

## Notes on some Cercosporae of India - II.\*)

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With plate II & III.

Further collections of species of *Cercospora* on various hosts were made and studied in detail. Some of the species reported herein are being recorded from new localities and others are new to Science. Type of the new species have been deposited in Herb. Crypt. Ind. Orient., New Delhi, Herb. C. M. I., Kew England and in Mycological Division, U.S.D.A., Beltsville, Maryland, U.S.A.

***Cercospora boerhaavicola*** Thirumalachar & Govindu sp. nov.

Leaf spots circular to irregular, 2 to 5 mm. in diameter, yellowish-brown, with greyish-white centre and surrounded by pinkish border. Stroma composed of few cells in substomal space, compact; conidiophores 1—3-septate, unbranched and geniculate, laterally coalesced at the base up to one third the height, free and divergent at apex,  $50-166 \approx 3 \mu$ ; conidia obclavate to cylindrical, 1—16 septate, straight or curved, obtruncate at base and acute at tip,  $50-150 \approx 3 \mu$ .

Hab. On leaves of *Boerhaavia diffusa* Linn., 22—11—1952, Patna, Bihar, leg. H. C. Govindu, (Fig. 13—14).

Maculae circulares vel irregulares, 2—5 mm. diam., luteo-brunneae, centro-albae, margine roseo. Hypostroma e paucis cellulis compositum, stomatibus innatum; conidiophora 1—3-septata, simplicia, geniculata, basin versus usque ad tertiam partem connata, superne divergentia,  $50-166 \approx 3 \mu$ ; conidia obclavata vel cylindrica, 1—16-septata, recta vel curvata, inferne truncata, superne acuminata,  $50-150 \approx 3 \mu$ .

***Cercospora cadabae*** Thirumalachar & Govindu sp. nov.

Leaf spots minute, circular, 1—2 mm. in diameter, dark brown to black, slightly raised, surrounded by a light yellow border; fruiting mostly amphigenous; stromata well developed, yellowish brown,  $25-75 \mu$  in diameter; fascicles dense and compact, protruding above epidermis; conidiophores radially disposed, pale brown, unseptate and unbranched, straight or undulate, blunt at apex,  $14-35.5 \approx 2.8-4 \mu$ ; conidia subhyaline, pale olivaceous, narrowly obclavate, straight to curved, obconically truncate at base, acute at tip,  $21-35.5 \approx 2.8-4 \mu$ .

Hab. on leaves of *Cadaba indica* Linn., 15—12—1948, Yashavan-tapur, Bangalore, leg. M. J. Thirumalachar, 1—3—1952, Malles-waram, Bangalore, leg. H. C. Govindu (Type). Figs. 7 and 8.

\*) Part-I in Mycologia **40**: 352—362, 1948.

Maculae minutae, circulares, 1—2 mm. diam., fusco-brunneae vel nigrescentes, parum incrassatae, pallide luteo-limbatae; caespituli plerumque amphigeni; hypostromata luteo-brunnea, 25—75  $\mu$  diam. Conidiophora fasciculatim erumpentia, superne divergentia pallide brunnea, continua, simplicia, recta vel undulata, ad apicem obtusa, 14—35.5  $\Rightarrow$  2.8—4  $\mu$ ; conidia subhyalina, pallide olivacea, anguste obclavata, recta vel curvata, ad basin truncata ad apicem acuta, 21—35.5  $\Rightarrow$  2.8—4  $\mu$ .

*Cercospora canavaliae* H. & Syd. Ann. Mycol. **12**: 303, 1914.

On leaves of *Canavalia ensiformis* DC., Patna, Bihar, 9—12—1952, leg. M. J. Thirumalachar & H. C. Govindu. The fungus incites severe defoliation of the plants at the time when young legumes are being formed.

**Cercospora fleuryae** Thirumalachar & Govindu sp. nov.

Leaf spots angular to polygonal, cinnamon-yellow to white. Fruiting mostly amphigenous; stroma of few brown cells; conidiophores light-brown, divergent, straight to undulate, unbranched and unseptate, blunt apex, 21.4—42.4  $\Rightarrow$  3—4  $\mu$ ; conidia obclavate to linear, obtruncate at base and acute at apex, 1—16 septate, 50—165  $\Rightarrow$  3  $\mu$ .

Hab. on leaves of *Fleurya interrupta* Gaud., 14—10—1951, Patna, Bihar, leg. M. J. Thirumalachar. Figs 15 and 16.

Maculae angulares cinnamomeo-luteae vel albidae. Caespituli amphigeni Hypostroma minutum, e cellulis paucis, brunneis, compositum; conidiophora pallide brunnea, divergentia, recta vel undulata, continua et simplicia, ad apicem obtusa, 21.4—42.4  $\Rightarrow$  3—4  $\mu$ ; conidia obclavata vel linearia, ad basim truncata, ad apicem acuta, 1—16-septata, 50—165  $\Rightarrow$  3  $\mu$ .

**Cercospora leucadis** Thirumalachar & Govindu sp. nov.

Producing large sooty patches on leaves and calyx lobes of verticillaster, non-maculicolous, indefinite, 2—4 cms. in diameter; Fruiting amphigenous; stromata of few dark cells in the substomal space; conidiophores light olivaceous brown, occasionally branched, 1—4-septate, slightly curved, blunt at tip, 21—42.8  $\Rightarrow$  2.5—4  $\mu$ . conidia subhyaline, pale olivaceous, narrowly obclavate to acicular, 1—12-septate, base obconically truncate, tip acute, 40—160  $\Rightarrow$  3—4  $\mu$ .

Hab. on leaves and inflorescence of *Leucas mollissima* Wall., 18—10—1951, Patna, Bihar, leg. M. J. Thirumalachar. Figs. 1 and 2.

Maculae magnae fuliginosae, indistincte limitatae, 2—4 cms. diam. Caespituli amphigeni; hypostromata minuta e paucis cellulis obscuris composita sub stomatibus innata; conidiophora pallide olivaceo-brunnea, interdum ramosa, 1—4-septata, leniter curvata, ad apicem obtusa, 21—42.8  $\Rightarrow$  2.5—4  $\mu$ ; conidia subhyalina, pallide olivacea, anguste obclavata vel acicularia, 1—12-septata, ad basim truncata, ad apicem acuta, 40—160  $\Rightarrow$  3—4  $\mu$ .

*Cercospora vestita* Ramakr. described on leaves of *Leucas vestita* in India (Proc. Indian Acad. Sci. 34: 69, 1951) is a different species with smaller 1—4-septate conidia measuring 34—60  $\Rightarrow$  2—4  $\mu$ .



**Cercospora moringae** Thirumalachar & Govindu sp. nov.

Leaf spots circular to polygonal, 2.5 mm. in diameter, often coalescing with each other to form continuous patches greyish-brown; fruiting bodies chiefly epiphyllous, fascicles dense and compact; conidiophores light olivaceous brown, unbranched 1—3-septate, slightly pointed at apex, irregular in width,  $21.5-42.5 \approx 4-7 \mu$ ; conidia subhyaline, pale olivaceous, cylindro-obclavate, base conical, tip acute,  $25.5-50 \approx 4-8 \mu$ .

Hab. on leaves of *Moringa oleifera* Lam., 26—12—1951, Allahabad, leg. M. J. Narasimhan. Figs. 3 and 4.

Maculae orbiculares vel irregulares 2.5 mm. diam., saepe confluentes, tunc magnam folii partem occupantes, griseo-brunneae. Caespituli plerumque epiphylli; conidiophora dense fasciculata, pallide olivaceo-brunnea, simplicia, 1—3-septata, superne acutata,  $21.5-42.5 \approx 4-7 \mu$ . Conidia subhyalina, pallide olivacea, cylindraco-clavata, ad basim obconica, ad apicem acuta,  $25.5-50 \approx 4-8 \mu$ .

*Moringa oleifera* popularly known as drum-stick tree, yields long fruits which are relished as vegetable. The fungus incites severe defoliation during December-January, when the plants begin to bear flowers. The fungus has been isolated in pure culture by transferring germinating conidia aseptically on potato dextrose agar, on which it produces black crustaceous heaped up growth. No conidial formation has been observed in artificial culture.

**Cercospora peristrophes** Thirumalachar & Govindu sp. nov.

Spots circular, 2 to 4 mms. in diameter, yellowish-brown, with greyish white centre; fruiting mostly amphigenous; stromata none or restricted to few cells; conidiophores divergent, pale yellowish-brown, 1—3-septate, unbranched, geniculate,  $33.3-116 \approx 3 \mu$ ; conidia subhyaline, narrowly obclavate to linear, 1—15-septate, obtruncate at base and acute at apex,  $50-133 \approx 3 \mu$ .

Hab. on leaves of *Peristrophe bicalyculata* Nees. 25—11—1952, Patna, Bihar, leg. M. J. Thirumalachar. Figs 11 and 12.

Maculae circulares, 2—4 mm. diam., luteo-brunneae, centro griseo-albidae. Caespituli plerumque amphigeni. Hypostroma nullum vel ad cellulas paucas restrictum; conidiophora divergentia, pallide luteo-brunnea, 1—3-septata, simplicia, geniculata,  $33.3-116 \approx 3 \mu$ ; conidia subhyalina, anguste obclavata vel linearia, 1—15-septata, ad basim truncata, ad apicem acuta,  $50-133 \approx 3 \mu$ .

*Cercospora peristrophes* Syd. described by Sydow and Mitter (Ann. Mycol. 31: 93, 1933) on the same host from Allahabad is a separate fungus.

**Cercospora rejouae** Thirumalachar & Govindu sp. nov.

Spots mostly circular, dark brown, 1 to 1.5 cms. in diameter, infected portion dropping off and leaving a circular hole; stromata well developed in substomal space; fascicles dense and compact,  $15-55 \mu$  in diameter. Conidiophores pale brown, straight or undulate,



unseptate, unbranched, blunt at apex,  $15-35 \approx 3 \mu$ ; conidia hyaline, 1—12-septate, narrowly obclavate to acicular, base obconically truncate, tip acute,  $21-78.5 \approx 3 \mu$ .

Hab. on leaves of *Rejoua dichotoma*, 25—6—1952, leg. H. C. Govindu, Koppa, Mysore. Figs. 17 and 18.

Maculae plerumque orbiculares, fusco-brunneae, 1—1.5 cm. diam., mox disrumpentes et elabentes; hypostromata bene evoluta sub stomatibus innata; caespituli densi,  $15-55 \mu$  diam.; conidiophora pallide brunnea, recta vel undulata, simplicia, continua, ad apicem obtusa,  $15-33 \approx 3 \mu$ ; conidia hyalina, 1—12-septata, anguste obclavata vel acicularia, ad basim, truncata ad apicem acuta.

***Cercospora rhynchosiae-minimae*** Thirumalachar & Govindu sp. nov.

Producing dark sooty patches on lower leaves surface, indefinite, mycelium creeping on leaf surface and also penetrating the host, often extending to epidermal hairs; stromata none; conidiophores arising singly or in groups, fuliginous, uniform colour, 1—3-septate, branched, without geniculations,  $28.5-57 \approx 4.2-5.7 \mu$ ; conidia subhyaline, pale olivaceous, mostly 1-septate and rarely 2-septate, rounded at base obtuse at tip  $14.2-28.5 \approx 4.2-5.7 \mu$ .

Hab. on leaves of *Rhynchosia minima* DC. Hebbal, Bangalore, leg. H. C. Govindu. Figs. 21 and 22.

Maculae fusco-fuliginosae hypophyllae, indefinitae mycelio superficiali ex hyphis repentibus, saepe pilos folii inficientibus constante; Hypostroma nullum; conidiophora singula vel aggregata, fuliginosa, 1—3-septata, ramosa,  $28.5-57 \approx 4.2-5.7 \mu$  conidia subhyalina, pallide olivacea, plerumque 1- raro 2-septata, ad basim rotundata, ad apicem obtusa,  $14.2-28.5 \approx 4.2-5.7 \mu$ .

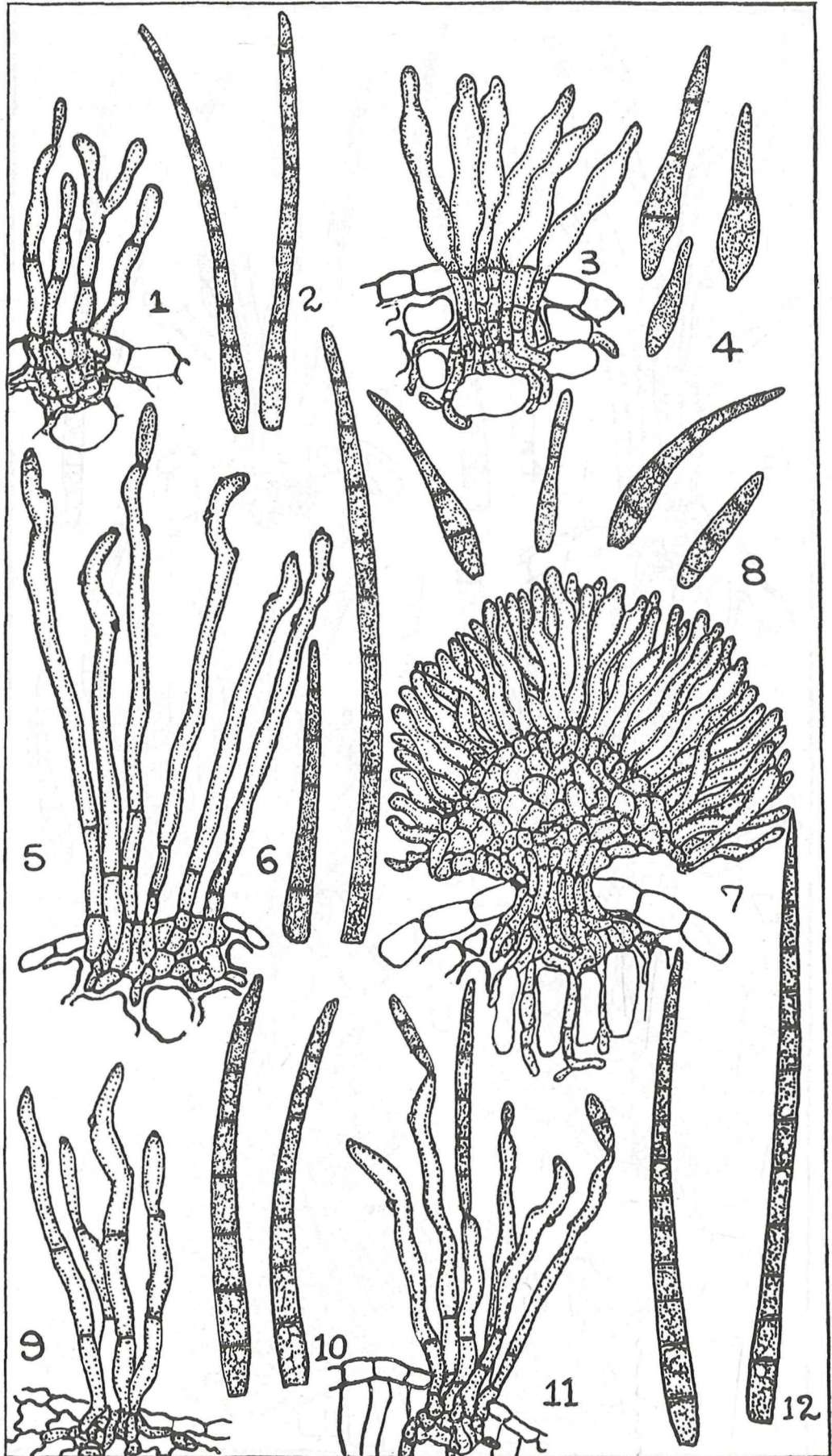
*Cercospora rhynchosiarum* Petr. & Cif. described by Petrak and Ciferri (Ann. Mycol. **30**: 332—333, 1932) on *Rhynchosia reticulata* from Dominican Republic is a separate species with 4—11-septate conidia measuring  $24-105 \approx 2.5-3.5 \mu$ . The species under study has chiefly 1-septate conidia as in the genus *Passalora*, which is now considered to refer to *Cercospora* having 2-celled spores. Occasionally the conidia in *C. rhynchosiae-minimae* are also 3-celled.

***Cercospora tabernaemontanae*** Thirumalachar & Govindu sp. nov.

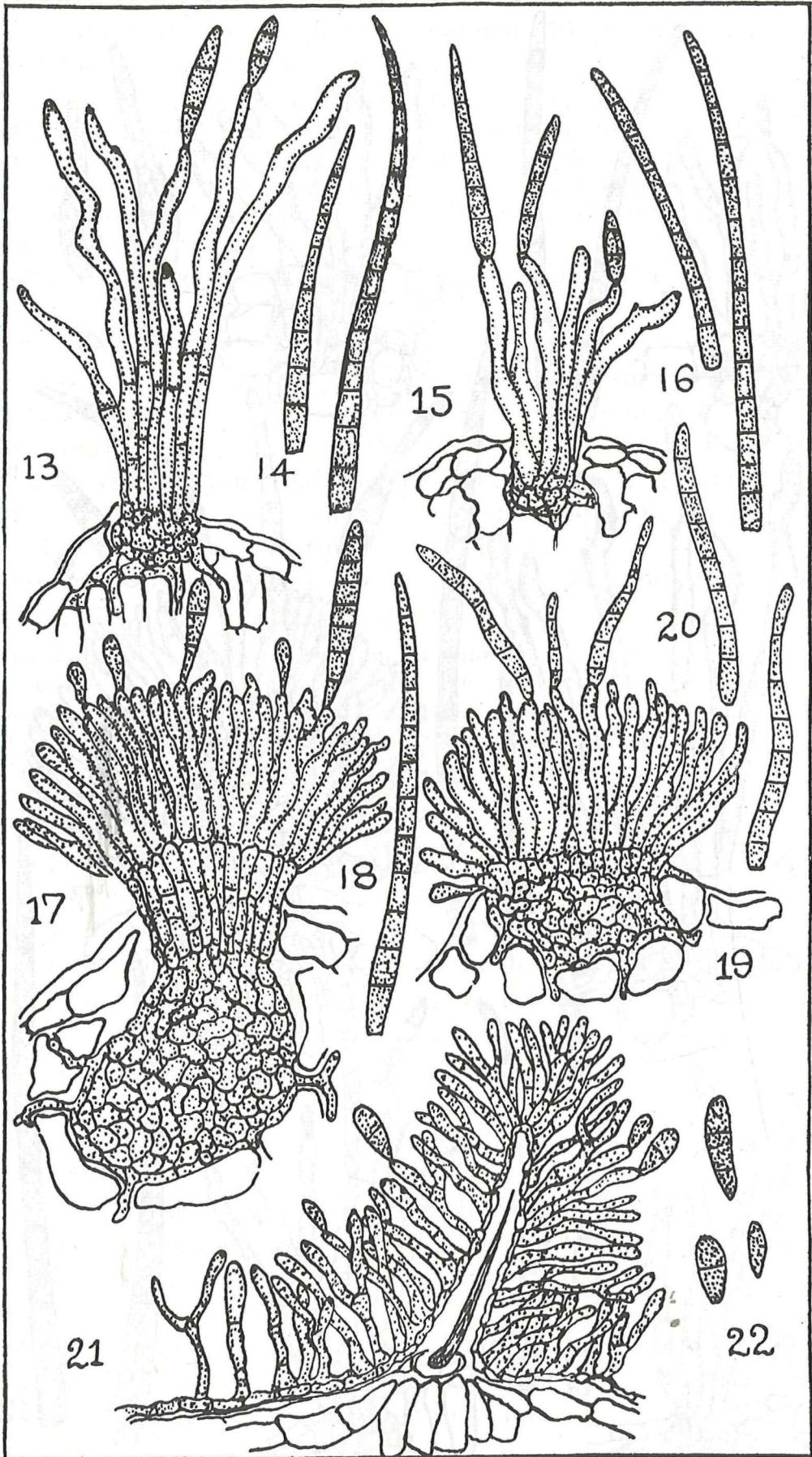
Spots circular to polygonal, yellowish-brown, with greyish-white centre, 1 to 1.5 cms. in diameter, often coalescing with each other, stromata of compactly grouped cells in substomal space,  $50-100 \mu$  in diameter; conidiophores pale-yellowish-brown, unseptate and unbranched, straight to undulating, blunt at apex,  $50-60 \mu \approx 3 \mu$ ; conidia obclavate to cylindric, hyaline, straight to curved, 1—8-septate, obtruncate at base and blunt at apex,  $40-66.6 \approx 3 \mu$ .

On leaves of *Tabernaemontana coronaria*, 25—11—1952, Patna, Bihar, leg. M. J. Thirumalachar. Figs. 19 and 20.











Maculae orbiculares vel angulosae, luteo-brunneae, centro griseo-albidae, 1—1.5 cm. diam., saepe confluentes; hypostromata sub stomatibus innata, contextu pseudoparenchymatico, 50—100  $\mu$  diam.; conidiophora pallide luteo-brunnea, simplicia continua, recta vel undulata, ad apicem obtusa 50—66  $\Rightarrow$  3  $\mu$ ; conidia obclavata vel cylindrica, hyalina, recta vel curvata, 1—8-septata, ad basim truncata, ad apicem obtusa, 40—66  $\Rightarrow$  3  $\mu$ .

**Cercospora tridacis-procumbentis** Govindu & Thirumalachar sp. nov.

Leaf spots circular to polygonal, greyish-white and distinct, usually surrounded by a pale pink coloured border. Stromata not developed; conidiophores 1—2-septate at base, unbranched, yellowish-brown, geniculate, 42.2—71.4  $\Rightarrow$  4.2—5.7  $\mu$ ; conidia hyaline, acicular, 1—16-septate, obconically truncate at base, acute at tip, 21.4—57  $\Rightarrow$  2.8—4  $\mu$ .

Hab. on leaves of *Tridax procumbens* L. 29—6—1952, Hebbal, Bangalore, leg. H. C. Govindu. Figs. 5 and 6.

Maculae orbiculares vel angulosae, griseo-albidae plerumque pallide roseo-limbatae. Hypostromata haud evoluta; conidiophora 1—2-septata simplicia, luteo-brunnea, geniculata, 42.2—71.4  $\Rightarrow$  4.2—5.7  $\mu$ ; conidia hyalina, acicularia, 1—16-septata, ad basim truncata, ad apicem acuta, 21.4—57.1  $\Rightarrow$  2.8—4.2  $\mu$ .

**Cercospora zizaniae** Thirumalachar & Govindu sp. nov.

Spots linear to irregular, brown, coalescing with each other to form long brownish stripes extending over the leaf surface. Fruiting chiefly epiphyllous; stromata absent or restricted to few brown cells; conidiophores light-brown, divergent, geniculate, unbranched, 1—3-septate, 21.5—78.5  $\Rightarrow$  3—4  $\mu$ ; apex acute; conidia obclavate to cylindrical straight or slightly curved, 1—8-septate, obtruncate at base and acute at apex, 28.5—42.8  $\Rightarrow$  4  $\mu$ .

Hab. on leaves of *Zizania aquatica* L., 4—10—1952, Patna, Bihar, leg. M. J. Thirumalachar. Figs. 9 and 10.

Maculae lineares vel irregulares, brunneae, interdum confluentes et strias longas brunneas formantes. Caespituli plerumque epiphylli; hypostroma non evolutum vel minutissimum e cellulis paucis brunneis compositum; conidiophora pallide brunnea, divergentia, geniculata, simplicia, 1—3-septata, 21.5—78.5  $\Rightarrow$  3—4  $\mu$  ad apicem acuta; conidia obclavata vel cylindrica, recta vel leniter curvata, 1—8-septata, ad basim truncata, ad apicem acuta, 28.5—42.8  $\Rightarrow$  4  $\mu$ .

In conclusion the writers wish to acknowledge their gratitude to Dr. F. Petrak for kindly translating the descriptions of new species to latin.

#### Explanation of plate II & III.

Hypostromata, conidiophores and conidia: 1.—2. *Cercospora leucadis*  $\times$  750. — 3.—4. *C. moringae*  $\times$  750. — 5.—6. *C. tridacis-procumbentis*  $\times$  750. — 7.—8. *C. cadabae*  $\times$  750. — 9.—10. *C. zizaniae*  $\times$  750. — 11.—12. *C. peristrophidis*  $\times$  1000. — 13.—14. *C. boerhaavicola*  $\times$  1000. — 15.—16. *C. fleuryae* 15:  $\times$  750; 16:  $\times$  1000. — 17.—18. *C. rejouae*  $\times$  750. — 19.—20. *C. tabernaemontanae*  $\times$  750. — 21.—22. *C. rhynchosiae-minimae*  $\times$  750.

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