

## MYCOFLORA ASSOCIATED WITH TWO SPECIES OF LILIACEAE IN BANGLADESH

SHAMIM SHAMSI\* AND NAJMUN NAHER<sup>1</sup>

*Department of Botany, University of Dhaka, Dhaka-1000, Bangladesh*

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### Abstract

A total of nine fungi were isolated from two ornamental angiosperms, namely *Hemerocallis fulva* L. and *Pancreatum verecundum* Ant. belong to Liliaceae. Three species of fungi were found to be associated with the leaf of *Hemerocallis fulva*. The fungi were *Colletotrichum capsici*, (Syd.) Bull. & Bisby, *Colletotrichum dematium* (Pers. Ex Fr.) and *Glomerella montana* (Sacc.)v Arx & E. Muller. Six species of fungi, namely *Alternaria alternata* (Fries) Keissler, *Colletotrichum orbiculare* (Berk & Mont.) Arex., *Curvularia clavata* Jain, *Fusarium solani* (Mort.) Sacc., *Lasioidiplodia theobromae* (Pat.) Griffon and Maubol and *Macrophomina phaseolina* (Tassi) Goid were found to be associated with *P. verecundum*. Among the fungal species *Glomerella montana* is new record for Bangladesh.

### Introduction

Species of Liliaceae are most common and attractive ornamental plants. Certain lilies are susceptible to fungal diseases such as anthracnose, botrytis blight, blue mold, powdery mildew and rust. Lily plants are also attacked by *Fusarium* sp., *Cylindrocarpon* sp. and *Sclerotium* sp.. These fungi weaken the plant over the time and can eventually kill it<sup>(1)</sup>. *Hemerocallis fulva* L. is a showy herb with short bulbous root stock and fleshy leaves. Its local name is 'Kamla lily' and flowers during June - July in Bangladesh. Plants grow well in hilly regions and well drained soil. Plant is distributed in South Europe, North Asia to Japan. The ornamental is cultivated throughout the Indian subcontinent, especially in the Himalayas and Khasia hills. *Pancreatum verecundum* Ant. is a bulbous annual herbs with white flower. Normally, it grows in hilly area and flowers during March - July. The plant is distributed in the foot of Himalayas, from Punjab to eastward to Sikkim and Assam. Children eat the sweet nectar accumulated in perienth tube<sup>(2)</sup>. Lily is most common ornamental plant in Bangladesh. A lot of research have been done on taxonomy of the lily plants<sup>(3)</sup>. Two economically important members of Liliaceae viz., *Allium cepa* and *Allium sativum* are attacked by the species of *Aspergillus* and *Colletotrichum* but report on fungal diseases of *Hemerocallis fulva* and *Pancreatum verecundum* is not available in the literatures. Present study was undertaken to find out the presence of pathogenic fungi with lily plants in Bangladesh.

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\*Author for correspondence: <prof.shamsi@gmail.com>. <sup>1</sup>Department of Botany, Life and Earth Science Group, National University, Gazipur-1704, Bangladesh.

### Materials and Methods

During March, 2009 to July, 2010 infected leaves of *Hemerocallis fulva* and *Pancreaticum verecundum* were collected from the Botanical Garden, University of Dhaka and Gulshan area, Dhaka. The samples were directly examined under a compound microscope. Twenty five samples were examined from infected leaves of two species of lily plants. Fungi associated with infected leaves of lily were also isolated following "Tissue planting" and "Blotter" methods<sup>(4)</sup>. Potato dextrose agar (PDA) medium was used for "Tissue Planting" method. From a particular sample 30 inocula, each measuring 2<sup>2</sup> 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 rinsed with sterilized water. Three pieces of leaf samples were placed in each plate containing PDA medium and on sterilized plate with moist filter paper. Petri plates were incubated at 25 ± 1°C for 5 - 7 days. Fungi grew from the inocula were transferred to separate plates and slants for further studies and preservation. For microscopic observations of fungal structures, temporary mount was prepared in lacto phenol on a clean slide. In case of hyaline structures, a little amount of aniline blue was added to the mounting fluid. The isolated fungi were identified comparing the morphological characteristics recorded during microscopic observation with standard keys<sup>(5-9)</sup>.

All the specimens were preserved in the Herbarium, Mycology and Plant Pathology Division, Department of Botany, University of Dhaka, Bangladesh.

### Results and Discussion

Three species of fungi were associated with the leaves of *Hemerocallis fulva* showing anthracnose symptom. The fungi were, namely *Colletotrichum capsici*, *C. dematium* and *Glomerella montana*. Healthy and infected plants of *H. fulva* with associated fungi are presented in Fig. 1. A-G. Six species of fungi namely, *Alternaria alternata*, *Colletotrichum orbiculare*, *Curvularia clavata*, *Fusarium solani*, *Lasioleptodia theobromae* and *Macrophomina phaseolina* were associated with infected leaves of *P. verecundum* (Figs 2A- F and 3A- F).

*Alternaria alternata*, *Colletotrichum capsici*, *C. dematium*, *C. orbiculare*, *Curvularia clavata*, *Fusarium solani*, *Lasioleptodia theobromae* and *Macrophomina phaseolina* are well documented plant pathogens having wide host range and also reported from Bangladesh other than lily plants<sup>(10-11)</sup>. This is the first record of association of all the fungi with lily in Bangladesh. The species of *Glomerella montana* is new record for Bangladesh. Descriptions of the identified fungi are summarized below.

#### ***Alternaria alternata* (Fries) Keissler**

(Fig. 2F)

Colony greyish green, reverse blackish green, Mycelia brown, septate, conidiophores dark brown, simple, mostly short, septate up to 50 µm long, 3 - 6 µm thick with a scar at the tip. Conidia dark brown, typically with both cross and longitudinally septate,

variously shaped, obclavate to elliptical or ovoid, mostly verruculose,  $20 - 63 (38) \times 9 - 19 (13) \mu\text{m}$ .

*Specimen examined:* Isolated from infected leaves of *Hemerocallis fulva*. N. Naher 33.

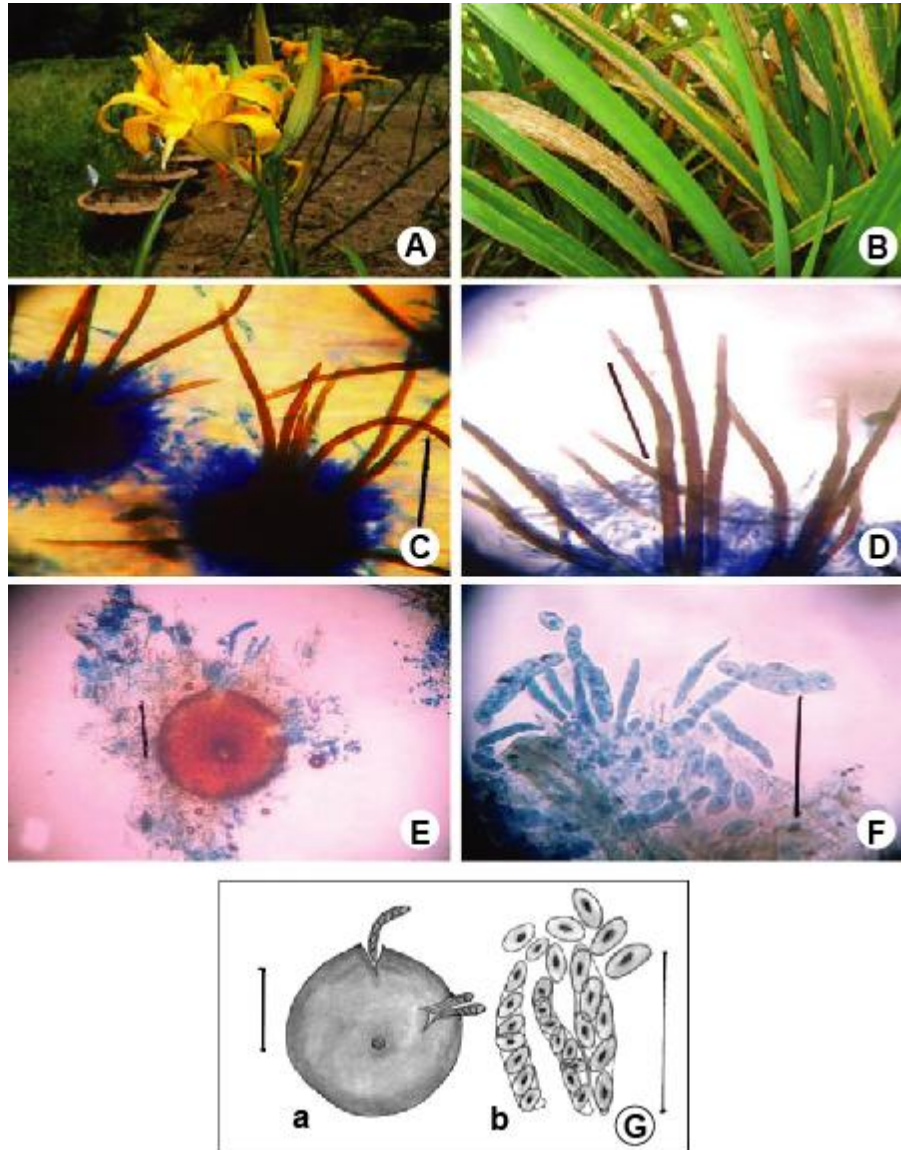


Fig. 1A - G. A, healthy plants. B, infected leaves of *Hemerocallis fulva*. C, characteristics of acervuli of *Colletotrichum capsici*. D, *Colletotrichum dematium*. E, perithecium of *Glomerella montana*. F, asci containing ascospores of *G. Montana* [Bars =  $50 \mu\text{m}$  (C, D, F) and  $100 \mu\text{m}$  (E)]. G, (a-b), Camera lucida drawing of perithecium, asci containing ascospores of *G. Montana* [Bars =  $11 \mu\text{m}$  (a) and  $25 \mu\text{m}$  (b)].

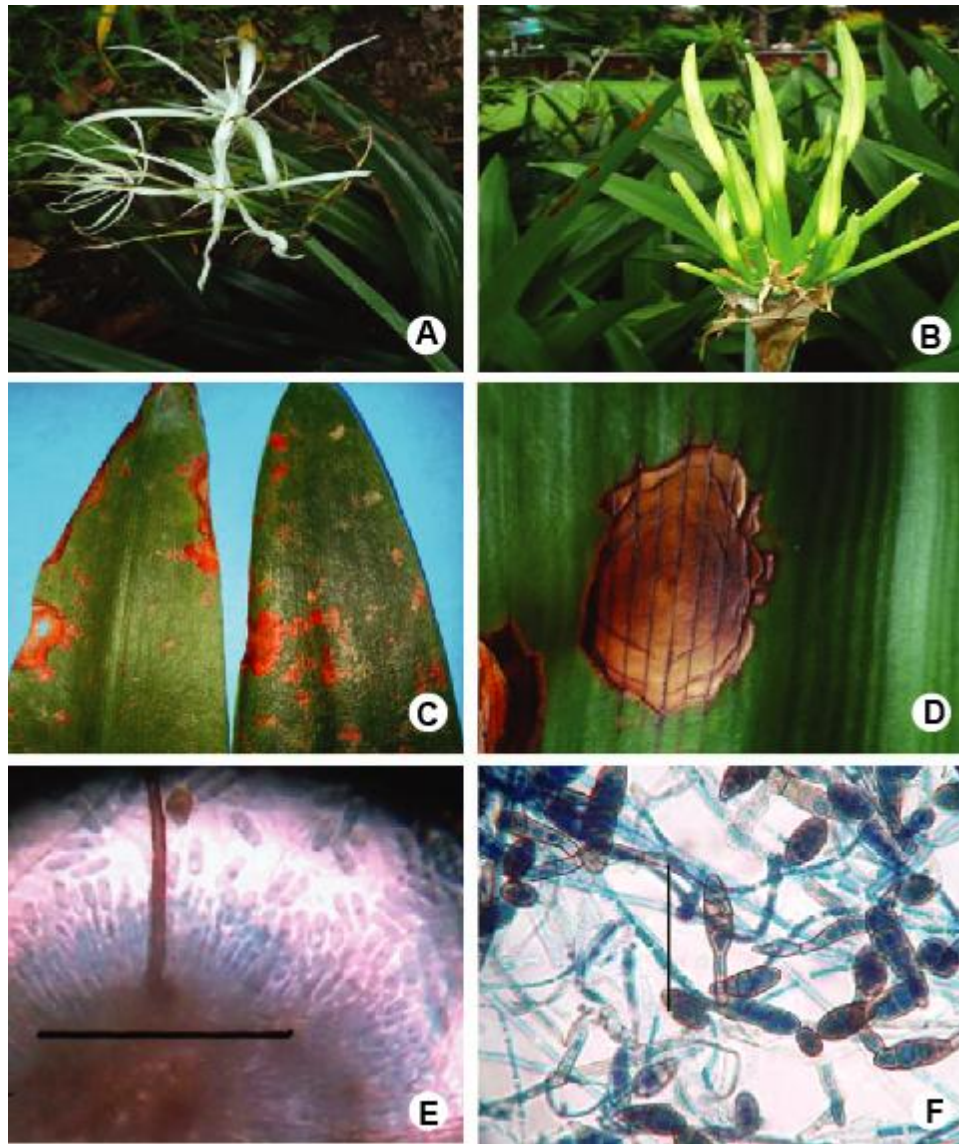


Fig. 2A-F. A, healthy plants; B, anthracnose infected plants. C, anthracnose infected leaves. D, enlarged view of lesion on anthracnose infected leaf of *Pancrtium verecundum*. E, characteristics of acervulli of *Colletotrichum orbiculare*, F, conidiophores and conidia of *Alternaria alternata* [Bars = 50  $\mu$ m].

***Colletotrichum capsici* (Syd.) Bult. & Bisby**

(Fig. 1C)

Colony dense whitish, dark grey at maturity on PDA medium, reverse dark brown, mycelia dark grey, branched septate, conidial masses buff to salmon. Sclerotia absent. Acervulus developed on PDA medium after 20 days of inoculation at 25 - 28°C

temperature. Setae abundant, dark brown, septate. Conidia falcate, fusiform, hyaline apices acute,  $17 - 24 \times 3 - 4 \mu\text{m}$ . Appressoria abundant, medium brown, clavate to circular, edge usually entire,  $9 - 15 \times 7 - 12 \mu\text{m}$ .

*Specimen examined:* Isolated from infected leaves of *Hemerocallis fulva*. N. Naher 34.

**Colletotrichum dematium** (Pers. ex Fr.) Grove (Fig. 1D)

Colony dense whitish, dark grey at maturity on PDA medium, reverse dark brown, Mycelia dark grey, branched, conidial masses buff to salmon. Scerotia absent. Acervulus developed on PDA medium after 20 days of inoculation at  $25 - 28^\circ\text{C}$  temperature. Setae abundant, dark brown, septate. Conidia falcate, fusiform, apices acute, hyaline,  $23 - 29 \times 3 - 4 \mu\text{m}$ . Appressoria abundant, medium brown, clavate to circular, edge usually entire,  $9 - 15 \times 7 - 12 \mu\text{m}$ , often becoming complex and forming long closely branched chains.

*Specimen examined:* Isolated from the healthy leaves of *Hemerocallis fulva*. S. Shamsi 2065.

The fungus is known from a wide range of hosts in different families and is found extremely in the tropics and subtropics of Africa, Asia, America and Australia.

**Colletotrichum orbiculare** (Berk & Mont.) Arex. (Fig. 2E)

Colonies grayish white, mycelia pale brown, branched, septate, conidial masses salmon pink. Conidiophores short, hyaline, setae dark brown, abundant, conidia straight, hyaline, aseptate, oblong,  $13 - 14 \times 4 - 5 \mu\text{m}$ . Appressoria dark brown,  $9 - 10 \times 4 - 6 \mu\text{m}$ , clavate or irregular, some times becoming complex.

*Specimen examined:* Isolated from infected leaves of *Pancratum verecundum*. S. Shamsi 2168.

**Glomerella montana** (Sacc.)v. Arx & E. Mülle (Fig. 1 E-G)  
(Teleomorph of *Colletotrichum* spp.)

Colony grayish black, perithecia brown-black, superficial, solitary or in groups obpyriform to ovate, asci hyaline,  $42 - 72 \times 9 - 11 \mu\text{m}$ . Ascospores hyaline, one celled, mostly  $14 - 17 \times 6 - 8 \mu\text{m}$ .

*Specimen examined:* Isolated from the leaves of *Hemerocallis fulva*. N. Naher 43.

The fungus was recorded on dead leaves, May to June. Plurivorous species, recorded on *Sesleria* including the stripe smut *Ustilago striiformis* and the hyphomycetes *Periconia hispidula*.

**Curvularia clavata** Jain. (Fig. 3A)

Colonies effuse, grayish black. Conidiophores solitary, mostly unbranched, straight or slightly undulated, brown, septate up to  $121 \mu\text{m}$  long,  $5 - 7 \mu\text{m}$  thick. Conidia

mostly 3 septate, olivaceous brown, slightly curved, third cell from the base is broader and darker than others, smooth,  $17 - 28 \times 7 - 13 \mu\text{m}$ .

*Specimen examined:* Isolated from infected leaves of *Panocratium verecundum*. N. Naher 25.

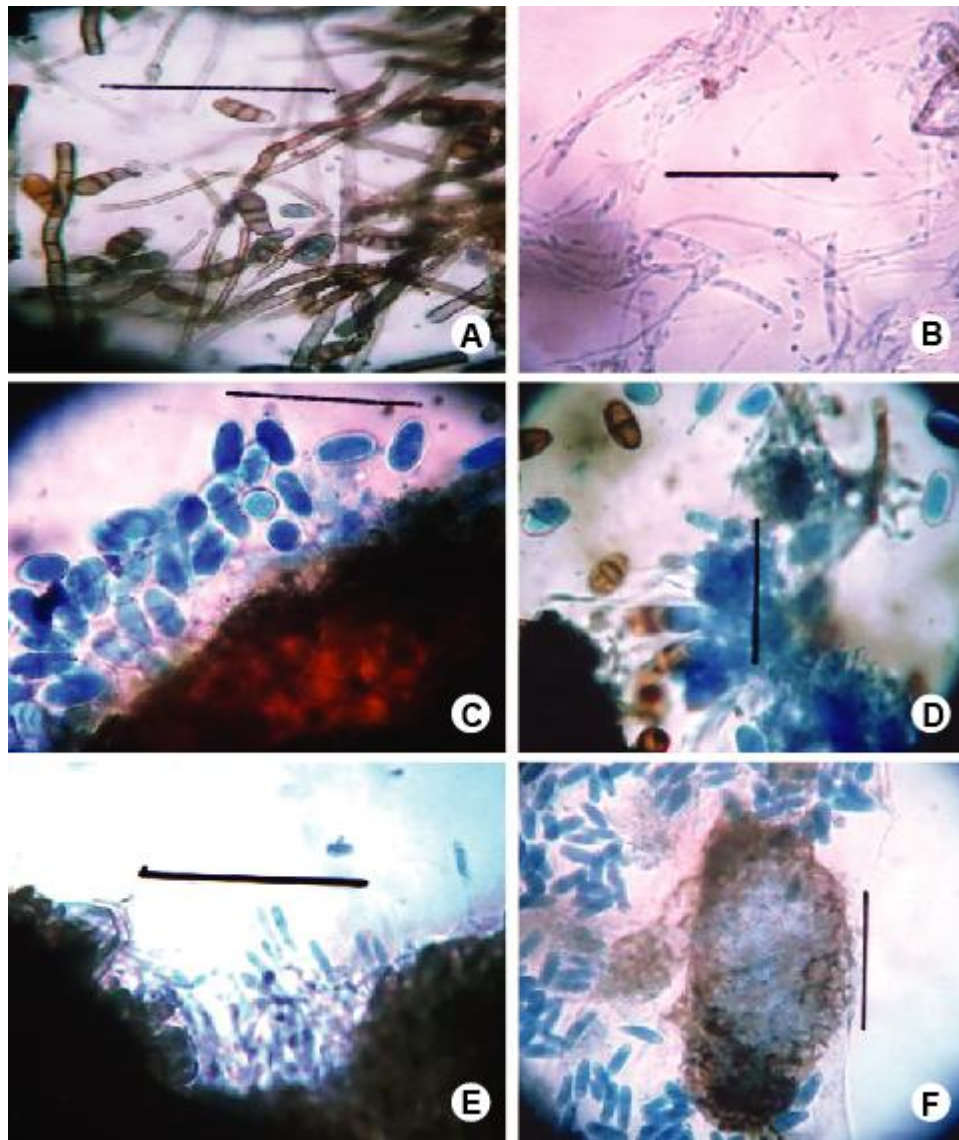


Fig. 3A-F. A, showing conidiophores and conidia of *Curvularia clavata*. B, phialide and conidia of *Fusarium solani*. C-D, pycnidia with conidiophores bearing conidia of *Lasiodiplodia theobromae* and E- F, pycnidia with conidiophores bearing conidia of *Macrophomina phaseolina* associated with *Panocratium verecundum* [Bars =  $50 \mu\text{m}$ ].

**Fusarium solani** (Mort.) Sacc. (Fig. 3B)

Colonies white but with some tinge of pink at maturity, cottony. Mycelium hyaline, septate, branched. Conidiophores hyaline short, branched, bearing phialides. Conidia hyaline, microconidia mostly two celled, ovoid or oblong, borne singly. Macroconidia hyaline mostly 3 celled, typically canoe shaped.

*Specimen examined:* Isolated from infected leaves of *Pancratium verecundum*. S. Shamsi 2169.

**Lasiodiplodia theobromae** (Pat.) Griffon and Maubol. (Fig. 3C, D)

(Syn. *Botryodiplodia theobromae* Pat.)

Colony grayish brown, reverse blackish brown. Pycnidia black ostiolate, erumpent. Conidiophores simple, short, conidia hyaline 1- but 2-celled and dark at maturity, ovoid to elongate.

*Specimen examined:* Isolated from infected leaves of *Pancratium verecundum*. S. Shamsi 2180.

**Macrophomina phaseolina** (Tassi) Goid. (Fig. 3E, F)

Colony grayish black, reverse grayish black, mycelia brown, septate, pycnidia dark, ostiolate, small, globose erumpent, 0.1-0.2 mm diam. Conidiophore short, hyaline. Conidia hyaline, 1-celled, ovoid to broadly ellipsoidal 13 - 28 × 5 - 11 μm.

*Specimen examined:* Isolated from infected leaves of *Pancratium verecundum*. S. Shamsi 2185.

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