Biospectra : ISSN: 0973-7057, Vol. 15(2), September, 2020, pp. 195-198 **40(IS).**
An International Biannual Refereed Journal of Life Sciences ***Interdisciplinery Science***

ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

Production of citric acid by *Aspergillus candidus* NCIM-883 exposed to 3- Acetyl-4-hydroxycoumarin

Serwer Equbal*
Department of Chemistry, M.G.College, Magadh University, Bodhgaya, Bihar, India

Received : 22nd April, 2020 ; Revised : 27th May, 2020

Abstract- The efficacy of 3-Acetyl- 4-hydroxycoumarin was studied on citric acid production by *Aspergillus candidus* NCIM-883. It has been found that the coumarin i.e. 3-Acetyl-4-hydroxycoumarin at concentration $6.0x10^{-4}$ M enhances the production of citric acid extent of 2.51383% higher in comparison to control fermentor flasks in 5.58152 g/100ml in 10 day of optimum incubation period.

Keywords : 3- Acetyl-4-hydroxycoumarin, citric acid, sucrose, *Aspergillus candidus* NCIM-883.

INTRODUCTION

Coumarin has a wide spread occurrence in natural products too & is a representative of lactones (where a lactone is an ester group integrated into a carbon ring system. Coumarin is a crystalline white solid when seen pure, with a hay like, sweet aromatic creamy odour with certain nutty shadings much used in synthetic form an a fragrance chemical for perfumes and for fragranced soaps and detergents.

A group of compounds closely related to the phenolic acid and also derived from the shikimic acid pathway are the coumarins.[1] More than 500 coumarins exists in nature, although only a few are usefully found in any particular plant family[2] Compounds containing two coumarins moleties have been found to be extremely useful as anticoagulants[3], antimicrobials[4] and triplet sensitizers[5]. Coumarins owe their class name to "Coumarou' the vernacular name of the tonka bean (*Dipteryx odorata* willd, fabaceae), from which coumarin was isolated in 1820.[6]

Thus, from the above review it is evident that coumarins are required for citric acid fermentation & in the view of this, the author has studied the influence of 3-Acetyl-4- hydroxyl coumarin on novel method of citric acid production by *Aspergillus candidus* NCIM-883.

MATERIALS AND METHODS

The influence of 3-Acetyl-4-hydroxy coumarin on citric acid production by *Aspergillus candidus* NCIM-883. The composition of the production medium for the production of citric acid by *Aspergillus candidus* NCIM-

*Corresponding author :
Phone : 96313 26431
E-mail : equbalserwer@gmail.com

883 was prepared as follows: sucrose: 15%, $NH_4 NO_3$: 0.18%, $KH_2 PO_4$: 0.25%, $MgSO_4 7H_2O$: 0.35%, pH:2.2

The pH of the production medium was adjusted to 2.2 by adding requisite amount of KCl-HCl buffer solution & this pH was also determined by a pH meter.

Production of citric acid by *Aspergillus candidus* NCIM-883 exposed to 3- Acetyl-4-hydroxy coumarin.

Concentration of coumarin used a x 10^{-x}M	Yield of citric acid* in g/100 ml			% of citric acid increase (+) in 10 day of optimum in incubation period
	7 days	10 days	15 days	
Control	3.86131	5.58152	4.82561	-----
$1.0x10^{-4}$M	3.86903	5.59554	4.81522	(+0.25118
$2.0x10^{-4}$M	3.87289	5.60292	4.82005	(+)0.38340
$3.0x10^{-4}$M	3.89989	5.65128	4.85847	(+)1.24983
$4.0x10^{-4}$M	3.91536	5.66643	4.87725	(+)1.52127
$5.0x10^{-4}$M	3.93082	5.68315	4.89210	(+)1.82083
$6.0x10^{-4}$M**	3.95782	5.72183***	4.92578	(+)2.51383
$7.0x10^{-4}$M	3.94625	5.70509	4.91134	(+)2.21391
$8.0x10^{-4}$M	****	5.69393	****	(+) 2.01378
$9.0x10^{-4}$M	****	5.58438	****	(+) 0.05124
$10.0x10^{-4}$M	****	5.58331	****	(+) 0.03207

* Mean of three observation.

** Optimum Concentrationof coumarin.

*** Optimumyild of citric acid

**** insignificant value (+) ve values indicate increase in the yield of citric acid

Experimental deviation (±) 1.5 to 3.5 %

The above compositon mediyum represents volume of a fermentor flask i.e. "100ml" citric acid production by *Aspergillus candidus* NCIM-883. Now the same production was prepared for 99- fermentor flask ie, each contained '100ml' of production medium. The above 99- fermentor flasks were then arranged to 11- sets each comprising of 9-fermentor flasks. Each set was then rearranged in 3-subsets, each consisting of 3-fermentor flasks. The remaining 9-fermentor flasks out of 99- fermentor flasks were kept as control and these were also rearranged in 3-subsets each consisting of 3-fermentor flasks. After preparing the above sets of fermentor flasks M/1000 solution of 3-Acetyl-4-hydroxycoumarin was prepared & form the above coumarin solution 1.0, 2.0,3.0, 4.0, 5.0,6.0,7.0,8.0,9.0, ad 10 ml was added to fermentation flask of above 1st to 10th sets respectively. Thus, the molar concentration of 3-Acetyl-4-hydroxycoumarin in 1st,2nd , 3rd, 4th, 5th, 6th,7th, 8th, 9th, 10th, subsets approximately as given below.

$Ax10^{-x}$ M

$1.0x10^{-4}$M to $10.0x10^{-4}$ M

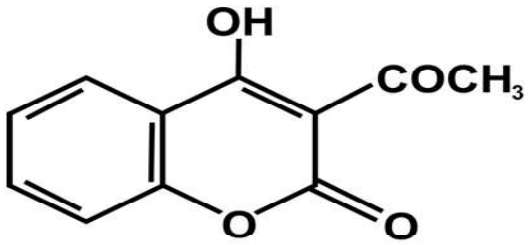
Where, A = amount of coumarin,

In ml, i.e. 1.0ml ..... to 10 ml

x=Molarity of the coumarin solution

The above fermentor flasks were then sterilized, cooled, inoculated, incubated at 28^0C and analysed after 7, 10 and 15 days for citric acid formed and sucrose sugar left unfermented.

RESULTS AND DISCUSSION



3- Acetyl-4-hydroxycoumarin

The data recorded in the table-1 shows that 3- Acetyl-4-hydroxycoumarin has stimulatory effect on production of of citric acid by *Aspergillus candidus* NCIM-883. The results show that the compound 3-Acetyl-4-hydroxycoumarin

is not much beneficial and encouraging for bioconversion of sucrose to citric acid by *Aspergillus candidus* NCIM-883 and thus causes slight enhancement in the production of citric acid exposed, to experimental coumarin concentration from 1.0 $x10^{-4}$ to 10.0 $x10^{-4}$M.

CONCLUSION

It has been observed that maximum yield of citric acid was found to be at $6.0x10^{-4}$M concentration of 3-Acetyl-4-hydroxycoumarin, i.e. 5.72183 g/100 ml in 10 days of optimum incubation period which is 2.51383% higher in comprarison to control fermentor flasks, i.e. 5.58152 g/100ml in the same set of experimental parameters.

ACKNOWLEDGEMENT

The author is grateful to Department of Chemistry, M.G.College, Magadh University, Bodhgaya for providing laboratory and library facilities.

REFERENCES

1. **R.P. Singh & D. Singh. 1985.** *Heterocytes*. **23:** 903
2. **A Patra, A.K. Mukhopadhayay & A.K. Mitra. 1986.** *Indian J. Chem. Sect. B.* **25:** 1167.
3. **K.C Majumdar, A.T. Khan & R.N. Pe. 1988.** Synth. Commum, **18:**1589.
4. **H.P Rao & G. Shrimannarayan. 1990.** *Synth. Commun.* **20:**535.
5. **K.C Majumdar, D.P. Das & A.T. Khan. 1988.** *Synth commun.* **18:**2027.
6. **Bruneton. J. 1999.** Immunotoxicity of epicutaneously applied anticoagulant rodenticide warfarin. Hampshire UK Intercept Ltd. **2:**245.

***