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EFFECT OF SOME EXTERNAL SOURCE OF NITROGEN ON VEGETATIVE GROWTH AND SPORULATION IN *NIGROSPORA ORYZÆ* (BERK. & BR.) PETCH IN CULTURE

By

SANDHYA SANTRA AND BALEN NANDI

Department of Botany, The University of Burdwan
Burdwan, West Bengal

The present investigation deals with role of different inorganic and organic nitrogen sources on vegetative growth and quantum of sporulation of the mycelium of *Nigrospora oryzæ* in Czapeck's medium with different sources of nitrogen. Maximum growth was noticed in medium with asparagine followed by tyrosine and tryptophane in case of organic sources. Among inorganic sources, ammonium nitrite showed best results followed by ammonium sulphate and sodium nitrate. As regards sporulation, however, sources exhibiting less vegetative growth showed maximum sporulation, sodium nitrate among inorganic sources and tryptophane among organic sources.

Introduction

Nitrogen plays an important role in the metabolism of fungi. Nicholas (1965) in a recent review has shown that fungi can utilize a wide source of simple inorganic nitrate, nitrite and ammonium compounds. Not all the inorganic nitrogen sources are, however, equally suitable for all fungi which often show specificity in their nitrogen utilization. Ammonia nitrogen is utilized by many fungi by passive diffusion of the undissociated weak electrolyte molecules (Davson and Danielli, 1952).

Utilization of amino-acids as nitrogen sources by fungi has not been extensively studied. Works of Cohen (1954), Greenberg (1954), McElroy and Glass (1955) and Cochrane (1958) suggest that most fungi utilize amino-acids directly by incorporating them into protein and not by primary degradation to ammonia. Amino-acids like glycine, asparagine, glutamic acid and others in well buffered culture media are reported to support good growth of a variety of fungi although they are not equally effective. Tryptophane and leucine are not generally good source of nitrogen. Amides have been observed to be a better source of nitrogen for some fungi than the corresponding amino-acids. Fungi, however, lack specificity in the up take of various amino-acids. Competition experiments with several amino-acids suggested that the process of concentrating the amino-acids in the mycelium was common to all types. The present investigation has been under taken with a view

to find out the effect of some external sources of nitrogen on vegetative growth and sporulation of *Nigrospora oryzæ* (Berk. & Br.) Petch in culture.

Material and Methods

The test-fungus, *Nigrospora oryzæ* was isolated from diseased leaves of *Oryza sativa* collected from rice fields near Burdwan, West Bengal, in November, 1969. Monosporous culture of the fungus was made on malt-agar slants and was maintained on the same liquid Czapeck's medium ($NaNO_3$ – 2gms, KH_2PO_4 – 1gm, KCl – 0.5gm, $MgSO_4$ – 0.5gm, $FeSO_4$ – 0.01gm and dist. water – 1000ml) was selected for the growth of the fungus. The medium was modified by substituting the nitrogen source by different nitrogen compounds, ammonium sulphate, ammonium nitrite, sodium nitrate, asparagin, tryptophane and tyrosine. Compounds were so substituted that equivalent weight of nitrogen per litre of each medium remained constant. Media containing different nitrogen sources were prepared and adjusted to *p*H 6.5. 25ml of the medium was taken in each Erlenmeyer flask (250ml), plugged and finally sterilized at 15 lb pressure for 15 minutes. A set of flasks with the nitrogen free medium was kept as control. The flasks were then inoculated with very thin and uniform disc (5mm in dia.) of mycelia of the fungus from actively growing cultures on malt-agar medium in Petridishes. Three replicates were made for each set of experiment. The inoculated flasks were allowed to grow at 30°C for 17 days. The mycelium was then harvested by filtering through filtar paper of known dry weight, dried at 90°C and finally weighed. No appreciable change of *p*H of the medium at the end of experiment was recorded.

In order to study the quantum of spore production, a parallel set of culture was run. At the end of the experimental period, the cultures were shaken vigorously in an electric shaker and 0.1 ml of the liquid from each flask was mounted on haemacytometer and the number of spores was counted. Three replicates were made for each type of nitrogen source.

Observations

The results obtained have been recorded in the following Table :

Table 1. *Effect of different nitrogen sources on vegetative growth and sporulation in* Nigrospora oryzæ *for a period of 17 days.*

Nitrogen source	Dry wt. of mycelium* (in mg)	No. of spores* (per 0.1 ml)
Without nitrogen	9.0	62
Ammonium sulphate	64.0	121
Ammonium Nitrite	118.0	—
Sodium Nitrate	50.3	180
Asparagine	196.0	35
Tyrosine	60.0	31
Tryptophane	14.3	62

* Average of three replicates.

Discussions

From the table, it was evident that among the inorganic nitrogen sources tried, vegetative growth was maximum in ammonium nitrite. Of the organic sources, the amide, asparagine exhibited maximum vegetative growth, which was even much higher than that exhibited by the best inorganic nitrogen source. In case of tyrosine growth was fair almost identical with that obtained in ammonium sulphate. In tryptophane growth was very poor only slightly better than that in the control flasks.

With regard to sporulation, distinct variation was noticed. Ammonium nitrite, which although promoted vegetative growth considerably, completely inhibited sporulation. In case of sodium nitrate sporulation was maximum followed by ammonium sulphate although slightly better vegetative growth occured in the latter than in the former. In nitrogen free medium sporulation occured to some extent. In organic sources of nitrogen, sporulation was much lower than the inorganic sources and even the control flasks. In case of tryptophane considerable sporulation occured even though vegetative growth was insignificant.

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