

Facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930 exposed to 1,3-butanediol

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Abstract : Mutagenic action of 1,3-butanediol was studied on facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930. It was found that 1,3-butanediol enhances the yield of 2-hydroxypropanoic acid significantly to an extent of 14.201% higher in comparison to control.

(Keywords): Mutagens, 1,3-butanediol, 2-hydroxypropanoic acid, *L. acidophilus* -2930).

Introduction

Molecular biology has helped us to understand the basic mechanisms underlying mutagenesis¹⁻¹⁰. The discovery of chemical mutagens initiated a flurry of activities in the field of mutagenesis. Therefore, one of the very interesting and exciting fields of biochemical research to-day is that of mutagenic effect on different fermentation processes¹¹⁻¹⁵. The survey of the literature reveals that much work has been done related to mutagenesis of plant breeding but not to fermentation technology. The present communication deals with the effect of chemical mutagen 1,3-butane diol on facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930

Experimental

Composition of production medium

Molassess : 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 1,3-butanediol 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 acid¹⁶ formed and molasses¹⁷ left was estimated unfermented colorimetrically.

M / 1000 solution of 1,3-butane diol of mutagen has been used.

Results and Discussion

Facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930 exposed to 1,3-butanediol :

The data given in the table 1 shows that 1,3-butanediol was found to be increasing upto its concentration from 1.0 x 10⁻⁵M to 5.0 x 10⁻⁵M and above this concentration the facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930 was found to be decreasing. However, facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus*-2930 at all the experimental concentrations of 1,3-butanediol used were higher than that of control flasks.

The maximum yield of lactic acid was observed at 5.0 x 10⁻⁵ M concentration of 1,3-butanediol , i. e., 11.041 g/100 ml in 7 days of

Table - 1
Facile bioproduction of 2-hydroxypropanoic acid by *Lactobacillus acidophilus* -2930
exposed to 1,3-butanediol

Concentration of mutagens 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	9.668	3.457	-
1.0×10^{-5} M	7	9.862	3.152	+2.006
2.0×10^{-5} M	7	10.315	2.701	+6.692
3.0×10^{-5} M	7	10.756	2.262	+11.253
4.0×10^{-5} M	7	10.960	2.065	+13.363
5.0×10^{-5} M**	7	11.041**	1.984	+14.201
6.0×10^{-5} M	7	10.670	2.348	+10.364
7.0×10^{-5} M	7	10.283	2.775	+6.361
8.0×10^{-5} M	7	9.989	3.025	+3.320
9.0×10^{-5} M	7	9.789	3.225	+1.251
10.0×10^{-5} M	7	9.750	3.269	+0.848

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

optimum incubation period which is 14.201% higher in comparison to the control flasks, i. e., 9.668g/100 ml in the same experimental conditions and optimum incubation period.

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