Addition to micromycetes of Lahore, Pakistan

*Amna Ali, Nosheen Akhtar, J. H. Mirza and Rukhsana Bajwa

Department of Mycology and Plant Pathology, University of the Punjab, Quaid -e- Azam Campus, Lahore, 54590 Pakistan
Email: aliaamna@hotmail.com

Abstract

A study of micromycetes of Lahore initiated during 2005 at Fungal Culture Bank of Pakistan (FCBP), Punjab University revealed the presence of 22 species of fungi. They were isolated from soil, air, khoya, stale bread, animal dung and diseased roots, leaves & fruits of various plants on MEA & PDA; a few, however, were recultured on other recommended media for verification of diagnostic characteristics. They include five species of Fusarium (F. equiseti, F. oxysporum F. semitectum, F. lateritium & F. solani), three species of Penicillium (P. simplicissimum, P. citrinum & P. capsulatum), two species each of Aspergillus (A. candidus & A. penicilloides) and Mucor (M. hiemalis, M. subtilissimus), one species each of Phytophthora (P. cinnamomi), Cunninghamella (C. degans), Acremonium (A. kiliense), Absidia (A. cylindrospora), Rhizopus (R. nigricans), Doratomyces (D. microsporus), Choanephora (C. cucurbitarum), Cladosporium (C. cladosporioides), Torula (T. herbarum), Alternaria (A. alternata), Drechslera (D. hawaiensis), Monilia (M. strophila) and Sclerotium (S. bataticola). Two species of Pilobolus (P. longipes & P. crystallinus) found growing on dung did not grow in culture on any agar medium used in these studies.

Key words: Micromycetes, Lahore, Fungi, Cultures.

Introduction

Fungi are ubiquitous and important because of their presence in all climates and on all substrates. Most of them can be easily cultured, though some require special media to grow but the biotrophs fail to grow in axenic cultures. For proper growth and sporulation of a fungus specific requirements (nutrients, temperature, moisture, light, relative humidity etc) of a fungus are to be fulfilled. Late Dr. Sultan Ahmad in 1956, 1969, and 1997 (with S. H Iqbal and A. N. Khalid) published lists of fungi from Pakistan. Mirza and Qureshi in 1978 revised the lists of fungi of Pakistan by Ahmad (1956, 1969), by including their own additions and new reports by other authors. They reported 3383 species of fungi belonging to 874 genera from whole of Pakistan.

Materials and Methods

Samples collected from different localities of Lahore in separate sterile cellophane or paper bags were placed in a refrigerator and cultured on agar media as early as possible. Different types of media were prepared (Table 1) for isolation and sporulation. Specimens of diseased plant material if not sporulating were incubated in a moist chamber to induce sporulation before isolation. Diseased pieces of roots, stems, leaves and rotten fruits were surface sterilized with 10% sodium hypochlorite (NaOCl) for 1-3 minutes, washed in sterile water and placed in petriplates on sterilized agar media. These specimens were incubated at about 25°C. Permanent slides of leaf spots were prepared by Whole Leaf Clearing & Staining Technique (Bruzzone and Hasan,1983).

Isolations from soil were made by direct soil plating method (Mirza et al., 1979) and incubated in the dark at 25°C, unless otherwise stated, for 48 to 72 hrs. After 24 hour’s incubation, fungal colonies start growing. Inoculum from the margin of developing young colonies was transferred to fresh agar plates for purification.

Pieces of dung were examined by preparing moist chambers (Mirza et al., 1979). These chambers were examined almost daily under stereoscope for the growth of fungi.

Phytophthora species was isolated by apple fruit and hemp seed baiting. (Waller et al., 1998). Identification of fungi was done by recording macroscopic and microscopic characters and consulting the pertinent literature. All pure cultures were deposited in Fungal Culture Bank of Pakistan (FCBP).
isolated from air (FCBP 229); decaying sissoo diameter.

hyaline, usuall towards their apices, 20 hyphae by a septum at the base and tapering like, narrow and monoblastic, separated from often forming hyphal ropes. Hyphae days on MEA; reverse cream to light b in the center, 2

Specimen Examined: Isolated from Dalbergia sissoo root, Lahore, 23.11.05(FCBP 554).

This species was reported earlier by Mirza & Qureshi (1978) on dead insect from Faisalabad.

2. Acremonium kiliense Grutz, 1925. Dermatologische Wochenschrift, B:774

Colonies white or pale pink, powdery, raised in the center, 2-3 cm in diameter at 25°C after 10 days on MEA; reverse cream to light brown. Hyphae hyaline, typically very fine and narrow, often forming hyphal ropes. Phialides long, needle-like, narrow and monoblastic, separated from hyphae by a septum at the base and tapering towards their apices, 20-25x1.5-1.9µm. Conidia hyaline, usually in clusters or in balls, ellipsoid, ovoid or cylindrical in shape, few to abundant, 2.5-2.8x1-1.9µm. Chlamydospores hyaline, 4-8µm in diameter.

Specimen Examined: Isolated from Dalbergia sissoo root, Lahore, 23.11.05(FCBP 565).

In the collection of FCBP it was previously isolated from air (FCBP 229); decaying Mycopath (2006), 4(2): 17-25

RESULT & DISCUSSION

The following fungi were found growing on different substrates. They were isolated in pure culture on media mentioned in Table: 2. Species of Pilobolus could not be cultured even on dung agar.


Colonies after 2-3 days at 25°C, 4.5-5.0 cm in diameter, cottony, white on MEA. Sporangioles branched, hyaline to light brown, smooth-walled, septa present, 79-228x2.36-10.1µm. Sporangia pyriform, 19.2-31.2x24-65µm, apophyses distinct. Columellae hyaline to grey, ovoid and conical, 6-35 x 5-25, smooth-walled and quickly deliquescing, with 1-3 apical projections. Sporangiospores cylindrical, rarely subglobulese smooth-walled, hyaline, contents homogenous, 2.3-7.1 x 1.8-4.1µm.

Specimen Examined: Isolated from Dalbergia sissoo root, Lahore, 23.11.05(FCBP 572).

This species was reported earlier by Mirza & Qureshi (1978) on dead insect from Faisalabad.

2. Acremonium kiliense Grutz, 1925. Dermatologische Wochenschrift, B:774

Colonies white or pale pink, powdery, raised in the center, 2-3 cm in diameter at 25°C after 10 days on MEA; reverse cream to light brown. Hyphae hyaline, typically very fine and narrow, often forming hyphal ropes. Phialides long, needle-like, narrow and monoblastic, separated from hyphae by a septum at the base and tapering towards their apices, 20-25x1.5-1.9µm. Conidia hyaline, usually in clusters or in balls, ellipsoid, ovoid or cylindrical in shape, few to abundant, 2.5-2.8x1-1.9µm. Chlamydospores hyaline, 4-8µm in diameter.

Specimen Examined: Isolated from Dalbergia sissoo root, Lahore, 23.11.05(FCBP 565).

In the collection of FCBP it was previously isolated from air (FCBP 229); decaying Mycopath (2006), 4(2): 17-25

Women(FCBP 259); Hothos leaves(FCBP 275); mulberry stem(FCBP 162); buffalo dung(FCBP 368) and soil(FCBP 408) from Lahor.


Colonies olivaceous black to grey, 5.5-6.0cm diameter after 2 days at 25°C on MEA reverse creamish yellow to black. Conidiophores arising singly or in small groups, branched, straight or curved, 1-3 septate, geniculate, pale to mid olivaceous, smooth, up to 50µm long, 3-6µm thick, with 1 or several apical conidial scars (pores). Conidia porospores often in branched chains, obclavate, obpyriform, ovoid, with a short conical or cylindrical beak, pale to mid golden brown, up to eight transverse and several longitudinal or oblique septa, 20-63µm long, 9-18µm thick, beak pale, 2-5µthick.

Specimen Examined: Isolated from Malus domestica fruit, Lahore, 12.12.05(FCBP 574), Lycopersicon esulentum fruit, Lahore, 12.12.05(FCBP 573), Khoya (Dehydrated milk), Lahore, 12.12.05(FCBP 572).

A. Alternata is reported as A. tenuis in older literature. It is the most common and variable species of Alternaria. In the collection of FCBP it was previously isolated from Rumex dentatus leaves(FCBP 03), air (FCBP 246), Dalbergia sissoo root (dieback)(FCBP 158, 189, 194), milk cream( FCBP 216), polluted water(FCBP 265), canned peach(FCBP 328), Citrullus vulgaris leaves(FCBP 335), soil(FCBP 345), Spinacea oleracea leaves(FCBP 352), Eucalyptus citriodora rhizospheric soil(FCBP 369), Cucurbita leaf(FCBP 402) and Gladiolus bulb(FCBP 404).


Colonies olive green, dense, velutinous, 5.0-6.0cm after 8 days on MEA at 25°C, reverse hyaline to pale brownish yellow. Conidial heads definitely columnar. Stipes 150-500µm, hyaline,
smooth-walled. **Conidiophores** short, smooth, usually hyaline to greenish in terminal areas. **Vesicles** subglobose, (7)-9-25µm in diameter; **Sterigmata** uniseriate. **Phialides** (6)-7-10(11)µm covering more than half of the vesicle. **Conidia** ellipsoid, rough-walled, 3.5(6)x3-4µm. **Specimen Examined:** Isolated from Litchi chinensis root, Lahore, 23.11.05 (FCBP 559).

Previously it was reported by Ahmad (1960) in soil from Lahore.


**Colonies** white to pale yellow, floccose, granular, 1.5-3.0cm in diameters after 4 days on MEA at 25°C, reverse pale yellow to dull brown. **Conidial heads** large, globose becoming radial with age. **Conidiophores** 200-500x4-10µm, smooth-walled, hyaline, slightly yellowed in terminal areas. **Vesicles** 17-35µm wide, globose, predominantly biseriate. **Metulae** club-shaped, 7-20x5-8µm, pyriform, 1-septate. **Phialides** 6-9x2-3µm, large, ampulliform, compactly arranged. **Conidia** globose, smooth-walled, 2.5-3.5µm diameter, uniseriate, the chains sometimes sliming down. **Specimen Examined:** Isolated from Air, Lahore, 02.11.05 (FCBP 546).

Previously it was reported by Ahmad (1956b, 1971a), Qureshi (1966) and J. Ahmad (1967). In the collection of FCBP it was previously isolated from Dalbergia sissoo soil (dieback, FCBP 220) from Lahore.

6. **Choanephora cucurbitarum** (Berk. & Rav.) Thaxter. 1903. Rhodora 5: 97.

**Colonies** at 25°C after 3 days on V-8A, 3-4cm in diameter, white to pale yellow, reverse pale olive-buff, sporangiolar heads seen as dark spots in the colony. **Sporangiophores** bearing sporangiola arising from surface hyphae, erect, hyaline, smooth, non-septate, with granular contents, up to 26µm in diameter. **Sporangiola**, 1-spored, ovoid, reddish brown, with longitudinal striations, hyaline, with papilla at one end, 17.3-12.6x14.9-9.2µm in size. **Specimen Examined:** Isolated from Calotropis procera leaves, Lahore, 12-09-2005 (FCBP 541).

7. **Cladosporium cladosporioides** (Fresen.) de Vries, 1952. Contribution to the knowledge of the genus Cladosporium Link ex Fr. 57.

**Colonies** effuse, olive green or olivaceous brown, velvety, 9 cm in 5 days at 25°C on PDA, reverse greenish black. **Conidiophores** macronematous and micronematous, 350µm long, 2-6µm thick, pale to mid olivaceous brown, smooth. **Ramo-conidia** 0-1 septate, 30µm long, 2-5µm thick, smooth. **Conidia** uninucleate, formed in long branched chains, mostly 0 septate, ellipsoidal, 3-11x2-5µm, pale to olivaceous brown, smooth. **Specimen Examined:** Isolated from Calotropis procera leaves, Lahore, 10.11.05 (FCBP 550).

This species was earlier reported by Qureshi (1966), J. Ahmad (1967), Ahmad (1968, 1969a) on soil and leaves of the Z. mays, from Lahore. In the collection of FCBP it was previously isolated from Dalbergia sissoo bark (dieback), (FCBP 190), air(FBP 215).


**Colonies** after three days at 25°C on MEA, 6.0-6.6cm in diameter, white to dark grey and powdery with sporangial development. **Sporangiophores** erect and collapsing, verticillately branched, hyaline, smooth, punctate, double-walled, septa present with a large apical vesicle and a cluster of lateral smaller one-spored sporangiola 2-12 in number. **Vesicles** globose, hyaline, smooth, bearing short sterigmata, **apical vesicles** 30.9-70x30.8-56µm, lateral **vesicles** globose 12-33.6µm in diameter. **Conidia** mostly globose, hyaline to light brown, smooth to minutely echinulate, 4.6-18.7µm in size. **Specimen Examined:** Isolated from Dalbergia sissoo roots, Lahore, 12-09-2005 (FCBP 504).

This species was earlier reported by Ahmad (1969a) on deer dung from Lahore Zoo and on cow dung from Faisalabad and by Mahmood and Mirza (1972) on dung of different animals and on plant substrates from Lahore. In the collection of FCBP it was previously isolated from Acacia arabica rhizospheric soil (dieback, FCBP 112), air mycota (FCBP 172), and soil (FCBP 218).


**Colonies** grey to black, having browning-like structures, reaching 2.5-3.0cm in 10 days at 25°C on MEA; reverse dark black. **Synnemata** cylindrical 540µm long, pointed tips when young. **Conidia** ovoid produced at apices of synnemata, smooth-walled, 3-4.5x2µm. **Specimen Examined:** Isolated from Dalbergia sissoo root, Lahore, 23.11.05 (FCBP 335).

In the collection of FCBP it was previously isolated from water of bleaching tank (FCBP 223), and goat dung (FCBP 355).


Colonies effuse, grey, dark blackish brown to black, 3.5-4.0cm in diameter in 7 days at 25°C on MEA, reverse black. **Conidiophores** solitary, flexuous, seporate, pale to mid brown, up to 120µm long but usually much shorter, 2-7µ thick. **Conidia** straight, ellipsoid, oblong or cylindrical rounded at the ends, pale to mid brown, 2-7 (mostly 5) pseudoseptate, 12-37(24.5)x 5-11(8.2)µm.

**Specimen Examined:** Isolated from *Eriobotrya japonica* fruit, Lahore, 15.11.05 (FCBP 553).

In the collection of FCBP it was previously isolated from Leaf blight of *Marsilea* sp(FCBP 07).


Colonies floccose, 3.0-3.2 cm diameter in four days on MEA and PSA at 25°C, green to bluish-brown, reverse pale to cream. **Microconidia** develop abundantly in fresh isolates after 2-3 days. **Phialides** are elongated lateral, narrow towards the apex, measured 45-80 x 2.5-3 µm. **Macroconidia** develop after four to seven days, borne on multibranched conidiophores which soon merge into effuse sporodochia, inequilaterally fusoid with many of the spores having widest diameter in the penultimate cell, 3-5 sepatate, rarely pedicellate, 31-38 x 5.2-6.0µm. **Chlamydospores** tend to develop abundantly on weak media after 7-14 days. They are globose, smooth-walled, 9-12x8-10µm and form terminally on short lateral branches.

**Specimen Examined:** Isolated from *Dalbergia sissoo* root bark, Lahore, 04.10.05 (FCBP 538).

F. solani is one of the most common species of *Fusarium* isolated from soil and roots of different plants. It was reported earlier by J. Ahmad (1967), Ahmad (1969a) on *Cyanopsis psoraloides*, *Solanum tuberosum* from Lahore. In the collection of FCBP it was previously isolated from soil(FCBP 16), *Rosa indica* root (FCBP 120), *Solanum tuberosum* tubers,(FCBP 470), *Acacia arabica*, root (wilt), (FCBP 136), *Litchi chinensis*, rhizospheric soil(FCBP 224), *Lycopersicon esculentum* fruit(FCBP 277), *Lens esculenta* seed(FCBP 438).

12. **Fusarium lateritium** Nees, 1817. *Syst. Pilze Schawmre 31.*

Colonies white or light colored, fluffy, with regular margins and zonations, slow growing, reaching 4-5cm in seven days on MEA and PSA at 25°C; reverse white. **Microconidia** absent. **Macroconidia** mostly straight, 3-5 (mostly 3) septate, 24-26x3-3.5µm.; apical cells beaked at the apex. **Phialides** monoblastic.

**Specimen Examined:** Isolated from *Dalbergia sissoo* soil, Lahore, 04.10.05 (FCBP 543), *Calotropis procera* leaves, Lahore, 23.11.05 (FCBP 558), *Spinacia oleracea* leaves, Lahore, 16.10.05 (FCBP 552).

This species is reported on dung for the first time from Pakistan. Previously it was reported by Ahmad (1969a) from soil, Lahore. In the collection of FCBP it was previously isolated from *Cucurris salinus* (FCBP 237), goat dung(FCBP 284), cow dung,(FCBP 287), *Cucurbita pepo* fruit(FCBP 309), *Solanan melongera* leaves(FCBP 333), *Cicer arietinum* seed(FCBP 348), *Citrus vulgaris* var. *fistulosus* fruit(FCBP 452), canned peach(FCBP 327), *Calotropis procera* leaves(FCBP 337), *Acacia* sp. leaves(FCBP 569).


Colonies whitish- cream colored, floccose, 4.5-5.0cm in five days on MEA and PSA at 25°C, reverse pale to bluish-violet. **Phialides** lateral and monoblastic. **Microconidia** borne on urn-shaped monophialides in false heads, oval to reniform, 0-septate 5-12x2.2-3.5µm. **Macroconidia** borne on monophialides, falcate to straight, usually 3-septate, 4.0-12.0x1.08-6.0µm, **apical cell** somewhat pointed; **foot cell** usually markedly pedicellate.

**Specimen Examined:** Isolated from *Dalbergia sissoo* root bark and soil, Lahore, 04.10.05 (FCBP 540, 539).

In the collection of FCBP it was previously isolated from field soil (FCBP 60), soil buried human nails(FCBP 134), soil, *Dalbergia sissoo* (FCBP 512), *Eucalyptus citriodora* root(FCBP 370).


Colonies creamish-yellow, floccose with aerial tufts, 4.5-6.6 cm on MEA and PSA at 25°C, reverse peach yellow. **Phialides** generally obclavate, 12-17x3-4µm, monoblastic. **Microconidia** absent. **Macroconidia** borne on monoblastic phialides, falcate with distinct foot cell, 20.8-26x3-7.5µm, tapering, 3-7 septate; foot cell usually markedly pedicellate, apical cell elongated.

**Specimen Examined:** Isolated from *Litchi chinensis* roots, Lahore, 04.10.05 (FCBP 544).

In the collection of FCBP it was previously isolated from *Litchi chinensis* root(FCBP 238), *Eucalyptus citriodora* root(FCBP 372), *Vigna radiata* seed(FCBP 459), *Psam sativum* seed(FCBP 384), *Chenopodium album* leaves(FCBP 436), *Trianthema* sp. leaves(FCBP 490).

15. **Fusarium semitectum** Berk. & Rav. 1875. 
_Greillea_ 3: 98.
_Colonies_ 6.1 cm in three days on MEA and PSA at 25°C, floccose, white with peach tinge gradually changing to avellaneous and finally becoming buff-brown (14-21 days). **Phialides** polyblastic. _Microconidia_ absent. _Macroconidia_ 3-5-septate curved wedge-shaped but non pedicellate basal cell and pointed apex, 3-septate spores 17-28x2.5-4µm, 5-septate 22-40x3.7-4µm. **Chlamydospores** globose, intercalary, 5-10µm, formed singly or in chains.
**Specimen Examined:** Isolated from Calotropis procera leaves, Lahore, 23.11.05 (FCBP 560).

_Colonies_ cottony, peach colored, 6.0-6.5 cm in diameter at 20-22°C after 2 days on MEA; reverse yellowish brown. **Conidiophores** highly branched, and septate, flexuous and curved. **Conidia** in chain, easily separating from each other.
**Specimen Examined:** Isolated from Moldy bread, Lahore, 05.12.05 (FCBP 552).
In the collection of FCBP it was previously isolated from soil (FCBP 305), wood (FCBP 677) and air (FCBP 593).

_Colonies_ on MEA 14.5-15.0mm high at 20°C after 2 days, buff, reverse pale. **Sporangiophores** weakly branched, smooth to punctate, hyaline, septa present at the base, 4.8-19.2µm in diameter. **Sporangia** globose, yellowish brown to black, smooth-walled to punctate, 28-90x72.4-89µm in diameter. **Colurniae** globose, light yellow, smooth, 8.4-34µm in diameter. **Sporangiospores** mostly ellipsoid, some ovoid, smooth-walled, light grey, with globulae, 4.5-11x2.3-8.6µm.
**Specimens Examined:** Isolated from Dalbergia sissoo root, Lahore, 23.11.05 (FCBP 542), _Lycopersicon esculentum_ fruit, Lahore, 12.12.05 (FCBP 571).

It was previously reported by Mirza et al., (1979) in soil and dung, from different parts of Punjab and Baluchistan. In the collection of FCBP it was previously isolated from _Cucumis melo_ fruit pulp (FCBP 425).

_Colonies_ 5cm in diameter after 2-3 days at 35°C on MEA, cottony, white, reverse hyaline. **Sporangiophores** unbranched, hyaline, smooth to punctate, 8.8-11µm in diameter. **Sporangia** globose, brown, smooth-walled and quickly deliquescent, 57-92µm in diameter. **Colurniae** globose or subglobose, hyaline to light brown, smooth-walled, 19-26µm in diameter. **Sporangiospores** mostly cylindrical or ellipsoid, hyaline, grey in mass, smooth, 6.10x2-3µm.
**Specimen Examined:** Isolated from _Spinacia oleracea_ leaves, Lahore, 23.11.05 (FCBP 562).

It was reported previously by Mirza & Qureshi (1978) on _Coprinus_ basidiocarp growing on cow dung, Faisalabad.

_Colonies_ white at the margin yellowish in the center, sulcate, centrally raised, velutinous, 1.4-2.0cm in 5 days on MEA at 20°C, reverse creamish yellow. **Conidiophores** arising from aerial hyphae, short, stout and monoverticillate, but longer, irregularly metulate forms also found. **Stipes** short, smooth, 15-40x2.0-2.5µm. **Phialides** in verticils of 5-8, ampulliform, acerose, commonly 8-10x2.0-2.5µm. **Conidia** ellipsoidal, cylindrical or pyriform, smooth-walled, 3.0-4.0x2.5-3.0µm.
**Specimen Examined:** Isolated from Moldy bread, Lahore, 05.12.05 (FCBP 567).

It was reported earlier by Mirza and Qureshi (1978) on _Lagenaria vulgaris_ from Faisalabad.

_Colonies_ bluish green, floccose in center and velutinous at margins, yellow exudates on surface, margin white, 6.0-6.5 cm after 7 days on MEA at 25°C, reverse yellow to yellowish cream. **Conidiophores** arise separately from submerged hyphae, usually up to 150µm in length. **Stipe** long, smooth, 300x2.2-3.0µm. **Metulae** often spathulate, 16-30x3.0µm. **Phialides** ampulliform with short collula, 6-7x2-3µm. **Conidia** spherical, smooth, greenish-yellow, 2.6-3.5µm in diameter.
**Specimen Examined:** Isolated from Khoya (Dehydrated milk), Lahore, 12.12.05 (FCBP 570).

It was earlier reported by Ahmad (1956), Qureshi (1966), J. Ahmad (1967) on rotting citrus fruits and in soil from Lahore.

_Colonies_ powdery dark green with white margin, 5.0-9.0cm in diameter after 3 days on MEA at 25°C, reverse yellow. **Conidiophores** borne from surface aerial hyphae. **Stipe** long and rough-walled, 400-800x2.5-4.0µm. **Metulae** in verticils of 2-5, 12-20x2.5-4.0µm, rough-walled. **Phialides** ampulliform, 8.9x2.2-2.5µm, narrowing abruptly to long collula. **Conidia** subglobose, finely echinulate, 2.5-3.0µm long.


Colonies comparatively slow growing, white to yellow, not exceeding 2.0-2.5 cm diameter in four days at 20°C on MEA and PSA. Mycelium thin-walled, globose hyphal swelling about 40µm in diameter and abundantly produced in terminal or lateral clusters. Sporangia are either produced singly or in a sympodial succession on mostly unbranched hyphae or with terminal proliferations, mostly 57-67x33-39µm, with an inconspicuous apical thickening. Zoospores not seen, even with hemp seeds bait.

Specimen Examined: Isolated from *Dalbergia sissoo* root, Lahore, 23.11.05.

It was earlier reported by Gill et al. (2001) from *Dalbergia sissoo* root, Faisalabad.


Trophocysts submerged, light yellow, elongated, 400-600x265-270µm. Sporangiophores hyaline, erect, unbranched, nonseptate, smooth-walled, 500-800x50-60µm. Subsporangial vesicles orange, ovoid, 525-625x400µm. Sporangia subglobose or hemispherical, smooth-walled, 300x180µm. Sporangiospores globose to ellipsoid, with one or more globules, thin-walled, variable in size, globose ones 7.2-21µm and ellipsoid 7.11.5x5.85µm.

Specimens Examined: Cow dung, Lahore, 08.09.04.

It was earlier reported on llama dung from Lahore Zoo (Mirza et al., 1979).


Trophocysts submerged, light yellow to brown, ovoid, 650-700x300-320µm. Sporangiophores hyaline, erect, unbranched, nonseptate, smooth-walled, 400-500x50-60µm. Subsporangial vesicles ellipsoid, light brown, 300-370x250-293µm. Sporangia hemispherical, smooth-walled, 200-230x150-160µm. Sporangiospores ellipsoid, 4-10x9-12µm.

Specimens Examined: Cow dung, Lahore, 08.09.04.

It is a very common species of *Pilobolus* reported earlier from dung of various animals from Punjab and Sindh (Mirza et al., 1979). None of the *Pilobolus* spp grew on media used in this study.


Colonies 4.0-4.5cm in diameter at 25°C on MEA in 2 days, cottony, white with black dots, reverse hyaline. Sporangiophores arising from stolons opposite the rhizoids, unbranched, dark brown, smooth to punctate, thick walled. Sporangia globose, black, erect, apophysate, apophyses broad columnellate, wall encrusted and quickly deliquescing, 45.3-227µm in diameter. Columellae globose or sub-globose, with broad apophyses, light brown, 2.4-158.5x21.6-120µm. Sporangiospores irregularly oval, light yellow, with prominent ridges, contents homogeneous, 9.7-18x5.9µm.

Specimen Examined: Isolated from *Dalbergia sissoo* root, Lahore, 23.11.05(FCBP 555).

It was reported by Mirza et al., (1979) from mole excreta, Lahore zoo.


Colonies dotted black with zonation, rounded, 6 cm in diameter at 20°C after 4 days on MEA; reverse black. Mycelium usually light, fluffy, branched. Sclerotia brown to black, globose or irregular compact; usually it does not produce spores. It is known to be sclerotial state of *Macrophomina phaseolina*.

Specimen Examined: Isolated from *Arachis hypogaea* leaves, Lahore, 12.12.05(FCBP 578).

Previously it was reported by Qazi et al., (1961) on cowpeas, cotton, okra & *Impatiens balsamina*, Faisalabad.


Colonies usually effuse, olive to brown or blackish brown, velvety, 9 cm after 7 days on PSA at 20°C, reverse yellow. Mycelium superficial and immersed. Conidiophores 2-6µm thick except for the conidiogenous cells, which are 7-9µm diameters, semi micromonomatous, unbranched, subhyaline to mid brown, smooth. Conidia straight or slightly curved, cylindrical, rounded at the ends, pale olive to brown, verruculose, 3-10 septate, constricted at the septa. 20-70(29)x5.9-7.1µm.

Specimen Examined: Isolated from *Calotropis procrea* leaves, Lahore, 02.11.05(FCBP 547).

It was previously reported by Ahmad (1968, 1969a) on dead branches, leaves, and pods of *Albizia lebebeck* from Lahore.
Table 2: (list of species isolated from different substrates)*

<table>
<thead>
<tr>
<th>Substrate/host</th>
<th>Place of Collection</th>
<th>Date of Collection</th>
<th>Medium Cultured on</th>
<th>Fungal species</th>
<th>FCBP Accession No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litchi chinensis, Wilted roots</td>
<td>Experimental Station of Department MPPL</td>
<td>23rd November 2005</td>
<td>PSA</td>
<td>Fusarium equiseti</td>
<td>544</td>
</tr>
<tr>
<td>Eriobotrya japonica, Rotted fruit</td>
<td>Fruit market, Lahore, Cantt</td>
<td>19th November 2005</td>
<td>MEA</td>
<td>Aspergillus penicillioides</td>
<td>559</td>
</tr>
<tr>
<td>Moldy Bread slices</td>
<td>Rahat Bakers, Lahore, Cantt</td>
<td>19th November 2005</td>
<td>MEA</td>
<td>Drechslera hawaiiensis</td>
<td>553</td>
</tr>
<tr>
<td>Malus domestica, Rotted fruit</td>
<td>Fruit market, Lahore, Cantt</td>
<td>20th November 2005</td>
<td>MEA</td>
<td>Penicillium capsulatum</td>
<td>567</td>
</tr>
<tr>
<td>Lycopersicon esculentum, Rotted fruit</td>
<td>Fruit market, Lahore, Cantt</td>
<td>12th December 2005</td>
<td>MEA</td>
<td>Alternaria alternata</td>
<td>574</td>
</tr>
<tr>
<td>Dalbergia sissoo, Decline root bark</td>
<td>Experimental Station of Department MPPL</td>
<td>4th October 2005</td>
<td>MEA</td>
<td>Phytophthora cinnamomi</td>
<td>504</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MEA</td>
<td>Cunninghamella elegans</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MEA</td>
<td>Mucor hiemalis</td>
<td>542, 571</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MEA</td>
<td>Absidia cylindrospora</td>
<td>554</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSA</td>
<td>Rhizopus nigricans</td>
<td>555</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSA</td>
<td>Fusarium solani</td>
<td>538</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSA</td>
<td>Fusarium lateritium</td>
<td>543</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSA</td>
<td>Fusarium oxysporum</td>
<td>539</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MEA</td>
<td>Alternaria alternata</td>
<td>573</td>
</tr>
<tr>
<td>Khoaya (Dehydrated milk) with rotten</td>
<td>Milk shop, Lahore, Cantt</td>
<td>12th December 2005</td>
<td>MEA</td>
<td>Penicillium chitinum</td>
<td>570</td>
</tr>
<tr>
<td>smell</td>
<td></td>
<td></td>
<td>V-8</td>
<td>Alternaria alternata</td>
<td>572</td>
</tr>
<tr>
<td>Calotropis procera, Grayish black spots on leaves</td>
<td>Experimental Station of Department MPPL</td>
<td>10th November 2005</td>
<td>PSA</td>
<td>Chaenohora cucurbatarum</td>
<td>541</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSA</td>
<td>Torula herbarum</td>
<td>547</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PDA</td>
<td>Fusarium solani</td>
<td>560</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PSA</td>
<td>Cladosporium cladosporioides</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MEA</td>
<td>Fusarium lateritium</td>
<td>558</td>
</tr>
<tr>
<td>Spinacia oleracea, Brownish black spots on leaves</td>
<td>Punjab University Shopping Center Lahore</td>
<td>16th October 2005</td>
<td>MEA</td>
<td>Mucor subtilissimus</td>
<td>562</td>
</tr>
<tr>
<td>Arachis hypogaea, Black spots on leaves</td>
<td></td>
<td></td>
<td>PSA</td>
<td>Fusarium lateritium</td>
<td>552</td>
</tr>
<tr>
<td></td>
<td>Lahore</td>
<td>2nd November 2005</td>
<td>DA</td>
<td>Aspergillus bataticola</td>
<td>578</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pilobolus candidus</td>
<td>546</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pilobolus crystallinus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pilobolus longipes</td>
<td></td>
</tr>
</tbody>
</table>

*All the specimens were collected by Amna Ali & Nosheen Akhtar. Due to the absence of sporulation the accession number is not given to Phytophthora cinnamomi.
Plate 1: Number of figures corresponds with the number of fungus species.

1: *Absidia cylindrospora*. Branched sporangiophores with sporangia (40x); 2: *Acremonium kiliense* a&b Phialides and conidia (100x); 3: *Alternaria alternata*. a: Hyphae and conidia (40x), b: Conidia (100x); 4: *Aspergillus penicillioides*. Conidiophore with vesicle (Inset), Conidia (100x); 5: *Aspergillus candidus*. Conidial head showing vesicle shape, sterigmata and conidia (100x); 6: *Choanephora cucurbitarum*. a: Sporangiophore with columella (40x), b: sporangiospores (100x); 7: *Cladosporium cladosporioides*. Conidiophores with conidia (100x); 8: *Cunninghamella elegans*. a&b: Conidiophores with vesicle (40x), c: vesicle (100x); 9: *Doratomyces microsporus*. a: Synnemata in culture (Stereo.), b: A Synnema (40x), c: Detail of synnema with conidiophores and conidia.

Addition to micromycetes of Lahore (100x); 10: Drechslera haiwiiensis. Typical hyphae and conidia showing pseudoseptation and shape. (100x); 11: Fusarium solani. a: Microconidiophore, phialides and Microconidia (40x); b: Macroconidia (100x); 12: Fusarium lateritium Macroconidia (100x); 13: Fusarium oxysporum Macroconidia (100x); 14: Fusarium equiseti a: Macroconidia with phialides, b: Macroconidia (100); 15: Fusarium semitectum Macroconidia (100x). 17: Mucor hiemalis. a&b: Sporangiophores with columellae and sporangia (40x & 100x); 18: Mucor subtilissimus. a: Sporangiophores with columnellae and sporangium (40x), b: Sporangiospores (100x); 19: Penicillium capsulatum Conidiophores showing ramulae, matulae, phialides and conidia (100x); 21: Penicillium simplicissimum Conidiophore, Phialides and conidia (100x); 22: Phytophthora cinnamomi. Sporangium filled with spores (100x); 23: Pilobolus longipes. Sporangium with subsporangial vesicle (40x); 24: P. crystallinus. a: Sporangium with subsporangial vesicle (40x), b: Sporangiospores (100x); 25: Rhizopus nigricans. Sporangiospores with sporangio & columnellae (100x); 27: Torula herbarum Conidia (100 x).

REFERENCES
FCBP 2003-06. Current inventory of Fungal Cultures in FCBP. Myconews. Volume 1-4