

Taxonomic Studies on *Cercospora* and Allied Genera in Korea (II)

Jeong-dong Kim and Hyeon-dong Shin*

Department of Agricultural Biology, Korea University, Seoul 136-701, Korea

한국산 *Cercospora* 및 관련 속의 분류학적 연구 (II)

김정동 · 신현동*

고려대학교 농생물학과

ABSTRACT: This paper is a contribution towards taxonomic studies on *Cercospora* and allied genera, and contains ten species of Korean cercosporoid fungi; viz. *Cercospora beticola*, *C. lactucae-sativae*, *C. lycii*, *Distocercospora pachyderma*, *Mycovellosiella passaloroides*, *Passalora dubia*, *P. sojina*, *Phaeoisariopsis griseola*, *Pseudocercospora atomarginalis*, and *P. rhoina*. Morphological characteristics of taxonomic value are described and drawn for these species to contribute towards a mycological monograph of Korean cercosporoid fungi.

KEYWORDS: *Cercospora*, *Distocercospora*, *Mycovellosiella*, *Passalora*, *Phaeoisariopsis*, *Pseudocercospora*, Monograph

In the first contribution of this series (Kim & Shin, 1998), 10 cercosporoid fungi from Korea including 5 species belonging to *Cercospora*, 1 to *Mycovellosiella*, 1 to *Passalora* and 3 to *Pseudocercospora* have been reported. In the present paper, based on Korean materials, 10 cercosporoid fungi, 3 species belonging to *Cercospora*, 1 to *Distocercospora*, 1 to *Mycovellosiella*, 2 to *Passalora*, 1 to *Phaeoisariopsis*, and 2 to *Pseudocercospora*, are described and illustrated.

Descriptions

1. *Cercospora beticola* Sacc. (Fig. 1)
Nuovo Giorn. Bot. Ital. 8: 189 (1876)
= *Cercosporina beticola* (Sacc.) K. Nakata, T. Nakajima & K. Takimoto, Rept. Agr. Korea No. 6 (1915)
= *Fusiporium betae* Desm., Ann. Sci. Nat. 2 ser. 19: 434 (1843)
= *Cercospora betae* A.B. Frank, Krankh. d.

- Pfl. p. 601 (1880)
= *Fusicladium betae* Sacc., Michelia 2: 132 (1880)
= *Pionnotes betae* Sacc., Syll. Fung. 4: 726 (1886)
= *Cercospora flagelliformis* Ellis & Halst., Jer. Ann. Rept. 1890: 355 (1891)
= *Cercospora anthelmintica* G.F. Atk., J. Elisha Mitchell Sci. Soc. 8: 49 (1892)
= *Cercospora longissima* Cooke & Ellis, Grevillea 17: 65 (1889)
= *Cercospora spinaciae* Oudem., Nederl. Kruidk. Arch. III. 2: 314 (1900)
= *Cercospora chenopodiicola* Bres., Hedwigia 39: 328 (1900)
= *Cercosporina spinacicola* Sacc., Nuovo Giorn. Bot. Ital., N.S. 22: 73 (1915)

Leaf spots scattered, often confluent, circular, 2~5 mm diam., at first appearing dirty brown with definite dark brown border, later center becoming whitish gray, finally turning reddish brown or purplish brown at the margin. **Caespituli** amphigenous, but chiefly epi-

*Corresponding author

phyllous. Mycelium internal, hyphae septate, branched. **Stromata** rudimentary to slightly developed. **Conidiophores** 3~20 in a divergent fascicle, sometimes up to 30 or more in a compact fascicle, pale brown at the base, paler upwards, nearly subhyaline at the apex, 1~4-septate, not branched, straight to 1(~3) times geniculate towards the apex, weakly to mildly attenuated, $18\text{--}85 \times 3.5\text{--}6.0 \mu\text{m}$, conidial scars conspicuous, thickened and darkened, apical or on shoulders caused by geniculation, usually concentrated in the apical portion. **Conidia** solitary, filiform to acicular, straight to mildly curved, hyaline, 3~25(~35) septate, non-constricted at the septa, obtuse to subacute at the apex, subtruncate at the base, $40\text{--}340 \times 2.5\text{--}4.5 \mu\text{m}$; hilum conspicuously thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Beta vulgaris* var. *cicla* L. (Chenopodiaceae).

Specimens examined: SMK 10386 (7 IX 1990, Kangnung), 10394 (13 IX 1990, Kangnung), 10395 (13 IX 1990, Kangnung), 10410 (16 IX 1990, Kangnung), 11083 (20 IX 1991, Yangku), 12023 (29 IX 1992, Kangnung), 12031 (1 X 1992, Kangnung), 12073 (6 X 1992, Kangnung), 12099 (9 X 1992, Kangnung), 13281 (30 X 1994, Kangnung), 13351 (6 XI 1994, Kangnung), 13428 (16 XI 1994, Kangnung).

Distribution: Nearly throughout the world wherever sugar beet and chard are cultivated, including China, Japan and Korea.

Notes: Nakata & Takimoto (1928) first reported this leaf spot fungus from Korea on *Beta vulgaris* var. *saccharifera* (sugar beet). Shin & Braun (1993) listed this fungal species on *B. vulgaris* var. *cicla* (chard, as an important green leaf vegetable in Korea). The conidiophores in our collection are longer ($18\text{--}85 \mu\text{m}$) and wider ($3.5\text{--}6.0 \mu\text{m}$) than those described by other authors (Chupp, 1954; Hsieh & Goh, 1990), but the measurements of conidiophores are usually of little taxonomic importance, since these structures are

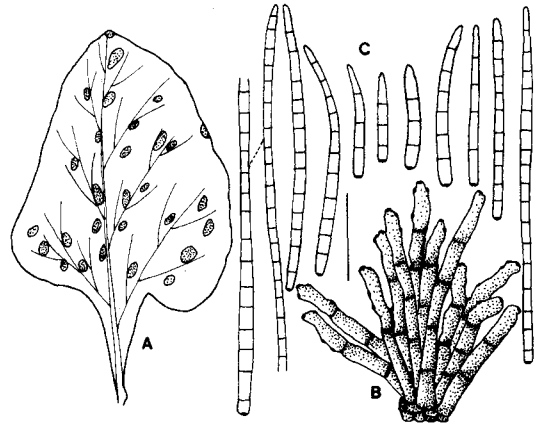


Fig. 1. *Cercospora beticola*: A, Leaf spots on the upper leaf surface of *Beta vulgaris* var. *cicla* (0.4 \times); B, Conidiophores; C, Conidia. Bar=30 μm .

very variable. Most earlier authors (Chupp, 1954; Hsieh & Goh, 1990) described acicular conidia with acute apices. The conidia of our collections are, however, obtuse to subacute at the apex.

2. *Cercospora lactucae-sativae* Sawada (Fig. 2) Formosa Agr. Res. Inst. Rept. 35: 111 (1928) = *Cercospora longispora* Cugini ex Trav., Malpighia 17: 217 (1902), non *C. longispora* Peck, 1884 = *Cercospora longissima* Trav., Malpighia 17: correzione (correctionship) to p. 217 (1903), non *C. longissima* Cooke & Ellis, 1889 = *Cercospora lactucae* Stev., J. Dept. Agr. Puerto Rico 1: 105 (1917), non *C. lactucae* Henn., 1902 = *Cercospora lactucae* Welles, Phytopathology 13: 289 (1923), nec *C. lactucae* Henn., 1902, non *C. lactucae* Stev., 1917 = *Cercospora ixeridis-chinensis* Sawada, Formosa Agric. Res. Inst. Rept. 86: 171 (1943) (nomen non rite publicatum, sine descriptione latina) = *Cercospora lactucae-indicae* Sawada, Formosa Agric. Res. Inst. Rept. 86: 172 (1943) (nomen non rite publicatum, sine descriptione latina)

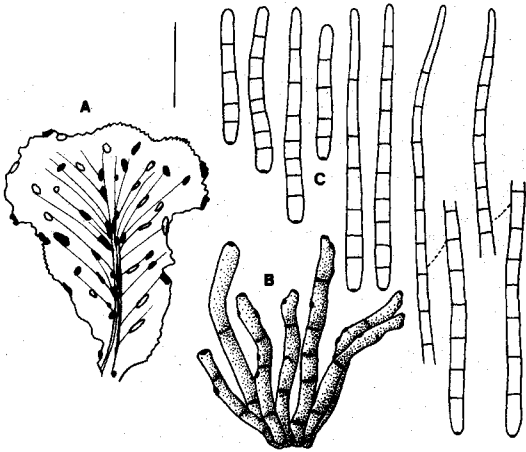


Fig. 2. *Cercospora lactucae-sativae*: A, Leaf spots on the upper leaf surface of *Lactuca sativa* (0.2 \times); B, Conidiophores; C, Conidia. Bar=30 μ m.

Leaf spots scattered, often confluent, distinct, circular to subcircular, often zonate, small to fairly large, 1–10 mm diam., at first appearing as water-soaked specks, then becoming dull brown to dingy gray in the center, finally turning grayish brown, without definite margin. **Caespituli** amphigenous, but chiefly hypophyllous. **Mycelium** internal, hyphae septate, branched, olivaceous brown. **Stromata** absent to rudimentary or weakly developed, composed of several brown swollen hyphal cells. **Conidiophores** 4–10 in a divergent fascicle, sometimes solitary, arranged over stomata, pale olivaceous brown throughout or paler upwards, 2–5-septate, 1(–3) times slightly geniculate near the middle, not branched, 40–100 \times 4.0–5.5 μ m, conidial scars large and conspicuous, apical or on shoulders caused by geniculation. **Conidia** solitary, acicular to filiform or even obclavate, straight or mildly curved, hyaline, 4–18-septate, non-constricted at the septa, mostly subacute at the apex, but obtuse in shorter conidia, truncate to subtruncate at the base, very variable in length, 30–250 \times 4.0–5.5 μ m; hilum conspicuously thickened, darkened, and protuberant.

Habitat: On living leaves of *Lactuca sativa*

L. (Compositae).

Specimens examined: SMK 11708 (19 VI 1992, Kangnung), 13663 (10 IX 1996, Kangnung).

Distribution: Nearly all of the world wherever the plant is growing or cultivated, including China, Japan, Korea and Taiwan.

Notes: Park (1958) recorded this fungus for the first time from Korea (as *C. longissima*) as causal agent of a leaf spot disease on *Lactuca sativa*. Shin & Braun (1993) listed the second Korean record. The conidiophores of *C. lactucae-sativae* are formed in a loose fascicle, and the conidia are rather stout, with more septa than those of *C. beticola*. Chupp (1954), in his monograph, used the name *C. longissima* (Cugini in Herb.) Sacc. for this species, but this name is a younger homonym of *C. longissima* Cook & Ellis.

3. *Cercospora lycii* Ellis & Halst. (Fig. 3)

J. Mycol. 4: 7 (1888)

Leaf spots scattered, rarely confluent, distinct, circular to subcircular, 2–12 mm diam., at first appearing pale yellowish gray, then becoming pale tan to dingy gray with or without brown margin, later center turning gray, with many black dots due to heavy fructification of the fungus, finally whitish gray, thin, papery, brittle, leaving a ragged hole. **Caespituli** amphigenous, but chiefly hypophyllous. **Mycelium** internal, hyphae septate, branched, olivaceous brown. **Stromata** rudimentary to slightly developed, subcuticular. **Conidiophores** 3–8 in a loose fascicle, uniformly olivaceous brown throughout or paler upwards, and narrower towards the tip, 2–5-septate, straight or 2–4 times, sometimes up to 6 times mildly to abruptly geniculate in the upper portion, not branched, 60–200 \times 4.5–5.5 μ m, conidial scars relatively large and conspicuously thickened, apical or on shoulders caused by geniculation. **Conidia** solitary, fili-

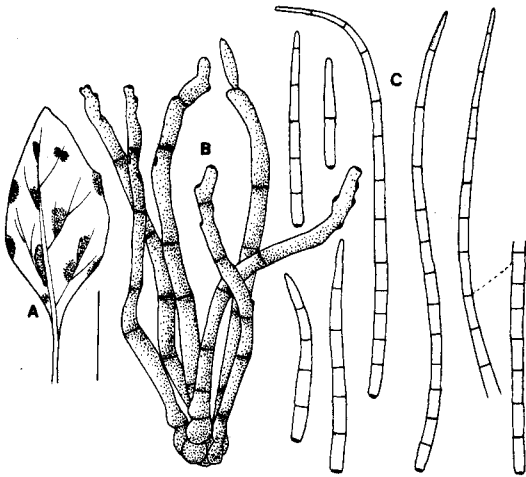


Fig. 3. *Cercospora lycii*: A, Leaf spots on the lower leaf surface of *Lycium chinense* (0.3 \times); B, Conidiophores; C, Conidia. Bar=30 μ m.

form or acicular to nearly obclavate, straight to mildly curved, hyaline, 1~30 (~38)-septate, non-constricted at the septa, subacute to acute at the apex, bluntly rounded, truncate or subtruncate at the base, very variable in length, 23~250 \times 2.5~4.5 μ m; hilum conspicuously thickened, darkened, and slightly protuberant.

Habitat: On living leaves of *Lycium chinense* Mill. (Solanaceae).

Specimens examined: SMK 11942 (10 IX 1992, Chunchon).

Distribution: USA, Poland and Korea.

Notes: The description of the first Korean collection of *C. lycii* (Anonymous, 1991) is not in accordance with this species, since the conidiophores (22~44 \times 3.5~4.0 μ m) and conidia (22~30 \times 3~4 μ m) are too short. *Pseudocercospora chengtuensis* (Chupp, 1954; Hsieh & Goh, 1990; Shin, 1995b), the second cercosporoid fungus on *Lycium chinense*, differs from this collection in having variable conidia and inconspicuous conidial scars. The identify of the specimen concerned can, however, not be proven, since it is not preserved.

4. *Distocercospora pachyderma* (Syd. & P.

Syd.) N. Pons & B. Sutton (Fig. 4)

Mycol. Papers 160: 60 (1988)

= *Cercospora pachyderma* Syd. & P. Syd.,
Annls Mycol. 12: 203 (1914)

= *Cercospora discoreae-bulbiferae* J.M. Yen
& Gilles, Cahiers de la Maboké 9: 102
(1971)

Leaf spots hypophyllous, scattered to confluent, indistinct, effuse, or circular, 2~10 mm diam., at first appearing blackish gray, then turning dingy to dark brown or even blackish, without definite margin, finally covering large areas. **Caespituli** hypophyllous, velutinous, blackish brown. **Mycelium** internal, hyphae septate, branched, olivaceous brown. **Stromata** rudimentary to slightly developed. **Conidiophores** ca. 10~30 in a loose fascicle, arising from stomata, brown to olivaceous brown at the base, paler upwards, 2~6-septate, straight to mildly sinuous, rarely geniculate, sometimes 1~3 times branched above the middle, 60~200 \times 4.5~5.5 μ m, conidial scars conspicuous, only the terminal one usually being visible, occasionally on inconspicuous lateral shoulders, indicating old displaced scars. **Conidia** solitary, obclavate or cylindrical-fusiform, mostly straight to mildly curved, rarely undulate, usually smooth, subhyaline to pale olivaceous brown, 0~5-distoseptate, septa sometimes inconspicuous, probably due to minute vacuoles, usually non-constricted, but occasionally very slightly constricted at some septa, obtuse to rounded at the apex, long obconic to rounded at the base, 25~140 \times 4.5~6.5 μ m; hilum conspicuously thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Dioscorea tokoro* Makino (Dioscoreaceae).

Specimen examined: SMK 11147 (26 IX 1991, Kangnung).

Distribution: China, Japan, Korea, Malaysia and Philippines.

Notes: Shin & Braun (1993) recorded this

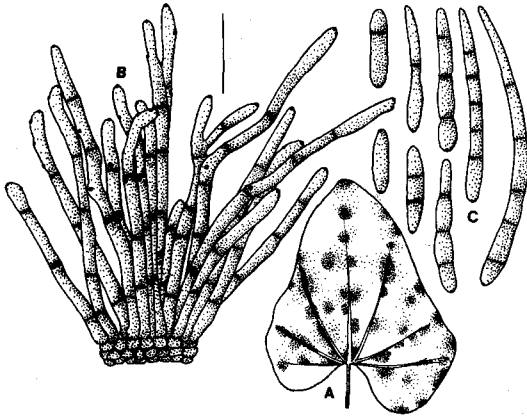


Fig. 4. *Distocercospora pachyderma*: A, Leaf spots on of the lower leaf surface of *Discorea tokoro* (0.3 \times); B, Conidiophores; C, Conidia. Bar=30 μ m.

fungus from Korea for the first time, and Shin (1997) also provided a brief morphological description, based on Korean material on *D. tokoro*. Yen (1971) mentioned that *C. discoreae-bulbiferae* J.M. Yen & Gilles on *D. tokoro* mainly differs from this fungus in indistinct leaf spots, conidiophores grouped in dense fascicles, and short chains of curved conidia. The present Korean material agrees well with Yen's description. The indistinct leaf spots are found on the lower leaf surface. The conidiophores are erect, formed in dense compact fascicles of 10-30 threads, and in addition, anastomoses between two conidia, sometimes three or four have been observed. The leaf spots on *D. tokoro* are also indistinct. Therefore, *C. discoreae-bulbiferae* may be synonymous with the present species. *D. africana* Crous & U. Braun (1994) is allied to this species, but the present species, which is a common, widespread pathogen of various *Dioscorea* species, differs from it in having much longer, frequently branched conidiophores and verruculose conidia with thicker walls.

5. *Mycovellosiella passaloroides* (G. Winter) J. K. Bai & M.Y. Cheng (Fig. 5)

Acta Mycol. Sinica 11(2): 120 (1992)

= *Cercospora passaloroides* G. Winter, Hedwigia 22: 71 (1883)

Leaf spots scattered, often confluent, distinct, circular or subcircular, irregular when coalescing, 2-7 mm diam., at first purple brown, without definite margin, then turning dull red to reddish brown, with blackish brown center, finally blackish brown on the petioles, causing small necrotic lesion. Caespituli hypophyllous, occasionally epiphyllous. Primary mycelium internal, hyphae septate, branched, uniformly olivaceous brown. Secondary mycelium external, hyphae septate, branched, with lateral conidiophores. Stromata lacking to rudimentary or weakly developed, composed of a few brown swollen hyphal cells. Conidiophores 2-8 in a loose fascicle, emerging through the stomatal opening or directly arising as lateral branches from secondary hyphae, olivaceous brown throughout or paler upwards, 0-2(-3)-septate, straight to 1-3 times geniculate, rarely denticulate, 28-90 \times 3.0-5.5 μ m, conidial scars small but conspicuous, apical or on shoulders caused by geniculation. Conidia solitary, filiform to cylindrical or obclavate, straight to mildly curved, subhyaline to pale olivaceous brown, (1-)3-4-septate, usually non-constricted at the septa, sometimes slightly constricted, obtuse at the apex, long obconic at the base, 20-128 \times 4.0-6.0 μ m; hilum conspicuously thickened, darkened, and slightly protuberant.

Habitat: On living leaves of *Amorpha fruticosa* L. (Leguminosae).

Specimens examined: SMK 11259 (6 X 1991, Kangnung), 14217 (24 IX 1991, Namyangju), 14189 (15 IX 1997, Yangku), 14217 (24 IX 1997, Namyangju).

Distribution: Canada, USA, China and Korea.

Notes: Shin & Braun (1993) recorded this fungus for the first time from Korea, and Shin (1997) published a brief description, bas-

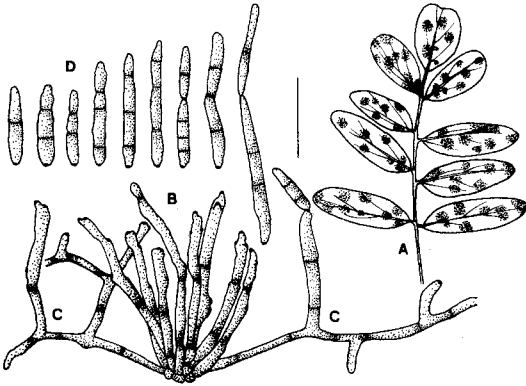


Fig. 5. *Mycovellosiella passaloroides*: A, Leaf spots on the lower leaf surface of *Amorpha fruticosa* (0.3 \times); B, Conidiophores; C, External secondary hyphae arising from a fascicle of primary conidiophores, bearing secondary conidiophores as lateral branches; D, Conidia. Bar=30 μ m.

ed on Korean material on *A. fruticosa*. The conidiophores in Chinese material (Bai & Cheng, 1992) have been rather long and wide, but these differences are due to the variability of this species.

6. *Passalora dubia* (Riess) U. Braun (Fig. 6)

Mycotaxon 55: 231 (1995)

= *Ramulalria dubia* Riess, Bot. Zeit. 12: 190 (1854); also Hedwigia 1: pl. 4. Fig. 9 (1854)

= *Cercospora dubia* (Riess) G. Winter, Syll. Fung. 4: 456 (1886)

= *Cercospora dubia* (Riess) Bubák, Annl. Mycol. 6: 29 (1908)

= *Cercosporidium dubium* (Riess) X.J. Liu & Y.L. Guo, Acta Mycol. Sinica 1: 95 (1982)

= *Cercospora chenopodii* Fresen., Beitr. Mycol., p. 92 (1863)

= *Cercospora dubia* G. Winter, Hedwigia 22: 10 (1883)

= *Cercospora chenopodii* Cooke, Grevillea 12: 22 (1883)

= *Cercospora dubia* var. *urbica* Roum., Rev. Mycol. 15: 15 (1893)

= *Cercospora dubia* var. *atriplicis* Bondartsev,

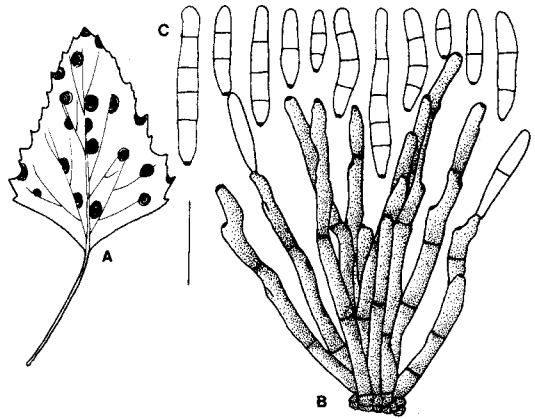


Fig. 6. *Passalora dubia*: A, Leaf spots on the lower leaf surface of *Chenopodium ficifolium* (0.3 \times); B, Conidiophores; C, Conidia. Bar=30 μ m.

Acta Hort. Petrop. 26: 51 (1910)

= *Cercospora chenopodii* var. *micromacula* Dearn., Mycologia 21: 329 (1929)

= *Cercospora penicillata* var. *chenopodii* Fuckel (F. Rhen. 119)

= *Cercospora chenopodii* var. *atriplicis patulae* Thüm., in Herb.

= *Cercospora bondarzevi* Henn., in Herb.

Leaf spots scattered to confluent, distinct, circular or subcircular, 3~8 mm diam., at first pale tan to dingy gray with pale brown margin, later center becoming greenish brown to grayish tan, finally turning grayish brown to pale yellowish brown, without clear border line. **Caespituli** amphigenous, often hypophyllous. **Mycelium** internal, hyphae septate, branched. **Stromata** slightly to moderately developed, globular, subhyaline to olivaceous brown. **Conidiophores** ca. 10~40 in a dense to divergent fascicle, olivaceous to pale olivaceous brown throughout or paler upwards, 2~5-septate, 1~2 times abruptly geniculate above the middle and slightly geniculate at the apex, sometimes apically swollen, not branched, 60~135 \times 4.0~7.0 μ m, conidial scars large and conspicuous. **Conidia** solitary, cylindrical to obclavate, straight or very

slightly curved, hyaline or subhyaline, (0~)2~4(~5)-septate, non-constricted or sometimes slightly constricted at the septa, bluntly rounded at the apex, subtruncate to obconically truncate at the base, variable in length and width, $25\sim 80 \times 5.0\sim 9.5 \mu\text{m}$; hilum slightly thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Chenopodium ficifolium* Smith (Chenopodiaceae).

Specimens examined: SMK 11016 (6 IX 1991, Kangnung), 11084 (20 IX 1991, Kangnung), 11808 (27 VII 1992, Kangnung), 11891 (3 IX 1992, Kangnung), 12088 (7 X 1992, Kangnung), 12572 (29 VIII 1993, Yangku), 13662 (10 X 1996, Kangnung).

Distribution: Nearly throughout the world wherever the host plant is growing, including China, Japan, Korea and Taiwan.

Notes: Shin & Braun (1993) listed this leaf spot fungus on *C. ficifolium* from Korea, and Shin (1995a) recorded it as *C. dubia* with a brief morphological description. The conidial scars on conidiophores are very slightly thickened, but visible, although not always very distinct. The conidia are short, wide, and broadly obclavate, hyaline or subhyaline and usually 1~4-septate. Therefore, Braun (1995b) re-allocated this species to *Passalora*.

7. *Passalora sojina* (Hara) H.D. Shin & U. Braun (Fig. 7)

Mycotaxon 58: 63 (1996)

= *Cercospora sojina* Hara, Nogyo Sekai, Tokyo 9: 28 (1915)

= *Cercosporidium sojinum* (Hara) X.J. Liu & Y.L. Guo, Acta Mycol. Sinica 1(2): 100 (1982)

= *Cercospora daizu* Miura, Manchurian Agric. Exp. Stat. Bull. 11: 25 (1920)

Leaf spots scattered, often confluent, distinct, circular or subcircular to angular, usually irregular to angular when coalescing, 1~7 mm diam., at first appearing as slightly yellowish gray areas on the upper leaf surface,

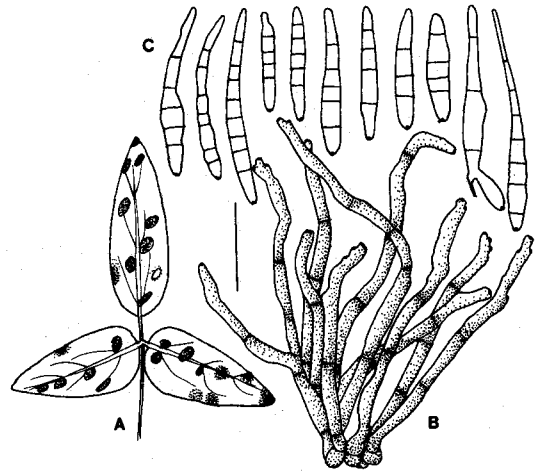


Fig. 7. *Passalora sojina*: A, Leaf spots on the upper leaf surface of *Glycine soja* (0.3 \times); B, Conidiophores; C, Conidia. Bar=30 μm .

later turning dirty gray to tan with narrow brown to dark brown margin, later center becoming paler, finally turning blackish brown to blackish gray due to heavy fructification, visible by means of a hand lens as dark blackish dots; on the lower leaf surface appearing as irregular slightly grayish yellow discolorations. **Caespituli** amphigenous. **Mycelium** internal, hyphae septate, branched, oliveaceous brown. **Stromata** rudimentary to poorly developed, composed of a few swollen brown hyphal cells. **Conidiophores** 3~10 in a dense fascicle, straight to sinuous or usually 3~8 times mildly geniculated from the middle upwards, uniformly pale yellowish brown to brown, 2~4-septate, usually not branched, 70~180 \times 4.5~6.5 μm . **Conidia** solitary, cylindro-obclavate to obclavate or narrowly obclavate, sometimes filiform, occasionally acicular, hyaline, straight to mildly curved, 3~7-septate, usually non-constricted, but sometimes very slightly constricted at some septa, obtuse to subobtuse or subacute at the apex, obconically truncate to subtruncate at the base, 40~88 \times 4.5~8.0 μm ; hilum slightly thickened, darkened, and slightly protuberant.

Habitat: On living leaves of *Glycine soja*

Sieb. & Zucc. (Leguminosae).

Specimens examined: SMK 12407 (24 VI 1993, Kangnung), 13063 (25 IX 1994, Kangnung), 14283 (27 IX 1997, Chunchon).

Distribution: Canada, Cuba, Mexico, USA, China, India, Japan, Korea, Nepal, Taiwan and Zambia.

Notes: This fungus was first recorded from Korea as *Cercospora sojina* on *Glycine max* (Park, 1967). Shin (1995a) reported this fungus from Korea as *Cercosporidium sojinum*, and Shin & Braun (1996) introduced the combination *Passalora sojina*, based on Korean material. For cylindrical and relatively wide conidia, Liu & Guo (1982) placed this fungus in the genus *Cercosporidium*. However, *Cercosporidium* is synonymous with the genus *Passalora* (Braun, 1995a, 1995b), which is characterized by wide, broadly obclavate conidia and slightly thickened conidial scars.

- 8. *Phaeoisariopsis griseola* (Sacc.) Ferr. (Fig. 8)**
 Anns Mycol. 7: 280 (1909)
 = *Isariopsis griseola* Sacc., *Michelia* 1: 273 (1878)
 = *Cercospora griseola* (Sacc.) Ragunath. & Ramakr., *J. Madras Univ.*, Bull. 35/36: 11 (1968)
 = *Graphium laxum* Ellis, *Bull. Torrey Bot. Club* 8: 65 (1881)
 = *Phaeoisariopsis laxa* (Ellis) S.C. Jong & E. F. Morris, *Mycopath. Mycol. Appl.* 34: 269 (1968)
 = *Cercospora solimani* Speg., *An. Soc. Cient. Argent.* 22(5): 214 (1886)
 = *Cercospora columnaris* Ellis & Everh., *Proc. Acad. Nat. Sci. Philad.* 46: 380 (1894)
 = *Pseudocercospora columnaris* (Ellis & Everh.) J.M. Yen, *Gardens Bull., Singapore* 33: 172 (1980)
 = *Arthrobotryum puttemansii* Henn., *Hedwigia* 41: 309 (1902)
 = *Cercospora stuhmannii* Henn., *Bot. Jahrb.* 33: 40 (1902)

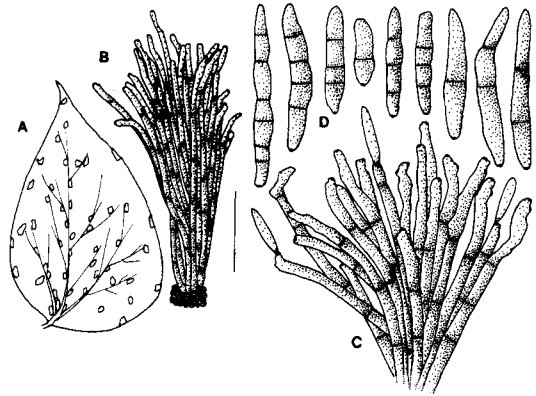


Fig. 8. *Phaeoisariopsis griseola*: A, Leaf spots on the lower leaf surface of *Phaseolus vulgaris* (0.2 \times); B, Synnematosus conidiophores; C, Upper portion of conidiophores; D, Conidia. Bar=30 μ m (but, 75 μ m for B).

Leaf spots scattered to confluent, distinct, angular, irregular when coalescing, usually vein-limited, sometimes also affecting pods, 1–6 mm diam., at first appearing yellowish brown with weak border lines and then turning brown to dark brown with well-developed margin on petioles and young stems, later very light brownish gray arising from stomatal openings, finally center becoming dirty grayish brown with blackish dots caused by heavy fungal fructification. **Caespituli** amphigenous, but mostly hypophyllous, blackish brown to blackish gray. **Mycelium** internal, hyphae septate, branched. **Stromata** well-developed, formed as brown hyphal aggregations, globose to lacrymoid. **Conidiophores** ca. 10–30 in a densely synnematosus fascicle, subhyaline to olivaceous brown throughout or paler upwards, 2–5-septate, usually straight, but sometimes apically 1–3 times mildly geniculate or sinuous, not branched, very long and slender, 200–1000 \times 4.0–6.0 μ m, but irregularly swollen up to 7 μ m at the apex, conidial scars small but conspicuous, apical and on shoulders caused by geniculation. **Conidia** solitary, obclavate to cylindro-obclavate, mildly curved to substraight, subhyaline, (0–)1–4(–6)-septate, usually non-constricted, sometimes slightly

constricted at some septa, subobtuse to obtuse at the apex, obconically truncate to rounded at the base, $25\sim 85 \times 4.5\sim 8.0 \mu\text{m}$; hilum slightly thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Phaseolus vulgaris* L. (Leguminosae).

Specimens examined: SMK 10544 (12 X 1990, Kangnung), 11079 (20 IX 1991, Yangku), 11779 (17 VII 1992, Yangku), 11960 (12 IX 1992, Yangku), 12059 (4 X 1992, Kangnung), 12317 (28 X 1992, Kangnung), 12648 (28 IX 1993, Kangnung), 14264 (27 IX 1997, Chuncheon).

Distribution: Nearly throughout the world wherever the crop is cultivated, including China, Japan and Korea.

Notes: Nakata & Takimoto (1928), Park (1958), and Shin & Braun (1993) listed this fungus from Korea. There are various concepts of the taxonomy of *Phaeoisariopsis*. Deighton (1990) considered the synnematos structure of the conidiomata in this genus to be of little taxonomic value. He proposed to confine this genus to *Phaeoisariopsis griseola* and some allied species with non-geniculate conidiogenous cells, and to re-allocate the "geniculate" species to *Passalora*. However, Braun (1995a, 1995b) discussed the taxonomy of *Passalora* and *Phaeoisariopsis* and proposed to maintain the broad concept of the latter genus. The formation of synnemata is considered to be a good generic feature, whereas the degree of geniculation of conidiogenous cells is proposed to be used as a characteristic for the separation of species, since these are gradual transition from non- to slightly geniculate.

9. *Pseudocercospora atromarginalis* (G.F. Atk.) Deighton (Fig. 9)

Mycol. Papers 140: 139 (1976)

= *Cercospora atromarginalis* G.F. Atk., J. Elisha Mitchell Sci. Soc. 8: 59 (1892)

= *Cercospora rigospora* G.F. Atk., J. Elisha Mitchell Sci. Soc. 8: 65 (1892)

= *Cercospora tosensis* Henn., Bot. Jahrb. 34: 605 (1905)

= *Cercospora nigri* Tharp, Mycologia 9: 112 (1917)

= *Cercospora solani-biflori* Sawada, Taiwan Agric. Res. Inst. Rept. 85: 123 (1943) (nomen non rite publicatum, sine descriptione latina)

Leaf spots epiphyllous, at first indistinct, later forming pale yellowish spots without definite margin, subcircular to irregular, 2~6 mm diam.; on the lower leaf surface pale yellowish brown with inconspicuous marginal line, later turning grayish brown to tan gray, center sometimes becoming dark gray due to scattered dots caused by the fungal fructification. **Caespituli** hypophyllous, rarely epiphyllous, effuse or circular patches, velutinous, dark brown. **Mycelium** internal, hyphae septate, branched. **Stromata** rudimentary to slightly developed, composed of a few brown swollen hyphal cells in the substomatal cavities. **Conidiophores** ca. 10~32 in a compact fascicle, pale olivaceous brown or brown, pal-

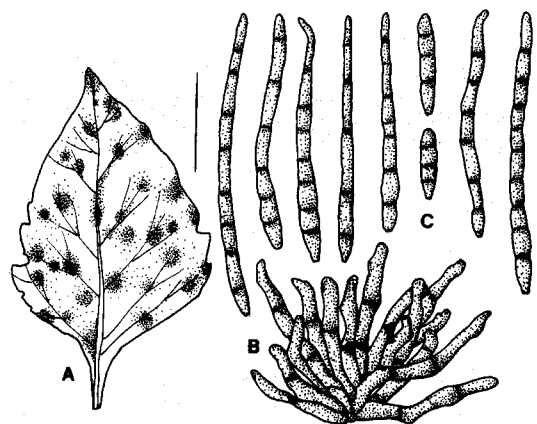


Fig. 9. *Pseudocercospora atromarginalis*: A, Leaf spots on the lower leaf surface of *Solanum nigrum* (0.4x); B, Conidiophores; C, Conidia. Bar=30 μm .

er upwards, darker than the conidia, 1~4-septate, branched at the base or at the middle, substraight to mildly sinuous, not geniculate, sometimes very slightly geniculate, $30\sim60\times 3.5\sim5.0\ \mu\text{m}$, conidial scars inconspicuous, sometimes subconspicuous at shoulders caused by geniculation. **Conidia** solitary, filiform or obclavato-cylindric to obclavate, straight to mildly curved, pale olivaceous brown, (0~)3~9(~12)-septate, usually non-constricted, but in some spores mildly constricted at the septa, subobtuse to broadly rounded at the apex, obconically truncate at the base, very variable in length, $30\sim100\times 2.5\sim5.0\ \mu\text{m}$; hilum unthickened, not darkened.

Habitat: On living leaves of *Solanum nigrum* L. (Solanaceae).

Specimens examined: SMK 11153 (28 IX 1991, Kangnung), 11285 (12 X 1991, Kangnung), 11293 (12 X 1991, Kangnung), 11302(13 X 1991, Kangnung), 12316 (28 X 1992, Kangnung), 13397 (12 XI 1994, Donghae), 14820 (19 VIII 1998, Chunchon).

Distribution: Nearly throughout the world wherever the plant is growing, including China, Japan, Korea and Taiwan.

Notes: Shin & Braun (1993) listed this fungus from Korea. Shin (1997) recorded it from Korea on *Solanum nigrum* and added a brief description. The Korean collections agree well with Chupp's description (1954), although the conidiophores are usually simple and only rarely branched.

10. *Pseudocercospora rhoina* (Cooke & Ellis) Deighton (Fig. 10)

Mycol. Papers 140: 152 (1976)

= *Cercospora rhoina* Cooke & Ellis, Grevillea 6: 89 (1878)

= *Cercospora copallina* Cooke, Grevillea 12: 31 (1883)

= *Cercospora rhoina* var. *nigromaculans* Peck, N.Y. State Mus. Nat. Hist. Ann. Rept. 42: 129 (1889)

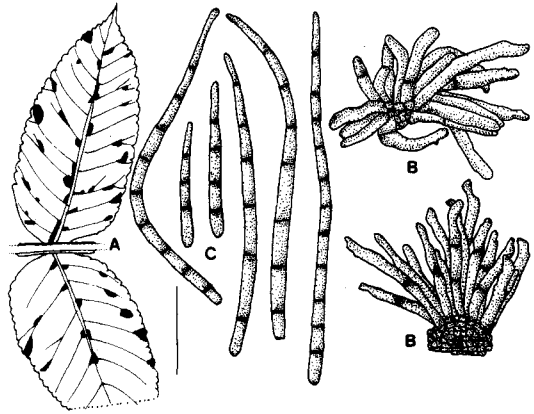


Fig. 10. *Pseudocercospora rhoina*: A, Leaf spots on the upper leaf surface of *Rhus chinensis* (0.2 \times); B, Fascicle of conidiophores; C, Conidia. Bar=30 μm .

Leaf spots scattered, distinct, sometimes confluent, subangular to irregular, usually vein-limited, 1~6 mm diam., at first with reddish brown center and narrow yellowish margin, later becoming reddish brown with grayish white center above, and pale brown below, finally center turning thin, papery, sometimes becoming detached resulting in a shot-hole spot. **Caespituli** amphigenous. **Mycelium** internal, hyphae septate, branched. **Stromata** large, well-developed, subglobular to globular, brown, erumpent through cuticle. **Conidiophores** ca. 20~40 in a dense fascicle, olivaceous to moderately brown, 0~1(~2)-septate, not branched, substraight to mildly sinuous, not geniculate, $23\sim58\times 2.5\sim4.0\ \mu\text{m}$, conidial scars inconspicuous. **Conidia** solitary, filiform to cylindric or obclavato-cylindric, straight to mildly curved, subhyaline to pale olivaceous brown, 3~10(~12)-septate, usually non-constricted or very slightly constricted at the septa, subobtuse to obtuse at the apex, truncate to subtruncate at the base, $20\sim80\times 3.0\sim5.5\ \mu\text{m}$; hilum unthickened, not darkened.

Habitat: On living leaves of *Rhus chinensis* Mill. (Anacardiaceae).

Specimens examined: SMK 11258 (6 X 1991, Kangnung), 11272 (9 X 1991, Kangnung),

11998 (20 IX 1992, Hongchon), 14233 (27 IX 1997, Chunchon), 14259 (27 IX 1997, Chunchon).

Distribution: USA, China, Japan and Korea.

Notes: Park (1967) and Shin & Braun (1993) listed this fungus as *Cercospora rhoina* and *Pseudocercospora rhoina*, respectively, from Korea. Shin (1997) provided a brief description for the species based on material from *Rhus chinensis*. Guo & Hsieh (1995) distinguished *Pseudocercospora rhoidis* from *P. rhoina* for its obclavato-cylindric and somewhat wide (4.0~7.5 μm) conidia. The shape and measurements of conidia, however, are variable in our Korean collections. Therefore, *P. rhoidis* may be synonymous with this species.

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적 요

본 연구는 1990년부터 국내에서 채집하여 고려대학교 농생물학과 진균표본보관소(SMK)에 보존하고 있는 *Cercospora* 및 관련 속의 진균을 대상으로 분류학적 연구를 실시한 결과의 두 번째 보고서이다. 이번에는 *Cercospora* 3종, *Distocercospora* 1종, *Mycovellosiella* 2종, *Passalora* 1종, *Phaeoisariopsis* 1종 및 *Pseudocercospora* 2종에 대한 균학적 특징을 기재, 묘사하였다.

근대에서 *Cercospora beticola*, 상추에서 *C. lactucae-sativae*, 구기자나무에서 *C. lycii*, 도꼬로마에서 *Distocercospora pachyderma*, 족제비싸리에서 *Mycovellosiella passaloroides*, 좁명아주에서 *Passalora dubia*, 돌콩에서 *P. sojina*, 강남콩에서 *Phaeoisariopsis griseola*, 까마중에서 *Pseudo-*

cercospora atromarginalis, 그리고 붉나무에서 *P. rhoina*를 각각 동정하였다.

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