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The influence of Inositol on growth of *A. clavatus*-24 and on production of citric acid by submerged fermentation

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ABSTRACT

The influence of inositol on the growth of the mold *A. clavatus*-24 and on citric acid production by submerged fermentation has been studied and has been found that it deactivates the enzyme systems. It retards the production of citric acid as the growth increases up to 4.0×10^{-3} M in 5 days of incubation while it increases up to 3.0×10^{-3} M concentration only within 10 and 15 days of incubation. Thus, it has been found that even the maximum yield of citric acid obtained within 10 and 15 days of incubation were far below than that in controls. However, the maximum yield obtained within 5 days of incubation was comparatively better than that in control

Keywords: Citric acid, *A. clavatus*-24, Inositol,

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INTRODUCTION

Inositol is vitamin B8. There are 9 geometric isomers of inositol. Out of these meso-inositol is important. Since it possesses significant activity as a growth factor for certain animals and micro-organisms. Other isomers of Inositol apparently do not possess this activity to any appreciable extent. For these reasons, meso - Inositol is often termed simply Inositol.

Experimental

The used medium's composition was as follows:

Sucrose : 720.00 g [15%]

NH₄NO₃ : 12.00 ± 0.5 g

MgSO₄.7H₂O : 1.20 g ± 0.5 g

KH₂PO₄ : 4.80 g ± 0.5 g

Distilled water : 2.40 litres

The PH of the medium was adjusted to 2.2 by adding requisite amount of buffer solution KCl-HCl. A PH metre was used to measure the PH. The composition medium shown above was divided into 48 sections to indicate the composition medium volume. Each dose was administered in its own 250ml flat-bottom fermentor flask. Then, three sets of fifteen fermentor flasks each were placed in the centre of the collection. As controls, the final three fermentor flasks were maintained. Each set was

split into five smaller groups, each made up of three fermentor flasks.

Now M/1000 solution of Inositol was prepared and 1ml, 2ml and 3 ml of the solution were added to the 1st, 2nd and 3rd subsets of all the three sets of the flasks respectively. Similarly 4 ml and 5 ml of the solutions were added to the 4th and 5th subsets respectively.

The control flasks contained no inositol. Each fermentor flask's total volume was increased to 100 ml by adding the necessary amount of distilled water. Thus the molar concentration of inositol in the 1st, 2nd, 3rd, 4th and 5th subsets were approximately as given below: -

$A \times 10^{-x} \text{ M}$

$1.0 \times 10^{-5} \text{ M}$

$2.0 \times 10^{-5} \text{ M}$

$3.0 \times 10^{-5} \text{ M}$

$4.0 \times 10^{-5} \text{ M}$

$5.0 \times 10^{-5} \text{ M}$

Where: A = Amount of Inositol in ml i.e. 1.0 ml....to 5.0 ml X = Molarity of the Inositol

The above fermentor flasks were then sterilized, cooled, inoculated and analysed after 5 days, 10 days and 15 days for citric acid formed and sugar left unfermented.



Table 1: The influence of Inositol on growth *A. clavatus* -24 and on citric acid production

Concentration of Inositol	Growth of* the mold			Yield of citric acid*			Sugar left*		
	g/100 ml	g/100ml	g/100ml	g/100 ml	g/100 ml	g/100 ml	g/100 ml	g/100 ml	g/100 ml
A × 10-XM	5	10	15	5	10	15	5	10	15
1.0×10-5M	1.2356	2.0513	2.0993	2.2131	1.7718	1.1886	6.6713	3.1712	2.1954
2.0×10-5M	1.3798	2.5793	2.7153	1.9386	1.9425	1.0136	8.3506	3.2285	2.7612
3.0×10-5M	1.4985	2.9765	3.2629	2.3516	1.8568	0.7325	7.9997	4.1123	3.6813
4.0×10-5M	1.6531	2.2115	2.6393	2.0586	1.9253	0.7816	8.2421	4.3815	3.4228
5.0×10-5M	1.4156	2.3513	2.2911	1.6718	1.7311	0.6256	8.4116	2.8350	1.3315
Control	1.6115	2.6113	3.1935	1.0863	3.4416	5.0539	12.5310	7.4512	4.3215

*Each value represents mean of three trials Experimental deviation (±) 1.5 to 3.5 %



Result and discussion

The data recorded in the table -1 showing results of the influence of Inositol on growth of the mold *A. clavatus*-24 was not encouraging. It was evident from the fact that the growth of the mold *A. clavatus*-24 was not significantly better than that in control. However, it was also observed that the growth increases with the increase in the incubation period as well as with the increase in the concentration of inositol up to a certain limit. For instance, in the case of 5 days of incubation the growth went on increasing up to $4.0 \times 10^{-5}M$ and with 10 and 15 days of incubation the growth was found to increase $3.0 \times 10^{-5}M$ concentration only. With higher concentrations of Inositol, the growth stated decreasing.

The influence of Inositol on the yield of citric acid was not found to be significant. The presence of Inositol retarded the yield of citric acid with the increase of incubation period it was also observed that even the maximum yields of citric acid obtained with 10 and 15 days of incubation were far below than that in the controls. However, the maximum yield obtained with 5 days of incubation was comparatively better than that in the control.

Thus, it was concluded that Inositol deactivates the enzyme system and consequently retards the production of citric acid.

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