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OPTIMIZATION OF CARBON, NITROGEN SOURCES AND TEMPERATURE FOR HYPER GROWTH OF ANTIBIOTIC PRODUCING STRAIN *STREPTOMYCES KANAMYCETICUS* MTCC 324

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ABSTRACT
The growth of *Streptamyces kanamyceticus* MTCC 324 strain was studied using a number of carbon and nitrogen sources at different temperatures. Among the carbon sources, glucose was found to be suitabe for the growth of the strain while on maltose, dextrose, sucrose and starch were moderate. Growth was optimum at 300C where as amonium dihydrogen phosphate was preferred to most other nitrogen sources. by this strain. At pH 7+1 maximum growth was obtained. The present study reveals that a corelation exists between growth of organism and antibiotic production.

INTRODUCTION

Members of actinomycetes are producer of a large number of commercially important antibiotics. *Streptomyces* is a leading producer of clinically important antibiotic among the actinomycetes. *Streptomyces kanamyceticus* is Gram positive actinomycetes which produce Kanamycin (Cross 1980). It is an aminoglycoside which inhibit the growth of pathogen by blocking the protein synthesis (Egorov, 1985). Nutrient medium containing organic, inorganic elements, vitamin with balance pH, temperature, aeration and duration are the key factors for the growth of organism and production of secondary metabolites. Antibiotic production usually takes place during second phase of growth (idiophase).The increase in biomass (dry weight of mycelium) takes place before initiation of idiophase with enhance the production of antibiotics (Egorov, 1985). The present paper relates to the study of utilization of different carbon, nitrogen sources along with pH at different temperature for the hyper growth of Kanamycin producing strain *S.kanamyceticus* MTCC 324.

MATERIALS AND METHODS

The strain of *S. kanamyceticus* MTCC was obtained from IMTECH, Chandigarh, India. The strain was maintained in the laboratory on starch casein agar slants at 30ºC and subcultured at 30 days interval Kuster and Williams (1964). Chemicals used were of analytical grade and purchased from Loba chemical India. Basal medium was used with slight modification as described by Kuster and Williams (1964) consisting of casein - 0.3g, NaCl $_2$.0g, K_2HPO_4 - 2.g, $MgSO_4$ $7H_2O$ 0.005g, $ZnSO_4$ $7H_2O$ 0.0005g, $CaCl_2$. $2H_2O$ 0.04g $FeSO_4$. $7H_2O$ 0.005g in 1000 mL distilled water. The pH was adusted to 7.+1 To study the effect of carbon and nitrogen sources on growth 0.51% sodium nitrate and dextrose 1% was sterilized separately and added in medium prior to inoculation.

For determination of dry weight of mycelium in different carbon, nitrogen sources at different temperatures and pH, freshly grown spores were taken in liquid media under shake condition. After 3rd 7th and 14 days, mycelia were harvested with the help of suction pump on a pre-weighed Filter papers Whatman No- 1. Filter papers with mycelia were then dried in the oven at 90ºC for 24 hrs. The difference between the final and initial weight gave the dry weight of mycelium.

RESULTS AND DISCUSSION

A number of carbon as well as nitrogen sources have been used to test for the growth of *Streptomyces kanamycetieus* MTCC 324 (Majumdar and Majumdar, 1967). Maximum dry

Table 1: Effect of carbon sources on growth at 30º C

	BSM + Carbon Sources + pH 7.0 ± 1				
Colony diameter in mm after 7th days	Starch 8	Glucose 9	Dextrose 8	Surcose 6	Maltose 6
Dry Weight of mycelium in mg after 7th days	162	167	162	158	158

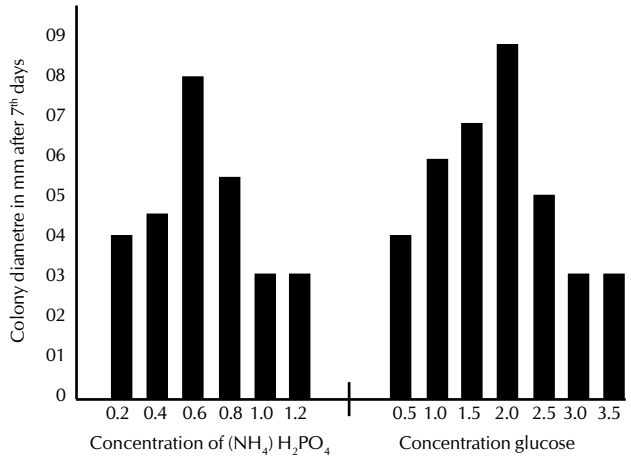

Figure1: Effect of different concentration in per cent (NH_4) H_2PO_4 and glucose on growth of *S. kanamyceticus* MTTC 324

Table 2: Effect of nitrogen sources on growth

	BSM + Nitrogen Sources + pH 7.0 + 1			
Colony diameter in mm after 7th days	$NaNo_3$ 7	Yeast extract 7	$(NH_4)H_2PO_4$ 8	KNO_3 5
Dry Weight of mycelium in mg after 7th days	156	155	162	148

weight of mycelium (Biomass) formation was recorded in 1% glucose in basal medium. Result has been mentioned in Fig. 1 and Table 1 and 2. The highest growth was obtained in a synthetic medium containg 0.6% amonium dihydrogen phosphate. The result shown in Fig. 1 and Table 2. The optimum tempereature and pH for the growth was 300C and 7+ .1. After seven days we noticed, the colour of colony of the strain varied in different carbon and nitrogen sources. It was also observed that old cultures changed their colour too. The change of colour of this strain may be ascribed due to the formation of secondary metabolities and depletion of nutrient in the old culture medium (Pridham and Gottliedb, 1948). Earlier workers also have achieved the optimization of media for suitable growth of Streptomyces sps by bselective different carbon sources the present result corroborates the earlier findings of Howell and Pine (1956); Brana and Dmain (1988); IMTECH (2000). Earlier report also revealed that Streptomyces coelicolor A 3(2) can utilize various carbon sources with specific permeases.

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Figure 2: Growth of myceliumin 1% glucose basal medium

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