

## THREE NEW RECORDS OF CAPNODIALES FROM PAKISTAN

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### Abstract

In this study three species belonging to three different genera of filamentous fungi have been isolated from spoilt fruit samples, collected from local market of Badami Bagh Lahore, Pakistan. These species have been described, illustrated and identified on morphological basis and are presented here as new records for Pakistan. Light micrographs of microscopic details of these taxa have been provided.

**Key words:** Colony characteristics, Filamentous fungi, Morphology, New reports, Spoilt fruits, Taxonomy

### Introduction

Order Capnodiales belongs to class Dothideomycetes of Phylum Ascomycota. It is a diverse order which includes several genera of saprobic plant pathogenic and endophytic fungi. Members of this order are commonly called sooty molds because they produce black hyphal mass on the surfaces of leaves, fruits and branches of host plants (Hughes, 1972, 1976; Crous *et al.*, 2009). The genera, *Chlamydomyces* Bainier, *Cladosporium* Link and *Devriesia* Seifert & N.L., described in this study are the members of order Capnodiales. In this investigation, three fungal taxa have been isolated from rotten fruits, and identified based on morphological features. The filamentous fungal taxa presented here are the new records from Pakistan.

### Materials and Methods

Filamentous fungi were isolated from spoilt samples of fruits; collected from local market of Badami Bagh Lahore; by culturing method on PDA (potato dextrose agar) medium. Fruit samples were sterilized by 1 % sodium hypochlorite solution, placed in petri plates after cutting with sanitized needle. The samples of fruits were incubated on PDA plates at room temperature in dark. Pure cultures were also established. One species of each genus *Chlamydomyces*, *Cladosporium* and *Devriesia* were obtained and observed under light microscope. Morphological characteristics of colony morphology and microscopic features were noted, measured and illustrated.

### Results

*Chlamydomyces palmarum* (Cooke) E.W. Mason, Annot. Acet Fungi rec'd Bur. Mycol. 2(1): 37 (1928) (Figs. 1 & 2)

### Macroscopic Characterization:

Colony morphology: Gray, margins irregular, spreading over all media, surface growth raised to prostrate, pattern not well defined.

**Microscopic Characterization:** Conidiophore hyaline, thick-walled, unbranched, conidia/aleuriospores present at tips, cytoplasmic contents aggregated,  $150\text{--}200 \times 10\text{--}15 \mu\text{m}$ . Conidium white to light blue, thick-walled,  $10\text{--}35 \times 10\text{--}20 \mu\text{m}$ . Basal cells absent. Phialospore state not observed.

*Cladosporium grech-delicatae* Sacc., G. bot. ital., n.s. 21(1): 125 (1914) (Figs. 3 & 4)

### Macroscopic Characterization:

Colony morphology: Brown, patches dense, smooth, velvety, surface growth compact.

**Microscopic Characterization:** Vegetative hyphae dark green to brown, bulging at some points, septate, sparsely branched, thick-walled, smooth, distinctively curving, minutely nodulose,  $2.13\text{--}5.7 \mu\text{m}$ . Conidiogenous cells brown, integrated, terminal, rarely intercalary, cylindrical-oblong,  $2.13\text{--}2.85 \times 0.7\text{--}2.13 \mu\text{m}$ . Conidia dark green, usually in branched chains, sub-globose, narrowly to broadly ellipsoid or sub-cylindrical, thick-walled,  $5.7\text{--}14.2 \times 4.9\text{--}14.2 \mu\text{m}$ .

*Devriesia americana* Crous & Dugan, in Crous, Braun, Schubert & Groenewald, Stud. Mycol. 58: 42 (2007) (Figs. 5 & 6)

### Macroscopic Characterization:

Colony morphology: Dark green, fluffy, thread like, spreaded all over media surface.

**Microscopic Characterization:** Conidiophore greenish, frequently septate, undulating near the tip, straight below branch, thin-walled, branched,  $4.2\text{--}7.1 \times 2.8\text{--}4.2 \mu\text{m}$ . Conidiogenous cells not present.

Conidia globose to ovoid, greenish, thick-walled,  $5.7\text{--}8.5 \times 2.8\text{--}5.7 \mu\text{m}$ .

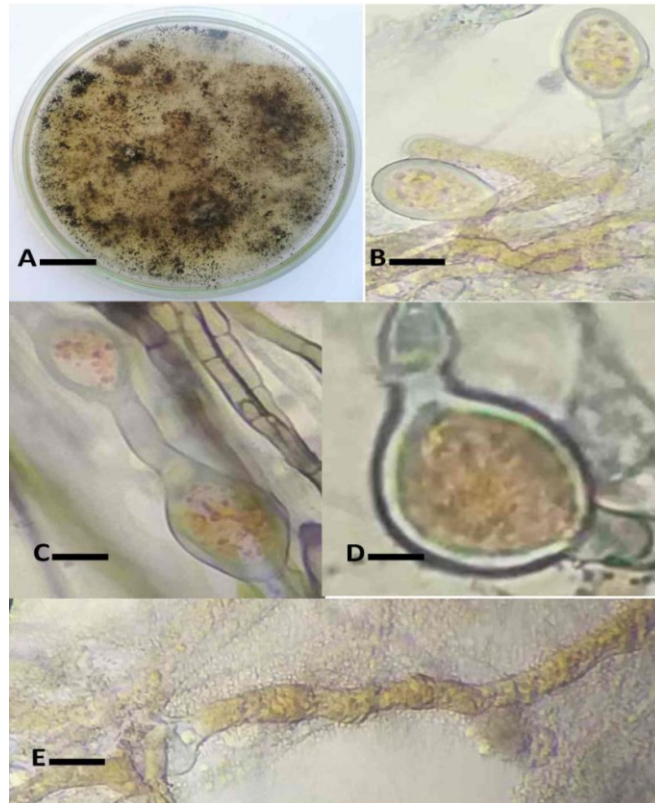


Fig. 1. A-E: Morphology of *Chlamydomyces palmarum*. A. Pure culture. B-D. Light micrographs of aleuriospores. E. Light micrograph of septate, thick-walled conidiophore. Scale bar: A = 1.3 cm. B-D = 16  $\mu\text{m}$ . E = 13  $\mu\text{m}$ .

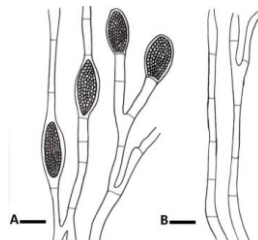


Fig. 2. A & B: Illustrations of *Chlamydomyces palmarum*. A. Illustration of intercalary and terminally attached aleuriospores. B. Illustration of septate, branched hyphae. Scale bar: A = 19  $\mu\text{m}$ . B = 23  $\mu\text{m}$ .

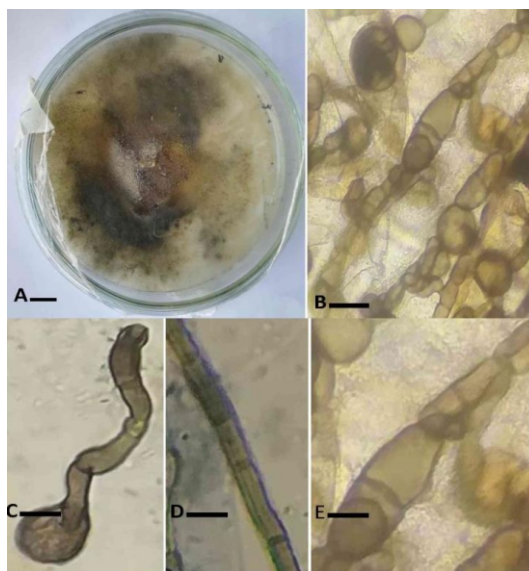


Fig. 3. A-E: Morphology of *Cladosporium grech-delicatae*. A. Pure culture. B. Light micrograph of different conidiogenous cells. C. Light micrograph of conidiogenous cells attached with conidiophore. D. Light micrograph of conidiophore. E. Light micrograph of conidiogenous cells. Scale bar: A = 1.1 cm. B = 4.8  $\mu$ m. C = 9.5  $\mu$ m. D = 9.5  $\mu$ m. E = 4.8  $\mu$ m.

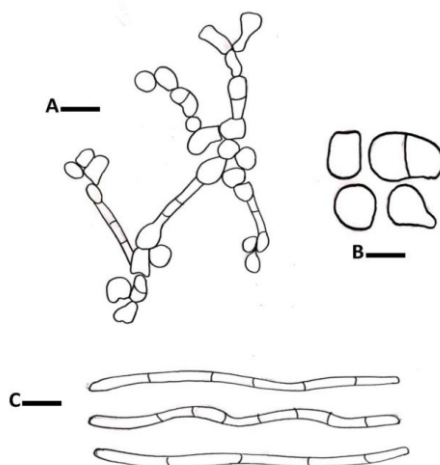


Fig. 4. A-C: Morphology of *Cladosporium grech-delicatae*. A. Illustration of conidia and conidiogenous cells. B. Illustration of conidia. C. Illustration of septate vegetative hyphae. Scale bar: A = 4.5  $\mu$ m. B = 5.7  $\mu$ m. C = 83  $\mu$ m.



Fig. 5. A-E: Morphology of *Devriesia americana*. A. Pure culture. B. Light micrograph of different chlamydospore like structures formed in culture. C. Light micrograph of conidiophore. D. Light micrograph of chlamydospores. E. Light micrograph of cells with terminal conidia. Scale bar: A = 1.2 cm. B = 5.1  $\mu\text{m}$ . C = 8.4  $\mu\text{m}$ . D = 3  $\mu\text{m}$ . E = 3  $\mu\text{m}$ .

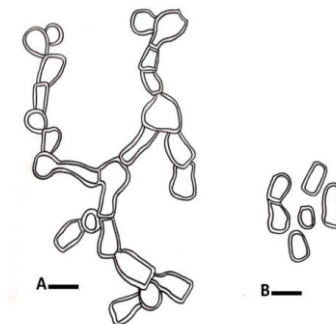


Fig. 6. A & B: Illustrations of *Devriesia americana*. A. Illustration of chlamydospores/conidia attached with conidiophore. B. Illustration of variable shaped chlamydospores. Scale bar: A = 5  $\mu\text{m}$ . B = 3  $\mu\text{m}$ .

## Discussion

The genera *Chlamydomyces*, *Cladosporium* and *Devriesia* are represented by only one species each. All these taxa have been characterized and identified on the basis of macroscopic and microscopic characterization. Genus *Chlamydomyces* is characterized by the presence of conidiophores which are more like mycelium; conidia (aleuriospores) are hyaline and borne on slender branches. Phialospores too are produced on short phialides (Barnett & Hunter, 1965). *Chlamydomyces palmarum* was identified morphologically by the presence of hyaline, thick-walled, unbranched conidiophore having conidium present at tips with aggregated cytoplasmic contents. It has been isolated from spoiled mango fruit and recorded as a new report from Pakistan.

Genus *Cladosporium* can be distinguished by dark, upright and branched conidiophores with dark, ovoid to cylindrical and irregular conidia of variable sizes. The genus is comprised of parasitic, pathogenic and saprophytic species with their conidia mostly prevalent in air (DeVries, 1952; Barnett & Hunter, 1965). *Cladosporium grechdelicatae* isolated during this study is characterized by brownish colony on PDA with dark green to brown hyphae which are septate, sparsely branched and thick-walled. It is first time reported as being associated with mango fruit and a new record for Pakistan. In Pakistan, *C. musae* and *C. lunata* species of this genus have been isolated from dates in Baluchistan and Punjab (Abdullah *et al.*, 2016; Ahmed *et al.*, 2016).

The genus *Devriesia* has been identified by hyaline to light green, branched, thin-walled conidiophores. Conidia are greenish, round and thick walled. This genus includes heat resistant *Cladosporium*-like fungi (Seifert *et al.*, 2004). *Devriesia americana* reported in this study is characterized by greenish brown, frequently septate, undulating and branched conidiophore. Conidia are globose to ovoid, greenish and thick walled. It has also been reported from spoiled mango and treated here as a new report for the country.

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