium for bioconversion of molasses to ethanol is prepared as follows :

Molasses : 15% (w/v), Malt-Extract : 1.25% , Yeast-Extract : 1.25%, Peptone : 1.25% Distilled water : To make up 100 ml, pH : 4.5, Distilled water was added to make up the volume up to '100 ml'. The pH of the medium was adjusted to 4.5 by adding requisite amount of lactic acid.

The fermentor-flasks were then steam sterilized, cooled, inoculated, incubated at 30°C and analysed colorimetrically after 48, 58, and 65 hours for ethanol¹⁸ formed and molasses sugars¹⁹ left unfermented.

Results and Discussion

The influence of atropine sulphate on bioconversion of molasses to ethanol.

The data given in the table-1 shows that the alkaloid, i.e.; atropine sulphate has been found stimulatory for the bioconversion of molasses to ethanol by *S. cerevisiae* RY-20. From the data given in the table - 1, it is obvious that atropine sulphate influences the ethanolic fermentation process in different phases. The main characteristics of the effect of atropine sulphate on bioconversion of molasses to ethanol by *S. cerevisiae* RY-20 is as under :

(i) Atropine sulphate is stimulatory at its all molar concentrations used during the course of the bioconversion of molasses to ethanol by *S. cerevisiae* RY-20, i.e; from 1.0×10^{-5} M to 10.0×10^{-5} M.

(ii) The molar concentration of the atropine sulphate from 1.0×10^{-5} M to 4.0×10^{-5} M influences the yield of ethanol significantly and enhances

Table - 1
Microbial bioconversion of molasses to ethanol by *Saccharomyces cerevisiae* RY-20
exposed to atropine sulphate

Concentration of alkaloid used A X 10 ^{-x} M	Incubation Period in hours	Yield of ethanol* in ml/100ml	Molasses sugars* left unfermented in g/100 ml	% Difference in yield of ethanol after 58 hours in comparison to control.
Control	58	4.58	2.524	—
1.0 × 10 ⁻⁵ M	58	4.70	2.405	+ 2.620
2.0 × 10 ⁻⁵ M	58	4.75	2.355	+ 3.711
3.0 × 10 ⁻⁵ M	58	4.89	2.215	+ 6.768
4.0 × 10 ⁻⁵ M**	58	5.11***	1.994	+ 11.572
5.0 × 10 ⁻⁵ M	58	5.02	2.085	+ 9.606
6.0 × 10 ⁻⁵ M	58	4.84	2.265	+ 5.676
7.0 × 10 ⁻⁵ M	58	4.75	2.354	+ 3.711
8.0 × 10 ⁻⁵ M	58	4.70	2.405	+ 2.620
9.0 × 10 ⁻⁵ M	58	4.66	2.445	+ 1.746
10.0 × 10 ⁻⁵ M	58	4.62	2.485	- 0.873

* Each value represents mean of three trials. ** Optimum concentration of the alkaloid used.

*** Optimum yield of ethanol in 58 hours. (+) Values indicate % increase in the yield of ethanol in comparison to control. Experimental deviation (±) 1.5–3%.

M/1000 solution of atropine sulphate was prepared and 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, and 10.0 ml of this solution was added to the fermentor-flasks.

the production of ethanol regularly.

(iii) The other molar concentrations of atropine sulphate i.e; from 5.0 × 10⁻⁵ M, to 10.0 × 10⁻⁵M influences the yield of ethanol in almost decreasing manner and could give the production of ethanol approximately with slight difference, i.e., 9.606%, 5.676%, 3.711%, 2.620%,

1.746% and 0.873% respectively. However, the maximum yield of ethanol has been found at 4.0 × 10⁻⁵M concentration of atropine sulphate, i.e., 5.11 ml/100 ml which is 11.572% higher in comparison to control fermentor flasks i.e. 4.58 ml/100ml

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