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Addition and reexamination of Japanese species belonging to the genus *Cercospora* and allied genera. VII. Newly recorded species from Japan (2)

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Abstract In the seventh report of the present series, four species of the genus *Pseudocercospora* were added to the Japanese mycoflora. They are *Pseudocercospora catappae*, *P. mali*, *P. polysciatis-pinnatae*, and *P. puderi*.

Key words *Cercospora* · New to Japan · *Pseudocercospora*

Introduction

In recent years, taxonomic reexamination of *Cercospora* and allied genera has been carried out throughout the world based on new generic concepts (Braun 1995a, 1998; Crous and Braun 2003). In Japan, Katsuki (1965) published a monograph of *Cercosporae* including 226 species. However, his monograph should be revised according to new generic concepts. Moreover, many species of this group are being added to the Japanese mycoflora (Kobayashi et al. 1998, 2002; Nakashima et al. 2002). In this contribution, five species are newly added with description and discussion.

In this study, slides for the light microscope were prepared by hand section of fresh materials. Mounting medium used was Shear's fluid. The dried specimens are maintained in the Laboratory of Forest Pathology Herbarium, Forestry and Forest Products Research Institute, Japan (TFM: FPH).

Descriptions

Pseudocercospora catappae (Henn.) X.J. Liu et Y.L. Guo, *Mycosystema* 2:230, 1989; Braun, *Crypt. Bot.* 3:241, 1993.

Figs. 2, 5, 6

Synonym: *Cercospora catappae* Henn., Engler's Bot. Jahrb. 34:56, 1905 (Chupp, A monograph of the fungus genus *Cercospora*: 114, 1953).

Cercospora terminaliae Sawada, *Agric. Rev. Formosa* 38:701, 1942 (nom. illeg.).

Pseudocercospora catappae Goh et W.H. Hsieh, in Hsieh & Goh, *Cercospora* and similar fungi from Taiwan: 57, 1990 (nom. superfl.).

Ramularia catappae Raciborski, *Paras. Algen u. Pilze Javas* II:41, 1900.

Leaf spots small, circular to subcircular, dark brown at first, grayish-white at last, with purplish-brown to black border, 3–5 mm in diameter, occasionally confluent. Fruit bodies strictly hypophyllous. Stromata olive-brown, distinct, up to 50 µm in diameter. External hyphae occasionally emerging from stromata and producing conidiophores. Conidiophores not branched, pale olive-brown, straight, densely fasciculate, 15–25 × 2–3 µm in size. Conidial scars unthickened. Conidia mainly cylindrical, smooth, pale to pale olive, 25–60 × 2.5–3 µm, 1–7-septate, with thin truncate basal ends.

Host: *Terminalia catappa* L. (Japanese name: Momotamana or Kobateishi).

Disease name: Circular leaf spot (Maruhoshi-byo in Japanese).

Specimens examined: Tonoshiro, Ishigaki (Ishigaki Is.), Yaeyama, Okinawa Pref., November 20, 1998, by Takao Kobayashi (TK) (TFM: FPH-7041); Zizoko, Ishigaki, Ishigaki (Ishigaki Is.), Yaeyama, Okinawa Pref., November 27, 1988, by TK (TFM: FPH-7050); Okinawa Memorial Park, Motobu (Okinawa Is.), Okinawa Pref., March 6, 1998, by TK and Chiharu Nakashima (CN) (TFM: FPH-7632); Kesaji, Higashi-son (Okinawa Is.), Okinawa Pref., November 18, 1999, by TK and CN (TFM: FPH-7633); China (Okinoerabu Is.), Kagoshima Pref., November 20, 2001, by TK and Yasunori Ono (TFM: FPH-7641).

Note: The host plant, *Terminalia catappa*, is planted as a shade tree throughout the Nansei Islands (mainly Okinawa Pref.). From those symptoms of the diseases and morphological characteristics except forming the external hyphae on leaf spot and large stromata, it was identified as

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Fig. 1. *Pseudocercospora polysciatis-pinnatae*. **a** Stroma and conidiophores. **b** Conidia. Bars 20µm

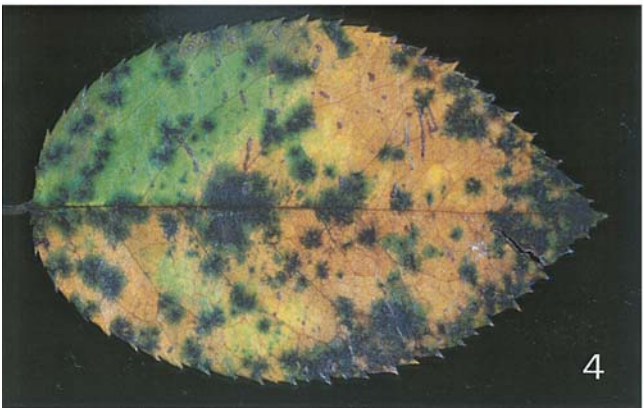
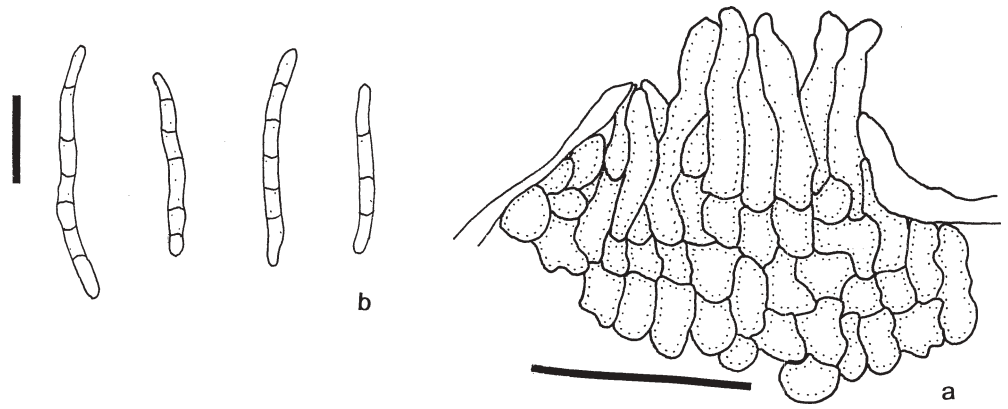


Fig. 2. Symptoms on *Terminalia catappa*
Fig. 3. Symptom on *Polyscias balfouriana*
Fig. 4. Symptom on *Rosa* sp.

Pseudocercospra catappae. Ten species belonging to the genus *Pseudocercospora* other than *P. catappae* have been known on *Terminalia*. They are distinguished from the present species based on their morphological characteristics. The differences are as follows: *Pseudocercospora arunjae* Sutton (1994b) has mainly epiphyllous stromata and does not have the external hyphae; *P. brevis* Sutton (1994c) forms small ovoid conidia (12–19 × 5.5–7µm); *P.*

chebulae Sutton (1994d) has acicular conidia (43–51 × 2–2.5µm in size); *P. combretacearum* var. *combretacearum* Verma et Kamal [1987; = *P. combretii* Singh et Kamal (1986)] has large and numerous septated conidia (60–92 × 5.5–7µm, 14–21-septate); *P. combretacearum* var. *minima* Sutton (1994e) has wide conidiophores and conidia (5–6µm in width); *P. kenemensis* Deighton (1976), *P. neodeightonii* Sutton (1994f), and *P. zambiensis* (Deighton) Sutton

(1994g) do not form stroma; *Pseudocercospora terminaliae* (Sydow) Ellis (1976), which was transferred to the genus *Prathigada* by Sutton (1994a), has dark-colored and wider conidiophores without external hyphae and conidia. The present species has been recorded from American Samoa, China, Cuba, Dominica, Fiji, Guam, India, Indonesia, Micronesia, Myanmar, New Caledonia, Panama, Papua New Guinea, Samoa, Solomon Islands, Taiwan, and Tanzania (Crous and Braun 2003).

Pseudocercospora mali (Ellis et Everh.) Deighton, Mycol. Pap. 140:147, 1976; Guo & Hsieh, The genus *Pseudocercospora* in China: 278, 1995; Braun & Melnik, Cercosporoid fungi from Russia and adjacent countries: 71, 1997. Figs. 7, 8

Synonym: *Cercospora mali* Ellis et Everhart, J. Mycol. 4:116, 1888 (Saccardo, Sylloge Fungorum 10:643, 1892); Chupp, A monograph of the fungus genus *Cercospora*: 481, 1953.

Cercospora minima Tracy et Earle, Bull. Torrey Bot. Club 23:206, 1896.

Leaf spots pale blackish-brown, angular to irregular, vein-limited, later white to pale brown with brown border, 3–12 mm in size. Fruit bodies amphigenous. Stromata small, pale brown to brown, 20–33 µm in diameter. External hyphae numerous developed. Conidiophores arising densely from stromata or singly from external hyphae, pale to pale brown, with thin conidial scars, 10–28 × 2–3 µm in size. Conidia cylindrical to obclavate, smooth, pale olivaceous-brown, with truncate and thin basal end, tip acute, 27–63 × 2–3 µm in diam., 3–9-septate.

Host: *Malus sieboldii* (Regel) Rehder (Japanese name: Zumi).

Disease name: Angular leaf spot (= *Cercospora* disease) [Kakuhan-byo (= *Cercospora*-byo) in Japanese].

Specimen examined: Tsukuba Experimental Botanical Garden, Tsukuba, Ibaraki Pref., September 11, 1998, by TK and CN (TFM: FPH-7634).

Note: The present species has been recorded from Brazil, China, Colombia, Cuba, Ecuador, Egypt, El Salvador, Guatemala, Hong Kong, India, Indonesia, Mauritius, Moldova, Mozambique, Pakistan, Panama, Russia, and the United States (Braun and Melnik 1997; Crous and Braun 2003; Chupp 1954; Tai 1979). However, this is the first record of this species from Japan. Also, *Malus sieboldii* is a new host plant of the present species.

Pseudocercospora polysciatis-pinnatae Braun et Mouchacca, N Z J Bot. 37:319, 1999. Figs. 1, 3, 9, 10

Leaf spots amphigenous, circular to irregular, reddish-purple, later white to pale brown with black border and blackish-purple halo, 5–15 mm in diameter. Stromata amphigenous, brown, small, up to 40 µm in diameter. Conidiophores straight, simple, loosely to densely fasciculate, with unthickened conidial scars, 12–33 × 3.8–5 µm in size. Conidia cylindrical to obclavate, straight or slightly curved, hyaline to pale brown, with thin and truncate basal end, dull head at the apex, 40–83 × 3.8–5 µm in size, 3–10-septate.

Host: *Polyscias balfouriana* (hort. Sander) L.H. Bailey (Japanese name: Fukurin'araria).

Disease name: Brown leaf spot (Kappan-byo in Japanese).

Specimens examined: Fujiwara, Tateyama, Chiba Pref., March 18, 1997, by TK, CN, and Erica Imaizumi (TFM: FPH-7635); May 30, 1998, by TK and CN (TFM: FPH-7636).

Note: Symptoms and morphological characteristics of Japanese materials were identical with those of *Pseudocercospora pinnatae* Braun et Mouchacca originally described from New Caledonia. On *Polyscias*, *Pseudocercospora polysciatis* (Sun) Yen (Yen 1978) has been known. According to Braun et al. (1999), *P. polysciatis* differs from *P. polysciatis-pinnatae* in having loosely fasciculate conidiophores, often branched and decumbent, developing into secondary hyphae with lateral solitary conidiophores and lacking stromata.

The host plant was introduced as an ornamental tree into a botanical garden from a foreign country.

Pseudocercospora puderi Deighton, Mycol. Pap. 140:90, 1976; Castaneda & Braun, Crypt. Bot. 1:52, 1989; Guo & Heish, The genus *Pseudocercospora* in China: 282, 1995; Shin & Braun, Mycotaxon 58:164, 1996. Figs. 4, 11, 12

Synonym: *Cercospora puderi* Davis, Mycologia 30:291, 1938.

Leaf spots subcircular to irregular, dark brown to blackish-brown, occasionally turned to reddish at border, 3–20 mm in size. Stromata amphigenous, mainly epiphyllous, brown, 20–50 µm in diameter. External hyphae observed. Conidiophores densely emerging from the upper part of stromata or singly arising from external hyphae, simple or branched, straight or geniculate, pale brown, 23–40 × 2.5–3.8 µm in size. Conidial scars unthickened. Conidia cylindrical to obclavate, slightly rough, pale olive-brown, with thin and obconically basal end, dull head, 15–50 × 2.5–3.8 µm in size.

Host: *Rosa* sp. (Japanese name: Bara).

Disease name: *Pseudocercospora* leaf spot (Hagare-byo in Japanese).

Specimens examined: Miyazaki, Miyazaki Pref., November 19, 1994, by Kishi Kunihei (TFM: FPH-7637); Fujimi, Tachikawa, Tokyo, September 27, 1978, by TK and Horie Hiromichi (TFM: FPH-5115); Hojo, Tateyama, Chiba Pref., October 20, 1997, by Seiji Uematsu (TFM: FPH-7638); Kawanishi, Anno, Aki, Mie Pref., September 24, 1998, by Shigeru Maruyama (TFM: FPH-7639); Chiba Pref., October 5, 1998, by Akiko Imai (TFM: FPH-7640).

Note: In Japan, *Cercospora rosicola* Pass. has been well known on *Rosa* spp. This fungus was transferred to the genus *Passalora* as *P. rosicola* by Braun (1995b). *Passalora rosicola* is easily distinguishable from the present species in its slightly thickened conidial scars, long conidiophores, and lack of stromata. Symptoms and morphological characteristics of the present collections on *Rosa* sp. were identical with those of *Pseudocercospora puderi*. Also, according to Deighton (l.c.), external hyphae of the present species are not uncommon on specimens from Sierra Leone and other

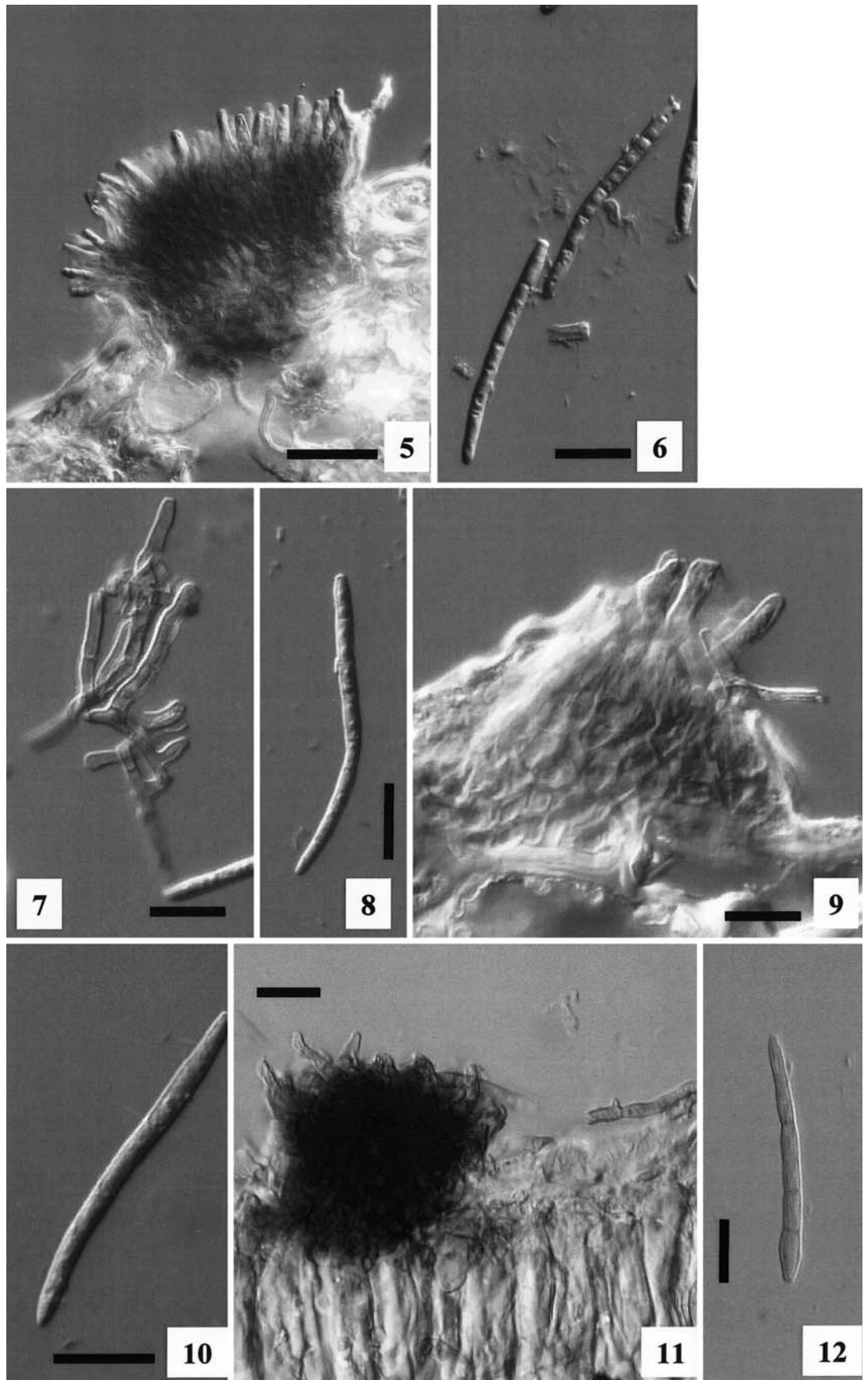


Fig. 5. Stromata of *Pseudocercospora catappae*. Bar 10µm
Fig. 6. Conidia of *Pseudocercospora catappae*. Bar 10µm
Fig. 7. External hyphae of *Pseudocercospora mali*. Bar 10µm
Fig. 8. Conidium of *Pseudocercospora mali*. Bar 10µm

Fig. 9. Stroma of *Pseudocercospora polysciatis-pinnatae*. Bar 10µm
Fig. 10. Conidium of *Pseudocercospora polysciatis-pinnatae*. Bar 10µm
Fig. 11. Stroma of *Pseudocercospora puderi*. Bar 10µm
Fig. 12. Conidium of *Pseudocercospora puderi*. Bar 10µm

tropical territories. In the case of Japanese specimens, external hyphae were commonly observed on each collection. *Pseudocercospora puderi* was newly named by Deighton (l.c.) based on *Cercospora puderi* Davis (nom. inval.; without Latin description). It has been recorded from Cambodia, China, Cuba, Cyprus, Dominica, Haiti, Hong Kong, India, Indonesia, Jamaica, Korea, Malaysia, Mauritius, Mexico, Netherlands, Papua New Guinea, Philippines, Sierra Leone, United States, and Venezuela (Castaneda and Braun 1989; Chupp 1954; Crous and Braun 2003; Deighton 1976; Guo and Hsieh 1995; Shin and Braun 1996). This is the first record of this species from Japan.

References

- Braun U (1995a) A monograph of *Cercospora*, *Ramularia* and allied genera (phytopathogenic hyphomycetes), vol 1. IHW-Verlag, Eching
- Braun U (1995b) Miscellaneous notes on phytopathogenic Hyphomycetes (II). Mycotaxon 55:223–241
- Braun U (1998) A monograph of *Cercospora*, *Ramularia* and allied genera (phytopathogenic hyphomycetes), vol 2. IHW-Verlag, Eching
- Braun U, Melnik VA (1997) Cercosporoid fungi from Russia and adjacent countries. Russian Academy of Sciences, Komarov Botanical Institute, St. Petersburg.
- Braun U, Mouchacca J, McKenzie EHC (1999) Cercosporoid hyphomycetes from New Caledonia and some other South Pacific islands. N Z J Bot 37:297–327
- Castaneda RR, Braun U (1989) *Cercospora* and allied genera of Cuba (I). Crypt Bot 1:42–55
- Chupp C (1954) A monograph of the fungus genus *Cercospora*. By the author. Ithaca.
- Crous PW, Braun U (2003) *Mycosphaerella* and its anamorph: 1. Names published in *Cercospora* and *Passalora*. CBS, Utrecht
- Deighton FC (1976) Studies on *Cercospora* and allied genera VI. *Pseudocercospora* Speg., *Pantospora* Cif. and *Cercoseptoria* Petr. Mycol Pap 140:1–168
- Ellis MB (1976) More dematiaceous hyphomycetes. Commonwealth Mycological Institute (CMI), Kew
- Guo YL, Hsieh WH (1995) The genus *Pseudocercospora* in China. International Academic Publishers, Beijing
- Katsuki S (1965) Cercosporae of Japan. Trans Mycol Soc Jpn extra issue 1
- Kobayashi T, Nishijima T, Nakashima C (1998) Addition and reexamination of Japanese species belonging to the genus *Cercospora* and allied genera I. Collection from Nansei-Islands (1). Mycoscience 39:185–194
- Kobayashi T, Nishijima T, Nakashima C (2002) Addition and reexamination of Japanese species belonging to the genus *Cercospora* and allied genera V. Collections from the Nansei Islands (2). Mycoscience 39:185–194
- Nakashima C, Tanda S, Kobayashi T (2002) Addition and reexamination of Japanese species belonging to the genus *Cercospora* and allied genera IV. Newly recorded species from Japan (1). Mycoscience 43:95–102
- Shin HD, Braun U (1996) Notes on Korean Cercosporae and allied genera (II). Mycotaxon 58:157–166
- Singh AK, Kamal (1986) Fungi of Gorakhpur. XXXIX. *Pseudocercospora*. Kavaka 14:25–29
- Sutton BC (1994a) *Prathigada terminaliae*. Mycopathologia 125:45–46
- Sutton BC (1994b) *Pseudocercospora arunjae*. Mycopathologia 125:47–48
- Sutton BC (1994c) *Pseudocercospora brevis*. Mycopathologia 125:49–50
- Sutton BC (1994d) *Pseudocercospora chebulae*. Mycopathologia 125:53–54
- Sutton BC (1994e) *Pseudocercospora combretacearum* var. *minima*. Mycopathologia 125:57–58
- Sutton BC (1994f) *Pseudocercospora neodeightonii*. Mycopathologia 125:59–60
- Sutton BC (1994g) *Pseudocercospora zambiensis*. Mycopathologia 125:61–62
- Tai FL (1979) Sylloge fungorum sinicorum. Science Press, Academia Sinica, Peking
- Verma RK, Kamal (1987) New species of *Pseudocercospora*, *Phaeoisariopsis*, *Sarcinella* and *Stenella* from Uttar Pradesh, India. Trans Br Mycol Soc 89:67–72
- Yen JM (1978) Les *Cercospora* de Cote D'Ivoire III. Bull Soc Mycol Fr 94:381–383