

Microbial search for production of lactic acid exposed to 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine

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Abstract : The efficacy of 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine on production of lactic acid by *Lactobacillus case* NCIM-2617 has been assessed. It has been found that cytokinin, i.e. 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine at concentrations 8.0×10^{-5} M enhances the production of lactic acid to an extent of 16.575% higher in comparison to control while at 8.0×10^{-5} M and onwards concentration of 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine inhibits the production of lactic acid to a great extent in comparison to control.

(Key words : Lactic acid fermentation, 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine and *Lactobacillus case* NCIM-2617)

Introduction

Cytokines are produced by a broad range of cells, including immune cells like macrophages, B lymphocytes, T lymphocytes and mast cells, as well as endothelial cells, fibroblasts, and various stromal cells; a given cytokine may be produced by more than one type of cell.¹⁻⁴

In 1969 Dudley Dumonde proposed the term “lymphokine” to describe proteins secreted from lymphocytes and later, proteins derived from macrophages and monocytes in culture were called “monokines”. As scientists learned more, it was understood that these proteins and others were part of a broader class of proteins involved in self-defense, and should be called “cytokines”.⁵⁻¹⁰

The influence of 6-(4-Hydroxy-3-methyl-

trans-2-butenyl) aminopurine in fermentation technology specially lactic acid fermentation has not been studied extensively¹¹⁻¹³ 6-(4-Hydroxy-3-methyl-*trans*-2-butenyl) aminopurine is one of the few cytokine which has found effective chemical in fermentations. 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine and its derivatives are the active ingredient in coconut milk, which causes plant growth¹⁴ 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine has several anti-aging effects on human skin fibroblasts¹⁵. Zeatin¹⁶ and some other compounds has been found effecting for lactic acid and other fermentation process¹⁷⁻³².

The present study was undertaken for the production of lactic acid by *Lactobacillus casei* NCIM-2617 exposed to 6-(4-Hydroxy-3-methyl-*trans*-2-butenyl) aminopurine

Experimental

Compositions of the production medium:

The composition of the production medium for production of lactic acid by *Lactobacillus casei* NCIM-2617 exposed to 6-(4-Hydroxy-3-methyl-*trans*-2-butenyl) aminopurine is as follows:

Molasses: 15% (w/v), Malt Extract :0.75%

Yeast Extract : 0.75%, Peptone: 0.75%

(NH₄)₂HPO₄: 0.75%, CaCO₃ : 5.0%, pH: 6.0

Distilled water : To make up 100 ml.

(pH was Adjusted by adding requisite amount of phosphate-buffer solution)

Assay methods:

Evaluation of lactic acid³² formed and

Table - 1
Microbial search for production of lactic acid exposed to
6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine

Concentration of mutagens used A X 10 ^{-x} M	Incubation Period in days	Yield of lactic acid* in g/100 ml	Molasses sugars* left unfermented in g/100 ml	% Difference in yield of lactic acid in comparison to control after 6 days
Control	3	3.498	2.512	—
(– Cytokinin)	6	6.196	0.813	—
	9	4.863	0.710	—
1.0 x 10 ⁻⁵ M	3	3.501	2.504	—
(+ Cytokinin)	6	6.203	0.798	(+) 0.112
	9	5.115	0.685	—
2.0 x 10 ⁻⁵ M	3	3.543	2.459	—
(+ Cytokinin)	6	6.278	0.737	(+) 1.323
	9	5.175	0.635	—
3.0 x 10 ⁻⁵ M	3	3.574	2.429	—
(+ Cytokinin)	6	6.335	0.673	(+) 2.243
	9	5.231	0.568	—
4.0 x 10 ⁻⁵ M	3	3.613	2.389	—
(+ Cytokinin)	6	6.401	0.610	(+) 3.308
	9	5.303	0.508	—
5.0 x 10 ⁻⁵ M	3	3.683	2.325	—
(+ Cytokinin)	6	6.528	0.481	(+) 5.358
	9	5.431	0.381	—
6.0 x 10 ⁻⁵ M	3	3.749	2.263	—
(+ Cytokinin)	6	6.645	0.380	(+) 7.246
	9	5.543	0.289	—
7.0 x 10 ⁻⁵ M	3	3.935	2.165	—
(+ Cytokinin)	6	6.982	0.115	(+) 12.685
	9	5.879	0.095	—
8.0 x 10 ⁻⁵ M**	3	4.071	1.935	—
(+ Cytokinin)	6	7.223***	0.095	(+) 16.575
	9	6.126	0.031	—
9.0 x 10 ⁻⁵ M	3	3.784	2.219	—
(+ Cytokinin)	6	6.707	0.299	(+) 8.247
	9	5.618	0.186	—
10.0 x 10 ⁻⁵ M	3	3.644	2.359	—
(+ Cytokinin)	6	6.459	0.548	(+) 4.244
	9	5.358	0.440	—

* Each value represents mean of three trials ** Optimum concentration of mutagen used

*** Optimum yield of lactic acid (+) values indicate % increase in the yield of lactic acid after 6 days.
 Experimental deviation (±) 1.5-3%

molasses³³ left unfermented was made colorimetrically.

Sterilization: The growth and production medium was sterilized in an autoclave maintained at 15 lbs steam pressure for 30 minutes.

Strain: *Lactobacillus casei* NCIM-2617 has been employed in the present study. The strain was procured from NCL - Pune, India

Age of the inoculum: 48 hours old.

Quantum of the inoculum : 0.5 ml bacterial suspension of *Lactobacillus casei* NCIM-2617
Incubation period : 3 6 and 9 days

Results and Discussion

The data recorded in the table-1 shows the influence of 6-(4-hydroxy-3-methyl-*trans*-2-butenyl) aminopurine on production of lactic acid

by *Lactobacillus casei* NCIM-2617. The results show that the compound 6-(4-Hydroxy-3-methyl-*trans*-2-butenyl) aminopurine is not much beneficial and encouraging for the production of lactic acid by *Lactobacillus casei* NCIM-2617 and thus causes slight enhancement in the production of lactic acid by *Lactobacillus casei* NCIM-2617 exposed to experimental cytokinins concentrations from 1.0×10^{-5} to 10.0×10^{-5} M.

The maximum production of lactic acid by *Lactobacillus casei* NCIM-2617 was found to be at 8.0×10^{-5} M concentration of 6-(4-Hydroxy-3-methyl-*trans*-2-butenyl) aminopurine, i.e., 7.223g/100 ml in 6 days of optimum incubation period which is 16.575% higher in comparison to control fermentor flasks, i.e., 6.196g/ 100 ml in the same set of experimental parameters.

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