

## FUNGI ASSOCIATED WITH *DATURA METEL* L.

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### Abstract

A total of 20 species of fungi representing 12 genera were found to be associated with *Datura metel* L. in Bangladesh. The fungi were *Alternaria alternata* (Fr.) Keissler, *Arthrinium saccharicola* Stevenson, *Aspergillus niger* Van Tiegh., *A. flavus* Link ex Fr., *Cladosporium elatum* (Harz) Nannf., *C. coffeanum* Noack, *C. gloeosporioides* (Penz.) Sacc., *C. graminicola* (Ces.) Wilson, *Corynespora pruni* (Berk. & Curt.) M. B. Ellis, *Curvularia fallax* Boedijn, *C. lunata* (Wakker) Boedijn, *C. penniseti* (Mitra) Boedijn, *C. prasadii* R.L. & B.L Mathur, *Fusarium flocciferum* Corda. Sturm's Deutschl, *F. nivale* (Fr.) Ces., Rabenth. Herb., *Nigrospora sphaerica* (Sacc.) Mason, *Penicillium* spp., *Pseudocercospora fuligena* (Roldan) Deighton, *Rhizopus stolonifer* (Ehrenb. ex Fr.) Lind and one sterile unidentified fungal species. The percentage of association of *Cladosporium elatum* isolated from infected fruits was higher than any other fungi. *Arthrinium saccharicola*, *Colletotrichum coffeanum*, *Corynespora pruni*, *Fusarium flocciferum* and *F. nivale* are new records for Bangladesh.

### Introduction

*Datura metel* L. and all other members of this genus contain narcotics which are very poisonous, even in their small doses. The whole plant, particularly the leaves and seeds are anesthetic, anodyne, antiasthmatic, antispasmodic, antitussive, bronchodilator, hallucinogenic, hypnotic and mydriatic.<sup>(1)</sup> It has a wide range of applications in India, including in the treatment of epilepsy, hysteria, insanity, heart diseases, fever with catarrh, diarrhoea, skin diseases etc. Caution is advised in the use of this plant species since its excess doses cause hallucinations, severe intoxication and even death.<sup>(2)</sup>

*Datura metel* contains the alkaloids hyoscyamine, hyoscyne and atropine. Atropine dilates the eye pupils and is being used in their surgery. Extract of the flowers is used as an anesthetic. Seeds are also used in the treatment of mental disorder.

Many works have been done on alkaloids of *Datura metel* but limited attempts have been made on the association of fungi with this plant.<sup>(3)</sup>

In the present investigation three types of symptoms were examined i.e. indistinct leaf spots with olivaceous green, asexual sporulating structures of *Pseudocercospora fuligena*, anthracnose symptom without any sporulating structure and frutits showed dry rot symptom (Fig.1A-C).

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### Materials and Methods

Samples were collected from the Botanical Garden, Curzon Hall Campus, University of Dhaka during the period of October, 2006 to February, 2007. All these samples showed a number of associated fungi. Twenty five samples were examined from healthy and infected leaves and fruits of *Datura* plants.

The fungi were isolated on PDA (Potato Dextrose Agar) medium following "Tissue planting method". From a particular sample 30 inocula, each measuring 2 square mm were cut and kept in a sterile Petri plate. The inocula were washed in sterile water and then surface sterilized by dipping in 10% Chlorox for 3 - 5 minutes and transferred into a sterile Petri plate containing sterile blotting paper to remove the surface water. These three inocula were placed in each plate and incubated for 5 - 7 days at  $25 \pm 1^\circ\text{C}$ . Fungi growing out of the inocula were transferred to separate plates and slants for further studies and storage. Percentage association of the fungi was also recorded.

For microscopic observations fungal structure like mycelia, spore bearing structures and spores were scrapped off from the surface with a scalpel or a blade or picked up with a needle and was mounted in lacto phenol over a clean slide for microscopic observation. In case of hyaline structures, a little amount of aniline blue (cotton blue) was added to the mounted fluid.

Identification of the isolates were determined following the standard literatures.<sup>(4-8)</sup> All the specimens were preserved in the Herbarium, Mycology and Plant Pathology section, Department of Botany, University of Dhaka, Bangladesh.

### Results and Discussion

*Datura metel* L. plants revealed the association of fungal species (Table 1). *Pseudocercospora fuligena* was frequently associated with leaves of the plants showing indistinct spot but this fungus did not produce mycelia in culture medium.

Six fungal species were isolated from healthy leaves of *D. metel* of which the percentage of association of *Arthrinium saccharicola* was highest (6.11) and *Corynespora pruni* was lowest (0.56), (Table 1).

Thirteen fungal species were isolated from the infected leaves of *D. metel* showing indistinct leaf spots. Frequency of association of *Colletotrichum graminicola* was highest (7.78%) and *Cladosporium elatum*, *Colletotrichum gloeosporioides*, *Curvularia fallax*, *C. lunata*, *C. penniseti*, *C. prasadii*, *Rhizopus stolonifer* were lowest (0.56%) (Table 1).

In case of infected leaves of *D. metel* with anthracnose symptom, four fungal species were isolated. Frequency of association of *Aspergillus niger* was higher (31.11%) and *Aspergillus flavus* was lower (10.00%), (Table 1).

**Table 1. Frequency (%) of association of fungi with leaves of *Datura metel*.**

| Name of isolates                | Healthy leaves | Diseased leaves  |            |
|---------------------------------|----------------|------------------|------------|
|                                 |                | Indistinct spots | Anthranose |
| <i>Alternaria alternata</i>     | 1.67           | -                | -          |
| <i>Arthrinium saccharicola</i>  | 6.11           | -                | -          |
| <i>Aspergillus flavus</i>       | 1.67           | 1.67             | 10.0       |
| <i>A. niger</i>                 | -              | 3.89             | 31.11      |
| <i>Cladosporium elatum</i>      | -              | 0.56             | 17.78      |
| <i>Colletorichum coffeanum</i>  | 1.67           | -                | -          |
| <i>C. gloeosporioides</i>       | -              | 0.56             | -          |
| <i>C. graminicola</i>           | -              | 7.78             | 10.99      |
| <i>Corynespora pruni</i>        | 0.56           | -                | -          |
| <i>Curvularia fallax</i>        | 1.67           | 0.56             | -          |
| <i>C. lunata</i>                | -              | 0.56             | -          |
| <i>C. penniseti</i>             | -              | 0.56             | -          |
| <i>C. prasadii</i>              | -              | 0.56             | -          |
| <i>Fusarium flocciferum</i>     | -              | 1.11             | -          |
| <i>Nigrospora sphaerica</i>     | -              | 3.33             | -          |
| <i>Penicillium</i> spp. 1       | -              | 1.67             | -          |
| <i>Rhizopus stolonifer</i>      | -              | 0.56             | -          |
| One unidentified sterile fungus | -              | 0.56             | -          |

- = No isolate.

Five fungal species were isolated from healthy fruit samples studied. Frequency of association of *Cladosporium elatum* was higher (19.44%) and *Aspergillus flavus*, *Fusarium nivale* were lower (0.56%) (Table 2).

**Table 1. Frequency (%) of association of fungi with fruits of *Datura metel*.**

| Name of fungi              | Healthy | Dry rot |
|----------------------------|---------|---------|
| <i>Aspergillus flavus</i>  | 0.56    | 3.33    |
| <i>Aspergillus niger</i>   | 1.67    | 12.21   |
| <i>Cladosporium elatum</i> | 19.44   | 54.44   |
| <i>Fusarium nivale</i>     | 0.56    | -       |
| <i>Penicillium sp2</i>     | 1.67    | -       |

- = No isolate.

Three fungal species were isolated from infected fruits. Frequency of association of *Cladosporium elatum* was higher (54.44%) and *Aspergillus flavus* was lower (3.33%), (Table 2).

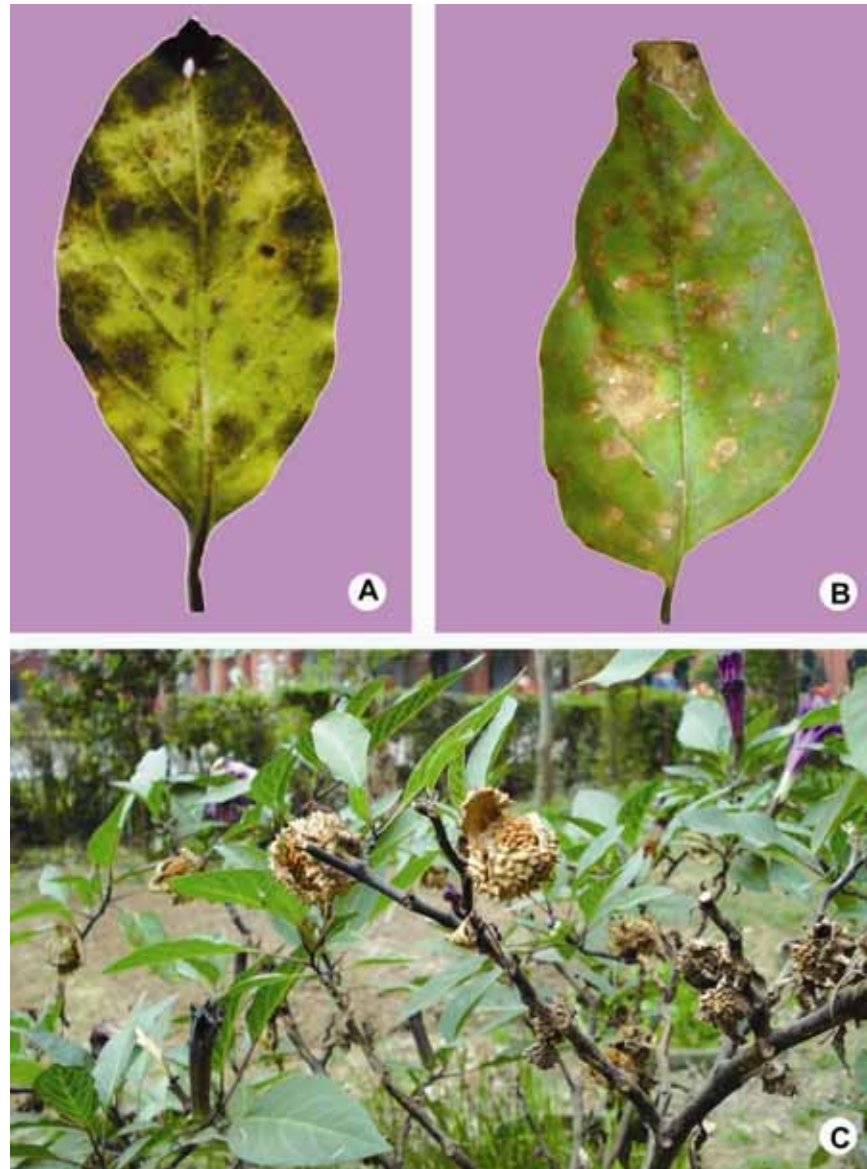


Fig. 1A-C: Infected leaves and fruits of *Datura metel*. (A) Indistinct leaf spots. (B) Anthracnose. (C) Fruit rot symptoms.

The present report is the first record of *Arthrinium saccharicola*, *Colletotrichum coffeanum*, *Corynespora pruni*, *Fusarium flocciferum* and *Fusarium nivale* from Bangladesh. At the same time this is the first record of association of these five fungi with *D. metel* plants. The newly recorded fungi are described with illustrations and photomicrographs.

**Taxonomic enumeration of the newly recorded taxa****1. *Arthrinium saccharicola* Stevenson (Fig. 2A).**

(Ellis<sup>(6)</sup> 1971, 574, Fig. 413D)

Colonies compact, black. Mycelium partly superficial, partly immersed. Setae and hyphopodia absent. Conidiophore arising singly from superficial mycelia, 2-4 µm thick. Conidia solitary, dark, smooth verruculose, sometimes slitted, 7.1 - 9.4 µm diam.

*Specimen examined:* Isolate from the healthy leaves of *Datura metel* L. (Solanaceae), Dhaka University, Curzon Hall Campus, 07 December, 2006, M. Aktar, 18. So far it was recorded on sugarcane from Puerto Rico, Venezuela.

**2. *Colletotrichum coffeanum* Noack (Fig. 2B)**

= *Gloeosporium coffeanum* Delacr.<sup>(8)</sup>, Bull. Trimest. Soc. Mycol. Fr. 13:110 (1897)

Colonies of dense or floccose pale chocolate brown aeriell mycelium, sometimes grayish with a lighter centre, reverse greenish gray, lacking acervuli. Sclerotia absent. Setae usually absent. Conidia straight, cylindrical, 12.4-20.6 µm, formed from individual hyphae rather than acervuli. Appressoria moderately abundant, pale to medium brown, circular or slightly irregular.

*Specimen examined:* Isolate from the healthy leaves of *Datura metel* L. (Solanaceae), Dhaka University, Curzon Hall Campus, 06 November, 2006, M. Aktar, 16.

The fungus was recorded on and isolated from berries of *Coffea arabica*, Kenya, Tanzania, Ethiopia.

**3. *Corynespora pruni* (Berk. & Curt.) M. B. Ellis. (Fig. 2C)**

(Ellis<sup>(6)</sup> 1971, 377, Fig. B.)

Colonies effuse, dark bluish brown, velvety or spongy. Mycelium partly superficial, partly immersed. Setae and hyphopodia absent. Conidiophores straight or flexuous, dark brown with up to 7 successive cylindrical proliferation, 28 - 68 × 3.8 - 12.6 µm. Conidia solitary or in short chains, straight or curved, smooth or verruculose 1-5 septate, (24) 33.6 - 70 (107) × (5.4) 8.2 - 13.8 µm.

*Specimen examined:* Isolate from the healthy leaves of *Datura metel* L. (Solanaceae), Dhaka University, Curzon Hall Campus, 06 November, 2006, M. Aktar, 17.

So far, it was recorded on *Acer*, *Alnus*, *Magnolia* and *Prunus* from U.S.A and it was also recorded on *Fagus*, from Great Britain.

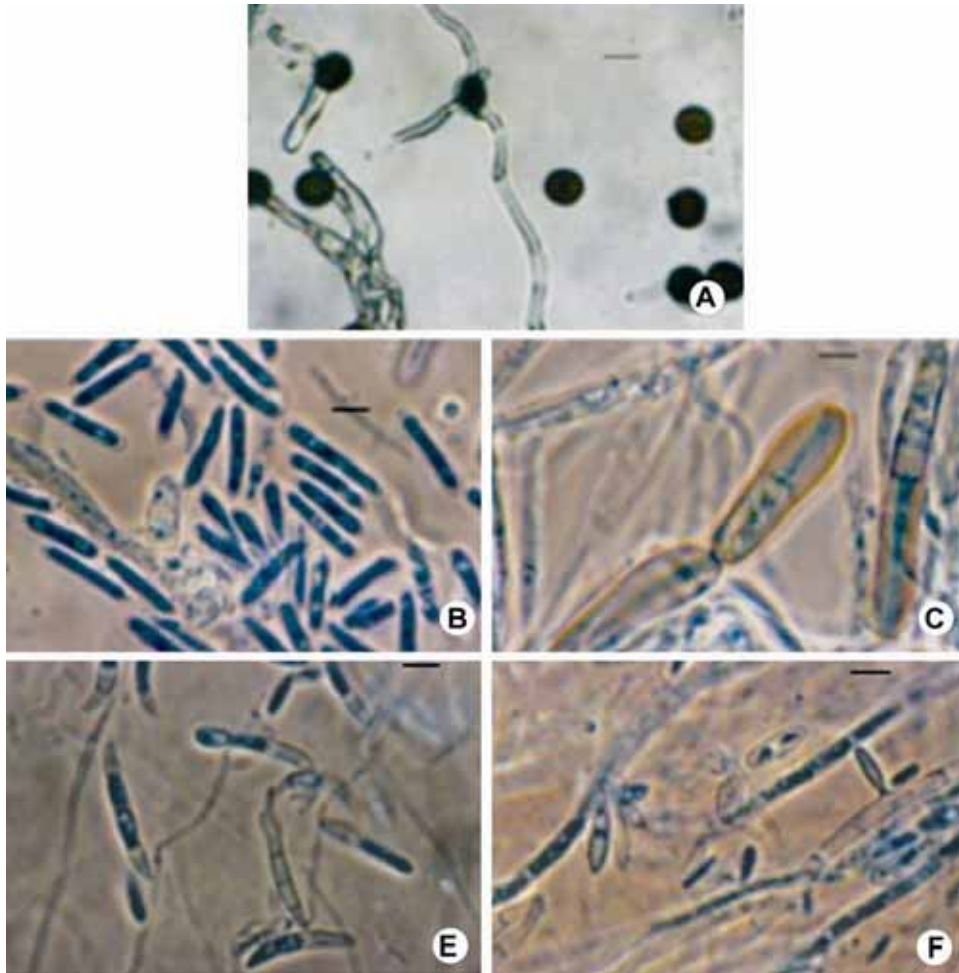


Fig. 2. Photomicrograph showing fruiting structures of (A) *Arthrinium saccharicola*, (B) *Colletotrichum coffeamum*, (C) *Corynespora pruni*, (D) *Fusarium flocciferum* and (E) *Fusarium nivale*.

#### 4. *Fusarium flocciferum* Corda

(Fig. 2D)

(Booth<sup>(4)</sup> 1971, 182, Fig. 49)

Colonies on PDA medium white to pale peach with slight discoloration of the medium. Conidiphores formed sporodochia. Phialides subulate to obpyriform,  $7 - 9 \times 2.5 - 3 \mu\text{m}$ . Conidia curved, broadly fulcate with a pointed apex and flattened base.,  $0 - 3$  septate,  $10 - 30 \times 2.5 - 5 \mu\text{m}$ .

*Specimen examined:* Isolate from infected leaves of *Datura metel* L. (Solanaceae), Dhaka University, Curzon Hall Campus, 17 December, 2006, M. Aktar, 20.

5. **Fusarium nivale** (Fr.) Ces. (Fig. 2E)  
(Booth<sup>(4)</sup> 1971, 42, Fig. 6)

Colonies white to pale peach with little discolouration of agar. Mycelium sparse to densely floccose or felted. Phialides subulate to obpyriform, 7.5 - 10 × 2.5 - 5.5 µm., borne on branched conidiophores that arise as lateral branches of the hyphae or from the loose pseudoparanchymatous cells that form the sporodochia. Conidia curved, broadly falcate with a pointed apex, 0 to 2 septate, 8.6 - 18 (30) × 2.6 - 4.5 µm.

*Specimen examined:* Isolate from the healthy fruits of *Datura metel* L. (Solanaceae), Dhaka University, Curzon Hall Campus, 07 February, 2007, M. Aktar, 25.

Recorded on *Avnae* from Scotlant, *Triticum* from New Zealand and *Setaria* from Australia.

The fungi were found associated with one-month-old-young plants and latter at maturity the entire plants were affected. The isolated fungi were mostly pathogenic and contain various phytotoxins which are harmful for mankind and animals. These fungi are likely to deteriorate the quality and quantity of the affected plants. Present study will be helpful for designing the proper control measures of datura plants.

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