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Drechslera: First reported from surrounding area of water bodies of Bhopal (M.P)

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Abstract
Eight species of *Drechslera* viz. *Drechslera australiensis, D. hawaiiensis, D. halodes, D. rostrata, D. sacchari, D. cochliobolus, D. spicifer.* And *D. tarcica* belonging to order Sphaeriales and group Ascomycotina were isolated from the soil of surrounding area of Upper Lake and Lower Lake of Bhopal, (M.P.), India.

Keywords: New Record/ soil fungi/around water bodies/Bhopal

Introduction
Bhopal capital of M.P. is situated on pink red stones of Vindhya region. It is known as city of lakes. The most famous are twin lakes known as Upper and Lower lake. The soil fungi from surrounding area of both the lakes were isolated during the coarse of study period. Present paper deals with eight species of *Drechslera viz. Drechslera australiensis, D. hawaiiensis, D. halodes, D. rostrata, D. sacchari, D. cochliobolus, D. spicifer.* and *D. tarcica* belonging to order Sphaeriales and group Ascomycotina. Rane and Gandhe [5], Ramesh [4] *et al*., Saravanakumar and Kaviyarasan [6] and many other workers had reported *Drechslera* species in different soil habitate from different part of the world. These species were reported first time from soil around the Upper lake and Lower lake of Bhopal.

Fungi are achlorophyllous, micro-macroscopic, holocarpic, eucarpic and eukaryotic living organisms leading saprophytic, biotrophic and symbiotic life. Some of the fungi live on living hosts and are considered as obligate parasite. Fungi are colonizing, multiply and survive on various habitats including micro ecological niches. Fungi also live in extreme habitats such as in deserts, thermal springs, hot springs, colder habitats and others. Fungi mostly occur in all aquatic, semi aquatic and arid habitats. Fungi and their spores are ubiquitious. Alexopoulous and mims (1979) defined fungi as eukaryotic (with nucleus), spore bearing, achlorophyllous organism that may reproduce sexually and asexually and whose filamentous branched, tubular body (radiating hyphae making up mycelia or colonies) and somatic structure are typically surrounded by cell wall containing chitin, cellulose and both of these substain as with many other complex carbohydrates. Fungi are present in and have been recovered from diverse soil habitats. Soil is a complex ecosystem consists by multiple minute habitats and harbors almost all major taxonomic groups of fungi. Soil fungi are participating in the decomposition of organic material.

Out of total isolated soil fungi eight species of drechslera were reported from surrounding area of upper lake and lower lake Bnopal. Upper Lake of Bhopal, locally known as bada Talab or Big Lake. This lake was created in 11th Century. It has a catchment area of 361 km^2. The lower lake of Bhopal is known a "Chhota Talab". This lake was created in 1794 by Nawab Chotte Khan, Minister of Nawab Hayat Mohammed Khan to add to the beauty of the city. It has small catchment area of 9.6 km^2.

Bhopal is located in the north western part of the state of Madhya Pradesh in the central region of India. It is situated on 23^0 16$^{`}$ N latitude and 77$^0$ 25$^{`}$ longitudes on hard pink red stone of the Vindhya Range. The average elevation is about 503 meters above mean sea level. Bhopal is having an undulating topography with scattered located hills. The lake sub-mergence is a valley in between the Shyamla and Idgah hills and Kamla Park.

Methodology

Soil samples were collected randomely from the surrounding area of the lake during the study period. For isolation and preservation method described by Waksman [8], Warcup [9] and Barlocher[1] were followed. All fungal species were identified by microscopic analysis by using taxonomic literature followed by Domesh [2] *et al*., A. Nagmani [3] *et al*. and Vasant Rao [7] *et al.*

(1) Sample Collection: Soil form is a rich and dynamic medium for growth of fungi. Fungi occur in soil either in mycelia state or reproductive stage. A single technique cannot give a complete picture of the fungi in the soil. The most commonly method used for collecting samples consists of digging pits in the area to be sampled and collecting the samples with a surface sterilized trowel after scraping away an inch of surface soil into fresh polythene bags. The soil samples are taken from a depth of 10-15 cm then soil are pooled and shaken directly into fresh polythene bags. The collected soil samples are kept in a cool place during transportation to the laboratory. Under aseptic condition the stones and organic debris are removed before isolation of fungi.

2. Isolation Techniques: Fungi in soil might be obtained by using various methods simultaneously along with direct microscopic examination of the soil being assayed. Isolation of soil fungi was done through various techniques i.e. serial dilution method (Waksman 1916), pour plate method. Spread plant, baiting technique etc. Streptomycin is added to the medium in all isolation techniques to avoid bacterial contamination.

(a) Dilution plate method (Waksman, 1916)

For isolation of fungi this method is commonly used. Firstly soil suspension is prepared by 10 grams of dry soil is suspended for 20-30 minutes in 250 ml. sterile Erlenmeyer flask with 90 ml sterile water. Then serial dilutions 10^{-2} to10^{-6} is made by withdrawing 1 ml in to additional dilution blanks having 9 ml sterile water in test tubes respectively. 10^{-3} to 10^{-4} dilutions are used for fungal isolation. Fially 1 ml aliquot of the desired dilution is aseptically pipette out in to sterile petri dishes and 12-15 ml of an appropriate cooled, melted agar medium is added to each petridish. The dishes are gently swirled in clockwise and anticlockwise direction to disperse the diluted soil suspension of the medium, the petriplates are incubated in an inverted position for 3-7 days at room temperature 25 ^{0}C.

(b) Spread plate method

In this method agar plates are left to stand overnight so that the surface water film on agar surface evaporates and these plates are referred to as surface dried agar plates. One ml of the diluted sample is spared over these surface dried agar plates with the help of bent glass rod. Then incubated the petri plates for 3-7 days at 25 ^{0}C.

(c) Pour plate method

In this method 1ml of the diluted soil sample is pipette to a sterile Petri dish. The melted agar in cooled to 45-50 ^{0}C. Then poured in the dishes, the dishes are gently swirled to ensure even mixing.

(d) The soil plate method (war cup, 1950)

In this method 8-10 ml melted, cooled agar medium is added, and soil particles are dispersed throughout the agar. Steriled sand is mixed with soil samples then this sprinkled thinly on the surface of the agar plate. Streptomycin is added to the medium to avoid bacterial contamination.

(3) Slide preparation

Take fungal material on slide from Petri dish with the help of forceps or needle. Fungal material were stained with the help of cotton blue and lacto-phenol and finally mounted in lacto phenol.

The slides were preserved by ringing with DPX and observed under the high power (40X) microscope for identification of fungi. Each slide was labeled with date and site. Camera Lucida drawings were also drawn along with measurement taken from freshly isolated fungal forms. Photograph were also taken. The slides were preserved in slide boxes wrapping them with the polythene bag in order to prevent them from the dust and for packets naphthalene balls were used to avoid insects.

(4) Identification

These fungal forms were identified up to species level with the help of monographs, manuals, relevant research papers and publication of same eminent scientist like Barnet and Hunter (1972), Cooker (1979), Ellis (1971, 1976), Sutton (1980), Vascant Rao *et al*. (2004), Domesh *et al*. (1980), Gilman (1959), Choudhary et. al. (2000).

Help regarding the identification of these fungi was also taken from various mycologist of the country.

***Drechslera* lto, 1930**

Proc. lmp. Acad. Japan, 6:355.

Colonies effuse grey brown or blackish brown sometime velvety. Mycelium mostly immersed stroma present in some species. Conidiophores macronematous, manonematous, straight, often geniculate, unbranched or in a few species loosely branched, brown, smooth in most species. Conidia solitary, in certain species also sometimes forming secondary conidiophores which bear conidia, simple, straight or curved, clavate, cylindrical rounded at the ends, ellipsoidal, fusiform or obclavate, Straw coloured, the end cells then being paler than intermediate ones, mostly smooth, rarely verruculose, pseudoseptate.

1. *Drechslera australiensis* (Bugnicourt) Subram. & Jain ex. M.B. Ellis; Subram. & Jain, 1966. *Curr. Sci*., 35:354.
(Fig.1)

Conidiophore up to 150 µm long, 3 – 7 µm thick. Conidia straight, ablong, 3 pseudoseptate, rarely with 4 or 5 pseudosepta,13 -40 µm long, 6-11 µm thick.

2. *Drechslera hawaiiensis*

(Bugnicourt) Subram. & Jain ex. M. B. Ellis; Subrm. & Jain, 1966.

Curr. Sci., 35:354.

(Fig.2)

Conidiophore up to 120 µm long and 2-7 µm thick. Conidia straight ellipsoidal, rounded at the ends, 2-7 seudoseptate, 12-37 µm long, 5-11 µm thick.

Previously reported from forest soils of Orissa by Panda *et al.* 2010.

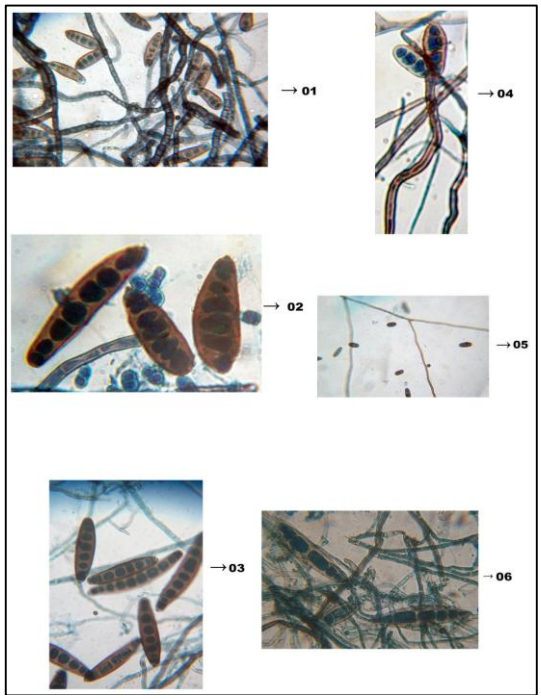
3. *Drechslera halodes* (Drecheslera) Subram. and Jain, 1966. Curr. Sci., 35:354.
(Fig.3)
Conidiophore up to 150 µm long, 5-8 µm thick. Conidia straight, ellipsoidal with up to 12 but commonly 6-8 pseudosepta, dark septa, 30-100 µm long, 11-20 µm thick hilum distinctly protuberant.

4. *Drechslera rostrata* (Drechslera) Richardson and Fraser, 1968.
Trans. Br. Mycol. Soc., 51: 148.
(Fig.4)
Conidiophore up to 200 µm long, 6-8 µm thick. Conidia rostrare, 6-16 pseudoseptate, dark septa, 40-180 µm long, 14-22 µm thick, helium distinctly protuberant.

5. *Drechslera sacchari* (Butler) Surbram. & Jain, 1966, Curr. Sci., 35:354.
(Fig. 5)
Conidiophore arising singhly or in small fascicles, up to 200 µm long, 5-8 µm mthick. Conidia cylindrical or narrowly ellipsoidal, with 5-9 pseudosepta,35-96 m long,9-17 µm thick.

6. *Drechslera* state of *Cochliobolus spicifer* Nelson 1964, *Mycologia*, 56-:198.
(Fig.6)
Conidiophores solitary or in small groups, flexous, repeatedly geniculate with numerous well defined scars. Conidia straight, cylindrical, rounded at the ends, 3 pseudo septate, 20—40 µm long, 9-14 µm thick.
Prevoiusly reported from riverbed soil Gadwal by Manoharachary and Bilolikar, 1979.

7. *Drechslera tarcica*
Drechslera state of *Trichometasphaeria turcica*. Luttrell, 1958, Phytopathology, 48: 281-287.
Conidiophore emerging singly or in groups. 300 µm long and 8-9 µm thick.
Conidia straight or slighty curved, smooth, 4-9 pseudoseptate, 115 µm long, 22µm thick.



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