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# STUDIES ON SOIL FUNGI

## Part II.—Fungi from PCSIR Nursery Soil

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Studies were carried out to determine the fungus flora of PCSIR Nursery soil. Twenty-one species belonging to 14 genera were isolated from the soil. Five species have been reported for the first time from Pakistan which will be described elsewhere.

In a previous communication[1] the authors have reported soil fungi from three locations namely nursery of Karachi Laboratories, plot of land behind the Botany Section and Block A of North Nazimabad, Karachi. The fungi mentioned in this paper have been isolated from the nursery of Karachi Laboratories and are in continuation with previous work.

Investigations have been carried out in these laboratories for the past several years on the isolation and identification of soil fungi from different places in Karachi. Husain *et a.l*[2] have reported a total number of 58 species belonging to 25 genera from six different locations of Karachi. The same authors later reported[3] four genera and seven species for the first time from West Pakistan. Rizvi[4] isolated and identified 78 species belonging to 32 genera from a plot of virgin land near Karachi Cantt.

The present authors reported[1] 31 species belonging to 14 genera from three different localities mentioned earlier. In the present paper, which is a part of previous work the authors have isolated and described 21 species belonging to 14 genera of which five organisms have been reported for the first time from Pakistan.

### Materials and Methods

The soil samples were collected from the nursery of PCSIR Laboratories, Karachi. For the purpose of inoculation of soil samples, Warcup and Streaking techniques were employed. To inhibit the growth of soil bacteria and fast growing fungi, Rosebengal in the ratio of 1:30,000 was used with the media.

Details of the methods have been mentioned in our previous communication[2] and may be looked into there.

### Results

A total number of 21 species belonging to 14 genera were isolated from the soil samples (Table 1) Five of these organisms namely *Ulocladium botrytis*, *Mucor hiemalis*, *Fusarium concolor*, *Trichoderma hamatum*, and *Paecilomyces terricola*, have been reported for the first time from Pakistan. A brief description of those organisms which have not been described before in our papers is given below:

TABLE 1

1. *Aspergillus niger* Van Tieghem.
2. *Aspergillus flavus* Link.
3. *Aspergillus nidulans* (Eidam) Winter.
4. *Aspergillus chevalieri* (Mang.) Thom & Church.
5. *Helminthosporium hawaiiensis* (Bugnicourt) Subr. & Jain.
6. *Alternaria alternata* (Fr.) Keissler
7. *Alternaria tenuissima* (Nees ex Fr.) Wiltshire.
8. *Penicillium chrysogenum* Thom.
9. *Trichoderma hamatum* (Bon.) Bain.
10. *Cladosporium sphaerospermum* Penz.
11. *Cladosporium tenuissimum* Cooke.
12. *Paecilomyces terricola*. (Miller, Giddens & Foster) onios & Barron.
13. *Paecilomyces varioti* Bainier.
14. *Fusarium concolor* Reink.
15. *Fusarium chlamydosporum* Wr.
16. *Stachybotrys atra* Corda
17. *Ulocladium botrytis*, Preuss.
18. *Mucor hiemalis* Wehmer.
19. *Chaetomium globosum* Kunze.
20. *Neocosmospora vasinfecta* E.F. Smith.
21. *Neurospora sitophila* Shear & Dodge.

1. *Neurospora sitophila* Shear and Dodge.—Perithecia flask-shaped with an apical papilla, up to 0.3 mm across, brown to black, smooth with loose hyphae. Asci cylindrical short-stalked, up to 160×144μ, thin walled, 8-spored, ascospores uniseriate, elliptic fusiform, 20–26×10–15μ olivaceous nearly black at maturity, ornamented with 16 somewhat anastomosing fine longitudinal ribs, paraphyses absent from the ripe perithecia.

2. *Stachybotrys atra* Corda.—Colonies spreading, at first hyaline, becoming black with age; mycelium hyaline, septate, 5–6μ thick, with branches almost at right angles, and with oval, ellipsoidal chlamydospores, articulate with age. Conidiophores arise from aerial mycelim, fuliginous near the apex almost hyaline near the base, branched, septate, 65–74μ long×2–4μ thick, slightly alternate toward the apex bearing on the summit a whorl of papillate phialides; phialides 10–12×4.5μ. Conidia small, smooth, elliptical usally with acute ends.

3. *Aspergillus chevalieri* (Mang.) Thom and Church.—Colonies on Czapeks-agar bluish gray in centre with typical heads and cleistothecia largely confined to marginal area. Reverse maroon in center to orange at margin. Cleistothecia abundant and closely enmeshed in a felt of orange-red incrusted hyphae, globose, yellow. Asci 9–10μ. Ascospores lenticular, 4.6–5×3.4–3.8μ walls with smooth, equatorial crests prominent, conidial heads abundant pale blue-green, appearing radiate from divergent conidial chains. Phialides in single series, closely packed, 5–7×3–3.5μ, conidia subglobose, spinulose, 4.5–5.5μ in diameter.

4. *Penicillium chrysogenum* Thom.—Colonies on Czapeks–agar gray-green, becoming brownish when old, cottony to subglobose, broadly spreading reverse commonly yellow; phialides 8×2.5μ, conidia elliptical, becoming globose, 3–4μ, pale-green.

5. *Chaetomium globosum* Kunze.—Perithecia scattered, broadly ovate, 250–300×200–250μ. First olivaceous but in dry condition dark-brown and membranous, flexuous hairs, apical hairs somewhat coarser than others, simple, sparingly septate, minutely scabrous, 3–4μ thick, asci oblong clavate evanescent; ascospores dark, broadly ovoid, faintly apiculate at both ends, 8–9.5×6–8μ.

6. *Mucor hiemalis* Wehmer.—Sporangiophores usually unbranched, erect, then prostrate by wilting. Turf about 1 cm high, close and fine, cottony, white, rarely grayish-yellow. Sporangia spherical gray, visible to naked eye, 50–92.5× 47.5–90.0μ. Wall diffluent in young condition, columell a free, oval, colourless, 25×21μ to 36× 29μ. Spores usually unequal, kidney shaped, smooth, hyalin with thin membrane. 8.75–10.0× 3.75–5.0μ.

7. *Ulocladium botrytis* Preuss.—Colony yellow to golden-brown, inconspicuously roughened, septate. Conidiophores erect, simple and short branched. Light yellow-brown smooth conidia, solitary, broadly ovoid rarely subspherical, yellow–brown to golden-brown to olivaceous, uniformely and closely roughened to verrucose, rarely smooth, 10.0–27.5×10.0–15.4μ. One or two longitudinal septa in 1–4 of the transverse divisions and commonly Y-form, septation in the distal division, base rounded, conical, commonly terminating in a minute apiculus, apex rounded.

8. *Fusarium concolor* Reink.—Aerial mycelium floccose, white to incarnate, leather-yellow to bright-orange, conidia scattered, small conidia numerous, large ellipsoid-oval, septate, large conidia, spindle-sickle-shaped, strongly curved, both ends usually tapered, tip-cell slightly constricted almost stout-like, basal cell conical truncate, almost pedicellate, three to five septate.

0 septate=10.0×2.5μ; 2 septate=15.0×2.5μ; 3 septate=30.0×5.0μ 4 septate=35.0×5.0μ.

9. *Trichoderma hamatum* (Bon.) Bain.—Colonies on Czapeks-agar fast growing, white at first, gradually becoming greenish and finally dark grayish-green. Reverse yellow. Conidiophores rise profusely as lateral branches of the aerial hyphae, bearing terminal conidial head, about 12–15μ dia, conidiophores elliptical to more or less oval, 3.75×2.5–3μ.

10. *Neocosmospora vasinfecta* E.F. Smith.—Perithecia gregarious, often closely crowded bright-red smooth with a very prominent obtuse ostiole, becoming perforate, Peridium of large cells, 12–15μ dia, perithecia flask-shaped, 200–225×250–275μ.

Asci nearly cylindrical, eight spored, 85–90×12–15μ, ascospores uniseriate, globose, at first hyaline becoming brown with outer surface becoming rough and wrinkled, 10μ dia. Paraphysis inconspicous, simple, septate.

## Discussion

During the course of screening of soil fungi from PCSIR nursery, as has been mentioned earlier, a total number of 21 species belonging to 14 genera were isolated. It may be observed that species of *Aspergillus* were most dominant and three species of *Aspergillus* i.e. *A. flavus*, *A. nidulans* and *A. niger* appeared in all the three screening of the soil. Two species of *Alternaria*, 2 of *Cladosporium*, 2 species of *Fusarium* and 2 of *Paecilomyces* were isolated. The remaining genera were represented by one species only.

It may be observed that out of 21 species, 17 belonged to Fungi Imperfecti, three to Ascomycetes and one to Phycomycetes. Five organisms have been reported for the first time from Pakistan and will be reported elsewhere.

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