International Journal of
Life Sciences
International Peer Reviewed Open Access Refereed Journal

Special Issue A 9: January 2018
UGC Approved Journal No 48951

Original Article Open Access

Effect of nitrogen sources on growth and sporulation of five species of *Aplosporella* Speg.

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Manuscript details:

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kaste PS (2018) Effect of nitrogen sources on growth and sporulation of five species of *Aplosporella Speg*., *Int. J. of. Life Sciences*, Special Issue, A9: 103-106.

ABSTRACT

Fungi differ widely in their choice and ability to utilize various sources of nitrogen for their growth and reproduction. In the present study, five different species of *Aplosporella* were investigated for their behavior under the influence of eleven nitrogen sources using liquid basal medium of Asthana and Hawker. Five species of *Aplosporella* so selected for the present investigations were obtained from different plant hosts of diversified host families. These are *Aplosporella labiatae, A. rubiae, A. coniferae, A.citrae and A. brossimumii*. Pure cultures of these five isolates of *Aplosporella* were maintained on Potato Dextrose Agar medium. Inorganic nitrogen sources like Ammonium nitrate, Ammonium chloride, sodium nitrite, sodium nitrate, potassium nitrite,potassium nitrate and organic nitrogen sources like phenyl alanine, aspartic acid, glycine, urea and peptone were taken for present investigation. From the results, it is concluded that the *Aplosporella* grows better in inorganic nitrogen sources than the organic nitrogenous sources.

Key words : *Aplosporella*, nitrogen sources, growth, sporulation

INTRODUCTION

Fungi are specific in their choice of food, but carbon and nitrogen substances are the most important substances required by fungi with regard to their vegetative and reproductive growth. Nitrogen is considered as one of the vital importance as being the chief constituent of proteins and a basic component of protoplasm. Nitrogen, thus, is indispensible for growth of fungi, having both functional and nutritional importance. A particular source of nitrogen is, however, not equally suitable for every fungus because of their differential choice and ability to utilize nitrogen obtained from various sources.

The essentiality of a proper source of nitrogen is an important limiting factor in the nutrition of fungi. Although much work has been done in the past on the nitrogen nutrition of fungi, a generalization of the suitability of different sources of nitrogen for their growth and reproduction is not yet possible. Tandon and Bilgrami (1957) have summarized voluminous literature on this particular aspect.

Generally, nitrates are found to support good growth and sporulation of many fungi, while ammonium salts have shown varying results. Nitrites proved to be toxic to various organisms and seldom promote growth and sporulation of fungi. Organic nitrogen sources, on the other hand, have generally been proved to be more promising and induce better mycelial growth and sporulation. Amino acids are reported to be superior sources of nitrogen than the inorganic sources. Irani (1955), however working with *Phyllosticta papayae* var. *macrospora*, found organic nitrogen sources to be inferior to inorganic ones. Urea and peptone have also been shown to support excellent growth and sporulation in fungi. (Neel *et al*, 1933 ; Lockwood *et al*, 1936, Gotteib, 1946; Leben and Keitt, 1948; Gorden, 1950; Converse, 1953; Aube and Gagnon, 1969; Danielson and Davey, 1973; Sierota, 1977; Jackson *et al*, 1991; Saha & Pan, 1998; Monga, D., 2001)

Nitrogen sources like ammonium nitrate was reported to be a good source for growth of *Diplodia psidii* and *D. viticola* (Shreemali; 1969), *Colletotrichum gloeosporioides* (Tandon & Chandra, 1962) and *Alternaria tenuis* (Mathur, 1978). Amongst nitrogenous inorganic compounds like potassium nitrate and sodium nitrate were observed to be good source for growth and sporulation of majority of the species like *Curvularia, Fusarium, Phoma, Botryodiplodia* etc. (Dandge, 1998).

From the above review it is clear that fungi differ widely in their choice and ability to utilize various sources of nitrogen for their growth and reproduction. In the present study, five different species of *Aplosporella* were investigated for their behavior under the influence of 11 nitrogen sources using liquid basal medium of Asthana and Hawker.

MATERIALS AND METHODS

Five new species of *Aplosporella* obtained from diversified hosts brought into pure culture. These are : *A. labiatae* sp.nov., *A. rubiae* sp. nov., *A. coniferae* sp. nov., A. *citrae* sp.nov. and *A. brossimumii* sp.nov. These five species of *Aplosporella* were designated as isolate L, R, Co, Ci and B respectively. Pure cultures of these isolates were maintained on Potato Dextrose Agar medium. Following nitrogen sources were taken for present investigation.

Inorganic Sources
Ammonium nitrate, Ammonium chloride, sodium nitrite, sodium nitrate, potassium nitrite, potassium nitrate.

Organic Sources
Phenyl alanine, aspartic acid, glycine, urea, peptone.
The original nitrogen source present in the basal medium (viz. potassium nitrate) was replaced individually with different nitrogen sources so as to provide equivalent amount of nitrogen present in the basal medium. 25 ml of the liquid medium was apportioned into 150 ml conical flasks (corning) which were then subjected to fractional sterilization (steaming for 30 minutes for 3 successive days) so as to avoid any decomposition of amino acids etc.

The liquid media containing various nitrogen sources were seeded with the isolates of *Aplosporella* and these were incubated for 15 days under laboratory conditions. At the end, the mats were harvested as usual and average dry weight of the three replicates noted.

RESULTS AND DISCUSSION

Isolate L : In this case, all the nitrogen sources supported good growth and sporulation.

Isolate R : This isolate grew better in aspartic acid, glycine, sodium nitrite, sodium nitrate, potassium nitrite and potassium nitrate while in phenyl alanine, urea, peptone, ammonium nitrate and ammonium chloride, it was poorly grown.

Table 1: Effect of nitrogen sources on growth and sporulation of five isolates of *Aplosporella:*

S.N.	Nitrogen sources	Colony characters	Isolate L	Isolate R	Isolate Co	Isolate Ci	Isolate B
1	Phenyl alanine	Growth Pycnidial development Dry. Wt.in mg	Spreading + 23.87	Spreading + 25.10	Scanty - - - 13.47	Isolated - - - 16.10	Isolated - - - 18.24
2	Aspartic acid	Growth Pycnidial development Dry. Wt.in mg	Spreading + 38.33	Isolated + 47.66	Spreading - - - 31.30	Spreading - - - 27.10	Isolated - - - 20.63
3	Glycine	Growth Pycnidial development Dry. Wt.in mg	Isolated ++ 47.90	Isolated + 53.00	Scanty - - - 23.40	Scanty - - - 31.60	Spreading + 55.33
4	Urea	Growth Pycnidial development Dry. Wt.in mg	Patchy + 34.80	Patchy + 23.37	Isolated - - - 22.67	Spreading - - - 28.67	Spreading + 30.10
5	Peptone	Growth Pycnidial development Dry. Wt.in mg	Patchy + 33.30	Scanty - - - 27.26	Patchy - - - 30.40	Isolated - - - 31.90	Patchy + 32.87
6	Ammoniu m nitrate	Growth Pycnidial development Dry. Wt.in mg	Congested + 18.67	Congested - - - 22.80	Isolated - - - 28.23	Scanty - - - 12.80	Scanty - - - 23.37
7	Sodium nitrite	Growth Pycnidial development Dry. Wt.in mg	Congested ++ 57.13	Congested + 58.87	Spreading - - - 40.58	Scanty - - - 27.40	Spreading + 61.33
8	Ammoniu m chloride	Growth Pycnidial development Dry. Wt.in mg	Spreading + 47.27	Isolated - - - 29.10	Isolated - - - 37.67	Patchy + 43.57	Patchy - - - 41.57
9	Sodium nitrate	Growth Pycnidial development Dry. Wt.in mg	Spreading ++ 33.00	Isolated + 31.53	Isolated - - - 27.30	Uniform - - - 25.27	Patchy + 32.90
10	Potassium nitrite	Growth Pycnidial development Dry. Wt.in mg	Spreading ++ 52.87	Spreading + 51.30	Patchy + 47.66	Uniform - - - 33.67	Patchy - - - 41.52
11	Potassium nitrate	Growth Pycnidial development Dry. Wt.in mg	Spreading ++ 32.56	Spreading +++ 44.78	Uniform + 20.12	Isolated + 31.68	Patchy - - - 30.47

Pycnidial development was further classified under four different gradations, viz., - - - Nil; + = Poor ; ++ = moderate ; +++ good.

Isolate Co: Sodium nitrite, potassium nitrite and ammonium chloride has responded well for growth as compared to the rest.

Isolate Ci: For this isolate glycine, peptone, ammonium choloride, potassium nitrite and potassium nitrate supported good growth as compared to urea, aspartic acid, sodium nitrite, sodium nitrate, phenyl alanine and ammonium nitrate.

Isolate B : For this isolate sources like glycine, urea, peptone, sodium nitrite, sodium nitrate have proved to be good for growth and sporulation while phenyl alanine, aspartic acid, ammonium nitrate, ammonium chloride, potassium nitrite, potassium nitrate were poor for growth and sporulation.

From the table, it is interesting to note that isolate Co, Ci and B failed sporulate in phenyl alanine, aspartic acid and ammonium nitrate whereas isolate L and R showed sparse and poor development of pycnidia. In glycine, all the isolates showed brown colored colony. Isolate Co and Ci did not develop pycnidia while isolate L, R and B developed poor pycnidia. Similar was the response of urea. Ammonium nitrate and peptone, however proved to be a poor source of nitrogen for all the isolates. Sodium nitrite is good for isolate L, R and B and potassium nitrite is good for isolate L, R and Co. Potassium nitrate proved to be a better source for four isolate i.e., L, R, Co, Ci and in isolate B only vegetative growth absorbed. Subhedar (1977) proved that potassium nitrate is a better source for five isolates of *Aplosporella* (out of the seven isolates).

So, it is the concluded that the *Aplosporella* grows better in inorganic nitrogenous sources than the organic nitrogenous sources.

Acknowledgement

The authors are extremely grateful to Principal and Head, Botany Department, Adarsha Mahavidyalaya, Dhamangaon Rly. For providing necessary laboratory facilities and encouragements.

Conflicts of interest: The authors stated that no conflicts of interest.

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