

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

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한국산 *Cercospora* 및 관련 속의 분류학적 연구(IX)

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ABSTRACT: This paper is the ninth contribution towards taxonomic studies on *Cercospora* and allied genera, and contains ten species of Korean cercosporoid fungi; viz., *Cercospora citrullina*, *C. gomphrenae*, *C. mirabilis*, *C. plantaginis*, *C. tabacina*, *Mycovellosiella ariae*, *Pseudocercospora contraria*, *P. lythracearum*, *P. rubi* var. *subhyalina*, and *Ramularia wisconsina*. Morphological characteristics of taxonomic value are described and illustrated for these species to contribute towards a mycological monograph of Korean cercosporoid fungi.

KEYWORDS: *Cercospora*, *Mycovellosiella*, *Pseudocercospora*, *Ramularia*, Korea, Monograph

Eighty cercosporoid fungi from Korea, comprising 30 *Cercospora*, one *Cercosporella*, one *Distocercospora*, two *Mycovellosiella*, two *Neoramularia*, five *Passalora*, one *Phaeoisariopsis*, one *Phacellium*, one *Phaeoramularia*, 23 *Pseudocercospora*, three *Pseudocercosporella*, nine *Ramularia*, and one *Stenella* species were treated in previous contributions of this series (Kim and Shin, 1998a, 1998b, 1998c, 1998d, 1999a, 1999b, 1999c, 1999d). The present paper deals with ten additional cercosporoid taxa from Korea, namely five *Cercospora*, one *Mycovellosiella*, three *Pseudocercospora*, and one *Ramularia* species that are described and illustrated. The specimens examined are preserved at the mycological herbarium (SMK) of the Department of Agricultural Biology, Korea University, Seoul, Korea.

Descriptions

1. *Cercospora citrullina* Cooke, Grevillea 12: 31 (1883)

Fig. 1

= *Cercospora cucurbitae* Ellis & Everh., J. Mycol. 4: 3 (1888)

= *Cercospora sechii* J.A. Stev., P. Rico, Ins. Exp. Stat. Dept. Agric. Ann. Rept. 1917/18: 137 (1919)

= *Cercospora luffae* Hara, Diseases of cultivated plants. p. 228 (1928)

= *Cercospora momordicae* McRae, Ann. Cryptog. Exotique 2: 267 (1929)

= *Cercospora trichosanthis* McRae, Ann. Cryptog. Ex-

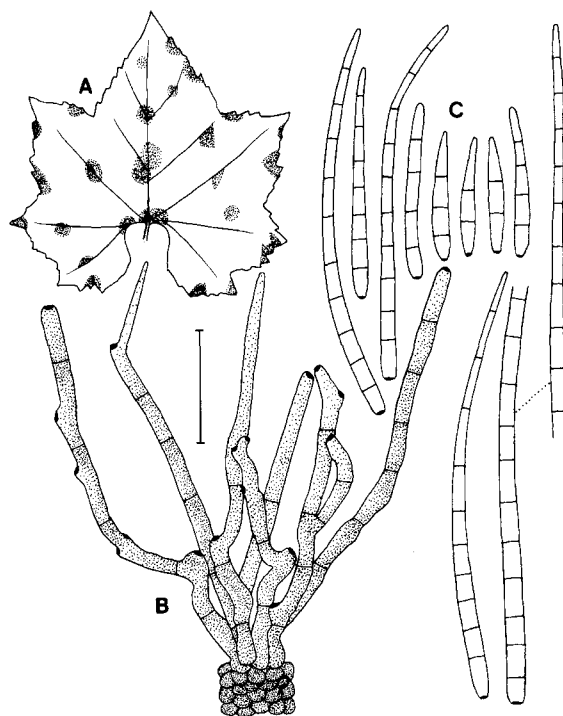


Fig. 1. *Cercospora citrullina*. (A) Leaf spots on the upper leaf surface of *Luffa cylindrica* (0.5×) (B) Conidiophores. (C) Conidia. Bar = 30 μ m.

otique 2: 270 (1929)

= *Cercospora chardoniana* Chupp, Monographs, Univ. P. Rico, B. 2: 245 (1934)

= *Cercospora momordicae* Mend., Philipp. J. Sci. 75: 173 (1941)

= *Cercospora momordicae* Sawada, Taiwan Agric. Res.

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Inst. Rept. 86: 173 (1943) (nomen non rite publicatum sine descriptione latina)

Leaf spots amphigenous, scattered to confluent, distinct, circular to irregular, 1~10 mm diam., or up to 20 mm when coalescent, initially appearing pale brown to tan, later centre becoming greyish brown to greyish white with yellowish brown to dark brown or sometimes purplish margins. **Caespituli** amphigenous, but mostly epiphyllous. **Mycelium** internal, hyphae septate, branched, hyaline, 2.0~3.5 μm wide. **Stromata** lacking to small, rudimentary to poorly developed, brown to dark brown, subglobular to irregular, 5~15 μm diam., composed of a few brown hyphal cells. **Conidiophores** 3~18 in a divergent fascicle, mostly emerging through the cuticle or from substomatal stromata, pale olivaceous brown or sometimes paler towards the apex, irregular in width, straight to slightly curved, narrowly attenuated towards the apical portion of young conidiophores, 1~5 times abruptly or mildly geniculate, usually not branched, but occasionally branched, 1~8-septate, very variable in length, 40~278 \times 3.5~5.0(~7.0) μm ; conidial scars large, 2.5~3.5 μm wide, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. **Conidia** solitary, acicular-filiform to obclavate-cylindric, straight to mildly curved, hyaline, 2~21-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, 30~240 \times 3.5~5.0 μm ; hilum conspicuously thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Cucurbita moschata* Duchesne and *Luffa cylindrica* Roem. (Cucurbitaceae).

Specimens examined: On *Cucurbita moschata*, SMK 14337 (3 X 1997, Seoul), 14407 (12 X 1997, Dongduchon); on *Luffa cylindrica*, SMK 14459 (23 X 1997, Suwon).

Distribution: Worldwide where the host plants are cultivated or growing, including China, Japan, Korea and Taiwan.

Notes: Park (1958) listed this species (under *Cercospora cucurbitae*) on *Cucurbita moschata* from Korea. *Luffa cylindrica* is added as a new host record to Korea in the present paper. Chupp (1954) and Katsuki (1965) described this species with the following features: Conidiophores unbranched, variable in length (50~300 \times 4.5~5.5 μm , 40~170 \times 3.5~4.0 μm , respectively), and conidia acicular to cylindric-obclavate. Taiwanese collections (Hsieh and Goh, 1990) possesses branched conidiophores. Yen and Lim (1969) described that the conidia are 3~29-septate, 60~447.5 \times 3.5 μm , acicular to filiform or even cylindric-filiform. These features are within the variation of this species. Therefore, the Korean collections correspond with *C. citrullina*.

2. *Cercospora gomphrenae* Ray, Mycologia 36: 172 (1944), non *C. gomphrenae* Sawada, 1943 (nomen non rite publicatum, sine descriptione latina) Fig. 2

Leaf spots amphigenous, scattered to confluent, distinct, subcircular to angular, 2~10 mm diam., at first appearing tan to dingy grey, later centre turning grey to greyish white with reddish brown to purplish brown or yellowish brown border lines on the upper surface, pale brown to olivaceous brown on the lower surface. **Caespituli** amphigenous. **Mycelium** internal, hyphae septate, branched, hyaline, 2.0~3.5 μm wide. **Stromata** lacking to medium, rudimentary to slightly developed, irregular, dark brown, up to 30 μm diam., composed of a few swollen, brown hyphal cells. **Conidiophores** 5~15 in a divergent fascicle, emerging through stomatal openings and the cuticle, pale brown or paler towards the apex, straight to slightly curved, 1~5 times mildly geniculate, not branched, 3~10-septate, 70~300 \times 3.5~5.5 μm ; conidial scars large, 2.5~3.5 μm wide, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. **Conidia** solitary, acicular to filiform, substraight to moderately curved or even undulate, hyaline, 8~20-septate, non-constricted at the septa, acute to obtuse at the apex, truncate at the base, 110~300(~450) \times 2.5~4.5 μm ; hilum conspicuously thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Gomphrena globosa* L. (Amaranthaceae).

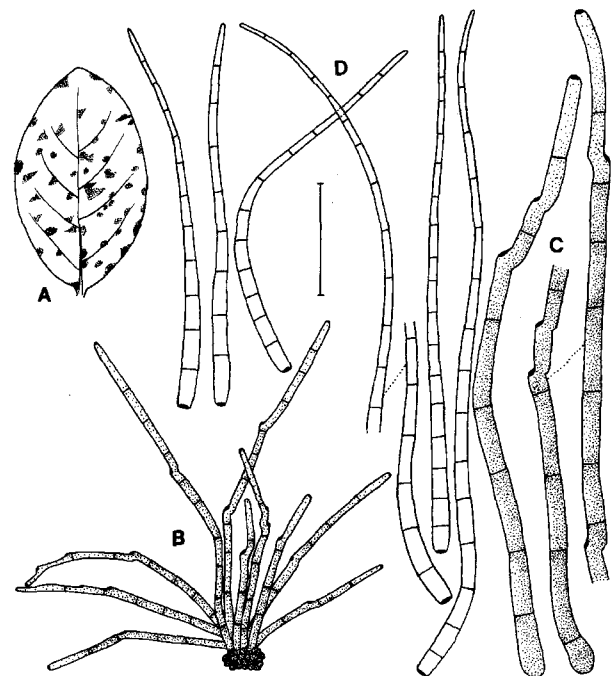


Fig. 2. *Cercospora gomphrenae*. (A) Leaf spots on the upper leaf surface of *Gomphrena globosa* (0.7 \times). (B) and (C) Conidiophores. (D) Conidia. Bar = 30 μm (but 75 μm for B).

Specimen examined: SMK 15327 (4 X 1998, Yangku).

Distribution: Korea and USA.

Notes: This is the first record of this species from Korea. The North American material (Chupp, 1954) was somewhat different from the present collection as follows: Conidiophores somewhat shorter (30–150 μm long), not geniculate; conidia much shorter and narrower, 30–135 \times 2.0–3.5 μm . However, these differences are within the variation of this species. *Cercospora gomphrenicola* Speg. is clearly different from it by the following characters: Conidiophores arranged in dense fascicles, irregular in width, constricted at the septa, not geniculate, branched, distinctly shorter and wider, 25–70 \times 4–7 μm ; conidia pigmented, cylindrical, 1–5-septate, but commonly uniseptate, constricted at the septa, bluntly rounded at the tips, very much shorter and broader, 20–60 \times 5–8 μm . Therefore, Chupp (1954) regarded this fungus to *Didymaria* or *Pyricularia*. *C. pretoriensis* Chupp & Doidge (Chupp, 1954), *Pseudocercospora gomphrenae* (Sawada) Goh & W.H. Hsieh (1990), and *Cercospora pfaffiae* Deighton (1973) are not related to the Korean collection. Hence, the present fungus is very close to *C. gomphrenae*.

3. *Cercospora mirabilis* Tharp, Mycologia 9: 111 (1917)

Fig. 3

Leaf spots amphigenous, scattered to confluent, distinct, circular to subcircular, 1–7 mm diam., or up to 13 mm

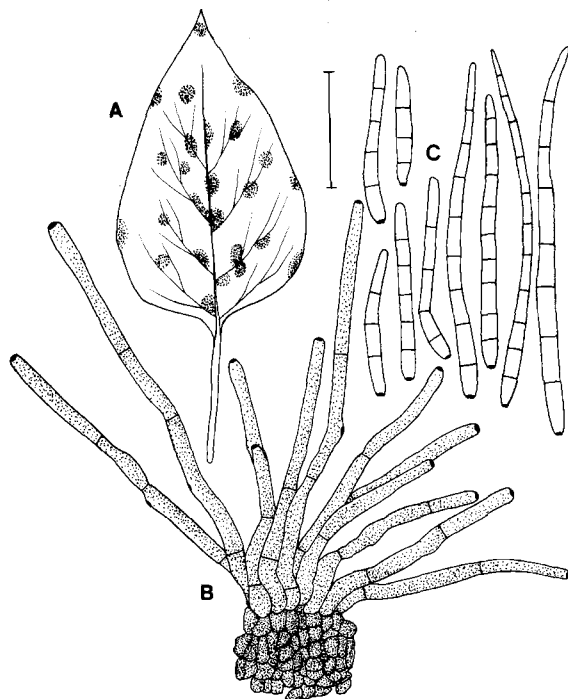


Fig. 3. *Cercospora mirabilis*. (A) Leaf spots on the upper leaf surface of *Mirabilis jalapa* (0.7 \times). (B) Conidiophores. (C) Conidia. Bar = 30 μm .

when coalescent, initially appearing pale brown to tan, later centre becoming dark grey to sooty grey with blackish brown margins. **Caespituli** amphigenous, turfs of conidiophores visible when viewed under a hand lens. **Mycelium** internal, hyphae septate, branched, 2.0–3.5 μm wide. **Stromata** small to medium, slightly to moderate developed, brown to dark brown, subglobular to angular, 15–25 μm diam., composed of swollen, brown hyphal cells. **Conidiophores** 4–15 in a divergent fascicle, arising from substomatal stromata and emerging through the cuticle, olivaceous brown to brown throughout, usually uniform in width or occasionally irregular, straight to mildly curved, 2–3 times mildly geniculate, not branched, 1–3-septate, sometimes slightly constricted at the septa, 50–142 \times 4.5–5.5 μm ; conidial scars medium, 2–3 μm , conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. **Conidia** solitary, filiform to narrowly obclavate or cylindrical to subcylindrical in shorter ones, straight to slightly curved, hyaline, 3–11-septate, non-constricted at the septa, subobtuse to obtuse, even subacute to acute at the apex in longer ones, truncate to subtruncate at the base, 35–140 \times 3.5–5.0 μm ; hilum conspicuously thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Mirabilis jalapa* L. (Nyctagineae).

Specimens examined: SMK 14452 (17 X 1997, Suwon), 15599 (28 X 1998, Namyangju).

Distribution: France, Korea, and North America (USA).

Notes: This is the first record of this species from Korea. In SMK 15599, the conidiophores arising from substomatal stromata are generally uniform in width, straight, and not geniculate, while the epiphyllous conidiophores emerging through the cuticle are sometimes irregular in width, curved to slightly sinuous, and mildly geniculate. Chupp (1954) described this species based on the North American material as follows: Fructification amphigenous; stromata lacking or small; conidiophores uniform in width and colour, sometimes with short branches, 50–125 \times 4.5–6.0 μm ; conidia acicular, 40–140 \times 3–5 μm . The North American *C. oxybaphi* Ellis & Halst. on *Mirabilis nyctagineus* (= *Oxybaphus nyctagineus*) is not related to this species. Therefore, the Korean collections are in accordance with *C. mirabilis*.

4. *Cercospora plantaginis* Sacc., Michelia 1: 267 (1879)

Fig. 4

= *Cercospora plantaginella* Tehon, Mycologia 16: 139 (1924)

Leaf spots amphigenous, scattered, indistinct, circular to subcircular, 1–4 mm diam., pale brown to grey with indistinct or brown border lines. **Caespituli** amphigenous,

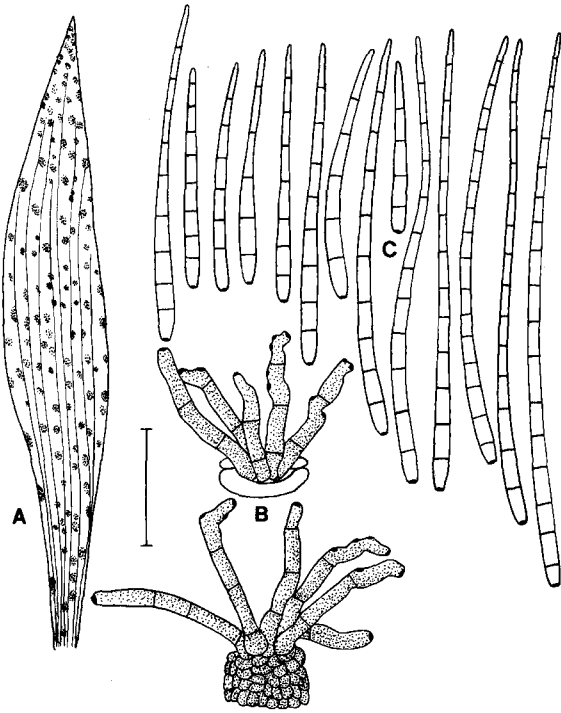


Fig. 4. *Cercospora plantaginis*. (A) Leaf spots on the upper leaf surface of *Plantago lanceolata* (0.7 \times). (B) and (C) Conidiophores. (D) Conidia. Bar = 30 μ m.

but chiefly epiphyllous, punctiform, later appearing greyish brown due to heavy fungal fructification. **Mycelium** internal, hyphae septate, branched, hyaline, 2.0–3.5 μ m wide. **Stromata** small to medium, slightly to moderate developed, globular to subglobular, brown to dark brown, 15–26 μ m diam., composed of several swollen hyphal cells. **Conidiophores** 5–15 in a divergent fascicle, mostly emerging through the cuticle and occasionally arising from substomatal stromata, pale olivaceous brown throughout, straight to mildly curved, usually 1–3 times mildly geniculate or sometimes 1–2 times abruptly geniculate at the apical portion, not branched, 1–3-septate, subtruncate to obtuse at the apex, 28–104 (~150) \times 3.5–5.5 μ m; conidial scars medium, 1.5–2.5 μ m wide, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. **Conidia** solitary, acicular-filiform to obclavate, straight to mildly curved, hyaline, 5–18-septate, non-constricted at the septa, acute to subobtuse at the apex, truncate to subtruncate at the base, 48–182 \times 2.5–4.0 μ m; hilum conspicuously thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Plantago lanceolata* L. (Plantaginaceae).

Specimens examined: SMK 13740 (30 X 1996, Suwon), 15055 (8 IX 1998, Suwon), 15297 (1 X 1998, Suwon), 15529 (20 X 1998, Suwon), 15556 (24 X 1998, Taegu).

Distribution: Cyprus, Cuba, Italy, Korea, Mauritius, Portugal, Russia, USA, and Venezuela.

Notes: This is the first record of this species from

Korea. The length of conidiophores seems to be variable among collections. In SMK 15556, the epiphyllous conidiophores are longer and more geniculate than the hypophyllous ones. Generally, the conidiophores (up to 150 μ m long) are usually longer than those of other specimens. Chupp (1954) described the following features of this fungus in detail: Conidiophores branched and much variable in length (20–300 μ m long), and conidia acicular. These characters are generally belonging to the variability of this species. Therefore, the Korean collections agree well with Chupp's description. *C. pantoleuca* Sacc. on the same host species is alike to this fungus, but somewhat different from it by having hypophyllous caespituli, shorter (5–15 μ m long) colourless conidiophores, often verruculose and subcylindric-fusiform conidia.

5. *Cercospora tabacina* Ellis & Everh., J. Mycol. 4: 6 (1888)

Fig. 5

= *Cercospora rudbeckiae* Peck, N.Y. State Mus. Bull. 131: 19 (1909)

Leaf spots amphigenous, scattered to confluent, indistinct, circular or ellipsoidal to irregular, 1–5 mm diam. on petals, or up to 20 mm when coalescent on leaves, initially appearing dark brown without definite margins on the upper surface, later becoming greyish brown angular patches on the lower surface. **Caespituli** amphigenous, but mostly hypophyllous, also on petals, later appearing dark brown angular patches due to heavy fungal fructification. **Mycelium** internal, hyphae septate, branched, hyaline, 2–3

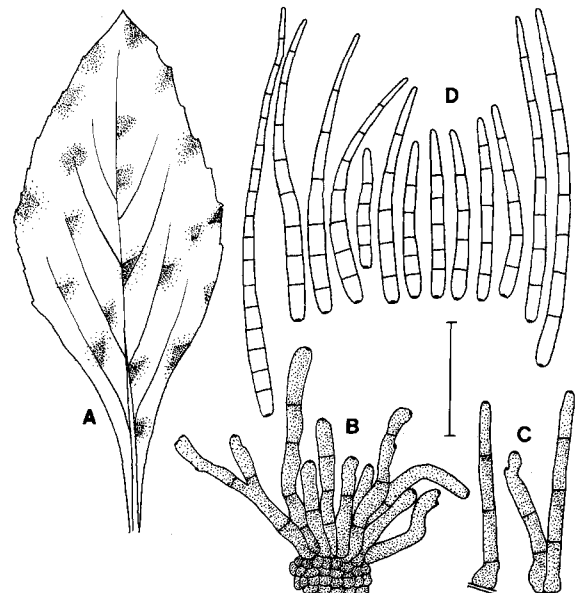


Fig. 5. *Cercospora tabacina*. (A) Leaf spots on the lower leaf surface of *Rudbeckia bicolor* (0.7 \times). (B) Conidiophores. (C) Upper portion of conidiophores showing the apices. (D) Conidia. Bar = 30 μ m.

μm wide. **Stromata** small to large, slightly to well-developed, globular, dark brown, 15–35 μm diam., composed of several swollen hyphal cells. **Conidiophores** solitary or 2–15 in a divergent fascicle, mostly arising from substomatal stromata, olivaceous brown throughout, irregular in width, straight to slightly curved, 1–2 times abruptly geniculate, not branched or occasionally branched, 0–4-septate, usually not constricted, but sometimes very slightly constricted at the septa, 20–80 \times 3.0–5.0 (~6.5) μm ; conidial scars small, ca. 1 μm wide, slightly conspicuous, apical, or on shoulders and along the rim of conidiogenous cell caused by geniculation. **Conidia** solitary, obclavate-cylindric to filiform, straight to mildly curved, subhyaline, 4–16-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate or even obconic at the base in shorter ones, 36–130 \times 3.5–4.5 μm ; hilum slightly thickened, slightly darkened, and non-protuberant.

Habitat: On living leaves or petals of *Rudbeckia bicolor* Nutt. (Compositae).

Specimens examined: SMK 14444 (17 X 1997, Suwon), 14980 (1 IX 1998, Suwon), 15046 (8 IX 1998, Suwon), 15319 (4 X 1998, Chunchon), 15326 (4 X 1998, Yangku).

Distribution: Korea and USA.

Notes: This is the first record of this species from Korea. In SMK 15319, the epiphyllous conidiophores are solitary or 2–5 in a loose fascicle, not geniculate or occasionally once geniculate at the upper portion, not branched, slightly bulbous at the base. The hypophyllous ones are 2–8 in a slightly divergent fascicle and occasionally branched. Chupp (1954) described the following characters of this species: Conidiophores non-fasciculate to densely fasciculate, irregular in width, often constricted at the septa, branched, 30–150 \times 4–6 μm ; conidia cylindric-obclavate, 30–75 \times 4.5–6.0 μm . Therefore, the Korean collections are in agreement with his description.

6. *Mycovellosiella ariae* (Fuckel) U. Braun, Nova Hedwigia 50: 518 (1990) Fig. 6

= *Cercospora ariae* Fuckel, Jahrb. Nass. Ver. f. Naturk. 23/24: 103 (1869)

= *Cercospora kriegneriana* Bres., in Krieger, Fungi saxonici, fasc. 15. No. 747 (1892) and Hedwigia 31: 41 (1892)

= *Ramularia sorbi* Karak., in Vassiljevsky & Karak., Fungi imperfecti parasitici. I. Hyphomycetes. p. 139 (1937)

Leaf spots amphigenous, scattered to confluent, distinct, angular to irregular, large, 1–15 mm diam., sometimes occupying almost entire leaf segments, initially appearing yellowish to reddish brown, later centre becoming greyish brown with indefinite margins. **Caespituli** hypophyllous, effuse. **Primary mycelium** internal, hyphae septate, bran-

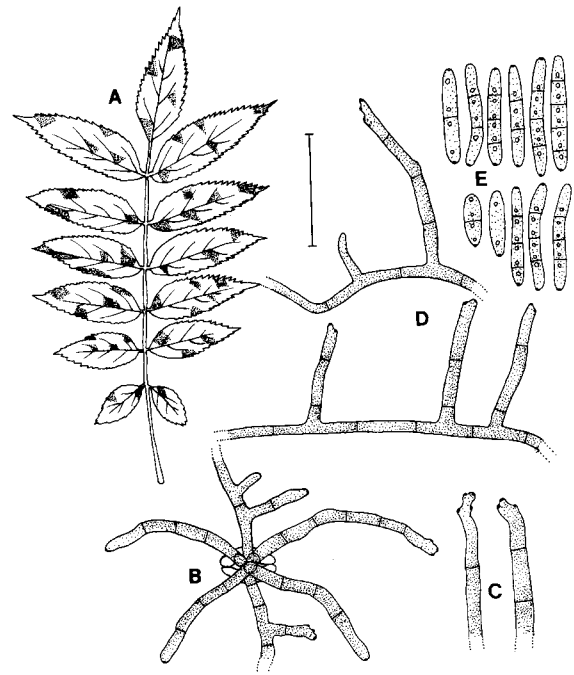


Fig. 6. *Mycovellosiella ariae*. (A) Leaf spots on the lower leaf surface of *Sorbus commixta* (0.7 \times). (B) Conidiophores. (C) Upper portion of conidiophores showing the apices. (D) Secondary conidiophores borne on the external mycelium. (E) Conidia. Bar = 30 μm .

ched, hyaline, 2–3 μm wide. **Secondary mycelium** external, creeping on the leaf surface, short or very long, arising from substomatal stromata, pale olivaceous brown to brown, 2.5–4.0 μm wide. **Stromata** lacking to small, rudimentary to slightly developed, subglobular to angular, brown to dark brown, 5–10 μm diam., composed of a few swollen hyphal cells. **Conidiophores** 2–15 in loose to moderately dense fascicle, emerging through stomatal openings or borne singly as lateral branches from superficial mycelium, olivaceous brown to yellowish brown or paler towards the apex, straight to mildly curved, sometimes 1–2 times mildly geniculate or undulate-geniculate, not branched, 0–4-septate, 34–75 \times 3.0–5.5 (~6.5) μm ; conidial scars minute, ca. 1 μm wide, conspicuous, apical, or on small shoulders of conidiogenous cells caused by geniculation. **Conidia** solitary or in short (1–2) unbranched chains, cylindric to obclavate-cylindric or ellipsoid-fusiform, straight to slightly curved, subhyaline to pale olivaceous brown due to a few oil drops, guttulate, 0–4-septate, often somewhat constricted at the septa, obconic at the apex, subobtuse to obtuse at the base, 18–60 \times 2.5–6.0 (~7.0) μm ; hilum very small, slightly thickened, darkened, and non-protuberant.

Habitat: On living leaves of *Sorbus commixta* Hedl. (Rosaceae).

Specimen examined: SMK 14791 (17 VIII 1998, Seoul).

Distribution: Germany, Korea, North America, and

Russia.

Notes: This is the first record of this species from Korea. Chupp (1954) published this species under *C. ariae* with a full morphological description. It was characterized by superficial hyphae, catenate conidia, conspicuous, and thickened conidial scars. All structures are pigmented. Therefore, Braun (1990) re-allocated this fungus into *Mycovelosiella*. He described the following characters: Secondary mycelium well-developed; conidiophores arranged in small to moderate rich fascicles, branched, aseptate to richly septate, $10\sim75\times3\sim7\ \mu\text{m}$; conidial scars terminal and lateral; conidia ellipsoid-ovoid to subcylindric, formed singly and in chains, $10\sim55\times3\sim9\ \mu\text{m}$. Hence, the Korean collection agrees well with these previous descriptions. Minor differences are present, but they belong to the variation of this fungus.

7. *Pseudocercospora contraria* (Syd. & P. Syd.) Deighton, Mycol. Papers 140: 30 (1976) Fig. 7

≡ *Cercospora contraria* Syd. & P. Syd., Ann. Mus. Congo Belge. Bot. Ser. V. fasc. 1. 3: 21 (1909)

= *Cercospora wildemanii* Syd. & P. Syd., Ann. Mus. Congo Belge. Bot. Ser. V. fasc. 1. 3: 21 (1909)

Teleomorph: *Mycosphaerella contraria* Hansf., Proc. Linn. Soc. Lond. 153: 23 (1941)

Leaf spots amphigenous, scattered to often confluent, distinct, circular to irregular, 2~10 mm diam., or up to 15 mm when coalescent, initially appearing brownish grey to dingy grey, later centre becoming greyish brown with dark

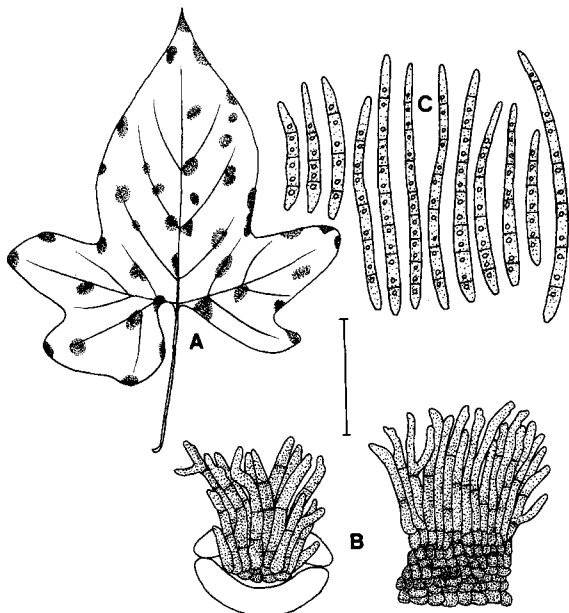


Fig. 7. *Pseudocercospora contraria*. (A) Leaf spots on the upper leaf surface of *Dioscorea quinqueloba* (0.5 \times). (B) Conidiophores. (C) Conidia. Bar = 30 μm .

brown margins, finally with pale brown to reddish brown haloes on the upper surface, pale brown to brown on the lower surface. **Caespituli** amphigenous. **Mycelium** internal, hyphae septate, branched, hyaline, 2.0~3.5 μm wide. **Stromata** medium to large, moderate to well-developed, subglobular, dark to blackish brown, 15~60 μm diam., composed of several swollen hyphal cells. **Conidiophores** 10~30 in a dense fascicle, arising from substomatal stromata or emerging through the cuticle, olivaceous brown to brown throughout, irregular in width, straight to slightly curved, usually not geniculate, but rarely once geniculate, rarely branched, aseptate or uniseptate, 15~45 \times 2.0~3.5 μm ; conidial scars inconspicuous. **Conidia** solitary, cylindrical-obclavate to cylindrical, straight to substraight, subhyaline to very pale olivaceous brown due to a few oil drops, guttulate, 2~6(~8)-septate, non-constricted at the septa, obtuse to subobtuse at the apex, obconically truncate to subtruncate at the base, 16~75 \times 2.5~4.5 μm ; hilum unthickened, not darkened.

Habitat: On living leaves of *Dioscorea quinqueloba* Thunb. (Dioscoreaceae).

Specimen examined: SMK 15309 (6 X 1998, Kimhae).

Distribution: Cameron, China, Ghana, Guinea, Indonesia, Korea, Nigeria, Sierra Leone, Sudan, Tanzania, Uganda, and Zaire.

Notes: This is the first record of this species from Korea. The taxonomy of cercosporoid taxa on *Dioscorea* is complicated. Deighton (1976) described *Pseudocercospora contraria* as follows: Fructification mostly epiphyllous; conidiophores 30 or more in a dense fascicle, up to 65 μm long; conidia cylindrical to obclavate, 2~22-septate, 35~114 \times 4~7 μm , commonly 5~6 μm wide. Chinese material (Guo and Hsieh, 1995) possessed chiefly hypophyllous fructification. *P. ubi* (Racib.) Deighton and *P. cylindrata* (Chupp & Linder) Pons & B. Sutton on *Dioscorea* are distinct from this species. Therefore, the Korean collection is very close to *P. contraria*. Although the conidia are somewhat narrower, less septate and guttulate, these features are only of minor taxonomic value, and within the variation of this fungus. *C. contraria* (Chupp, 1954) was described as having conidiophores in dense fascicles, 10~50 \times 4.5~5.0 μm , and cylindrical, occasionally catenate conidia, 20~120 \times 5~8 μm . *C. wildemanii* was reported (Chupp, 1954) as follows: Conidiophores aseptate, 5~25 \times 4~6 μm ; conidia straight to strongly curved, 40~120 \times 5.0~6.5 μm . However, Deighton (1976) re-allocated the two *Cercospora* species into *Pseudocercospora* as synonyms of this species.

8. *Pseudocercospora lythracearum* (Heald & F.A. Wolf) X.J. Liu & Y.L. Guo, Acta Mycol. Sinica 11: 294 (1992)

Fig. 8

≡ *Cercospora lythracearum* Heald & F.A. Wolf, *Mycologia* 3: 18 (1911)

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

Leaf spots amphigenous, scattered to confluent, distinct, circular to irregular, 1–8 mm diam., or up to 15 mm when coalescent, initially appearing pale brown to brown, later becoming brown to blackish brown with dark brown margins on the upper surface, greyish brown to brown on the lower surface, finally centre turning greyish white, surrounded with dark brown border lines. **Caespituli** amphigenous. **Mycelium** internal, hyphae septate, branched, hyaline, 2–3 μm wide. **Stromata** small, but well-developed, subglobular, brown to dark brown, 10–20 μm diam., composed of a few swollen, brown hyphal cells. **Conidiophores** 5–20 in a loose to dense fascicle, arising from stromata or erumpent through the cuticle, olivaceous brown throughout, slightly attenuated towards the apex, straight to slightly curved, sometimes sinuous, sometimes 1–2 times geniculate, usually not branched, but rarely branched, 0–2-septate, 12–50 \times 3.0–4.5 μm ; conidial scars inconspicuous. **Conidia** solitary, obclavate to obclavate-cylindric, straight to mildly curved, subhyaline to hyaline, obtuse to subobtuse at the apex, obconically truncate to subtruncate at the base, 24–80 \times 3.0–4.5 μm ; hilum unthickened, not darkened.

Specimen examined: SMK 15114 (18 IX 1998, Jinju).

Distribution: China, India, Japan, Korea, Philippines,

Puerto Rico, Trinidad, Uganda, and USA.

Notes: Kim *et al.* (1991) listed this species (under *Cercospora lythracearum*) for the first time from Korea. Chupp (1954) described *C. lythracearum* based on the North American material as follows: Conidiophores arranged in mostly dense fascicles, aseptate; conidia obclavate to cylindric-obclavate with long obconically truncate bases. For Japanese collections, Katsuki (1965) mentioned somewhat shorter conidiophores (22–30 μm long). Therefore, the Korean collection agrees well with these previous descriptions. Chupp (1954) and Katsuki (1965) regarded *Cercospora lagerstroemiae-subcostatae* Sawada and *C. lagerstroemiicola* Sawada on *Lagerstroemia subcostata* as synonyms of this species, but they seem to represent distinct species. Hsieh and Goh (1990) re-deposited the two species under *Pseudocercospora lagerstroemiae-subcostatae* (Sawada) Goh & W.H. Hsieh. *C. lythracearum* var. *macrophora* Chidd. (Chiddarwar, 1959) collected from India does not have resemblance with the present species. *P. lagerstroemiigena* Goh & W.H. Hsieh (1990) is confusable with the Korean collection, but different from it by having well-developed superficial secondary mycelium, somewhat narrower (2–3 μm wide) and filiform conidia.

9. *Pseudocercospora rubi* (Sacc.) Deighton var. *subhyalina* H.D. Shin & U. Braun, *Mycotaxon* 58: 164 (1996)

Fig. 9

Leaf spots amphigenous, scattered, sometimes confluent, distinct, circular to subcircular, usually zonate, 3–10 mm

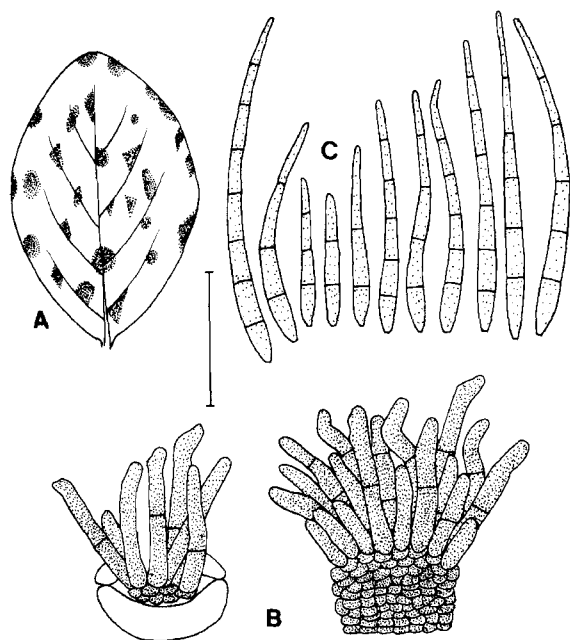


Fig. 8. *Pseudocercospora lythracearum*. (A) Leaf spots on the upper leaf surface of *Lagerstroemia indica* (0.7 \times). (B) Conidiophores. (C) Conidia. Bar = 30 μm .

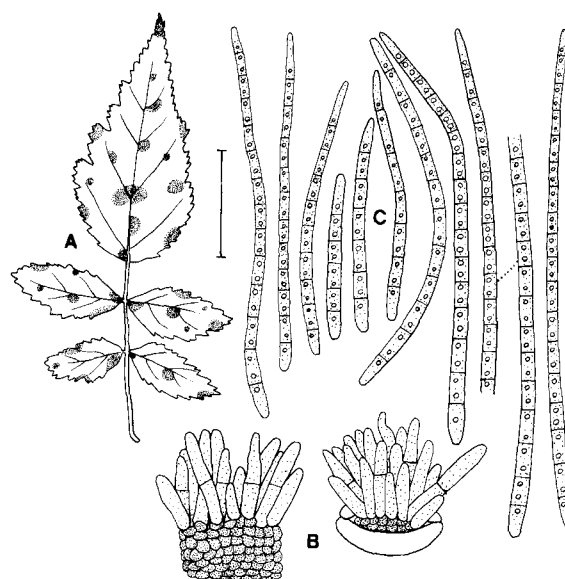


Fig. 9. *Pseudocercospora rubi* var. *subhyalina*. (A) Leaf spots on the lower leaf surface of *Rubus oldhamii* (0.7 \times). (B) Conidiophores. (C) Conidia. Bar = 30 μm .

diam., or up to 15 mm when coalescent, at first appearing brown to reddish brown, centre becoming dark brown with purplish brown margins. **Caespituli** amphigenous, but abundantly hypophyllous. **Mycelium** internal, hyphae septate, branched, hyaline, 2–3 μm wide. **Stromata** large, well-developed, subglobular to globular, pale brown, 20–35 μm diam., composed of several hyphal cells. **Conidiophores** 10–30 in a loose to dense fascicle, arising from substomatal stomata or emerging through the cuticle, very pale olivaceous brown to subhyaline, straight to mildly sinuous, not geniculate, not branched, 0–1-septate, 12–35 \times 3.5–5.0 μm ; conidial scars inconspicuous. **Conidia** solitary, filiform, straight to mildly curved, subhyaline to pale greenish, guttulate, 5–22-septate, septation interval uneven, some septa unclear, non-constricted at the septa, obtuse at the apex, subtruncate to subobtuse at the base, 52–195 \times 2.5–4.5 μm ; hilum unthickened, not darkened.

Habitat: On living leaves of *Rubus oldhamii* Miq. (Rosaceae).

Specimens examined: SMK 13388 (12 XI 1994, Tonghae) (holotype), 14305 (27 IX 1997, Chunchon), 15333 (4 X 1998, Yangku).

Distribution: Known only from the type locality, Korea.

Notes: Shin and Braun (1996) first recorded this fungus as a new variety from Korea on the same host species. SMK 14305 and 15333 agree with the holotype, though the conidiophores are arranged in dense fascicles. In SMK 14035, the conidiophores are more plentiful on the upper surface than those of the holotype. In SMK 15333, a larger proportion of shorter conidia are present than in the type material, and a few have been seen with a width of up to 4.5 μm . The Korean collections are somewhat different from the North American material (Chupp, 1954) as follows: Fructification chiefly epiphyllous, conidiophores sometimes branched and longer (10–40 μm), and conidial scars minute. The Korean material also differs from European material (Deighton, 1976) by its short, subhyaline conidiophores and conidia with subobtuse or subtruncate base and obtuse apex. But, the conidiophores in var. *rubi* are pigmented, and the conidia are usually provided with obconically truncate bases. Therefore, this species was placed in a separate variety (Shin and Braun, 1996). *P. rubicola* (Thüm.) X.J. Liu & Y.L. Guo differs from the present fungus by its epiphyllous fructification, pigmented conidiophores, and cylindrical to obclavate-cylindrical conidia with broadly rounded apices and obconically truncate bases.

10. *Ramularia wisconsinia* H.C. Greene, Am. Midl. Nat. 44(3): 641 (1950) Fig. 10

Leaf spots amphigenous, scattered to confluent, angular to irregular, occasionally vein-limited, 1–10 mm diam., or

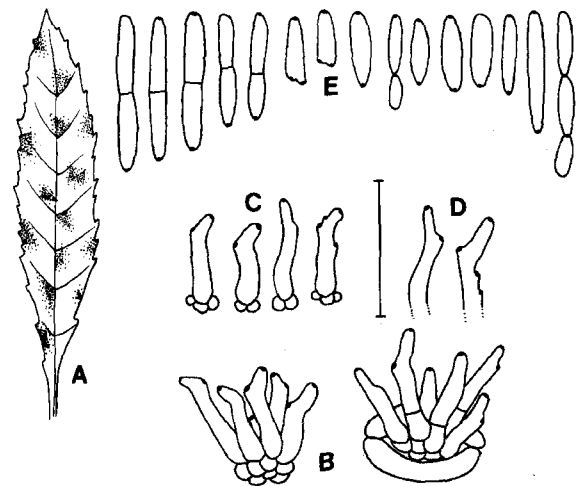


Fig. 10. *Ramularia wisconsinia*. (A) Leaf spots on the upper leaf surface of *Erechites hieracifolia* (0.7 \times). (B) and (C) Conidiophores. (D) Upper portion of conidiophores showing the apices. (E) Conidia. Bar = 30 μm .

up to 20 mm when coalescent, brown to greyish brown with indefinite margins. **Caespituli** amphigenous, but abundantly hypophyllous. **Mycelium** internal, hyphae septate, branched, hyaline, 1.5–2.5 μm wide. **Stromata** lacking to very small, rudimentary to slightly developed, subglobular, subhyaline to very pale coloured, less than 10 μm diam., composed of a few swollen hyphal cells. **Conidiophores** solitary or 2–6 in a loose fascicle, emerging through stomata or erumpent through the cuticle, hyaline to subhyaline, usually not geniculate or sometimes once geniculate, not branched, aseptate, 10–24 \times 3–4 μm ; conidial scars minute, ca. 1 μm wide, but conspicuous, apical or on small shoulders of conidiogenous cells caused by geniculation. **Conidia** solitary or in short (1–3) branched or unbranched chains, cylindrical to ellipsoid or fusiform, hyaline, 0–1-septate, non-constricted at the septa, obtuse to subobtuse or subacute at both ends, 8–36 \times 2.5–4.5 μm ; hilum slightly thickened, darkened, and non-protruberant.

Habitat: On living leaves of *Erechites hieracifolia* (L.) Raf. (Compositae).

Specimens examined: SMK 14388 (5 X 1997, Seoul), 14737 (30 VII 1998, Seoul), 14943 (28 VIII 1998, Seoul), 15034 (4 IX 1998, Seoul).

Distribution: Korea and USA.

Notes: This is the first record of this species from Korea. In SMK 15034, the conidia are occasionally slightly constricted at the septa, and the conidiophores are sometimes denticulated at the apical portion. In SMK 14737, the catenate conidia are plentiful, but rather less frequent in SMK 15034 and rare in SMK 14943 in which the conidia are all short. Greene (1950) described the following characters of this species based on the North American material: Fructification amphigenous, but mostly hypophyllous;

conidiophores once geniculate, frequently uniseptate, tips denticulate; conidia cylindric or subfusoid, 1-septate, 10~20×3~4 μm . Braun (1998) also published this species with detailed illustration as follows: Caespituli hypophyllous; conidiophores geniculate-sinuous, 10~20×2~4 μm ; conidia catenate, 0~1-septate, 6~23×2.5~4.5 μm . Therefore, the Korean collections agree well with these previous descriptions.

Acknowledgements

This study was partly supported by the Korea Science & Engineering Foundation (Grant No. 941-0600-043-2). Dr. Uwe Braun, Martin-Luther Universität, Germany, kindly reviewed the manuscript.

적 요

본 연구는 1990년부터 국내에서 채집하여 고려대학교 농생물학과 진균표본보관소(SMK)에 보존하고 있는 *Cercospora* 및 관련 속의 진균을 대상으로 분류학적 연구를 실시한 결과의 아홉 번째 보고이다. 이번 보고에서는 *Cercospora* 5종, *Mycovellosiella* 1종, *Pseudocercospora* 3종 및 *Ramularia* 1종에 대한 균학적 특징을 기재·묘사하였다. 호박과 수세미오이에서 *Cercospora citrullina*, 천일홍에서 *C. gomphrenae*, 분꽃에서 *C. mirabilis*, 창질경이에서 *C. plantaginis*, 원추천인국에서 *C. tabacina*, 마가목에서 *Mycovellosiella ariae*, 단풍마에서 *Pseudocercospora contraria*, 배롱나무에서 *P. lythracearum*, 줄딸기에서 *P. rubi* var. *subhyalina*, 그리고 붉은서나물에서 *Ramularia wisconsina*를 각각 동정하였다.

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