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The influence of hydrogen ion concentration on the growth of A. clavatus strain 24 on the citric acid production by submerged Fermentation:-

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Abstract—*The influence of hydrogen-ion concentration on the growth of A. clavatus strain- 24 on the citric acid product in by submerged fermentation has been studied. It has been observed that the consumption of sugar during the course of citric acid production by submerged fermentation corresponds with the production of citric acid. However, at PH 1.8 the consumption of sugar was not proportionate to the production of citric acid . The amount of sugar utilized at PH 1.8 was 11.985g while it was 12.160g at PH1.6 .The amount of citric acid produced 2.6359gm at PH 1.6 was less than the amount of citric acid produced 2.920g at PH 1.8. However PH2.2 was most suitable for the higher yields of citric acid and therefore this PH value was maintained in the medium employed in through out the experiment of bioconversion of sugar to citric acid by submerged fermentation.*

Keywords*: A.clavatus-24, hydrogen-ion, citric acid*

Introduction:-

All biological and physiological process occur most readily at some unique PH-value .Hydrogen-ion concentration plays an impotant role in citric acid fermentation and it is therefore desired that the fermentation should be carried out at optimum PH of the medium, the maintenance of a favourable PH is very important for the successful operation of the fermentation process.

Sorenson was the first to throw light on the importance of PH in the biochemical and microbial studies. Bahadur and Malviya showed the influence of PH on citric acid production by various stranis of A. niger. Mario found that an appreciable yield of citric acid was obtained by resuming aeration and adjusting PH to 2.2 in the fermentation medium in which the aeration had been interrupted and the PH becomes less than 2. In the present study, the PH of the medium was controlled by using the required quantity of KCl-HCl buffer solution

Experimental:-

The composition of the medium employed was as follows:-

Sucrose : 450.00 [15%]
NH4NO3 : 7.50g+<->0.05g
MgSO4.7H2o : o.75g+<->o.5g
Distilled water : 1.50 litres

The entire volume of the above medium was divided to 30 equal parts and each part was taken in a 250 ml flat bottom flask. The flasks were arranged in ten sets, each comprising of three flasks. To the first five sets requisite amounts of KCL-HCL buffer solution were added to adjust respectively the PH at 1.2,1.4,1.6,1.8,and 2.0. Similarly the PH- values 2.2,2.4,2.6,2.8 and 3.0 were kept in the sets from 6 to 10 respectively. The PH adjusted in each set was also ascertained by the PH-meter. Then The total volume in each flask was made up to 100 ml by adding requisite amount of distilled water.

The fermenter flasks were plugged with cotton and sterlized in an auto- clave maintained at 15 lb steam pressure for 30 minutes. After the sterilization the flasks were allowed to cool to room temperature and then in oculated with a definite quantity of conodia suspension of A. clavatus strain 24. The flasks were then incubated for 10 days only at 33 c in an incubator. The contents of the fermentor flasks were analysed for the growth of the mold, for The amount of citric acid produced and the amount of sugar left.

Effect of hydrogen-ion concentrations on the growth of mold and on the production of citric acid by A. clavatus 24 after 10 days of incubation.

Hydrogen ion concentration	Growth of the mold * g/100ml	Yield of citric acid g /100ml	sugar left*
1.2	NIL	Nil	11.812
1.4	NiL	Nil	12.00
1.6	1.4402	2.6359	2.540
1.8	2.3224	2.9290	3.015
2.0	3.1416	3.2014	2.812
2.2**	3.7382***	3.3252***	2.488
2.4	3.3120	2.2934	2.922
2.6	3.309	3.09682.864	2.864
2.8	3.5622	2.696	2.820
3.0	3.0740	2.0504	3.730

* Each value represents mean of three triaes. Experiment deviation -+ 1.5 to 3.5%

Note:- Approve 3-5%of sugar is utilized in the growth of the mold and production of some other by-products.

** optimum PH valume

*** optimum growth of the mold

***optimum yield of citric acid. Result and discussion:-

The data given in the above table show that the growth of the mold A. clavatus -24 did not take place at PH 1.2 and 1.4 The growth of the mold began with 1.6 PH and went on increasing with the increase of PH upto 2.2. The minimum growth of the mold was 1.4402 g/100ml at 1.6 and the maximum growth was 3.7382g/100ml at PH 2.2. There was a gradual decrease in the growth of the mold with the increase in PH values from 2.4 to 3.0

As for as the production of citric acid by submerged formention was concerned, it was observed that citric acid was also not produced at low PH,1.2 and 1.4 because of the fact that there was no growth of the mold at these PH- values.However like the growth,the production of citric acid started at PH 1.6 and went an increasing upto a PH of 2.2 The minimum yield of citric acid was 2.0504g/100ml at PH 3.0 while The maximum was 3.3252 g/100 ml at PH 2.2. There was then a gradual decrease in the yield of citric acid from 2.4 to 3.0 PH

It was observed that the consumption of sugar during the course of citric acid fermentation by submerged fermentation correspond with the production of citric acid. However, at PH 1.8 the consumption of sugar was not proportionate to the production of citric acid. The amount of sugar utilized at PH 1.8 was 11.985g, while it was 12.160 at PH 1.6. The amount of citric acid at PH 1.6 .The amount of citric acid produced 2.6359g, at PH 1.6 was less than the amount of citric acid produced 2.9290g at PH 1.8.

It was thus concluded that PH 2.2 was most suitable for the higher yields of citric acid and therefore this PH 2.2 was maintained in the medium employed in all experiments carried out in bioconversion of sugar to citric acid by submerged fermentation.

References:

Sorenson s. and Ergeb,P.L.	:	Physiol,12,393-532(1912)
Neish,A.C.	:	First intern.congs.biohem Engle,533-5(1949)
Bahadur,and Malviya,A.N	:	Zentr,bakt. Parasit, Intect. Hyg. Abt.11,117,66-69,1963
Currie,J.N.	:	Jour .Biol. .Chem . ,31 ,15-37(1917)
Doelger ,W.P .and Prescott,	:	Ind . Eng .Chem;26,1142(1934)
Behadur, K . and malviya,A.N	:	Mycopathol.Appli,36,359-64(1968)
Mario,A.B,	:	U.S .3,290,227,(u.195-36)1967
A. Patra ,A.KMukhopadhyay and A.K Mitra	:	Indian I. chem seet.B,17,138,(1979)
Matzel,H.Was mhoff and F.Korte,	:	Chem .Ber.102,312(1969)
R.Chenvert,J.plante and D. Beaucage	:	synthesis75(1982)
Green,D.E,	:	DSc Thesis, PP.231-243,un Allahabad(india)(1955)
Booy ,H.L.,	:	Rec.trav,botany.nearlad,37,1(1940)
Hickey,R.J	:	Arch .Biochem.8,439-47(1945)
Brack,A. ,	:	Helv. Chem .acta ., 30,(1947)