

## Additions to the Fungi of Raipur (Mathya Pradesh)-1\*

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(With 2 figs.)

Efforts are afoot in Madhya Pradesh (India) to make a systematic collection and description of parasitic and saprophytic fungi of various groups occurring on wild as well as cultivated plants. A series of papers have been published (a few listed under reference) by the author to accomplish such studies at Raipur (M. P.).

The present paper — the first contribution of a new series — adds ten more species to the fungus flora of Raipur, of which a few are new species, others new to India and some familiar ones occur on new hosts.

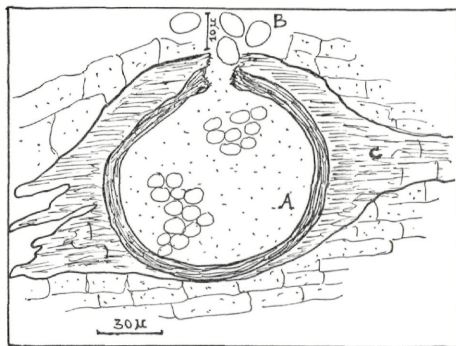


Fig. 1. *Protomyces najadis* Chowdhury. — A) Chlamydospore — B) Endospores — C) Surrounding, dark gal-tissues

### 1. *Protomyces najadis* Chowdhury sp. nov.

On the living leaves of *Najas graminea* Del. (Najadaceae), Duda-dhari, December '65, leg. K. S. Ú n n i.

\*) The paper was read in the 37th. annual session of the National Academy of Sciences, India, held at Ahmedabad (Gujrat) from 1st. to 4th. February, 1968. The research is financed by the University Grants Commission, New Delhi.

Symptoms of the disease: the disease starts with the appearance of minute dots on both the surfaces of leaves, involving the stem and leaf-sheaths as well. The dots get elongated into dark-brown to blackish-brown streaks; rendering the affected tissues necrotic, and extending along the length of the affected organs it gets converted ultimately into ill-defined, slightly upraised isolated galls, enclosed by dead dark-brown tissues. The chief veins are also traversed.

The causal organism: galls only on leaves and stems, upto  $2 \times 0.5$  mm. in dimensions, brown to dark-brown in colour, elongated along the length of the organ, with dark-brown periphery at maturity, with rounded or pointed ends, slightly raised, light-brown when young; mycelial hyphae scanty or becoming evanescent, hyaline, with granulated protoplasm, uniformly wide, at times showing swellings, upto  $2 \mu$  wide, long slender thread-like or sometimes as thin, broken fragments dispersed in the gall, septate, branching sparse; Chlamydo-spores single, globose, 17 to  $160 \mu$ , average  $120 \mu$  in diam. or oval,  $100-192 \times 79-144 \mu$ , average  $154 \times 97 \mu$ , walls golden-brown, upto  $15 \mu$  thick, protoplasm highly dense and granular when young converting into spores at maturity; endospores non-motile, hyaline, of varying shapes, thin-walled,  $4.6-10.6 \mu$ , average  $7 \mu$  when spherical or globose,  $6.2-11.2 \times 3.7-6.2 \mu$ , average  $8.2 \times 5.2 \mu$  when ovoid (Fig. 1).

So far no *Protomyces* has been described on any species belonging to Najadaceae nor it seems to match any of the recorded species of *Protomyces*. It is, therefore, being described here as a new species.

*Protomyces najadis* Chowdhury sp. nov.

Gallae solum in foliis et caulibus insidentes, usque ad  $2 \times 0.5$  mm dimensione, colore brunneo ad fusco (atro-brunneo), secus longitudinem organ elongatae, finibus rotundatis aut acutis, leviter prominentes, pallidae-brunneae in juventute, fusca peripharia in maturitate; hyphae myceliales angustae aut evanescentes, hyalinae, protoplasmate granulato, uniformiter latae, interdum praebentes tumores, usque ad  $2 \mu$  latae, longae graciles, filiformes aut interdum quamrupta fragmenta tenua disperata in galla, septatae, sparsim ramificantes; chlamydo-spores singulares, globosae, 17—160  $\mu$ , plus minusve 120  $\mu$  diametro, aut ovaes 100—192  $\times$  79—144  $\mu$ , plus minusve 154—97  $\mu$ , parietes aureobrunneae, usque ad 15  $\mu$  crassae, protoplasma maxime densum et granulatum in juventute, convertens ad spores in maturitate; endospores non-motiles, hyalinae, forma variante, pariete tenui, 4.6—10.6  $\mu$ , plus minusve 7  $\mu$  si sphaericae, aut globosae, 6.2—11.2  $\times$  3.7—6.2  $\mu$ , plus minusve 2.2—5.2  $\mu$  si ovoideae.

Super foliis et caulibus viventibus plantae *Najas graminea* Del., Dudadhari, Decembro '65, legit K. S. Ünni.

Holotypus depositus est in Herb. I. M. I. sub numero 118102.

2. *Colletotrichum capsici* (Syd.) Butl. & Bisby, in The

fungi of India, Imp. Coun. Agri. res., India, Sci. Monog. 1, 18: 237, 1931.

(a) On leaves of *Jatropha glandulifera* Roxb. (Euphorbiaceae), College garden, December '66, leg. S. R. Chowdhury.

(b) On living stems of *Basella alba* L. (Chenopodiaceae), Katora Talab, December '66, leg. S. R. Chowdhury.

Symptoms of the disease: (a) on the leaves of *Jatropha glandulifera* discoloured specks first appear on upper surface later becoming muddy-brown delimited by brown margin followed by yellowish zone. At maturity spots attain ash-colour dotted with black fruiting bodies. Spots coalesce but midrib is untraversed.

(b) on green stems of *Basella alba* discoloured streaks appear first which extend linearly acquiring ash-colour at maturity dotted by small black fructifications. The stems and leaves dry premature losing chlorophyll and are thus devalued economically.

The causal organism: acervuli dark-brown, confluent, superficial, upto 150  $\mu$  in width; setae brown, simple septate, scattered; conidia hyaline, single celled, falcate,  $10.6-20 \times 2-2.5 \mu$ , average  $15 \times 2.3 \mu$ .

*Colletotrichum capsici* has been found to parasitise on various host plants. Chowdhury (1966) reported it on leaves of *Caladium* ssp. from Raipur. *Jatropha glandulifera* and *Basella alba* are new host records for the fungus. The specimens have been deposited in the Herb. I. M. I., Nos. 125191 a & 125196 a respectively.

3. *Glomerella cingulata* (Stonem.) Spauld. & Schr., in Syll. Fung. XVII, 573, 1905.

(a) On living leaves of *Artabotrys odoratissimus* Br. (Anonaceae)

(b) On living leaves of *Jatropha glandulifera* Roxb. (Euphorbiaceae), College garden, December '66, leg. S. R. Chowdhury,

(c) On living stems of *Basella alba* L. (Chenodiaceae), Katora Talab, December '66, leg. S. R. Chowdhury.

Symptoms of the disease: (a) discoloured patches appear on the leaves of *Artabotrys odoratissimus* first, which spreading irregularly attain muddy-brown central area with minute black dot-like fructifications enclosed by distinct thick blackish-brown halo, followed by yellow zone, spots coalesce rarely while midrib remains untraversed.

(b) on leaves of *Jatropha glandulifera*, water-soaked spots become muddy-brown with small black acervuli surrounded by irregular brown margin at the maturity.

(c) on *Basella alba* stems the initial light-brown patches turn into ash-colour at maturity bounded by irregular dark-brown, upraised halo. Usually lesions are elongated which coalesce.

The causal organism: acervuli dark-brown, discoid, setose, 90—160  $\mu$  wide with setae dark-brown, septate, erect; conidiophores hyaline, simple; conidia single-celled, hyaline, elliptical to ellipsoid-cylindrical with rounded ends, straight,  $7.8-15.7 \times 2.6-4 \mu$ , average  $12.6 \times 3 \mu$ .

Only the imperfect stage viz *Colletotrichum gloeosporioides* Penz. was present.

Chowdhury (1967) and Hasija (1963) have recorded this fungus on the leaves of *Plumeria acutifolia* and *Citrus medica* respectively.

*Artabotrys odoratissimus*, *Jatropha glandulifera* and *Basella alba* are new host records.

The specimens have been deposited in the Herb. I. M. I., Nos. 125186, 125191 b and 125196 b respectively.

4. *Alternaria tenuissima* (Nees) Wiltshire, in Trans. Brit. mycol. soc. 18: 157, 1933.

(a) on inflorescence of *Sorghum vulgare* Pers., Ganj area, December '66, leg. Chowdhury.

(b) on leaves of *Tagetes* sp. (Compositae), Katono Talab, December 1966, leg. Chowdhury.

(c) on leaves of *Curcuma longa* L. (Zingiberaceae), Rampura, November 1966, leg. Chowdhury & Diwan.

Symptoms of the disease: (a) on the fruit-walls and glumes dark-brown powdery mass deposits. The grains get infected and remain undeveloped. The pedicels and peduncles are not affected.

(b) discoloured specks on leaves of *Tagetes* sp. get necrotic, at length converting into ash-coloured dotted spots which freely coalesce. The involucre and other floral parts are also attacked which ultimately, along with the leaves, are completely blighted.

(c) spots on leaves of *Curcuma longa* arise as small colourless structures, later becoming brownish bounded by brown, irregular margins. The fructifications appear as small black dots on both surfaces. Under severe conditions of the attack leaves turn brown and dry up.

The causal organism: conidiophores brown, single or in clusters septate, geniculate, simple or branched, amphigenous,  $40-157 \times 4-6 \mu$ , average  $130 \times 4.5 \mu$ ; conidia brown, muriform, beaded, with 6-8 transverse and 4 longitudinal septa,  $36-84 \times 8-16 \mu$ , average  $57 \times 14 \mu$ .

*Alternaria tenuissima* has been reported by Chowdhury (1967) on leaves of *Cajanus indicus* from Raipur. *Sorghum vulgare*, *Tagetes* sp. and *Curcuma longa* are new host records for the fungus.

The specimens have been deposited in the Herb. I. M. I., Nos. 125189 a, 125192 b and 125194 respectively.

5. *Nigrospora sphaerica* (Sacc.) Mason, in Sacc. XXII, 1490 as *Epicoecum hyalopes* Miyake, 1913; in Trans. Brit. mycol. soc. 12: 152, 1927.

On inflorescences of *Sorghum vulgare* Pers. (Graminae), Ganj area, December 1966, leg. Chowdhury.

The fungus was found associated with *Alternaria tenuissima*, described under serial No. 4.

The causal organism: conidiophores arise as lateral branches of the



hyphae, sub-hyaline, with swollen jar-like terminal cells bearing solitary conidia, upto  $3.8\ \mu$  in width; conidia spherical to sub-globose, dark brown to black, epispore smooth,  $10.5\text{--}17.6\ \mu$  in diam., average  $14\ \mu$ .

*Nigrospora sphaerica* was reported by Chowdhury (1967) on leaves of *Cajanus indicus* from Raipur *Sorghum vulgare* is a new host record for the fungus.

#### 6. *Cladosporium sorghi* Chowdhury sp. nov.

On living inflorescences of *Sorghum vulgare* Pers. (Gramineae), Ganj area, December 1966, leg. S. R. Chowdhury.

Symptoms of the disease: disease first appears as dark-brown powdery mass deposited on the inflorescence giving false appearance of smuts. The whole of the ear gets ultimately blackened, crumpled and grains are not set in. The disease is confined to the floral parts.

The causal organism: conidiophores erect, unbranched, septate, with geniculations, usually in fascicles, with broader base, upto  $158 \times 5.2\ \mu$  in dimensions; conidia borne at the tips of the conidiophores in short chains, oval-elliptic to somewhat cylindrical, brown, one to two-celled, at times 4-celled, epispore smooth,  $6.5\text{--}10.5 \times 2.6\text{--}5.2\ \mu$ , average  $7.9 \times 3.7\ \mu$  (Fig. 2).

So far none of the species of *Cladosporium* has been reported to occur on any species of *Sorghum*. Moreover, this species of fungus does not seem to match with any of the recorded ones. Hence, it is being described here as a new species.

Conidiophora erecta, inramosa, septata, cum geniculationibus, vulgo in fasciculis, base latiore, usque ad  $158 \times 5.2\ \mu$  dimensiones; conidia portata ad apices conidiophorarum in catenis brevibus, ovalia-elliptica vel eliquentum cylindrica, brunnea, uni- vel bicellularia, nonnumquam tetra-cellularia, epispodium laeve,  $6.5\text{--}10.5 \times 2.6\text{--}5.2\ \mu$ , plus minusve  $7.9 \times 3.7\ \mu$ .

Super viventibus inflorentiis plantae *Sorghum vulgare* Pers., Ganj regione, India, Decembero 1966, leg. S. R. Chowdhury.

Holotypus depositus est in Herb. I. M. I., No. 125190.

#### 7. *Cercospora curcumae* Govindu & Thirum., in Sydowia 10: 275, 1956.

On living leaves of *Curcuma longa* L. (Zingiberaceae), November 1966, Rampura, leg. Chowdhury.

Symptoms of the disease: the disease appears as small brown to blackish spots surrounded by irregular boundary. The affected tissues dry up. The spots coalesce.

The causal organism: stroma upto  $45\ \mu$  in diam., amphigenous; conidiophores olivaceous-brown, rarely branched, septate, in fascicles, geniculate,  $100\text{--}200 \times 3\text{--}5.5\ \mu$ , average  $155\text{--}4.5\ \mu$ ; conidia hyaline, cylindric, septate, tapering toward tip, truncate at the base,  $52\text{--}184 \times 2\text{--}4\ \mu$ , average  $134 \times 2.8\ \mu$ .

*Cercospora curcumae* was first recorded by Govindu & Thirum. (1956) from Bangalore. This is the first record from the state of Madhya Pradesh. The specimen has been deposited in the Herb. I. M. I., No. 125195.

8. *Curvularia verruculosa* Tandon & Bilgrami, in Curr. Sci. 31, 6: 254, 1962.

On inflorescences of *Sorghum vulgare* Pers. (Graminae), Ganj area, December 1966, leg. Chowdhury

Symptoms of the disease: on the inflorescence stalk and inside the grains blackish brown granular powdery mass appears which partly spoils the grains as they are covered with the mycelia and the fructifications of the fungus.

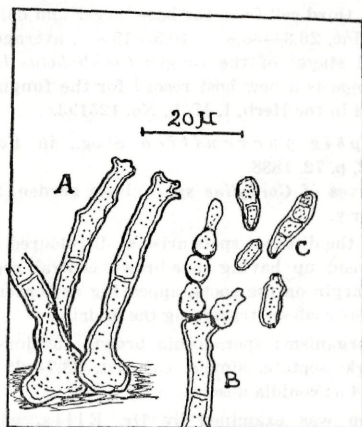


Fig. 2. *Cladosporium sorghi* Chowdhury — A) Conidiophores — B) Catenate conidia attached to conidiophore — C) Conidia

The causal organism: conidiophores light-brown, simple or rarely branched, geniculate usually near the tips, upto  $142 \times 4.7 \mu$  in dimensions; conidia straight or curved or fusiform, brown, 3-septate, not constricted at the septa, third cell from base larger and darker than others, basal cell hyaline, epispore verruculose,  $21-26 \times 7-19 \mu$ , average  $24 \times 12 \mu$ .

*Curvularia verruculosa* was first described by Tandon & Bilgrami (1962) on leaves of *Typha* sp. *Sorghum vulgare* is a new host record for the fungus and is also a first report from the state of Madhya Pradesh. The specimen has been deposited in the Herb. I. M. I., No. 125188.

9. *Cochliobolus lunatus* Nelson & Haasis, in Bull. Jard. Bot. Buitenz. 3 Ser. 13 (1): 127, 1933.

On living leaves of *Curcuma longa* L. (Zingiberaceae), Rampura, December 1966, leg. Chowdhury & Diwan.

Symptoms of the disease: the disease starts as discoloured patches first on the upper surface of the leaves; later spreading irregularly acquires ash-coloured central region enclosed by brown margin. The lesions later freely coalesce and more than half of the lamina gets necrotic losing chlorophyll from margin and tip of the leaf inward.

Causal organism: stroma dark-brown, upto 250  $\mu$  in dimensions; conidiophores brown, amphigenous, septate, in fascicles, 110—171  $\times$  5.2—6.6  $\mu$ , average 132  $\times$  5.8  $\mu$ ; conidia brown, straight or curved, smooth, 3-septate, third cell from the base larger and darker than others, end cells sub-hyaline, 26.3—36.8  $\times$  10.5—15.8  $\mu$ , average 32.3  $\times$  12.6  $\mu$ .

Only conidial stages of the fungus *Cochliobolus lunatus* was met with. *Curcuma longa* is a new host record for the fungus. The specimen has been deposited in the Herb. I. M. I., No. 125193.

10. *Pucciniopsis guaranitica* Speg., in Fungi guaranitici Pug. 2, n. 202, p. 72, 1888.

On living leaves of *Cordyline* sp., College garden, September 1966, leg. Chowdhury.

Symptoms of the disease: spots arise as discoloured irregular specks, which widely spread up having pale-brown central region surrounded by dark-brown margin on the spots, appearing as concentric, black, granular patches. Spots coalesce traversing the midrib.

The causal organism: sporodochia brown, cushion-like, spreading; conidiophores dark, septate, simple, compact, 23.7—29  $\times$  7.9—10.5  $\mu$ , average 25.2  $\times$  9.4  $\mu$ ; conidia absent.

The specimen was examined by Dr. Ellis, who reported the fructifications of the fungus resembling those of *Pucciniopsis guaranitica* Speg., which is a new fungus record for India. The specimen has been deposited in the Herb. I. M. I., No. 123387.

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