Some new Records of Soil Fungi from India

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Literature Review:

The ecology of soil fungi has recently been studied only by a few workers. Mention may be made of the works of Martin et al. (1942); Warcup, (1951); Tresner et al, (1954); Nicholes, (1956); Garrett, (1950, 51, 52 and 56); Miller et al, (1956); Griffin, (1963); Dick and Newby, (1963); and Jones and Farmer, (1967). Among Indian workers Saksena, (1955) investigated the fungal flora of forest soil of saugar with special reference to the ecological factors influencing the population of soil fungi followed by Saksena and Sarbhoy (1963) and Dayal and Gupta (1967). The present study was undertaken to contribute to the knowledge of the ecological factors governing the distribution of soil fungi of Varanasi and in course of the work authors have isolated some fungi which have been found to be new records from soil.

Experimental:

For the present study three different types of soils from different localities in the Banaras Hindu University campus were selected. First site was on the bank of a pond situated in the old Botanical garden. The soil was peaty type rich in humus, remaining water-logged during rainy season and supporting a variety of surface vegetation. Second site was in the bottom of a drainage channel with clayee loam soil, flooded during the rains and without any surface vegetation throughout the year. Third site was open fallow land by the side of Plant Pathology Laboratory, the soil type was gangetic alluvium, covered with surface vegetation all the year round.

All collections of the soil samples were made from fixed 90 cm^2 area on the three sites according to Quadrat Sampling technique, which has been used only rarely in the investigation of soil microbiology. The method used for taking soil samples and isolations were same as described by Dayal and Gupta (1967).

Fungi Isolated:

1. *Pestalotia magnifolia* Guba (Figure 4)
   Bull. Jard. Bot. Etat. Bruxelles *19:* 320, 1949.

Colonies growing rapidly on Czapek's agar, mycelial mat white whith scattered olivaceous green acevuli. Conidia 5-celled, longcylindrical, fusiform, straight, 22—28 μ × 6—8.5 μ; walls only slightly constricted at the septa, middle three cells olivaceous or dark, concolourous, guttulate, 14—19 μ long; apical hyalin cells long-cylindric, bearing 3 setulae, 8—26 μ long, divergent; basal hyalin cells long-conic, tapering; pedicels upto 5 μ long.

The present isolate was identified with help of Guba's monograph on *Pestalotia*.

Isolated from fallow land soil in January 1965. Leg. O. S. D. Gupta.

2. *Pestalotia fuchsiae* Thuem. (Figure 3)

Inst. Rev. Sci. Litt. Coimbra, Ser. 2, 27: 326—327;

Syll. 3: 790, 1884.

Acevuli scattered on mycelial mat, brown, limited, circular. Conidia 5-celled, elliptic-fusoid, errect, 14—18 μ × 5-5.6 μ; middle three cells guttulate, olivaceous, equally coloured, 10—13 μ long; basal hyalin cells short, conic or obtuse; apical hyalin cells narrow-conic or acute; setulae usually 2, sometimes branched, 6—16 μ long, unequal; pedicels short, deciduous, less than 3 μ long.

Thuemen reported conidia 20—21 μ and 3 setulae 6 μ long. Klebahn (Myc. Central. bl. 4: 7, fig. 34, 1914) reported conidia 15—17 μ × 5.5—6 μ and 1, mostly 2, rarely 3 setulae, 9—17 μ long. The fungus is very close to and probably identical with *P. guepini* Desm.

Isolated from fallow land soil in November 1964. Leg. O. S. D. Gupta.

3. *Sordaria humana* (Fuckel) Wint. (Figure 1 and 2)

Sord. p. 21, t, VIII fig. 9.

Syn. *Hypocopra humana* Fuck. Symb. Myc. 241; Syll. I: 240, 1882.

Perithecia produced abundantly on Czapek's agar, partially immersed into the substratum at the base, bulb like, with a short conical thick neck, blackish brown, upto 402.6 μ in diameter; asci cylindric more or less long with rounded or slightly truncate tips and slightly thickened, octosporous, uniseriate, 120—138 μ × 18 μ in size. Ascospores blackish-brown with gelatinous sheath, oval, distinctly broader in proportion to their lenth, 22—28 μ × 16—19 μ.

Isolated from drainage channel soil in January 1965. Leg. O. S. D. Gupta.

4. *Helminthosporium spiciferum* (Bain.) Nicot. (Figure 9)

Ost. Bot. Z. p. 482, 1953.

Syn. *Brachycladium spiciferum* Bain.

Colonies on Czapek's agar brownish-black, dense, growing fast. Conidiophores erect, short, septate, with marked knee-bends at the point of attachment of conidia. Conidiophore 43.2—139 μ long and 3.3—6.6 μ wide. Conidia obclavate, olivaceous-brown, 2—4 septate, 9.9—29.9 μ long and 6.6—9.9 μ broad.

Isolated from all the three soils in October 1964. Leg. O. S. D. Gupta.

5. *Chaetobasidiella* sp. (Figure 5)

Colonies on Czapek's agar medium growing very slow but grow profusely on Potato Dextrose Agar medium and produce abundant pycnidia. Pycnidia dark black, carbonaceous, setose, ostiolate, 69.3—95.7 μ in diameter. Conidia dirty white in colour, oblong to spherical, 4.5 × 3 μ in size.

Not a single species of the genus *Chaetobasidiella* has been reported from soil. The genus *Chaetobasidiella* is described by Höhnel in Ber. Deutsch. Bot. Gesell. *36*: 317, 1918. The type species described is *C. vermicularoidea* Höhnel. The present isolate differs from type species described by Höhnel in respect of pycnidial and conidial measurements. We have not yet confirmed the species of the fungus.

Isolated from fallow land soil in January 1965. Leg. O. S. D. Gupta.

6. *Chaetomella raphigera* Swift. (Figure 7 and 8)

Mykologia, *4:* p. 165, 1930.

Colonies on Potato Dextrose agar growing close to the substratum, at first flocose creamy white, later becoming red dotted due to abundant production of pycnidia. Pycnidia superficial, planconvex, attached to the substratum by its plane surface, without ostiole, setose, redish brown, and measuring 147—387 μ ×124—291 μ. Setae septate, brown, curved at the tips, 27—137 μ long and 3.3 μ wide at the tips and 7.5 μ wide at the base. Pycnidiospores produced on the branched conidiophores in side the pycnidium and extrude out en mass when pycnidia ruptured, spores single celled, oblong, hyaline, 4.5—7.5 μ × 3.3 μ in size.

Isolated from fallow land soil in January 1965. Leg. O. S. D. Gupta.

7. *Chaetomium venezuelense* Ames. (Figures 6)

In a monograph of Chaetomiaceae, p. 42, 1961.

Colonies growing on Czapek's agar dark brown, mycelium immersed within the substratum and the perithecia seated on pale brown, simple rhizoids; perithecia black, globose to ovoid, ostiolate, measuring 118—130 μ × 109—130 μ. Terminal hairs arcuate, light brown, distinctly septate, thick walled, bulbous at the base, 8.5 μ in thickness; rounded

at the tips and 4.8 μ in wide in central area. Lateral hairs few in numbers, slightly curved, 75—100 μ long, at the base 3.3 μ in thickness. Asci evanescent, clavate, octosporous. Ascospores narrow elliptical, often with apiculate ends, hyaline when immature, pale olivaceous at maturity, measuring 8.5 × 4 μ.

The above species is morphologically allied to *C. erraticum* Ames. The species, however, differs in bearing regularly typical hairs which are arcuate throughout constituting apparently a blossoming flower, where as *C. erraticum* Ames. has hairs not uniformally arranged forming a ragged appearance. The terminal hairs at maturity often become branched as Ames described his *C. venezuelense* Ames. The branching was not observed in the present isolate.

Isolated from fallow land and drainage channel soils in April 1964. Leg. O. S. D. Gupta.

Summary

A study of soil fungi of three different types of soils situated in the Banaras Hindu University campus was undertaken. For sampling a modified Quadrat sampling technique was adopted. The following fungal species have been isolated for the first time from soil:

Pestalotia mangifolia Guba, *P. fuchsiae* Thuem., *Sordaria humana* (Fuck.) Wint. *Helminthosporium spiciferum* (Bain.) Nicot., *Chaetobasidiella* sp., *Chaetomella raphigera* Swift., *Chaetomium venezuelense* Ames.

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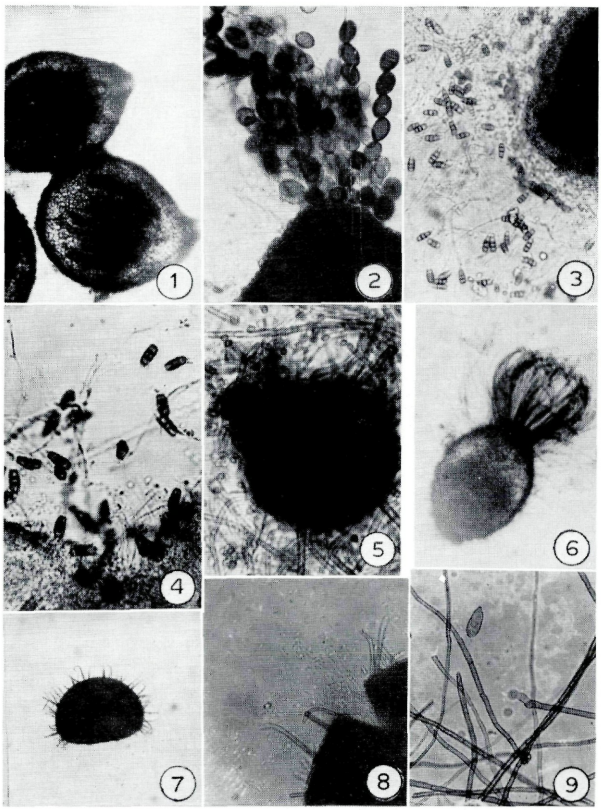

Figs. 1—2. *Sordaria humana*, 1. Complete perithecium 90×, 2. Asci and ascospores comming through the ostiole 280×. — Fig. 3. *Pestalotia fuschiae*, conidia and acervulus 360×. — Fig. 4. *Pestalotia magnifolia*, conidia comming out of acervulus, 360×. — Fig. 5. *Chaetobasidiella* sp. Pycnidia and pycnidiospores, 496×. — Fig. 6. *Chaetomium venezuelense*, Perithecium, 217×. — Figs. 7—8. *Chaetomella raphigera*, 7. Complete pycnidium, 86×, 8. Conidia and conidiophores comming through ruptured opening of pycnidium, 330×. — Fig. 9. *Helminthosporium spiciferum*. Conidium and conidiophore, 466×.

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