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Influence of various carbon and nitrogen sources on the growth and sporulation of *Alternaria alternata* causing *Alternaria*-leaf spot of dolichos bean

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Effect of thirteen carbon and twelve nitorgen sources on the growth and sporulation of *Alternaria alternata* was evaluated *in vitro*. Among the carbon and nitrogen sources, maxium growth was found on sucrose and peptone, respectively. In case of carbon sources, excellent sporulation was on sucrose, maltose and raffinose, while among the nitrogen sources, sporulation was found excellent on peptone and sodium nitrate. Poor growth and sporulation of the fungus were observed on rhamnose in different carbon sources, but poor growth was obtained on thiourea among nitrogen sources. No sporulation was found on the same source as well as in control.

Key words : Growth, sporulation, *Alternaria alternata*, dolichos bean, nutritional factors

INTRODUCTION

Dolichos bean *(Lablab purpureus* (L.)Sweet) is an important vegetable crop grown in India and abroad. It is a common vegetable proliferating on the thatches of farmers and fields of vegetable growers in the villages and thriving in kitchen gardens in cities and towns. In addition to vegetable, it is also used as pulse in dry form and serves the purpose of forage for animals. The crop is not totally free from diseases. *Alternaria* - leaf spot of dolichos bean caused by *Alternaria alternata* was reported first time in severe form from Rajathan (Goyal, 1966). Carbon and nitrogen play an important role in the metabolism of fungi. They help in the synthesis of the essential compounds. Different fungi have different requirements of carbon and nitrogen for their optimum growth and sporulation (Lilly and Barnett, 1951). The present study was designed to investigate the effect of various carbon and nitrogen sources on the growth and sporulation of *A. alternata.*

MATERIALS AND METHODS

To study the effect of various carbon and nitrogen sources on the growth and sporulation of *A. alternata* in dolichos bean, basal liquid Richard's medium was used for culturing the fungus. Thirteen carbon compunds viz., xylose, rhamnose, glucose, galactose, mannose, fructose, lactose, maltose, sucrose, raffinose, mannitol, sorbitol and dextrin were used to replace sucrose individually in equivalent quantities of 50 g of sucrose. A carbon-free medium served as control.Similarly, twelve nitrogen sources viz., peptone, urea, thio-urea, ammonium chloride, ammonium carbonate, ammonium sulphate, ammonium nitrate, ammonium oxalate, ammonium acetate, calcium nitrate, potassium nitrate and sodium nitrate were substituted singly for potassium nitrate in the medium. The concentration was so adjusted as to get the amount of nitrogen present in 10 g of sodium nitrate per litre of the basal medium. Peptone was substituted in equal amount to sodium nitrate. Medium, without nitrogen, served as control.Each flask containing 50 ml of

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Richard's medium at 6.5 pH level was inoculated with 5 mm inoculum disc of fungus obtained by a cork borer and incubated at 28 +1° C for 10 days in triplicate. Mycelial mats were filtered through Whatman's filter paper No. 42, washed with distilled water and dried in oven at 60° C for 48 hs, then cooled in desiccator and to measure the fungal growth as dry weight for *A. alternata* on every carbon or nitrogen source employed.

Sporulation was noticed by 1 ml of fungal suspension, added in flask containing 50 ml medium and diluted to five times with distilled water. 1 ml of this diluted suspension was divided into five equal drops and placed under microscope for observing the sporulation.

RESULTS AND DISCUSSION

The data presented in Table 1 deplict that all carbon sources tested were significantly superior to control in promising the growth of *A. alternata*. Maximum growth of the fungus was found in media having sucrose as carbon source, followed by galactose and maltose, which were statistically at par. Sporulation was excellent on sucrose, maltose and raffinose while rhamnose proved to be a poor source of carbon for growth and sporulation of the pathogen. No sporulation and lowest growth were recorded in case of control which was devoid of any carbon source.

These results are in accordance with the finding of Mathur and Sarbhoy (1977) who also reported the best growth and sporulation of *A. alternata* on sucrose.

It is evident fromTable 2 that all the sources of nitrogen used were signficantly superior than control. Peptone was the best source of nitrogen for growth of *A. alternata*, followed by sodium nitrate, potassium nitrate and calcium nitrate. Ammonium nitrate and ammonium chloride were statistically at par, while urea and thio-urea proved to be the poor source of nitrogen for the growth of pathogen which did not differ significantly. Excellent sporulation was observed in the presence of peptone and sodium nitrate but ammonium sulphate ammonium carbonate and urea of nitrogen sources tested were poor in inducing sporulation. No sporulation was recorded in thio-urea and control without nitrogen sources.

The present findings are in agreement with the observations of Goyal (1977) and Susuri and Hagedorn (1986) who reported that peptone supported good growth and sporulation of *A. alternata.* In general, ntrogen in form of nitrate has been reported to be most favourable for the mycelial growth of many fungi (Lilly and Barnett, 1951).

Table 1. Influence of various carbon sources on the growth and sporulation of *A. alternata* at 28+ 1°C

Carbon sources	Average mycelial weight (mg)	Sporulation
Sucrose	690.10	++++
Galactose	651.30	+++
Maltose	637.00	+++
Raffinose	607.10	++++
Dextrose	591.00	+++
Mannose	555.25	+++
Fructose	525.10	+++
Xylose	492.66	+++
Sorbitol	463.00	++
Lactose	450.21	++
Mannitol	409.33	+++
Dextrin	360.00	++
Rhamnose	312.65	+
Control	90.40	-

CD at 5% level 17.67

++++ = Execellent +++ Good ++Fair +=Poor -=Nil

Table 2. Effect of different nitrogen sources on the growth and sporulation of A. alternata at 28+1°C

Nitrogen sources	Average mycelia weight (mg)	Sporulation
Pepton	845.00	++++
Sodium nitrate	734.10	++++
Potassium nitrate	640.00	+++
Calcium nitrate	571.00	+++
Ammonium nitrate	501.20	+++
Ammonium chloride	474.40	++
Ammonium oxalate	418.30	++
Ammonium acetate	365.00	++
Ammonium sulphate	304.66	+
Ammonium carbonate	242.00	+
Urea	1713 3	+
Thio-urea	144.01	-
Control	119.00	-

CD at 5% level 33.85

++++ = Excellent +++ = Good ++ = Fair + =Poor -=Nil.

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