

Facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930 exposed to 2-hydrazinobenzoic acid hydrochloride

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Abstract : Mutagenic action of 2-hydrazinobenzoic acid hydrochloride was studied on facile bioproduction of 2-hydroxypropanoic acid by some lactic acid bacteria such as *Bacillus licheniformis* -2537, *Lactobacillus acidophilus* -2930, *Bacillus polymyxa*-2539, *Bacillus circulans* -5031 and *Lactobacillus plantarum*-2912. It was found that *Lactobacillus acidophilus* -2930 was most effective and higher lactic acid producer and enhances the yield of 2-hydroxypropanoic acid significantly to an extent of 10.323% higher in comparison to control.

(Keywords : Mutagens, 2-hydrazinobenzoic acid hydrochloride, 2-hydroxypropanoic acid, *Lactobacillus acidophilus* -2930).

Introduction

Mutagenic chemical are active molecules that enhances the frequency of some kinds of mutations¹⁻⁵. Chemical mutagens are employed to induce favourable mutations at high frequency that includes chemical mutagens⁶⁻⁹ and ionization radiation. Therefore, one of the very interesting and exciting fields of biochemical research to-day is that of mutagenic effect on different fermentation bioprocesses¹⁰⁻¹³. The survey of the literature reveals that much work has been done related to mutagenesis of plant breeding but not to fermentation biotechnology. The present communication deals with the effect of chemical mutagen 2-hydrazinobenzoic acid hydrochloride on facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus*-2930.

Experimental

Composition of production medium

Molasses : 25%(W/V), Malt-extract : 0.25%

Yeast extract : 0.25%, (NH₄)₂HPO₄ : 0.25%

CaCO₃:12%, pH :5.8

(Adjusted by phosphate-buffer solution).

Distilled water : Distilled water was added to make up the volume upto 100 ml

The pH of the medium was adjusted to 5.8 by adding requisite amount of 'phosphate-buffer' solution, and the pH was also ascertained by a pH meter. Now, M/1000 solution of 2-hydrazinobenzoic acid hydrochloride was made 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 flat bottom fermentor flask of 1st to 10th sets respectively.

Assay Methods : Lactic acid¹⁴ formed and molasses¹⁵ left unfermented was estimated colorimetrically. M / 1000 solution of 2-hydrazinobenzoic acid hydrochloride of mutagen has been used.

Results and Discussion

Facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930 exposed to 2-hydrazinobenzoic acid hydrochloride

The data recorded in the table -1 shows that 2-hydrazinobenzoic acid hydrochloride was found to be increasing upto its concentration from 1.0×10^{-5} M to 7.0×10^{-5} M. It was found that gradual addition of 2-hydrazinobenzoic acid hydrochloride to the fermentation medium above the optimum concentration 7.0×10^{-5} M gradually the yield of lactic acid which shows that higher concentrations

Table - 1
Facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930
exposed to 2-hydrazinobenzoic acid hydrochloride

Concentration of mutagen used $A \times 10^{-x}$ M	Incubation Period in days	Yield of lactic acid *in g/100ml	Molasses* left unfermented in g/100 ml	%Diff. in the yield of lactic acid in 7 days
Control	7 days	9.677	3.341	-
1.0×10^{-5} M	7 days	9.701	3.332	+0.248
2.0×10^{-5} M	7 days	9.809	3.512	+1.364
3.0×10^{-5} M	7 days	9.906	3.109	+2.366
4.0×10^{-5} M	7 days	10.002	3.061	+3.358
5.0×10^{-5} M	7 days	10.209	2.806	+5.597
6.0×10^{-5} M	7 days	10.502	2.756	+8.525
7.0×10^{-5} M**	7 days	10.676**	2.389	+10.323
8.0×10^{-5} M	7 days	10.293	2.723	+6.365
9.0×10^{-5} M	7 days	9.893	3.125	+2.323
10.0×10^{-5} M	7 days	9.785	3.473	+1.116

*Each value represents mean of three observations. (+) values indicate % increase in the yield of lactic acid. ** Optimum concentraion of mutagens and yield of lactic acid. Experimental deviation ($\pm$) 1.5 to 2.5%

of 2-hydrazinobenzoic acid hydrochloride are not favourable for the facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930 and thus insignificant. However, it was observed that 2-hydrazinobenzoic acid hydrochloride has stimulating effect at all its concentrations used.

The maximum yield of lactic acid was observed at 7.0×10^{-5} M concentration of 2-hydrazinobenzoic acid hydrochloride, i. e., 10.676 g/100 ml in 7 days of optimum incubation period which was found to be 10.323% higher in comparison to control flat bottom fermentor flask, i.e., 9.677g/100 ml in the same conditions and optimum incubation period.

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