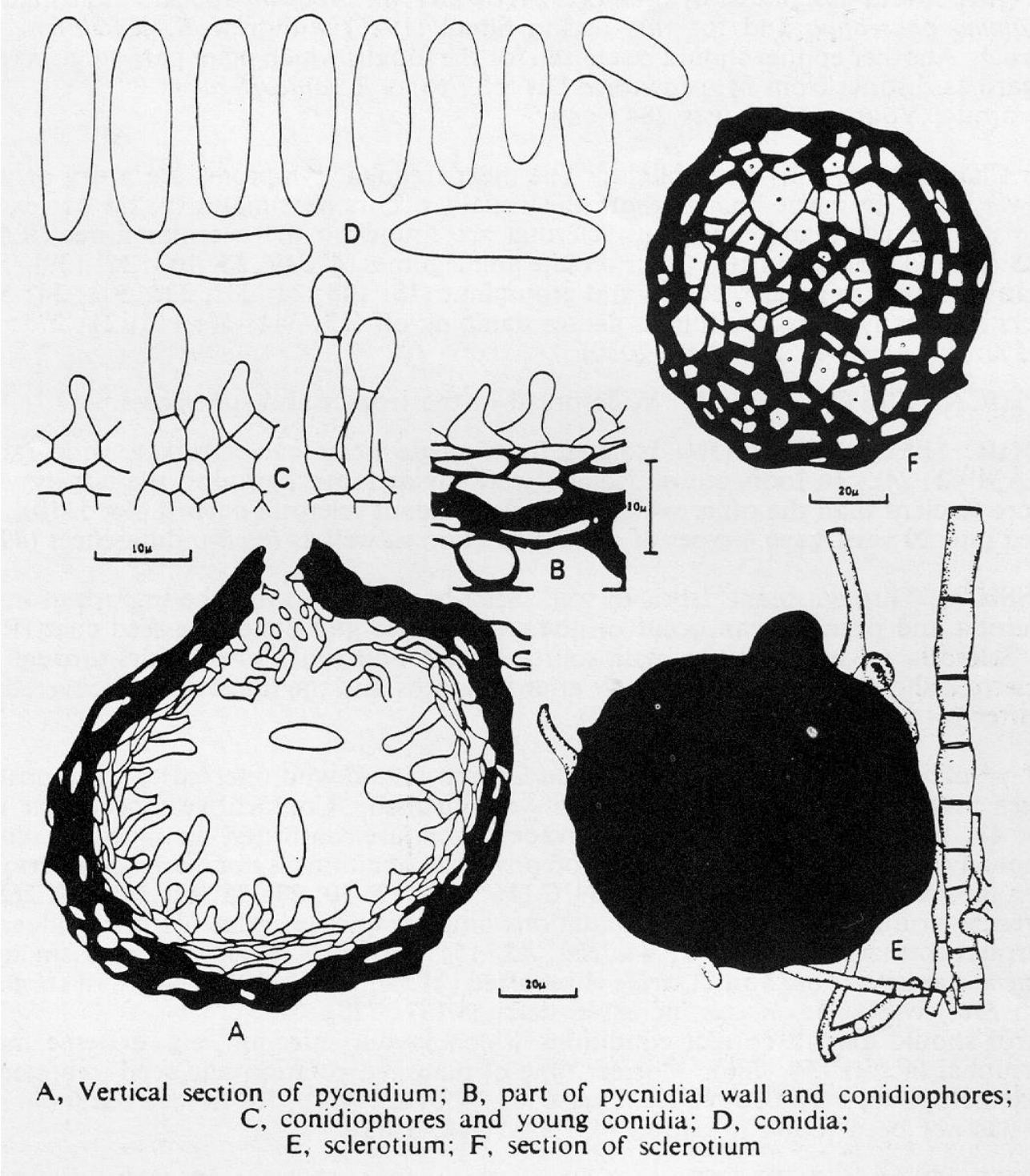
Set No 28, published 1970

C.M.I. Descriptions of Pathogenic Fungi and Bacteria No. 275

MACROPHOMINA PHASEOLINA



A, Vertical section of pycnidium; B, part of pycnidial wall and conidiophores; C, conidiophores and young conidia; D, conidia; E, sclerotium; F, section of sclerotium

Macrophomina phaseolina (Tassi) Goid., *Annali Sper. agr.* N.S. **1**: 449–461, 1947.

Macrophoma phaseolina Tassi, 1901.
Macrophomina phaseoli (Maubl.) Ashby, 1927.
Macrophoma phaseoli Maubl., 1905.
Macrophomina philippines Petr., 1923.
Macrophoma corchori Sawada, 1916.
Macrophoma cajani Syd. & Butl., 1916.
Macrophoma sesami Sawada, 1922.
Sclerotium bataticola Taub., 1913.
Rhizoctonia bataticola (Taub.) Briton-Jones, 1925 (as *Rhizoctonia bataticola* (Taub.) Butl.).

Rhizoctonia lamellifera Small, 1924.
Dothiorella cajani Syd. & Butl., 1925.

Sclerotia within roots, stems, leaves and fruits, black, smooth, hard, 100 µm to l mm diam. (in culture 50–300 µm). *Pycnidia* dark brown, solitary or gregarious on leaves and stems, immersed, becoming erumpent, 100–200 µm diam., opening by apical ostioles; wall multicellular with heavily pigmented thick-walled cells on the outermost side. *Conidiophores* (phialides) hyaline, short obpyriform to cylindrical, 5–13 × 4–6 µm. *Conidia* hyaline, ellipsoid to obovoid, 14–30 × 5–10 µm. Culture producing pycnidia on propylene oxide sterilized tissues (Goth & Ostazeski,1965) and on groundnut meal irradiated with UV light and filter paper treated with vegetable oil on peptone or asparagine agar (Knox-Davies, 1965, 1966).

HOSTS: Plurivorous; Young (1949) lists 284 hosts.

DISEASES: Charcoal rot, ashy stem blight. The most frequent symptoms are a dry or wet, dark rot of the lower stem. In maize and sorghum this usually occurs near maturity; the cortex is destroyed, lodging may take place and numerous sclerotia are found on the vascular fibres (**16**: 310; **24**: 96; **25**: 109). Leaf lesions also occur on jute and legumes (**4**: 349; **23**: 107; **26**: 139). Stem rot and canker can be severe in potato, cotton and groundnut (**15**: 148; **24**: 202, 228, 503; **34**: 541; **47**, 378). In conifers and many crops the fungus causes damping-off (**13**: 344; **17**: 115; **21**: 275; **26**: 139; **35**: 42; **38**: 550; **40**: 193; **45**, 2846; **48**, 2030).

GEOGRAPHICAL DISTRIBUTION: Widespread in the tropics and subtropics.

PHYSIOLOGIC SPECIALIZATION: Isolates from single hosts can attack a wide range of other hosts (**42**: 24). In India cotton isolates were divided into two groups, the largely vegetative one being more virulent than the other which formed abundant sclerotia *in vitro* (**46**, 3110). Jute isolates inoculated into 20 varieties gave four types of disease reaction as well as *in vitro* differences (**49**: 1045).

TRANSMISSION: Through plant debris in soil. Seed-borne spread may be important in some crops. Both sclerotia and pycnidia can occur on the seed surface and under the seed coat (**18**: 82; **27**: 71). Sclerotia are probably the main source of infection which also occurs through conidia (**26**: 139). Sclerotia showed no loss in viability after 8 months and the fungus was recovered from cotton stubble after 24–42 weeks (**25**: 56; **35**: 607).

NOTES: There has been considerable controversy over the use of the name *Rhizoctonia lamellifera* Small. The type (lMI 35132) designated by Small (1924) on *Grevillea robusta* appears indistinguishable from *Macrophomina phaseolina* and for this reason Small (1926) withdrew *R. lamellifera* in favour of *R. bataticola.* Another epithet should be chosen for the fungus which plant pathologists (e.g. Hopkins, 1933) regard as distinct from *M. phaseolina* but refer to as *R. lamellifera*.

Macrophomina phaseolina is a root inhabitant *sensu* Garrett (1956) who referred to its imposter role since it has been implicated in more diseases than were justified. Competitive saprophytic ability is low (**33**: 466, **41**: 17, **48**, 2616). The fungus invades immature, unthrifty, wounded or senescent roots. A nutritionally balanced host growing in good physical conditions is not likely to be seriously affected. Disease is most severe at high temperatures, 35–39ºC (**16**: 310; **19**: 90; **27**: 55; **41**: 745; **44**, 268).

Flowering, fruiting, temperature fluctuations and organic amendments may influence incidence and sclerotial formation (**43**, 2879; **44**, 269; **45**, 1547; **49**, 487, 607). Antagonism by *Aspergillus niger*, *Trichoderma terricola* and *T. viride* is reported (**21**: 76; **34**: 320; **40**: 343). In sorghum, association with *Pratylenchus hexincisus* increased damage (**37**: 720).

Control should aim to correct conditions which favour infection, e.g. extreme moisture levels and nutritional factors (**34**: 786). Correct time of planting, rotation and seed treatment are important; mixed cropping may also reduce disease (**21**: 450; **23**: 484). Resistance occurs in sorghum and jute but has not been found in cotton (**43**: 3231; **48**, 3503).

LITERATURE: Garrett, *Biology of root-infecting fungi*, 1956; Reichert & Hellinger, *Palest. J. Bot*. Rehovot Ser. **6**: 107–147, 1947 (165 refs); Young, *Bull. Texas agric. Exp. Stn* **712**, 33 pp., 1949 (91 refs); Moreau, *Revue Mycol.* **21**, Suppl. Colon. 2, 6 pp., 1956; Sabet, Samra & Abdel-Azim, *Agric. Res. Rev. Cairo* **46**: 30–52, 1968 (general and bibliographies); Ashby, *Trans. Br. mycol. Soc.* **12**: 141–147, 1927; Hopkins, *Proc. Trans. Rhod. scienr. Ass.* **32**: 65–79, 1933; Kulkarni & Patil, *Mycopath. Mycol. appl.* **28**: 257–264, 1966; Small, *Trans. Br. mycol. Soc.* **9**: 165, 1924; Small, *Trans. Br. mycol. Soc.* **10**: 287–302, 1926 (morphology and taxonomy); Goth & Ostazeski, *Phytopathology* **55**: 1156, 1965; Knox-Davies, *S. Afr. J. agric. Sci.* **8**: 205–218, 1965; **9**: 595–600, 1966 (culture techniques); Uppal, Kolhatkar & Patel, *Indian J. agric. Sci.* **6**: 1323–1334, 1936; Livingston, *Res. Bull. Neb. agric. Exp. Stn* **136**, 32 pp., 1945; Wadsworth & Sieglinger, *Bull. Okla. agric. Exp. Stn* B **355**, 7 pp., 1950; Tarr, *Diseases of sorghum, sudan grass and broom corn*: 73–84, 1962 (on maize and sorghum); Varada-Rajan & Patel, *Indian J. agric. Sci.* **13**: 148–156, 1953 (on jute); Tompkins & Gardener, *Hilgardia* **9**: 219–230, 1935 (on bean and cowpea).

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