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Microbiological examination of macronutrients (C & N) for production of Antibiotics produced by Actinomycetes

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Abstract

The present study indicates that C and N sources are very important for antibiotic production. Streptomyces isolates DC-25 and DC-30 are specific to utilize C and N source for their growth. The compounds which have generally amino group is easily utilized by streptomyces and promote its growth for production of antibiotics by adding various amino acids like glycine, alanine, phenyl alanine, leucine and thyroxin. It was noted during course of study that various carbon sources like xylose, maltose, lactose *etc*. were utilized by actinomycetes but cellulose was poorly utilized.

Keywords: *Streptomyces isolate, DC-25, DC-30, Carbon and Nitrogen source*

Introduction

The presence of different carbon and nitrogen sources is very important for the growth of actinomycetes and production of antibiotics. Sometimes it was found that presence of carbon sources like glucose, maltose, starch *etc.* causes lower production for streptomycin (Dulany, 1948). But actinomycetes species like *S.gresius* can be easily grown on xylose , glucose, galactose, while it doesn't shows any growth on arbinose, lactose, inocitol and ducitol.Similarly few of nitrogen sources like protein, peptone and amino acid supported the growth of actinomycetes and nitrate and urea followed the production of antibiotics.

Materials and Method

The DC-25 and DC-30 isolates of streptomyces were cultured on different broths in 250 ml flask which were sterilized at 15 lbs for 30 minute.

Now 1ml of spore suspension was inoculated on the DC-25 and DC-30 and incubated for 15 days at 28 . Different carbon sources including sugar, alcohol and nitrogen sources were then examined for the measurement of growth for DC-25 and DC-30. The pH was maintained at 6.6 and autocleved

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Similarly, nitrogen compounds were incorporated on basal medium and pH was maintained to 6.6. After that the streptomyces was inoculated and incubated at 30 for 15 days.

Media Used

Sucrose Nitrate

Sucrose	3.0 gm
$NaNO_3$	0.2 gm
$FeSO_4$	0.001 gm
$MgSO_4$	0.05 gm
Pot. Dihydrogen Phosphate	0.1 gm

Glucose asparagin

Glucose	1.0 gm
$MgSO_4$	0.025 gm
Asparagines	0.5 gm
Dipotassium hydrogen phosphate	0.5 gm
Distilled water	1.0 liter

Gelatin Broth

Peptone	0.5 gm
Beef extract	0.3 gm
Gelatin	0.4 gm

Nutrient Broth

Peptone	0.5 gm
Beef extract	0.5 gm
NaCl	0.5 gm

Results and Discussion

The results of the present study are tabulated in Table. 1 to 4. Table 1 shows the effect of different carbon sources on the growth and productionof antibiotic by actinomycetes (Isolate DC-25). The maximum value was observed in Xylose i.e. 16.8 after 20 days of inhibition while lowest value was observed in Sucrose i.e. 9.4. Table 2 shows the effect of carbon sources in production of antibiotic substances by actinomycetes (Isolate DC 30). In DC-30 the maximum inhibition in incubation after 20 days was observed in Xylose i.e 17.0 mm while lowest was observed in starch i.e. 12.2 mm. Table 3 shows the effect of nitrogen sources in production of antibiotic substances by actinomycetes (Isolate DC 25). The maximum value was observed in Arginine i.e. 16.2 mm while lowest was observed in Glycine i.e. 13.2 mm. Table 4 shows the effect of nitrogen sources in production of antibiotic substances by actinomycetes (Isolate DC 30). The highest value was observed in Glycine i.e. 17 mm while lowest was observed in Arginine i.e. 12.4 mm. It is evident from various culture mediums that the maximum yield of antibiotic occurred in sucrose nitrate medium in comparison to other medium. Glucose asparagines medium showed less yield of antibiotic. Gupta and Tandon (1977) have found that chemically defined media is able to enhance antibiotic production.

During our study of different culture medium the best yield occured in sucrose nitrate medium in comparison to glucose asparagines which showed mild yield whereas the gelatin broth and nutrient broth media showed very poor growth in case of *S. ganmycicus* it showed maximum antibiotic yield but showed poor mycelial growth. It showed less antibiotic production with decreased medium. Basuchaudhary (1961), Baldacci (1961), Chestster and Rollinson (1955) and Clutterbuck et *al.* (1932) found similar results.

Table.1: Effect of different Carbon sources in the growth and production of antibiotics by actinomycetes (Isolate DC-25)

S.No	Carbon Source	Inhibition in incubation (mm) after 20 days of *A. alternata.*
1	Xylose	16.8
2	Sucrose	9.4
3	Lactose	15.2
4	Starch	16.4
5	Maltose	16.1

Table. 2: Effect of different Carbon sources in production of antibiotic substance by actinomycetes (Isolate DC--30)

S.No	Carbon Source	Inhibition in incubation (mm) after 20 days of *A. alternata.*
1	Sucrose	16.0
2	Xylose	17.0
3	Maltose	15.3
4	Lactose	14.0
5	Starch	12.2

Table.3: Effect of different Nitrogen sources in production of antibiotic substance by actinomycetes (DC-25)

S.No	N Source	Inhibition in incubation (mm) after 20 days of *A.* alternata.
1	Glycine	13.2
2	Alanine	14.8
3	Glutamic Acid	14.3
4	Arginine	16.2
5	Aspartic Acid	12.2

Table.4 : Effect of different Nitrogen sources in production of antibiotic by actinomycetes (DC-30)

S.No	N Source	Inhibition in incubation (mm) after 20 days of *A. alternata.*
1	Glycine	17
2	Alanine	14
3	Glutamic Acid	15.2
4	Arginine	12.4
5	Aspartic Acid	15.3

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