OPTIMISATION OF MEDIUM COMPOSITION FOR THE PRODUCTION OF SOPHOROLIPIDS FROM *CANDIDA TROPICALIS*

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ABSTRACT

The present study was aimed to optimise the cultural conditions for the production of sophorolipids from *candida tropicalis* by using different carbon, nitrogen and lipid sources. oleic acid was used as a co substrate for the better yield of sophorolipids. Medium composition was determined by shake flask method using Erlenmeyer flask in a rotary shaker. The fermentation medium was composed of 100g/L glucose. Medium was sterilized at the temperature of 121^{0}C for 20 minutes and incubated with 10% inoculum. Batch culture was carried out in 500 ml Erlenmeyer flask containing 100ml production medium for 168 hours at 30 ± 1^{0}C in a rotary shaker at 120 rpm. During fermentation pH was not controlled. The Sophorolipids were extracted with ethyl acetate. The production media and cultural conditions were same for other carbon sources. D-glucose was replaced with other carbon sources such as sucrose, dextrose, lactose, maltose, n-hexadecane and their concentration also studied.

KEY WORDS: sophorolipids, *candida tropicalis*, optimisation, production.

1. INTRODUCTION:

In recent years micro organisms have found their applications not only in the production of a variety of metabolites but also in the bio transformation of several chemicals. Now a days sophorolipid (Glycolipid biosurfactants) is used as a source for preparing new compounds of useful functionality. such as glucose lipid –acid [17-L-(β-glucopyranosyl)-oxy- octadec-(9)-enoic acid]which are commercially not yet available and difficult to prepare employing organic synthesis, could be a useful intermediate for polyester and macrocyclic lactone production.

ORGANISM PROFILE

Candida are ascomycetous or basidomyceous fungi that reproduces vegetatively by budding or fission and that forms sexual status which are not enclosed in a fruiting body. The subdivisions are based on aspects of *Candida* sexuality (Ascomycotina or Basidomycotina) or lack of it (Deutromycotina). Various *Candida spp* come under the subdivision deutromycotina, *Candida* are anamorphic i,e.,Mitosporic expression.

2.RESULTS AND DISCUSSION

A. Characterization of *Candida tropicalis*

a. Macroscopic morphology

On sabouraud dextrose agar, *Candida tropicalis* colonies are cream coloured with mycelial border.It produced a thin surface film and bubbles when grown in sabouraud broth.

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b. Microscopic morphology

On cornmeal tween 80 agar plate they are abundant with branched *pseudo hyphae*.The blastospores appeared in clusters.No capsules were found in Indian ink preparations.

c. Physiological test

Germ tube test is negative

Hydrolysis of urea is positive

Growth at 30^{0}C and 37^0 C are positive.

d. Fermentation test

Positive-Glucose, dextrose, sucrose, lactose and maltose.

e. Assimilation test

Positive-Glucose, dextrose and sucrose

Negative-Maltose and lactose

B. Production of Sophorolipids

Optimization of medium composition:

The medium composition for sophorolipids production by *Candida tropicalis* was determined by shake flask method using Erlenmeyer flask in a rotary shaker. We studied the effect of carbon source by fermentation medium containing only carbon source in batch culture .There was no yield obtained in the medium containing only carbon source (carbon source studied such as glucose, dextrose, sucrose, maltose (carbohydrate)n-hexadecane(hydro carbon)substrate. we obtained significant yield only in the medium containing carbon and nitrogen. A maximum yield of 25.3g/L sophorolipids produced by *Candida tropicalis* from medium containing glucose 100g/L, urea 10g/L and yeast

extract 10g/L.The other nitrogen sources such as ammonium nitrate, potassium nitrate, yeast extract and peptone gave less yield of sophorolipid when compared with the medium containing yeast extract and urea. There was significant improvement in the yield when we added oleic acid to the above medium. We obtained 31.18g/L of sophorolipid from the medium containing n-hexadecane (precursors), mineral salts (sodium chloride, ammonium chloride, potassium chloride) and vitamins from our strain.

Table 1: Influence of various carbon sources on SLS production by *Candida tropicalis* in Batch Culture

Carbon sources	Glucose	Dextrose	Sucrose	Lactose	n-Hexadecane	Maltose
NY	NY	NY	NY	NY	NY	NY

*NY- No Yield

Table 2: Influence of various Nitrogen Sources on SLS production by *Candida tropicalis* in Batch Culture

Nitrogen sources	Ammonium nitrate (10 g/L)	Potassium nitrate (10 g/L)	Sodium nitrate (10 g/L)	Urea (10 g/L)	Yeast extract (10 g/L)	Peptone (10 g/L)	Urea + yeast extract (10 g/L)
Yield in g/L	17.18	6.20	15.19	23.32	20.19	16.13	25.30

Table 3: Influence of various Lipid Sources on SLS production by *Candida tropicalis* in Batch Culture

Lipid Sources	Oleic acid	Soya bean oil	Sunflower oil	Coconut oil
Yield in g/L	31.18	19.17	16.13	12.18

Table 4: Effect of Various Precursors on Sophorolipid Production by *Candida tropicalis* in Batch Culture

Precursors	n-hexadecane	Vitamins
Yield in g/L	23.32	22.13

Table 5: Influence of various Mineral Salts on SLS production by *Candida tropicalis* in Batch Culture

Mineral salts	NaCl	NH_4Cl	KCl
Yield in g/L	22.13	20.31	19.18

EFFECT OF MINERAL SALTS

The effects of mineral salts on the production of SLs were studied by *Candida tropicalis* on various mineral salts such as sodium chloride, Ammonium chloride and Potassium chloride.

3.SUMMARY AND CONCLUSION

Sophorolipids can be used for recovery of metals for polluted water ways and use of bio fertilizers and biopesticides. From our study we obtained 49.8g/L sophorolipid from Fed-batch –II method using *Candida tropicalis*. The yield can be improved by mutations and also the cost of sophorolipids can be reduced by using cheap substrates such as sugar molasses, beat molasses and waste meat product, sulphur waste.

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