CHAPTER 4

RESULTS AND DISCUSSION

4.1 Collection

During collection and observation from October 2004 to October 2005 in four sites, 118 samples were collected in Nothern Thailand, covering 40 families of host plant, 76 samples were collected in Chiang Mai Province, 30 samples were collected in Chiang Rai Province, 5 samples were collected in Uttradit Province and 7 samples were collected in Phetchabun Province respectively.

In Chiang Mai Province, 73 species of cercosporoid fungi covering 5 genera were found. Furthermore, 33 species of cercosporoid fungi of 3 genera were found in Chiang Rai Province, 5 species of cercosporoid fungi of 2 genera were found in Uttradit Province, and 7 species of cercosporoid fungi of 2 genera were found in Phetchabun Province. The complete results were listed in the table 1.

4.2 Observation and identification

In this study, totally 118 species of the *Cercospora* and allied genera were found in 90 genera of plants belonging to 40 families (Table 1).

Table 1 New Record of *Cercospora* and allied genera in Thailand.

Family Name	Cercosporoid Genera	Scientific Name
Acanthaceae	*Cercospora andrographidicola*	*Andrographis paniculata*[3]
	Cercospora barlericola	*Barleria cristata*[3]
	Cercospora strobilanthis	*Strobilanthes* sp.[1]
	Cercospora sp.	*Phlogacanthus curviflorus*[2]
	Pseudocercospora rhinacanthi	*Rhinacanthus nasutus*[1]
Asclepiadaceae	*Pseudocercospora* sp.	*Raphistemma pulchellum*[1]
	Cercospora celosiae	*Celosia argentea* [2]
	Cercospora celosiae	*Celosia argentea* var. *cristata*[2]
Apocynaceae	*Pseudocercospora plumeriae*	*Plumeria acuminate*[2]
Araceae	*Cercospora richardiicola*	*Zantedeschia* sp.[4]
Araliaceae	*Pseudocercospora* sp.	*Trevesia palmate*[2]
Asteraceae	*Cercospora gerberae*	*Gerbera jamesonii*[2]
Balsaminaceae	*Cercospora balsaminiana*	*Impatiens balsamina*[4]
	Pseudocercospora balsaminae	*Impatiens balsamina*[1]
Basellaceae	*Cercospora basellae-albae*	*Basella alba*[1]
Bignoniaceae	*Pseudocercospora tecomae-heterophyllae*	*Tecoma stans*[1]
Boraginacare	*Cercospora ehretiicola*	*Ehretia microphylla*[2]
Caprifoliaceae	*Pseudocercospora viburnigena*	*Viburnum prunifolium*[2]
Cruciferae	*Cercospora brassicicola*	*Brassica pekinensis*[1]
	Cercospora brassicicola	*Brassica campestris* var. *chinensis*[1]
	Cercospora brassicicola	*Brassica rapa*[1]
	Cercospora beticola	*Spinacia oleraceal*[1]

Table 1 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Cruciferae	*Cercospora brassicicola*	*Brassica oleracea*[2]
	Cercospora brassicicola	*Brassica juncea*[1]
	Cercospora brassicicola	*Brassica alboglabra*[1]
Chenopodiaceae	*Cercospora beticola*	*Beta vulgaris* var. *alba*[1]
Combretaceae	*Pseudocercospora quisqualidis*	*Quisqualis indica*[2]
Compositae	*Cercospora bidentis*	*Bidens pilosa*[4]
	Cercospora eupatorii	*Eupatorium adenophorum*[1]
	Cercospora virgaureae	*Eupatorium adenophorum*[1]
	Cercospora helianthicola	*Helianthus annuus*[1]
	Cercospora lactucae-sativae	*Lactuca sativa* var. *longifolia*[1]
	Cercospora lactucae-sativae	*Lactuca sativa* var. *crispa*[1]
	Cercospora sp.	*Melampodium paludosum*[1]
	Cercospora mikaniicola	*Mikania cordata*[1]
	Passalora tithoniae	*Tithonia diversifolia*[1]
	Cercospora tagetis-erectae	*Tagetes erecta*[2]
	Cercospora tridacis-procumbentis	*Tridax procumbens*[1]
Convolvulaceae	*Cercospora ipomoeae*	*Ipomoea nil*[2]
	Cercospora ipomoeae	*Ipomoea aquatica*[2]
	Cercospora merremiae	*Merremia vitifolia*[2]
Cucurbitaceae	*Cercospora cucurbitacea*	*Cucurbita moschata*[1]
	Cercospora citrullina	*Coccinia grandis*[1]
	Cercospora citrullina	*Sechium edule*[2]
Dioscoreaceae	*Pseudocercospora carbonacea*	*Dioscorea glabra* var. *glabra*[1]

Table 1 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Dioscoreaceae	*Pseudocercospora contraria*	*Dioscorea alata*[2]
Euphorbiaceae	*Cercospora analyphae*	*Acalypha wilkesiana*[4]
	Cercospora analyphae	*Acalypha indica*[1]
	Cercospora sp.	*Bridelia ovata*[2]
	Cercospora pulcherrimae	*Euphorbia pulcherrima*[2]
	Cercospora jatrophigena	*Jatropha curcas*[2]
	Cercospora manihobae	*Manihot esculenta*[2]
	Cercospora phyllanthi	*Phyllanthus* sp.[3]
	Cercospora ricinella	*Ricinus communis*[1]
	Pseudocercospora melanolepidis	*Mallotus pierrei*[3]
Elaeanaceae	*Cercospora elaeagni*	*Elaeagnus latifolia*[2]
Elaeocarpaceae	*Cercospora* sp.	*Elaeocarpus hygrophilus*[2]
Hydrangeaceae	*Cercospora hydrangeae*	*Hydrangea macrophylla*[1]
Leguminosae	*Cercospora arachidicola*	*Arachis hypogaea*[1]
	Pseudocercospora stizolobii	*Mucuna bracteata*[1]
	Cercospora psophocarpicola	*Psophocarpus letragonlobus*[2]
	Passalora arachidicola	*Arachis hypogaea*[2]
	Cercospora bauhiniae-variegatae	*Bauhinia racemosa*[1]
	Passalora aenea	*Cassia angustifolia*[1]
	Cercospora centrosematis	*Centrosema pubescens*[1]
	Pseudocercospora dalbergiae	*Dalbergia stipulacea*[1]
	Cercospora kikuchii	*Glycine max*[1]
	Cercospora leucaenae	*Leucaena leucocephalade*[2]

Table 1 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Leguminosae	*Cercospora canescens*	*Phaseolus purpureus*[2]
	Phaeoisariopsis griseola	*Phaseolus vulgaris*[2]
	Phaeoramularia sp.	*Phaseolus vulgaris*[1]
	Cercospora canescens	*Vigna unguiculata* var. *sesquipedalis*[2]
	Cercospora canescens	*Vigna radiata*[2]
	Cercospora rufula	*Ficus* sp.[1]
	Cercospora sp.	*Ficus religiosa*[1]
	Cercospora ficicola	*Ficus rumphii*[1]
	Cercospora morina	*Morus alba*[1]
Loganiaceae	*Pseudocercospora buddleiae*	*Buddleja asiatica*[4]
Lythuraceae	*Pseudocercospora cupheae*	*Cuphea hyssopifalia*[1]
Malvaceae	*Passalora* sp.	*Hibiscus* sp.[1]
	Cercospora malayensis	*Hibiscus rosae-sinensis*[1]
Moraceae	*Cercospora broussonetiae*	*Broussonetia papyrifera*[1]
Musaceae	*Pseudocercospora musae*	*Musa acuminata*[1]
Myricaceae	*Cercospora myrti*	*Myrica esculenta*[1]
Nyctaginaceae	*Passalora bugainvilleae*	*Bougainvillea spectabilis*[1]
	Cercospora bugainvilleae	*Bougainvillea spectabilis*[1]
Nymphaeaceae	*Cercosporella* sp.	*Nymphaea stellata*[1]
Oleandraceae	*Cercosporella* sp.	*Nephrolepis biserrata*[1]
Onagraceae	*Cercospora fuchsiae*	*Fuchsia* spp.[1]
Portulacaceae	*Cercospora talini*	*Talinum triangulae*[1]

Table 1 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Rosaceae	*Cercospora fragariae*	*Fragaria* sp.[1]
	Cercospora rosicola	*Rosa* sp.[1]
Rubiaceae	*Pseudocercospora* sp.	*Haldina cordifolia*[3]
	Cercospora coffeicola	*Coffea arabica*[1]
	Pseudocercospora ixorae	*Ixora congesta*[2]
Saururaceae	*Pseudocercospora houttuyniae*	*Houttuynia cordata*[1]
Solanaceae	*Pseudocercospora* sp.	*Solanum trilobatum*[1]
	Cercospora beticola	*Spinacia oleracea*[1]
	Passalora sp.	*Lycopersicon esculentumcer* var. *asiforme*[1]
	Cercospora physalidis	*Capsicum frutescens*[4]
	Cercospora capsici	*Capsicum annuum*[1]
	Cercospora lycopersici	*Lycopersicon esculentum* var. *pyriforme*[1]
	Cercospora capsicigena	*Capsicum annuum* var. *acuminatum*[1]
	Cercospora sp.	*Solanum pseudocapsicum*[1]
	Cercospora sp.	*Solanum wrightii*[2]
	Pseudocercospor solani-melongenicola	*Solanum melongena*[1]
	Cercospora physalidis-angulatae	*Physalis angulata*[1]
	Cercospora nicotianicola	*Nicotiana tabacum*[1]

Table 1 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Umbelliferae	*Cercospora apii*	*Apium graveolens*[1]
Verbenaceae	*Cercospora volkameriae*	*Clerodendrum paniculatum*[1]
	Cercospora volkameriae.	*Clerodendrum indicum*[1]
	Passalora gmelinae-arboreae	*Gmelina arborea*[1]
	Pseudocercospora viticicola	*Vitex quinata*[1]
	Cercospora lantanae-camarae	*Lantana camera*[2]
	Cercospora tectonae	*Tectona grandis*[1]
	Cercospora holmskioldiae	*Holmskioldia sanginea*[1]

1 = Chiang Mai Province, 2 = Chiang Rai Province, 3 = Uttradit Province, 4 = Phetchabun Province.

In this study, 92 species of plants were recorded as new hosts (Table 2). Furthermore, the data led to new species based on the recent publications on *Cercosporoid* classification (Table 3).

Table 2 New record of *Cercospora* and allied genera in Thailand.

Family Name	Cercosporoid Genera	Scientific Name
Acanthaceae	*Cercospora andrographidicola*	*Andrographis paniculata*
	Cercospora barlericola	*Barleria cristata*
	Cercospora strobilanthis	*Strobilanthes* sp.
	Cercospora sp.	*Phlogacanthus curviflorus*
Asclepiadaceae	*Pseudocercospora* sp.	*Raphistemma pulchellum*
Apocynaceae	*Pseudocercospora plumeriae*	*Plumeria acuminate*
Araceae	*Cercospora callae richardiicola*	*Zantedeschia* sp.
Araliaceae	*Pseudocercospora* sp.	*Trevesia palmata*
Balsaminaceae	*Cercospora balsaminiana*	*Impatiens balsamina*
	Pseudocercospora balsaminae	*Impatiens balsamina*
Basellaceae	*Cercospora basellae-albae*	*Basella alba*
Bignoniaceae	*Pseudocercospora tecomae-heterophyllae*	*Tecoma stans*
Boraginacare	*Cercospora ehretiicola*	*Ehretia microphylla*
Caprifoliaceae	*Pseudocercospora viburnigena*	*Viburnum prunifolium*
Cruciferae	*Cercospora brassicicola*	*Brassica pekinensis*
	Cercospora brassicicola	*Brassica campestris* var. *chinensis*
	Cercospora brassicicola	*Brassica rapa*
	Cercospora beticola	*Spinacia oleraceal*
Cruciferae	*Cercospora brassicicola*	*Brassica juncea*
	Cercospora brassicicola	*Brassica oleracea*
	Cercospora brassicicola	*Brassica alboglabra*
Chenopodiaceae	*Cercospora beticola*	*Beta vulgaris* var. *alba*

Table 2 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Combretaceae	*Pseudocercospora quisqualidis*	*Quisqualis indica*
Compositae	*Cercospora bidentis*	*Bidens pilosa*
	Cercospora eupatorii	*Eupatorium adenophorum*
	Cercosporella virgaureae	*Eupatorium adenophorum*
	Pseudocercospora eupatorii	*Eupatorium odoratum*
	Cercospora lactucae-sativae	*Lactuca sativa* var. *crispa*
	Cercospora sp.	*Melampodium paludosum*
	Cercospora mikaniicola	*Mikania cordata*
	Passalora tithoniae.	*Tithonia diversifolia*
	Cercospora tagetis-erectae	*Tagetes erecta*
	Cercospora lactucae-sativae	*Lactuca sativa* var. *longifolia*
Convolvulaceae	*Cercospora ipomoeae*	*Ipomoea nil*
	Cercospora ipomoeae	*Ipomoea aquatica*
	Cercospora merremiae.	*Merremia vitifolia*
Cucurbitaceae	*Cercospora cucurbitacea*	*Cucurbita moschata*
	Cercospora citrullina	*Sechium edule*
Dioscoreaceae	*Pseudocercospora carbonacea*	*Dioscorea glabra* var. *glabra*
	Pseudocercospora contraria	*Dioscorea alata*
Euphorbiaceae	*Cercospora analyphae*	*Acalypha wilkesiana*
	Cercospora sp.	*Bridelia ovata*

Table 2 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Euphorbiaceae	*Cercospora jatrophigena*	*Jatropha curcas*
	Cercospora pulcherrimae	*Euphorbia pulcherrima*
	Cercospora manihobae	*Manihot esculenta*
	Cercospora phyllanthi	*Phyllanthus* sp.
	Pseudocercospora melanolepidis	*Mallotus pierrei*
Elaeanaceae	*Cercospora elaeagni*	*Elaeagnus latifolia*
Elaeocarpaceae	*Cercospora* sp.	*Elaeocarpus hygrophilus*
Leguminosae	*Cercospora arachidicola*	*Arachis hypogaea*
	Passalora arachidicola	*Arachis hypogaea*
	Cercospora bauhiniae-variegatae	*Bauhinia racemosa*
	Cercospora centrosematis	*Centrosema pubescens*
	Pseudocercospora dalbergiae	*Dalbergia stipulacea*
	Passalora aenea	*Cassia angustifolia*
	Cercospora leucaenae	*Leucaena leucocephalade*
	Pseudocercospora stizolobii	*Mucuna bracteata*
	Phaeoisariopsis griseola	*Phaseolus vulgaris*
	Phaeoramularia sp.	*Phaseolus vulgaris*
Loganiaceae	*Pseudocercospora buddleiae*	*Buddleja asiatica*
Lythraceae	*Pseudocercospora cupheae*	*Cuphea hyssopifalia*
Malvaceae	*Passalora* sp.	*Hibiscus* sp.
Moraceae	*Cercospora broussonetiae*	*Broussonetia papyrifera*
	Cercospora rufula	*Ficus* sp.
	Cercospora sp.	*Ficus religiosa*

Table 2 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Moraceae	*Cercospora ficicola*	*Ficus rumphii*
Musaceae	*Pseudocercospora musae*	*Musa acuminata*
Myricaceae	*Cercospora myrti*	*Myrica esculenta*
Nyctaginaceae	*Passalora bugainvilleae*	*Bougainvillea spectabilis*
	Cercospora bugainvilleae	*Bougainvillea spectabilis*
Nymphaeaceae	*Cercosporella* sp.	*Nymphaea stellata*
Oleandraceae	*Pseudocercospora phyllitidis*	*Nephrolepis biserrata*
Onagraceae	*Cercospora fuchsiae*	*Fuchsia* spp.
Portulacaceae	*Cercospora talini*	*Talinum triangulae*
Rosaceae	*Cercospora fragariae*	*Fragaria* sp.
Rubiaceae	*Pseudocercospora* sp.	*Haldina cordifolia*
	Pseudocercospora ixorae	*Ixora congesta*
Saururaceae	*Pseudocercospora houttuyniae*	*Houttuynia cordata*
Solanaceae	*Pseudocercospora* sp.	*Solanum trilobatum*
	Passalora sp.	*Lycopersicon esculentumcer* var. *asiforme*
	Cercospora capsici	*Capsicum annuum*
	Cercospora sp.	*Solanum wrightii*
	Cercospora physalidis-angulatae	*Physalis angulata*
	Pseudocercospora solani-melongenicola	*Solanum melongena*
Verbenaceae	*Cercospora volkameriae*	*Clerodendrum paniculatum*
	Cercospora volkameriae	*Clerodendrum indicum*

Table 2 (continued)

Family Name	Cercosporoid Genera	Scientific Name
Verbenaceae	*Passalora gmelinae-arboreae*	*Gmelina arborea*
	Cercospora tectonae	*Tectona grandis*
	Cercospora holmskioldiae	*Holmskioldia sanginea*
	Pseudocercospora viticicola	*Vitex quinata*

Table 3 New record of *Cercospora* and allied genera in the world.

Family Name	Cercosporoid Genera	Scientific Name
Acanthaceae	*Cercospora* sp.	*Phlogacanthus curviflorus*
Asclepiadaceae	*Pseudocercospora* sp.	*Raphistemma pulchellum*
Araliaceae	*Pseudocercospora* sp.	*Trevesia palmate*
Compositae	*Cercospora* sp.	*Melampodium paludosum*
Euphorbiaceae	*Cercospora* sp.	*Bridelia ovata*
Elaeocarpaceae	*Cercospora* sp.	*Elaeocarpus hygrophilus*
Leguminosae	*Phaeoramularia* sp.	*Phaseolus vulgaris*
Moraceae	*Cercospora* sp.	*Ficus religiosa*
	Pseudocercospora fici	*Ficus rumphii*
Nymphaeaceae	*Cercosporella* sp.	*Nymphaea stellata*
Oleandraceae	*Pseudocercospora phyllitidis*	*Nephrolepis biserrata*
Rubiaceae	*Pseudocercospora* sp.	*Haldina cordifolia*
Solanaceae	*Pseudocercospora* sp.	*Solanum trilobatum*
	Cercospora sp.	*Solanum pseudocapsicum*
	Passalora sp.	*Lycopersicon esculentumcer* var. *asiforme*

Cercospora and allied genera are described based on the family name of the host plants.

Family Acanthaceae

Cercospora barlericola Payak and Thirum. (*barlericola*), Indian Phytopathol. 2: 191. 1949.

= *Cercospora barleriae-cristatae* Govindu and Thirum., Sydowia 10: 273. (1956) 1957.

Leaf spots amphigenous, circular to subcircular, 3.00-4.00 mm in diameter, distinct on the upper surface, greyish-brown to dark brown. Stromata distinct, usually epiphyllous, then erumpent, olive-brown, 27.06-41.82 µm in diameter. Conidiophores emerging from the upper part of stromata, dark brown, densely fasciculate, simple, straight or slightly curved, 1-6-septate, (17.22-)22.14-61.50(-68.88)×(2.46-)3.69-4.92(-6.88) µm, with indistinct and unthickened conidial scars. Conidia obclavate, straight, smooth, hyaline, with thickened and truncate hilum, (29.52-)50.43-93.48 (-123.00)×(2.46-)4.42-4.92(-5.41) µm, 5-13-septate (Figure 17 and 18).

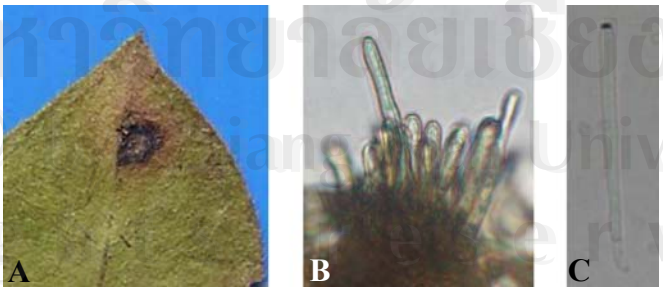

Figure 17 Photograph of *Cercospora barlericola* on *Barleria cristata*: A. Symptom, B. Conidiophores and C. Conidia.

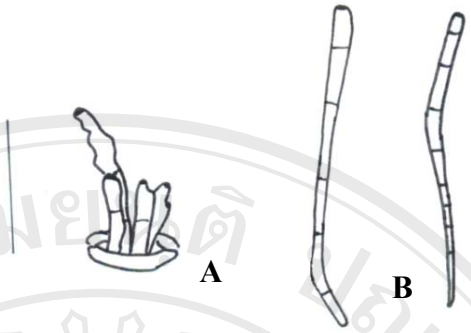

Figure 18 Drawing of *Cercospora barlericola* on *Barleria cristata*:
A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Sak Yai National Park, A. Nam Pad, Uttradit Province. Leaves of *Barleria cristata*, November 25, 2004, C. Nakashima (CN) and J. Meeboon (JM), (CMU MH 014), CMU MH 001.

Known distribution: India and Jamaica (Crous and Braun, 2003).

Notes: This is the first record from Thailand, type species was in Banares Hindu University, India; *Barleria cristata*; M. M. Payak; December 9, 1949. Several Indian collections from IMI on *Barleria* spp. have been examined and proved to belong to a single variable *Cercospora s.str.* species indistinguishable from *C. apii s. lat.*

***Cercospora* sp.**

Leaf spots distinct, circular-subcircular, dark brown, blackish-brown border, 3.00-5.00 mm in diameter, often confluent. Fruit bodies amphigenous. Stromata brown, amphigenous, mostly hypophyllous, 12.30-24.60 µm in diameter. Conidiophores arising from stromata, hyaline to brown, straight or sinuous, 1-9-septate, fasciculate, 14.76-118.08×3.69-4.92 µm, with thickened conidial scars. Conidia pale olivaccous, obclavate, 27.06-108.24×1.23-4.92 µm, 3-12-septate, hilum conspicuously thickened and darkened (Figure 19 and 20).

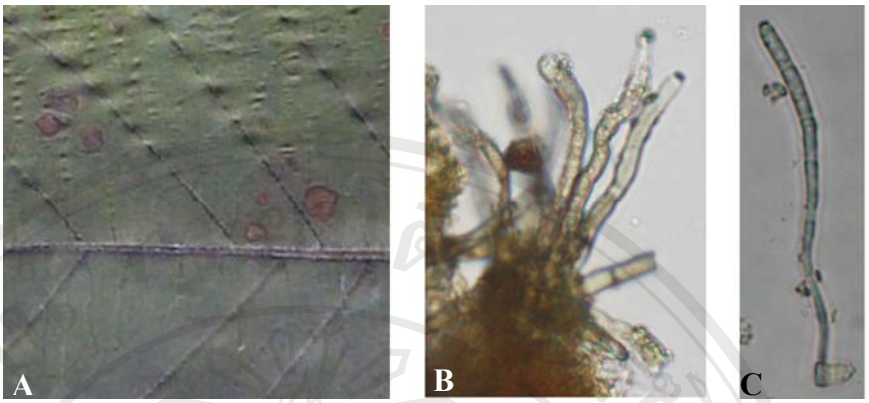

Figure 19 Photograph of *Cercospora* sp. on *Phlogacanthus curviflorus*:

A. Symptom, B. Conidiophores and C. Conidia.

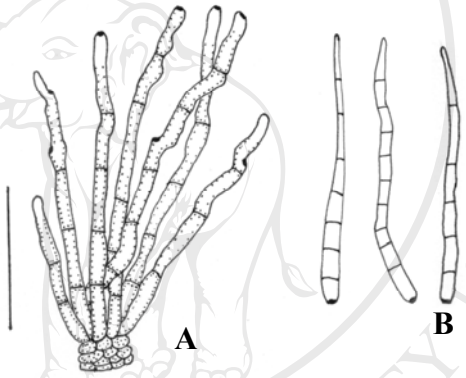

Figure 20 Drawing of *Cercospora* sp. on *Phlogacanthus curviflorus*:

A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Phlogacanthus curviflorus*, November 25, 2004, JM CMU MH 114.

Known distribution: Known only in Thailand.

Notes: This is the first record of *Phlogacanthus curviflorus* cause by *Cercospora* sp. from Thailand.

Pseudocercospora rhinacanthi (Höhn.) Deighton. Pap.140: 152. 1976.

≡ *Cercospora rhinacanthi* Höhn. (*rhynacanthi*). Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Wien. 121: 414. 1912. [T: Kabàt and Bubàk, Fungi imp. exs. 847, e.g., BPI440801, IMI 89002 (slide); HBG; W].

≡ *Cercosporina rhinacanthi* (Höhn.) Sacc., Syll. Fung. 25: 917. 1931.

Leaf spots visible on both surfaces, distinct, circular-subcircular, 1.00-4.00 mm in diameter, dark brown, centre whitish grey surrounded by raised yellowish brown border line, on the lower surface brown to yellowish brown margin. Stromata small, globular to subglobular. Conidiophores in a loose to dense fasicle, emerging through stomata and the cuticle, dark brown, uniform in colour, straight to mildly curved, slightly geniculate or geniculate-sinuous, 1-7-septate, (19.51-)19.51-39.02 (-43.90)×(2.43-)4.87- 4.87(-4.87) µm, conidial scars inconspicuous. Conidia solitary, filiform or narrowly obclavate, straight, hyaline, 3-7-septate, non-constricted at the septa, subacute at the apex, obconically truncate at the base, (31.70-)39.02-58.53 (-65.85)×(3.65-)4.87-4.87(-4.87) µm, hilum unthickened and not darkened (Figure 21 and 22).

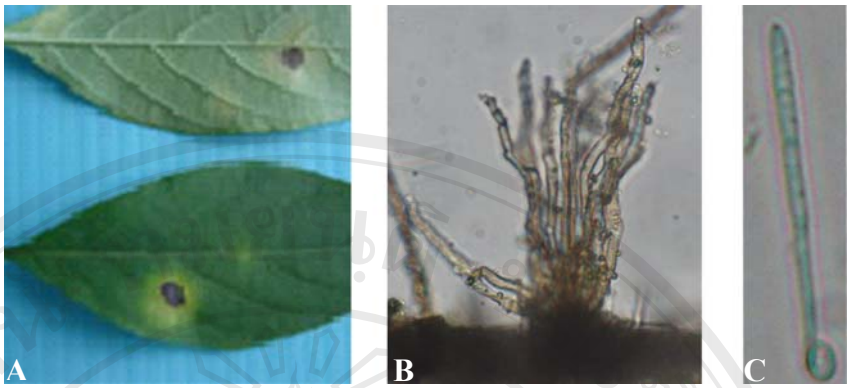

Figure 21 Photograph of *Pseudocercospora rhinacanthi* on *Rhinacanthus nasutus*: A. Symptom, B. Conidiophores and C. Conidia.

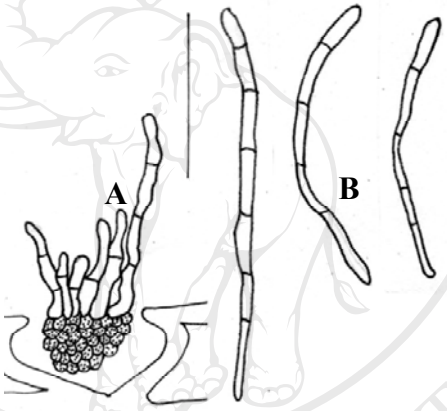

Figure 22 Drawing of *Pseudocercospora rhinacanthi* on *Rhinacanthus nasutus*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Rhinacanthus nasutus*, November 25, 2004, JM CMU MH 002.

Known distribution: China, Indonesia, Java, Philippines and Thailand (Crous and Braun, 2003).

Notes: Chandrasrikul (1962) reported *Cercospora rhinacanthi* in *Rhinacanthus nasutus* in a preliminary host list of plant diseases in Thailand.

Cercospora andrographidicola S. Q. Chen and P. K. Chi (andrographicala), J. S. China Agric. Univ. 11: 61. 1990; also in Chi, Fungal diseases of cultivated medicinal plants in Guangdong Province: 94. 1994. [T: Herbarium, S. China Agric. Univ., Guangzhou].

Leaf spots amphigenous, deep blackish-brown, subcircular to irregular, 2.00-5.00 mm in diameter, distinct on the upper surface, brown to dark brown with out definite margins on the lower surface. Stromata lacking to small, rudimentary to poorly developed. Conidiophores arranged in a loose fascicle, arising from stromata, straight or flexuous, simple or branched, brown to dark brown or paler towards the apex, 1-9-septate, (12.30-)22.14-73.80(-83.64)×3.69-4.92 µm, with thickened conidial scars. Conidia obclavate to acicular, straight, smooth, hyaline, with thickened and truncate hilum, (19.68-)36.90-93.48(-172.20)×2.46-4.92 µm, 3-15-septate (Figure 23 and 24).

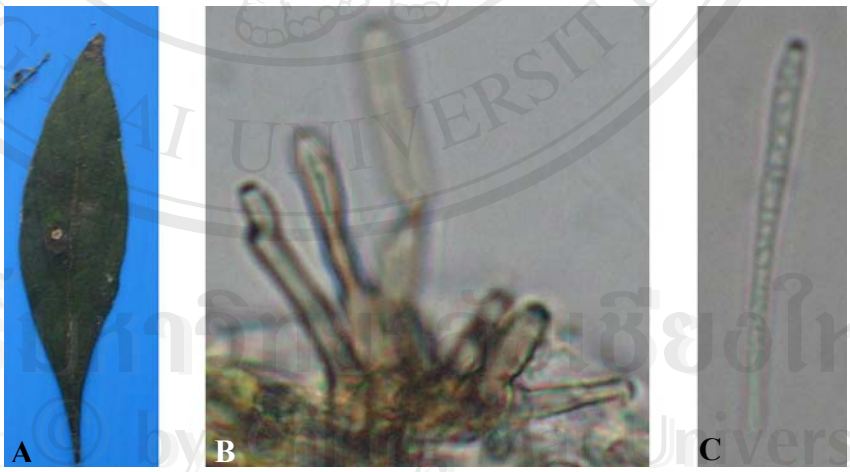

Figure 23 Photograph of *Cercospora andrographidicola* on *Andrographis paniculata*: A. Symptom, B. Conidiophores and C. Conidia.

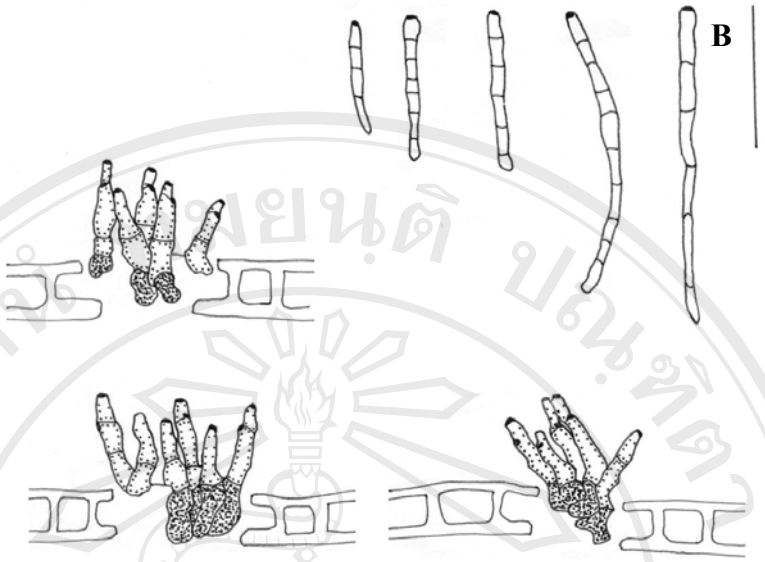

Figure 24 Drawing of *Cercospora andrographidicola* on *Andrographis paniculata*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Sak Yai National Park, Uttradit Province. Leaves of *Andrographis paniculata*, November 25, 2004, JM CMU MH 003.

Known distribution: China (Crous and Braun, 2003).

Notes: *Cercospora andrographidicola* has been previously recorded in China. This is the first record of this fungus in Thailand.

Cercospora strobilanthis Chidd. (strobilanthidis), Mycopathol. Mycol. Appl. 17: 71. 1962. [T: IMI 83190].

Leaf spots amphigenous, subcircular, grey in the centre, usually surrounded by a rather undulate greyish brown, 1.50-3.00 mm in diameter. Stromata lacking to small, rudimentary to poorly developed, 10.00-15.00 μm in diameter. Conidiophores arranged in a loose fascicle, arising from stromata, straight or flexuous, simple or branched, brown to dark brown or paler towards the apex, 1-9-septate, 12.30-

83.64×3.69-4.92 µm, with thickened conidial scars. Conidia obclavate, straight, smooth, hyaline, with thickened and truncate hilum, 19.68-172.20×2.46-4.92 µm, 3-15-septate (Figure 25 and 26).

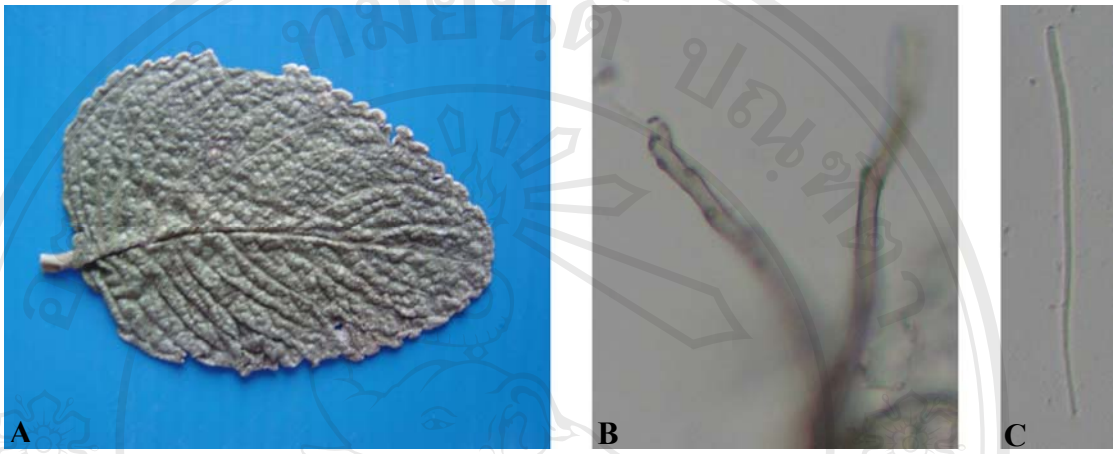

Figure 25 Photograph of *Cercospora strobilanthis* on *Strobilanthes* sp.: A. Symptom, B. Conidiophores and C. Conidia.

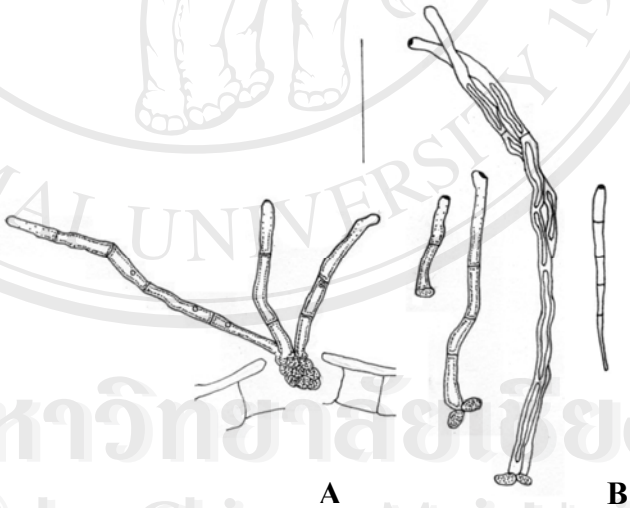

Figure 26 Drawing of *Cercospora strobilanthis* on *Strobilanthes* sp.: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Strobilanthes* sp., November 25, 2004, JM CMU MH 004.

Known distribution: India (Crous and Braun, 2003).

Notes: *Strobilanthes* sp. has been previously recorded in India. This is the first record of this fungus in Thailand. A true *Cercospora s.str* is distinct from *C. apii s. lat.*

Family Amaranthaceae

Cercospora celosiae Syd., Ann. Mycol. 27: 430. 1923.

Leaf spots circular to subcircular with dark brown margin, with a brown central area up to 3.00 mm in diameter (somewhat grey-brown in the centre of larger spots). Fruit bodies mostly hypophyllous. Stromata medium, brown, fascicles 3-15 stalks. Conidiophores pale to medium brown, paler and more narrow toward the tip, 1-3 septate, 0-3 geniculate, (26.82-)31.70-56.09(-70.73)×(2.43-)3.65-4.87 µm. Conidia hyaline, acicular, hyaline, with thickened and truncate hilum, tip acute, 2-5 septate, (12.19-)26.82-60.97(-70.73)×2.43-4.87 µm (Figure 27 and 28).

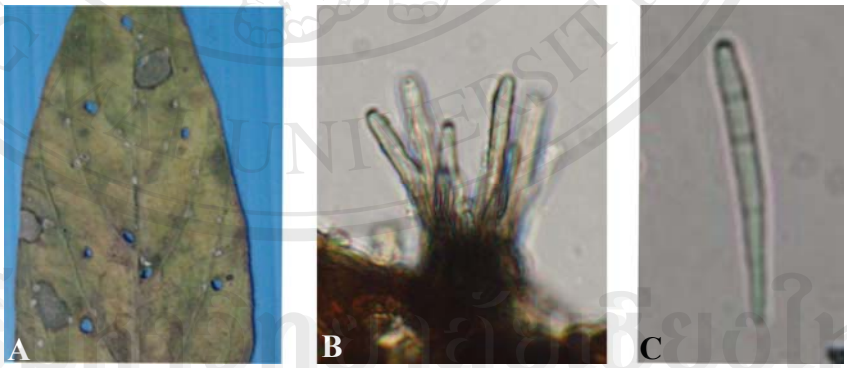

Figure 27 Photograph of *Cercospora celosiae* on *Celosia argentea*: A. Symptom, B. Conidiophores and C. Conidia.

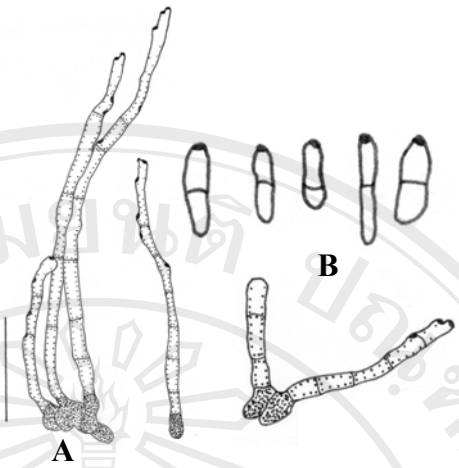

Figure 28 Drawing of *Cercospora celosiae* on *Celosia argentea*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Celosia argentea*, November 25, 2004, JM, CMU MH 005.

Known distribution: Bangladesh, Brazil, Brunei, Cambodia, China, Cuba, India, Indonesia, Japan, Malaysia, Myanmar, Nigeria, Pakistan, Papua New Guinea, Sabah, Sri Lanka, Sudan, Taiwan, Thailand, Uganda, U.S.A (AL, FL, OK) and Venezuela (Crous and Braun, 2003).

Notes: *Celosia argentea* has been previously recorded in Thailand by Petcharat and Kanjanamaneesathian in 1989.

Cercospora celosiae Syd., Ann. Mycol. 27: 430. 1923.

Leaf spots circular to subcircular, 2.00-5.00 mm in diameter, tan to pale brown, slightly darker margin, frequently causing a pronounced shot-hole effect; Fruit bodies mostly hypophyllous, stromata lacking or small, brown, 19.51-46.34 μm in diameter. Conidiophores pale to medium brown, paler and more narrow toward the tip, 4-8 septate, 2-6 geniculate, not branched excepting rarely a bifurcate tip, medium

sized spore scar, (75.60-)109.75-158.53(-195.12)×4.87 µm. Conidia hyaline, acicular to obclavate, with thickened hilum, straight to curved, base truncate, tip acute, 4-10 septate, (34.14-)48.78-131.70(-180.48)×(2.43-)2.43-2.43(-4.87) µm (Figure 29 and 30).

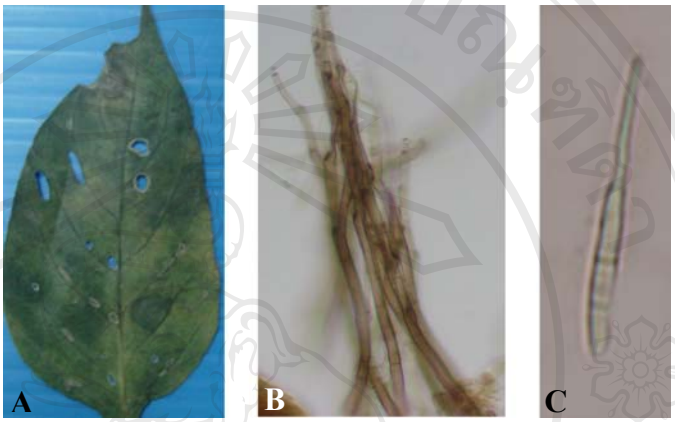

Figure 29 Photograph of *Cercospora celosiae* on *Celosia argentea* var. *cristata*: A. Symptom, B. Conidiophores and C. Conidia.

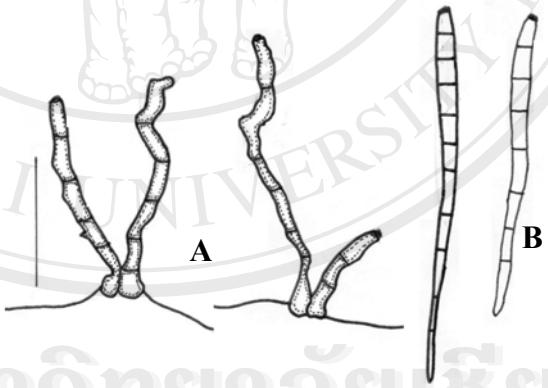

Figure 30 Drawing of *Cercospora celosiae* on *Celosia argentea* var. *cristata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Celosia argentea* var. *cristata*, November 25, 2004, JM CMU MH 006.

Known distribution: Bangladesh, Brazil, Brunei, Cambodia, China, Cuba, India, Indonesia, Japan, Malaysia, Myanmar, Nigeria, Pakistan, Papua New Guinea, Sabah,

Sri Lanka, Sudan, Taiwan, Thailand, Uganda, U.S.A (AL, FL, OK) and Venezuela (Crous and Braun, 2003).

Notes: *Celosia argentea* var. *cristata*. has been previously recorded by Niranam in 1960 refer to Sontirat (1980). A true *Cercospora s.str*. is distinct from *C. apii s. lat.* The above description is based on Chupp (1954).

Family Asclepiadaceae

***Pseudocercospora* sp.**

Leaf spots amphigenous, distinct, subcircular to irregular, 2-8 mm in diameter, sometimes confluent, brown or grey-brown, later with a greyish or whitish centre, with reddish brown margin on the upper surface, paler on the lower surface. Fruit bodies amphigenous. Stromata medium, rudimentary to slightly developed, irregular, dark brown, composed of a few swollen, brown hyphal cells. Conidiophores mostly numerous in a dense fascicle emerging through a stoma and the cuticle, paler brown or paler towards the apex, straight to slightly curved, 1-5 times mildly geniculate, not branched, 1-3-septate, (19.51-)19.51-39.02(-43.90)×(2.43-)4.87-4.87 μm. Conidia pale olivaceous, smooth, usually obclavate-cylindric, substraight or more usually slightly curved, subobtuse or obtuse at the apex, 3-7-septate, (31.70-)39.02-58.53 (-65.85)×(3.65-)4.87-4.87 μm (Figure 31 and 32).

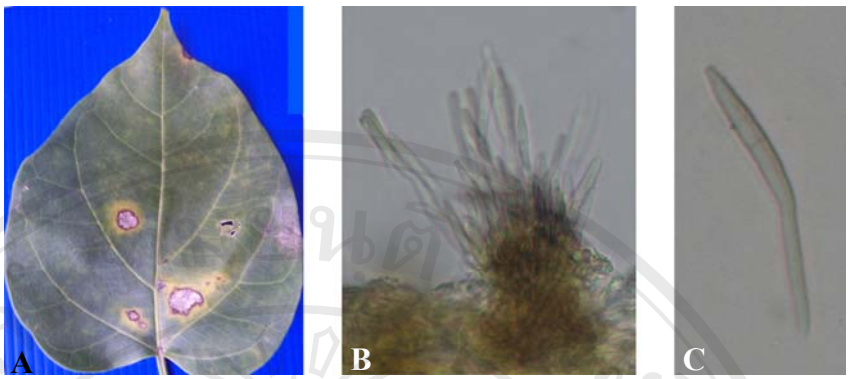

Figure 31 Photograph of *Pseudocercospora* sp. on *Raphistemma pulchellum*: A. Symptom, B. Conidiophores and C. Conidia.

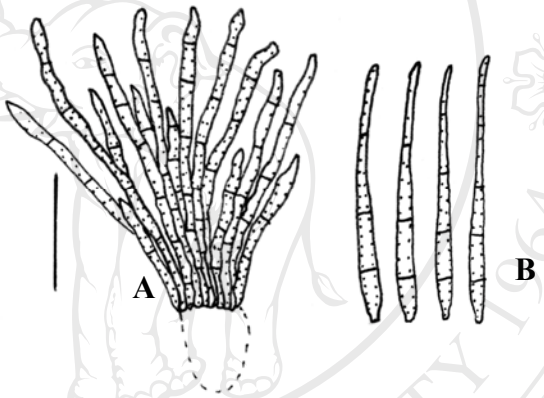

Figure 32 Drawing of *Pseudocercospora* sp.on *Raphistemma pulchellum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Raphistemma pulchellum*, November 25, 2004, JM CMU MH 007.

Known distribution: Known only Thailand.

Notes: This is the first record of this fungus in Thailand.

Family Apocynaceae

Cercospora plumeriae Chupp, A monograph of the fungus genus *Cercospora*: 49. 1954. [T: CUP].

≡ *Pseudocercospora plumeriae* (Chupp) Tak. Kobay., Nishijima and C. Nakash., Mycoscience 39: 188. 1998.

Leaf spots amphigenous, scattered to confluent, distinct, subcircular to angular, 2.00-10.00 mm in diameter, grey to greyish white with dark brown to purplish brown margin on the upper surface, pale brown to olivaceous brown on the lower surface. Fruit bodies amphigenous. Stromata lacking to medium, rudimentary to slightly developed, irregular, dark brown, 36.58-121.95 μm in diameter, composed of a few swollen, brown hyphal cells. Conidiophores 5-15 in a divergent fascicle, emerging through stomatal openings and the cuticle, paler brown or paler towards the apex, straight to slightly curved, 1-5 times mildly geniculate, not branched, 2-8-septate, (48.78-)78.04-109.75(-121.95)×(4.87-)4.87-4.87(-7.31) μm, conidial scars conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to filiform, substraight to moderately curved or even undulate, hyaline, 4-11-septate, non-constriced at the septa, acute to obtuse at the apex, truncate at the base, (51.21-)85.36-97.56(-236.58)×4.87-7.31 μm, hilum conspicuously thickened and darkened (Figure 33 and 34).

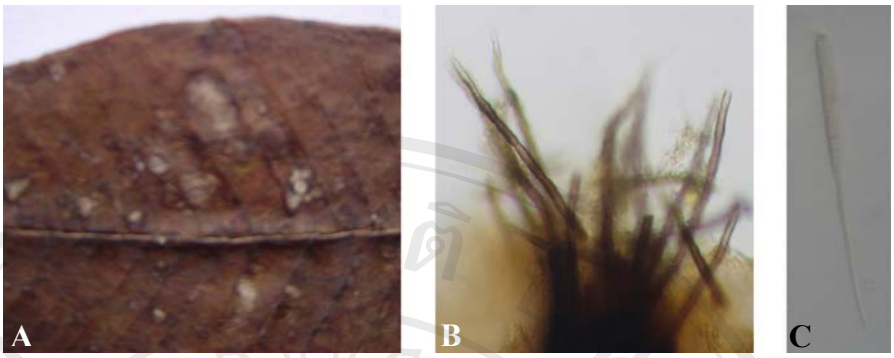

Figure 33 Photograph of *Cercospora plumeriae* on *Plumeria acuminate*:

A. Symptom, B. Conidiophores and C. Conidia.

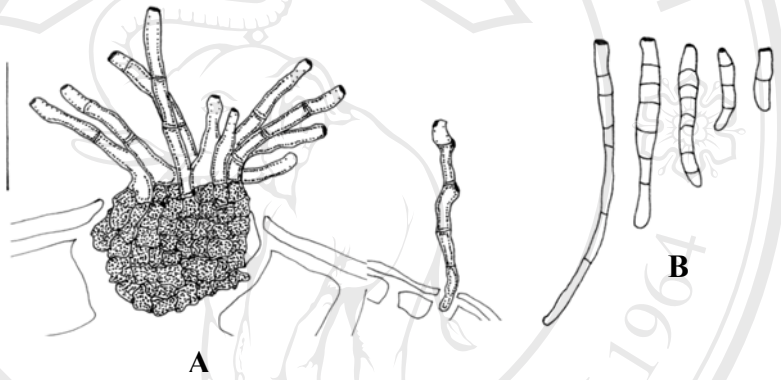

Figure 34 Drawing of *Cercospora plumeriae* on *Plumeria acuminate*:

A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Plumeria acuminate*, November 25, 2004, JM CMU MH 008.

Known distribution: Bangladesh, India, Indonesia, Japan, Malaysia, Myanmar, Philippines, Trinidad, Tobago and U.S.A (FL) (Crous and Braun, 2003).

Notes: Hitherto known species in Thailand. This is the first record of this fungus in Thailand.

Family Araceae

Cercospora richardiicola G. F. Atk. 'richardiaecola', J. Elisha Mitchell Sci. Soc. 8: 51 (1892). (*Cercospora apii* sensu lato, Crous and Braun 2003).

Leaf spots scattered, 1.00-7.00 mm in diameter, later confluent and zonate, distinct, circular to subcircular, center tan to brown with purple brown margin. Fruit bodies amphigenous. Stromata pale brown, 9.84-44.28 µm in diameter. Conidiophores pale brown at the base and paler to apex, loose to dense fascicule, with distinct and small conidial scars at the tip, straight, (17.22-)-24.60-56.58 (-76.26)×2.46-6.15 µm. Conidia solitary, acicular, straight to mildly curved, hyaline, smooth, thickened and truncate basal end, (27.06-)41.82-88.56(-172.20)×(2.46-)3.69-4.92 µm, 3-12 septate, obtuse at the apex (Figure 35 and 36).

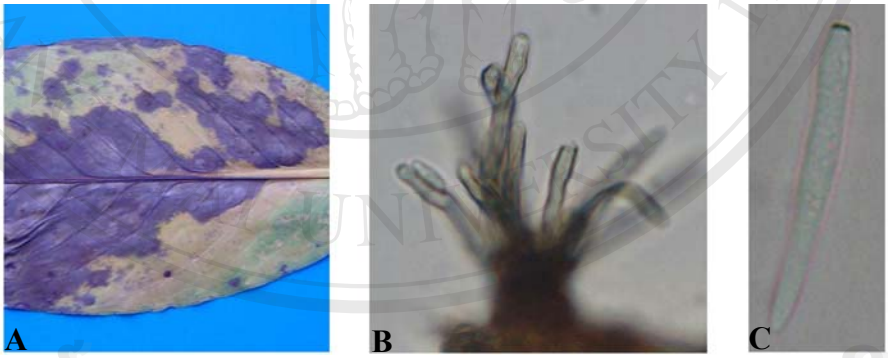

Figure 35 Photograph of *Cercospora richardiicola* on *Zantedeschia* sp.:
A. Symptom, B. Conidiophores and C. Conidia.

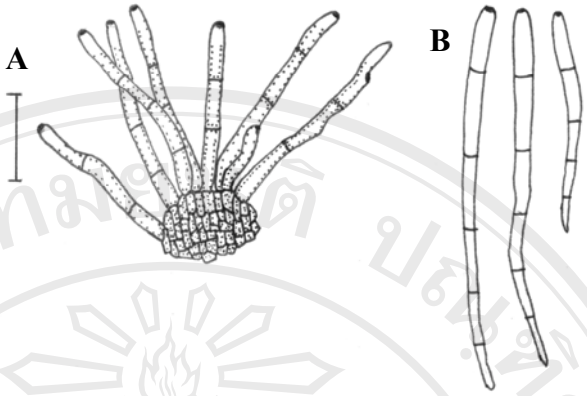

Figure 36 Drawing of *Cercospora richardiicola* on *Zantedeschia* sp.:
A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Zantedeschia* sp., November 24, 2004, CN and JM, CMU MH 009.

Known distribution: Ethiopia, Guatemala, Hong Kong, Indonesia, Japan, Malaysia, Puerto Rico, Sierra Leone, South Africa, USA, Virgin Islands, Zimbabwe (Crous and Braun, 2003).

Notes: Hitherto known species in Thailand. This is the first record of this fungus in Thailand.

Family Araliaceae

***Pseudocercospora* sp.**

Leaf spots amphigenous, distinct on upper surface as greyish brown, circular to subcircular, 1.50-5.00 mm in diameter. Stomata dark brown, irregular, distinct, usually amphigenous, subepidermal, erumpent, brown to olivaceous brown, 12.30-39.36 µm in diameter. Conidiophores emerging from the upper part of stromata,

greenish brown, densely fasciculate, simple, straight, sinuous or slightly curved, 2-9-septate, (21.95-)41.46-126.82(139.02)×(3.65-)4.87-4.87 µm, conidial scars inconspicuous. Conidia solitary, obclavate-cylindric to obclavate, straight to mildly curved, pale olivaceous brown, 5-10-septate, non-constricted, occationally mildly constricted at the septa, subobtuse to broadly rounded at the apex, obconically truncate at the base, (47.56-)51.21-90.24(-117.07)×2.43-4.87 µm, hilum unthickened and not darkened (Figure 37 and 38).

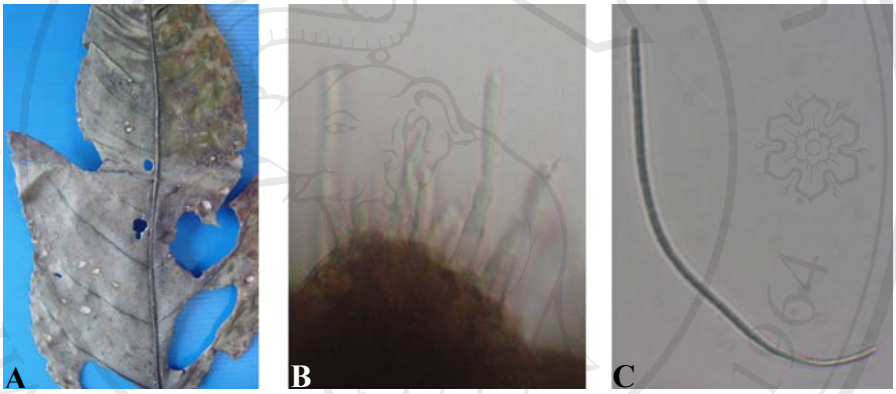

Figure 37 Photograph of *Pseudocercospora* sp. on *Trevesia palmata*: A. Symptom, B. Conidiophores and C. Conidia.

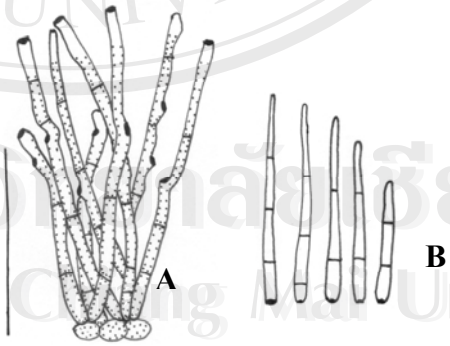

Figure 38 Drawing of *Pseudocercospora* sp. on *Trevesia palmata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Trevesia palmata*, December 6, 2005, JM CMU MH 010.

Known distribution: Known only Thailand.

Notes: Hitherto known species in Thailand. This is the first record of this fungus in Thailand.

Family Balsaminaceae

Cercospora balsaminiana J. M. Yen and Lim, Cah. Pacifique 14: 91. 1970.

Leaf spots circular, 1.50-5.50 mm in diameter, white center and dark purple to brown margin. Fruit bodies amphigenous. Stromata lacking to medium, rudimentary to slightly developed, irregular, dark brown. Conidiophores 5-15 in a divergent fascicle, emerging through stomatal openings and the cuticle, paler brown or paler towards the apex, straight to slightly curved, 1-5 times mildly geniculate, not branched, 2-5-septate, (13.00-)18.20-44.20(-65.00)×(2.60-)5.20-7.80 μm. Conidial scars large, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to obclavate, substraight to moderately curved or even undulate, hyaline, 4-16-septate, non-constriced at the septa, acute to obtuse at the apex, truncate at the base, (52.00-)65.00-130.00(-234.00)×(1.30-)2.60-5.20(-7.80) μm, hilum conspicuously thickened, darkened (Figure 39 and 40).

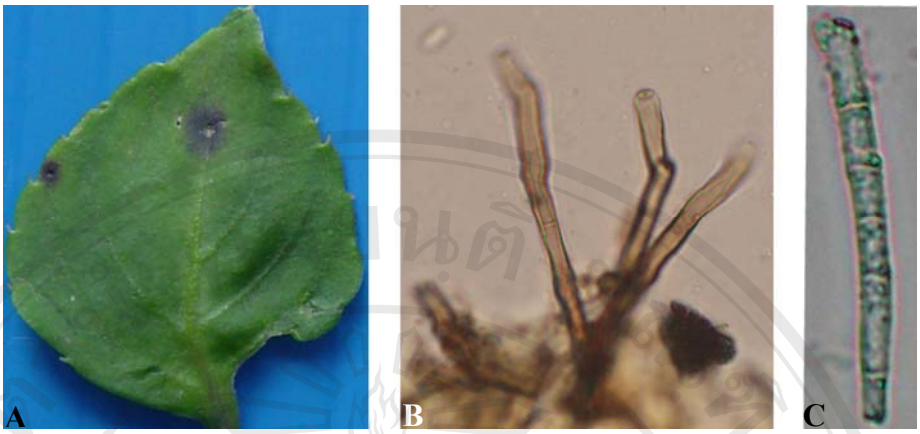

Figure 39 Photograph of *Cercospora balsaminiana* on *Impatiens balsamina*: A. Symptom, B. Conidiophores and C. Conidia.

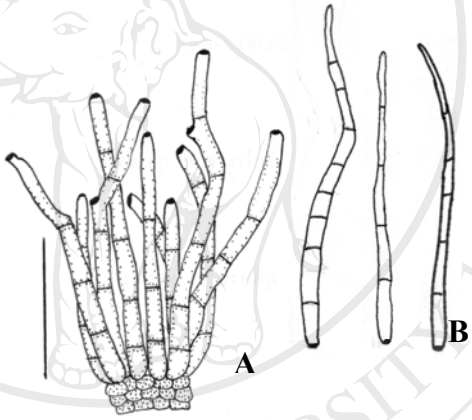

Figure 40 Drawing of *Cercospora balsaminiana* on *Impatiens balsamina*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Impatiens balsamina*, November 24, 2004, JM CMU MH 011.

Known distribution: Argentina, Singapore and Thailand.

Notes: This name was probably based on an immature sample of *Cercospora apii s.lat*. (incl. *C. fukushiana*), but the type has not been examined. In Thailand Sontirat *et al.* in 1980 recorded *C. fukushiana* in *Impatiens balsamina*.

Pseudocercospora balsaminae (Syd.) Deighton Mycol. Papers 140: 139 (1976)

= *Cercoseptoria balsaminae* Syd., Annls Mycol. 33: 69 (1935)

Leaf spots amphigenous, orbicular to irregular, distinct, 2.00-6.00 mm in diameter, pale brown to dingy grey in the center, with a dark purple border. Stromata medium, subglobular, brown to dark brown, 7.00-19.00 µm in diameter, composed of a few brown hyphal cells. Conidiophores 6-10 in a loose fascicle, emerging through stomatal openings or erupent through the cuticle, olivaceous brown to brown, irregular in width, short, not geniculate, not branched, short, slightly narrower at the apical portion, euseptate, 1-3-septate, (12.30-)17.22-34.44(-63.96)×(4.92-)4.92-4.92 (-7.38) µm, conidial scars inconspicuous. Conidia solitary, obclavate, subhyaline, 3-4-septate, euseptate, constricted at the septa, subobtuse to subacute at the apex, obconically truncate to truncate at the base, (9.84-)22.14-29.52(-54.12)×(4.92-)4.92-7.38(-9.84) µm (Figure 41 and 42).

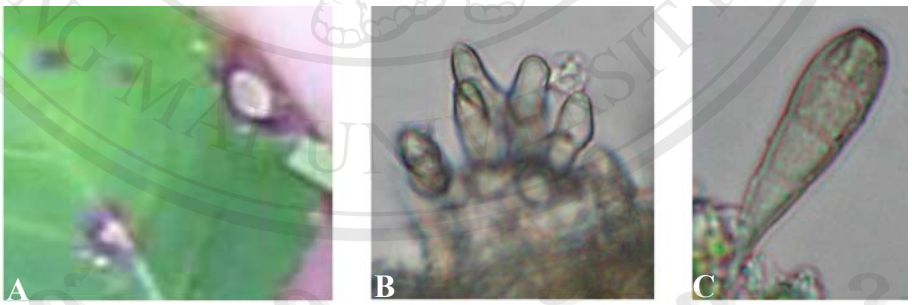

Figure 41 Photograph of *Pseudocercospora balsaminae* on *Impatiens balsamina*: A. Symptom, B. Conidiophores and C. Conidia.

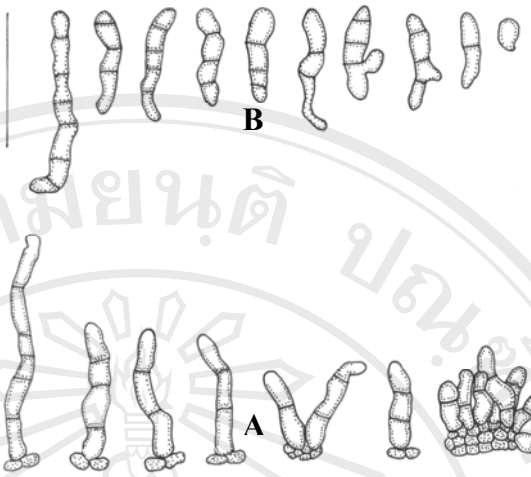

Figure 42 Drawing of *Pseudocercospora balsaminae* on *Impatiens balsamina*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Impatiens balsamina*, October 3, 2004, JM, CMU MH 012.

Known distribution: Worldwide where the host is growing (Crous and Braun, 2003).

Notes: This is the first record of this fungus in Thailand. In Korea was recorded by Kim and Shin (1999d). They provided the detailed description and illustration for this fungus based on Korean collection.

Guo and Liu (1992) described the following characters of the present fungus: Secondary mycelium superficial; conidiophores arranged in loose to dense fascicle or arising singly from the external mycelial hyphae, 0-2-septate, 6.50-4.00×2.50-4.00 µm, conidia narrowly obclavate, 3-11-septate, 25.00-90.00×1.50-3.00 µm. Therefore, the Korean collections match well with Chinese description (Guo and Liu, 1992; Guo and Hsied, 1995), though the secondary mycelium was not observed in all Korean specimens.

Several species of *Cercospora* and allied genera have been known on I. *balsamina,* namely *Cercospora fukushiana* (Marsuura) W. Yamam., *C. balsamiana* J. M. Yen and Lim, *Cercoseptoria balsaminicola* (J. M. Yen and Lim) J. M. Yen, *Passalora campi-silii* (Speg.) U. Braun, and *Pseudocercospora nojimai* (Togashi and Katsuki) Y. L. Guo and X. J. Liu. C. *balsaminicola* is confusable with this species, but differs in several respects: Stromata large, well-developed, 20.00-60.00 µm in diameter, conidiophores arranged in dense fascicles, oncegeniculate, much shorter and somewhat narrower, 10.00-27.60×2.50-3.60 µm, conidia filiform, somewhat longer and in diameter, 45.60-132.00×2.00-2.50 µm, *C. balsamiana* is clearly distinguishable from it by having epiphyllous fructification, aseptate conidiophores, very long (66.00-307.00 µm in length) and 5-17-septate conidia, *P. campi-silii* on *I. noli-tamgere* was described with conidia which are broadly obclavate-subcylindric, 4.00-7.00 µm in diameter, and 1-6-septate. Deighton (1976) believed that this species is the same as *C. nojimai* Tagashi and *Pseudocercospora nojimai* Katsuki, but according to the original description, the latter species has epiphyllous fructification, 0-1-septate conidiophores, and elongate-obclavate conidia, *P. nojimai,* described and illustrated from Korea by Kim and Shin (1999a) is confusable with the present fungus, but distinguished from the latter species as follows: secondary mycelium developed, conidiophores and conidia somewhat in diameter.

Family Basellaceae

Cercospora basellae-albae R. K. Srivast., S. Narayan and A. K. Srivast., Indian Phytopathol. 47: 229. 1994. [T: HCIO 30880].

Leaf spots amphigenous, subcircular to irregular, 2.00-8.00 mm in diameter, pale brown to dingy grey in the center, with a dark purple border, later centre turning grey to greyish white with reddish brown to purplish brown margin on the upper surface, pale brown to olivaceous brown on the lower surface. Fruit bodies amphigenous. Stromata medium, rudimentary to slightly developed, irregular, dark brown, 14.63-31.14 µm in diameter, composed of a few swollen, brown hyphal cells. Conidiophores 5-15 in a divergent fascicle, emerging through stomatal openings and the cuticle, paler brown or paler towards the apex, straight to slightly curved, 1-5 times mildly geniculate, not branched, 2-6-septate, (65.58-)80.48-97.56 (-121.95)×(3.65-)4.87-4.87(-7.31) µm, conidial scars large, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to obclavate, substraight to moderately curved or even undulate, hyaline, 2-12-septate, non-constriced at the septa, acute to obtuse at the apex, truncate at the base, (24.39-) 43.90-73.17(-104.87)×(1.21-)2.43-4.87(-7.31) µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 43 and 44).

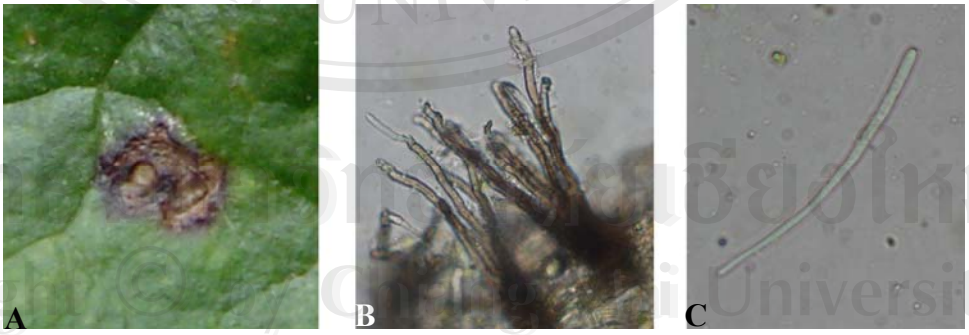

Figure 43 Photograph of *Cercospora basellae-albae* on *Basella alba*: A. Symptom, B. Conidiophores and C. Conidia.

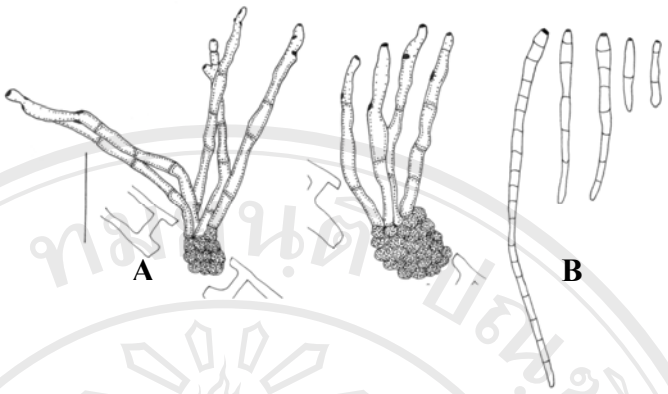

Figure 44 Drawing of *Cercospora basellae-albae* on *Basella alba*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Basella alba,* September 11, 2004, JM CMU MH 013.

Known distribution: India (Crous and Braun, 2003).

Notes: *Basella alba* has been previously recorded in India. This is the first record of this fungus in Thailand. A true *Cercospora s.str.* is close to or identical with *C. apii s.lat.*

Family Bignoniaceae

Pseudocercospora tecomae-heterophyllae (J. M. Yen) Y. L. Guo and X. J. Liu, Acta Mycol. Sin. 12: 30 (1993).

≡ *Cercospora tecomae-heterophyllae* J. M. Yen, Rev. Mycol. 31: 143 (1996).

≡ *Cercoseptoria tecomae-heterophyllae* (J. M. Yen) J. M. Yen, Gard. Bull., Singapore 33: 153 (1980).

Leaf spots amphigenous, very small, irregular, not vein limited, scattered coalescing to large spot, pale brown to brown with indefinite margins. Fruit bodies amphigenous. Stromata lacking or well-developed, amphigenous, 14.76-36.90 µm in diameter, brown. External hyphae developed on both leaf surface. Conidiophores arising from stromata or external hyphae, brown, solitary to densely fasciculate, simple, straight or slightly curved, 0-4-septate, (9.84-)19.68-49.20(-59.04)×2.46 µm, with distinct and unthickened conidial scars. Conidia acicular to obclavate, straight, smooth, hyaline to pale colored, with unthickened and truncate basal end, acute at the tip, (24.60-)27.06-49.20(-63.96)×(2.46-)2.46-2.46(-4.92) µm, 3-7-septate (Figure 45 and 46).

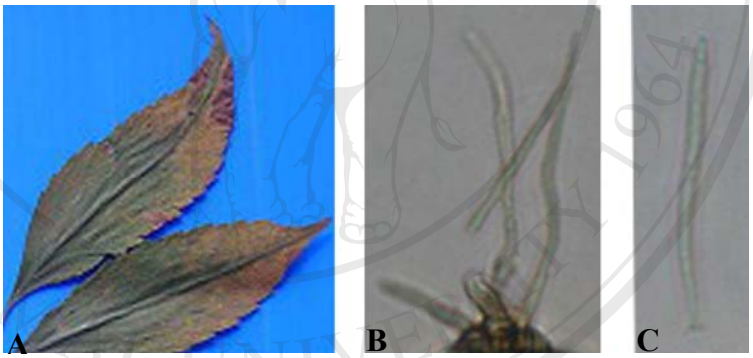

Figure 45 Photograph of *Pseudocercospora tecomae-heterophyllae* on *Tecoma stans*: A. Symptom, B. Conidiophores and C. Conidia.

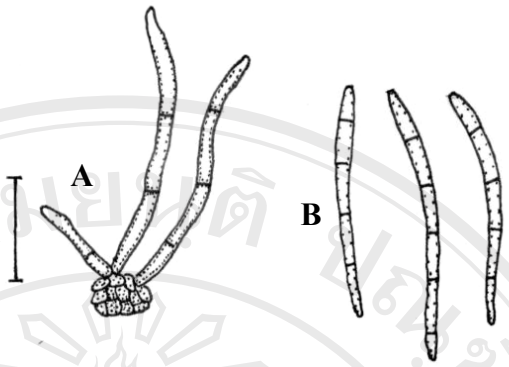

Figure 46 Drawing of *Pseudocercospora tecomae-heterophyllae* on *Tecoma stans*: A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Tecoma stans*, November 21, 2004, CN and JM, CMU MH 014.

Known distribution: China, India and Singapore (Crous and Braun 2003).

Notes: Hitherto known species in Thailand.

Family Boraginacare

Cercospora ehretiicola Saleem and Mirza (ehriticola), Pakistan J. Bot. 9: 151. 1977.

Leaf spots amphigenous, distinct, circular to subcircular, brown to grey with blackish brown margins, 1.00-3.00 mm in diameter. Stromata small to medium, rudimentary to slightly developed, irregular, dark brown, 29.26-24.39 µm in diameter. Conidiophores pale brown at the base and paler upwards, arranged in a loose to dense fascicle, with distinct conidial scars, 2-4-septate, (29.26-)41.46-46.34(-85.36)×(2.43-)4.87-4.87(-7.31) µm. Conidia solitary, obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, (9.75-)14.63-24.39

(-34.14)×(2.43-)4.87-4.87(-7.31) µm, 1-4-septate, acute to obtuse at the apex, truncate at the base (Figure 47 and 48).

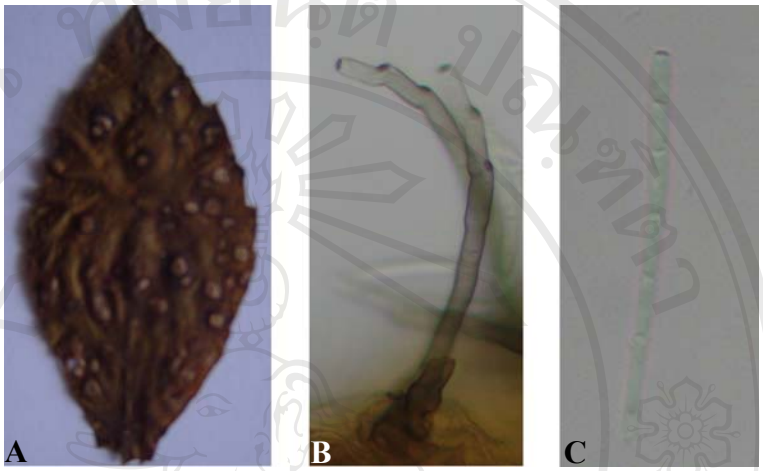

Figure 47 Photograph of *Cercospora ehretiicola* on *Ehretia microphylla*:

A. Symptom, B. Conidiophores and C. Conidia.

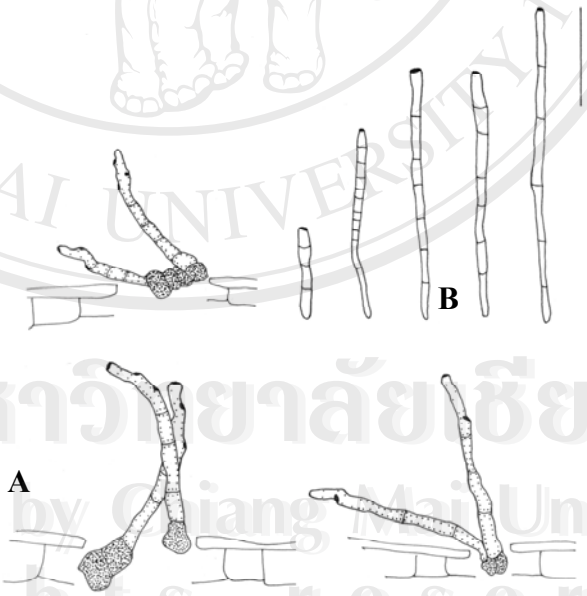

Figure 48 Drawing of *Cercospora ehretiicola* on *Ehretia microphylla*:

A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Ehretia microphylla*, November 11, 2005, JM CMU MH 015.

Known distribution: Pakistan (Crous and Braun, 2003).

Notes: This is the first record of this fungus in Thailand. A true *Cercospora s.str.* is close to *C. apii s. lat.* Saleem and Mirza found *Cercospora ehretiicola* on *Ehretia acuminata* in 1977.

Family Caprifoliaceae

Pseudocercospora viburnigena U. Braun and Crous, Mycol. Progress 1(1): 23. 2002.

≡ *Cercospora tinea* Sacc., Michelia 1: 268. 1878. [T: Sacc., Mycoth. ven. 1252, e.g., HAL], non *Pseudocercospora tinea* Y. L. Guo and W. H. Hsieh, 1994.

≡ *Cercoseptoria tinea* (Sacc.) Deighton, Mycol. Pap. 140: 167. 1976

≡ *Stigmina tinea* (Sacc.) M. B. Ellis, More dematiaceous hyphomycetes: 118. 1976.

≡ *Stigmina tinea* (Sacc.) M. B. Ellis, Mycol. Pap. 151: 1. 1983 (*comb. superfl.*).

Leaf spots amphigenous, suborbicular to irregular, with a slightly raised black margin, mostly 2.00-8.00 mm in diameter, often confluent, dark brown to blackish, center greyish white to brown, margin dark brown to blackish on the upper surface, brown to dark brown on the lower surface. Fruit bodies epigenous. Stromata small. Conidiophore loosly fasciculate, moderately olivaceous brown to pale brown, paler towards the apex, 3-15-septate, rarely geniculate, not branched, apex bluntly rounded

to subtruncate or conic, uniform in colour and width, (63.41-)92.68-214.63 (-239.02)×(3.65-)4.87-7.31 µm, conidial scars inconspicuous. Conidia pale olivaceous, cylindric or cylindric-obclavate, straight to mildly curved, rarely slightly curved, subobtuse to subacute at the apex, obcomic to obconically truncate at the base (17.07-)53.65-187.80(-204.87)×(4.87-)4.87-6.09(-7.31) µm, hilum inconspicuous (Figure 49 and 50).

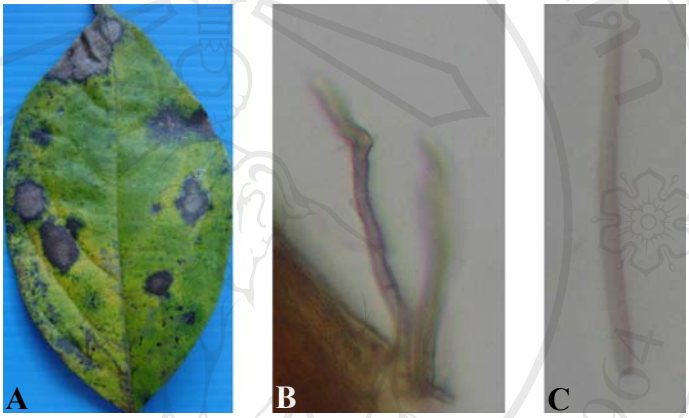

Figure 49 Photograph of *Pseudocercospora viburnigena* on *Viburnum prunifolium*: A. Symptom, B. Conidiophores and C. Conidia.

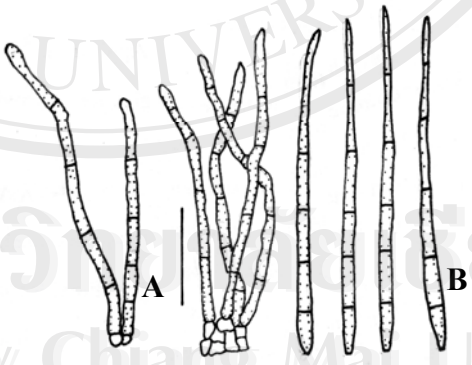

Figure 50 Drawing of *Pseudocercospora viburnigena* on *Viburnum prunifolium*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Viburnum prunifolium*, February 11, 2004, JM CMU MH 016.

Known distribution: Germany, Great Britain, Italy, Portugal and Spain (Crous and Braun, 2003)

Notes: Hitherto known species in Thailand.

Family Chenopodiaceae

Cercospora beticola Sacc., Nuovo Giorn. Bot. Ital. 8: 189. 1876. [T: PAD].

≡ *Cercosporina beticola* (Sacc.) K. Nakata, T. Nakajima and K. Katimoto, Rep. Agric. Korea 6. 1915.

= *Fusisporium betae* Desm., Ann. Sci. Net., Bot., 2 Ser., 19: 434. 1843.

= *Fusarium betae* (Desm.) Sacc., Michelia 2: 132.1880.

= *Pionnotes betae* (Desm.) Sacc., Syll. Fung. 4: 726. 1886.

= *Cercospora betae* A. B. Frank ex Sacc., Syll. Fung. 10: 637. 1892.

= *Cercospora longissima* Cooke and Eills, Grevillea 17: 65. 1889.

= *Cercospora flagelliformis* Ellis and Halst., New Jersey Agric. Coll. Exp. Sta., Annual Rep. 11: 355. 1890. [T: NY].

= *Cercospora anthelmintica* G. F. Atk., J. Elisha Mitchell Sci. Soc. 8: 48. 1892. [T: CUP].

= *Cercospora spinaciae* Oudem., Ned. Kruidk. Arch. III, 2: 324.1900.

= *Cercospora chenopodiicola* Bres., Hedwigia 39: 328. 1900. [T: Krieger, Fungi sax. 1631, e.g., HAL, LEP].

= *Cercosporina spinaciicola* Sacc., Nuovo Giorn. Bot. Ital., N. S., 22: 73. 1915.

= *Cercospora beticola* var. *poonensis* Chidd., Sydowia 13: 153. 1959 (*nom. inval.*). [T: BPI; HCIO; IMI]. (= *Cercospora apii s.lat*.).

Leaf spots scattered, often confluent, circular, 2.00-5.00 mm in diameter, grey in colour, later centre becoming whitish grey, reddish brown or purplish brown at the margin. Fruit bodies amphigenous, but chiefly epiphyllous. Stromata rudimentary to slightly developed. Conidiophores 3-14 in a divergent fascicle, pale brown at the base, paler upwards, nearly subhyaline at the apex, 2-5-septate, not branched, straight to 1-3 times geniculate towards the apex, weakly to mildly attenuated, (52.00-)83.20-187.20(-208.00)×(3.90-)3.90-5.20(-7.80) µm, conidial scars small, mostly less than 2 µm in diameter, conspicuous, thickened and darkened, apical or on shoulders of conidiogenous cells caused by geniculation, usually concentrated in the apical portion. Conidia solitary, acicular, straight to mildly curved, hyaline, 3-15-septate, non-constricted at the septa, obtuse to subacute at the apex, subtruncate at the base, greatly variable in length, (52.00-)65.00-135.20(-145.60)×(2.60-)3.90-5.20(-7.80) µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 51 and 52).

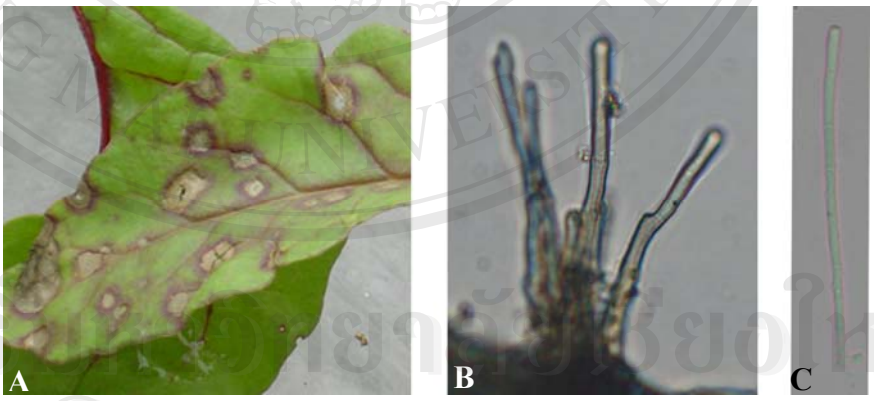

Figure 51 Photograph of *Cercospora beticola* on *Beta vulgaris* var. *alba*:
A. Symptom, B. Conidiophores and C. Conidia.

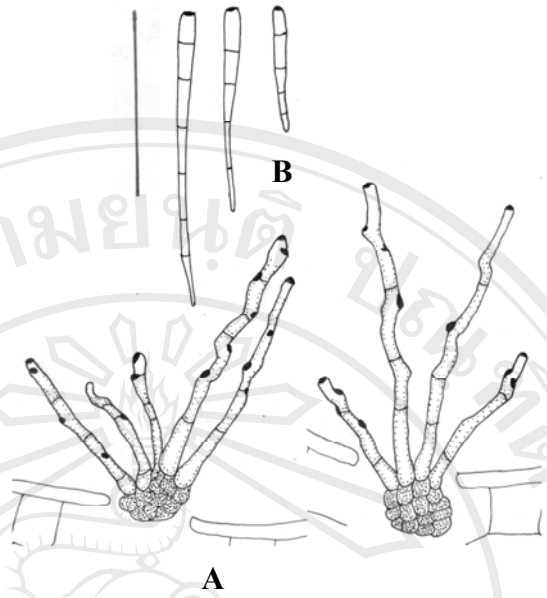

Figure 52 Drawing of *Cercospora beticola* on *Beta vulgaris* var. *alba*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Mae Jo, Chiang Mai Province. Leaves of *Beta vulgaris* var. *alba*, August 19, 2004, JM, CMU MH 017.

Known distribution: Nearly throughout the world wherever sugar beet and chard are cultivated, including China, Japan and Korea (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora beticola* in Thailand. Nakata and Takimoto (1928) first reported this leaf spot fungus from Korea on *Beta vulgaris* var. *saccharifera* (sugar beet). Shin and Braun (1993) listed this fungal species on *B. vulgaris* var. *alba* (chard). Detailed description and illustration based on Korean collection of this species was provided by Kim and Shin (1998b). The leaf spot disease of chard associated with this fungus is one of the limiting factors for successful harvest. Though the sugar beet is not cultivated in Korea, this host species planted in the experimental plot of Crop Research Sation, Suwon, was found to be infected by this fungus.

The conidiophores in collection are longer (18.00-85.00 µm) and in diameter (3.50-6.00 µm) than those described by other authors (Chupp, 1954; Hsieh and Goh, 1990), but the measurementas of conidiophores are usually of little taxonomic importance, since these structures are very variable. Most earlier authors (Chupp, 1954; Hsieh and Goh, 1990) described acicular conidia with acute apices. The conidia of our collections are, however, obtuse to subacute at the apex.

Family Combretaceae

Pseudocercospara quisqualidia (Narain and B. S. Mehrotra) Z. D. Jing and P. K. Chi, J. S. China Agr. Univ. 15: 19. 1994 and in Chi, Fungal diseases of cultivated medicinal plants in Guangdong Province: 100. 1994.

≡ *Cercospora quisqualidis* Narain and B. S. Mehrotra, Sydowia 24: 327. (1970) 1971. [T: BPI].

Leaf spots amphigenous, scattered to confluent, circular to angular, 1.00-6.00 mm in diameter, at first appearing yellowish brown to deep brown, later centre becoming greyish white to greyish brown with reddish brow margins, finally turning dingy to dark grey with definite margin. Fruit bodies amphigenous, but abundantly hypophyllous, punctiform. Mycelium internal, hyphae septate, branched, hyaline, 2.00-3.00 µm in diameter. Secondary mycelium external, hyphae emerging from the stomata, olivaceous to pale brown, septate, branched, bearing secondary conidiophores laterally and terminally. Stromata absent. Conidiophores loosely fasciculate at stomatal openings, or sometimes emerging through the cuticle, olivaceous brown, fairly uniform in colour and width, 1-8 times mildly geniculate

above the middle, not branched, straight to slightly curved, truncate at the apex, 1-5-septate, (17.07-)24.39-56.09(-60.97)×(2.43-)2.43-3.65(-4.87) µm, conidial scars large, 2.00-3.50 µm in diameter, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular-filiform to obclavate or obclavate-cylindric, straight to mildly curved, hyaline, 4-8-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, (31.70-)39.02-65.85(-68.29)×2.43-4.87 µm, hilum inconspicuous (Figure 53 and 54).

Figure 53 Photograph of *Pseudocercospara quisqualidia* on *Quisqualis indica*: A. Symptom, B. Conidiophores and C. Conidia.

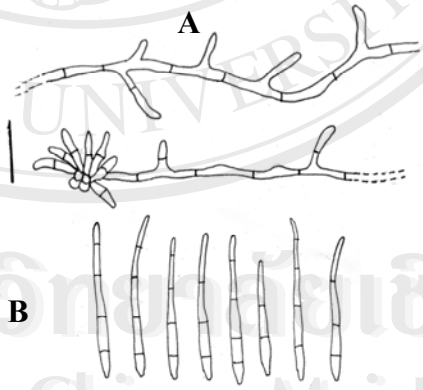

Figure 54 Drawing of *Pseudocercospara quisqualidia* on *Quisqualis indica*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Quisqualis indica*, November 24, 2004, JM, CMU MH 018.

Known distribution: China and India (Crous and Braun, 2003).

Notes: This is the first record of *Pseudocercospara quisqualidia* in Thailand.

Family Asteraceae

Cercospora gerberae Chupp and Viégas Bol. Da Soc. Brasil. De Agron. 8: 27. 1945. [T: CUP 39884; IACM 3958].

Leaf spots suborbicular to irregular, 1.00-20.00 mm in diameter, at first olivaceous, then turning dark until the spots are almost black, later coalescing to from large blotches covering much of the leaf surface, dark brown, surrouned by a purplish black margin, the dead tissues may drop out leaving the leaf with holes. Fruit bodies amphigenous but chiefly hypophyllous. Stromata a few brown cells or up to 50.00 µm in diameter, subglobose, dark brown. Conidiphores in dense divergent fascicles of 10-35, emerging through the stomata, pale to medium brown, paler and more narrow toward the tip, uniform in colour, straight, not branched, 2-6-septate, 0-3 geniculate, subtruncate at apex, (34.14-)51.21-92.68(-104.87)×4.87-7.31 µm, conidial scare conspicuously thickened. Conidia hyaline, acicular, straight to slightly curved, indistinctly multi-septate, acute at the apex, truncate at the base with a thickened hilum, (58.53-)63.41-146.34(-182.92)×(2.43-)4.87-4.87 µm (Figure 55 and 56).

Figure 55 Photograph of *Cercospora gerberae* on *Gerbera jamesonii*: A. Symptom, B. Conidiophores and C. Conidia.

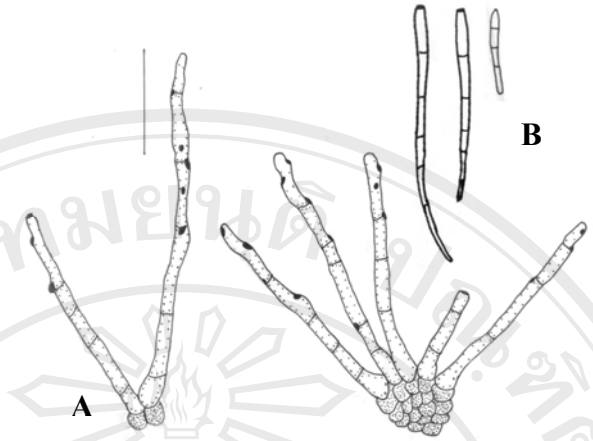

Figure 56 Drawing of *Cercospora gerberae* on *Gerbera jamesonii*:

A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Gerbera jamesonii*, March 9, 2004, JM CMU MH 019.

Known distribution: Australia (NSW), Bangladesh, Bermuda, Brazil, British Solomon Islands, Brunei, Cuba, Cambodia, Ghana, Hong Kong, India, Indonesia, Iran, Jamaica, Kenya, Malawi, Malaysia, Pakistan, Philippines, Puerto Rico, Sierra Leone, Singapore, Taiwan, Tanzania, Thailand, Uganda, U.S.A and Virgin Islands (Crous and Braun, 2003).

Notes: The first mount made showed a few conidia with appendages, like those of *Centrospora* on *Carum*, *Viola*, and *Apium*, but such appendages later could not be found in fairly numerous mounts. It there is considered a *Cercospora.* Type species are Est. Exp. De Agriculture, Belo Horizonte, Minas Geraes, Brazil; *Gerbera jamesonii*; Carlos Tomas de Almeida, 3958; April 14, 1939.

Family Compositae

Passalora tithonia (R. E. D. Baker and W. T. Dale) U. Braun and Crous, *comb. nov.*

≡ *Cercospora tithoniae* R. E. D. Baker and Dale, Mycol. Pap. 33: 106. 1951. [T: IMI 24506].

≡ *Phaeoramularia tithoniae* (R. E. D. Baker and W. T. Dale) Deighton, in Ellis, More dematiaceous hyphomycetes: 319. 1976.

≡ *Cercospora tithoniae* Chidd., Mycopathol. Mycol. Appl. 17: 80. 1962 (*nom. illeg.*). [T: BPI 441950], homonym of *C. tithoniae* R. E. D. Baker and W. T. Dale, 1951.

≡ *Cercospora tithonicola* J. M. Yen (tithonicola) Rev. Mycol. 31: 144 1966 (*nom. nov.*).

Leaf spots amphigenous, scattered to confluent, usually vein-limited, angular to irregular in shape, brown to greyish-brown in colour, 2.00-15.00 mm in diameter, coalescing and covering the whole surface of the leaf. Stromata medium, breaking throught epidermis, brown to olive-brown in colour, 34.44-49.20 µm in diameter, with out external mycelia. Conidiophores emerging from the upper part of stromata, brown to olive-brown at the basal part, hyaline to pale at the tip, with small conidial scars, 1-8-septate, (9.84-)19.68-78.72(-86.10)×2.46-4.92 µm. Conidia obclavate, subcylindric, olive-brown, straight, smooth, with small thickened hilum, (22.14-) 24.60-51.66(-73.80)×(3.69-)4.92-4.92(-7.38) µm, 1-6-septate (Figure 57 and 58).

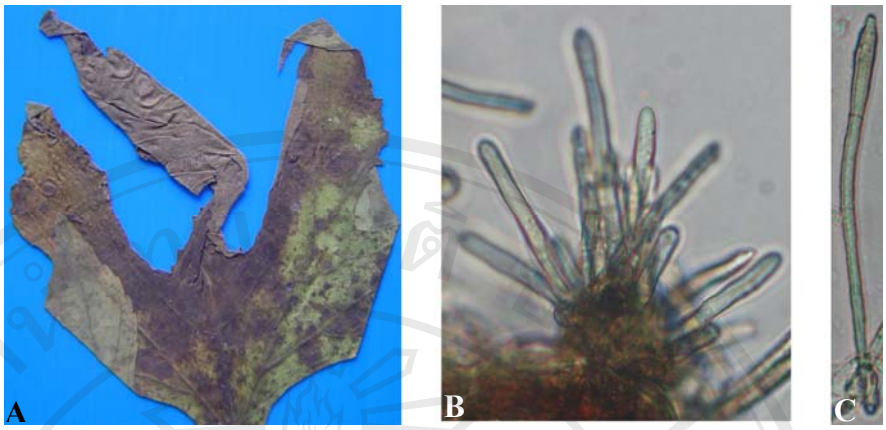

Figure 57 Photograph of *Passalora tithonia* on *Tithonia diversifolia*: A. Symptom, B. Conidiophores and C. Conidia.

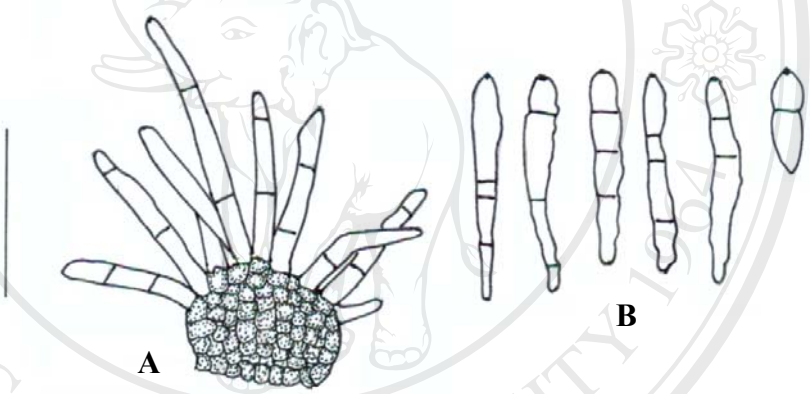

Figure 58 Drawing of *Passalora tithonia* on *Tithonia diversifolia*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Queen Sirikit Botanical Garden, Chiang Mai Province. Leaves of *Tithonia diversifolia*, November 20, 2004, CN and JM, CMU MH 020.

Known distribution: Barbados, Cuba, Hong Kong, India, Ivory Coast, Mauritius, Singapore, Taiwan, Trinidad and Tobago (Crous and Braun, 2003).

Notes: This is the first record of *Passalora tithonia* in Thailand.

Cercospora eupatorii Sacc., unknown, 1886 fide Chupp (1954).

Leaf spots distinct, circular-subcircular, medium brown with a narrow raised purplish to almost black border, 2.00-4.50 mm in diameter, often confluent. Fruit bodies amphigenous. Stromata brown, amphigenous, mostly hypophyllous, 12.30-24.60 µm in diameter. Conidiophores arising from stromata, hyaline to brown, straight or sinuous, 2-8-septate, fasciculate, (117.02-)139.02-295.11(-331.70)×(2.43-)3.65-7.31 µm, with thickened conidial scars. Conidia pale olivaceous, obclavate, (14.63-)21.95-39.02(-51.21)×(2.43-)3.65-4.87(7.31) µm, 2-12-septate, hilum conspicuously thickened, darkened and non-protuberant (Figure 59 and 60).

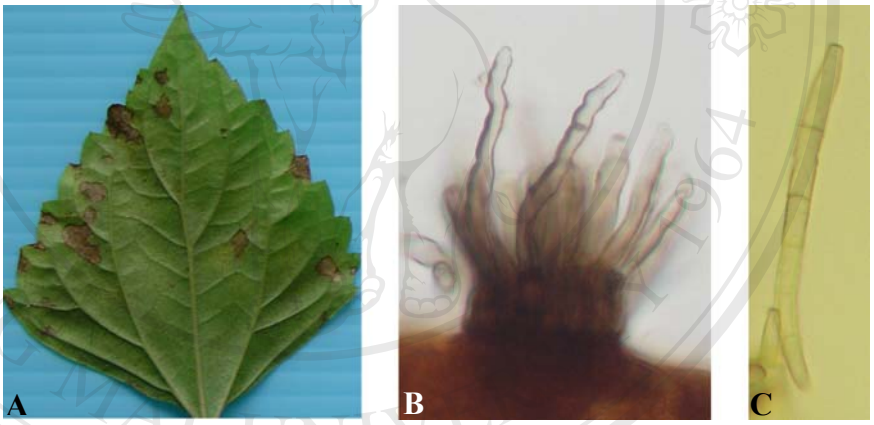

Figure 59 Photograph of *Cercospora eupatorii* on *Eupatorium adenophorum*: A. Symptom, B. Conidiophores and C. Conidia.

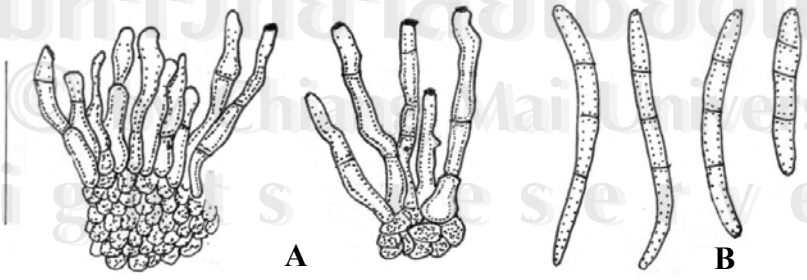

Figure 60 Drawing of *Cercospora eupatorii* on *Eupatorium adenophorum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Queen Sirikit Botanical Garden, Chiang Mai Province. Leaves of *Eupatorium adenophorum*, November 20, 2004, JM, CMU MH 115.

Known distribution: Nepal and U.S.A (FL) (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora eupatorii* found on *Eupatorium adenophorum* in Thailand. Chupp (1954) was unable to locate a description or specimen of this species.

Cercosporella virgaureae (Thüm.) Allesch., Hedwigia 34: 286. 1895.

≡ *Ramularia virgaureae* Thüm., Fungi austr., No. 1072, 1874. [T: Thüm., Fungi austr. 1074, e.g., HAL].

≡ *Ovularia virgaureae* (Thüm.) Sacc., Syll. Fung. 4: 142. 1886.

≡ *Cercospora virgaureae* (Thüm.) Ellis and Everh. J. Mycol. 5: 69. 1889.

≡ *Cercospora virgaureae* (Thüm.) Allesch., in Oudem., Ned. Kruidk. Arch., Ser. 3, 2: 315. 1901.

= *Cercospora cana* Sacc., Nuovo Giorn. Bot. Ital. 8: 188. 1876. [T: BPI 420584; PAD].

≡ *Cercosporella cana* (Sacc.) Sacc., Michelia 2: 20. 1880.

≡ *Septocylindrium canum* (Sacc.) J. Schroet., in Cohn, Kryptog. -F1. Schles., 3: 493. 1897.

= *Fusidium canum* Pass., in Thüm., Mycoth. Univ., No. 378. 1876. [T: Thüm., Mycoth. Univ. 378, eg., HAL].

= *Cercospora fulvescens* Sacc., Nuovo Giorn. Bot. Ital. 8: 189.1876. [T: PAD].

= *Cercospora canadensis* A. B. Frank. 1878, unknow fide chupp (1954, p. 126).

= *Cercospora griseëlla* Peck, Rep. (Annual) New York State Mus. Nat. Hist. 33: 29. 1880. [T: NYS].

= *Cercosporella reticulate* Peck, Rep. (Annual) New York State Mus. Nat. Hist. 34: 47. 1881. [T: NYS].

≡ *Cercospora reticulate* (Peck) Ellis and Everh., J. Mycol. 1: 61. 1885.

= *Cercospora grindeliae* Ellis and Everh., Proc. Acad. Nat Sci. Philadelphia 47: 439. 1895. [T: NY].

= *Cercosporella asterina* Speg., Anales Mus. Nac. Hist. Nat. Buenos Aires 6: 335. 1899. [T: LPS].

= *Cercospora virgaureae* Oudem., Ned. Kruidk. Arch., Ser. 3, 2: 315. 1901. [T: L].

= *Cercosporella ontariensis* Sacc., Ann. Mycol. 11: 551. 1913. [T: PAD].

= *Cercosporella dearnessii* Bubák and Sacc., Ann. Mycol. 11: 552. 1913. [T: BPI 429648; PAD].

= *Ramularia erigerontis* Gonz. Frag., Bol. Acad. Ci. Exact., Madrid 5, 15: 39. 1917. [T: MA].

= *Cercosporella cana* var. *gracilis* Davis, Trans. Wisconsin Acad. Sci. 19: 675. 1919. [T: BPI 420617; WIS].

= *Cercospora viminei* Tehon, Mycologia 16: 141. 1924. [T: ILLS].

= *Cercosporella eupatorii* Sawada, rep. Gov. Agric. Res. Inst. Taiwan 86: 160. 1943 (*nom. inval*).

≡ *Cercosporella eupatorii* Sawada ex Goh and W.H. Hsieh, in Hsieh and Goh, *Cercospora* and similar fungi from Taiwan: 70. 1990. [T: NTU-PPE, herb. Sawada].

= *Ramularia erigerontis-annui* Sawada, Bull. Gov. Forest. Exp. Stst. Tokyo 105: 86. 1958.

= *Cercosporella curva* Diedicke, (JE) *fide* Braun (1995a).

= *Cercospora foliosa* Ellis and Kellerm., unknown *fide* Chupp (1954).

Leaf spots circular to subcircular, vein-limited, 2.00-5.50 mm in diameter, on the upper surface, at first indefinite yellowish discolourations, on the lower surface, pale greenish, yellowish to brown, later greyish brown to brown without definite margin. Fruit bodies hypophyllous, appearing as white to pale tan patches, similar to symptoms of downy mildews, without define margin. Mycelium internal, hyphae septate, branched, hyaline. Stromata small, but well-developed, composed of several swollen brown hyphal cells. Conidiophores 5-11 in a divergent fascicle, emerging from stomatal openings, hyaline, 0-2-septate, straight to mildly sinuous, sometimes apically swollen due to compact conidial scars, geniculate in the upper portion, not branched, (9.84-)12.30-27.06(-39.36)×2.46-4.92 µm, conidial scars small, conspicuous, apical or on small shoulders of the upper plants caused by geniculation. Conidia solitary, filiform to obclavate, straight to mildly curved, hyaline to subhyaline due to dense cytoplasm, 1-3-septate, non-constricted at the septa, obtuse to subobtuse at the apex, long obconic to obconically truncate at the base, (12.30-)24.60-41.82 (-49.20)×2.46-4.92(7.38) µm, hilum conspicuously thickened and non-protuberant (Figure 61 and 62).

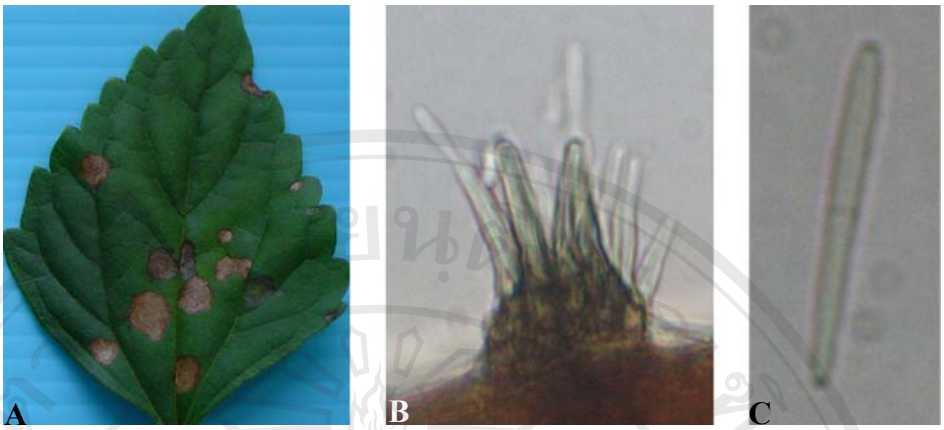

Figure 61 Photograph of *Cercosporella virgaureae* on *Eupatorium adenophorum*: A. Symptom, B. Conidiophores and C. Conidia.

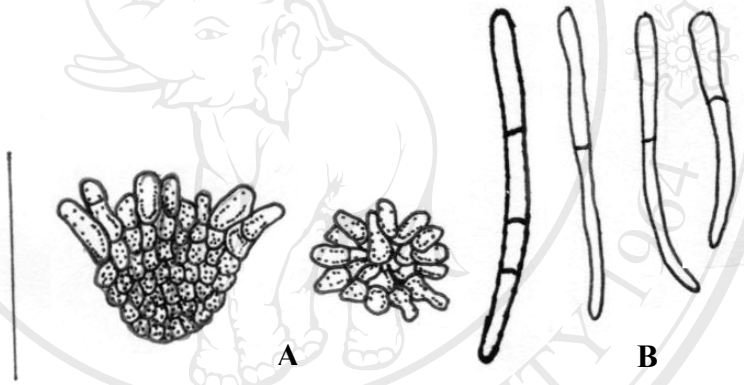

Figure 62 Drawing of *Cercosporella virgaureae* on *Eupatorium adenophorum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Inthanon National Park, Chiang Mai Province. Leaves of *Eupatorium adenophorum*, November 22, 2004, JM, CMU MH 021.

Known distribution: Worldwide, including Abkhasia (Transcaucasia), Argentina, Austria, Brazil, Bulgaria, Canada, China, Colombia, Czech Republ., Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Japan, Kazakhstan, Kirghizia, Korea, Latvia, Netherlands, Norway, Poland, Puerto Rico, Romania, Russia (Asian part), Slovakia, Spain, Sweden, Switzerland, Turkmenistan, Ukraine,

U.S.A (CO, DE, ID, IL, KS, LA, MS, MT, NC, NE, NJ, OK, OR, TX, WA, WI), Uzbekistan, Taiwan and Virgin Islands (Crous and Braun, 2003).

Notes: This is the first record of *Cercosporella virgaureae* found on *Eupatorium adenophorum* in Thailand. Detailed description and illustration based on Korean materials of this species were provided by Kim and Shin (1998c).

Gilman and Archer (1929) mentioned various synonyms of *C. virgaureae* (Thüm.) Allesch. including *Cercospora virgaureae* Thüm., *Ramularia virgaureae* Thüm., *Cercospora virgaureae* Oudem., *Septoria virgaureae* Oudem., *Cercospora reticulate* Peck, *Cercosporella ontariensis* Sace., *Cercosporella dearnessii* Bub. and Sacc. and *Ramularia tenuis* Davis. They remarked that further study of *Cercosporella cana* on *Erigeron* will probably result in the combination of this form with that on *Solidago.*

Deighton (1973) reported that the two species, *C. cana* and *C. virgaureae*, cannot be distinguished by their conidia which vary considerably in length, width and septation. Therefore, he added *C. cana* as a synonym of *C. virgaureae*. *C. asterina* differs only in that its Fruit bodies are mostly epiphyllous, and *R. asteris* is distinguished from his collection by having usually shorter, narrower conidia (15.00-80.00×3.00-5.00 μm).

Cercospora fulvescens is only very young material of *Cercosporella virgaureae* as described by Lindau (1907). Braum (1995) explained that young conidia of *C.virgaureae* are similar to *Ramularia erigerontis*. Chupp (1954) found no colour of *Cercospora grindeliae* and suggested it be considered as *Cercosporella.* Therefore, Braun (1998) reduced this species to synonymy with *C. virgaureae*.

Cercospora bidentis Tharp, Mycologia 9: 108. 1917. [T: BPI433647].

= *Cercospora bidentis* Marchal and Steyaert, Bull. Soc. Roy. Bot. Belgique61: 167. 1929 (*nom. illegit.*)

= *Cercospora bidentis-pilosae* Sawada, Rep. Gov. Agrric. Res. Inst. Taiwan 85: 98. 1943 (*nom. inval.*)

Leaf spots are circular to subcircular, brown, centre with pale yellowish brown margins, 0.50-2.50 mm in diameter. Fruit bodies amphigenous, but abundantly epiphyllous. Stromata small to large, dark brown to brown, subglobular to globular, 19.68-29.52 µm in diameter. Conidiophores arranged in a loose to dense fascicle, arising from stromata, emerging though the stromata or erumpent through the cuticle, brown or paler towards the apex, slightly curved, with distinct conidial scars, 1-3-septate, (9.84-)12.30-31.98(-39.36)×(2.46-)3.69-4.92 µm. Conidia solitary, obclavate to subcylindric-obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, 15.99-46.74×2.95-4.92 µm, 2-4-septate, subobtuse to obtuse at the apex, truncate to subtruncate at the base (Figure 63 and 64).

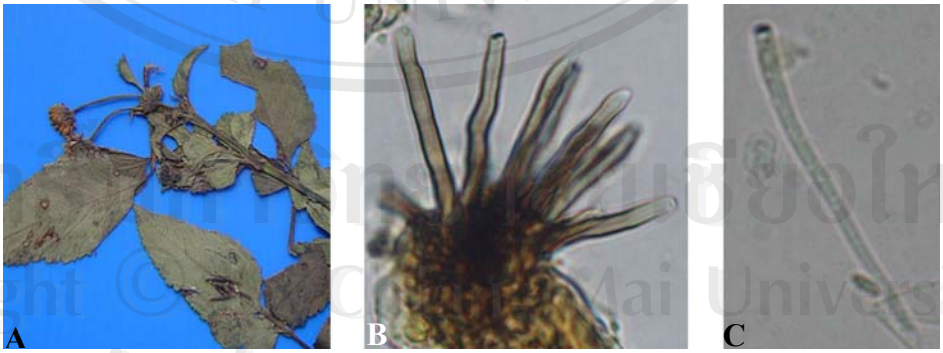

Figure 63 Photograph of *Cercospora bidentis* on *Bidens pilosa*: A. Symptom, B. Conidiophores and C. Conidia.

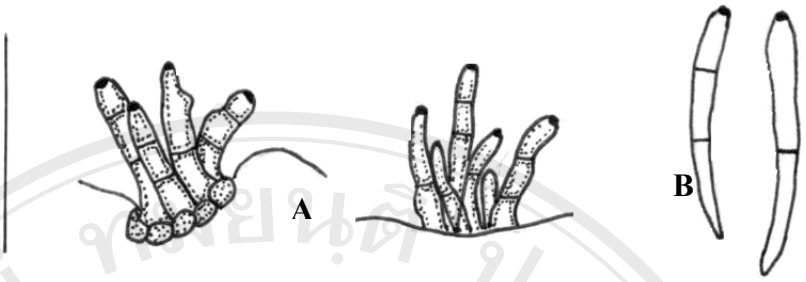

Figure 64 Drawing of *Cercospora bidentis* on *Bidens pilosa*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Bidens pilosa*, November 24, 2004, CN and JM, CMU MH 022.

Known distribution: In diameter spread in the tropics and subtropics, American, Samoa, Brazil, China, Congo, Cuba, Ghana, India, Indonesia, Japan, Kenya, Malaysia, Malawi, Mauritius, Myanmar, Nepal, Nigeria, Panama, Papua, New Guinea, Solomon Islands, South, Africa, Sudan, Taiwan, Tanzania, Tongo, Trinidad, Tobago, Venezuela, U.S.A (FL, TX, WI) and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora bidentis* found on *Bidens pilosa* in Thailand. A true *Cercospora s.str*. is close to or identical with *C. apii s. lat*.

Cercospora eupatorii Sacc., unknown, 1886 fide Chupp (1954).

Leaf spots distinct, circular-subcircular, medium brown with a narrow raised purplish to almost black border, 2.00-4.00 mm in diameter, often confluent. Fruit bodies amphigenous. Stromata brown, amphigenous, mostly hypophyllous, 12.30-24.60 μm in diameter. Conidiophores arising from stromata, hyaline to brown, straight or sinuous, 1-9-septate, fasciculate, 14.76-118.08×3.69-4.92 μm, with

thickened conidial scars. Conidia pale olivaccous, obclavate, 29.12-102.45×1.70-4.00 µm, 3-12-septate, hilum conspicuously thickened, darkened (Figure 65 and 66).

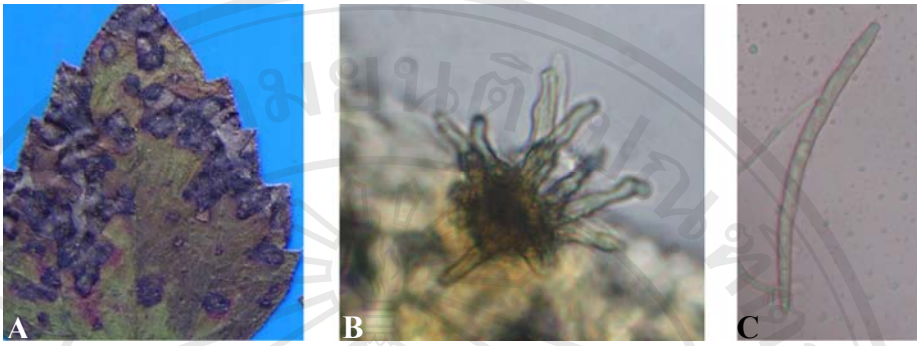

Figure 65 Photograph of *Cercospora eupatorii* on *Eupatorium odorata*: A. Symptom, B. Conidiophores and C. Conidia.

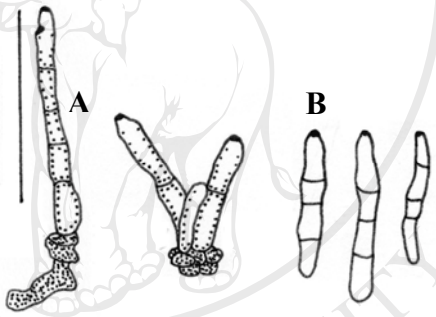

Figure 66 Drawing of *Cercospora eupatorii* on *Eupatorium odorata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Eupatorium odorata*, November 24, 2004, CN and JM, CMU MH 023.

Known distribution: Cuba, U.S.A (AL, IN, NJ, NY). Long Island, Alabama, New Jersey and India (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora eupatorii* found on *Eupatorium odorata* in Thailand. This species, the Fruit bodies not being effuse and occurring on both leaf surfaces.

Cercospora helianthicola Chupp and Viégas Bol. da Soc. Brasil. deagron. 8: 29. 1945

≡ *Passalora helianthi* (Ellis and Everh.) U. Braun and Crous, comb. nov.

≡ *Cercospora helianthi* Ellis and Everh., J. Mycol. 3: 20. 1887. [T; NY].

≡ *Mycovellosiella helianthi* (Ellis and Everh.) U. Braun, Schlechtendalia 2: 2. 1999.

Leaf spots distinct on upper surface, irregularly angular, minute to large part of leaf surface, very dark reddish brown. Fruit bodies amphigenous, stromata lacking or a few brown cells, fascicles 2-8 stalks, conidiophores pale to medium brown, paler and more narrow toward the tip, longer ones tortuous to multigeniculate, rarely branched, subtruncate tip, 1-4 septate, (18.20-)26.00-65.00(-83.20)×(2.60-)3.90-5.20 (-7.80) µm. Some fascicle have only short conidiophores; conidia hyaline, acicular, variously adcurved, 2-8-septate, base truncate, tip acute, (18.20-)28.60-59.80 (-72.80)×2.60-5.20 µm (Figure 67 and 68).

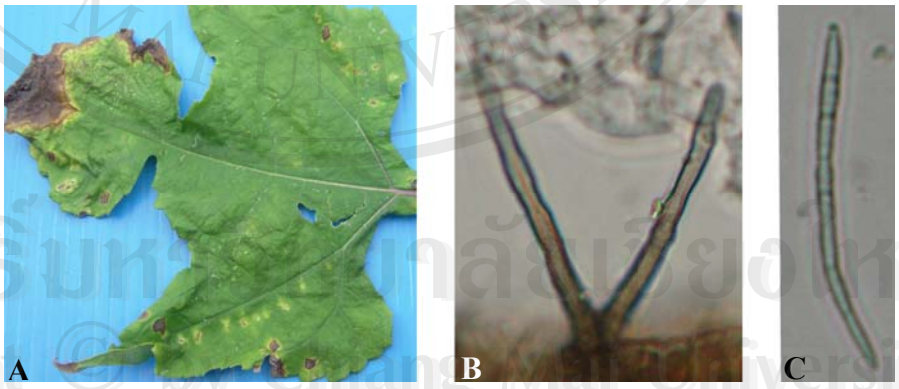

Figure 67 Photograph of *Cercospora helianthicola* on *Helianthus annuus*: A. Symptom, B. Conidiophores and C. Conidia.

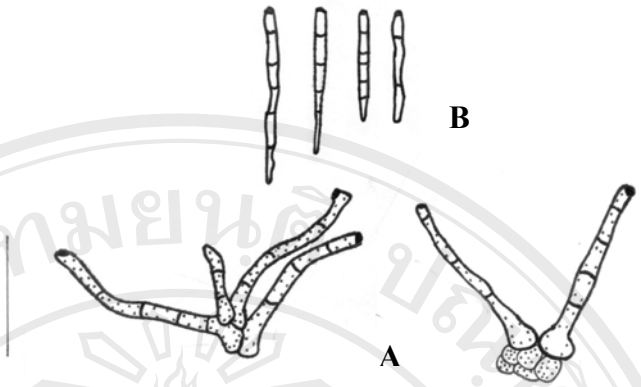

Figure 68 Drawing of *Cercospora helianthicola* on *Helianthus annuus*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Helianthus annuus*, November 30, 2004, JM, CMU MH 024.

Known distribution: Brunei, China, India, Russia, South Africa, Thailand and U.S.A (FL, IA, IL, KS, MO, NJ, OH, TX, WI) (Crous and Braun, 2003).

Notes: Petcharat and Kanjanamaneesathian (1989) recorded this fungus in Thailand. Type species, est. exp. De Agriculture, Belo Horizonte, Minas Geraes, Brazil, *Helianthus annuus,* Carlos Tomaz de Almeida, No. 3984, March 24, 1940.

Cercospora lactucae-sativae Sawads Formosa Agr. Res. Inst. Rept. 35: 111 (1928)

= *Cercospora longispora* Cugini ex Trav., Malpighis 17: 217 (1902), non *C. logispora* Peck (1884)

= *Cercospora longissima* Trav., Malpighia 17: correzione (correctionship) p. 217 (1903), non *C. longissima* Cooke and 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) non *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)

Leaf spots scattered, often confluent, distinct, circular to subcircular, often zonate, small to fairly large, 3.00-10.00 mm in diameter, at first appearing as watersoaked specks, then becoming dull brown to dingy grey in the centre, finally turning greyish brown, without definite margin. Fruit bodies amphigenous, but chiefly hypophyllous. Mycelium internal, hyphae septate, branched, pale olivaceous. 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, 3-6-septate, 1-3 times slightly geniculate near the middle, not branched, (98.80-)106.60-174.20(-223.60)×(2.60-)3.90-5.20(-7.80) µm, conidial scars large, conspicuous, apical or on small shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to filiform or even obclavate, straight or mildly curved, hyaline, 5-16-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, (65.00-)72.80-169.00(-202.80)×(3.90-)5.20-9.10(-11.70) µm, hilum conspicuously thickened, darkened (Figure 69 and 70).

Figure 69 Photograph of *Cercospora lactucae-sativae* on *Lactuca sativa* var. *longifolla*: A. Symptom, B. Conidiophores and C. Conidia.

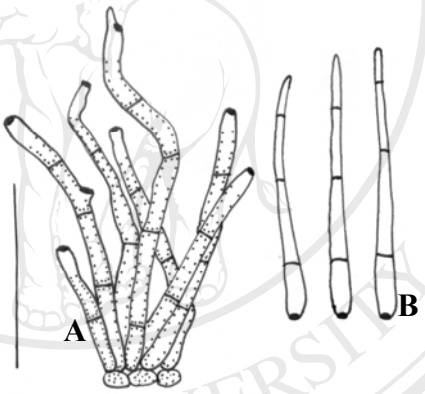

Figure 70 Drawing of *Cercospora lactucae-sativae* on *Lactuca sativa* var. *longifolla*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai Province. Leaves of *Lactuca sativa* var. *longifolla*, October 31, 2004, JM, CMU MH 025.

Known distribution: Nearly all of the world wherever the plant is growing or cultivated, including China, Japan, Korea and Taiwan (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora lactucae-sativae* on *Lactuca sativa* var. *longifolla* in Thailand. Park (1958) recorded this fungus (under *C. longissima*) as causalagent of a leaf spot disease on *Lactuca sativa* for the first time from Korea. Shin

and Braun (1993) listed the second Korean record. The detailed description and illustration based on Korean collection of this species were provided by Kim and Shin (1998b).

The conidiophores of *C. longissima-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 and Ellis.

Cercospora lactucae-sativae Sawads Formosa Agr. Res. Inst. Rept. 35: 111 (1928)

= *Cercospora longispora* Cugini ex Trav., Malpighia 17: 217. 1902 (*nom. illeg.*), homonym of *C. longispora* Peck, 1884.

≡ *Cercospora longissima* Trav., Malpighia 17: correzione (correction slip) to p. 217. 1903 (*nom. illeg.*), homonym of *C. longissima* Cooke and Ellis, 1889.

≡ *Cercospora longisima* Cugini ex Sacc., Syll. Fung. 18: 607. 1906 (*nom. illeg.*), homonym of *C. longissima* Cooke and Ellis, 1889.

= *Cercospora lactucae* J. A. Stev., J. Dept. Agric. Puerto Rico 1: 105. 1917 (*nom.illeg.*) [T: BPI 437770, 437771], homonym of *C.lactucae* Henn., 1902.

= *Cercospora lactucae* Welles, *Phytopathology* 13: 289. 1923 (*nom. illeg.*, Art. 53.1), homonym of *C. lactucae* Henn., 1902.

= *Cercospora ixeridis-chinensis* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 86: 171. 1943 (*nom. inval.*). [T: NTU-PPE, herb. Sawada]

= *Cercospora lactucae-indicae* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 86: 172. 1943 (*nom. inval*.). [T: NTU-PPE, herb. Sawada].

Leaf spots circular to oval, 2.00-5.00 mm in diameter, visible as concentric zones resembling a frog eye, grey brown and dingy at centre and surrounded by a pale tan halo, then bordered by a narrow raised dark brown line. Fruit bodies amphigenous, but chiefly hypophyllous. Mycelium internal; hyphae septate, branched, pale olivaceous. 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, 3-9-septate, not branched, (41.46-)53.65-141.46(-185.36)×2.43-4.87 µm, conidial scars large, conspicuous, apical or on small shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to filiform or even obclavate, straight or mildly curved, hyaline, 2-9-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, (31.70-)39.02-102.43(-136.58)×(2.43-)4.87-4.87(-7.31) µm, hilum conspicuously thickened, darkened (Figure 71 and 72).

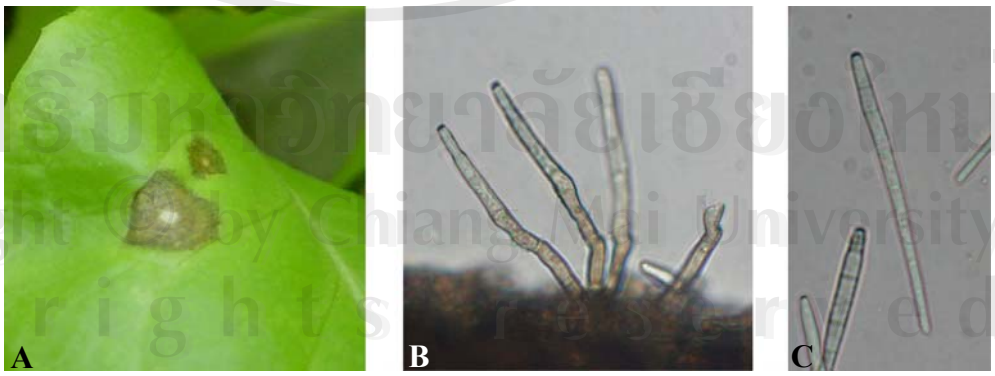

Figure 71 Photograph of *Cercospora lactucae-sativae* on *Lactuca sativa* var. *crispa*: A. Symptom, B. Conidiophores and C. Conidia.

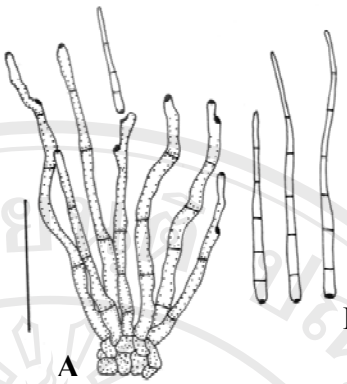

Figure 72 Drawing of *Cercospora lactucae-sativae* on *Lactuca sativa* var. *crispa*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai Province. Leaves of *Lactuca sativa* var. *crispa*, October 31, 2004, JM, CMU MH 026.

Known distribution: Worldwide, including Angola, Bangladesh, Barbados, Brazil, Brunei, Cambodia, China, Colombia, Cuba, Dominican Republ., EI Salvador, Guatemala, Guatemala, Guadeloupe, Hong Kong, India, Indonesia, Italy, Iran, Ivory Coast, Jamaica, Japan, Korea, Laos, Lebanon, Libye, Malaysia, Martinique, Mauritius, Morocco, Mozambique, New Caledonia, Nigeria, Philippines, Puerto Rico, Romania, Russia (European part), Saudi Arabia, Sierra Leone, Somalia, South Africa, Spain, Saint Kitts and Nevis, Sudan, Taiwan, Tanzania, Togo, Trinidad and Tobago, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora lactucae-sativae* on *Lactuca sativa* var. *crispa* in Thailand. A true *Cercospora s.str.* is close to *C. apii s. lat.*

Cercospora mikaniicola F. Stevens (*mikaniacola*), Trans. Illinois Acad. Sci. 10: 213. 1917. [T: BPI 438505; ILL 14865; IMI 120992; PC].

= *Cercospora mikaniae-cordatae* J. M. Yen, Rev. Mycol. 30: 183. 1965. [T: PC].

Leaf spots circular, 0.50-7.50 mm in diameter, greyish at center, on the upper surface with a raised line border, on lower surface with a in diameter dark area in which the Fruit bodies is found. Stromata lacking to medium, 14.76-39.36 µm. Conidiophores pale to medium olivaceous brown, uniform in colour and in diameter, multiseptate, not branced, 1-10 abruptly geniculate, rarely near tip rachislike, minute spore scar at small rounded tip, 2-10-septate, (49.20-)118.08-154.98(-177.12)×4.92-4.92(-7.38) µm. Conidia obclavate, subhyaline to very pale olivaceous, straight to slightly curved, long obconically truncate base, tip obtuse to subobtuse, sometimes catenulate, 3-11-septate, (54.12-)61.50-108.24(-135.30)×(2.46-)4.92-7.38(-8.61) µm (Figure 73 and 74).

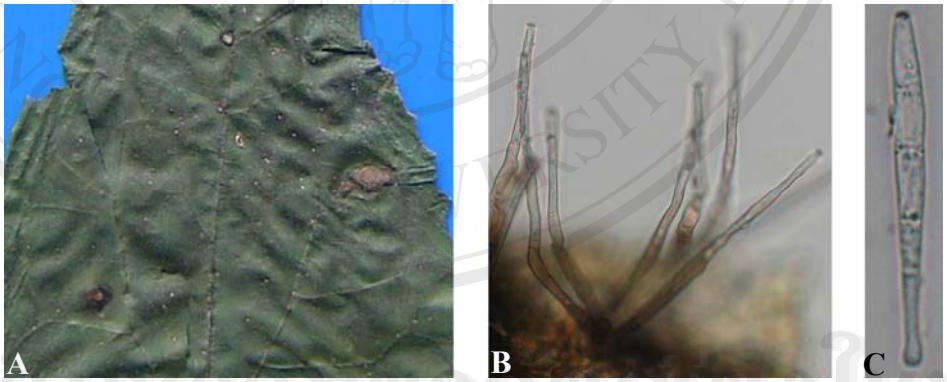

Figure 73 Photograph of *Cercospora mikaniicola* on *Mikania cordata*: A. Symptom, B. Conidiophores and C. Conidia.

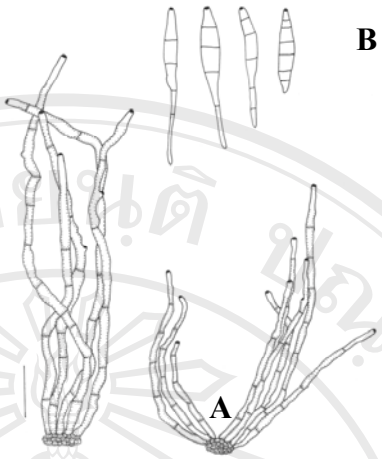

Figure 74 Drawing of *Cercospora mikaniicola* on *Mikania cordata*:
A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Mikania cordata*, October 31, 2004, JM, CMU MH 027.

Known distribution: American Samoa, Agentina, Bangladesh, Brazil, Cuba, Colombia, Fiji, Guadalcanal, Hong Kong, India, Jamaica, Malaysia, Niue, Pakistan, Papua New Guinea, Puerto Rico, Samoa, Sierra Leone, Singapore, Solomon Islands, Tuvalu, U.S.A and Vanuatu (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora mikaniicola* on *Mikania cordata* in Thailand. This species belongs in *Cercospora s. str.*, and it is distinct from *C. apii s.lat*. Definite leaf spots and the long conidiophores separate this from the other species on *Mikania*. For a further description see Mycologia 23: 397. 1931. Key, page 154. Type species is in Utuado, Puerto Rico; *Mikania* sp.; F. L. Stevens, No. 7922; July 7. 1915.

Cercospora tridacis-procumbentis Govindu and Thirum., Sydowia 7: 49. 1953. [T: IMI 55520].

= *Cercospora apii s.lat*.

Leaf spots circular, suborbicular to irregular, without distinct margin, 2.00-9.00 mm in diameter, dull grey to greyish brown, sometimes confluent. Stromata lacking or a few brown cells. Conidiophores solitary or in fascicles of 2-5, pale to medium olivaceous brown, subhyaline at the apex, 2-8-septate, not branched, geniculate, conidial scars thickened, (46.80-)62.40-117.00(-124.80)×(2.60-)2.60-5.20(-7.80) μm. Conidia cylindric, subhyaline to very pale olivaceous, straight to slightly curved, 5-13-septate, long obconically truncate base, tip obtuse to subobtuse, sometimes catenulate, (72.80-)88.40-158.60(-223.60)×(2.60-)2.60-5.20(-6.50) μm (Figure 75 and 76).

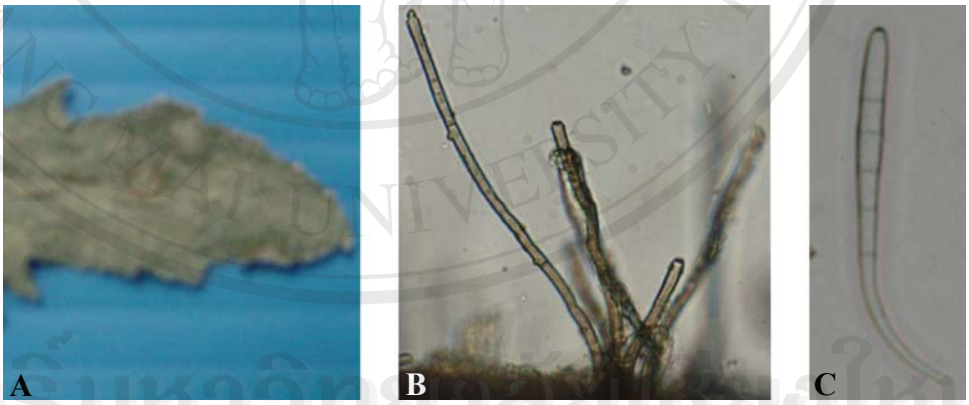

Figure 75 Photograph of *Cercospora tridacis-procumbentis* on *Tridax procumbens*: A. Symptom, B. Conidiophores and C. Conidia.

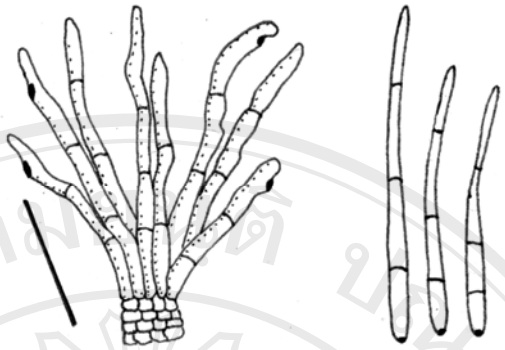

Figure 76 Drawing of *Cercospora tridacis-procumbentis* on *Tridax procumbens*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai Province. Leaves of *Tridax procumbens*, October 31, 2004, JM, CMU MH 028.

Known distribution: Australia, Cuba, Ghana, Guinea, India, Kenya, Kiribati, Myanmar, Nauru, Nigeria, Papua New Guinea, Sierra Leone, Solomon Islands, South Africa, Tanzania, Togo and Tuvalu (Crous and Braun, 2003).

Notes: *Cercospora tridacis-procumbentis* was recorded by Sontirat *et al.* 1991 in Thailand.

***Cercospora* sp.**

Leaf spots amphigenous, distinct, subcircular to angular, yellowish brown with blackish brown margins, 2.00-7.00 mm in diameter. Stromata small to medium, rudimentary to slightly develped, irregular, dark brown, 14.00-40.00 μm in diameter. Conidiophores pale brown at the base and paler upwards, arranged in a loose to dense fascicle, with distinct conidial scars, 1-7-septate, (31.70-)39.02-70.73(-87.80)×4.87-7.31 μm. Conidia solitary, obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, (19.51-)31.70-99.99

(-126.82)×(3.65-)4.87-4.87 µm, 2-10-septate, acute to obtuse at the apex, truncate at the base (Figure 77 and 78).

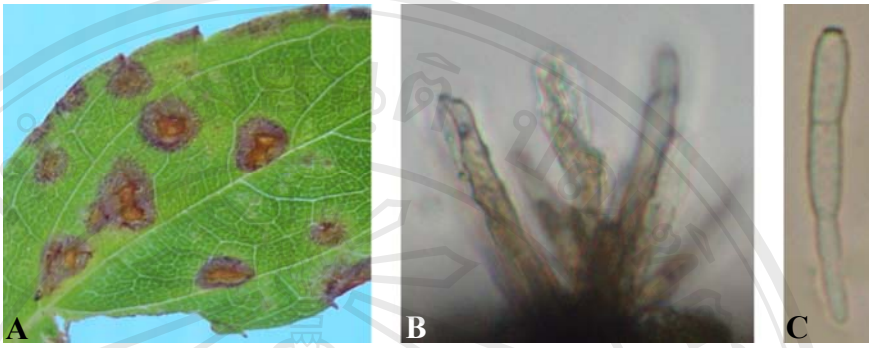

Figure 77 Photograph of *Cercospora* sp. on *Melampodium paludosum*: A. Symptom, B. Conidiophores and C. Conidia.

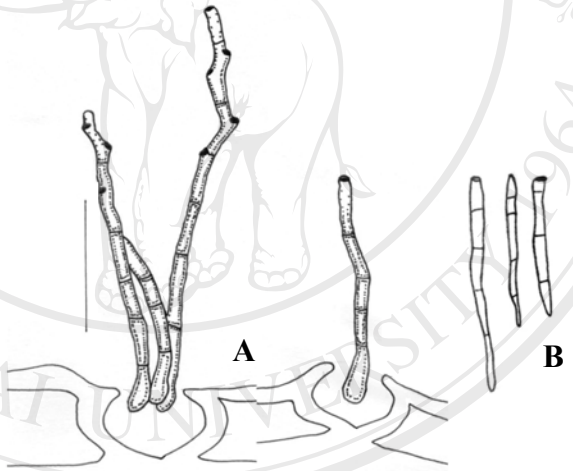

Figure 78 Drawing of *Cercospora* sp. on *Melampodium paludosum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Melampodium paludosum*, October 31, 2004, JM, CMU MH 029.

Known distribution: Known only Thailand.

Notes: This is the first report of *Cercospora* sp. on *Melampodium paludosum* in Thailand.

Cercospora tagetis-erectae Thirum. and Govindu (tagetes-erectae), Sydowia 10: 262. (1956) 1957

Leaf spots amphigenous, subcircular, brown, bordered by a dark brown margin, 5-7 mm in diameter. Stromata small to medium, rudimentary to slightly develped, irregular, dark brown, 19.51-36.58 µm in diameter. Conidiophores pale brown at the base and paler upwards, arranged in a loose to dense fascicle, with distinct conidial scars, 2-8-septate, (60.97-)119.51-129.26(-185.36)×4.78-7.31 µm. Conidia solitary, obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, (24.39-)48.78-78.04(-163.41)×2.43-3.65 µm, 1-9-septate, acute to obtuse at the apex, truncate at the base (Figure 79 and 80).

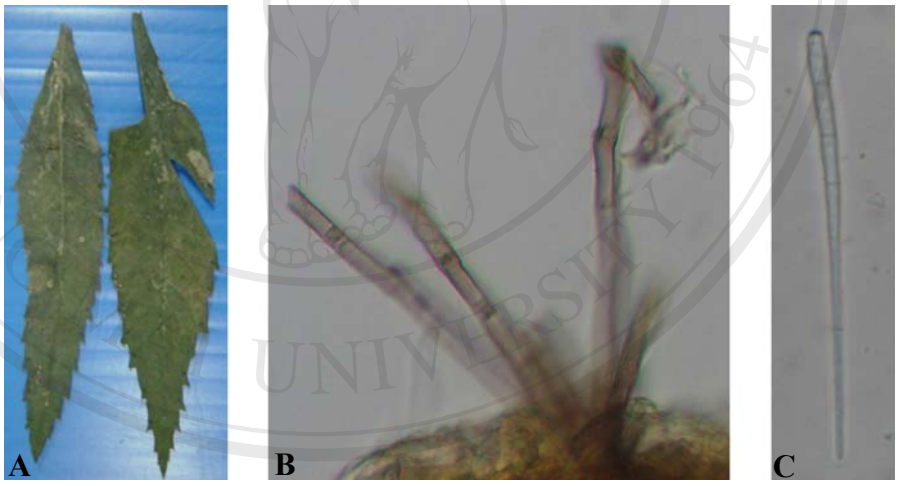

Figure 79 Photograph of *Cercospora tagetis-erectae* on *Tagetes erecta*:
A. Symptom, B. Conidiophores and C. Conidia.

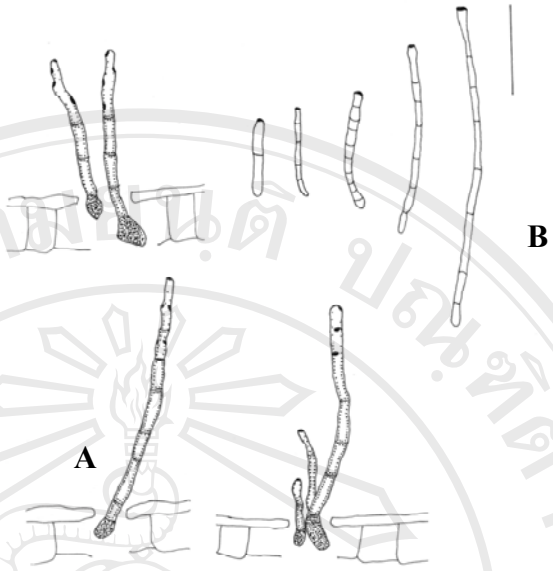

Figure 80 Drawing of *Cercospora tagetis-erectae* on *Tagetes erecta*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Wiang Pa Pao, Chiang Rai Province. Leaves of *Tagetes erecta*, October 31, 2004, JM, CMU MH 030.

Known distribution: India (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora tagetis-erectae* on *Tagetes erecta* in Thailand.

Family Convolvulaaceae

Cercospora convolvuli Tracy and Earle, Bull. Torrey Bot. Club. 28: 187. 1901. [T: NY].

≡ *Passalora convolvuli* (Tracy and Earle) U. Braun and Crous. comb. nov.

≡ *Mycovellosiella convolvuli* (Tracy and Earle) U. Braun, in Braum and Melnik, Trudy Bot. Inst. im. Komarova 20: 52. 1997.

= *Cercospora elongata* Sorok., Rev. Mycol. 12: 54. 1890 (*nom. illeg.*), homonym of *C. elongata* Peck, 1880.

≡ *Cercospora sorokinii* Sace., Syll. Fung. 19: 255. 1910 (*nom. nov*.).

Leaf spots scattered or confluent, distinct, circular, often zonate, small to fairly large, 3.50-4.50 mm in diameter, centre pale tan to dingy grey, with dark or purplish brown margin, sometimes surrounded by a narrow dark brown margin, later greyish brown due to abundant frutification of the fungus. Fruit bodies amphigenous, but abundantly hypophyllous. Mycelium internal; hyphal septate, branched, hyaline. Stromata rudimenrary to slightly to slightly developed, composed of several brown hyphal cells, 12.19-24.39 µm. Conidiophores 4-12 in a divergent fascicle, uniformly subhyaline to hyaline, straight to mildly sinuous, 1-4-septate, (29.26-)46.34-51.21 (-73.17)×4.87-7.31 µm, conidial scars conspicuous. Conidia solitary, acicular, occasionally obclavate, straight to mildly curved, gradually narrowed towards the tip, hyaline, 4-9-septate, non-constricted at the septa, subacute at the apex, truncate at the base, very variable in length, (85.36-)122.19-146.34(-175.60)×4.87 µm, hilum conspicuously thickened, darkened (Figure 81 and 82).

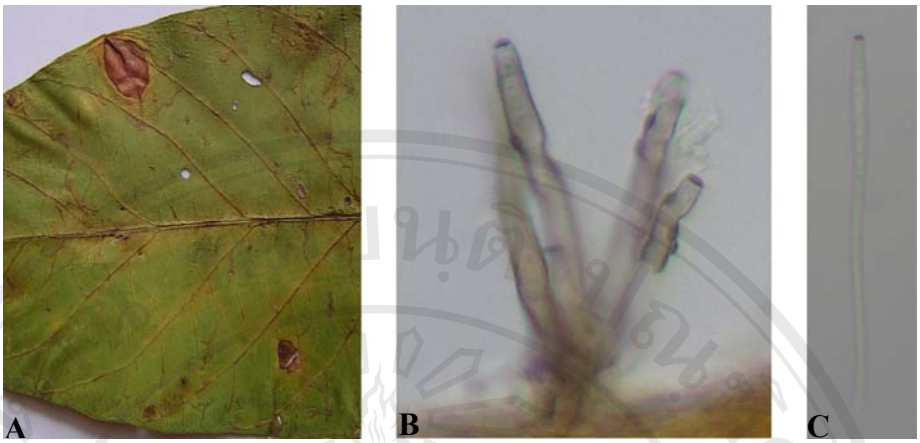

Figure 81 Photograph of *Cercospora convolvuli* on *Ipomoea aquatica*: A. Symptom, B. Conidiophores and C. Conidia.

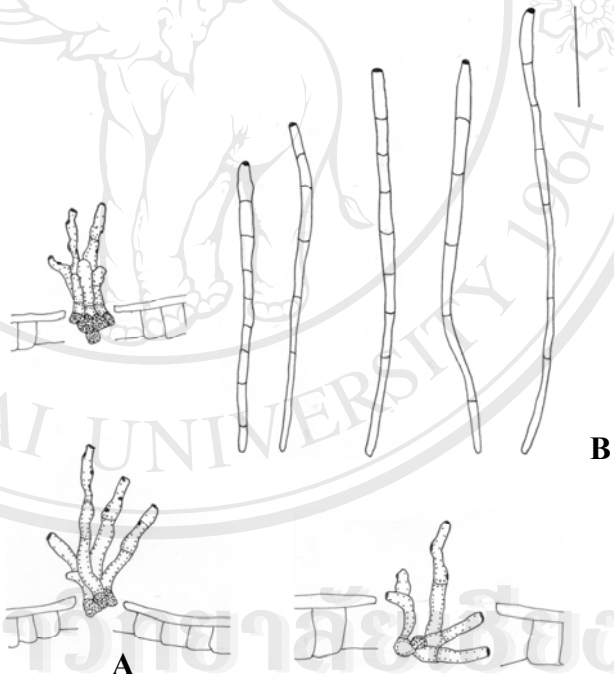

Figure 82 Drawing of *Cercospora convolvuli* on *Ipomoea aquatica*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Ipomoea aquatica*, October 2, 2005, JM, CMU MH 032.

Known distribution: Brazil, Georgia, Italy (Sardinia), Lithuania, U.S.A (LA, MO, WI) and Uzbekistan (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora convolvuli* on *Ipomoea aquatica* in Thailand. The synonymy of *C. Elongata* needs to be confirmed.

Cercospora ipomoeae G. Winter, Hedwigia 26: 34. 1887. [T: Rabenh., Fungi eur. 3585, in numerous herbaria, e.g., B, HAL, HBG].

= *Cercospora viridula* Ellis and Everh., Mycol. 5: 70 (1889)

= *Cercospora alabamensis* G. F. Atk., J. Elisha Mitchell Sci. Soc. 8: 51(1892)

= *Cercospora stuckertiana* Syd. and P. Syd., Mem. Herb. Boissier 8(4): 2(1900)

= *Cercospora* ipomoeae-illustriae Chidd., Ind. Phytopath. 12: 114 (1959)

= *Cercospora* ipomoeae-pes-caprae J. M. Yen and Lim, Bull. Soc. Mycol. Fr. 86 (3): 747(1970)

Leaf spots scattered or confluent, distinct, circular, often zonate, small to fairly large, 1.00-3.00 mm in diameter, centre pale tan to dingy grey, with dark or purplish brown margin, sometimes surrounded by a narrow dark brown margin, later greyish brown due to abundant frutification of the fungus. Fruit bodies amphigenous, but abundantly hypophyllous. Mycelium internal, hyphal septate, branched, hyaline. Stromata rudimenrary to slightly to slightly developed, composed of several brown hyphal cells. Conidiophores 4-12 in a divergent fascicle, usually pale olivaceous brown throughout or sometimes paler towards the apex, 2-4-septate, (19.51-)34.14-68.29(-87.80)×(3.65-)4.87-4.87(-6.09) μm, conidial scars conspicuous, apical or on

small shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular, occasionally obclavate, straight to mildly curved, gradually narrowed towards the tip, hyaline, 3-10-septate, non-constricted at the septa, subacute at the apex, truncate at the base, very variable in length, (29.26-)34.14-102.43(-146.34)×(2.43-)2.43-4.87(-7.31) µm, hilum conspicuously thickened, darkened, and protuberant (Figure 83 and 84).

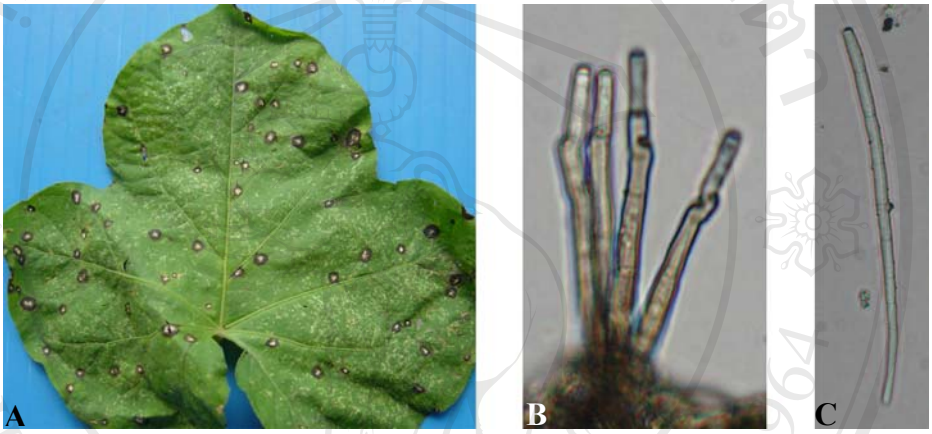

Figure 83 Photograph of *Cercospora ipomoeae* on *Ipomoea nil*: A. Symptom, B. Conidiophores and C. Conidia.

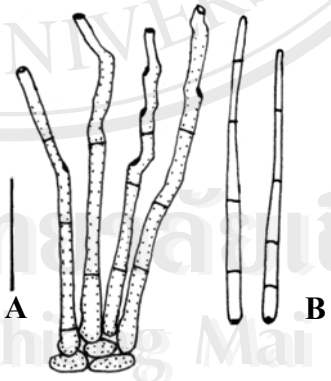

Figure 84 Drawing of *Cercospora ipomoeae* on *Ipomoea nil*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Ipomoea nil*, March 21, 2005, JM, CMU MH 033.

Known distribution: Worldwide, including American Samoa, Antigua and Barbuda, Argentina, Australia, Barbados, Brazil, Brunei, China, Cook Islands, Costa Rica, Cuba, Fiji, Guam, Hong Kong, India, Indonesia, Italy, Ivory Coast, Jamaica, Japan, Kenya, Kiribati, Korea, Malaysia, Marshall Islands, Mauritius, Myanmar, New Caledonia, New Zealand, Pakistan, Panama, Papua New Guinea, Puerto Rico, Samoa, Sierra Leone, Solomon Island, Sudan, Venezuala, Taiwan, Tanzania, U.S.A (AL, GA, FL, HI, IL, IN, KS, MO, NC, NE, NJ, OH, TX, VA) and Vanuatu (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora ipomoeae* on *Ipomoea nil* in Thailand.

Family Brassicaceae

Cercospora brassicicola Henn., Bot. Jahrb. Syst. 37: 166. 1906. [T: B; LEP].

= *Cercospora brassicae-campestris* Rangel, Arq. Mus.Nac., Rio de Janeiro 18: 163. 1917.

≡ *Cercosporina brassicae-campestris* (Rangel) Sacc., Syll. Fung. 25: 899. 1931.

= *Cercospora brassicae-junceae* Sawada (*brassicae-yunciae*), Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 212. 1959 (*nom. nud*.). [T: NYU-PPE, herb. Sawada].

= *Cercospora bloxami auct*. Sensu E. Young, Mycologia 8: 43. 1916.

Leaf spots amphigenous, scattered to confluent, indistinct, subcircular to irregular, fairly large, 3.00-6.00 mm in diameter, pale brown to tan centres with indefinite margins. Fruit bodies amphigenous. Stromata small, rudimentary to slightly

developed, subglobular, brown to dark brown, composed of several brown hyphal cells. Conidiophores 2-15 in a loose fascicle, olivaceous brown or paler towards the upper portion, substraight to slightly curved, usually not branched, but very rarely branched, 1-4 times mildly geniculate, 2-6-septate, (41.46-)63.41-131.70 (-163.41)×(2.43-)3.65-4.87(-7.31) µm, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, obclavate, straight to mildly curved or somewhat undulate in long ones, hyaline, 5-10-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, (47.56-)51.21-87.80(-97.56)×2.43-4.87 µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 85 and 86).

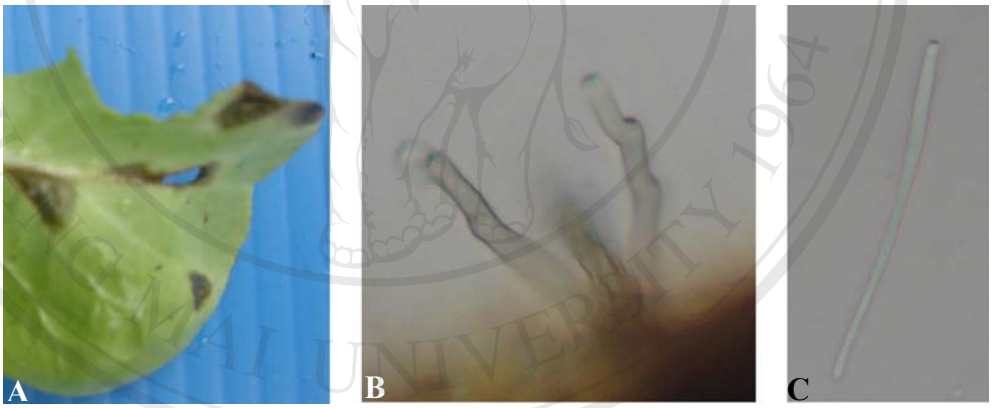

Figure 85 Photograph of *Cercospora barlericola* on *Brarssica pekinensis*:

A. Symptom, B. Conidiophores and C. Conidia.

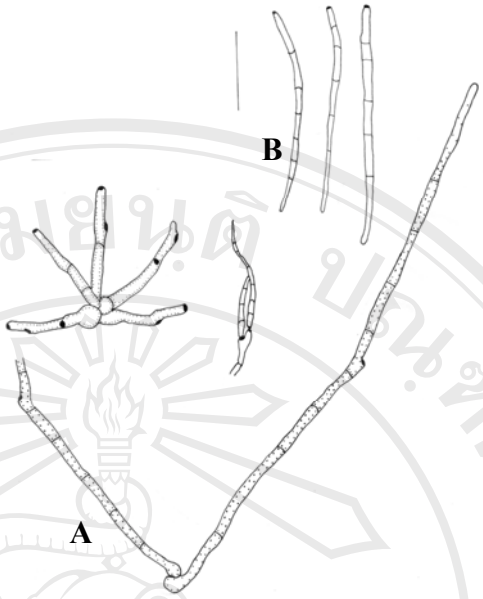

Figure 86 Drawing of *Cercospora barlericola* on *Brarssica pekinensis*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Brarssica pekinensis*, October 31, 2004, JM, CMU MH 034.

Known distribution: Worldwide, including Angola, Armenia, Australia, Belarus, Brazil, China, Colombia, Cuba, Dominican Republ., Estonia, Great Britain, India, Indonesia, Jamaica, Japan, Kazakhstan, Kenya, Korea, Latvia, Lithuania, Malaysia, Malawi, Mauritius, Myanmar, Nigeria, Niue, Papua, New Guinea, Peru, Philippines, Puerto Rico, Russia, Sierra Leone, South Africa, Solomon Islands, Somalia, Sri Lanka, Sudan, Taiwan, Tanzania, Togo, Trinidad, Tobago, Togo, Uganda and Ukraine and U.S.A (AL, CA, DE, FL, GA, HI, IL, IN, LA, MS, NC, NH, NJ, OK, TX, VA) (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora brassicicola* on *Brarssica pekinensis* in Thailand. A true *Cercospora s.str.* is close to *C. apii s. lat.*

Cercospora brassicicola Henn., Bot. Jahrb. Syst. 37: 166. 1906. [T: B; LEP].

= *Cercospora brassicae-campestris* Rangel, Arq. Mus. Nac., Rio de Janeiro 18: 163. 1917.

≡ *Cercosporina brassicae-campestris* (Rangel) Sacc., Syll. Fung. 25: 899. 1931.

= *Cercospora brassicae-junceae* Sawada (*brassicae-yunciae*), Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 212. 1959 (*nom. nud*.). [T: NYU-PPE, herb. Sawada].

= *Cercospora bloxami* auct. Sensu E. Young, Mycologia 8: 43. 1916.

Leaf spots amphigenous, visible on both surfaces, irregularly suborbicular, 2.00-7.00 mm in diameter, pale greenish brown to yellowish yellowish grey at the center, with a brown raised margin. Fruit bodies amphigenous. Mycelium internal, hyphae septate, branched, hyaline. Stromata small, rudimentary to slightly developed, subglobular, brown to dark brown, composed of several brown hyphal cells. Conidiophores loosely fasciculate at the cuticle, olivaceous brown or paler towards the upper portion, substraight to slightly curved, subtruncate at the apex, 2-12-septate, (31.70-)34.14-80.48(-97.56)×(2.43-)3.65-4.87 µm, conidial scars large, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia hyaline, acicular, straight to curved, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, 4-14-septate, (26.82-)43.90-114.63(-148.77)×(2.43-)3.65-4.87(-6.09) µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 87 and 88).

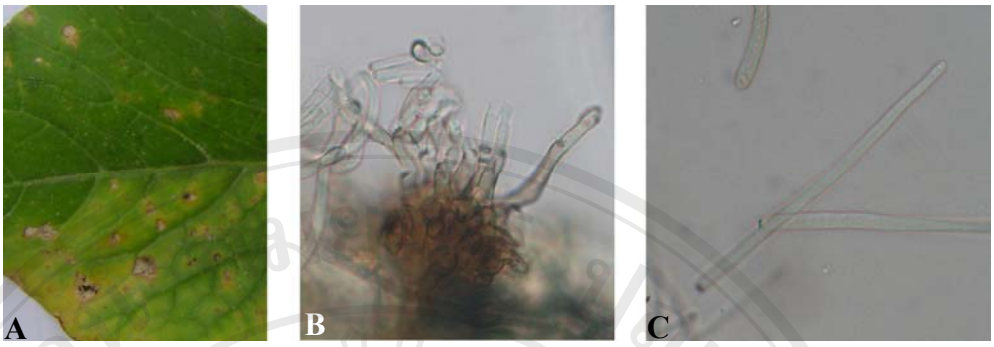

Figure 87 Photograph of *Cercospora barlericola* on *Brassica campestris*: A. Symptom, B. Conidiophores and C. Conidia.

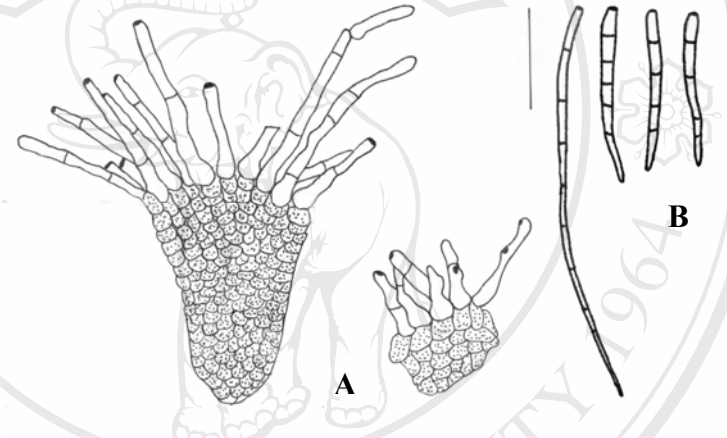

Figure 88 Drawing of *Cercospora barlericola* on *Brassica campestris*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Brassica campestris*, October 15, 2004, JM, CMU MH 035.

Known distribution: Worldwide, including Angola, Armenia, Australia, Belarus, Brazil, China, Colombia, Cuba, Dominican Republ., Estonia, Great Britain, India, Indonesia, Jamaica, Japan, Kazakhstan, Kenya, Korea, Latvia, Lithuania, Malaysia, Malawi, Mauritius, Myanmar, Nigeria, Niue, Papua, New Guinea, Peru, Philippines, Puerto Rico, Russia, Sierra Leone, South Africa, Solomon Islands, Somalia, Sri Lanka, Sudan, Taiwan, Tanzania, Togo, Trinidad and Tobago, Togo, Uganda,

Ukraine and U.S.A (AL, CA, DE, FL, GA, HI, IL, IN, LA, MS, NC, NH, NJ, OK, TX, VA) (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora brassicicola*. on *Brassica campestris* in Thailand. A true *Cercospora s.str.* is close to *C. apii s. lat.*

Cercospora brassicicola Henn., Bot. Jahrb. Syst. 37: 166. 1906. [T: B; LEP].

= *Cercospora brassicae-campestris* Rangel, Arq. Mus. Nac., Rio de Janeiro 18: 163. 1917.

≡ *Cercosporina brassicae-campestris* (Rangel) Sacc., Syll. Fung. 25: 899. 1931.

= *Cercospora brassicae-junceae* Sawada (*brassicae-yunciae*), Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 212. 1959 (*nom. nud*.). [T: NYU-PPE, herb. Sawada].

= *Cercospora bloxami auct. sensu* E. Young, Mycologia 8: 43. 1916.

Leaf spots angular, scattered or aggregated and coalescing in larger areas, at first yellowish green but gradually changing to greyish brown with indefinite margins. Fruit bodies epiphyllous. Mycelium internal, hyphae septate, branched, hyaline. Stromata small, rudimentary to slightly developed, subglobular, brown to dark brown, 8.00-15.00 µm in diameter, composed of several brown hyphal cells. Conidiophores 2-11 in a loose fascicle, pale olivaceous to medium brown or paler towards the upper portion, substraight to slightly curved, usually not branched, but very rarely branched, 1-5 times mildly geniculate, 2-7-septate, (59.04-)76.26-147.60(-159.90)×(3.69-)4.92-6.15(-7.38) µm, conidial scars thickened, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia hyaline, acicular to filiform, shorter ones

obclavate-cylindric, straight to mildly curved or somewhat undulate in long ones, hyaline, 3-13-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, (54.12-)73.80-140.22 (-206.64)×2.46-4.92 µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 89 and 90).

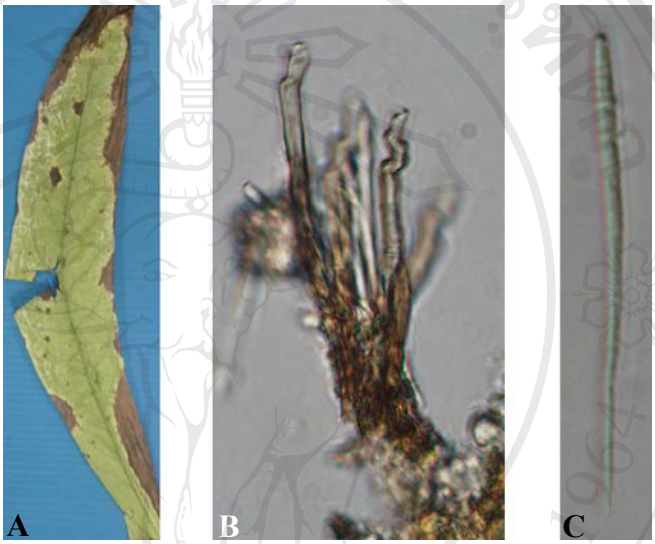

Figure 89 Photograph of *Cercospora barlericola* on *Brassica oleracea*:

A. Symptom, B. Conidiophores and C. Conidia.

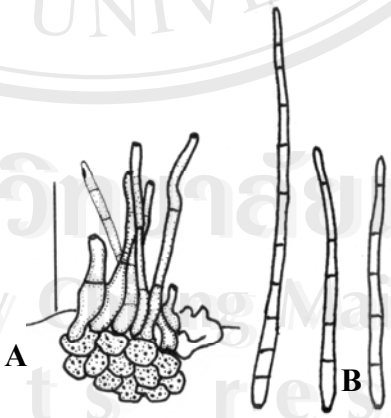

Figure 90 Drawing of *Cercospora barlericola* on *Brassica oleracea*:

A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Brassica oleracea*, October 19, 2005, JM, CMU MH 036.

Known distribution: Worldwide (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora brassicicola* on *Brassica oleracea* in Thailand.

Cercospora beticola Sacc., Nuovo Giorn. Bot. Ital. 8: 189. 1876. [T: PAD].

≡ *Cercosporina beticola* (Sacc.) K. Nakata, T. Nakajima and K. Katimoto, Rep. Agric. Korea 6. 1915.

= *Fusisporium betae* Desm., Ann. Sci. Net., Bot., 2Ser., 19: 434. 1843.

= *Fusarium betae* (Desm.) Sacc., Michelia 2: 132. 1880.

= *Pionnotes betae* (Desm.) Sacc., Syll. Fung. 4: 726. 1886.

= *Cercospora betae* A. B. Frank ex Sacc., Syll. Fung. 10: 637. 1892.

= *Cercospora longissima* Cooke and Eills, Grevillea 17: 65. 1889. [T: K].

= *Cercospora flagelliformis* Ellis and Halst., New Jersey Agric. Coll. exp. Sta., Annual Rep. 11: 355. 1890. [T: NY].

= *Cercospora anthelmintica* G. F. Atk., J. Elisha Mitchell Sci. Soc. 8: 48. 1892. [T: CUP].

= *Cercospora spinaciae* Oudem., Ned. Kruidk. Arch. III, 2: 324. 1900. [T: L].

= *Cercospora chenopodiicola* Bres., Hedwigia 39: 328. 1900. [T: Krieger, Fungi sax. 1631, e.g., HAL, LEP].

= *Cercosporina spinaciicola* Sacc., Nuovo Giorn. Bot. Ital., N. S.,

22: 73. 1915.

= *Cercospora* beticola var. Poonensis Chidd., Sydowia 13: 153. 1959 (*nom. inval.*). [T: BPI; HCIO; IMI]. (= *Cercospora apii s.lat*.).

Leaf spots scattered, often confluent, circular, 2.00-4.00 mm in diameter, at first appearing dirty brown with definite dark brown border, later centre becoming whitish grey, finally turning reddish brown or purplish brown at the margin. Fruit bodies amphigenous, but chiefly epiphyllous. Mycelium internal, hyphae septate, branched, hyaline. Stromata rudimentary to slightly developed. Conidiophores densely fasciculate, pale brown at the base, paler upwards, nearly subhyaline at the apex, 1-4-septate, rarely geniculate towards the apex, weakly to mildly attenuated, 29.52-98.40×2.46-3.69 µm, conidial scars conspicuous, thickened and darkened, apical or on shoulders of conidiogenous cells caused by geniculation, usually concentrated in the apical portion. Conidia solitary, filiform to acicular, straight to mildly curved, hyaline, 3-10-septate, non-constricted at the septa, obtuse to subacute at the apex, subtruncate at the base, greatly variable in length, 36.90-93.48×2.46-3.69 µm, hilum conspicuously thickened, darkened. (Figure 91 and 92).

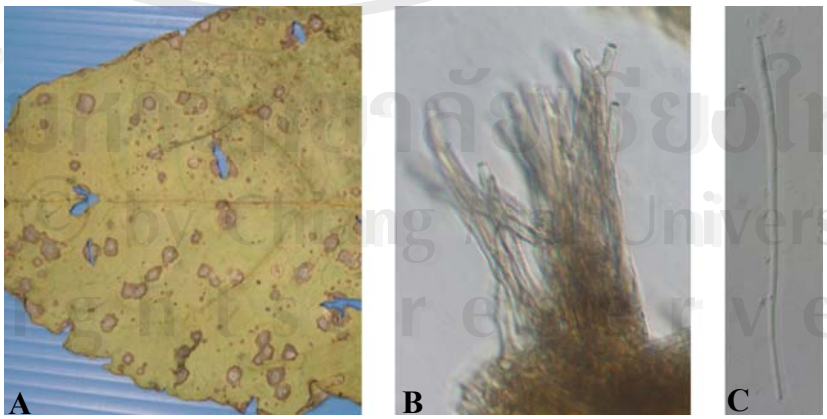

Figure 91 Photograph of *Cercospora beticola* on *Spinacia oleracea*: A. Symptom, B. Conidiophores and C. Conidia.

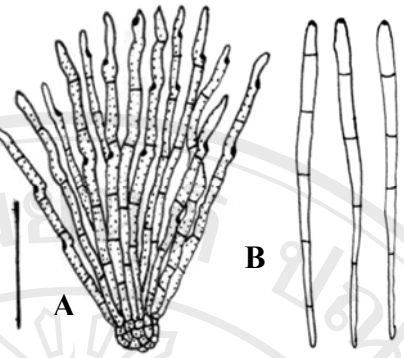

Figure 92 Drawing of *Cercospora beticola* on *Spinacia oleracea*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Spinacia oleracea*, October 10, 2005, JM and Iman Hidayat, CMU MH 037.

Known distribution: Worldwide, including Afghanistan, Algeria, Angola, Armenia, Antigua and Barbuda, Argentina, Australia, Austria, Bangladesh, Barbados, Belarus, Belgium, Bermuda, Bosnia and Herzegovina, Brazil, Bulgaria, Cambodia, Canada, Chile, China, Colombia, Congo, Costa Rica, Croatia, Cuba, Cyprus, Czech Republ., Denmark, Dominican Republ., Egypt, El Salvador, Estonia, Ethiopia, France, Georgia, Germany, Great Britain, Greece, Guatemala, Guyana, Haiti, Honduras, Hong Kong, Hungary,India, Indonesia, Israel, Italy, Ivory Coast, Iran, Iraq, Ireland, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kirghizia, Korea, Latvia, Laos, Lebanon, Libya, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Malta, Mauritius, Mexico, Morocco, Mozambique, Nepal, Netherlands, New Calwdonia, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Portugal, Puerto Rico, Romania, Russia, Saudi Arabia, Senegal, Sierra Leone, Slovakia, Slovenia, Somalia, South Africa, Spain, Sri Lanka,

Saint Vincent and the Grenadines, Sudan, Sweden, Switzerland, Syria, Taiwan, Tanzania, Togo, Trinidad, Tobago, Tunisia, Turkey, Ukraine, Uruguay, U.S.A (AL, AR, AZ, CA, CO, Easterm states, FL, HI, IA, IL, IN, MA, MD, MI, MN, MS, MT, NC, ND, NE, NM, OH, OK, SD, TX, WI, WY), Venezuela, Virgin Islands, Yemen, Yugoslavia, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora beticola* on *Spinacia oleracea* in Thailand. Numerous additional hosts have been reported in the literature.

Cercospora brassicicola Henn., Bot. Jahrb. Syst. 37: 166. 1906. [T: B; LEP].

= *Cercospora brassicae-campestris* Rangel, Arq. Mus. Nac., Rio de Janeiro 18: 163. 1917.

≡ *Cercosporina brassicae-campestris* (Rangel) Sacc., Syll. Fung. 25: 899. 1931.

= *Cercospora brassicae-junceae* Sawada (*brassicae-yunciae*), Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 212. 1959 (*nom. nud*.). [T: NYU-PPE, herb. Sawada].

= *Cercospora bloxami* auct. Sensu E. Young, Mycologia 8: 43. 1916.

Leaf spots epiphyllous, distinct, circular to subcircular, 2.00-6.00 mm in diameter, pale yellowish to tan centres with dark brown margins. Fruit bodies amphigenous. Stromata small, composed of several brown hyphal cells. Conidiophores 2-7 in a loose fascicle, olivaceous brown or paler towards the upper portion, substraighr to slightly curved, usually not branched, but very rarely branched, 1-8 times mildly geniculate, 1-3-septate, (17.07-)21.95-51.21(-68.29)×(3.65-)4.87-4.87(-7.31) µm, conidial scars large. Conidia acicular-filiform, hyaline, 3-14-septate,

non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, (29.26-)39.02-51.21(-58.53)×4.87-7.31 µm, hilum conspicuously thickened, darkened. (Figure 93 and 94).

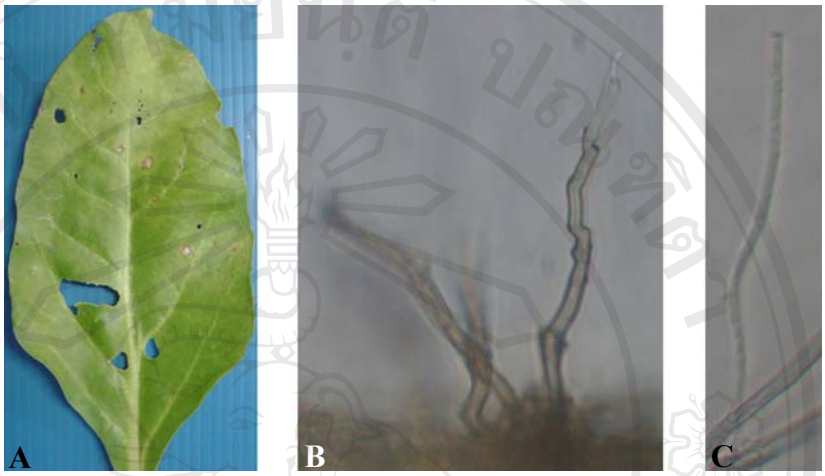

Figure 93 Photograph of *Cercospora brassicicola* on *Brassica rapa*: A. Symptom, B. Conidiophores and C. Conidia.

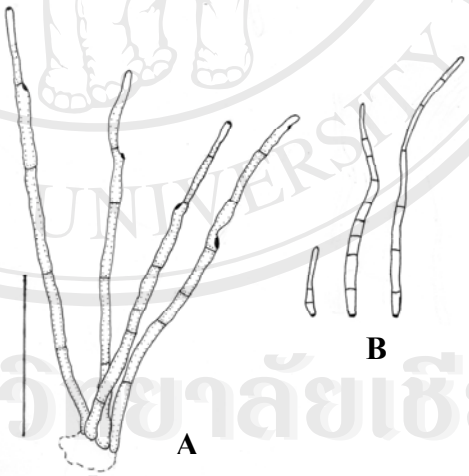

Figure 94 Drawing of *Cercospora brassicicola* on *Brassica rapa*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Faculty of Agriculture, Chiang Mai University, Chiang Mai Province. Leaves of *Brassica rapa*, November 9, 2005, JM, CMU MH 038.

Known distribution: Worldwide including Angola, Armenia, Australia, Belarus, Brazil, China, Colombia, Cuba, Dominican Republ., Estonia, Great Britain, India, Indonesia, Jamaica, Japan, Kazakhstan, Kenya, Korea, Latvia, Lithuania, Malaysia, Malawi, Mauritius, Myanmar, Nigeria, Niue, Papua, New Guinea, Peru, Philippines, Puerto Rico, Russia, Sierra Leone, South Africa, Solomon Islands, Somalia,Sri Lanka, Sudan, Taiwan, Tanzania, Togo, Trinidad and Tobago, Togo, Uganda, Ukraine and U.S.A (AL, CA, DE, FL, GA, HI, IL, IN, LA, MS, NC, NH, NJ, OK, TX, VA) (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora brassicicola* on *Brassica rapa* in Thailand. A true *Cercospora s.str*. is close to *C. apii s. lat.*

Cercospora brassicicola Henn., Bot. Jahrb. Syst. 37: 166. 1906. [T: B; LEP].

= *Cercospora brassicae-campestris* Rangel, Arq. Mus. Nac., Rio de Janeiro 18: 163 (1917).

≡ *Cercosporina brassicae-campestris* (Rangel) Sacc., Syll. Fung. 25: 899 (1931).

= *Cercospora brassicae-junceae* Sawada, Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 212 (1959).

= *Cercospora bloxami auct. sensu* E.Young, Mycologia 8: 43 (1916).

Leaf spots white to grayish white at the center with brown border, distinct, circular to subcircular, 1.00-9.00 mm in diameter. Fruit bodies amphigenous. Stromata pale brown, composed of a few large brown cells or large and loose hyphal masses, 12.30-41.82 μm in diameter. Conidiophores loose fascicule, pale brown, pale to apex, simple, occasionally branched, straight or geniculate, with thickened conidial

scars at shoulder, 0-4-septate, (14.76-)22.14-63.96(-83.64)×3.69-6.15 µm. Conidia acicular, straight to mildly curved, hyaline, smooth, thickened and truncate basal end, (19.68-)39.36-137.76(-184.50)×(1.23-)2.46-4.92(-5.41) µm, 1-10-septate. (Figure 95 and 96).

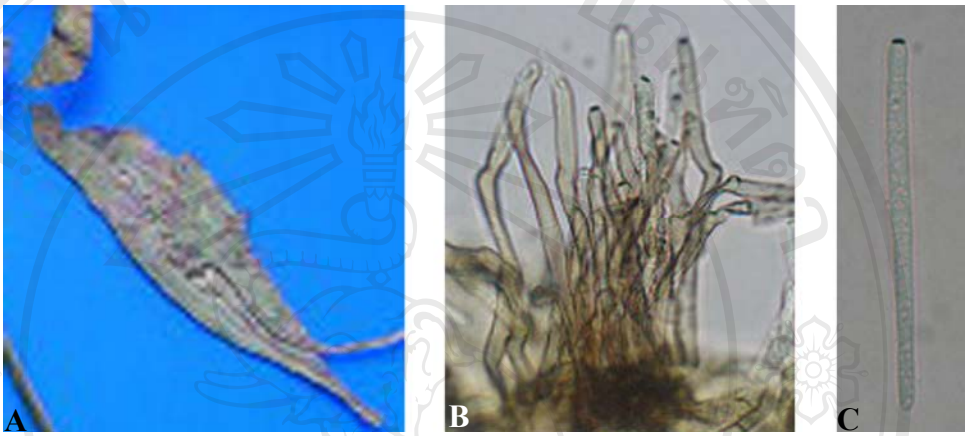

Figure 95 Photograph of *Cercospora brassicicola* on *Brassica juncea*:

A. Symptom, B. Conidiophores and C. Conidia.

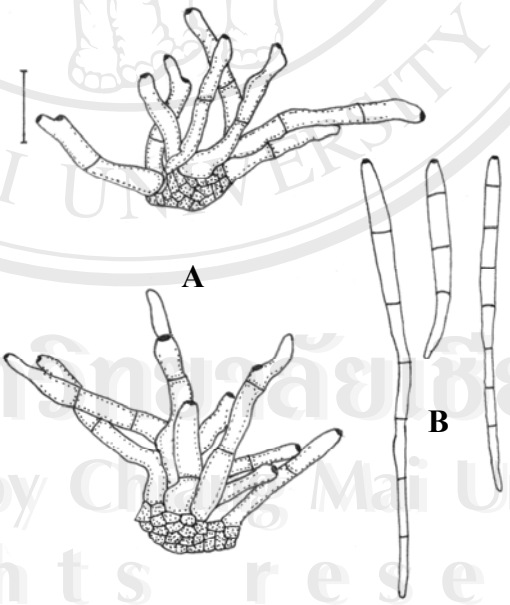

Figure 96 Drawing of *Cercospora brassicicola* on *Brassica juncea*:

A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Brassica juncea*, November 21, 2004, CN and JM, CMU MH 039.

Known distribution: Worldwide, including Angola, Armenia, Australia, Belarus, Brazil, China, Colombia, Cuba, Dominican Republ., Estonia, Great Britain, India, Indonesia, Jamaica, Japan, Kazakhstan, Kenya, Korea, Latvia, Lithuania, Malaysia, Malawi, Mauritius, Myanmar, Nigeria, Niue, Papua, New Guinea, Peru, Philippines, Puerto Rico, Russia, Sierra Leone, South Africa, Solomon Islands, Somalia, Sri Lanka, Sudan, Taiwan, Tanzania, Togo, Trinidad, Tobago, Togo, Uganda, Ukraine and U.S.A (AL, CA, DE, FL, GA, HI, IL, IN, LA, MS, NC, NH, NJ, OK, TX, VA) (Crous and Braun, 2003).

Notes: Hitherto Known. This is the first report of *Cercospora brassicicola* on *Brassica juncea* in Thailand. A true *Cercospora s.str.* is close to *C. apii s. lat.*

Cercospora brassicicola Henn., Bot. Jahrb. Syst. 37: 166. 1906. [T: B; LEP].

= *Cercospora brassicae-campestris* Rangel, Arq. Mus. Nac., Rio de Janeiro 18: 163. 1917.

≡ *Cercosporina brassicae-campestris* (Rangel) Sacc., Syll. Fung. 25: 899. 1931.

= *Cercospora brassicae-juncea* Sawada (*brassicae-yunciae*), Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 212. 1959 (*nom. nud*.). [T: NYU-PPE, herb. *Sawada*].

= *Cercospora bloxami auct. sensu* E. Young, Mycologia 8: 43. 1916.

Leaf spots white to grey at the center with brown border, distinct, subcircular to irregular, 1.00-9.00 mm in diameter. Stromata small, composed of a few swollen,

brown hyphal cells. 12.30-41.82 µm in diameter. Conidiophores arising from the upper part of stromata, densely fascicular, pale brown, simple, straight with thickened conidial scars at shoulder, 1-5-septate, (29.26-)31.70-75.60(-126.82)×(2.43-)4.87-4.87(-7.31) µm. Conidia obclavate to acicular, straight to mildly curved, hyaline, smooth, hilum conspicuously thickened, darkened, 3-9-septate, (24.39-)39.02-87.80 (-109.75)×4.87-7.31 µm, 3-10-septate (Figure 97 and 98).

Figure 97 Photograph of *Cercospora brassicicola* on *Brassica alboglabra*: A. Symptom, B. Conidiophores and C. Conidia.

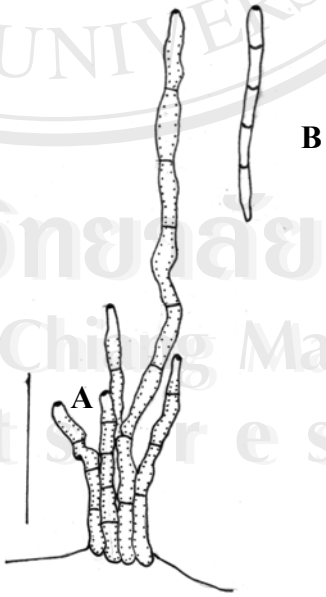

Figure 98 Drawing of *Cercospora brassicicola* on *Brassica alboglabra*:

A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Faculty of Agriculture, Chiang Mai University, Chiang Mai Province. Leaves of *Brassica alboglabra*, January 19, 2005, JM, CMU MH 040.

Known distribution: Worldwide, including Angola, Armenia, Australia, Belarus, Brazil, China, Colombia, Cuba, Dominican Republ., Estonia, Great Britain, India, Indonesia, Jamaica, Japan, Kazakhstan, Kenya, Korea, Latvia, Lithuania, Malaysia, Malawi, Mauritius, Myanmar, Nigeria, Niue, Papua, New Guinea, Peru, Philippines, Puerto Rico, Russia, Sierra Leone, South Africa, Solomon Islands, Somalia, Sri Lanka, Sudan, Taiwan, Tanzania, Togo, Trinidad and Tobago, Togo, Uganda, Ukraine and U.S.A (AL, CA, DE, FL, GA, HI, IL, IN, LA, MS, NC, NH, NJ, OK, TX, VA) (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora brassicicola* on *Brassica alboglabra* in Thailand. A true *Cercospora s.str.* is close to *C. apii s. lat.*

Family Cucurbitaceae

Cercospora citrullina Cooke Grevillea 12: 31 (1883)

= *Cercospora cucurbitae* Ellis and Everh., J. Mycol. 4: 3. 1883.

= *Cercospora sechii* J. A. Stev., Puerto Rico Agric. exp. Sta. Rep. 1917-1918: 137. 1919.

= *Cercospora momordicae* McRae, Ann. Cryptog. Exot. 2: 267. 1929.

= *Cercospora trichosanthis* McRae, Ann. Cryptig. Exot. 2: 270. 1929.

= *Cercospora luffae* Hara, Diseases of cultivated plants: 228. 1928.

= *Cercospora chardoniana* Chupp, Monogr. Univ. Puerto Rico, B, 2: 245. 1934.

= *Cercospora momordicae* Mend., Philipp. J. Sci. 75: 173. 1941. (*mom. illeg*.), homonym of *C. momordicae* McRae, 1929.

= *Cercospora momordicae* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 86: 173. 1943 (*nom. inval.*), homonym of *C. momordicae* McRae, 1929. (=*Cercospora apii s.lat*.).

Leaf spots amphigenous, scattered to confluent, distinct, circular to irregular, 1.00-8.00 mm in diameter, when coalescent, initially appearing pale brown to tan, later centre becoming greyish brown to greyish white yellowish brown to dark brown or sometimes purplish margins. Fruit bodies amphigenous, but mostly epiphyllous. Sromata small, rudimentary to poorly developed, brown to dark brown, sub-globular to irregular, 24.39-48.78 μm in diameter, composed of a few brown hyphal cells. Conidiophores 3-18 in a divergent fascicle, mostly emerging through the cuticle, or sometimes from 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, 1-6 times abruptly or mildly geniculate, usually not branched, but occationally branched, 1-9-septate, very variable in length, (65.85-)70.73-92.68(-99.99)×4.87-4.87(-6.09) μm, conidial scars large, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular-filiform to obclavate-cylindric, straight to mildly curved, hyaline, 2-18-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, (15.85-)112.19-165.85(-202.43)×(2.43-)3.65-4.87 μm, hilum conspicuously thickened, darkened and non-protuberant (Figure 99 and 100).

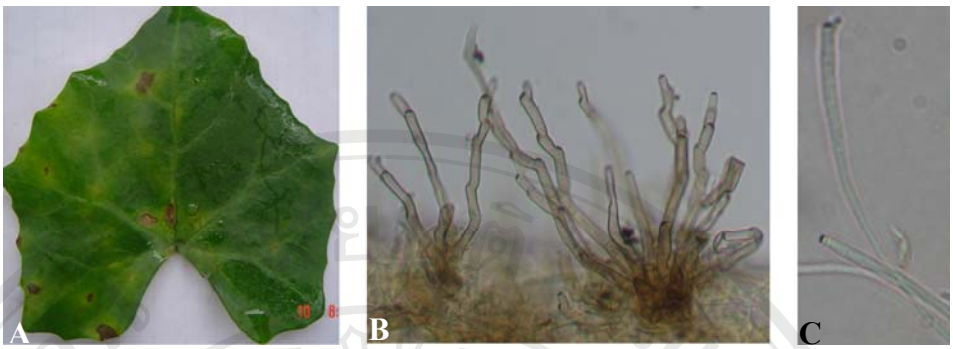

Figure 99 Photograph of *Cercospora citrullina* on *Coccinia grandis*: A. Symptom, B. Conidiophores and C. Conidia.

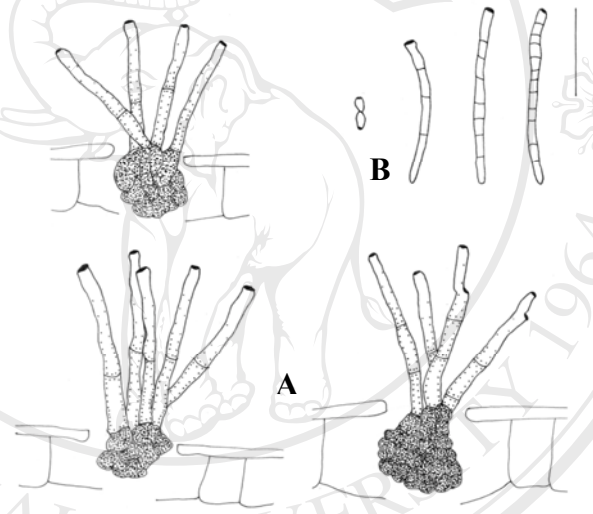

Figure 100 Drawing of *Cercospora citrullina* on *Coccinia grandis*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Faculty of Agriculture, Chiang Mai University, Chiang Mai Province. Leaves of *Coccinia grandis*, January 19, 2005, JM, CMU MH 041.

Known distribution: Wordwide, where the host plants are cultivated or growing, including American Samoa, Argentina, Austria, Banggladesh, Barbados, Belize, Bolivia, Brazil, Brunei, Bulgaria, Cambodia, Canada, Chile, China, Cook Island, Costa Rica, Cuba, Czech Republ., Denmark, Dominican Republ., El Salvador,

Ethiopia, Fiji, French Polynesia, Gabon, Georgia, Germany, Ghana, Great Britain, Greece, Guam, Hong Kong, India, Indonesia, Iran, Iraq, Ireland, Israel, Israel, Italy, Jamaica, Japan, Kenya, Korea, Laos, Malawi, Malaysia, Mauritius, Mexico, Morocco, Myanmar, Nepal, Netherlands, New Caledonia, New Zea-land, Nicaragua, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Pitcairn Island, Poland, Puerto Rico, Romania, Russia, Samoa, Saudi Arabia, Solomon Islands, Somalia, South Africa, Sri Lanka, Sweden, Switzerland, Sudan, Taiwan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Uganda, Ukraine, UK, U.S.A (AL, DE, FL, GA, HI, IA, IL, IN, KS, MD, NC, NJ, NY, OH, OK, SC, SD, TX, WI, WV), Vanuatu, Venezuela, Virgin Islands, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: *Cercospora citrullina* has been previously recorded in Thailand (Petcharat and Kanjanamaneesathian, 1989)

Cercospora cucurbitacea Ellis and B.T. Galloway, U.S.D.A. Dept. Bull. 1366: 40. 1926 (*nom. nud*.).

Leaf spots visible on both surfaces, irregular, 2.00-10.00 mm in diameter, often angular, greyish white, usually but not always with a narrow brown margin and sometime with narrow brown line zonation. Fruit bodies amphigenous, but mostly epiphyllous, densely distributed all over the spot. Stromata lacking to small, rudimentary to poorly developed, brown to dark brown, sub-globular to irregular, 3.00-9.00 µm in diameter, composed of a few brown hyphal cells. Conidiophores 3-12 in a divergent fascicle, mostly emerging through the cuticle, pale olivaceous brown or sometimes paler towards the apex, straight to slightly curved, 1-5 times abruptly or mildly geniculate, usually not branched, but occationally branched, 2-5-septate, very

variable in length, (-31.70-)48.78-104.87(-121.95)×(2.43-)3.65-6.09(-7.31) µm, conidial scars conspicuous, apical or on shoulders of conidiogrnous cells caused by geniculation. Conidia solitary, acicular-filiform to obclavate-cylindric, straight to mildly curved, hyaline, 4-9-septate, non-constricted at the septa, obtuse to subobtuse at the apex, truncate to subtruncate at the base, (26.82-)60.97-139.02(-170.73)×(2.43-) 3.65-6.09(-7.31) µm, hilum conspicuously thickened, darkened, and non-protuberant (Figure 101 and 102).

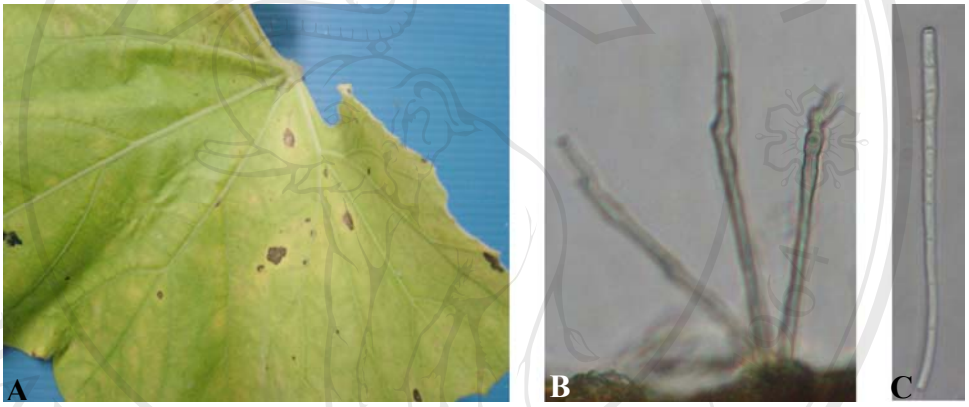

Figure 101 Photograph of *Cercospora cucurbitacea* on *Cucurbita moschata*: A. Symptom, B. Conidiophores and C. Conidia.

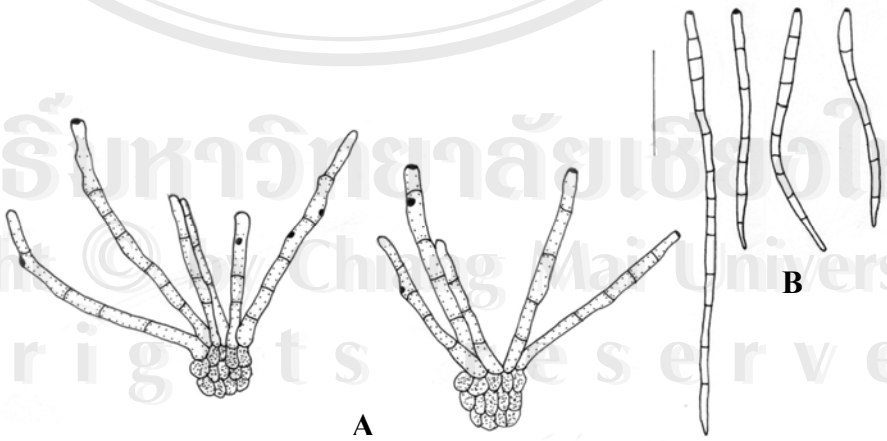

Figure 102 Drawing of *Cercospora cucurbitacea* on *Cucurbita moschata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Faculty of Agriculture, Chiang Mai University, Chiang Mai Province. Leaves of *Cucurbita moschata*, January 19, 2005, JM, CMU MH 042.

Known distribution: U.S.A (AL) and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora cucurbitacea* on *Cucurbita moschata* in Thailand.

Cercospora citrullina Cooke Grevillea 12: 31 (1883)

= *Cercospora cucurbitae* Ellis and Everh., J. Mycol. 4: 3. 1883.

= *Cercospora sechii* J. A. Stev., Puerto Rico Agric. exp. Sta. Rep. 1917-1918: 137. 1919.

= *Cercospora momordicae* McRae, Ann. Cryptog. Exot. 2: 267. 1929.

= *Cercospora trichosanthis* McRae, Ann. Cryptig. Exot. 2: 270. 1929.

= *Cercospora luffae* Hara, Diseases of cultivated plants: 228. 1928.

= *Cercospora chardoniana* Chupp, Monogr. Univ. Puerto Rico, B, 2: 245. 1934.

= *Cercospora momordicae* Mend., Philipp. J. Sci. 75: 173. 1941. (*mom. illeg*.), homonym of *C. momordicae* McRae, 1929.

= *Cercospora momordicae* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 86: 173. 1943 (*nom. inval*.), homonym of *C. momordicae* McRae, 1929. (=*Cercospora apii s.lat*.).

Leaf spots amphigenous, distinct to irregular, 2.00-7.00 mm in diameter, at first greenish yellow, they turn greyish yellow, finally becoming dark grey in colour. Fruit bodies amphigenous, but mostly epiphyllous. Sromata very large, brown to dark

brown, sub-globular to irregular. Conidiophores 3-11 in a divergent fascicle, olivaceous brown or sometimes paler towards the apex, straight, 2-6-septate, (21.95-) 41.46-85.36(-104.87)×4.87-6.09(-7.31) µm, conidial scars conspicuous. Conidia obclavate, hyaline, 3-10-septate, straight to mildly curved, obtuse to subobtuse at the apex, truncate to subtruncate at the base, very variable in length, (29.26-)34.14-102.43(-146.34)×2.43-4.87(-7.31) µm, hilum conspicuously thickened and darkened (Figure 103 and 104).

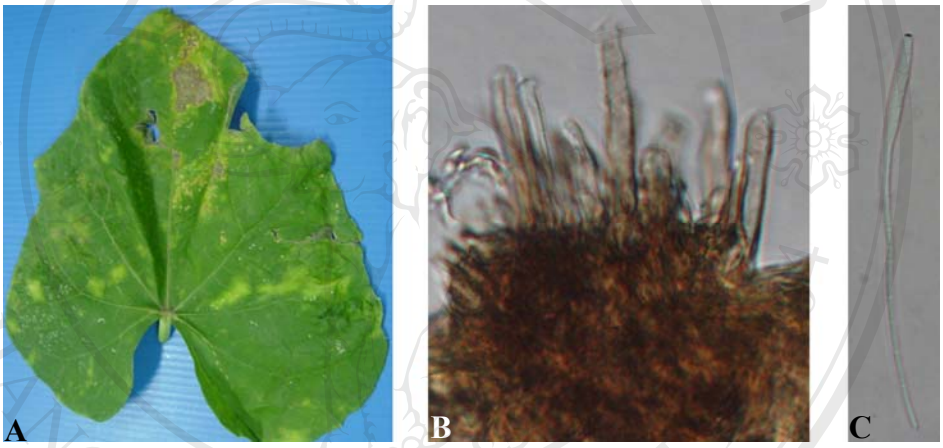

Figure 103 Photograph of *Cercospora citrullina* on *Sechium edule*: A. Symptom, B. Conidiophores and C. Conidia.

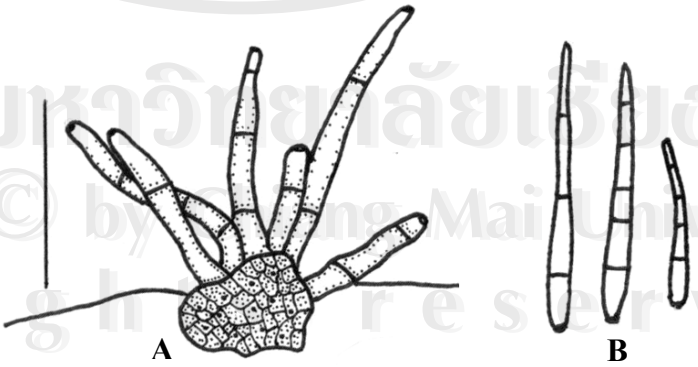

Figure 104 Drawing of *Cercospora citrullina* on *Sechium edule*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Sechium edule*, December 19, 2005, JM, CMU MH 043.

Known distribution: Wordwide where the host plants are cultivated or growing, including American Samoa, Argentina, Austria, Banggladesh, Barbados, Belize, Bolivia, Brazil, Brunei, Bulgaria, Cambodia, Canada, Chile, China, Cook Island, Costa Rica, Cuba, Czech Republ., Denmark, Dominican Republ., El Salvador, Ethiopia, Fiji, French Polynesia, Gabon, Georgia, Germany, Ghana, Great Britain, Greece, Guam, Hong Kong, India, Indonesia, Iran, Iraq, Ireland, Israel, Israel, Italy, Jamaica, Japan, Kenya, Korea, Laos, Malawi, Malaysia, Mauritius, Mexico, Morocco, Myanmar, Nepal, Netherlands, New Caledonia, New Zea-land, Nicaragua, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Peru, Philip-pines, Pitcairn Island, Poland, Puerto Rico, Romania, Russia, Samoa, Saudi Arabia, Solomon Islands, Somalia, South Africa, Sri Lanka, Sweden, Switzerland, Sudan, Taiwan, Tanzania, Togo, Tonga, Trinidad and Tobago, Uganda, Ukraine, UK, U.S.A (AL, DE, FL, GA, HI, IA, IL, IN, KS, MD, NC, NJ, NY, OH, OK, SC, SD, TX, WI, WV), Vanuatu, Venezuela, Virgin Islands, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora citrullina* on *Sechium edule* in Thailand.

Family Dioscoreaceae

Pseudocercospora carbonacea (L. E. Miles) N. Pons and B. Sutton, Mol. Pap. 160: 26. 1988.

≡ *Cercospora carbonacea* L. E. Miles, Trans. Illinois Acad. Sci. 10: 255. 1917. [T: IMI 255657; NY].

Leaf spots on the surface scattered to confluent, distinct, angular, dark brown, without definite margins, 2.00-19.00 mm in diameter. Stromata moderately developed, emerging through stomata or erumpent through the cuticle, 24.60-63.96 µm in diameter. Conidiophores arising from the upper part of stromata, densely fascicular, pale brown, with indistinct conidial scars, 2-8-septate, (22.14-)29.52-81.18 (-100.86)×(2.46-)2.95-4.92 µm. Conidia solitary, cylindric-obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum small thickened, darkened, (43.05-)56.58-110.70(-130.38)×2.46-4.92 µm, 4-14-septate, obtuse at the apex, subtruncate or obconically truncate at the base (Figure 105 and 106).

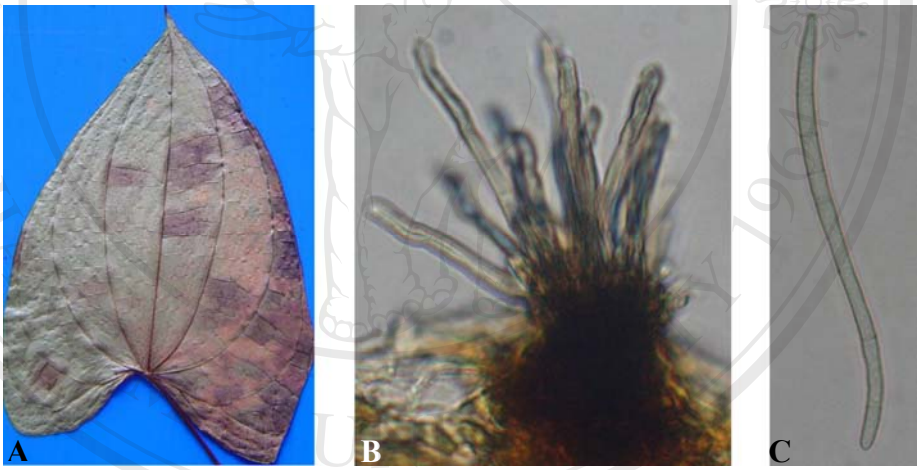

Figure 105 Photograph of *Pseudocercospora carbonacea* on *Dioscorea glabra* var. *glabra*: A. Symptom, B. Conidiophores and C. Conidia.

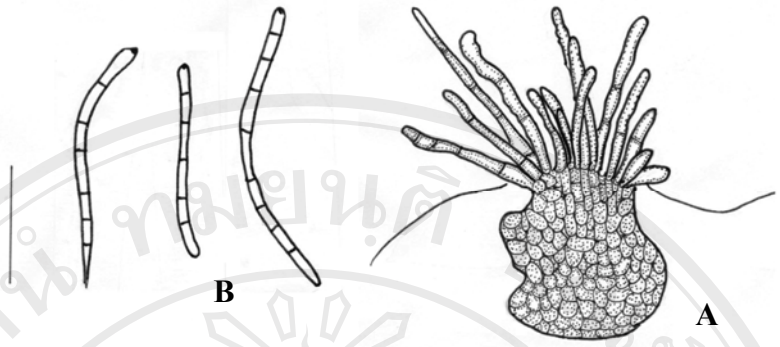

Figure 106 Drawing of *Pseudocercospora carbonacea* on *Dioscorea glabra* var. *glabra*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Queen Sirikit Botanical Garden, Chiang Mai Province. Leaves of *Dioscorea glabra* var. *glabra*, November 20, 2004, CN and JM, CMU MH 044.

Known distribution: Thailand, Barbados, Brabados, Brazil, Canada, Cuba, Dominican Republ., Ethiopia, French Antilles, Ghana, Grenada, Guinea, Haiti, India, Indonesia, Jamaica, Myanmar, Nigeria, Panama, Puerto Rico, Sierra Leone, Saint Lucia, Saint Vincent and the Grenadines, Tanzania, Togo, Trinidad, Tobago, Venezuela and Virgin Islands (Crous and Braun, 2003).

Notes: This is the first report of *Pseudocercospora carbonacea* on *Dioscorea glabra* var. *glabra* in Thailand.

Pseudocercospora contraria (Syd. and P. Syd.) Deighton, Mycol. Pap. 140: 30. 1976.

≡ *Cercospora contraria* Syd. and P. Syd., Ann. Mus. Congo, Bot., Ser. V, 3: 21. 1909. [T: B; BR; IMI 91059]

= *Cercospora wildemanii* Syd. and P. Syd., Ann. Mus. Congo, Bot., Ser. V, 3: 21. 1909. [T: BR; IMI 90862].

Teleomorph.: *Mycosphaerella contraria* Hansf., Proc. Linn. Soc. London 153: 22. 1941.

Leaf spots amphigenous, distinct, circular to irregular, 2.00-8.00 mm in diameter brownish grey to dingy grey, centre greyish brown with dark brow margins. Fruit bodies body epiphyllous. Mycelium internal, hyphae septate, branched, hyaline, 2.00-3.50 µm in diameter. Stromata medium, blackish brown, 12.00-45.00 µm in diameter, composed of several swollen hyphal cells. Conidiophores fascicle, emerging through the cuticle, olivaceous brown to brown throughout, straight to slightly curved, usually not geniculate, 3-5-septate, (24.39-)31.70-85.36(-117.07)×(3.65-)4.87-4.87 (-7.31) µm, conidial scars inconspicuous. Conidia solitary, cylindric-obclavate to cylindric, straight to substraight, subhyaline to very pale olivaceous brown, 3-10-septate, non-constricted at the septa, obtuse to subobtuse at the apex, obconically truncate to subtruncate at the base, (46.34-)48.78-85.36(-124.38)×3.65-4.87 µm, hilum unthickened, not darkened (Figure 107 and 108).

Figure 107 Photograph of *Pseudocercospora contraria* on *Dioscorea alata*: A. Symptom, B. Conidiophores and C. Conidia.

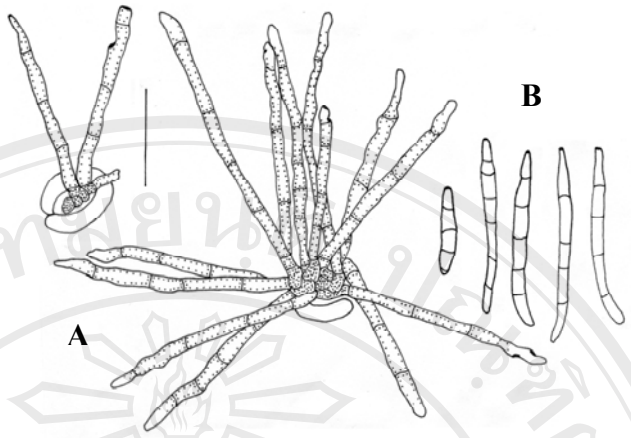

Figure 108 Drawing of *Pseudocercospora contraria* on *Dioscorea alata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Dioscorea alata*, November 28, 2005, JM, CMU MH 045.

Known distribution: Brazil, Cameroon, China, Congo, Ghana, Guinea, India, Indonesia, Japan, Java, Korea, Nigeria, Sierra Leone, Sudan, Tanzania, Togo and Uganda (Crous and Braun, 2003).

Notes: This is the first report of *Pseudocercospora contraria* on *Dioscorea alata* in Thailand. The previous record of this species from Korea was made by Kim and Shin (2001). They provided the detailed description and illustration for the Korean material. 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 65.00 µm along, conidia cylindric to obcalvate, 2-22-septate, 35.00-114.00×4.00-7.00 µm, commonly 5.00-6.00 µm in diameter.

Chinese material (Hsieh and Guo, 1990) possessed chiefly hypophyllous fructification. *P. ubi* (Racib) Deighton and *P. cylindrata* (Chupp and Linder) Pons and

B. Sutton on *Dioscorea* are distinct from this species. Therefore, the Korean collection is very is 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. contralia* (Chupp, 1954) was described as having conidiophores in dense fascicles, 10.00-50.00×4.50-5.00 µm, and cylindric, occasionally catenate conidia, 20.00-120.00×5.00-8.00 µm.

C. wildemanii was reported (Chupp, 1954) as follows: Conidiophore aseptate, 5.00-25.00×4.00-6.00 µm, conidia straight to strongly curved, 40.00-120.00×5.00-6.50 µm. However, Deighton (1976) reallocated the two *Cercospora* species into *Pseudocercospora* as synonyms of this species.

Family Euphorbiaceae

Cercospora analyphae Peck, Rep. (Annual) New York State Mus. Nat. Hist. 34: 48. 1881. [T: DAOM; NYS].

= *Cercospora acalypharum* Tharp, Mycologia 9: 106. 1917.
[T: BPI432369].

≡ *Cercosporina acalypharum* (Tharp) Sacc., Syll. Fung. 25: 902. 1931.

Leaf spots distinct, angular to irregular, blackish-brown, 4.00-11.00 mm in diameter, frequently confluent. Fruit bodies amphigenous, mainly hypophyllous. Stromata brown, composed of a few brown cells, 12.30-24.60 µm in diameter. Conidiophores arising from stromata, brown, straight to slightly curved or geniculate, 1-9-septate, (14.76-)24.60-100.86(-118.08)×(3.69-)4.92-4.92 µm, with thickened conidial scars. Conidia hyaline, acicular, (27.06-)29.52-93.98(-108.24)×(1.23-)2.46-

3.69(-4.92) µm, 6-12-septate, conspicuously thickened and truncate basal end, acute tip (Figure 109 and 110).

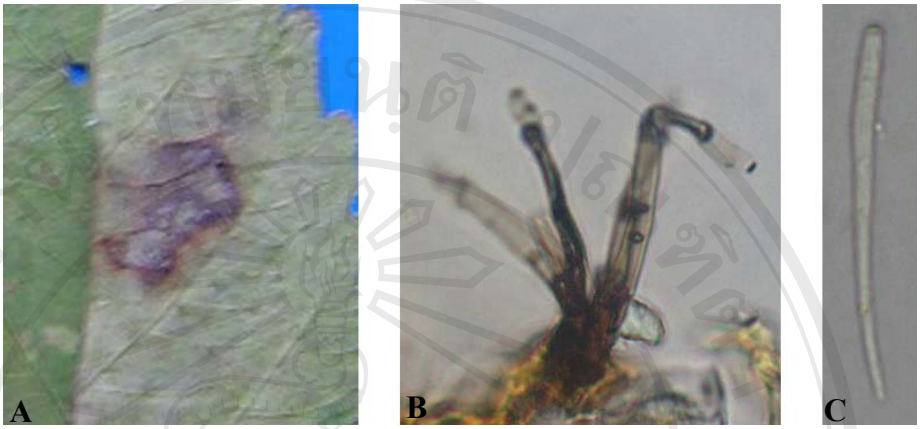

Figure 109 Photograph of *Cercospora analyphae* on *Acalypha wikesiana*: A. Symptom, B. Conidiophores and C. Conidia.

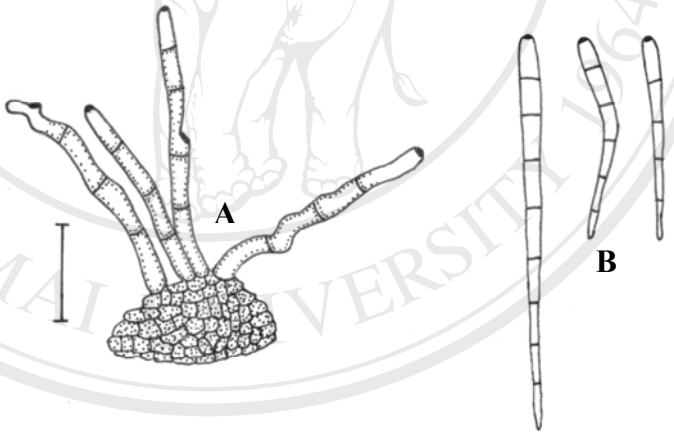

Figure 110 Drawing of *Cercospora analyphae* on *Acalypha wikesiana*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Acalypha wikesiana*, November 24, 2004, CN and JM, CMU MH 046.

Known distribution: Brazil, China, Cuba, India, Jamaica, Japan, Solomon Islands, U.S.A (AL, DE, Eastern states, FL, NY, OK, OR, TX, WI) and Venezuela (Crous and Braun, 2003).

Notes: Hitherto known. This is the first report of *Cercospora analyphae* on *Acalypha wikesiana* in Thailand.

Cercospora transvalensis Syd., Ann. Mycol. 33: 237. 1935. [T: PREM 26002].

Leaf spots distinct, at first dark brown, later become greyish at center, with a dark brown margin, 2.00-12.00 mm in diameter, often confluent. Fruit bodies amphigenous. Stromata brown, amphigenous, mostly epiphyllous, 12.00-24.00 µm in diameter. Conidiophores arising from stromata, hyaline to brown, straight or sinuous, 2-4-septate, fasciculate, (63.96-)73.80-83.64(-91.02)×4.92-4.92(-6.15) µm, with thickened conidial scars. Conidia pale olivaceous, obclavate, (29.52-)44.28-78.72 (-86.10)×2.46-3.69(-4.92) µm, 2-11-septate, hilum conspicuously thickened and darkened (Figure 111 and 112).

Figure 111 Photograph of *Cercospora transvalensis* on *Acalypha indica*:

A. Symptom, B. Conidiophores and C. Conidia.

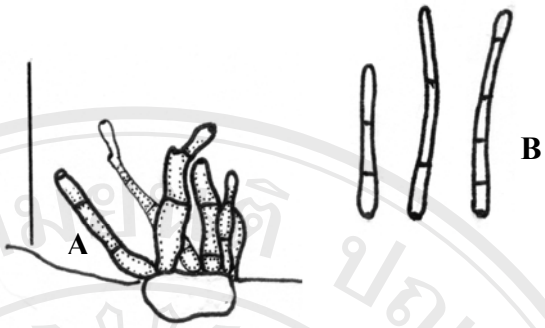

Figure 112 Drawing of *Cercospora transvalensis* on *Acalypha indica*:

A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Queen Sirikit Botanic Garden, Chiang Mai University, Chiang Mai Province. Leaves of *Acalypha indica*, September 23, 2005, JM, CMU MH 047.

Known distribution: India and South Africa (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Petcharat and Kanjanamaneesathian (1989).

Pseudocerpora melanolepidis Goh and W. H. Hsieh, Trans. Mycol. Soc. Republ. China 2: 132.1987.

≡ *Cercospora melanolepidis* Sawada, Taiwan Agric. Rev. 38: 698. 1942 (*nom. inval.*). [T: BPI438248, 438249; NTU-PPE, herb. Sawada].

Leaf spots numerous, scattered, distinct, circular-subcircular, centre whitish grey surrounded by raised dark brown border line, 3.00-9.00 mm in diameter. Stromata amphigenous, intra or subepidermal, then erumpent, brown, 24.60-44.28 μm in diameter. Conidiophores arranged in a loose fascicle, arising from stromata, brown to dark brown or paler towards the apex, sightly to slightly curved, not branched, 1-3-septate, fasciculate, (12.30-)17.22-36.90(-59.40)×2.46-4.92 μm, with indistinct and

unthickened conidial scars. Conidia cylindrical to obclavate, straight or curved, occasionally sigmoid, with truncate and unthickened basal end, and with obconical tip, (22.14-)34.44-73.80(-98.40)×(2.95-)4.92-4.92 µm, smooth, 2-9-septate (Figure 113 and 114).

Figure 113 Photograph of *Cercospora barlericola* on *Mallotus pierrei*: A. Symptom, B. Conidiophores and C. Conidia.

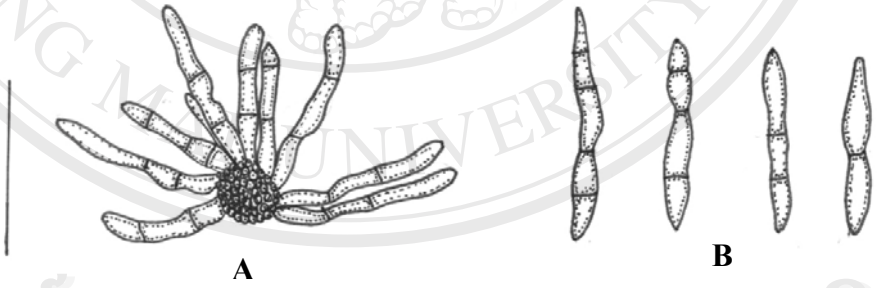

Figure 114 Drawing of *Cercospora barlericola* on *Mallotus pierrei*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Sak Yai National Park, Uttradit Province. Leaves of *Mallotus pierrei*, November 25, 2004, CN and JM, CMU MH 048.

Known distribution: China and Taiwan (Crous and Braun, 2003).

Notes: This is the first report of *Pseudocerpora melanolepidis* on *Mallotus pierrei* in Thailand.

Cercospora ricinella Sacc. and Berl., Atti Reale Ist. Ven. Sci. Lett. Art., 6, Ser. 3: 721. 1885. [T: PAD].

≡ *Cercosporina ricinella* (Sacc. and Berl.) Speg., Anales Mus. Nac. Hist. Nat. Buenos Aires 20: 429. 1910.

= *Cercospora albido-maculans* G. Winter, Hedwigia 24: 202.1885; also in J. Mycol.1: 124. 1885.

= *Cercospora ricini* Speg., Anales Mus. Nac. Hist. Nat. Buenos Aires Ser. 2.3: 343. 1899. [T: LPS937].

Leaf spots amphigenous, scattered, circular to subcircular, white to yellow with brown margins, 0.50-2.00 mm in diameter. Stromata medium, rudimentary to slightly develped, irregular, dark brown, 20.00-60.00 µm in diameter. Conidiophores 5-15 in a divergent fascicle, emerging slightly curved, 1-5 time mildly geniculate, with distinct conidial scars, apical or on shoulders of conidiogenous cells caused by geniculation, 2-7-septate, (30.00-)40.00-95.00(-105.00)×(3.75-)5.00-5.00(-7.50) µm. Conidia solitary, aciculate to filiform, substraight to moderately curved or even undulate, hyaline to pale olive to brown, smooth, hilum conspicuously thickened, (15.00-) 30.00-117.50(-130.00)×3.75-5.00(-6.25) µm, 1-8-septate, acute to obtuse at the apex, truncate at the base (Figure 115 and 116).

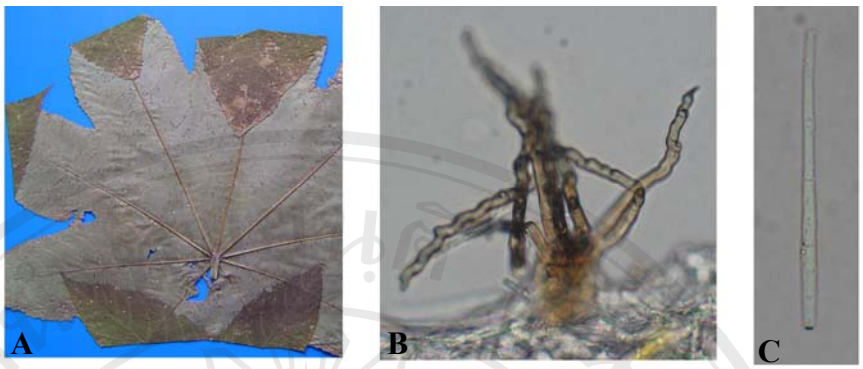

Figure 115 Photograph of *Cercospora ricinella* on *Ricinus communis*: A. Symptom, B. Conidiophores and C. Conidia.

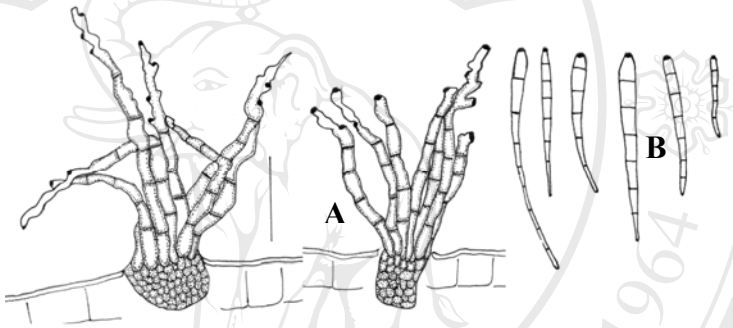

Figure 116 Drawing of *Cercospora ricinella* on *Ricinus communis*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Inthanon National Park, Chiang Mai Province. Leaves of *Ricinus communis*, November 22, 2004, CN and JM, CMU MH 049.

Known distribution: Worldwide, including Angola, Argentina, Australia, Bangladesh, Barbados, Brazil, Bulgaria, Cambodia, China, Colombia, Cuba, Dominican Republ., Egypt., El Salvador, Ethiopia, French Polynesia, Georgia, Ghana, Guatemala, Haiti, India, Indonesia, Iraq, Jamaica, Japan, Kazakhstan, Kenya, Korea, Malawi, Malaysia, Mauritius, Morocco, Mozambique, Myanmar, Nepal, New Caledonia, Nigeria, Pakistan, Panama, Philippines, Puerto Rico, Russia (European part), Sierra Leone, Somalia, South Africa, Sri Lanka, Sudan, Tahiti,Taiwan,

Tanzania, Togo, Trinidad and Tobago, Uganda, Ukrain, U.S.A (CA, FL, Gulf states, MO), Vanuatu, Venezuela and Zimbabwe (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Petcharat and Kanjanamaneesathian (1989). A true *Cercospora s.str.* is close to or identical with *C. apii s.lat*. An Indian collection of this species, deposited at HAL, was characterized by forming conidia in short chains. Nakata and Takimoto (1928) and Park (1958) listed this fungus from Korea. The detailed morphologica description and illustration for this species based on Korean material were provided by Kim and Shin (1999f). The leaf spot disease caused by this fungus is very common during the rainy season in Korea.

Chupp (1954) published this species with the following characters: Stromata lacking to 50.00 µm in diameter, conidiophores arranged in dense fascicles, 1-2 times geniculate, conidia acicular to obclavate or cylindric. Katsuki (1965) described somewhat shorter (28.00-70.00 µm long), 0-1-septate conidiophores, acicular to obclavate conidia with subconical-truncate bases. Bagynarayana *et al.* (1991) reported that an Indian collection possesses pigmented conidiophores and colourless, partly catenate conidia. These characters are, however, somewhat variable in this species. Therefore, the Korean collections are in agreement with these previous descriptions.

Cercospora pulcherrimae Tharp, Mycologia 9: 114. 1917. [T: BPI 440049].

≡ *Cercosporina pulcherrima* (Tharp) Sacc., Syll. Fung. 25: 902. 1931.

= *Cercosporina pulcherrima*e var. *minima* Tharp, Mycologia 9: 114. 1917. [T: BPI].

≡ *Cercosporina pulcherrima* var. *minima* (Tharp) Sacc., Syll. Fung.

25: 903. 1931.

= *Cercosporina euphorbiae* Fukui, Bull. Liberal Arts Dept. Mie Univ. 6: 121. 1951.

Leaf spots circular to subcircular, 2.00-7.00 mm. in diameter, greyish brown, center tan to grey, border dark reddish brown. Fruit bodies amphigenous. Stromata lacking or small, dark, 36.58-121.95 μm in diameter, somewhat larger on upper than on lower leaf surface, mostly 2-6 diverging stalks. Conidiophores pale to medium olivaceous brown, uniform in colour and width, sometimes paler and attenuated toward the apex, (48.78-)78.04-109.75(-121.95)×4.87-4.87(-7.31) μm, 2-8-septate, rarely branched, 0-3 geniculate, conidial scars thickened conspicuously. Conidia obclavate, hyaline, straight to curved, 4-11-septate, truncate at the base with a thickened hilum, acute to subacute at the apex, (51.21-)65.85-97.56(-236.58)×4.87-7.31 μm (Figure 117 and 118).

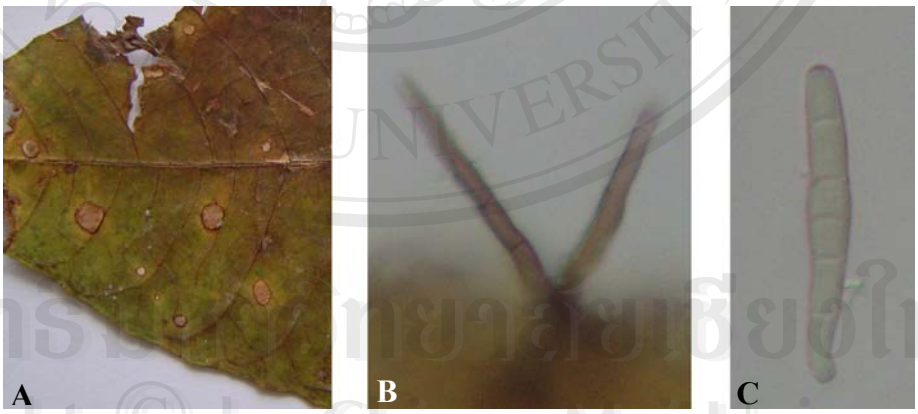

Figure 117 Photograph of *Cercospora pulcherrimae* on *Euphorbia pulcherrima*: A. Symptom, B. Conidiophores and C. Conidia.

Figure 118 Drawing of *Cercospora pulcherrimae* on *Euphorbia pulcherrima*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Euphorbia pulcherrima*, November 25, 2004, JM, CMU MH 050.

Known distribution: Barbados, Brazil, Brunei, Chaina, Dominican Republ., Ethiopia, Hong Kong, India, Indonesia, Jamaica, Japan, Malaysia, Myanmar, Panama, Sabah, Sierra Leone, Sudan, Taiwan, Tanzania, Uganda, U.S.A (FL, MO, OK, SD, TX, WI), Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora pulcherrimae* on *Euphorbia pulcherrima* in Thailand. The differences between these two does not seem so marked as Tharp (1916) suggested in his description. The hyaline acicular conidia separate this species from the others on Euphorbia. Type species, Austin, Texas; *Euphobia pulcherrima;* B. C. Tharp; January 29, 1916; (*C. pulcherrimae minima*) Victoria, Texas; *E. pulcherrima*; H. C. Millender; October 18, 1915 (Chupp).

Cercospora jatrophigena U. Braun, Fungal Diversity 7: 51. 2001. [T: IMI 337609].

Leaf spots distinct, irregular. Fruit bodies amphigenous, but more abundant on the upper surface, effuse, greyish, without definite border, usually confluent and covering a large area of the leaf surface, 1.00-6.00 mm in diameter. Stromata slightly

to moderately developed, dark brown, 12.19-36.58 µm in diameter. Conidiophores 2-9 in a fascicle, pale olivaceous brown at the base and paler upwards, 1-6-septate, (41.46-)56.09-107.31(-124.38)×(3.65-)4.87-4.87 µm, conically narrowed at the apex; conidial scars small but conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia acicular, subhyaline to pale olivaceous, obclavate-cylindric, straight to slightly curved, constricted at the septa, 3-12 septate, subobtuse to obtuse at the apex, truncate or obconically truncate at the base, (26.82-)40.24-103.65(-178.04)×(1.21-)2.43-2.43(-3.65) µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 119 and 120).

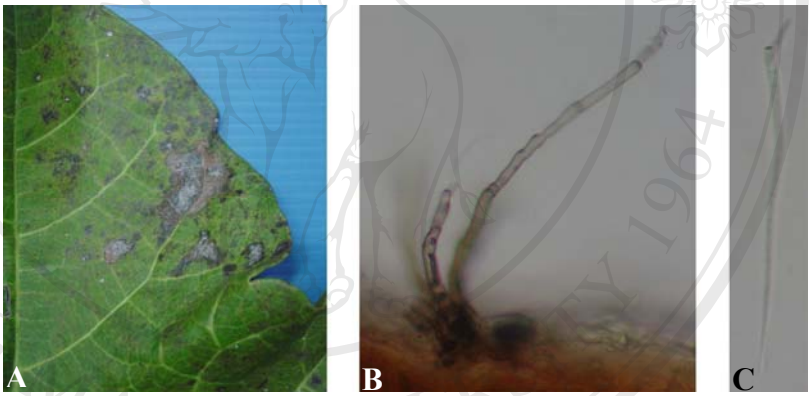

Figure 119 Photograph of *Cercospora jatrophigena* on *Jatropha curcas*:

A. Symptom, B. Conidiophores and C. Conidia.

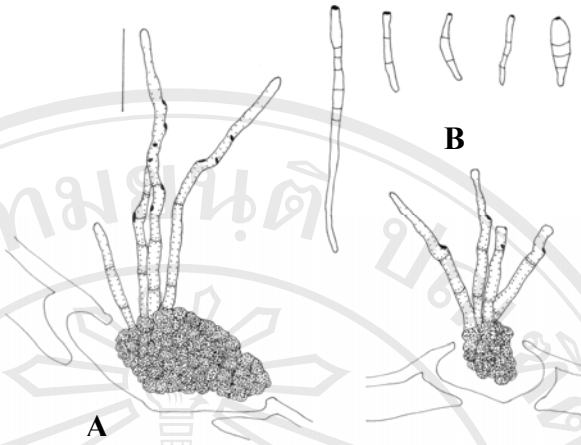

Figure 120 Drawing of *Cercospora jatrophigena* on *Jatropha curcas*:
A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Jatropha curcas*, November 25, 2004, JM, CMU MH 051.

Known distribution: India (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora jatrophigena* on *Jatropha curcas* in Thailand. Previous report listed *Cercospora jatrophigena* on *Jatropha* sp. in India (Braun, 2001)

Cercospora phyllanthi Chupp (phyllanthae), J. Dept. Agric. Porto Rico 15: 12. 1931. [T: CUP; IMI 73464].

≡ *Pseudocercospora phyllanthi* (Chupp) Deighton, Mycol. Pap. 140: 150. 1976.

≡ *Cercospora phyllanthina* Petr. and Cif., Ann. Mycol. 30: 329. 1932. [T: BPI 439631; IMI 74751a; W].

= *Cercospora phyllanthi* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 85: 118. 1943 (*nom. illeg.*). [T: IMI 72709 (slide)], homonym of *C. phyllanthi* Chupp, 1931.

= *Cercospora phyllanthi-pentandri* J. M. Yen and Gilles, Bull. Soc. Mycol. France 90: 318. (1974) 1975. [T: IMI 212939 (paratype); PC].

= *Pseudocercospora phyllanthi-pentandri* (J. M. Yen and Gilles) J. M. Yen, Bull. Soc. Mycol. France 94: 388. 1979.

= *Cercospora pakistanica* S. A. Khan and Kamal, Mycopath. Mycol. Appl. 21: 112. 1963. [T: IMI 98168].

= *Cercospora phyllanthicola* J. M. Yen. Rev. Mycol. 30: 186. 1965 (*nom. illeg.*) [T: PC], homonym of *C. phyllanthicola* S. A. Khan and Kamal, 1963

≡ *Cercospora phyllanthi-niruri* J. M. Yen, Rev. Mycol. 32: 192. 1967.

= *Pseudocercospora phyllanthi-niruri* (J. M. Yen) J. M. Yen, Gard. Bull., Singapore 33: 181. 1980.

Leaf spots distinct, circular-subcircular, centre whitish grey surrounded by raised blackish-brown border line, 7.00-12.00 mm in diameter, often confluent. Fruit bodies amphigenous. Stromata small to large, dark brown to brown, subglobular to globular, 14.76-73.80 µm in diameter. Conidiophores arranged in a loose to dense fascicle, arising from stromata, brown to dark brown or paler towards the apex, sightly to slightly curved, not branched, 1-10-septate, fasciculate, (14.76-)19.68-95.94(-132.84)×2.46(-4.92)-4.92 µm, with distinct and unthickened conidial scars. Conidia pale olivaceous, obclavate, (22.14-)34.44-105.78(-127.92)×2.46-4.92 µm, 2-17-septate, hilum conspicuously thickened and darkened (Figure 121 and 122).

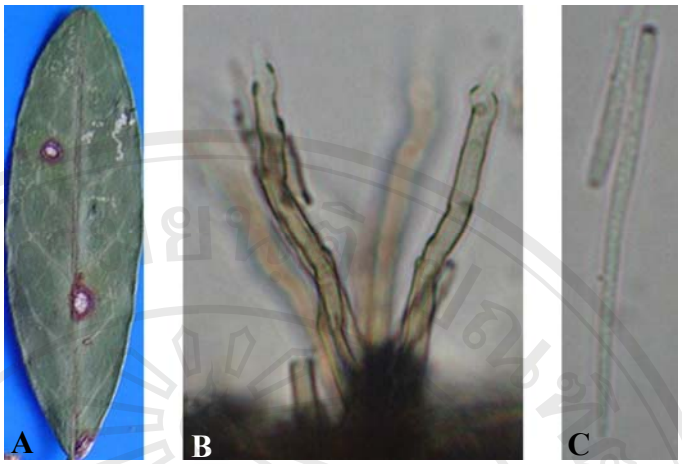

Figure 121 Photograph of *Cercospora phyllanthi* on *Phyllanthus* sp.: A. Symptom, B. Conidiophores and C. Conidia.

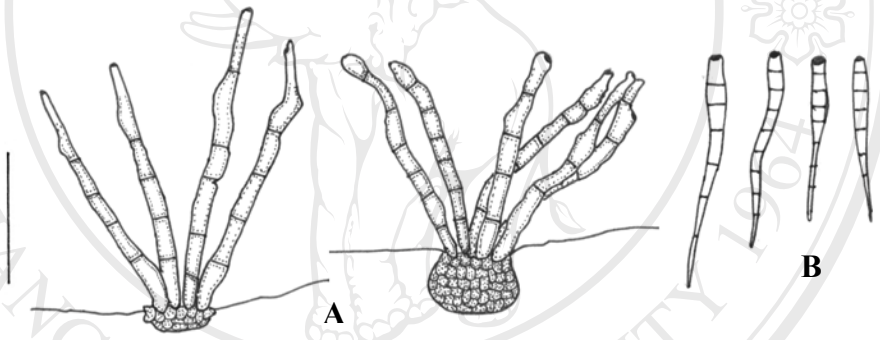

Figure 122 Drawing of *Cercospora phyllanthi* on *Phyllanthus* sp.: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Sak Yai National Park, A. Muang, Uttradit Province. Leaves of *Phyllanthus* sp., November 25, 2004, JM and Nakashima, CMU MH 052.

Known distribution: Brazil, China, Dominican Republ., Ghana, India, Ivory Coast, Jamaica, Myanmar, Pakistan, Puerto Rico, Sierra Leone, Singapore, Taiwan and Uganda (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora phyllanthi* on *Phyllanthus* sp. in Thailand. Chupp (1954) placed *Cercospora phyllanthina* Petrak, *Cercospora phyllanthi* Saw. and *Cercospora phyllanthi* Hansf. under the name *Cercospora*

entebbensis Deighton (1959) placed *Cercospora phyllanthi* Hansf. under the name *Cercospora entebbensis* Deighton. Yen (1967) reported *Cercospora phyllanthi-niruri* L. and *Cercospora phyllanthi-pentandri* Yen and Gilles on *Phyllanthus pentandrus* L. in 1974.

Guo and Hsieh (1995) examined Sawada's *Cercospora phyllanthi* Chupp collected from Taiwan and *Cercospora phyllanthi-pentandri* Yen and Gilles collected from the Ivory Cost by Gilles, and *Cercospora phyllanthi-niruri* Yen collected from India by Das. They found to be very similar except in *Cercospora phyllanthi-niruri* Yen, the conidiophores are longer (up to 110.00 μm) and regard *Pseudocercospora phyllanthi-niruri* (Yen) Yen and *Pseudocercospora phyllanthi-pentandri* (Yen and Gilles) Yen as synonyms of *Pseudocercospora phyllanthi* (Chupp) Deighton.

Cercospora manihobae Viegas, Bol. Soc. Brasil. Agron. 8: 38. 1945. [T: IACM].

Leaf spots amphigenous, scattered to confluent, distince, circular to subcircular, 1-10 mm in diameter, or up to 20 mm when coalescent, initially appearing pale brown to brown, later centre becoming greyish brown to dingy grey with reddsh brown or blackish brown margins. Fruit bodies amphigenous, but abundantly epiphyllous. Stromata lacking to small, rudimentary to slightly developed, subglobular to globular, brown to dark brown, 14.63-48.78 μm in diameter, composed of a few swollen hyphal cells. Conidiophores 3-15 in a loose fascicle, emerging through the cuticle or occasionally arising from substomstal stromata, brown to deep brown throughout, irregular in width, straight to slightly curved, 1-3 times geniculate, 2-5-septate, obtuse to subtruncate at the apex, 2-7-septate, (34.14-)46.68-85.36 (-136.58)×(3.65-)4.87-4.87(-7.31) μm, conidial scars large, conspicuous, apical or on

shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to obclavate-cylindrec, substraight to mildly curved, hyaline, 2-10-septate, non-constricted at the septa, subacute to obtuse at the apex, subtruncate to truncate, (18.29-)29.26-39.02(-73.17)×(1.21-)2.43-3.65(-4.87) µm, hilum conspicuously thickened, darkened, and non-protuberant (Figure 123 and 124).

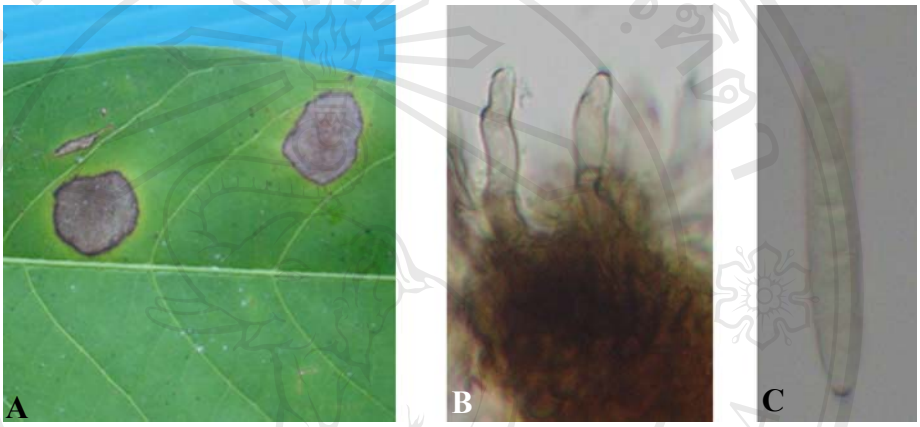

Figure 123 Photograph of *Cercospora manihobae* on *Manihot esculenta*: A. Symptom, B. Conidiophores and C. Conidia.

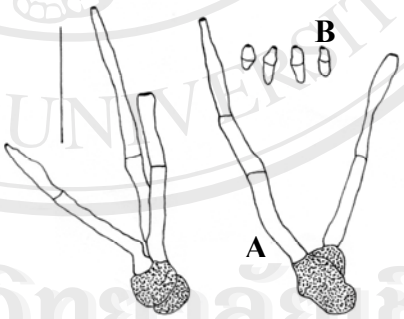

Figure 124 Drawing of *Cercospora manihobae* on *Manihot esculenta*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Manihot esculenta*, November 18, 2005, JM, CMU MH 053.

Known distribution: Angola, Antigua and Barbuda, Australia, Barbados, Brazil, Brunei, Cambodia, China, Colombia, Conta Rica, Cuba, Dominican Republ., Fiji, El

Salvador, French Polynesia, Gabon, Ghana, Haiti, India, Indonesia, Ivory Coast, Jamaica, Kenya, Madagascar, Malawi, Malaysia, Mauritius, New Caledonia, Nigeria, Palau, Panama, Peru, Philippines, Puerto Rico, Sierra Leone, Singapore, Somalia, Solomon Islands, South Africa, Sri Lanka, Sudan, Suriname, Taiwan, Tanzania, Timor, Togo, Trinidad, Tobago, Uganda, U.S.A (FL, HI, TX), Vanuatu, Venezuela, Virgin Islands, Wallis and Futuna Islands and Zimbabwe.

Notes: This is the first report of *Cercospora manihobae* on *Manihot esculenta* in Thailand. The first record of *Cercospora cassavae* from Thailand was made by Chandrasrikul (1962) but now *Cercospora cassavae* transferred to *Passalora* (Crous and Braun, 2003)

***Cercospora* sp.**

Leaf spots orbicular, 3.00-10.00 mm in diameter, tan, grey, or white center with a reddish brown to almost black margin, sometimes distinctly zonate, paler on the lower surface. Fruit bodies amphigenous. Stromata medium, globular, dark brown. Conidiophores 3-30 in a fascicle, pale olivaceous to medium brown, slightly paler near the apex, sometimes branched, multiseptate, geniculate, truncate at the apex, 2-6-septate, (65.85-)80.48-97.56(-121.95)×(3.65-)4.87-4.87(-7.31) μm. Conidia hyaline, acicular to obclavate, straight to mildly curved, 2-12-septate, acute at the apex truncate or subtruncate at the base, (24.39-)43.90-73.17(-104.87)×(1.21-)2.43-4.87 (-7.31) μm (Figure 125 and 126).

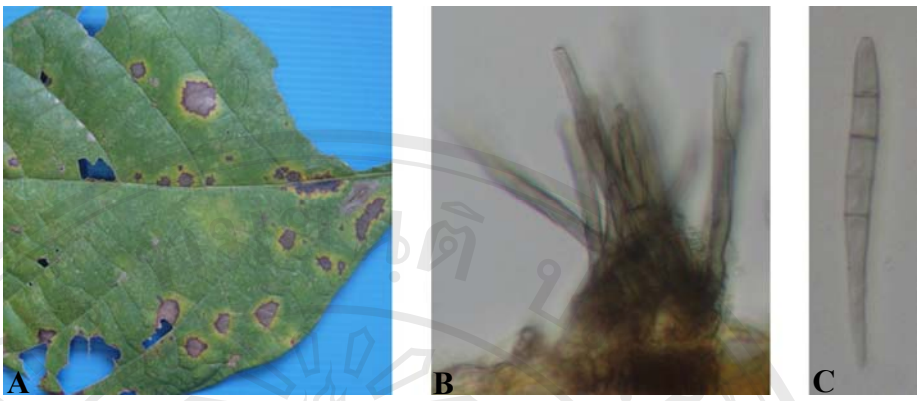

Figure 125 Photograph of *Cercospora* sp. on *Bridelia ovata*: A. Symptom, B. Conidiophores and C. Conidia.

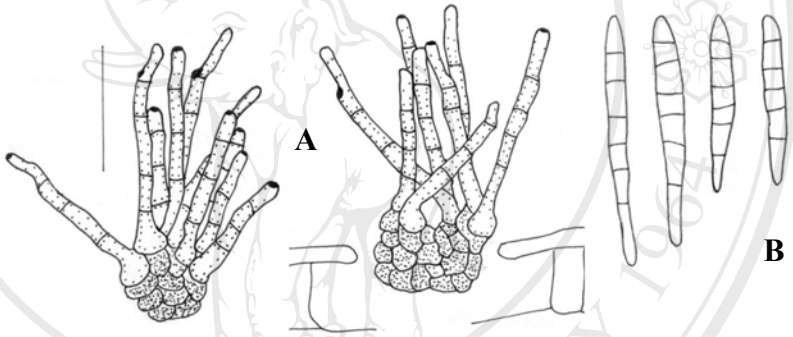

Figure 126 Drawing of *Cercospora* sp. on *Bridelia ovata*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Queen Sirikit Botanic Garden, Chiang Mai Province. Leaves of *Bridelia ovata*, November 18, 2005, JM, CMU MH 054.

Known distribution: Known only Thailand.

Notes: This is the first report of *Cercospora* sp. on *Bridelia ovata* in Thailand and a new host plant in the world.

Family Elaeocarpaceae

***Cercospora* sp.**

Leaf spots amphigenous, distinct, circular to subcircular, 1.00-8.00 mm in diameter, pale brown to brown, later centre becoming greyish brown to dingy grey brown or blackish brown margins. Fruit bodies amphigenous. Stromata medium, rudimentary to slightly developed, subglobular to globular, brown, 12.19-43.90 µm in diameter, composed of a few swollen hyphal cells. Conidiophores 3-12 in a loose fascicle, emerging through the cuticle, brown to deep brown throughout, irregular in width, straight to slightly curved, 1-5 times geniculate, usually 1-2 times abruptly geniculate, not branched, 1-3-septate, obtuse to subtruncate at the apex, (13.41-) 17.07-21.95(-31.70)×(2.43-)3.65-4.87 µm. Conidia solitary, acicular to obclavate-cylindrec, substraight to mildly curved, hyaline, 1-4-septate, non-constricted at the septa, subacute to obtuse at the apex, subtruncate to truncate, (10.97-)14.63-24.39 (-31.70)×1.21-2.43(-4.87) µm, hilum conspicuously thickened, darkened, and non-protuberant (Figure 127 and 128).

Figure 127 Photograph of *Cercospora* sp. on *Ellaeocarpus hygrophilus*:

A. Symptom, B. Conidiophores and C. Conidia.

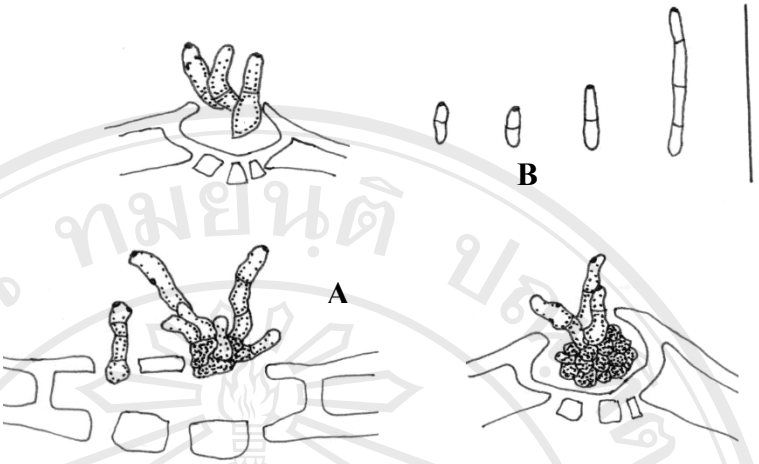

Figure 128 Drawing of *Cercospora* sp. on *Ellaeocarpus hygrophilus*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Ellaeocarpus hygrophilus*, November 18, 2005, JM, CMU MH 055.

Known distribution: Known only Thailand.

Notes: This is the first report of *Cercospora* sp. on *Ellaeocarpus hygrophilus* in Thailand and a new host plant in the world.

Family Elaeanaceae

Cercospora elaeagni Head and F. A. Wolf.

≡ *Cercospora elaeagni* (Head and F. A. Wolf) Sacc., Syll. Fung. 25: 901. 1931.

Leaf spots circular, 2.00-4.00 mm in diameter, tan with dark greyish brown centre, surrounded by a definite dark brown border. Fruit bodies amphigenous, but abundantly epiphyllous. Stromata rudimentary to slightly developed, subglobular, brown to dark brown, 21.95-60.97 μm in diameter, composed of a few swollen hyphal

cells. Conidiophores 3-15 in a loose fascicle, emerging through the cuticle or occasionally arising from substomstal stromata, irregular in width, straight to slightly curved, 1-3-septate, obtuse at the apex, (9.75-)14.63-19.51(-48.78)×2.43-3.65(-4.87) µm, conidial scars large, conspicuous. Conidia obclavate-cylindrec, substraight, hyaline, 1-6-septate, non-constricted at the septa, subacute at the apex, (12.19-) 23.17-34.14(39.02)×2.43-2.43(-3.65) µm, hilum conspicuously thickened, darkened and non-protuberant (Figure 129 and 130).

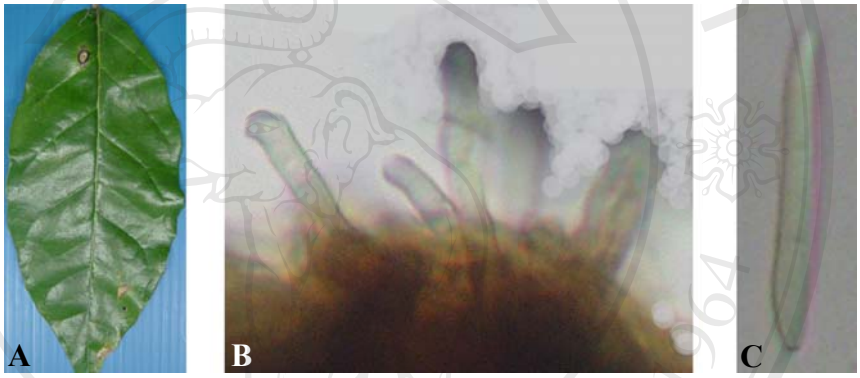

Figure 129 Photograph of *Cercospora elaeagni* on *Elaeagnus latifolia*:
A. Symptom, B. Conidiophores and C. Conidia.

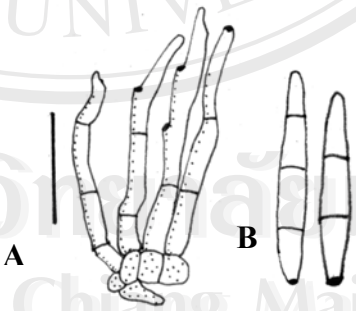

Figure 130 Drawing of *Cercospora elaeagni* on *Elaeagnus latifolia*:
A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Elaeagnus latifolia*, November 18, 2005, JM, CMU MH 056.

Known distribution: Iran and U.S.A (FL, MS, OK, TX) (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora elaeagni* on *Elaeagnus latifolia* in Thailand. A true *Cercospora s.str.* is close to or probably identical with *C. apii s. lat.* Chupp (1954) reduced *C. carrii* to synonym with *C. elaeagni*, which is, however, a distinct species placed of *Pseudocercospora*.

Family Hydrangeaceae

Cercospora hydrangeae Ellis and Everh., J. Elisha Mitch. Soc. 8: 52. 1892. [T: BPI437266; NY].

= *Cercosporina hydrangeicola* Speg., Anales Mus. Nac. Buenos Aires 20: 426. 1910. [T: IMI247005 (slide); LPS4050].

≡ *Cercospora hydrangeicola* (Speg.) Vassiljevsky, in Vassiljevsky and Karakulin, Fungi imperfecti parasitici. 1. Hyphomycetes: 339. 1937.

= *Cercospora hydrangeana* Tharp, Mycologia 9: 110. 1917. [T: BPI437266].

≡ *Cercosporina hydrangeana* (Tharp) Sacc., Syll. Fung. 25: 915. 1931.

= *Cercospora arborscentis* Tehon and E. Daniels, Mycologia 17: 246. 1925. [T: BPI 433019; ILLS599]. (=*Cercospora apii s.lat*. *fide* Braun, 2000, p. 76)

Leaf spots amphigenous, distinct, subcircular, 2.00-12.00 mm in diameter, brown to brown, centre dingy grey blackish brown margins. Fruit bodies amphigenous, but abundantly epiphyllous. Stromata small, rudimentary to slightly developed, brown to dark brown. Conidiophores 2-6 in a loose fascicle, emerging

through the cuticle or occasionally arising from substomstal stromata, brown, slightly curved, 1-10 times geniculate, subtruncate at the apex, 3-9-septate, (23.40-)31.20-78.00(-158.60)×2.60-3.90 µm, conidial scars small, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia obclavate, mildly curved, hyaline, 3-18-septate, non-constricted at the septa, subacute at the apex, subtruncate to truncate, (39.00-) 78.00-249.60(-293.80)×2.60-5.20(-7.80) µm, hilum conspicuously thickened, darkened (Figure 131 and 132).

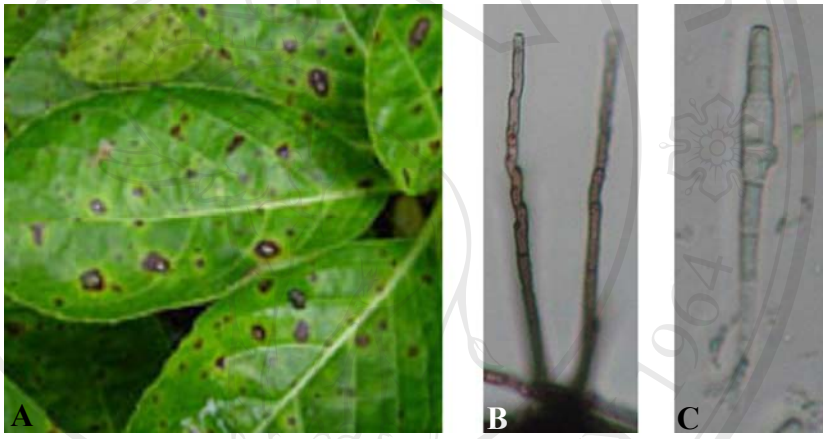

Figure 131 Photograph of *Cercospora hydrangeae* on *Hydrangea macrophylla*: A. Symptom, B. Conidiophores and C. Conidia.

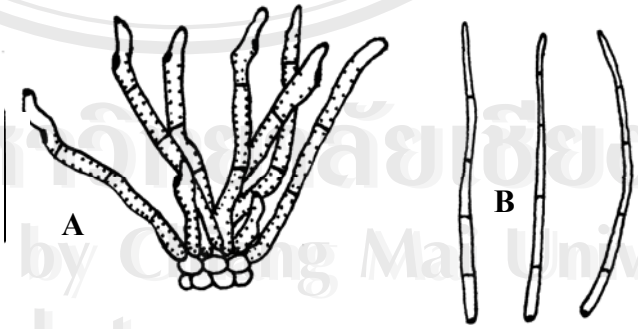

Figure 132 Drawing of *Cercospora hydrangeae* on *Hydrangea macrophylla*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Hydrangea macrophylla*, November 21, 2004, JM, CMU MH 057.

Known distribution: Argentina, Borneo, Brazil, Brunei, China, Hong Kong, India, Iran, Japan, Korea, Malawi, Malaysia, Myanmar, Nigeria, Philippines, Puerto Rico, Romania, Russia (Asian part), Sabah, Sierra, Leone, Singapore, Taiwan, U.S.A (AL, FL, IL, MS, OK, SE states, TX), Virgin Islands and Zimbabwe (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Petcharat and Kanjanamaneesathian (1989) but they did not made the detailed morphological description and illustration for this fungus. In Korea this species was recorded by Kim and Shin (1999). They were identify this fungus based on Korean collection. Yen (1967) described the following characters of this fungus. Fructification amphigenous; stomata forming globular to irregular; conidiophores tortuous, 2-20 in fascicles, but sometime solitary, 48.00-160.00×4.50-7.00 µm, conidia acicular to obclavate-acicular, 84.00-176.00×3.60-4.80 µm.

Several species of *Cercospora* were also recorded on *Hydrangea, including* *C. obtegens* Syd. and P. Syd., C. *holobrunnea* J. M. Yen, *C. hyalofilispora* J. M. Yen, *C. katonegensis* J. M. Yen, *C. triseptispora* J. M. Yen, and *C. yakushimensis* Togashi and Katsuki, *C. obtegens* (Chupp, 1954) differs by its much longer (40.00-300.00 µm in length) conidiophores and undulate conidia, *C. yakushimensis* (Togashi and Karsuki, 1952) is distinguished by possessing mostly hypophyllous fructification, non-geniculate conidiophores, pigmented and somewhat shorter (50.00-65.00 µm long) conidia. Furthermore, Yen and Lim (1980) redeposited *C. holobrunnea,*

C. hyalofilispora and *C. triseptispora* into *Mycovellosiella,* and *C. katonegensis* into *Pseudocercospora.* Therefore, the Korean collections agree well with *C. hydrangeae.*

Family Leguminosae

Cercospora arachidicola Hori Nishigahara Agric. Expt. Stat. Tokyo Ann. Rept. p. 26 (1917)

= *Cercospora arachidis* var.*macrospora* Maffei, Riv. Pat. Veget. 12: 7(1992)

Teleomorph: *Mycosphaerella arachidis.* Deighton, Trans. Brit. Mycol. Soc. 50: 328 (1967)

Leaf spots scattered, rarely confluent, distinct, circular or subcircular to irregular, small to fairly large, 1.00-3.00 mm in diameter, dark to greyish brown surrounded by blackish brown margin. Fruit bodies amphigenous, on young spots chiefly epiphyllous. Stromata slightly to moderately developed, dark brown. Conidiophores golden brown, pale olivaceous brown at the base and paler upwards, straight or 1-2 times mildly geniculate in the upper portion, not branched, 1-3-septate, (13.41-)17.07-21.95(-31.70)×(2.43-)3.65-4.87 μm, conically narrowed at the apex, conidial scars small but conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia subhyaline to pale olivaceous, obclavate to cylindric, straight to slightly curved, constricted at the septa, 1-4-septate, subobtuse to obtuse at the apex, truncate or obconically truncate at the base, (10.97-)17.07-24.39 (-31.70)×1.21-2.43(-4.87) μm, hilum conspicuously thickened, darkened and non-protuberant (Figure 133 and 134).

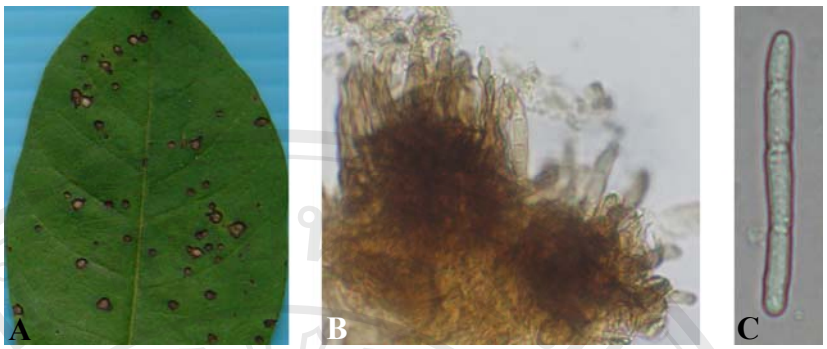

Figure 133 Photograph of *Cercospora arachidicola* on *Arachis hypogaea*: A. Symptom, B. Conidiophores and C. Conidia.

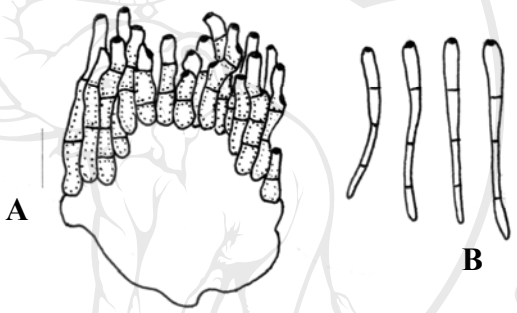

Figure 134 Drawing of *Cercospora arachidicola* on *Arachis hypogaea*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Arachis hypogaea*, November 21, 2004, JM, CMU MH 058.

Known distribution: Nearly throughout the world wherever the crop is cultivated, including China, Japan, Korea and Taiwan (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Sontirat (1980). Park (1961) recorded this fungus for the first time from Korea and Shin and Braun (1996) included it in a paper dealing with Korean cercosporoid fungi. Detailed description and illustration based on Korean collection of this species were provided by Kim and Shin (1998a).

The less dense fascicle, the mildly geniculate conidiophores and the truncate or obconically truncate bases of the conidia separate it from other cercosporoid species on hosts of this family, especially from *Passalora personata* (Berk. and Curt.) S. A. Khan and K. Kamal [≡*Cercosporidium personata* (Berk. and Curt.) Ellis and Everh.] which has cylindric conidia, 5.00-10.00 µm in diameter. This species grows often together with *P. personata* on the same leaves. Microscopically, it is very different from the latter one.

Passalora arachidicola (Hori) U. Braun, New Zealand J. Bot. 37: 303. 1999.

≡ *Cercospora arachidicola* Hori, Rep. (Annual) Nishigahara Agric. Exp. Sta. Tokyo: 26. 1917.

= *Cercospora arachidis* var. *macrospora* Maffei, Riv. Patol. Veg. 12: 7. 1922.

Teleomorph: *Mycosphaerella arachidis* Deighton, Trans. Brit. Mycol. Soc. 50: 328. 1967.

Leaf spots orbicular, deep brown or blackish-brown, 2.00-7.00 mm in diameter, with or without a narrow yellow margin, sometimes numerous on a leaf and confluent. Fruit bodies mostly epiphyllous on larger spots, appearing as discrete large deep olivaceous pustules densely and evenly distributed over the spot. Secondary mycelium absent. Stromata well-developed, 80.48-158.53 µm in diameter. Conidiophores very numerous in dense fascicle, pale olivaceous, smooth, slightly or strongly geniculate, straight or slightly curved, not branched, 0-3-septate, (14.63-) 24.39-31.70(-39.02)×4.87-7.31 µm, conidial scars conspicuously thickened, usually situated on rounded shoulders or at the end of a short peg-like projection. Conidia,

subhyaline, concolourous with the conidiophores, subcylindrical, long fusiform-obclavate, or obclavate, sometimes beaked, rarely clavate, usually straight or very slightly curved, usually very finely rough-walled, obtuse or broadly rounded at the apex, shortly tapered at the base to the conspicuously thickened hilum, usually not constricted but some times slightly constricted at the septa, (29.26-)39.02-41.46 (-46.34)×(2.43-)7.31-7.31(-9.75) µm, 1-6-septate (Figure 135 and 136).

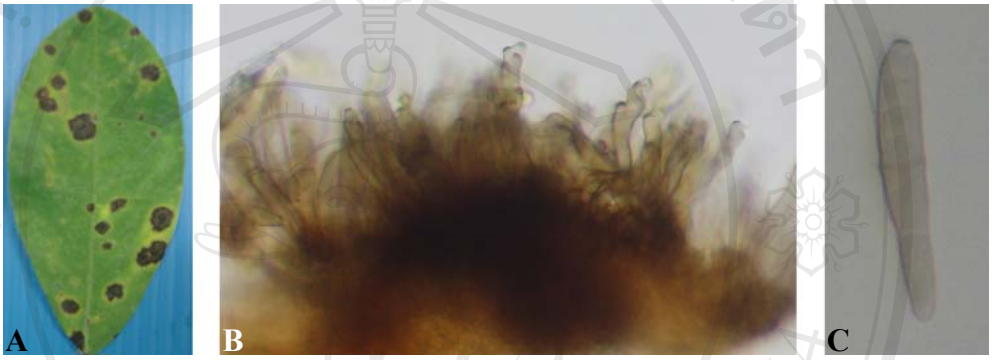

Figure 135 Photograph of *Passalora arachidicola* on *Arachis hypogaea*:
A. Symptom, B. Conidiophores and C. Conidia.

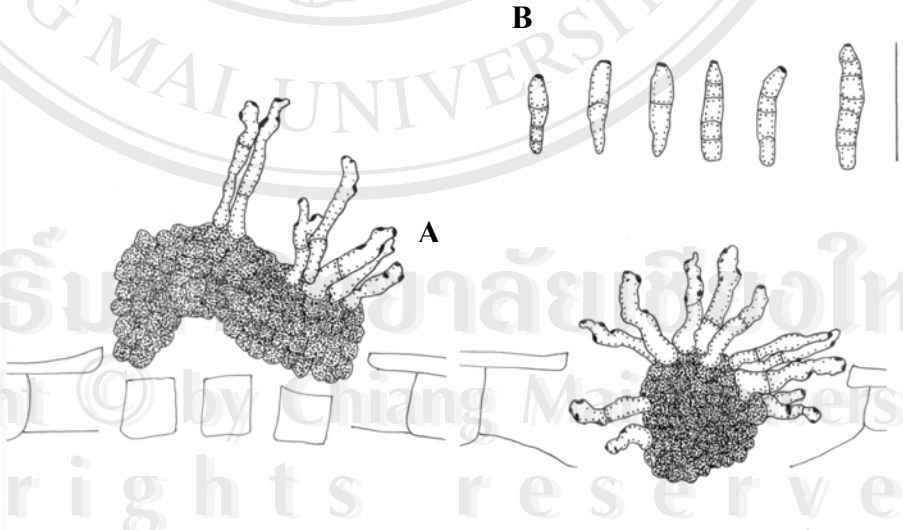

Figure 136 Drawing of *Passalora arachidicola* on *Arachis hypogaea*:
A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Arachis hypogaea*, November 21, 2004, JM, CMU MH 059.

Known distribution: In diameterly distributed with host, including Afghanistan, Angola, Argentina, Australia, Bangladesh, Benin, Bolivia, Brazil, Brunei, Burkina Faso. China, Cuba, Cameroon, Colombia, Comoros, Congo, Cuba, Dominican Republ., El Salvador, Fiji, Gabon, Gambia, Ghana, Guatemala, Guinea, Guyana, Hong Kong, India, Indonesia, Ivory Coast, Jamaica, Japan, Kenya, Korea, Laos, Lebanon, Libya, Madagascar, Malawi, Malaysia, Mali, Mauritius, Mexico, Mozambique, Myanmar, Nepal, New Caledonia, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Philippines, Puerto Rico, Sabah, Senegal, Sierra Leone, Solomon Islands, Somalia, South Africa, Sudan, Suriname, Taiwan, Tanzania, Togo, Uganda, U.S.A (AL, AR, FL, GA, HI, NC, OK, TX, VA), Uruguay, Venezuela, Vietnam, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Passalora arachidicola* on *Arachis hypogaea* in Thailand. This fungus is a common pathogen which causes destructive disease where peanuts are grown intensively.

Cercospora bauhiniae-variegatae R. C. Rajak, Curr. Sci. 51: 1022. 1982. [T: IMI 225289]. (=*Cercospora apii s.lat.*).

Leaf spots amphigenous, brown to greyish brown, with dark brown marginal line or border, size and variable, usually 2.00-56.00 mm in diameter, irregular, Stromata well-developed, subglobular, dark brown, 19.68-78.72 µm in diameter. Conidiophores in a loose to dense fasicle, mostly arising from substomatal atroma, dark brown, with indistinct conidial scars, 1-12-septate, (14.76-)49.20-118.08

(-221.40)×4.92 µm. Conidia solitary, obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, (24.60-)29.52-59.04 (-83.64)×2.46 µm, 5-12-septate, obtuse at the apex, subtruncate or obconically truncate at the base (Figure 137 and 138).

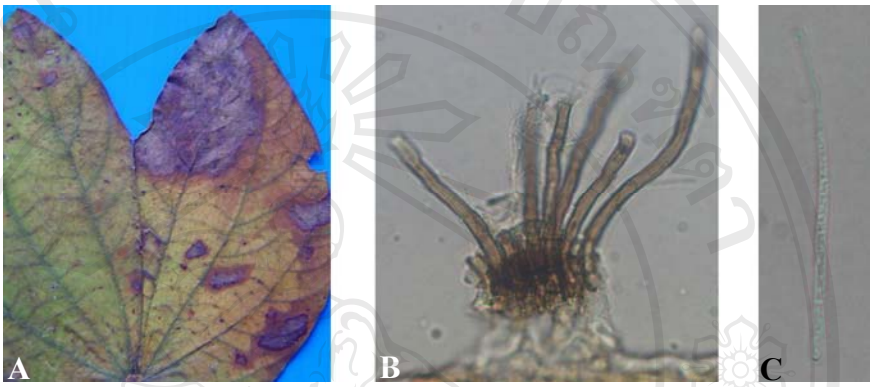

Figure 137 Photograph of *Cercospora bauhiniae-variegatae* on *Bauhinia racemosa*: A. Symptom, B. Conidiophores and C. Conidia.

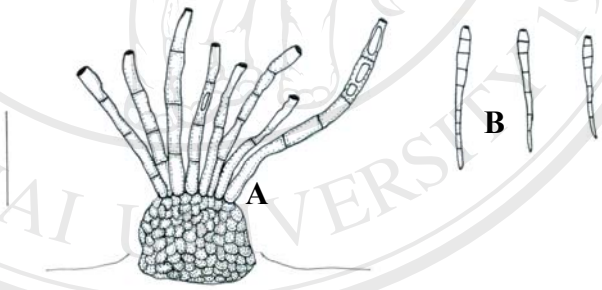

Figure 138 Drawing of *Cercospora bauhiniae-variegatae* on *Bauhinia racemosa*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Bauhinia racemosa*, November 21, 2004, CN and JM, CMU MH 060.

Known distribution: India (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora bauhiniae-variegatae* on *Bauhinia racemosa* in Thailand.

Cercospora kikuchii T. Matsumoto and Tomoy. Annals Phytopath. Soc. Japan 1 (6): 1 (1925)

Leaf spots amphigenous, scattered to confluent, angular to irregular, 1.00-6.00 mm in diameter, brown to tan, greyish white at the centre, grey with reddish brown margin. Fruit bodies amphigenous, also on stems and pods. Stromata small to medium, slightly to moderately developed, dark brown to blackish brown, subglobular to globular. Conidiophores 2-10 in a loose fascicle, arising from substomatal cavities and emerging through the cuticle, olivaceous brown throughout, irregular in width, straight to slightly curved, 1-5 times mildly geniculate, not branched, 2-5-septate, (39.02-)43.90-48.78(-60.97)×(3.65-)4.87-4.87(-7.31) µm conidial scars conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to filiform, straight to slightly curved, hyaline, 3-8-septate, non-constricted at the septa, obtuse to subacute at the apex, truncate at the base, (31.70-)65.85-73.17(-92.68)×3.65-4.87 µm, hilum conspicuously thickened, darkened, and non-protuberant (Figure 139 and 140).

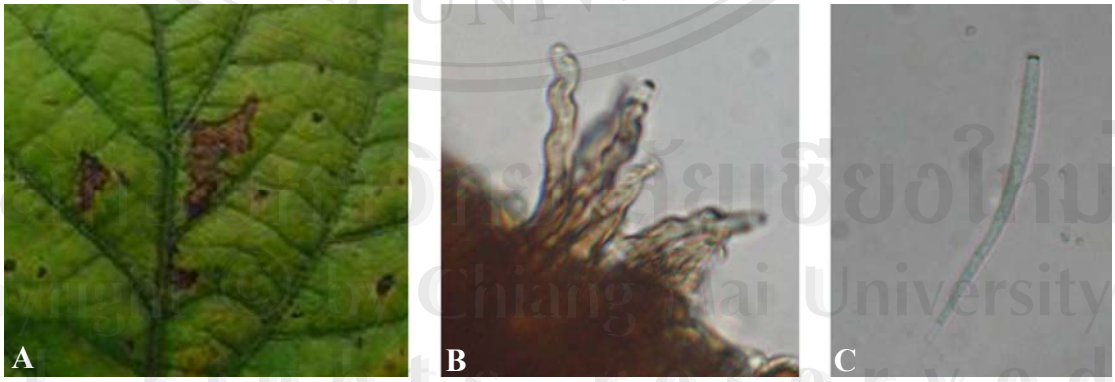

Figure 139 Photograph of *Cercospora kikuchii* on *Glycine max*: A. Symptom, B. Conidiophores and C. Conidia.

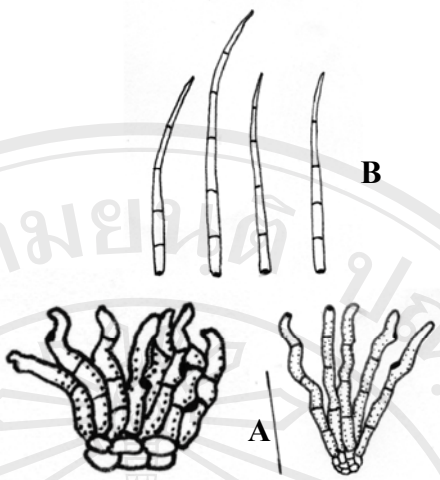

Figure 140 Drawing of *Cercospora kikuchii* on *Glycine max*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Glycine max*, November 21, 2004, JM, CMU MH 061.

Known distribution: Worldwide where the host is cultivated, including China, Japan, Korea, Taiwan and Thailand (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Sontirat *et al.* (1979). Nakata and Takimoto (1928), Park *et al.* (1978) and Oh and Kwon (1981) listed this fungus from Korea. The detailed description and illustration for this species based on Korean collection were provided by Kim and Shin (1998c).

Chupp (1954) recorded several *Cercospora* species on *Glycine* and related host genera. *Passalora sojina* (Hara) H. D. Shin and U.Braun (≡*Cercospora sojina* Hara) is clearly distinguishable. *Cercospora canescens* Ellis and G. Martin is morphologically very akin to the present fungus, but different from it by having condiophores arranged in dense fascicles and amphigenous Fruit bodies. *Pseudocercospora cruenta* (Sacc.) Deighton (Deighton, 1976) differs from this species as follows: Fructification mostly hypophyllous; conidiophores rarely

branched, 0-3-septate, 10.00-70.00×3.00-6.00 µm, conidia obclavate to cylindric, 40.00-150.00×2.50-5.00 µm. *P. glycines* (Cook) Deighton differs from this fungus in many respects. Fructification abundantly epiphyllous; conidiophores arranged in very dense fascicle, 0-1-septate, 10.00-25.00×1.50-3.00 µm, Conidia narrowly obclavate, 30.00-100.00×1.50-2.50 µm.

Phaeoisariopsis griseola (Sacc.) Ferraris, Ann. Mycol. 7: 273. 1909.

≡ *Isariopsis griseola* Sacc., Michelia 1: 273. 1878.

= *Cercospora griseola* (Sacc.) Ragunath. and K. Ramakr., J. Madras Univ. 35-36: 11. (1965-1966) 1968.

= *Graphium laxum* Ellis, Bull. Torrey Bot. Club 8: 64. 1881. [T: NY].

≡ *Isariopsis laxa* (Ellis) Sacc., Syll. Fung. 4. 631. 1886.

= *Phaeosariopsis laxa* (Ellis) S. C. Jong and E. F. Morris, Mycopathol. Mycol. Appl. 34: 269. 1968.

= *Cercospora solimanii* Speg. (*solimani*), Anales Soc. Ci. Argent. 16: 167. 1883. [T: LPS918].

= *Cercospora columnaris* Ellis and Everh. (*columnare*), Proc. Acad. Nat. Sci. Philadelphia 46: 380. 1894. [T: NY].

≡ *Pseudocercospora columnaris* (Ellis and Everh.) J. M. Yen, in Ten and Lim, Gard. Bull., Singapore 33: 172. 1980.

= *Arthrobotryum puttemansii* Henn., Hedwigia 41: 309. 1902.

= *Cercospora stuhlmannii* Henn., Bot. Jahrb. Syst. 33: 40. 1904.

Leaf spots distinct, angular, irregular when coalescing, usually vein limited, sometimes also affecting pods, 1.00-5.00 mm in diameter, at first appearing yellowish

brown with weak margin and then turning brown to dark brown with well-developed margin on petioles and young stems, later very light brownish grey arising from stomatal openings, finally centre becoming dirty greyish brown with blackish dots caused by heavy fungal fructification. Fruit bodies amphigenous, but mostly hypophyllous, blackish brown to blackish grey. Stromata well-developed, formed as brown hyphal aggregations, globose to lacrymoid. Conidiophores 6-18 in a densely synnematous fascicle, subhyaline to olivaceous brown throughout or paler upwards, 2-7-septate, usually straight, but sometimes apically 1-3 times mildly geniculate or sinuous, not branched, very long and slender, 170.00-400.00×3.00-5.50 µm, conidial scars small but conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, obclavate to cylindric-obclavate, sometimes slightly constricted at some septa, subobtuse to obtuse at the apex, obconically truncate to tounded at the base, 26.00-90.00×3.50-7.00 µm, hilum slightly thickened, darkened, and non-protuberant (Figure 141 and 142).

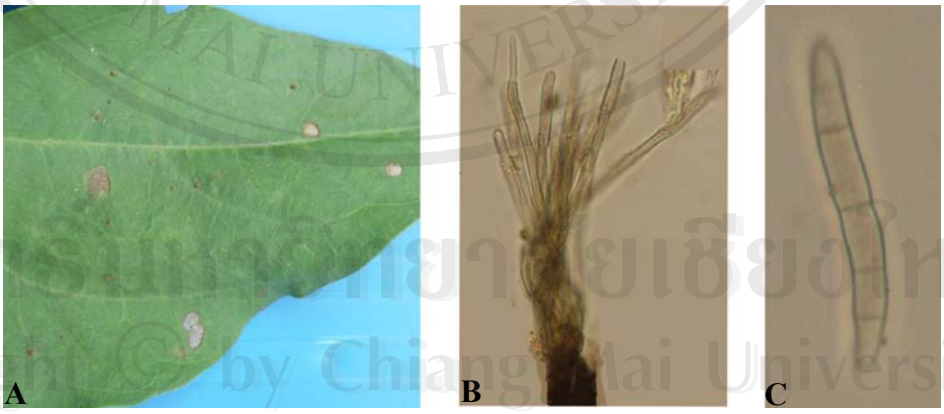

Figure 141 Photograph of *Phaeoisariopsis griseola* on *Phaseolus vulgaris*:

A. Symptom, B. Conidiophores and C. Conidia.

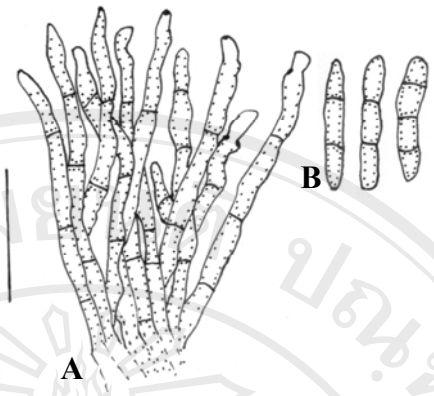

Figure 142 Drawing of *Phaeoisariopsis griseola* on *Phaseolus vulgaris*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province, *Phaseolus vulgaris*, November 21, 2004, JM, CMU MH 062.

Known distribution: Worldwide, including Angola, Argentina, Armenia, Australia, Austria, Bhutan, Brazil, Bulgaria, Burundi, Cameroon, Canada, China, Colombia, Congo, Costa Rica, Croatia, Cuba, Dominican Republ., Ecuador, E1 Salvador, Ethiopia, Fiji, France, Georgia, Germany, Ghana, Great Britain, Greece, Guatemala, Haiti, Hungary, Jamaica, Japan, India, Indonesia, Iran, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Kenya, Korea, Laos, Latvia, Malawi, Madagascar, Malaysia, Mauritius, Mexico, Mozambique, Nepal, Netherlands, Netherland Antilles, New Caledonia, New Caledonia, New Zealand, Nicaragua, Nigeria, Norfolk Island, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Reunion, Romania, Russia, Rwanda, Saint Helena, Senegal, Sierra, Leone, Singapore, Slovenia, Solomon Island, Somalia, South Africa, Spain, Sudan, Suriname, Swaziland, Taiwan, Tanzania, Trinidad and Tobago, Turkey, Uganda, Ukraine, U.S.A (CT, DE, Eastern states, FL, HI, IN, MA, MD, ME, MI, MS, NC,

NH, NJ, NY, OK, PA, SC, TX, VA, WI), Vanuatu, Venezuela, Vigin Islands, Yugoslavia, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Giatgong (1980). Leaf lesions are the most conspicuous, and start as small, brown or grey spots that develop into angular, necrotic lesions delimited by vascular strands. Lesions eventually enlarge, coalesce and cause defoliation of plants. Most crop losses result from premature defoliation. Circular to elliptical red-brown lesions can develop on pods, whereas browning of stems has also been attributed to this disease.

Nakata and Takimoto (1928), Park (1958), and Shin and Braun (1993) listed this fungus from Korea. Detailed description and illustration based on Korean collections of this species were provided by Kim and Shin (1998b). The leaf spot disease caused by this fungus occurs in diameterly and is responsible for premature defoliation in Korea.

There are various concepts of the taxonomy of *Phaeoisariopsis.* Deighton (1990) considered the synnematous 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 reallocate 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.

African and Andean races are known for this pathogen. Deighton (1990) also refers to records from different hosts.

***Phaeoramularia* sp.**

Leaf spots amphogenous, distinct, scattered to confluent, sometimes vein limited, angular to irregular, 2.00-11.00 mm in diameter, greyish brown to greyish white, light brown centre with dark purplish brown to dark brown margins. Fruting bodies epiphyllous. Stromata lacting to small. Conidiophore 2-6 in loose fascicle, emerging though stomata, pale olivaceous brown near the basal portion, paler towords the apex, straight to geniculate sinuous, not branched, 1-4 septate, (36.58-)70.73-90.24(-136.36)×3.65-4.87 μm, conidial scars small and somewhat conspicuous, apical or on small shoulders of conidiogenous cells caused by geniculation. Conidia solitary to catenate, occasionally in branched chains, subcylindric to ellipsoid, straight, hyaline, 0-1-septate, non-constricted at the septa, obtuse or shortly obconic to subacute at both ends, (20.87-)26.34-35.98(-39.02)×1.21-2.43 μm, hilum small, somewhat conspicuously thickened, somewhat darkened, and non-protuberant (Figure 143 and 144).

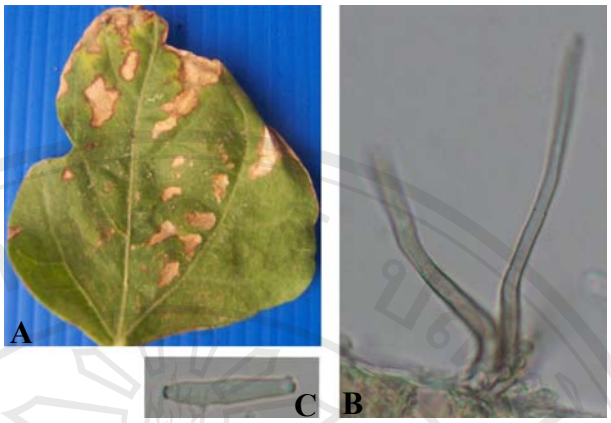

Figure 143 Photograph of *Phaeoramularia* sp. on *Phaseolus vulgaris*: A. Symptom, B. Conidiophores and C. Conidia.

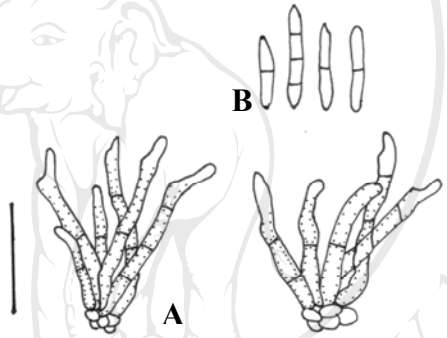

Figure 144 Drawing of *Phaeoramularia* sp. on *Phaseolus vulgaris*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Phaseolus vulgaris*, November 21, 2004, JM, CMU MH 063.

Known distribution: Known only from type locality, Thailand.

Notes: This is the first record of *Phaeoramularia* sp. on *Phaseolus vulgaris* in Thailand.

Cercospora canescens Ellis and G. Martin, Amer. Naturalist 16: 1003. 1882. [T: NY].

≡ *Cercosporiopsis canescens* (Ellis and G. Martin) Miura, Flora of Manchuria and East Mongolia 3: 529. 1928.

= *Cercospora vignicaulis* Tehon, Mycologia 29: 436. 1937. [T: ILLS]. (=*Cercospora apii s.lat*).

Leaf spot suborbicular to irregular, pale brown, tan or dingy center, with a reddish brown to ferruginous margin, 3.00-14.00 mm in diameter. Fruit bodies amphigenous, but more abundant on lower surface, sometimes also present on stems, cotyledon, and dying pods in effuse black to grey patches. Stromata small, 24.39-39.02 µm. Conidiophores densely fasciculate, pale to medium dark brown, fairly uniform in colour and width, 1-5-septate, geniculate, rarely branched, truncate at the apex, (24.39-)31.70-36.58(-53.65)×4.87-7.31 µm, conidial scars conspicuously thickened. Conidia hyaline, acicular, straight to curved, indistinctly multiseptate, acute at the apex, truncate at the base with a thickened hilum, 1-6-septate, (19.51-) 24.39-29.26(-43.90)×4.87 µm (Figure 145 and 146).

Figure 145 Photograph of *Cercospora canescens* on *Phaseolus purpureus*: A. Symptom, B. Conidiophores and C. Conidia.

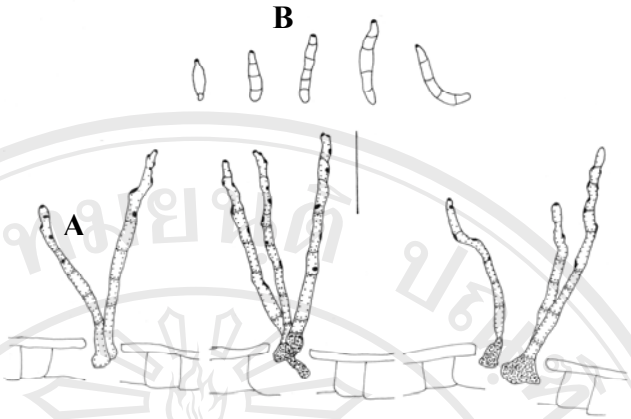

Figure 146 Drawing of *Cercospora canescens* on *Phaseolus purpureus*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Phaseolus purpureus*, November 21, 2004, JM, CMU MH 064.

Known distribution: Nearly throughout the world wherever the crop is cultivated, including Australia, Bangladesh, Barbados, Brazil, Bolivia, Brunei, Cambodia, China, Colombia, Costa Rica, Cuba, Dominican Republ., Ecuador, Fiji, Georgia, Ghana, Guyana, Haiti, Hong Kong, India, Indonesia, Iran, Japan, Kenya, Korea, Malawi, Malaysia, Malawi, Mauritus, Myanmar, Nepal, New Caledonia, New Zealand, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Puerto Rico, Russia, Senegal, Sierra Leone, Solomon Islands, Somalia, South Africa, Saint Vincent and the Grenadines, Sudan, Tadzhikistan, Taiwan, Tanzania, Trinidad and Tobago, Togo, Uganda, U.S.A (AL, FL, HI, IA, IL, KS, MD, MO, MS, NC, NJ, SC, TX, VA, WV), Uzbekistan, Vanuatu, Venezuela,Virgin Islands, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora canescens* on *Phaseolus purpureus* in Thailand. This fungus has been reported in Taiwan on *Dolichos lablab* L., *Glycine*

max (L.) Merr., *Vigna radiata* (L.) R. Wilczek (*Phaseolus radiatus* (L.) Wilcz var. typicus Prain). *Vigna sinensis* (L.) Endl. ex Hassk. and *V. sinensis* (L.) Endl. var. *catiang* Nakai. *Cercospora canescens* was recorded as a member of Korean cercosporoid fungi from *Phaseolus radiatus* (Park, 1958; Chung *et al.*, 1977; Kwon and Oh, 1981) and *P. angularis* (Shin and Braun, 1993). *C. cruenta* (≡ *Pseudocercospora cruenta)* was reported on *P. vulgaris* (Nakata and Takimoto, 1928; Park, 1958; Chung *et al.*, 1977) and *P. angularis* (Nakata and Takimoto, 1928; Park, 1958) from Korea. *C. cruenta* (Nakata and Takimoto, 1928; Park, 1958) on *P. angularis* is well-known as a causal agent of brown leaf spot in red beans and in accordance with this species. The identification of the specimen concerned can, however, not be proven, since it is not preserved. Recently, Kim and Shin (1998c) provided the detailed description and illustration based on Korean materials from *P. angularis* for this fungal species.

C. canescens on *P. trilobus* from India (Thirumalachar and Govindu, 1957) possesses narrow conidiophores (2.80-4.20 μm) and conidia (2.40-3.50 μm). *C. canescens* on *Heylandia* sp. described by Bagyanarayana *et al.* (1991) from Indian collection is characterized by having conidiophores up to 180.00×4.00-6.00 μm, solitary or in small fascicles, and conidia 50.00-120.00×2.50-4.00 μm, short and narrow. The conidiophores and conidia are very variable and the conidiophores are formed in relatively loose fascicles. The characters of conidiophores and conidia are, however, generally variable in species of *Cercospora s. str.*

Deighton (1976) distinguished *C. canescens* from *C. phaseolina* by much longer conidia with multisepta and roundly truncate bases. *C. chamaecristae* on *Cassia chamaecrista* is characterized by having small stromata, 0-2-septate

conidiophores, narrowly obclavate, subhyaline to olivaceous conidia, 15.00-55.00×5.00-7.00 µm (Chupp, 1954; Brown and Morgan-Jones, 1977). Brown and Morgan-Jones (1977) noted this species to be an atypical *Cercospora.* Therefore, Braun (Braum and Melnik, 1997) reallocated this species to *Passalora.*

Passalora centrosematis N. Pons, U. Braun and Crous, sp. nov.

≡ *Cercospora centrosematis* Chupp and A. S. Mull. (centrosemae), Bol. Soc. Venez. Ci. Nat. 8: 40. 1942 (*nom. inval.*).

Leaf spot distinct, irregular, brown spots with definite dark brown border on both sides of the leaf. Stromata medium to large. Conidiophores densely fasciculate, medium dark brown, fairly uniform in colour and width, 1-3-septate, not branched, truncate at the apex, (29.26-)31.70-56.09(-63.41)×(2.43-)3.65-6.09(-12.19) µm, conidial scars conspicuously thickened. Conidia subhyaline, obclavate, obclavate-cylindric, obtuse at the base with a small thickened hilum, 21.95-34.14(-46.34)×2.43-4.87(-7.31) µm. 2-5-septate (Figure 147 and 148).

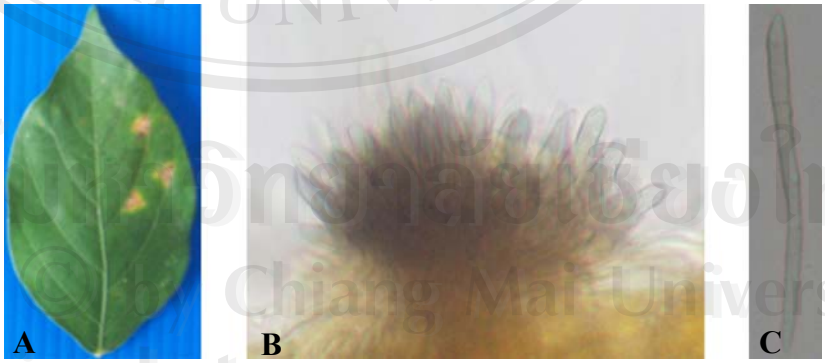

Figure 147 Photograph of *Passalora centrosematis* on *Centrosema pubescens*: A. Symptom, B. Conidiophores and C. Conidia.

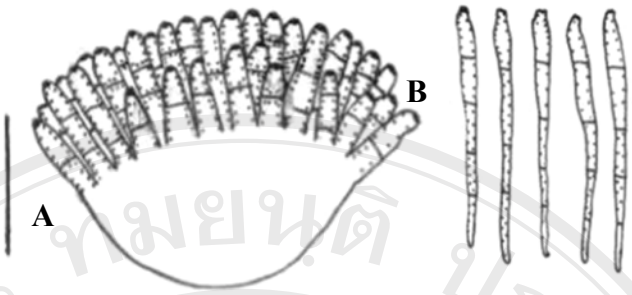

Figure 148 Drawing of *Passalora centrosematis* on *Centrosema pubescens*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Queen Sirikit Botanic Garden, Chiang Mai Province. Leaves of *Centrosema pubescens*, November 21, 2004, JM, CMU MH 065.

Known distribution: Philippines, Puerto Rico and Venezuela (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora canescens* on *Passalora centrosematis* in Thailand. A typical *Passalora* with conspicuous conidiogenous loci and pigmented conidia. *C. centrosematis* is an invalid name published without Latin description. A full English description was published by Chupp (1954).

Cercospora canescens Ellis and G. Martin, Amer. Naturalist 16: 1003. 1882. [T: NY].

≡ *Cercosporiopsis canescens* (Ellis and G. Martin) Miura, Flora of Manchuria and East Mongolia 3: 529. 1928.

= *Cercospora vignicaulis* Tehon, Mycologia 29: 436. 1937. [T: ILLS]. (=*Cercospora apii s.lat*).

Leaf spot suborbicular to irregular, pale brown, tan or dingy center, with a reddish brown to ferruginous margin, 3.00-15.00 mm in diameter. Fruit bodies amphigenous, but more abundant on lower surface, sometimes also present on stems,

cotyledon, and dying pods in effuse black to grey patches. Stromata small, 21.95-48.78 µm. Conidiophores densely fasciculate, pale to medium dark brown, fairly uniform in colour and width, 2-3-septate, geniculate, rarely branched, truncate at the apex, (48.78-)56.09-60.97(-75.60)×(3.65-)4.87-4.87 µm. Conidial scars conspicuously thickened. Conidia hyaline, acicular, straight to curved, 3-9-septate, acute at the apex, truncate at the base with a thickened hilum, (42.68-)53.65-80.48(-102.43)×2.43 (-3.65)-3.65 µm (Figure 149 and 150).

Figure 149 Photograph of *Cercospora canescens* on *Vigna unguiculata* var. *sesquipedalis*: A. Symptom, B. Conidiophores and C. Conidia.

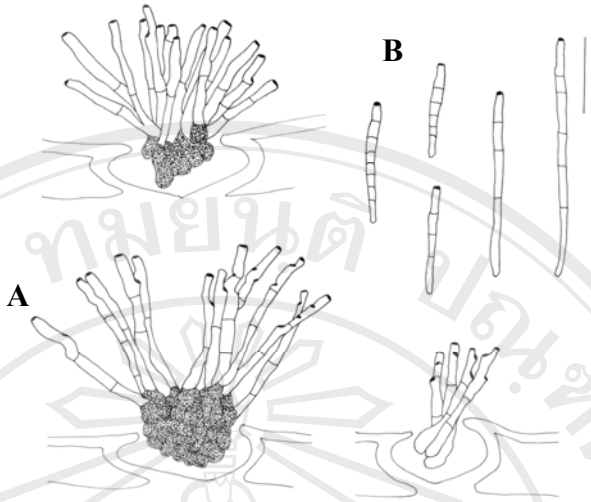

Figure 150 Drawing of *Cercospora canescens* on *Vigna unguiculata* var. *sesquipedalis*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Vigna unguiculata* var. *sesquipedalis*, November 25, 2005, JM, CMU MH 066.

Known distribution: Worldwide, including Afghanistan, Angola, Argentina, Australia, Azerbaijan, Banglndesh, Barbados, Bolivia, Brazil, Brunei, Combodia, Canda, China, Colobia, Cube, Dominican Republ., Egypt, E1 Salvador, Ethiopia, Fiji, Georgia, Ghana, Grenada, Guatemala, Guyana, Haiti, Honduras, Hong Kong, India, Indonesia, Iran, Iraq, Italy, Jamaica, Japan, Korea, Liberia, Malawi, Malaysia, Mauritius, Mexico, Mosambique, Myanmar, Nepal, New Caledonia, Niger, Nigeria, Pakistan, Panama, Papua, New Guinea, Peru, Philippines, Puerto Rico, Russia, Rwanda, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Sri Lanka, Sudan, Suriname, Taiwan, Tanzania, Thailand, Togo, Tonga, Trinidad, Tobago, Uganda, U.S.A (AL, AR, DE, Easterm states, FL, GA, HI, IA, IL, KS, LA,

MD, MO, MS, NC, NJ, OK, SC, TN, TX, VA, WI), Venezuela, Virgin Islands, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Pitakpraivan *et al.* (1994).

Pseudocercospora stizolobii (Syd. and P.Syd.) Deighton, Mycol. Pap. 140: 153. 1976.

≡ *Cercospora stizolobii* Syd. and P. Syd., Ann. Mycol. 11: 270. 1913. [T: S, BPI 441666, 441672; S].

= *Cercospora lussoniensis* Sacc., Ann. Mycol. 12: 314. 1914. [T: B].

= *Cercospora mucunae-capitatae* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 85: 116. 1943 (*nom. inval*.).

Leaf spots orbicular, 1.00-5.00 mm in diameter, often confluent and become irregular, tan with dark greyish brown center, surrounded by a definite dark reddish raised border. Fruit bodies amphigenous, but chiefly hypophyllous. Secondary mycelium absent. Stromata small or up to 34.00 μm in diameter, dark brown. Conidiophores 6-15 in a fascicle, subhyaline to pale olivaceous brown, uniform in colour, substraight to undulate or tortuous sometimes, irregular in width, 0-3 indistinctly septate, rarely branched, rarely once abruptly geniculate, conically rounded at the apex, 17.22-44.39×2.46-3.93 μm, conidial scars unthickened. Conidia subhyaline to pale olivaceous, cylindric to cylindric-clavate, longer ones may be obclavate, straight to mildly curved, indistinctly 1-9 septate, subobtuse to rounded at the apex, long obconic to obconically truncate at the base, 9.84-51.52×2.46-4.53 μm, hilum unthickened and inconspicuous (Figure 151 and 152).

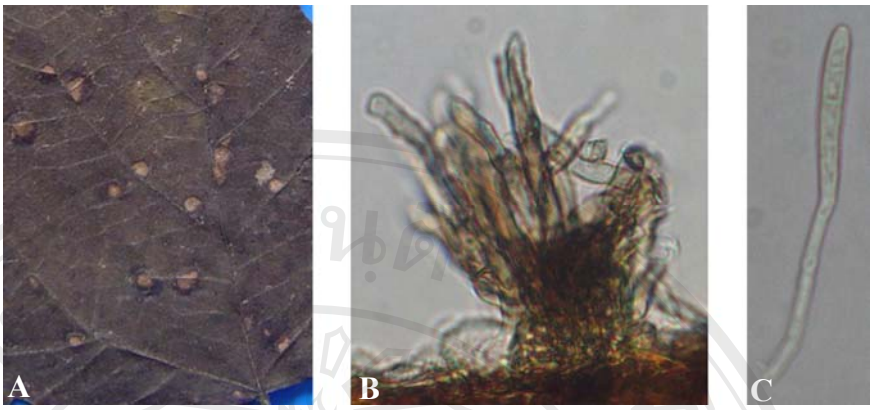

Figure 151 Photograph of *Pseudocercospora stizolobii* on *Mucuna bracteata*: A. Symptom, B. Conidiophores and C. Conidia.

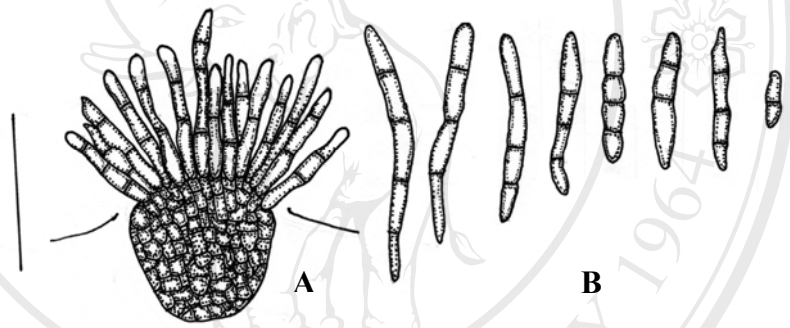

Figure 152 Drawing of *Pseudocercospora stizolobii* on *Mucuna bracteata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Mucuna bracteata*, November 21, 2004, CN and JM, CMU MH 067.

Known distribution: In diameter spread, including Australia, Barbados, Brazil, Cambodia, China, Colombia,Cuba, Fiji, Gabon, Ghana, Guatemala, Guyana, Haiti, Hong Kong, India, Jamaica, Japan, Java, Malawi, Nigeria, Nepal, Panama, Papua New Guinea, Philippines, Puerto Rico, Sierra Leone, South Africa, Saint Vincent and the Grenadines, Taiwan, Togo, Trinidad, Tobago, U.S.A (FL, MS, NC), Venezula, Virgin Islands, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first record of *Pseudocercospora stizolobii* on *Mucuna bracteata* in Thailand.

Passalora aenea (Cif.) U. Braun and Crous, *comb. nov.*

≡ *Berteromyces aeneus* Cif., Sydowia 8: 267. 1954. [T: IMI 81080, neotype, selected here].

= *Cercospora cassiae* Henn., Bull. Herb. Boissier 1: 121. 1893 [T: B, IMI 88979, K, LEP, W], non *Passalora cassiae* Syd., 1939.

≡ *Cercosporidium cassiae* (Henn.) Deighton, Mycol. Pap. 112: 66. 1967.

≡ *Phaeoisariopsis cassiae* (Henn). Arx, Proc. K. Ned. Akad. Wet., C 86: 43. 1983.

≡ *Passalora cassiae* (Henn.) Poonam Srivast., J. Living World 1: 114. 1994 (*nom. inval. et. illeg*.), homonym of *Passalora cassiae* Syd., 1939.

≡ *Passalora cassiae* (Henn.) U. Braun, Mikol. Fitopatol. 30: 6. 1996 (*nom. illeg*.), homonym of *Passalora cassiae* Syd., 1939.

= *Cercospora cassiicola* Roum. (*cassiaecola*), Fungi sel. exs., No. 4486. 1888 (*nom. nud*.). [T: LEP].

Leaf spots distinct, subcircular to irregular, brown, 2.00-11.00 mm in diameter. Stromata well-developed, composed of swollen brown hyphal cells, 55.00-237.00 µm in diameter. Conidiophores very numerous in adense fascicle, straight to somewhat sinuous, uniformly pale yellowish brown to brown, with conidial scars minute but conspicuous, 0-4-septate, (27.50-)35.00-57.50(-75.00)×(2.50-)5.00-10.00

(-12.50) µm, apical or on small shoulders of conidiogenous cells caused by geniculation, concentrated at the apical cell. Conidia solitary, cylindric-obclavate to obclavate, straight to mildly curved, (20.00-)32.50-47.50(-50.00)×(7.50-)10.00-(12.50) µm, 2-4-septate, obtuse to subobtuse at the apex, obconically truncate to subtruncate at the base, hilum slightly thickened, darkened (Figure 153 and 154).

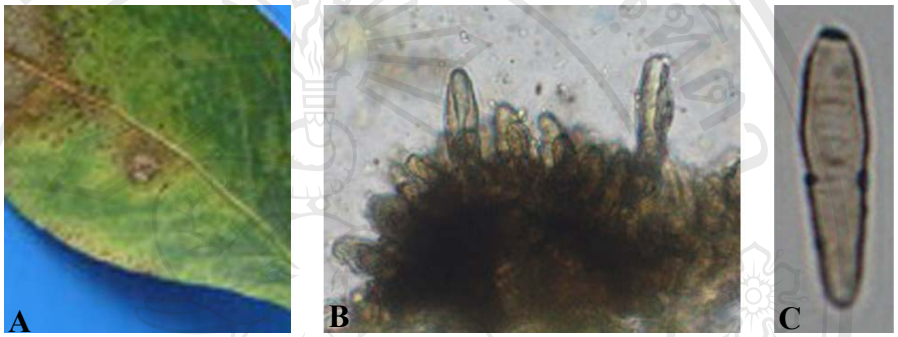

Figure 153 Photograph of *Passalora aenea* on *Cassia angustifolia*: A. Symptom, B. Conidiophores and C. Conidia.

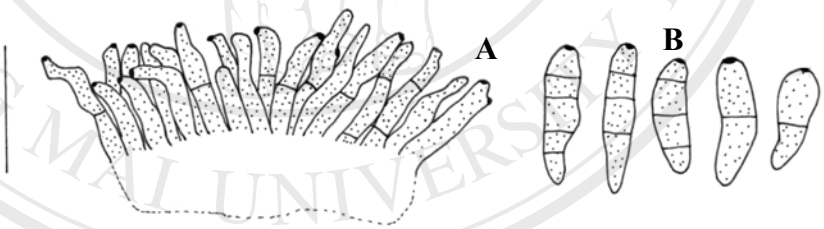

Figure 154 Drawing of *Passalora aenea* on *Cassia angustifolia*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Cassia angustifolia*, November 21, 2004, JM, CMU MH 068.

Known distribution: Brazil**,** Barbados, Colombia, Ethiopia, India, Jamaica, Tanzania, Uganda, U.S.A (MO) and Zambia (Crous and Braun, 2003).

Notes: This is the first record of *Passalora aenea* on *Cassia angustifolia* in Thailand.

Pseudocercospora dalbergiae (S. H. Sun) J. M. Yen, Bull. Soc. Mycol. France 94: 386. (1978) 1979.

≡ *Cercospora dalbergiae* S. H. Sun, J. Agric. Forest. Taiwan 4: 179. 1955.

≡ *Cercoseptoria dalbergiae* (S. H. Sun) J. M. Yen, Bull Soc. Mycol. France 97: 91. 1981.

Leaf spots amphigenous, distinct, subcircular to irregular, 1.00-4.50 mm in diameter, dark brown, without definite margins. Stromata medium, slightly to well-developed, olivaceous brown, subglobular to angular, may up to 30.00 µm in diameter. Conidiophores arranged in a loose to dense fasicle, usually erumpent throught the cuticle, hyaline to subhyaline or sometimes very pale olivaceous brown throught, uniform in width, straight to slightly curved, sometime once geniculate, conidial scars inconspicuous, 0-2-septate, (9.84-)12.30-14.76(-17.22)×2.46-2.46 (-2.95) µm. Conidia long obclavate to cylindric, hyaline to subhyaline, hilum unthickened, not darkened, (14.76-)27.06-56.58(-73.80)×2.46-3.69 µm, 2-8-septate, subobtuse to obtuse at the apex, truncate to subtruncate at the base

(Figure 155 and 156).

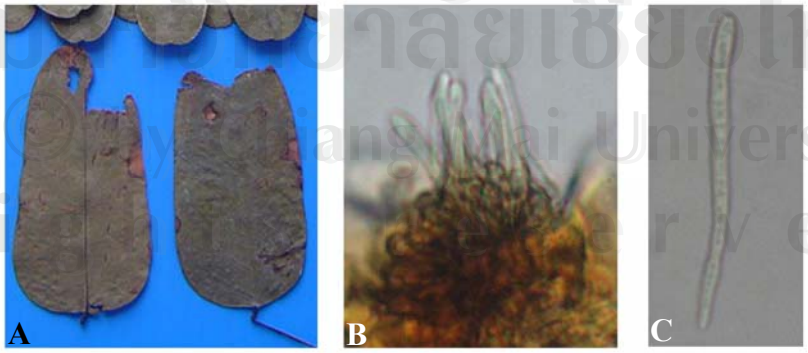

Figure 155 Photograph of *Pseudocercospora dalbergiae* on *Dalbergia stipulacea*: A. Symptom, B. Conidiophores and C. Conidia.

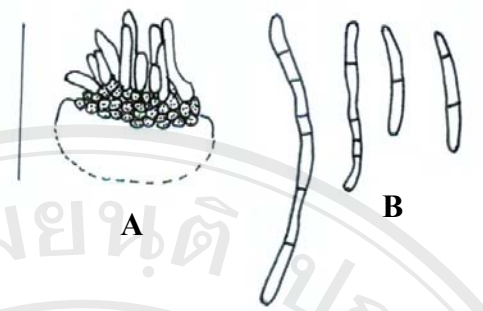

Figure 156 Drawing of *Pseudocercospora dalbergiae* on *Dalbergia stipulacea*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Dalbergia stipulacea*, November 21, 2004, CN and JM, CMU MH 069.

Known distribution: China and Taiwan (Crous and Braun, 2003).

Notes: This is the first record of *Pseudocercospora dalbergiae* on *Dalbergia stipulacea* in Thailand.

Cercospora psophocarpicola J. M. Yen, Bull. Soc. Mycol. France 83: 339. 1967.

Leaf spots amphigenous, scattered, circular to subcircular, white to yellow with brown margins, 1.00-15.00 mm in diameter. Stromata medium, rudimentary to slightly develped, irregular, dark brown, 9.75-29.26 µm in diameter. Conidiophores 2-10 in a divergent fascicle, emerging slightly curved, 1-5 time mildly geniculate, with distinct conidial scars, apical or on shoulders of conidiogenous cells caused by geniculation, 2-6-septate, (39.02-)48.78-56.09(-78.04)×4.87-7.31 µm. Conidia solitary, aciculate to filiform , substraight to moderately curved or even undulate, hyaline to pale olive-brown, smooth, hilum conspicuously thickened, (51.21-)65.85-104.87(-163.41)×2.43-4.87 µm, 6-15-septate, acute to obtuse at the apex, truncate at the base (Figure 157 and 158).

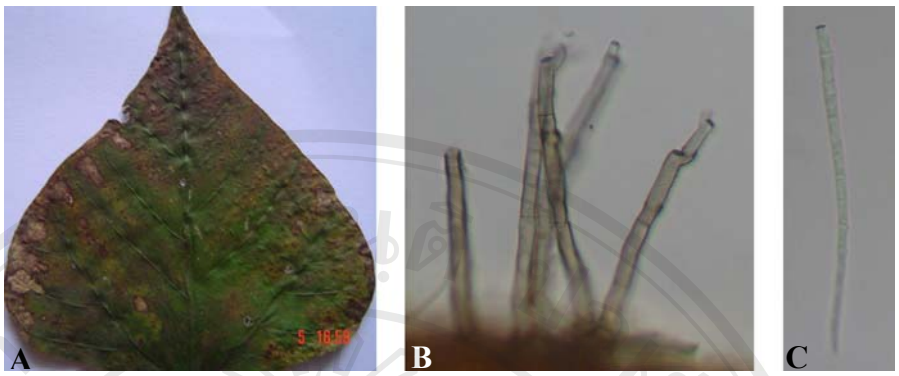

Figure 157 Photograph of *Cercospora psophocarpicola* on *Psophocarpus tetragonolobus*: A. Symptom, B. Conidiophores and C. Conidia.

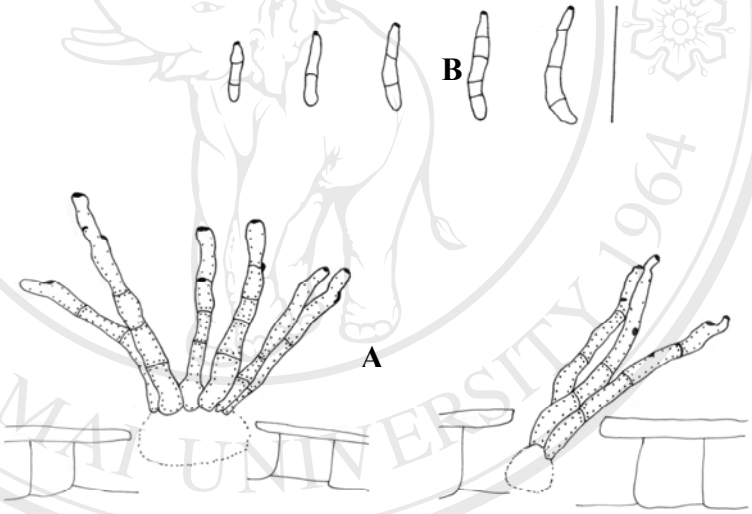

Figure 158 Drawing of *Cercospora psophocarpicola* on *Psophocarpus tetragonolobus*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Psophocarpus tetragonolobus*, November 21, 2004, JM, CMU MH 070.

Known distribution: Myanmar, Nigeria and Singapore (Crous and Braun, 2003).

Notes: This is the first record of *Cercospora psophocarpicola* on *Psophocarpus tetragonolobus* in Thailand. The type material of this species is the same collection as

the type of *C. psophocarpi* (mixed collection). There is abundant Fruit bodies of the latter species, but conidiophores and conidia of *C. psophocarpicola* have not been found.

Cercospora canescens Ellis and G. Martin, Amer. Naturalist 16: 1003. 1882.

≡ *Cercosporiopsis canescens* (Ellis and G. Martin) Miura, Flora of Manchuria and East Mongolia 3: 529. 1928.

= *Cercospora vignicaulis* Tehon, Mycologia 29: 436. 1937. [T: ILLS]. (=*Cercospora apii s.lat*).

Leaf spot suborbicular to irregular, pale brown, tan or dingy center, with a reddish brown to ferruginous margin, 3.00-15.00 mm in diameter. Fruit bodies amphigenous, but more abundant on lower surface, sometimes also present on stems, cotyledon, and dying pods in effuse black to grey patches. Stromata small to medium. Conidiophores densely fasciculate, pale to medium dark brown, fairly uniform in colour and width, 1-4-septate, geniculate, rarely branched, truncate at the apex, (75.60-)109.75-158.53(-195.12)×4.87 µm, conidial scars conspicuously thickened. Conidia hyaline, acicular, straight to curved, indistinctly multiseptate, acute at the apex, truncate at the base with a thickened hilum, (34.14-)48.78-131.70 (-180.48)×2.43-2.43(-4.87) µm (Figure 159 and 160).

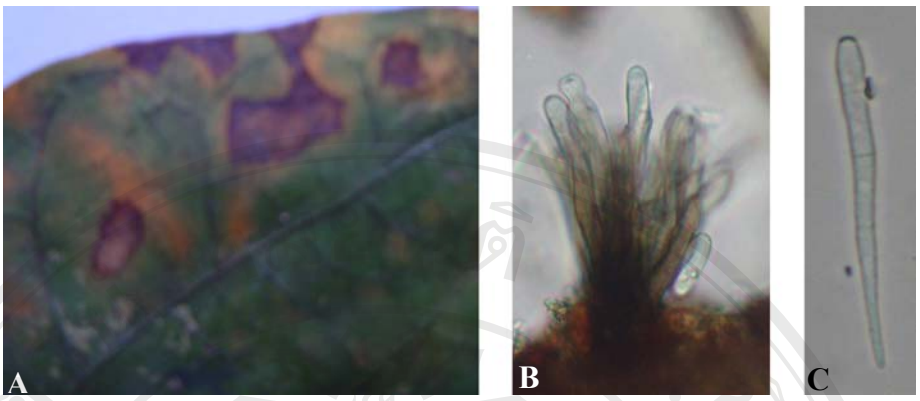

Figure 159 Photograph of *Cercospora canescens* on *Vigna radiata*: A. Symptom, B. Conidiophores and C. Conidia.

Figure 160 Drawing of *Cercospora canescens* on *Vigna radiata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Vigna radiata*, October 25, 2005, JM, CMU MH 071.

Known distribution: Nearly throughout the world wherever the crop is cultivated, including Australia, Bangladesh, Barbados, Brazil, Bolivia, Brunei, Cambodia, China, Colombia, Costa Rica, Cuba, Dominican Republ., Ecuador, Fiji, Georgia, Ghana, Guyana, Haiti, Hong Kong, India, Indonesia, Iran, Japan, Kenya, Korea, Malawi, Malaysia, Malawi Mauritus, Myanmar, Nepal, New Caledonia, New Zealand, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Puerto Rico, Russia, Saint Vincent, Senegal, Sierra Leone, Solomon Islands, Somalia, South

Africa, the Grenadines, Sudan, Tadzhikistan, Taiwan, Tanzania, Thailand, Trinidad and Tobago, Togo, Uganda, U.S.A (AL, FL, HI, IA, IL, KS, MD, MO, MS, NC, NJ, SC, TX, VA, WV), Uzbekistan, Vanuatu, Venezuela, Virgin Islands, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Niranam refer to Sontirat *et al*. (1980). This fungus has been reported in Taiwan on *Dolichos lablab* L., *Glycine max* (L.) Merr., *Vigna radiata* (L.)R. Wilczek (*Phaseolus radiatus* (L.) Wilcz var. *typicus* Prain). *Vigna sinensis* (L.) Endl. ex Hassk. and *V. sinensis* (L.) Endl. var. *catiang* Nakai. *Cercospora canescens* was recorded as a member of Korean cercosporoid fungi from *Phaseolus radiatus* (Park, 1958; Chung *et al.*, 1977; Kwon and Oh, 1981) and *P. angularis* (Shin and Braun, 1993). *C. cruenta* (≡*Pseudocercospora cruenta)* was reported on *P. vulgaris* (Nakata and Takimoto, 1928; Park, 1958; Chung *et al.*, 1977) and *P. angularis* (Nakata and Takimoto, 1928; Park, 1958) from Korea. *C. cruenta* (Nakata and Takimoto, 1928; Park, 1958) on *P. angularis* is well-known as a causal agent of brown leaf spot in red beans and in accordance with this species. The identify of the specimen concerned can, however, not be proven, since it is not preserved. Kim and Shin (1998c) provided the detailed description and illustration based on Korean materials from *P. angularis* for this fungal species.

C. canescens on *P. trilobus* from India (Thirumalachar and Govindu, 1957) possesses narrow conidiophores (2.80-4.20 μm) and conidia (2.40-3.50 μm).

C. canescens on *Heylandia* sp. described by Bagyanarayana *et al.* (1991) from Indian collection is characterized by having conidiophores up to 180.00×4.00-5.50 μm, solitary or in small fascicles, and conidia 50.00-120.00×2.50-4.00 μm, short and

narrow. The conidiophores and conidia are very variable and the conidiophores are formed in relatively loose fascicles. The characters of conidiophores and conidia are, however, generally variable in species of *Cercospora s. str.*

Deighton (1976) distinguished *C. canescens* from *C. phaseolina* by much longer conidia with multisepta and roundly truncate bases. *C. chamaecristae* on *Cassia chamaecrista* is characterized by having small stromata, 0-2-septate conidiophores, narrowly obclavate, subhyaline to olivaceous conidia, 15.00-55.00×5.00-7.00 µm (Chupp, 1954; Brown and Morgan Jone, 1977). Brown and Morgan-Jones (1977) noted this species to be an atypical *Cercospora.* Therefore, Braum and Melnik (1997) reallocated this species to *Passalora.*

Cercospora leucaenae A. N. Shukla and P. C. Sharma, Indian Forester 110: 1066. 1984. [T: IMI 284468].

Leaf spots on the surface scattered to confluent, distinct, circular to subcircular, brown, centre yellowish white to brown with dark brown margin, 1.00-7.00 mm in diameter. Stromata moderately developed, emerging through stomata or erumpent through the cuticle, 17.07-48.78 µm in diameter. Conidiophores pale brown at the base and paler upwards, arranged in a loose to dense fascicle, with distinct conidial scars, 3-8-septate, (43.90-)90.24-99.99(-114.63)×(3.65-)4.87-4.87(-6.09) µm. Conidia solitary, obclavate to cylindric-obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, (24.39-)60.97-78.04 (-109.75)×2.43-3.65(-4.87) µm, 3-16-septate, obtuse at the apex, subtruncate or obconically truncate at the base (Figure 161 and 162).

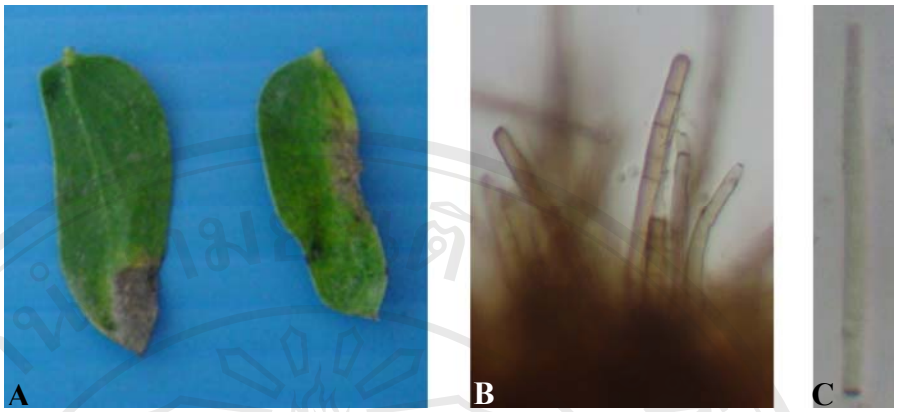

Figure 161 Photograph of *Cercospora leucaenae* on *Leucaena leucocephalade*: A. Symptom, B. Conidiophores and C. Conidia.

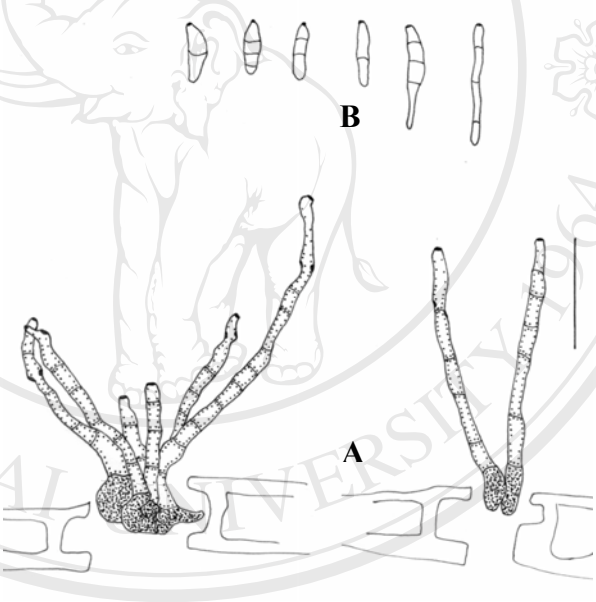

Figure 162 Drawing of *Cercospora leucaenae* on *Leucaena leucocephalade*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Leucaena leucocephalade*, November 21, 2004, JM, CMU MH 072.

Known distribution: India (Crous and Braun, 2003).

Notes: *Cercospora leucaenae* has been previously recorded in India. This is the first record of this fungus in Thailand. A true *Cercospora s.str.* is close to or indentical with *C. apii s. lat.*

Family Loganiaceae

Pseudocercospora buddleiae (W. Yamam.) Goh and W. H. Hsieh, Trans. Mycol. Soc. Republ. China 2: 114. 1987.

≡ *Cercospora buddleiae* W. Yamam., Trans. Nat. Hist. Soc. Formosa 26: 279. 1936. [T: NTU-PPE].

≡ *Pseudocercospora buddleiae* (Yamam.) X. J. Liu and Y. L. Guo, *Mycosystema* 2: 230. 1989 (*comb. superfl*.).

Leaf spots distinct, angular to irregular, vein limited, brown, scattered, later confluent, 1.50-5.50 mm in diameter. Fruit bodies amphigenous. Stomata mainly epiphyllous, distinct, brown, 12.30-39.36 µm in diameter. External hyphae developed on under leaf surface. Conidiophores arising from stromata or external hyphae, brown, densely fascicule, straight, sinuous or slightly curved, frequently geniculate at head, rough, 2-11-septate, (24.60-)49.20-182.04(-214.02)×2.46-4.92 µm. Conidial scars denticulate. Conidia solitary, cylindrical to obclavate, rough, straight to mildly curved, pale olivaceous brown, 2-7-septate, obtuse at apex, obconically truncated at the basal end, (19.68-) 29.52-54.12(-91.02)×(2.46-)3.69-4.92 µm (Figure 163 and 164).

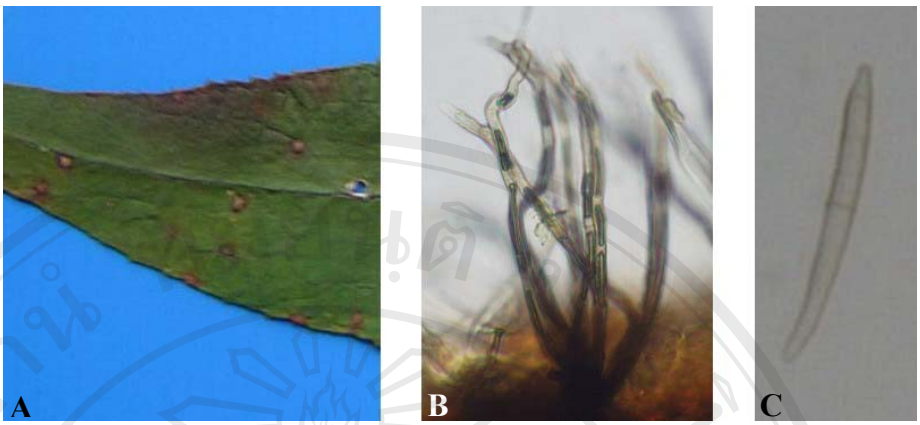

Figure 163 Photograph of *Pseudocercospora buddleiae* on *Buddleja asiatica*: A. Symptom, B. Conidiophores and C. Conidia.

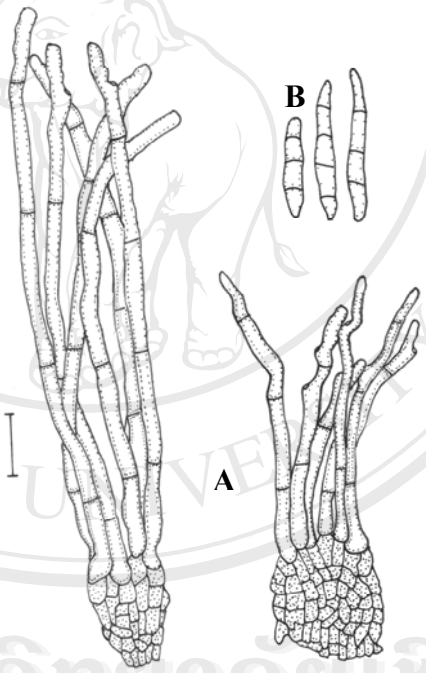

Figure 164 Drawing of *Pseudocercospora buddleiae* on *Buddleja asiatica*: A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Buddleja asiatica*, November 24, 2004, CN and JM, CMU MH 073.

Known distribution: China, India, Japan, Philippines and Taiwan (Crous and Braun, 2003).

Notes: This is the first report of *Pseudocercospora buddleiae* on *Buddleja asiatica* in Thailand.

Family Lythraceae

Pseudocercospora cupheae (Syd.) U. Braun, Schlechtendalia 2: 14. 1999.

≡ *Cercospora cupheae* Syde., Ann. Mycol. 37: 428. 1939. [T: Syd., Fungi exot. exs. 1241, e.g., HBG].

Leaf spots distinct, circular to subcircular, brown, scattered, later confluent, angular to irregular, 1.50-5.50 mm in diameter. Stomata distinct, usually amphigenous, subepidermal, erumpent, brown to olivaceous brown, 12.30-39.36 µm in diameter. Conidiophores emerging from the upper part of stromata, greenish brown, densely fasciculate, simple, straight, sinuous or slightly curved, 4-8-septate, (75.60-)109.75-158.53(-195.12)×4.87 µm, conidial scars inconspicuous. Conidia solitary, obclavate-cylindric to obclavate, straight to mildly curved, pale olivaceous brown, 4-10-septate, non-constricted, occationally midly constricted at the septa, subobtuse to broadly rounded at the apex, obconically truncate at the base, (34.14-) 48.78-131.70(-180.48)×2.43 µm, hilum unthicked, not darkened (Figure 165 and 166).

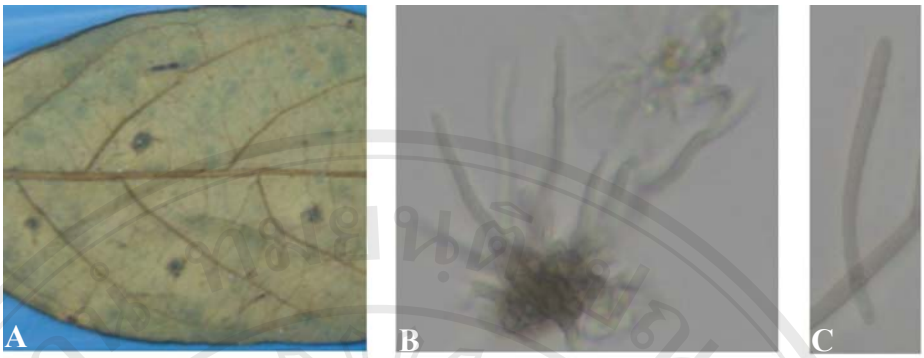

Figure 165 Photograph of *Pseudocercospora cupheae* on *Cuphea hyssopifalia*: A. Symptom, B. Conidiophores and C. Conidia.

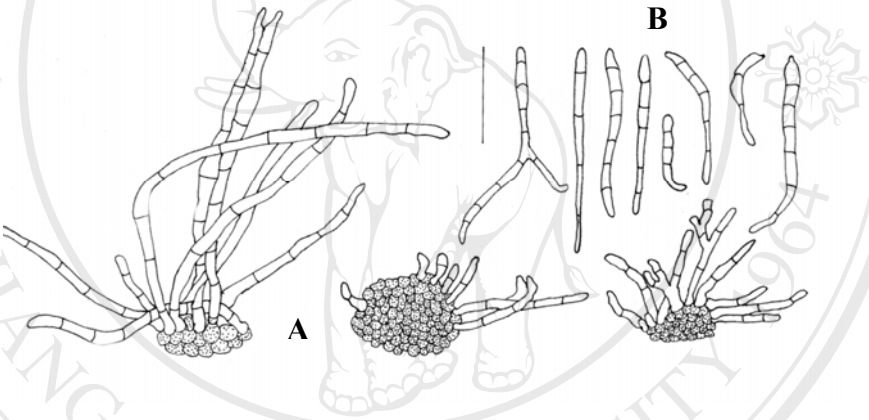

Figure 166 Drawing of *Pseudocercospora cupheae* on *Cuphea hyssopifalia*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Sirikit Botanic Garden, Chiang Mai Province. Leaves of *Cuphea hyssopifalia*, November 21, 2004, JM, CMU MH 074.

Known distribution: Known only Thailand.

Notes: This is the first report of *Pseudocercospora cupheae* on *Cuphea hyssopifalia* in Thailand.

Family Malvaceae

Pseudocercospora abelmoschi (Ellis and Everh.) Deighton, Mycol. Pap. 140: 138 (1976). (Figs. 2, 3)

≡ *Cercospora abelmoschi* Ellis and Everh., J. Inst. Jamaica 1: 347 (1893).

= *Cercospora hibisci* Tracy and Earle, Bull. Torrey Bot. Club 22: 179 (1895).

= *Cercospora hibisci-manihotis* Henn., Hedwigia 43: 146 (1904).

Leaf spots distinct, circular to subcircular, 1.50-9.00 mm in diameter, brown to dark brown with blackish brown border. Fruit bodies amphigenous. Stromata small, 12.30-27.06 µm. Conidiophores loose to dense fascicule, brown to pale brown, straight to geniculate, rough, tortuous, multi septated, (12.30-)19.68-46.74 (-56.58)×2.46-4.92 µm, with unthickened and slightly swelled scars. Conidia solitary, ovoid to obclavate, straight or mildly curved, rough, pale to pale olivaceous brown, 4-6 septate, obtuse to acute at the apex, obconically truncated and unthickened at basal end, (17.22-)22.14-61.50(-66.42)×3.69-4.92 µm (Figure 167 and 168).

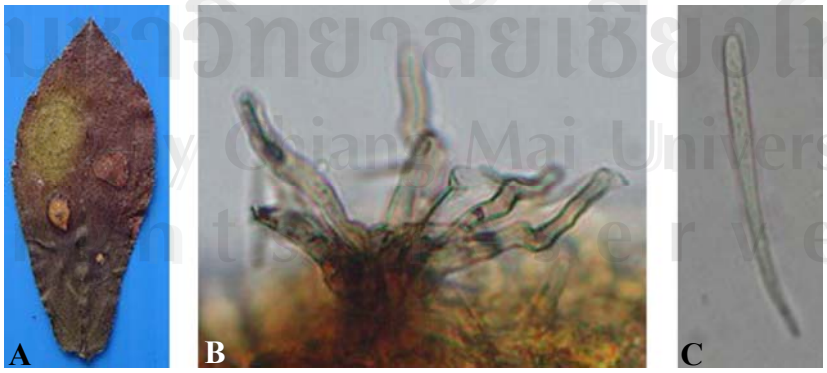

Figure 167 Photograph of *Pseudocercospora abelmoschi* on *Hibiscus* sp.: A. Symptom, B. Conidiophores and C. Conidia.

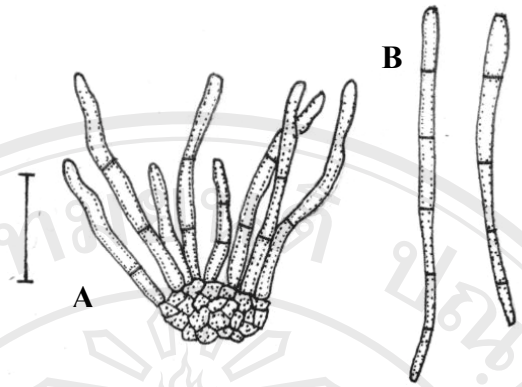

Figure 168 Drawing of *Pseudocercospora abelmoschi* on *Hibiscus* sp.: A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Queen Sirikit Botanic Garden, Chiang Mai Province. Leaves of *Hibiscus* sp., November 20, 2004, CN and JM, CMU MH 075.

Known distribution: Worldwide. (Crous and Braun, 2003).

Notes: Hitherto known species in Thailand.

Cercospora malayensis F. Stevens and Solheim, Mycologia 23: 394. 1931. [T: ILL 14824].

= *Cercospora hibisci-esculenti* Sawada (*nom. nud.) fide* Hsieh and Goh (1990, p. 219).

= *Cercospora hibisci-sabdariffae* Sawada, Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 220. 1959 (*nom. nud.*).

(= *Cercospora apii s. lat.).*

Leaf spots orbicular to irregular, 3.00-8.00 mm in diameter, tan to dingy grey, usually with a purple or red border. Fruit bodies amphigenous. Stromata none or 24.60-73.80 µm in diameter. Conidiophores 5-20 in a compact or divergent fascicle, pale to dark olivaceous brown, multiseptate, straight, or 2-5 geniculate, not branched,

fairly uniform in colour and width, (4.92-)9.84-19.68(-24.60)×2.46-3.69(-4.92) µm. Conidia hyaline, acicular, straight to curved, indistinctly multiseptate, subobtuse at the apex, truncate to subtruncate at the base, (36.90-)36.90-81.18(-100.86)×1.23-2.95 (-3.69)µm (Figure 169 and 170).

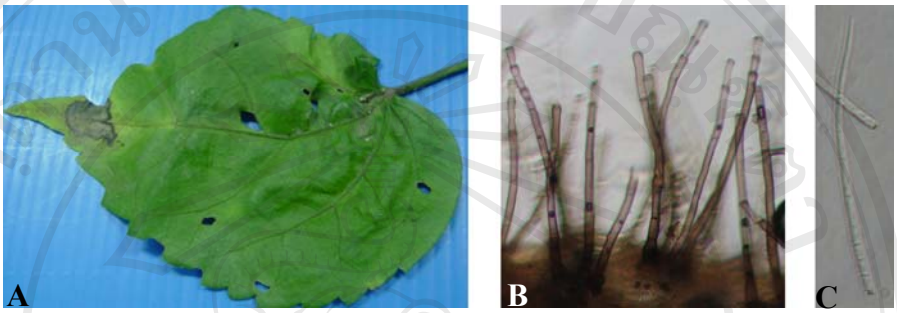

Figure 169 Photograph of *Cercospora malayensis* on *Hibiscus rosae-sinensis*: A. Symptom, B. Conidiophores and C. Conidia.

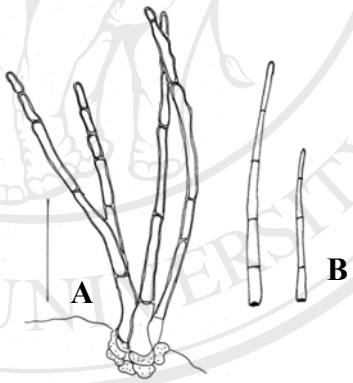

Figure 170 Drawing of *Cercospora malayensis* on *Hibiscus rosae-sinensis*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Hibiscus rosae-sinensis*, November 21, 2005, JM, CMU MH 076.

Known distribution: Brazil, Brunei, Cambodia, China, Cuba, El Salvador, Ethiopia, Fiji, Ghana, India, Indonesia, Iran, Jamaica, Japan, Korea, Malaysia, Mauritius, Nepal, New Caledonia, Nigeria, Niue, Pakistan, Papua New Guinea, Philippines,

Senegal, Sierra Leone, Singapore, Solomon Islands, South Africa. Sudan, Taiwan, Tanzania, Togo, Trinidad and Tobago, Uganda, U.S.A (AL, FL, GA, HI, MO, NJ, OK, SE states, TX, VA), Venezuela, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora malayensis* on *Hibiscus rosae-sinensis* in Thailand. A true *Cercospora s.str*. is close to *C. apii s. lat.,* but distinct by having obclavate-cylindrical conidia with obconically truncate bases.

Park (1967) and Shin and Braun (1993) listed this leaf spot fungus on *Althaea rosea* from Korea. Detailed description and illustration based on Korean material of this species were provided by Kim and Shin (1998a).

According to Yen and Sun (1983), *Cercospora althaeigena* on *A. rosae* is different from this fungus in having coloured obclavate or cylindric to cylindric conidia. They also recorded *Cercospora althaeicola* on *A. rosae,* which differs from the present species in its indistinct leaf spots and cylindric conidia.

However, subhyaline and obclavate-cylindric have also been observed in the present Korean collections, and indistinct leaf spots are present on the lower surface in these specimens. The conidial shape and pigmentation is very variable in *C. althaeina* and *C. althaeicola* are reduced to synonymy with this species.

Family Moraceae

Cercospora broussonetiae Y. L. Guo and L. Xu, Mycosystema 21: 181. 2002.

[T: HMA 81404].

≡ *Pseudocercospora broussonetiae* (Chupp and Linder, Mycologia)

29: 27. 1937. [T: BPI 433862; CUP 39252].

Leaf spots amphigenous, distinct, subcircular to angular, yellowish brown with blackish brown margins, 3.00-8.00 mm in diameter. Stromata small to medium, rudimentary to slightly develped, irregular, dark brown, 14.50-41.50 µm in diameter. Conidiophores pale brown at the base and paler upwards, arranged in a loose to dense fascicle, with distinct conidial scars, 5-10-septate, (158.53-)241.46-250.46 (-292.68)×4.87-4.87(-6.09) µm. Conidia solitary, obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, (14.63-) 28.04-48.78(-82.19)×(2.43-)3.65-4.87(-6.09) µm, 3-7-septate, acute to obtuse at the apex, truncate at the base (Figure 171 and 172).

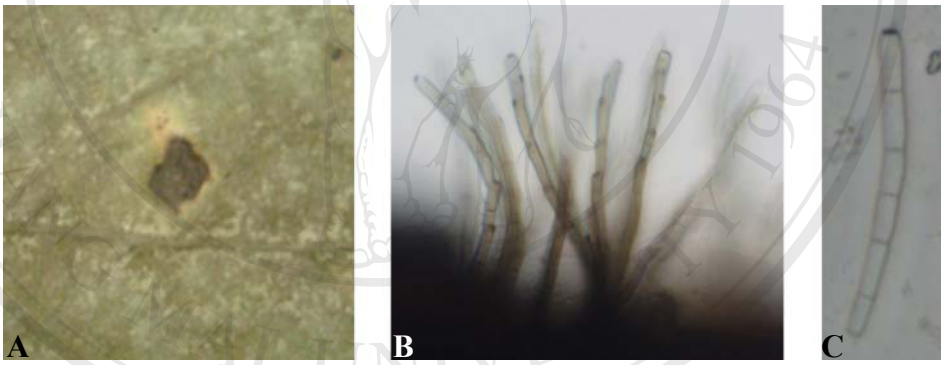

Figure 171 Photograph of *Cercospora broussonetiae* on *Broussonetia papyrifera*: A. Symptom, B. Conidiophores and C. Conidia.

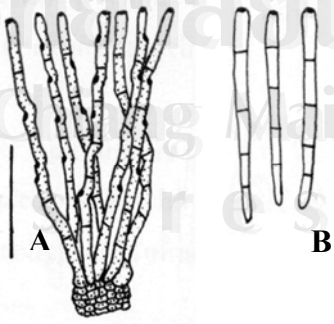

Figure 172 Drawing of *Cercospora broussonetiae* on *Broussonetia papyrifera*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Mae Jo, Chiang Mai Province. Leaves of *Broussonetia papyrifera,* September 1, 2005, JM, CMU MH 078.

Known distribution: China (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora broussonetiae* on *Broussonetia papyrifera* in Thailand. A true *Cercospora s.str.* is close to or identical with *C. apii s. lat.*

***Cercospora* sp.**

Leaf spots scattered, rarely confluent, distinct, circular or subcircular to irregular, small to fairly large, 3.00-5.00 mm in diameter, dark brown, on the upper surface surrounded by blackish brown margin. Fruit bodies amphigenous. Stromata slightly to moderately developed, dark brown. Conidiophores 3-6 in a fascicle, pale brown at the base and paler upwards, straight geniculate in the upper portion, not branched, 2-5-septate, (46.80-)78.00-150.80(-161.20)×(2.60-)3.90-5.20 μm, conically narrowed at the apex, conidial scars small but conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia subhyaline to pale olivaceous, obclavate to cylindric, straight to slightly curved, constricted at the septa, 3-12-septate, subobtuse to obtuse at the apex, truncate or obconically truncate at the base, (23.40-)49.40-52.00(-78.00)×(2.60-)5.20-5.20 μm, hilum conspicuously thickened, darkened and non-protuberant (Figure 173 and 174).

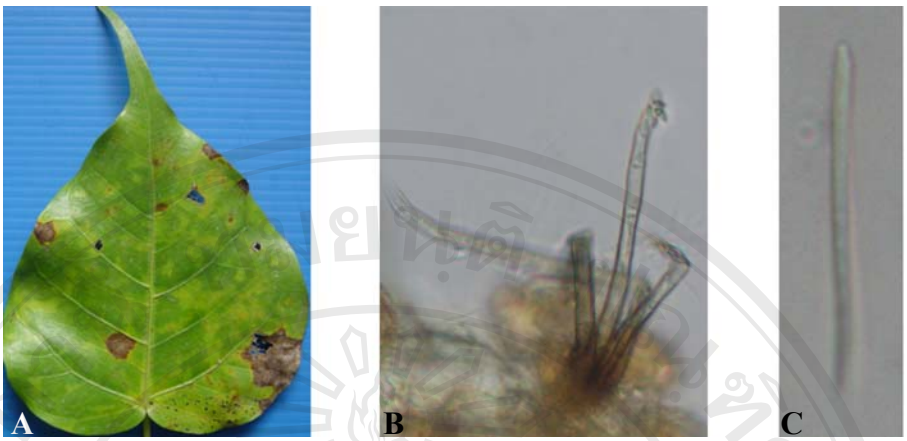

Figure 173 Photograph of *Cercospora* sp. on *Ficus religiosa*: A. Symptom, B. Conidiophores and C. Conidia.

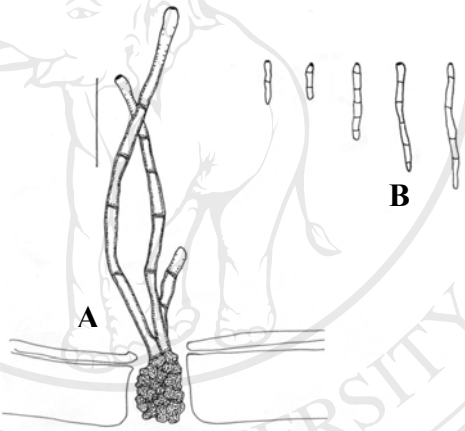

Figure 174 Drawing of *Cercospora* sp. on *Ficus religiosa*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Ficus religiosa,* December 3, 2005, JM, CMU MH 116.

Known distribution: Known only in Thailand.

Notes: This is the first report of *Cercospora* sp. on *Ficus religiosa* in Thailand and in the world.

Cercospora rufula Syd., Ann. Mycol. 21: 91. 1923.

Leaf spots subcircular to irregular, 3.00-6.00 mm in diameter, pale brown to dingy grey at center, with a darker margin. Fruit bodies amphigenous. Stromata lacking, non fasciculate. Conidiophores pale to very pale olivaceous brown, uniform in colour, irregular in width, 1-3-septate, rarely geniculate, straight to variously curved or bent, (29.52-)36.90-51.66(-61.50)×4.92 µm. Conidia pale to very pale olivaceous, cylindric-obclavate, straight to mildly curved, 3-5-septate, base long obconically truncate, tip obtuse to conic, 24.60-27.06(-31.98)×2.46 µm (Figure 175 and 176).

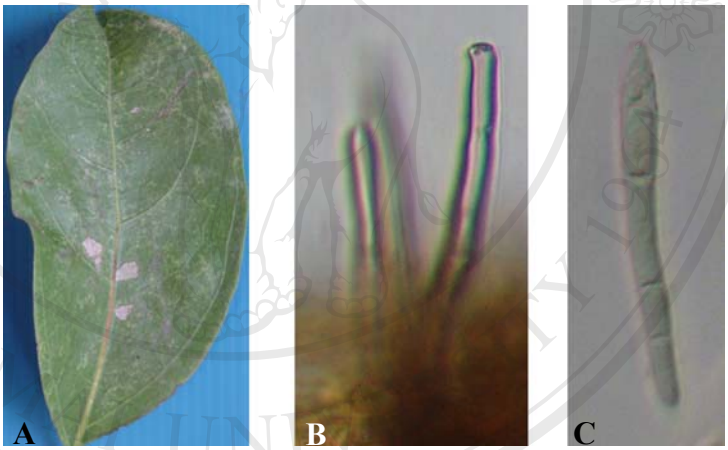

Figure 175 Photograph of *Cercospora rufula* on *Ficus* sp.: A. Symptom, B. Conidiophores and C. Conidia.

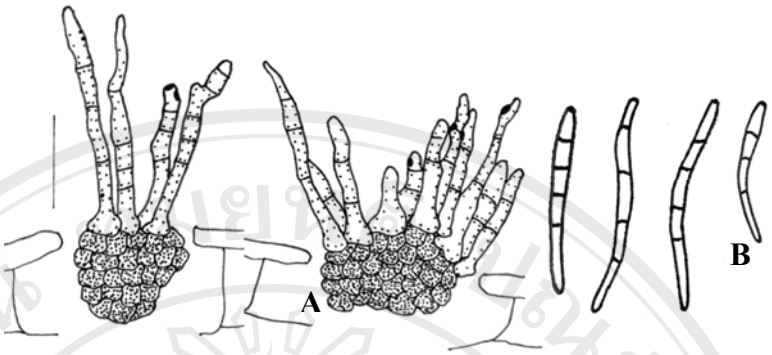

Figure 176 Drawing of *Cercospora rufula* on *Ficus* sp.: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Ficus* sp., November 21, 2004, JM, CMU MH 079.

Known distribution: Indonesia, Malaysia and Thailand (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora rufula* on *Ficus* sp. in Thailand

Cercospora ficicola Bond. -Mont., Trudy Bot. Inst. Akad. Nauk SSR, Ser. 2, 3: 755. 1936. [T: LE 40401].

≡ *Cercospora fici* Head and F. A. Wolf, Mycologia 3: 16. 1911. [T: BPI 436354].

= *Pseudocercospora fici* (Heald and F. A. Wolf,) X. J. Liu and Y. L.

Leaf spots distinct, brown, with yellowish to orange margin, angular or irregular, vein limited, 2.00-8.00 mm in diameter, coalescing and covering the whole surface of the leaf. Fruit bodies amphigenous. Secondary mycelium external: hyphae emerging through the stomata, bearing secondary conidiophores laterally, pale olivaceous. Stromata poorly developed or consist of several brown cells. Conidiphores emerging through the stomata, pale olivaceous brown, uniform in

colour, not branched erect or slightly tortuous, septate and geniculate, conidial scars conspicuously thickened, 1-4-septate, (19.51-) 21.95-48.78(-60.97)×2.43 µm. Conidia cylindric, subhyaline to pale olivaceous, straight or slightly curved, 4-11-septate, rounded at the apex, obconically truncate at the base, catenulate end of the conidia holding a conspicuously thickened hilum, (58.53-)65.85-109.75(-117.07)×3.65-4.87 µm (Figure 177 and 178).

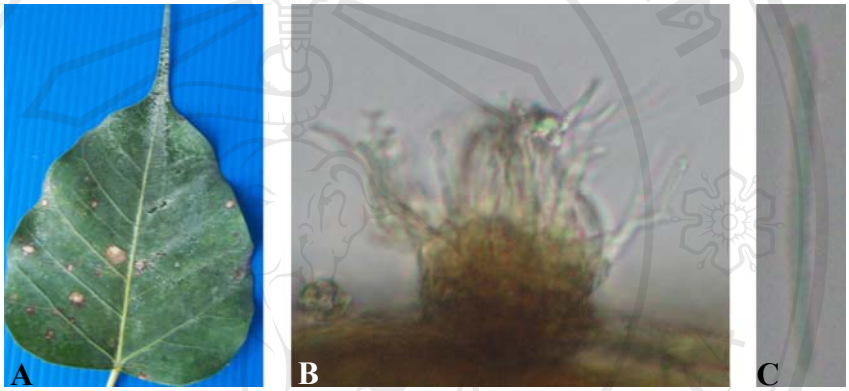

Figure 177 Photograph of *Cercospora ficicola* on *Ficus rumphii*: A. Symptom, B. Conidiophores and C. Conidia.

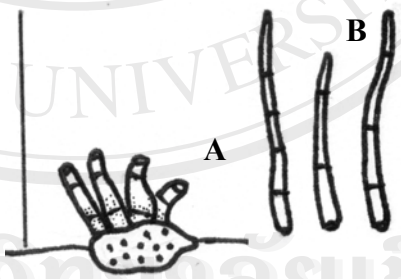

Figure 178 Drawing of *Cercospora ficicola* on *Ficus rumphii*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Ficus rumphii*, December 3, 2005, JM, CMU MH 080.

Known distribution: Known only Thailand.

Notes: This is the first report of *Pseudocercospora fici* on *Ficus rumphii* in Thailand and in the world.

Cercospora morina Chupp, a monograph of the fungus genus *Cercospora*: 400.

[T: CUP-MG 897]

Leaf spots irregular, vein-limited, scattered, extending from margin to midrib, bounded on the sides by the veins, greyish brown to dingy grey, Fruit bodies slightly darkening some of the areas, amphigenous, but more abundant on the upper leaf surface. Stromata small, very dark brown. Conidiophore medium dark brown, paler toward the tip, uniform in width, multiseptate, straight to curved, not branched, 2-5 geniculate, large spore scar at the subtruncate tip, (34.14-)41.46-78.04(-99.99)×4.87-6.09 µm. Conidia hyaline, acicular, straight to curved, indistinctly multiseptate, base truncate, tip acute, (51.21-)65.85-114.63(-170.73)×(3.65-)4.87-4.87 µm (Figure 179 and 180).

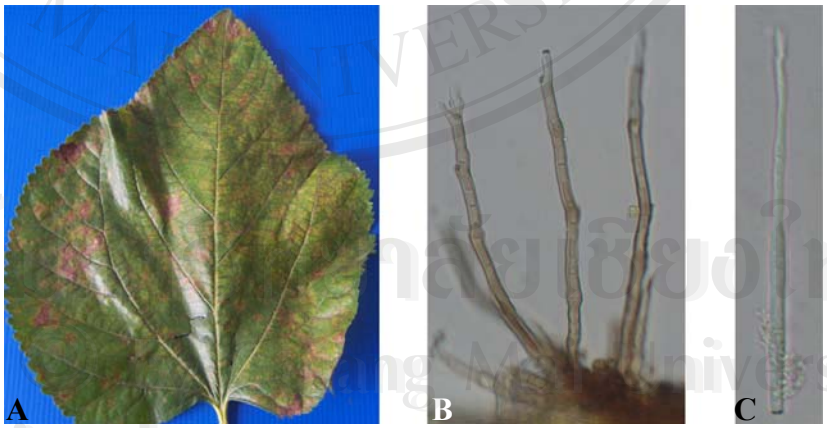

Figure 179 Photograph of *Cercospora morina* on *Morus alba*: A. Symptom, B. Conidiophores and C. Conidia.

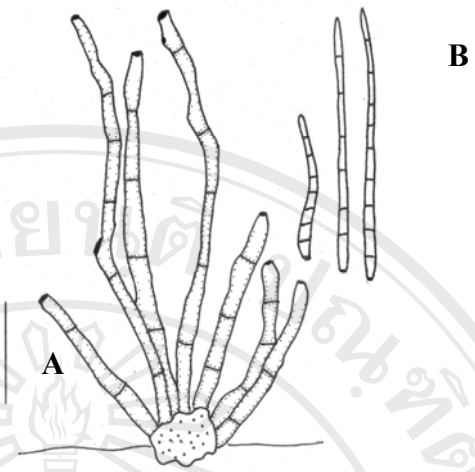

Figure 180 Drawing of *Cercospora morina* on *Morus alba*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Morus alba*, November 21, 2004, JM, CMU MH 081.

Known distribution: Brazil, Estonia, Latvia and Russia (European part) (Crous and Braun, 2003).

Notes: This is the first report of *Cercospora morina* on *Morus alba* in Thailand. Previous report list *Cercospora morina* on this plant was made by Chandrasrikul (1962)

Family Musaceae

Pseudocercospora musae (Zimm.) Deighton, Mycol. Pap. 140: 148. 1976.

≡ *Cercospora musae* Zimm., Centralbl. Bakteriol., Abt. 2, 8: 219. 1902.

= *Cercospora musae* Massee, Bull. Misc. Inform. 28: 159. 1914. [T: K].

Teleomorph.: *Mycosphaerella musicola* R. Leach, J. L. Mulder and R. H. Stover, Trans. Brit. *Mycol. Soc*. 67: 77. 1976.

≡ *Mycosphaerella musicola* R. Leach, Trop. Agric. 18: 92. 1941 (*nom. nud*.).

Leaf spots numerous, irregular, vein-limited but without definite margin, dark brown, 3.00-8.00 mm in diameter. Stromata amphigenous, intra or subepidermal, then erumpent, brown, 24.60-44.28 µm in diameter. Conidiophores arranged in a loose fascicle, arising from stromata, brown, paler towards the apex, sightly to slightly curved, not branched, 1-3-septate, fasciculate, 12.30-59.40×2.46-4.92 µm, 27.32×2.83 µm on average, with indistinct and unthickened conidial scars. Conidia cylindrical to obclavate, straight or curved, occasionally sigmoid, with truncate and unthickened basal end, and with obconical tip, 22.14-98.40×2.95-4.92 µm, smooth, 2-9-septate (Figure 181 and 182).

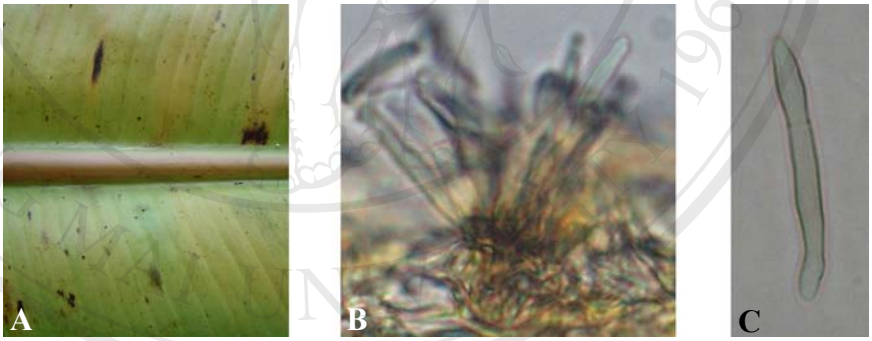

Figure 181 Photograph of *Pseudocercospora musae* on *Musa acuminate*: A. Symptom, B. Conidiophores and C. Conidia.

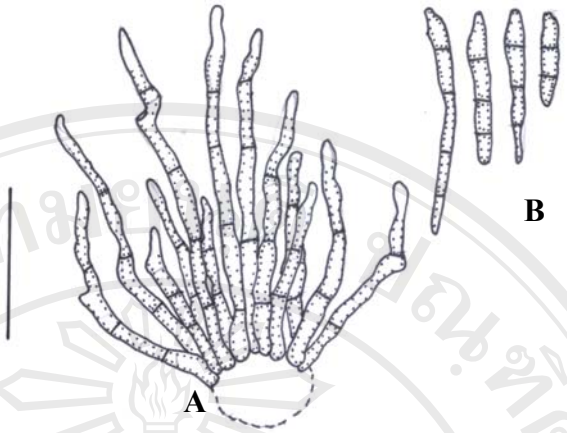

Figure 182 Drawing of *Pseudocercospora musae* on *Musa acuminate*:
A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Musa acuminate*, November 21, 2004, JM, CMU MH 082.

Known distribution: In diameterly distributed, including American Samoa, Angola, Antigua and Barbuda, Argentina, Australia, Bahamas, Barbados, Belau, Belau, Belize, Bolivia, Brazil, Brunei, Bhutan, Cambodia, Cameroon, Cape Verde, Cayman Islands, China, Colombia, Congo, Cook Islands, Costa Rica, Cuba, Dominican Republ., Ecuador, Egypt, E1 Salvador, Ethiopia, Fiji, France, Guiana, French Polynesia, Guiana, French Polynesia, Gabon, Ghana, Grenada, Guadeloupe, Guam, Guatemala, Guinea, Guinea-Bisiau, Guyana, Haiti, Honduras, Hong Kong, India, Indonesia, Ivory Coast, Jamaica, Kenva, Kiribati, Laos,Madagascar, Malawi, Malaysia, Martinique, Mauritius, Mexico, Micronesia, Montserrat, Mozambique, Nepal, New Caledonia, Nicaragua, Nigeria, Niue, Norfolk Island, Panama, Papua New Guinea, Peru, Philippines, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, São Toné e Príncipe, Sierra Leone, Solomon Islands, Somalia, South Africa, Sri Lanka, Suriname, Taiwan, Tanzania, Togo, Tonga,

Trinidad and Tobago, Tuvalu, Uganda, U.S.A (FL, HI), Vanuatu, Venezuela, Vietnam, Wallis and Futuna Islands,Yemen, Zambia and Zimbabwe (Crous and Braun, 2003).

Notes: This is the first report of *Pseudocercospora musae* on *Musa acuminata* in Thailand.

Family Myricaceae

Cercospora myriactidis Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 85: 117. 1943 (*nom. inval.*). [T: NTU-PPE, herb. Sawada].

Leaf spots orbicular, often zonate, 0.50-5.00 mm in diameter, pale brown to dingy grey at center, with a darker margin. Fruit bodies amphigenous. Stromata lacking or a few darker brown cells. Conidiophores 2-14 in a divergent fascicle, medium brown, paler towards the apex, uniform in width, straight, 1-3-septate, not branched, truncate at the apex, (13.00-)15.60-24.70(-31.20)×2.60-5.20 µm, conidia hyaline, acicular, straight to curved, 2-5-septate, acute to subacute at the apex, truncate at the base, (23.40-)37.70-53.30(-57.20)×2.60-5.20 µm (Figure 183 and 184).

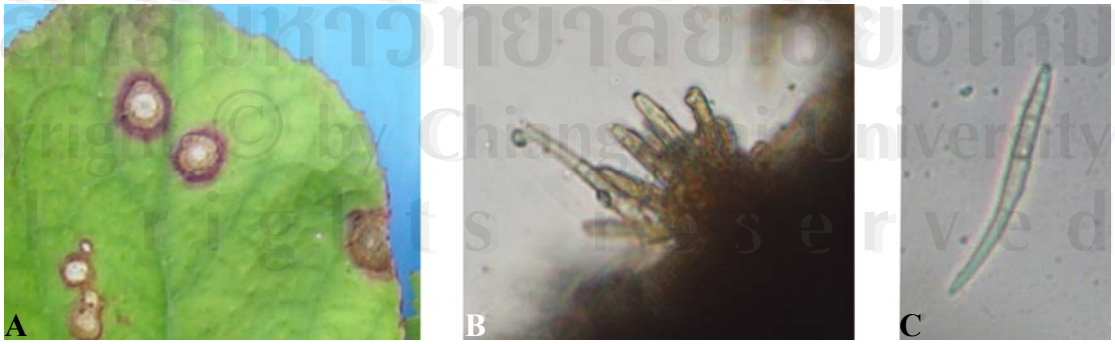

Figure 183 Photograph of *Cercospora myriactidis* on *Myrica esculenta*:

A. Symptom, B. Conidiophores and C. Conidia.

Figure 184 Drawing of *Cercospora myriactidis* on *Myrica esculenta*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Myrica esculenta*, November 21, 2004, JM, CMU MH 117.

Known distribution: Known only Thailand.

Notes: This is the first report of *Cercospora myriactidis* on *Myrica esculenta* in Thailand.

Family Nyctaginaceae

Passalora bougainvilleae (Munt.-Cvetk.) R. F. Castañeda and U. Braun, Cryptog. Bot. 2: 291 (1991)

≡ *Cercospora bougainvilleae* Munt.-Cvetk., Revista Argent. Agron. 24: 84 (1957).

≡ *Cercosporidium bougainvilleae* (Munt.-Cvetk.) Sobers and C. P. Seymour, Proc. Florida State Hort. Soc. 81:398 (1969).

Leaf spots are circular to subcircular, brown, pale brown in the center, with dark brown border, 0.50-3.00 mm in diameter. Fruit bodies amphigenous. Stromata brown, amphigenous, 24.60-29.52 μm in diameter. Conidiophores arising from stromata, pale brown to brown, straight, rarely geniculate, densely fasiculate,

with distinct and thickened conidial scars, 1-4-septate, (17.22-)27.06-56.58 (-86.10)×4.92 µm. Conidia ovoid to obclavate, brown, straight, with thickened and truncate basal end, dull head, (31.98-)71.34-93.48(-98.40)×2.46(-4.92)-4.92 µm, 1-4-septate (Figure 185 and 186).

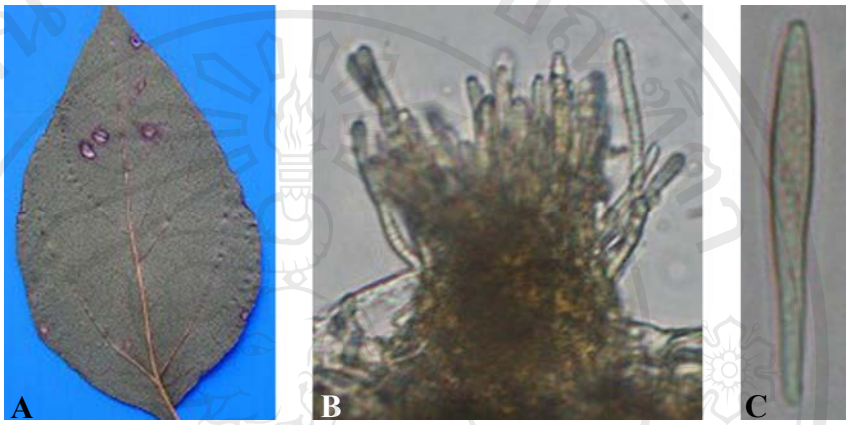

Figure 185 Photograph of *Passalora bugainvilleae* on *Bougainvillea spectabilis*: A. Symptom, B. Conidiophores and C. Conidia.

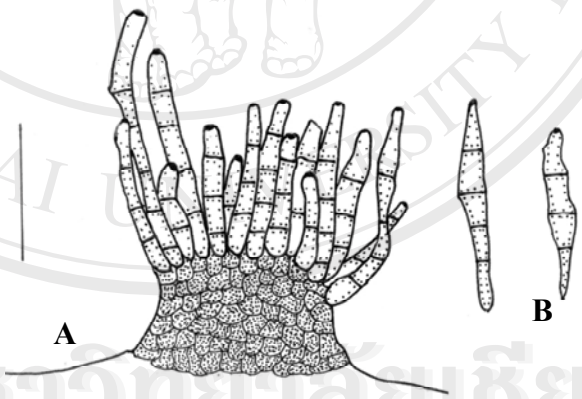

Figure 186 Drawing of *Passalora bugainvilleae* on *Bougainvillea spectabilis*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Bougainvillea spectabilis*, November 21, 2004, CN and JM, CMU MH 083.

Known distribution: Argentina, Brasil, Brunei, China, Cuba, El Salvador, India, Indonesia, Jamaica, Japan, USA and Venezuela (Crous and Braun 2003).

Notes: This is the first record of the circular leaf spot of *Bougainvillea spectabilis* caused by *Passalora bugainvilleae* from Thailand.

Cercospora bougainvilleae Munt. -Cvetk., Revista Argent. Agron. 24: 84. 1957.

≡ *Passalora bugainvilleae* (Munt. -Cvetk.) R.F. Castañeda and U. Braum, Cryptog. Bot. 2: 291. 1991.

≡ *Cercosporidium bougainvilleae* (Munt. -Cvetk.) Sobers and C. P. Seymour, Proc. Florida State Hort. Soc. 81: 398 (1968) 1969.

Leaf spots circular to angular, 2.00-8.00 mm in diameter, pale to medium dark brown, the older spots with a pale center or with concentric rings and a dark line margin; Fruit bodies chiefly epiphyllous, stromata a few cells to 24.00 μm in diameter. dark brown, fascicles 3-20 diverging stalks, conidiophores pale to medium dark brown, paler and sometimes more narrow toward the tip, 3-8-septate, slightly branced, 0-2 geniculate or undulate, straight to curved, medium scar at the subtruncate tip, (41.60-)44.20-104.00(-137.80)×(2.60-)3.90-5.20(-7.80) μm. Conidia hyaline, acicular to obclavate, straight to mildly curved, 2-8-septate, base truncate to long obconically truncate, tip subacute to subobtuse, (18.20-)23.40-57.20 (-72.80)×5.20-6.50 μm (Figure 187 and 188).

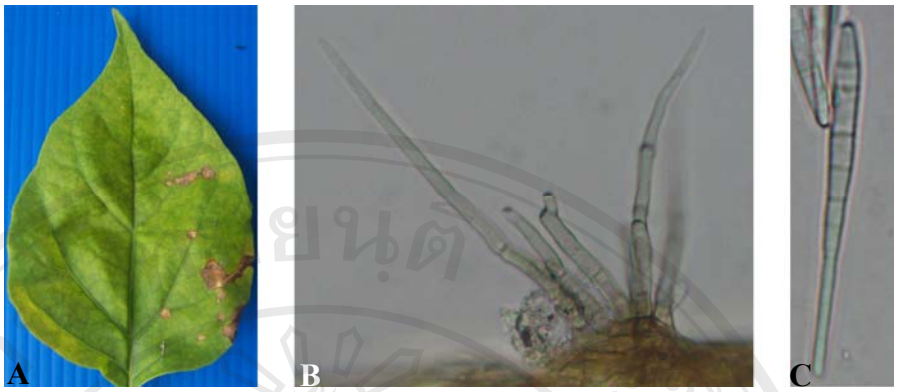

Figure 187 Photograph of *Cercospora bougainvilleae* on *Bougainvillea spectabilis*: A. Symptom, B. Conidiophores and C. Conidia.

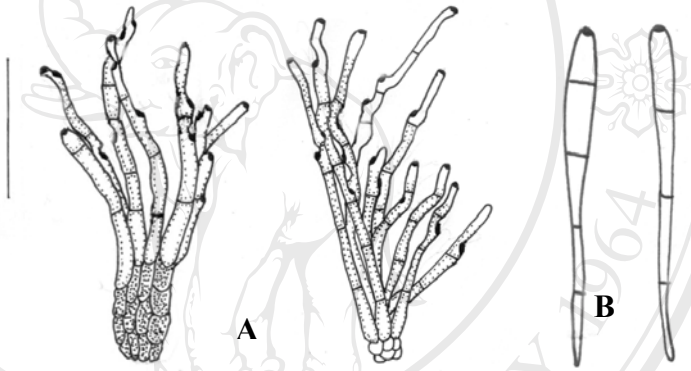

Figure 188 Drawing of *Cercospora bougainvilleae* on *Bougainvillea spectabilis*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Bougainvillea spectabilis*, November 21, 2004, JM, CMU MH 084.

Known distribution: China and India (Crous and Braun, 2003).

Notes: This is the first record of *Bougainvillea spectabilis* caused by *Passalora bugainvilleae* from Thailand.

Family Nymphaeaceae

***Cercosporella* sp.**

Leaf spots are subcircular to irregular, usually vein-limited, brown to dark brown, centre with pale yellowish brown margins, 1.00-4.00 mm in diameter. Fruit bodies amphigenous, but abundantly epiphyllous. Stromata medium, well-developed, subglobular to globular, dark brtown. Conidiophores arising through the cuticle, hyaline to brown, straight to slightly curved, densely fasiculate and solitary, with indistinct conidial scars, 1-2-septate, 4.92-24.60×2.46-4.92 µm. Conidia aciculate to filiform, subhyaline to pale olive-brown, straight, smooth, with unthickened hilum, 36.90-100.86×1.23-3.69 µm, 2-7-septate, with truncate and thin basal end (Figure 189 and 190).

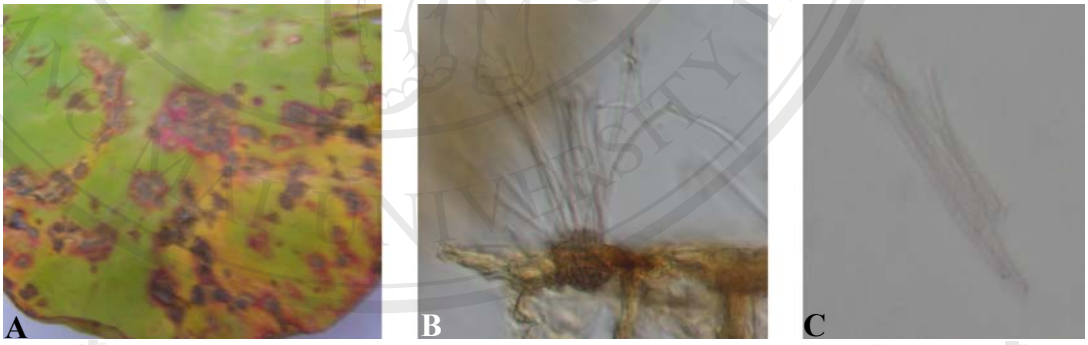

Figure 189 Photograph of *Cercosporella* sp. on *Nymphaea stellata*: A. Symptom, B. Conidiophores and C. Conidia.

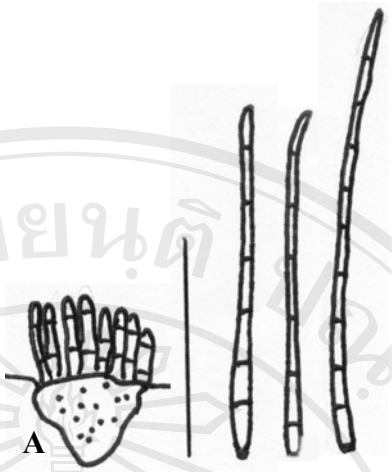

Figure 190 Drawing of *Cercosporella* sp. on *Nymphaea stellata*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Nymphaea stellata*, November 21, 2004, JM, CMU MH 085.

Known distribution: Known only Thailand.

Notes: This is the first record of *Nymphaea stellata* caused by *Cercosporella* sp. from Thailand.

Family Oleandraceae

Pseudocercospora phyllitidis (H. H. Hume) U. Braun and Crous, *Mycosphaerella* and its anamorphs: 321 (2003).

≡ *Cercospora phyllitidis* H. H. Hume, Bull. Torrey Bot Club 27: 577 (1900).

Leaf spots are subcircular to irregular, usually vein-limited, pale brown to brown with pale yellowish halo, 1.00-4.00 mm in diameter. Fruit bodies amphigenous. Stromata epiphyllous, 24.00-74.00 μm in diameter, brown. External

hyphae developed. Conidiophores arising from stromata or external hyphae, pale brown, geniculate to slightly curved, densely fasciculate or solitary, with indistinct conidial scars, 1-2 septate, 4.00-34.00×2.00-3.00 µm. Conidia acicular to obclavate, pale colored to pale olivaceous brown, straight to mildly curved, smooth, with unthickened and truncate basal end, 36.00-118.00×1.80-3.70 µm, 2-10-septate (Figure 191 and 192).

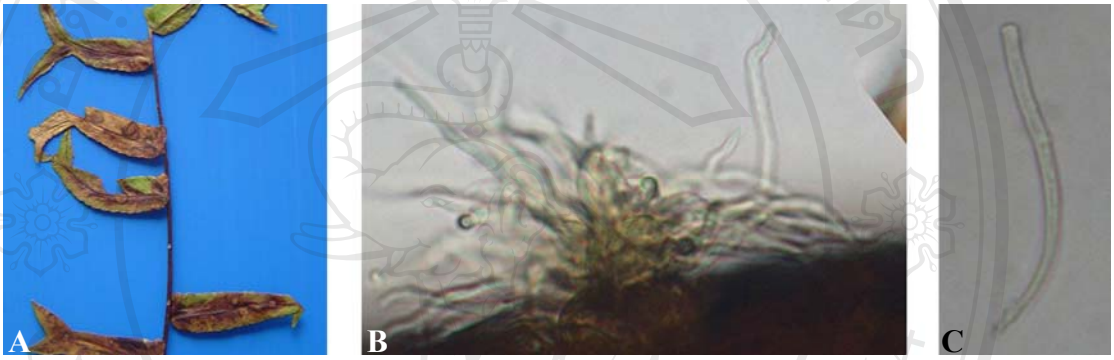

Figure 191 Photograph of *Pseudocercospora phyllitidis* on *Nephrolepis biserrata*: A. Symptom, B. Conidiophores and C. Conidia.

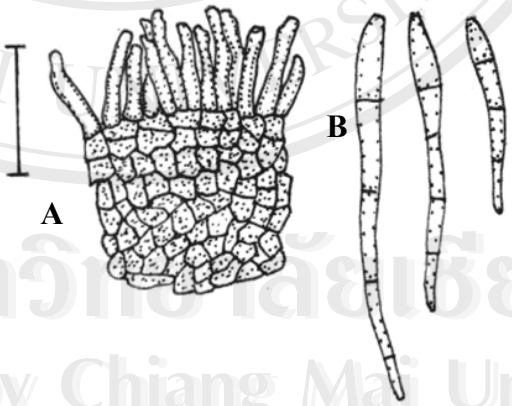

Figure 192 Drawing of *Pseudocercospora phyllitidis* on *Nephrolepis biserrata*: A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Nephrolepis biserrata*, November 21, 2004, JM, CMU MH 086.

Known distribution: Canada, Great Britain, India, Puerto Rico, USA and Virgin Islands (Crous and Braun, 2003) .

Notes: This is the first record of *Nephrolepis biserrata* caused by *Pseudocercospora phyllitidis* from Thailand.

Family Onagraceae

Cercospora fuchsiae Chupp and A. S. Mull., Bol. Soc. Venez. Ci. Nat. 8: 45. 1942 (*nom.inval*.). [T: CUP-VZ3540]. (=*Cercospora apii s.lat*.).

Leaf spots circular to angular, 2.00-8.00 mm in diameter, pale to medium dark brown, the older spots with a pale center or with concentric rings and a drak line margin, Fruit bodies chiefly epiphyllous. Stromata dark brown. Conidiophore pale to medium dark brown, paler and sometimes more narrow towards the tip, plainly multiseptate, slightly branched, 0-2 geniculate or undulate, straight to curved, medium spre scar at the subtruncate tip, (14.76-)24.60-49.20(-68.88)×(3.69-)4.92-4.92 μm. Conidia hyaline, acicular to obclavate, straight to mildly curved, indistinctly multiseptate, base truncate to long obconically truncate, tip subacute to subobtuse, (22.14-)36.90-61.50(-73.80)×2.46-4.92 μm (Figure 193 and 194).

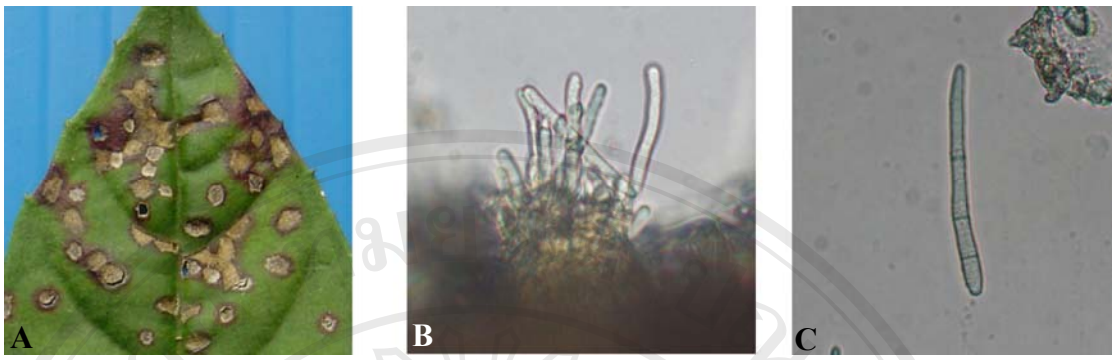

Figure 193 Photograph of *Cercospora fuchsiae* on *Fuchsia* sp.: A. Symptom, B. Conidiophores and C. Conidia.

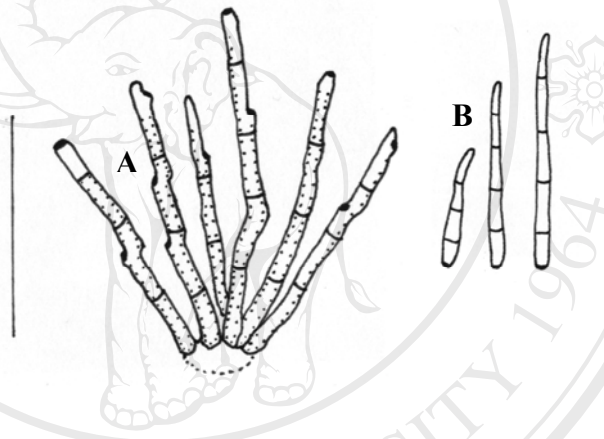

Figure 194 Drawing of *Cercospora fuchsiae* on *Fuchsia* sp.: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Fuchsia* sp., November 21, 2004, JM, CMU MH 087.

Known distribution: Brazil, Guatemala, U.S.A (FL), Thailand, Venezuela and Zimbabwe.

Notes: This is the first record of *Fuchsia* sp. caused by *Cercospora fuchsiae* from Thailand. Type species, El Valle, Caracas, Venezuela; *Fuchsia* sp.; A. S. Muller, No. 3540; Oct. 18, 1939.

Family Portulacaceae

Cercospora talini Syd. and P. Syd., Mem. Herb Boissier 8: 2. 1900 [Saccardo's Syll. fung. XVI: 1067 (1902)]. (*Cercospora apii* sensu lato, Crous and Braun, 2003)

Leaf spots subcircular, 0.50-6.00 mm in diameter, distinct on the upper surface, reddish brown to dark brown, with indefinite margins. Stromata epiphyllous, small to medium, dark brown, 20.00-40.00 µm in diameter, occasionally up to 59.00 µm. Conidiophores arising from the upper part of stromata, brown, moderately fascicule, simple, straight or mildly geniculate, 1-9-septate, 48.00-72.00×3.80-5.60 µm, with distinct and thickened conidial scars. Conidia acicular, straight, smooth, hyaline, with thickened and truncate basal end, 30.00-42.00×2.50 µm, 3-5-septate (Figure 195 and 196).

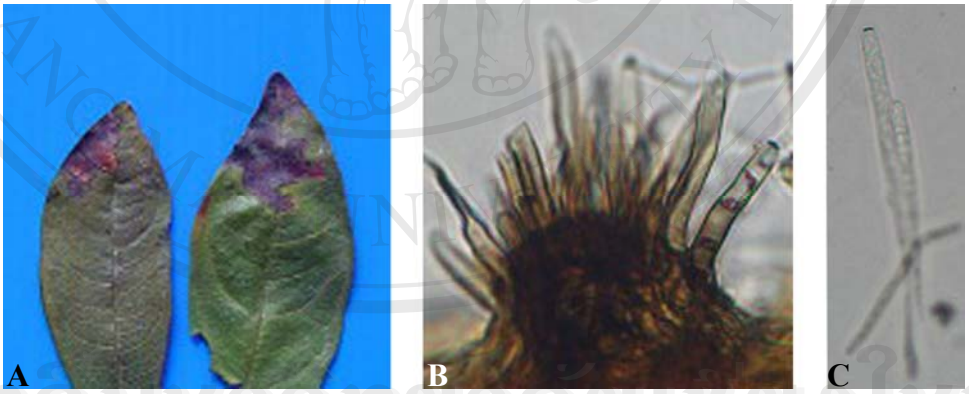

Figure 195 Photograph of *Cercospora talini* on *Talinum triangulae*: A. Symptom, B. Conidiophores and C. Conidia.

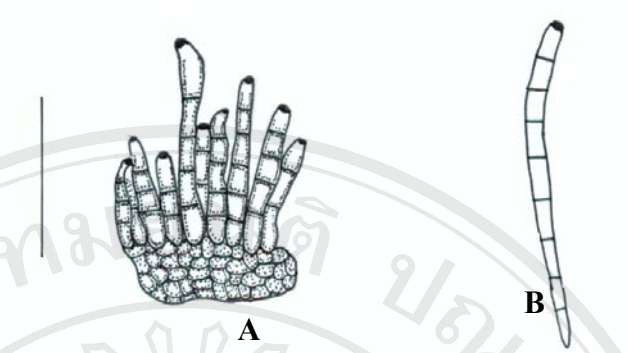

Figure 196 Drawing of *Cercospora talini* on *Talinum triangulae*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Talinum triangulae*, November 21, 2004, CN and JM, CMU MH 088.

Known distribution: Argentina and Venezuela (Chupp, 1954).

Notes: Present species are first report from Asian country in this report.

Family Rosaceae

Cercospora fagariae Lobik, Bolezni Rast. 17: 195. 1928 (*nom. dub*.). [T: LE].

Leaf spots circular, 1.00-3.00 mm in diameter, white center, dark purple border, sometimes indistinct on lower surface, Fruit bodies amphigenous. Stromata a few dark cells to 50 μm in diameter, dark brown to almost black. Conidiophore fascicles 2-20 stalks, pale olivaceous brown, almost hyaline tips, 2-4-septate, not branched, curved, undulate or 1-3 abruptly geniculate, large spore scar at subtruncate tip, (12.30-)17.22-31.98(-46.74)×2.46-4.92 μm. Conidia hyaline to subhyaline, acicular to obclavate, shorter ones may be cylindric, straight to mildly curved,

indistinctly multiseptate, base truncate to long obconically truncate, tip subacute to subobtuse, (14.76-)24.60-31.98(-49.20)×2.46 µm (Figure 197 and 198).

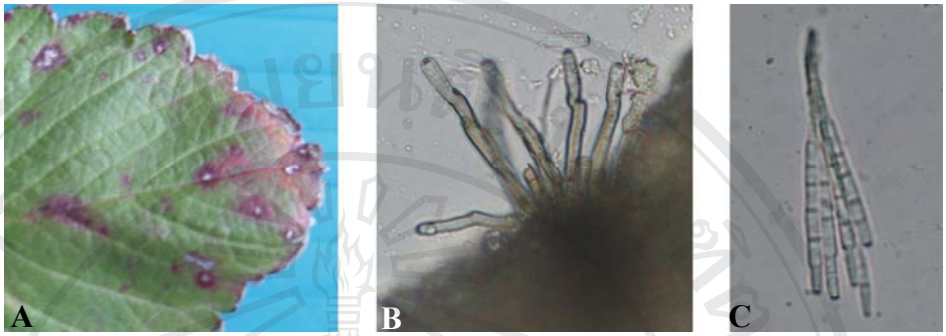

Figure 197 Photograph of *Cercospora fagariae* on *Fragaria* sp.: A. Symptom, B. Conidiophores and C. Conidia.

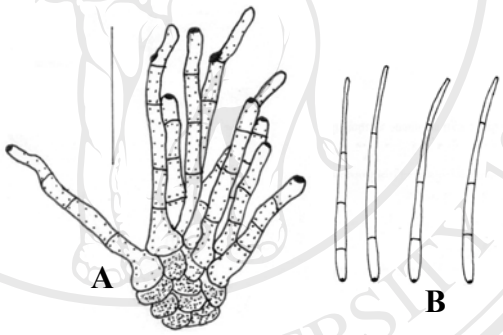

Figure 198 Drawing of *Cercospora fagariae* on *Fragaria* sp.: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Fragaria* sp., October 8, 2004, JM, CMU MH 089.

Known distribution: Azerbaijan, Ethiopia, Kazakhstan, Malawi, Russia (European part), Thailand and U.S.A (LA).

Notes: This is the first record of *Fragaria* sp. caused by *Cercospora fagariae* from Thailand. The description of Chupp (1954), based on American material, dose not agree with that of Lobik (1928). Braun and Melnik (1997) only found material of

Ramularia grevilleana on the type. See also *C. vexan*s for differences between the two species on *Fragaria.* They have been unable to procure the Lovik type to compare with the Plakidas collection, but Lobik's description fits very closely the Louisiana fungus.

Cercospora rosicola

Leaf spots circular, 0.50-3.00 mm in diameter, white center, dark purple border, sometimes indistinct on lower surface, Fruit bodies amphigenous; stromata a few dark cells to 60.00 µm in diameter, dark brown to almost black. Conidiophore fascicles 5-15 stalks, subhyaline, almost hyaline tips, uniforme in diameter, 1-4-septate, not branced, curved, 24.39-77.87×2.43 µm. Conidia hyaline to subhyaline, obclavate to cylindric, straight to mildly curved, 3-4-septate, base truncate to long obconically truncate, tip subacute to subobtuse, 24.39-114.63×2.43-7.31 µm (Figure 199 and 200).

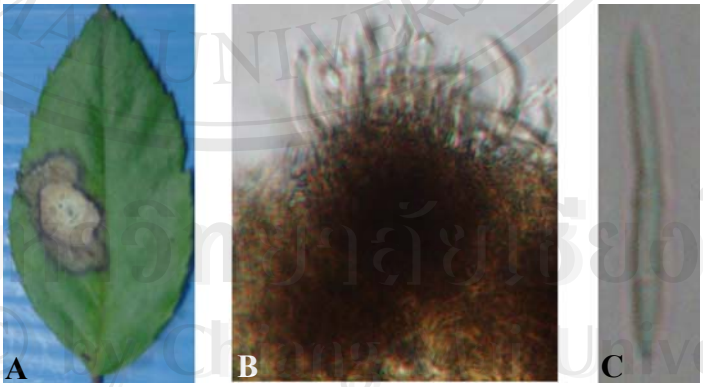

Figure 199 Photograph of *Cercospora rosicola* on *Rosa* sp.: A. Symptom, B. Conidiophores and C. Conidia.

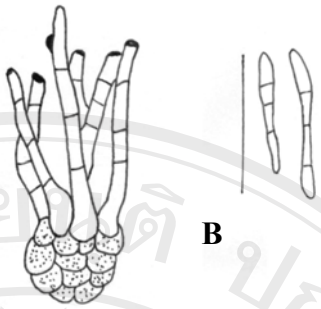

Figure 200 Drawing of *Cercospora rosicola* on *Rosa* sp.: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Rosa* sp., December 3, 2004, JM, CMU MH 090.

Known distribution: Iran (Crous and Braun, 2003).

Notes: This is the first record of *Rosa* sp. caused by *Cercospora rosicola* from Thailand.

Family Rubiaceae

Cercopora coffeicola Berk. and Cooke, Grevillea 9: 99. 1881. [T: K].

= *Cercospora coffeae* Zimm., Ber. Land-Forstw.Deutsch-Ostafr. 2: 35. 1904.

= *Cercospora herrerana* Farneti, Atti Ist. Bot. Univ. Pavia, Ser. 2, 9: 37. 1911.

Teleomorph: *Mycosphaerella coffeicola* (Cooke) J. A. Stev. and Wellman, J. Wash. Acad. Sci. 34: 262. 1944.

≡ *Sphaerella coffeicola* Cooke, Grevillea 9: 11. 1880.

≡ *Mycosphaerella coffeicola* (Cooke) Cif., Ist. Bot. Reale Lab. Crittog. Pavia Atti, Ser. 5, 19: 118. 1962 (*comb. superfl*.).

Leaf spots orbicular, 3.00-12.00 mm in diameter, tan, grey, or white center with a reddish brown to almost black margin, sometimes distinctly zonate, paler on the lower surface. Fruit bodies amphigenous. Stromata medium, globular, grey. Conidiophores pale olivaceous to medium brown, slightly paler near the apex, sometimes branched, multiseptate, geniculate, truncate at the apex, (7.80-)13.00-46.80(-59.80)×(1.30-)2.60-3.12(-3.90) μm. Conidia hyaline, acicular to obclavate, straight to mildly curved, 4-8-septate, acute at the apex truncate or subtruncate at the base, (52.00-)65.00-83.20(-88.40)×2.60 μm (Figure 201 and 202).

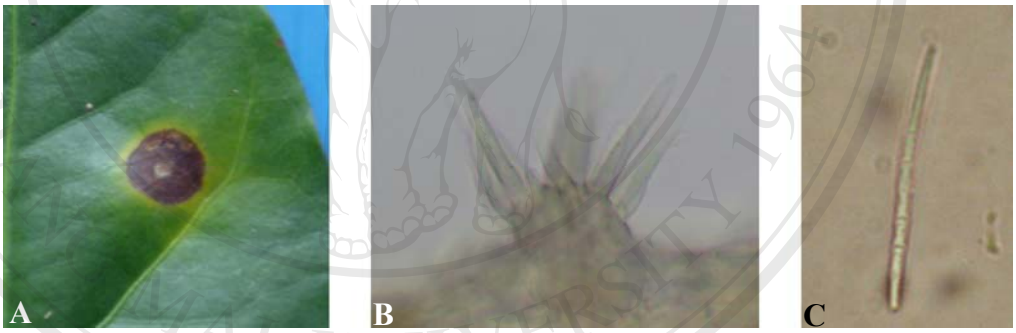

Figure 201 Photograph of *Cercopora coffeicola* on *Coffea arabica*: A. Symptom, B. Conidiophores and C. Conidia.

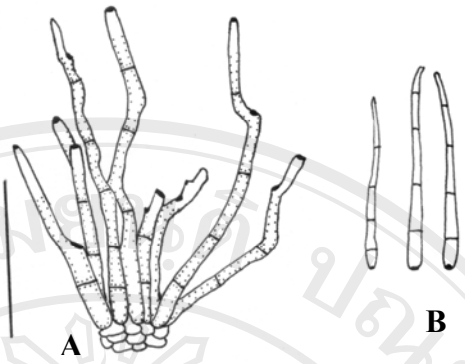

Figure 202 Drawing of *Cercopora coffeicola* on *Coffea arabica*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Chiang Mai University, Chiang Mai Province. Leaves of *Coffea arabica,* November 1, 2005, JM, CMU MH 091.

Known distribution: In diameterly distributed, including American, Samoa, Angola, Australia, Brazil, Brunei, Cambodia, China, Colombia, Congo, Costa Rica, Cuba, Dominican Republ., E1 Salvador, Ethiopia, Fiji, French Guiana, French Polynesia, Gabon, Ghana, Guadeloupe, Guyana Haiti, India, Indonesia, Ivory Coast, Jamaica, Japan, Kenya, Laos, Madagascar, Malawi, Martinque, Mauritius, Micronesia, Mosambique, Myanmar, Nepal, New Caledonia, Nigeria, Panama, Papua New Guinea, Peru, Philippines, Puerto Rico, Samoa, Sierra Leone, Somalia, South Africa, Sudan, Surinam, Taiwan, Tanzania, Thailand, Togo, Trinidad, Tobago, Uganda, U.S.A (FL, HI), Vanuatu, Venezuela, Yemen and Zimbabwe (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Chandrasrikul (1962).

***Pseudocercospora* sp.**

Leaf spots are subcircular to irregular, brown to dark brown, reddish brown to dark brown, with indefinite margins, 1.00-14.00 mm in diameter. Fruit bodies amphigenous, but abundantly epiphyllous. Stromata medium, 22.14-41.82 µm in diameter, well-developed, subglobular to globular, dark brtown. Conidiophores arising through the cuticle, hyaline to brown, straight to slightly curved, densely fasiculate and solitary, with indistinct conidial scars, 2-7-septate, (14.76-)19.68-46.74(-56.58)×(1.23-)2.46-4.42(-4.92) µm. Conidia aciculate to filiform , subhyaline to pale olive-brown, straight, smooth, with unthickened hilum, (17.22-)27.06-(49.20)×(2.46-)2.95-4.92 µm, 1-5-septate, with truncate and thin basal end (Figure 203 and 204).

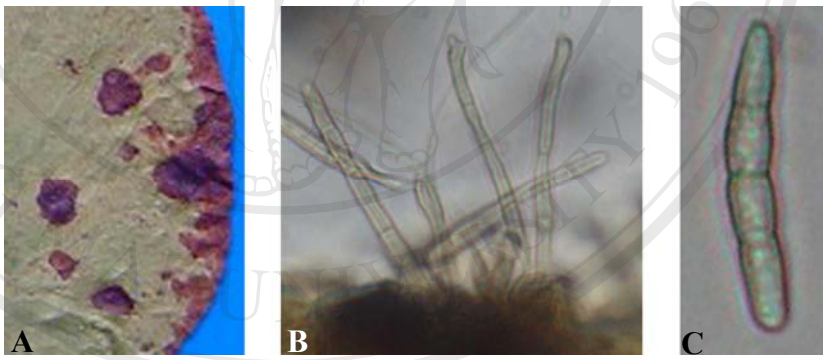

Figure 203 Photograph of *Pseudocercospora* sp. on *Haldina cordifolia*:

A. Symptom, B. Conidiophores and C. Conidia.

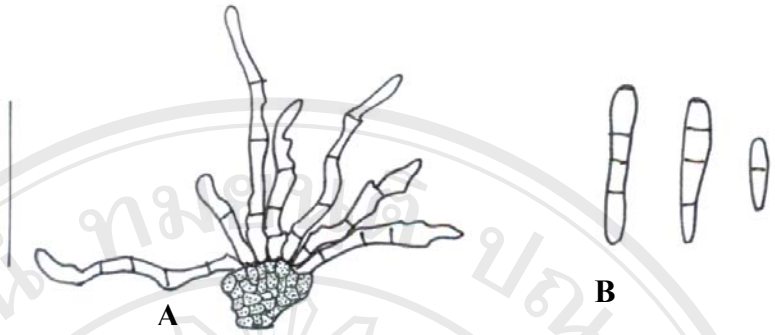

Figure 204 Drawing of *Pseudocercospora* sp. on *Haldina cordifolia*:

A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Sak Yai National Park, Uttradit Province Province. Leaves of *Haldina cordifolia,* November 25, 2004, JM and Nakashima, CMU MH 092.

Known distribution: Known only Thailand.

Notes: This is the first record of *Haldina cordifolia* cause by *Pseudocercospora* sp. from Thailand and the world.

Pseudocercospora ixorae (Solheim) Deighton, Mycol. Pap. 140: 145. 1976.

≡ *Cercospora ixorae* Solheim, Indian J. Agric. Sci. 3: 15. 1933.

= *Cercospora ixorae* W. Yamam., J. Soc. Trop. Agric. 6: 602. 1934 (*nom. illeg.*), homonym of *C. ixorae* Solheim, 1933.

Leaf spots suborbicular, 4.00-16.00 mm in diameter, confluent and become irregular, at first yellowish or orangy, then become tan to pale brown, finally the center turns greyish, surrounded by darker lines and a distinct dark brown margin, zonate in appearance. Fruit bodies amphigenous but more abundant on the lower leaf surface, especially on the dark margin of the spots. Stromata subglobular, dark brown, 15.00-45.00 μm in diameter, erumpent. Conidiophores densely fasciculate, subhyaline

to very pale olivaceous brown, 1-4-septate, irregular in width, not branched, rarely geniculate, substraight to variously bent, conically rounded at the apex, (24.39-)31.70-92.68(-104.87)×(2.43-)4.87-4.87(-7.31) µm. Conidia subhyline to very pale olivaceous, cylindric or longer ones filiform, straight to mildly curved, indistinctly 3-10-septate, tip subobtuse to narrowly rounded, truncate at the base, (24.39-)34.14-95.12 (-114.63)×(2.43-)3.65-7.31 µm (Figure 205 and 206).

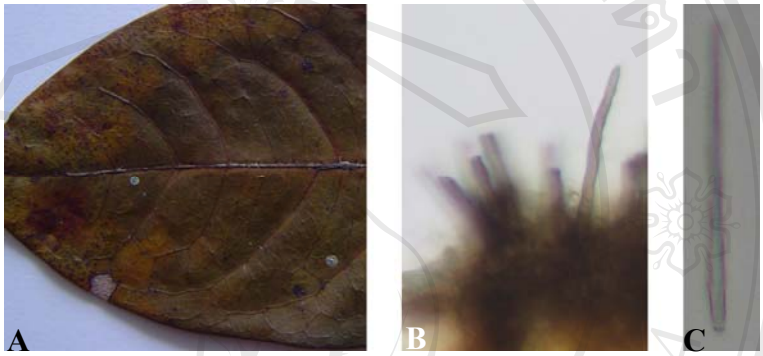

Figure 205 Photograph of *Pseudocercospora ixorae* on *Ixora congesta*:

A. Symptom, B. Conidiophores and C. Conidia.

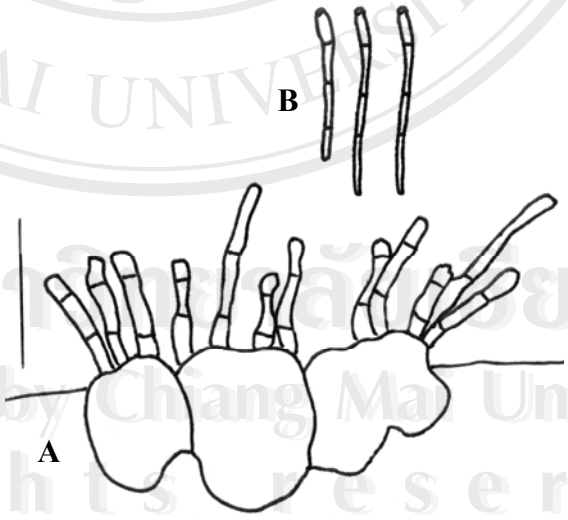

Figure 206 Drawing of *Pseudocercospora ixorae* on *Ixora congesta*:

A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Rai Province. Leaves of *Ixora congesta,* October 21, 2004, JM, CMU MH 093.

Known distribution: China, Hong Kong, India, Indonesia, Japan, Nepal, Taiwan and U.S.A (FL, HI) (Crous and Braun, 2003).

Notes: This is the first record of *Ixora* spp. cause by *Pseudocercospora ixorae* from Thailand.

Family Sauruaceae

Pseudocercospora houttuyniae (Togashi and Katsuki) Y. L. Guo and W. X. Zhao, Acta Mycol. Sin. 8: 118 (1989).

≡ *Cercospora houttuyniae* Togashi and Katsuki, Bot. Mag. Tokyo 65: 21 (1952).

Leaf spots subcircular to irregular, 1.00-7.00 mm in diameter, reddish brown to reddish purple with indistinct border. Fruit bodies amphigenous, mainly hypophyllous, brown. Stromata lacking or well developed, globular to subglobular, up to 68.00 µm. Conidiophores emerging through stomata, pale to olivaceous brown, pale to apex in color, loose to dense fascicle, straight to mildly geniculate, occasionally branched, 1-7-septate, (17.50-)27.50-75.00(-90.00)×(2.50-)5.00-5.00 µm. Conidial scars inconspicuous. Conidia solitary, filiform to narrowly obclavate, straight or mildly curved, hyaline, 7-10-septate, non-constricted at the septa, obtuse at the apex, unthickened and obconically truncate at the basal end, (35.00-)45.00-95.00 (-100)×2.50-5.00 µm (Figure 207 and 208).

Figure 207 Photograph of *Pseudocercospora houttuyniae* on *Houttuynia cordata*: A. Symptom, B. Conidiophores and C. Conidia.

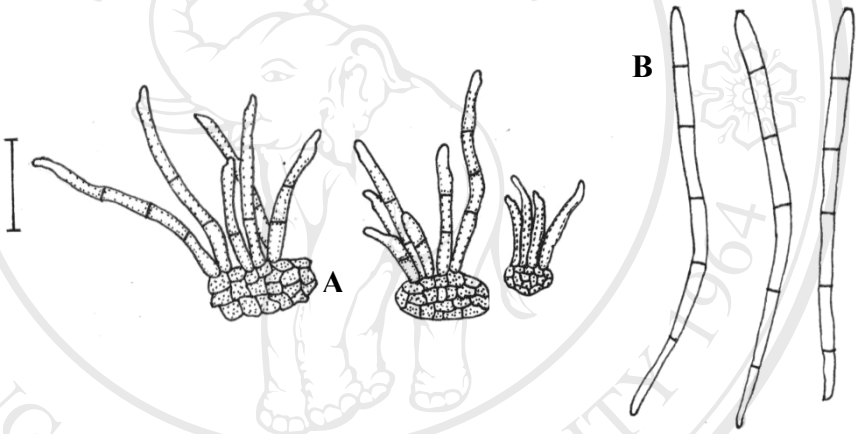

Figure 208 Drawing of *Pseudocercospora houttuyniae* on *Houttuynia cordata*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Houttuynia cordata*., November 21, 2004, CN and JM, CMU MH 094.

Known distribution: China, Japan and Taiwan (Crous and Braun, 2003).

Notes: This is the first record of *Houttuynia cordata* caused by *Pseudocercospora houttuyniae* from Thailand. Chupp (1954) misspells host and fungus species as *houtthuynia* and *houtthuyneae.*

Family Solanaceae

Cercospora capsicigena Bhartiya, R. Dubey and S. K. Singh, Indian Phytopathol. 53(3): 149. 2000. [T: GPU (Gorakhpur University, Dept. of Botany, India) 8010, HCIO 42379]. (= *Cercospora apii s. lat.*).

Leaf spots hypophyllous, distinct, subcircular to irregular, yellowish brown with blackish brown margins, 1.00-7.00 mm in diameter. Stromata small to medium, rudimentary to slightly developed, irregular, dark brown, 13.00-40.00 µm in diameter. Conidiophores pale brown at the base and paler upwards, arranged in a loose to dense fascicle, with distinct conidial scars, 2-10-septate, 49.20-177.12×4.92-7.38 µm. Conidia solitary, obclavate, straight to mildly curved, hyaline to subhyaline, smooth, hilum conspicuously thickened, darkened, 54.12-135.30×2.46-8.61 µm, 3-11-septate, acute to obtuse at the apex, truncate at the base (Figure 209 and 210).

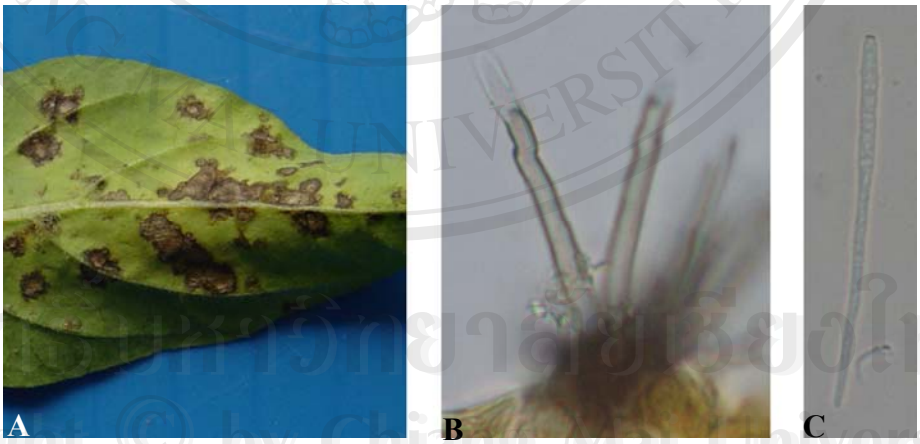

Figure 209 Photograph of *Cercospora capsicigena* on *Capsicum annuum* var. *acuminatum*: A. Symptom, B. Conidiophores and C. Conidia.

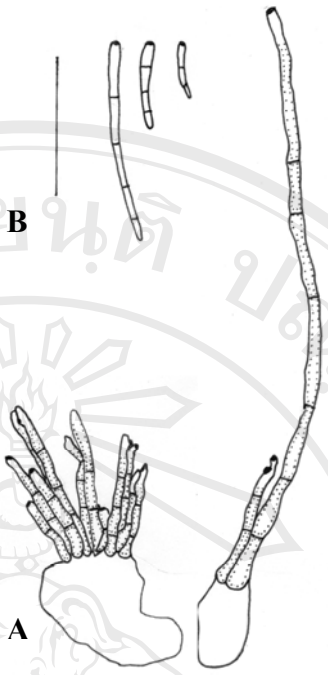

Figure 210 Drawing of *Cercospora capsicigena* on *Capsicum annuum* var. *acuminatum*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Capsicum annuum* var. *acuminatum,* November 21, 2004, JM, CMU MH 095.

Known distribution: India and Thailand (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Sontirat *et al.* (1980)

Cercospora capsici Heald and Wolf Mycologia 3: 15. 1911

Leaf spots circular to subcircular, sometimes zonate, 2.00-11.00 mm in diameter, brown to yellowish brown, finally with minute to fairly large grey center, Fruit bodies amphigenous. Stromata 17.50-35.00 μm in diameter. Conidiophore

fascicles 2-20 stalks, pale to medium dark olivaceous brown, paler and more narrow toward the tip, plainly 3-6-septate, almost never branched, straight, medium to large spore scar at truncate tip, 25.00-150.00×3.00-5.00 µm, base sometimes slightly in diameter, conidia hyaline, acicular, rarely obclavate, straight to mildly curved, 5-14-septate, base truncate to subtruncate, tip subobtuse to subacute, 30.00-200.00×2.50-4.00 µm (Figure 211 and 212).

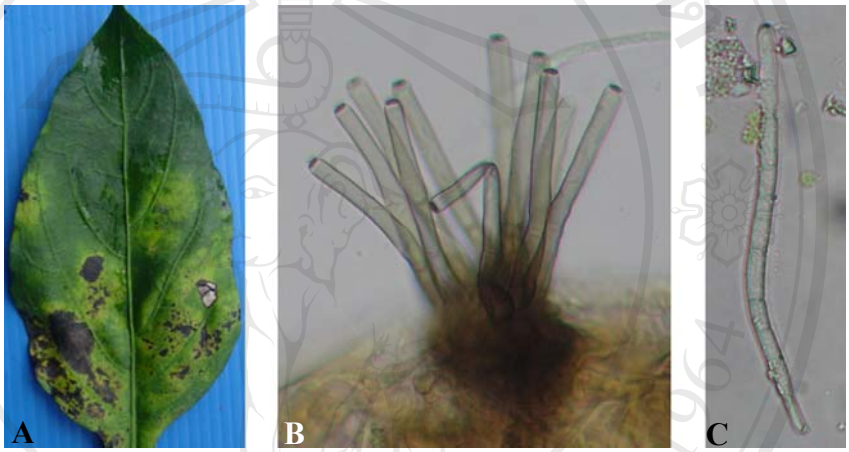

Figure 211 Photograph of *Cercospora capsici* on *Capsicum annuum*: A. Symptom, B. Conidiophores and C. Conidia.

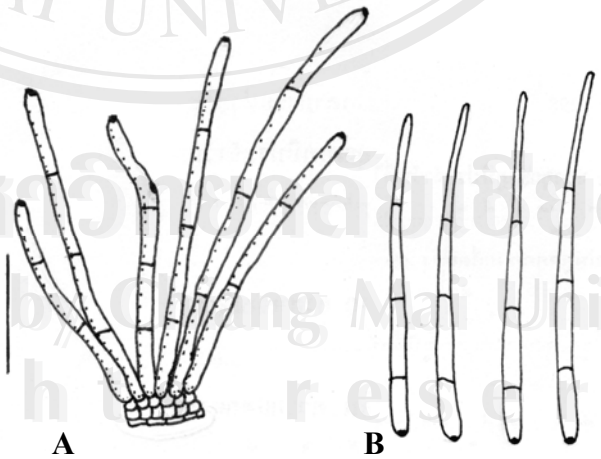

Figure 212 Drawing of *Cercospora capsici* on *Capsicum annuum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Capsicum annuum,* November 21, 2004, JM, CMU MH 096.

Known distribution: Worldwide (Crous and Braun, 2003).

Notes: This is the first record of *Capsicum annuum* caused by *Cercospora capsici* from Thailand. Kovachevski (Zeitschr. Pflanzenkr. 48: 321. 1938) after studying *C. capsici* Mar. and Stey. concluded that this *Cercospora* on *Capsicum* was really *Cladosporium.* It is true that the species which Marchal and Steyaert refer to Shin and Kim (2001) described as well as the one Unamuno (Bol. Soc. Espanola Hist. Nat. 32: 161. 1932) named *C. capsici* has effuse olivaceous growth like a *Cladosporium*; but the conidiophores are in dense fascicles, and the conidia elongate, so that they do not agree with Kovachevski that the effuse type with coloured conidia is a *Cladosporium*, but agree with Castellani (Riv. Agric. Subtrop. Trop. 42: 20. 1948) who says it is a true *Cercospora* and gives the name *C. unamunoi.*

Cercospora physalidis Ellis, Amer. Naturalist 16: 810 (1882), emend. Braun and Melnik, Trudy Bot. Inst. im V. L. Komarova 20: 79 (1997).

≡ *Cercosporina physalidis* (Ellis) Miura, South Manch. Railway Co. Agric. Rept. 27: 525 (1928).

= *Cercospora solanicola* G. F. Atk., J. Elisha Mitchell Sci. Soc. 8:53 (1892).

= *Cercospora nicotianae* Ellis and Everh., Prroc. Acad. Sci. Philadelphia 45: 170 (1893).

= *Cercospora phyalidicola* Ellis and Barthol., Erythea 4: 28 (1896).

= *Cercospora physalidicola* Speg., Anales Mus. Nac. Buenos Aires Ⅱ, 3: 342 (1899)(nom. illeg.).

= *Cercospora raciborskii* Sacc. and Syd, Syll. Fung. 16: 1070 (1902).

= *Cercosporina physalidicola* Speg. Anales Mus. Nac. Hist. Nat. Buenos Aires 20: 426 (1910).

= *Cercosporina daturicola* Speg. Anales Mus. Nac. Hist. Nat. Buenos Aires 20: 425 (1910).

≡ *Cercospora daturicola* (Speg.) Vassiljevsky, in Vassiljevsky and Karakulin, Fungi imperfecti parasitici. 1. Hyphomycetes: 247 (1937).

≡ *Cercospora daturicola* (Speg.) W. W. Ray, Mycologia 36: 175 (1944).

= *Cercospora capsici* Heald and W. A. Wolf, Mycologia 3: 15 (1911).

= *Cercospora abchasica* Siemaszko, Izv. Severo-Kavkazsk. Muz. (Tiflis) 12: 26 (1919).

= *Cercospora melongenae* Welles, Phytopathology 12: 63 (1922).

= *Cercospora atropae* Kvashn., Izv. Severo-Kavkazsk. Kraev. Stantsii Zashch. Rast. 4: 37 (1928).

= *Cercosporina petuniae* Saito, Trans. Tottori Soc. Agric. Sci. 3:271 (1931).

≡ *Cercospora petuniae* (Saito) Chupp and A. S. Mull., Ceiba 1: 176 (1950)(nom. illeg.).

= *Cercospora petuniae* A. S. Mull. and Chupp, Arq. Inst. Biol. Veg. Rio de Janeiro 3: 96 (1936)(nom. inval.).

= *Cercospora petuniae* Sandu and Sarea, in Sandu et al., Lucr. Sti. Inst. Agron. 1962: 94 (1962)(nom. illeg.).

= *Cercospora petuniae* var. *brevipedicellata* Chidd., Indian Phytopathol. 12: 120 (1960)(nom. inval.).

Leaf spots distinct, circular to subcircular, 1.00-9.00 mm in diameter, brown to yellowish brown, centre whitish grey surrounded by raised blackish brown border. Fruit bodies amphigenous. Stromata small, composed of a few brown cells, up to 30.00 µm. Conidiophores solitary or densely fasciculate, emerging through stomata or erumpent through the cuticle, brown, 1-4-septate, straight or geniculate, (17.22-) 24.60-59.04(-61.50)×(2.46-)3.69-4.92 µm, with thickened conidial scars on apical or on shoulders of conidiogenous cells. Conidia solitary, acicular to narrowly obclavate, straight or mildly curved, hyaline, slightly acute at the apex, obconically truncate and thickened at basal end, (19.68-)27.06-86.10(-157.44)×2.46-2.46(-4.92) µm, 1-12-septate (Figure 213 and 214).

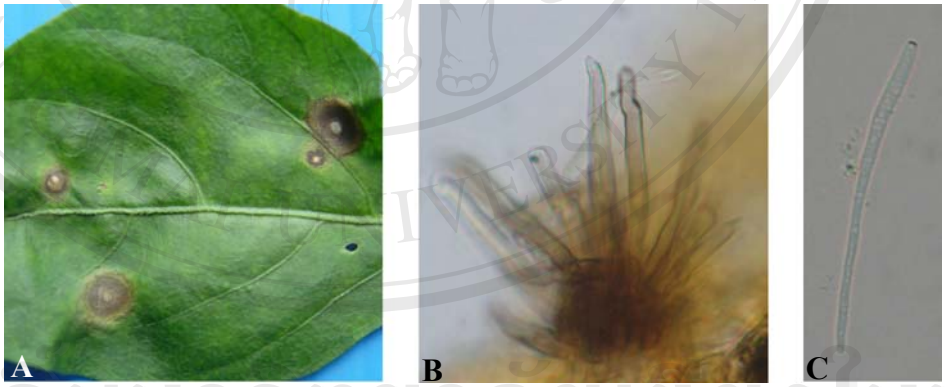

Figure 213 Photograph of *Cercospora physalidis* on *Capsicum frutescens*: A. Symptom, B. Conidiophores and C. Conidia.

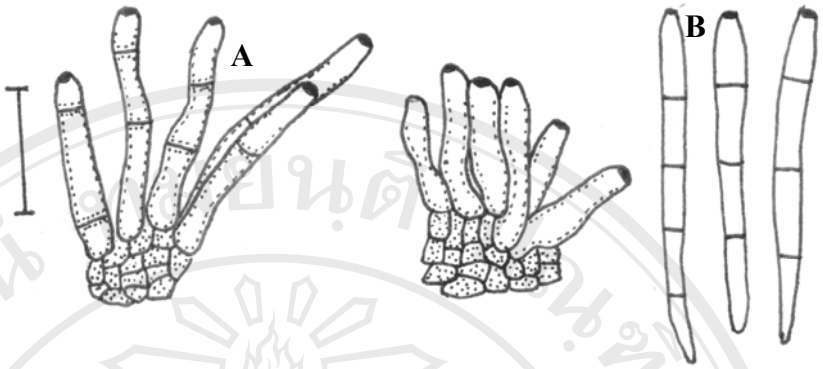

Figure 214 Drawing of *Cercospora physalidis* on *Capsicum frutescens*:
A. Conidiophores and B. Conidia (scale bar = 20 μm).

Material examined: Thailand, Nam Nao National Park, Phetchabun Province. Leaves of *Capsicum frutescens,* November 24, 2004, CN and JM, CMU MH 097.

Known distribution: Worldwide where the host is cultivated (Crous and Braun, 2003).

Notes: Hitherto known. Bird Chili (Capsicum frutescencs) is important crop in Thailand. And, its 'Leaf spot' disease caused by C.capsici Heald & W.A. Wolf (Sontirat *et al*. 1994) is recognized as important disease in Thailand. However, C. capsicii was already treated as synonym of C.physalidis by Braun and Melnik (1997).

Pseudocercospora solani-melongenicola Goh and Hsieh *Cercospora* and Similar Fungi from Taiwan p. 318, 1990.

= *Cercospora melongenae* Welles, sensu Saw., Rep. Govt. Res. Inst. Formosa 85: 115, 1943, non auct. Welles Phytopath. 12: 63, 1922.

Leaf spots subcircular to slightly angular, dingy grey to greyish brown, with a dark margin, often surrounded with an indefinite yellowish outer border and slightly

zonate in appearance, 2.00-4.00 mm in diameter. Fruit bodies chiefly epigenous. Mycelium immersed. Stromata medium. Conidiophores pale olivaceous brown, paler towards the apex, uniform in width, straight or curved, 1-2 geniculate, conically truncate or bluntly rounded at the apex, not or rarely once branched, 1-3-septate, non-constricted at the septa, 25.00-50.00×2.50-4.00 µm. Conidia hyaline, cylindric-obclavate to slightly obclavate, straight to substraight, obtuse at the apex, 3-10-septate, often mildly to moderately constricted at the septa, 25.00-90.00×3.50-5.50 µm, obconically truncate at the base (Figure 215 and 216).

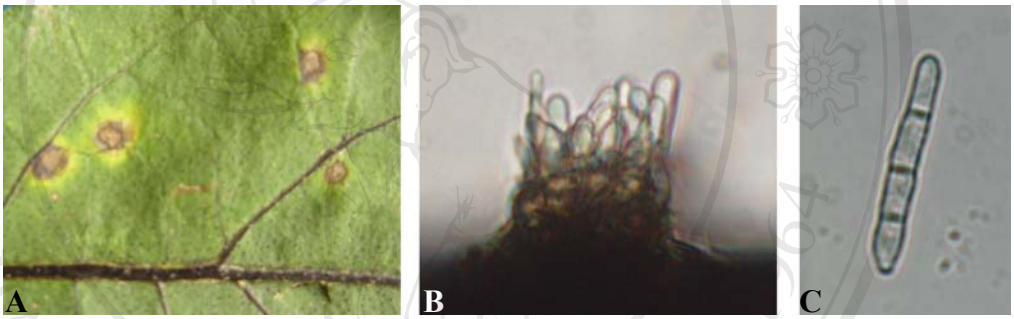

Figure 215 Photograph of *Pseudocercospora solani-melongenicola* on *Solanum melongena*: A. Symptom, B. Conidiophores and C. Conidia.

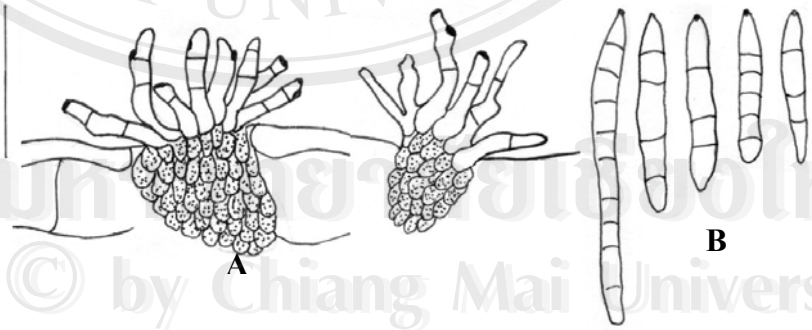

Figure 216 Drawing of *Pseudocercospora solani-melongenicola* on *Solanum melongena*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Mai Province. Leaves of *Solanum melongena,* November 21, 2004, JM, CMU MH 098.

Known distribution: Worldwide where the host is cultivated (Crous and Braun, 2003).

Notes: This is the first record of *Solanum melongena* caused by *Pseudocercospora solani-melongenicola* from Thailand.

***Pseudocercospora* sp.**

Leaf spots amphigenous, scattered to confluent, circular to subcircular, 2.00-8.00 mm in diameter or up to 15.00 mm when coalescing, initially appearing with chlorotic discolourations, later becoming pale yellow to yellowish brown without definite definite margins on the upper surface, finally brown to darkish brown on the lower surface. Fruit bodies amphigenous, but mostly hypophyllous, effuse, velutionous, greyish brown to dirty due to heavy fungal fructification. Primary mycelium internal, hyphae septate, branched, hyaline, 2.00-3.00 µm in diameter. Secondary mycelium external, superficial; hyphae septate, branched, subhyaline to pale olivaceous brown, often forming ropes or climbing leaf hairs. Stromata lacking. Conidiophores borne singly as lateral branches from the superficial secondary mycelium, pale olivaceous to olivaceous brown, straight to slightly curved, 0-2 times geniculate, not or rarely once branched, 1-7-septate, non-constricted at the septa, (9.75-)21.95-39.02(-56.09)×(2.43-)4.87-7.31 µm, conidial scars minute, 1.00-1.50 µm in diameter, conspicuous, apical or on small shoulders of conidiogenous cells caused by geniculation. Conidia solitary to catenate, cylindric-obclavate to slightly obclavate, straight to substraight, very pale olivaceous brown to pale olivaceous brown, slightly

attenuated towards the apex, 3-6-septate, often mildly to moderately constricted at the septa, (31.70-)34.14-58.53(-65.85)×4.87-7.31 µm, hilum somewhat thickened, darkened, somewhat refractive, and slightly protuberant (Figure 217 and 218).

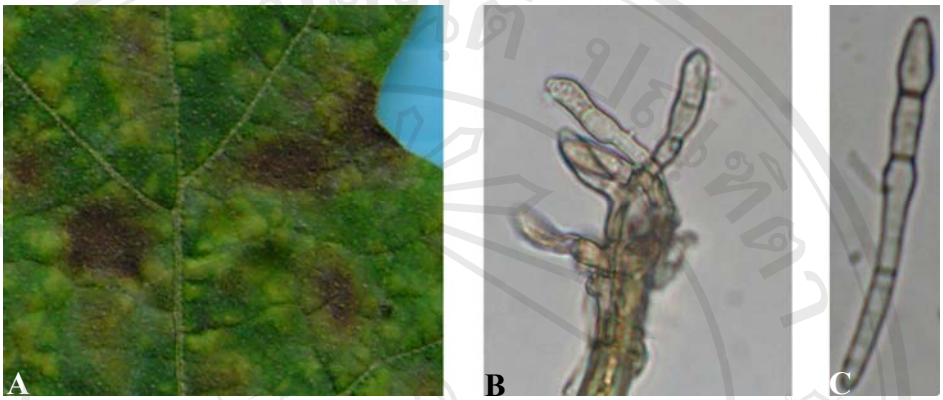

Figure 217 Photograph of *Pseudocercospora* sp. on *Solanum trilobatum*: A. Symptom, B. Conidiophores and C. Conidia.

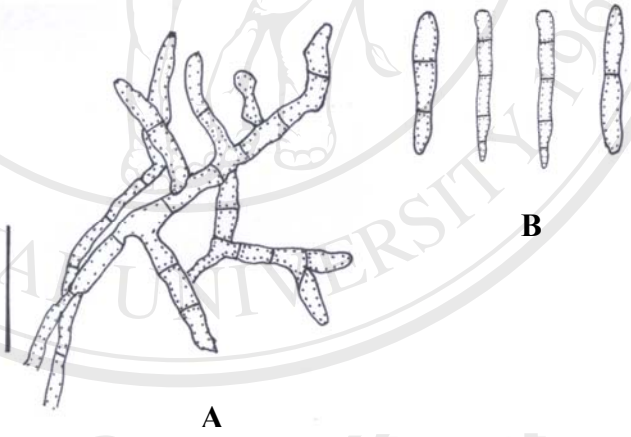

Figure 218 Drawing of *Pseudocercospora* sp. on *Solanum trilobatum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Solanum trilobatum,* November 21, 2004, JM, CMU MH 099.

Known distribution: Known only Thailand.

Notes: This is the first record of *Solanum trilobatum* caused by *Pseudocercospora* sp. from Thailand.

Cercospora physalidis-angulatae J. M. Yen, Cah. Maboké 9: 112. (1971) 1973.

Leaf spots distinct, circular-subcircular, blackish-brown, 1.00-5.00 mm in diameter, often confluent. Fruit bodies amphigenous. Stromata brown, amphigenous, mostly hypophyllous, 12.30-24.60 µm in diameter. Conidiophores arising from stromata, hyaline to brown, straight or sinuous, 2-6-septate, fasciculate, (24.39-) 43.90-73.17(-80.87)×(1.21-)2.43-4.87(7.31) µm, with thickened conidial scars. Conidia pale olivaceous, obclavate, (65.85-)80.48-97.56(-121.95)×(3.65-)4.87-4.87 (-7.31) µm, 3-12-septate, hilum conspicuously thickened, darkened and non-protuberant (Figure 219 and 220).

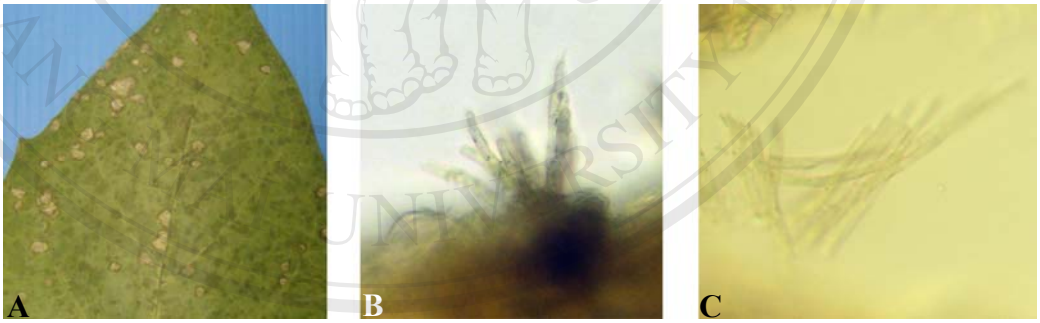

Figure 219 Photograph of *Cercospora barlericola* on *Physalis angulata*: A. Symptom, B. Conidiophores and C. Conidia.

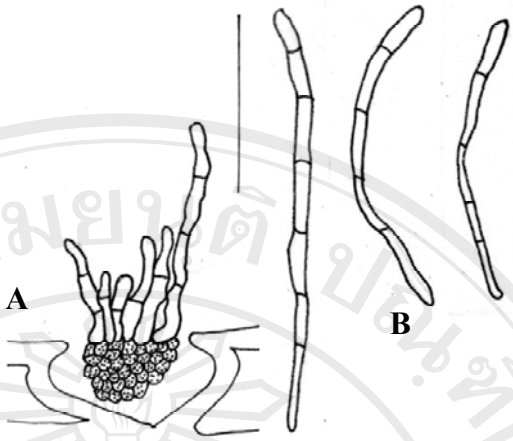

Figure 220 Drawing of *Cercospora barlericola* on *Physalis angulata*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Physalis angulata,* October 2, 2005, JM, CMU MH 100.

Known distribution: Gabon (Crous and Braun, 2003).

Notes: This is the first record of *Physalis angulata* caused by *Cercospora physalidis-angulatae* from Thailand.

Cercospora nicotianicola J. M. Yen, Rev. Mycol. 32: 188. 1967. [T: PC].

≡ *Cercospora nicotianae* Ellis and Everhart Proc. Acad. Sci. Phila. 45: 170 (1893).

= *Cercospora raciborskii* Sacc. and Sydow, Syll. Fung. 16: 1070 (1902).

Leaf spots orbicular, often zonate, 0.50-10.00 mm in diameter, pale brown to dingy grey at center, with a darker margin. Fruit bodies amphigenous. Stromata lacking or a few darker brown cells. Conidiophores medium brown, paler towards the apex, uniform in width, straight, 3-13-septate, not branched, truncate at the apex,

(39.00-) 52.00-140.40(-200.20)×(3.38-)3.90-7.80 µm. Conidia hyaline, acicular, straight to curved, 3-18-septate, acute to subacute at the apex, truncate at the base, (18.20-) 36.40-150.80(-202.80)×(3.64-)4.42-7.80 µm (Figure 221 and 222).

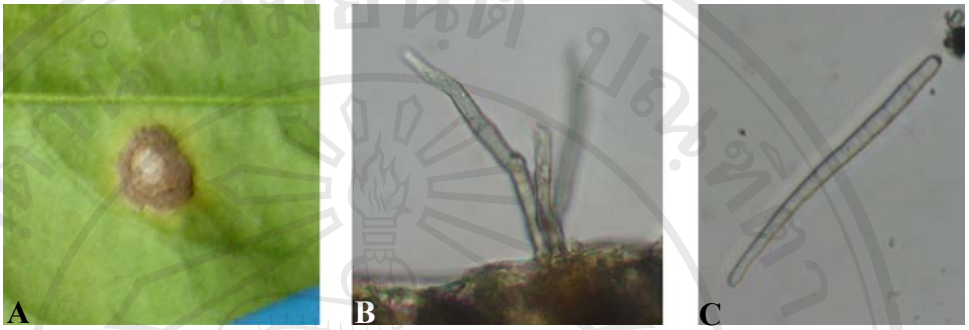

Figure 221 Photograph of *Cercospora nicotianicola* on *Nicotiana tabacum*: A. Symptom, B. Conidiophores and C. Conidia.

Figure 222 Drawing of *Cercospora nicotianicola* on *Nicotiana tabacum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Mae Jo, Chiang Mai Province. Leaves of *Nicotiana tabacum,* January 6, 2005, JM, CMU MH 101.

Known distribution: Malaysia, Singapore and Thailand (Crous and Braun, 2003).

Notes: The first record of *Nicotiana tabacum* caused by *Cercospora nicotianae* was by Tongpun refer to Sontirat *et al.* (1980). A true *Cercospora s.str.* is distinct from *C. apii s. lat.* (incl. *C. nicotianae*).

Cercospora lycopersici Salam and P. N. Rao, J. Indian Bot. Soc. 36: 425. 1957. [T: HY 50].

Leaf spots orbicular, often zonate, 0.50-10.00 mm in diameter, pale brown to dingy grey at center, with a darker margin. Fruit bodies amphigenous. Stromata a few darker brown cells, 24.39-36.58 µm in diameter. Conidiophores 2-14 in a divergent fascicle, medium brown, paler towards the apex, uniform in width, straight, 2-6-septate, not branched, truncate at the apex, (39.02-)43.90-48.78(-60.97)×(3.65-)4.87-4.87(-7.31) µm. Conidia hyaline, obclavate, straight to curved, 3-8-septate, hilum conspicuously thickened, darkened, (31.70-)65.85-73.17(-92.68)×3.65-4.87 µm (Figure 223 and 224).

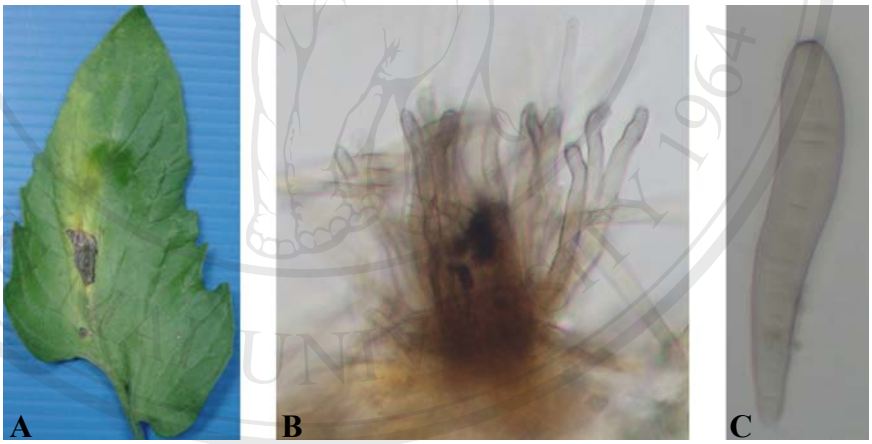

Figure 223 Photograph of *Cercospora lycopersic* on *Lycopersicon esculentum* var. *pyriforme*: A. Symptom, B. Conidiophores and C. Conidia.

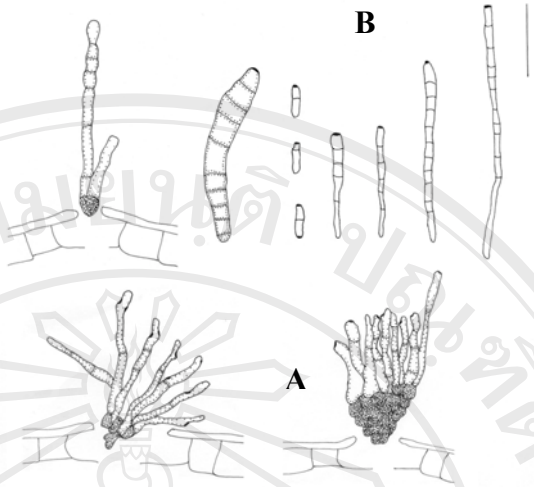

Figure 224 Drawing of *Cercospora barlericola* on *Lycopersicon esculentum* var. *pyriforme*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Lycopersicon esculentum* var. *pyriforme,* Febuary 5, 2005, JM, CMU MH 102.

Known distribution: India (Crous and Braun, 2003).

Notes: This is the first record of *Lycopersicon esculentum* var. *pyriforme* caused by *Cercospora lycopersici* from Thailand. Conidia pigmented, no *Cercospora s.str.*

***Passalora* sp.**

Leaf spots orbicular, often zonate, 1.50-7.00 mm in diameter, pale brown to dingy grey at center, with a darker margin. Fruit bodies amphigenous. Stromata 9.75-43.90 µm in diameter. Conidiophores in a divergent fascicle, medium brown, paler towards the apex, uniform in width, straight, 0-3-septate, not branched, truncate at the apex, small conidial scars, 17.07-24.39(-41.46)×(2.43-)3.65-4.87 µm. Conidia

subhyaline, cylindric, straight to curved, 4-8-septate, subacute at the apex, (74.38-) 78.04-87.80(-102.43)×(2.43-)3.65-4.87 µm (Figure 225 and 226).

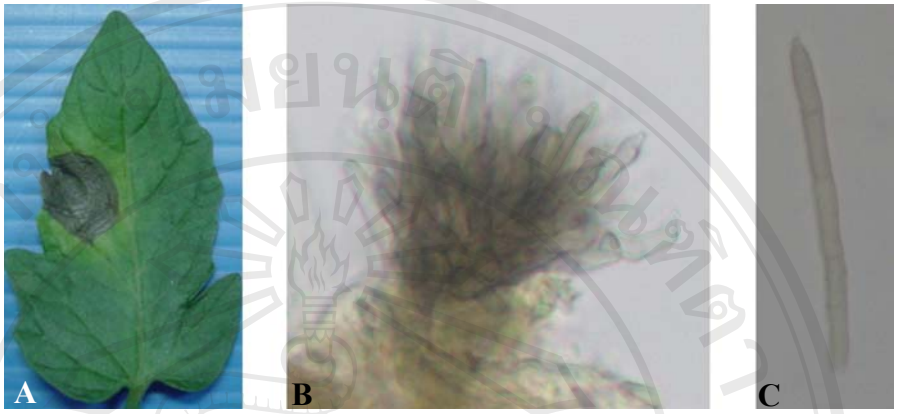

Figure 225 Photograph of *Passalora* sp. on *Lycopersicon esculentum,*: A. Symptom, B. Conidiophores and C. Conidia.

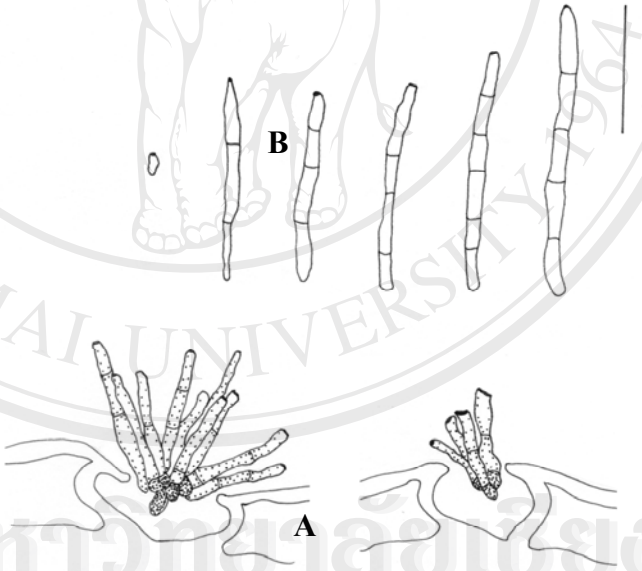

Figure 226 Drawing of *Passalora* sp. on *Lycopersicon esculentum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, A. Fang, Chiang Mai Province. Leaves of *Lycopersicon esculentum,* November 21, 2005, JM, CMU MH 103.

Known distribution: Known only Thailand.

Notes: This is the first record of *Lycopersicon esculentum* caused by *Passalora* sp. from Thailand.

***Cercospora* sp.**

Leaf spots circular to irregular, 2.00-10.00 mm in diameter, pale brown to dingy grey at center, with a darker margin. Fruit bodies amphigenous. Stromata small, 14.63-34.14 µm. Conidiophores 2-14 in a divergent fascicle, medium brown, paler towards the apex, uniform in width, straight, 1-4-septate, not branched, truncate at the apex, conidial scars conspicuously thickened, (29.26-)31.70-36.58(-48.78)×(3.65-)4.87-4.87(-6.09) µm. Conidia hyaline, acicular, straight to curved, 3-9-septate, acute to subacute at the apex, truncate at the base, hilum conspicuously thickened, darkened, (29.26-)58.53-70.73(-85.36)×2.43-3.65(-4.87) µm (Figure 227 and 228).

Figure 227 Photograph of *Cercospora* sp. on *Solanum pseudocapsicum*:
A. Symptom, B. Conidiophores and C. Conidia.

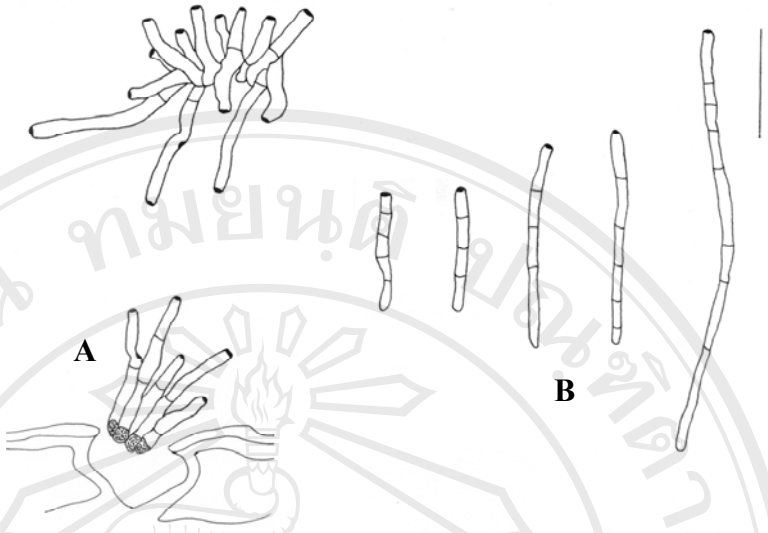

Figure 228 Drawing of *Cercospora* sp. on *Solanum pseudocapsicum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Fang, Chiang Mai Province. Leaves of *Solanum pseudocapsicum,* September 9, 2005, JM, CMU MH 104.

Known distribution: Known only Thailand..

Notes: This is the first record of *Solanum pseudocapsicum* caused by *Cercospora* sp. from Thailand.

***Cercospora* sp.**

Leaf spots suborbicular, 2.00-8.00 mm in diameter, dingy grey to greyish brown at center, with a darker margin, often surrounded with an indefinite yellowish outer border and slightly zonate in appearance. Fruit bodies amphigenous. Stromata lacking to small 29.26-48.78 µm. Conidiophores medium brown, paler towards the apex, uniform in width, straight, 4-8-septate, not branched, truncate at the apex, (75.60-)109.75-158.53(-195.12)×4.87 µm. Conidia hyaline, acicular, straight to curved, 4-10-septate, acute to subacute at the apex, truncate at the base with a

thickened hilum, very variable in length, (34.14-)48.78-131.70(-180.48)×2.43-2.43 (-4.87) µm (Figure 229 and 230).

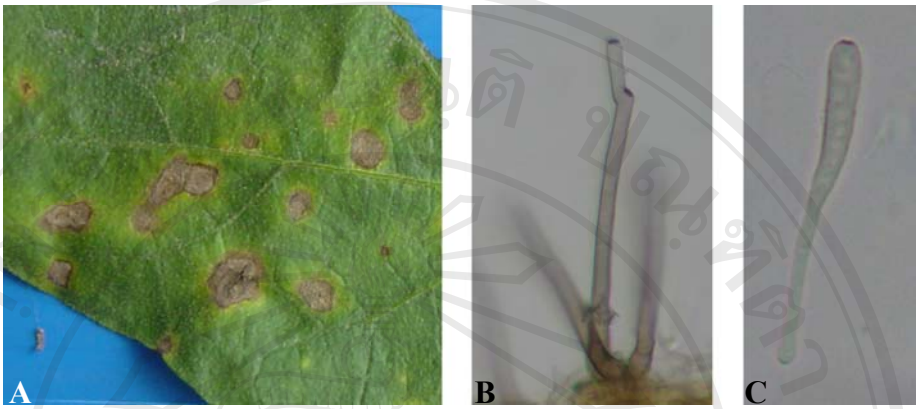

Figure 229 Photograph of *Cercospora* sp. on *Solanum wrightii*: A. Symptom, B. Conidiophores and C. Conidia.

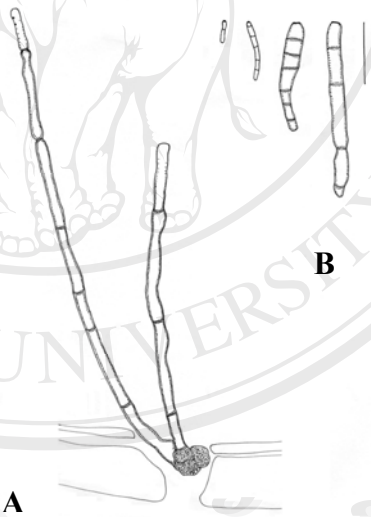

Figure 230 Drawing of *Cercospora* sp. on *Solanum wrightii*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Wiang Pa Pao, Chiang Mai Province. Leaves of *Solanum wrightii*, December 18, 2005, JM, CMU MH 105.

Known distribution: Known only Thailand.

Notes: This is the first record of *Solanum wrightii* caused by *Cercospora* sp. from Thailand.

Family Umbelliferae

Cercospora apii Fresen. Beitr. Zur Mykol. Drittes Heft 3: 91(1863)

Leaf spots amphigenous, scattered to confluent, distinct, circular to irregular, small to fairly large, 2.00-10.00 mm in diameter, when confluent up to 10 mm, greyish to dark brown with narrow darker margins. Fruit bodies amphigenous, but mostly hypophyllous. Mycelium internal; hyphae septate, branched, hyaline. Stromata small, rudimentary to slightly developed, composed of several brown, swollen hyphal cells. Conidiophores olivaceous brown throughout, or paler upwards, 2-7-septate, straight to slightly curved, 1-3 times mildly geniculate, sometimes once abruptly geniculate, not branched, (26.82-)51.21-112.19(-136.58)×(3.65-)4.87-7.31 (-8.53) µm, conidial scars small but conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular to filiform, sometimes shorter ones obclavate-cylindric, straight to mildly curved, hyaline, 3-17-septate, non-constricted at the septa, subacute to subobtuse at the apex, obconically truncate to subtruncate at the base, (39.02-)60.97-170.73(-221.94)×(3.65-)4.87-8.53 (-9.75) µm, hilum large and conspicuously thickened, darkened and non-protuberant (Figure 231 and 232).

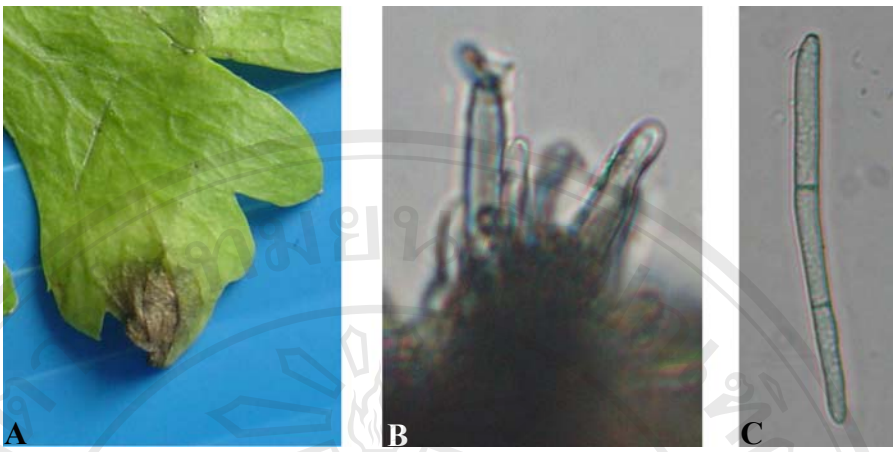

Figure 231 Photograph of *Cercospora apii* on *Apium graveolens*: A. Symptom, B. Conidiophores and C. Conidia.

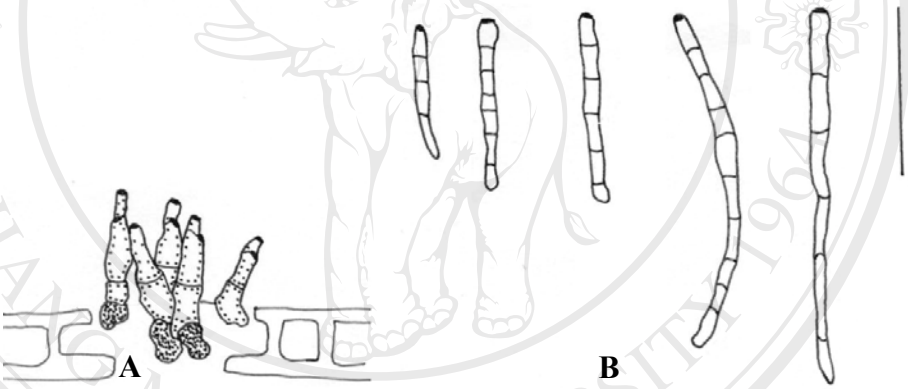

Figure 232 Drawing of *Cercospora apii* on *Apium graveolens*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Apium graveolens*, November 21, 2004, JM, CMU MH 106.

Known distribution: Worldwide, including Australia, Austria, Azerbaijan, Bangladesh, Barbados, Brazil, Brunei, Bulgaria, Cambodia, Canada, Canary Islands, China, Colombia, Congo, Cuba, Czech Republ., Denmark, Dominican Republ., Egypt, El Salvador, France, Germany, Greece, Guatemala, Hong Kong, India, Indonesia, Iraq, Italy, Jamaica, Jordan, Kenya, Korea, Latvia, Lebanon, Libya,

Lithuania, Mexico, Malaysia, Mauritius, Morocco, Myanmar, Nepal, Netherlands, New Caledonia, New Zealand, Morocco, Nepal, Nigeria, New Zealand, Panama, Papua New Guinea, Peru, Philippines, Poland, Puerto Rico, Romania, Russia, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Sudan, Suriname, Switzerland, Taiwan, Tanzania, Thailand, Togo, Trinidad, Tobago, Uruguay, U.S.A (AK, CA, CT, FL, HI, IL, KY, NC, NE, NJ, NY, MD, MN, MO, TX, WV), Vanuate, Venezuela and Zimbabwe (Crous and Braun, 2003).

Notes: A new circumscription of *C. apii emend*. is given earlier and the synonyms are cited and marked under the particular names in the present list. This item only comprises data to *C. apii s. str.* (Distribution and literature to *Apium graveolens* and some additional hosts of the Umbelliferae), supplemented with other host records which have been directly referred to as *C. apii*

Nakata and Takimoto (1928) recorded this fungus from Korea, and Cho *et al.* (1997) added a short morphological notes. Detailed description and illustration based on Korean material of this species were provided by Kim and Shin (1999c). The disease caused by the fungus was common at celery plantation in Korea.

Chupp (1954) published the following characters of *Cercospora apii:* Conidiophores (25.00-300.00×4.00-6.50 μm) are long and rarely branched, conidia (25.00-315.00×3.00-6.00 μm) with truncated base are long and acicular. The Korean collection, however, agrees well with Chupp's description, although the conidiophores and conidia are somewhat shorter, since the differences are variable in this species and other most taxonomic characters are fall within the Chupp's concepts. Chupp (1954) listed several varieties of *C. apii*, which he considered to be separate species in their own right. These have been treated elsewhere, as *Cercosporacarotae*

(Pass.) Kazn. and Siemaszko and *Passalora pastinacae* (Sacc.) U. Braun. Pons and Sutton (1988) mentioned that *C. apii* is not restricted to genera of the Umbelliferae. They concluded that the species is very variable, and that the length of the conidiophores and conidia can be strongly influenced by changes in the relative humidity, temperature and light conditions. Crous and Braun (1996) are of the opinion that it would be best treat *C. apii* as occurring on *Apium* only, as several other studies have been found that cercosporoid fungi are highly host specific. Some Taiwanese specimens on *Apios taiwanianus* is close to the present species, but differs from the latter species by having comparatively narrower (4.00-5.00 μm) and paler conidiophores. Therefore, Goh and Hsieh (1990) placed the Taiwanese species in a separate species, *Cercospora apios.*

Family Verbenaceae

***Passalora* sp.nov.**

≡ *Mycovellosiella gmelinae-arboreae* A. K. Sarbhoy, Hosag. And N. Ahmad. J. Econ. Taxon. Bot. 7: 521.(1986).

Leaf spots scattered, distinct, irregular to angular, vein-limited, dark brown, centre pale brown, 1.00-9.00 mm in diameter, later coalescing to large spot, grayish white. Stromata epiphyllous, well-developed, composed of swollen brown to dark brown hyphal cells, 25.00-57.50 μm in diameter. Conidiophores densely fascicule, dark brown, pale toward apex, rough, percurrent proliferation, geniculate, conidial scars small, slightly thickened, 1-5-septate, (15.00-)20.00-40.00(-52.50)×5.00 μm. Conidia solitary, occasionally catenulate, cylindro-obclavate to obclavate, straight to

mildly curved, rough, (22.50-)27.50-72.50(-87.50)×3.75(-5.00)-5.00(-6.25) µm, 3-16-septate, obtuse to subobtuse at the apex, obconically truncate and slightly thickened at the base (Figure 233 and 234).

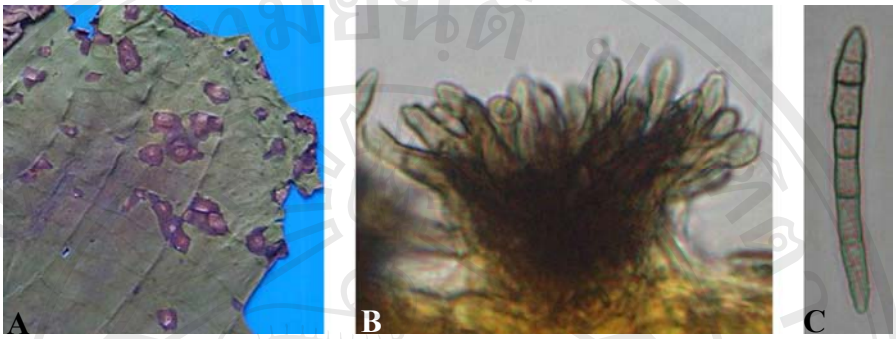

Figure 233 Photograph of *Passalora gmelinae-arboreae* on *Gmelina arborea*: A. Symptom, B. Conidiophores and C. Conidia.

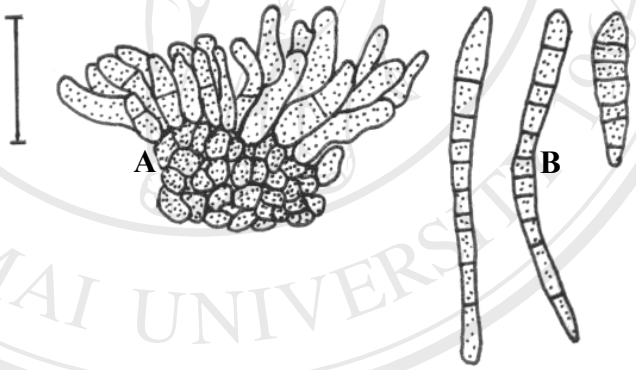

Figure 234 Drawing of *Passalora gmelinae-arboreae* on *Gmelina arborea*: A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Gmelina arborea*, November 21, 2004, CN and JM, CMU MH 107.

Known distribution: India (Crous and Braun, 2003).

Notes: *Passalora gmelinae-arboreae* (A. K. Sarbhoy, Hosag. and N.Ahmad) U.Braun and Crous (Sarbhoy *et al.* 1985; Crous and Braun 2003) is different from present

species without stroma, with branched and wide conidiophore, narrow and short conidia.

This is the first record of *Gmelina arborea* caused by *Passalora gmelinae-arboreae* from Thailand.

Cercospora holmskiodiae Lall and Gill, Indian Phytopathol. 15: 244. (1962) 1963. [T: HCIO 27197]. (= *Cercospora apii s.lat.*).

Leaf spots epiphyllous, circular to subcircular, 3.00-23.00 mm in diameter. distinct on the upper surface, greyish-brown with blackish brown border line. Stromata distinct, small to medium, moderately to well-developed, dark brown, subglobular to angular, 27.06-36.90 µm in diameter. Conidiophores emerging from the upper part of stromata, dark brown, densely fasciculate, simple, straight or slightly curved, 2-8-septate, (17.22-)27.06-81.18(-113.16)×(3.69-)4.92-4.92(-5.16) µm, with distinct and thickened conidial scars. Conidia acicular, straight, smooth, hyaline, with thickened and truncate hilum, (9.84-)17.22-98.40(-184.50)×2.46-4.92 µm, 1-16-septate (Figure 235 and 236).

Figure 235 Photograph of *Cercospora holmskiodiae* on *Holmskioldia sanguinea*: A. Symptom, B. Conidiophores and C. Conidia.

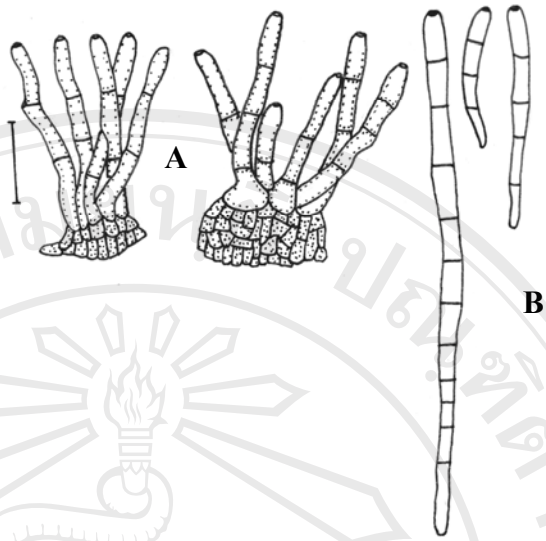

Figure 236 Drawing of *Cercospora holmskiodiae* on *Holmskioldia sanguinea*: A. Conidiophores and B. Conidia (scale bar = 20 μm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Holmskioldia sanguinea*, November 21, 2004, JM, CMU MH 108.

Known distribution: Cuba, India and Venezuela (Crous and Braun, 2003).

Notes: This is the first record of *Holmskioldia sanguinea* caused by *Cercospora holmskiodiae* from Thailand. Shorter conidia are obclavate-subcylindrical with obconically truncate bases, but long conidia are acicular.

Pseudocercospora viticicola (J. M.Yen and Lim) J. M. Yen, Gard. Bull., Singapore 33: 190 (1980) (emend. Braun, 1998).

≡ *Cercospora viticicola* J. M. Yen and Lim, Cah. Pacifique 17: 104 (1973).

= *Cercospora viticis* Ellis and Everh., J. Mycol. 3: 18 (1887)

≡ *Pseudocercosporella viticis* (Ellis and Everh.) B. K.Gupta and Kamal, Indian Phytopathol. 42: 388 (1989).

≡ *Pseudocercospora viticicola* U. Braun, Mycotaxon 48: 296 (1993).

= *Cercospora viticis* Sawada, Rep. Gov. Agric. Res. Inst. Taiwan 87: 90 (1944).

≡ *Pseudocercospora viticis* Goh and W. H. Hsieh, Trans. Mycol. Soc. R.O.C. 4: 11 (1989)

= *Cercospora viticis-quinatae* J. M. Yen, Bull. Soc. Mycol. France 93: 158 (1979).

≡ *Pseudocercospora viticis-quinatae* (J. M. Yen) J. M. Yen, Bull. Soc. Mycol. France 94: 388 (1979).

= *Pseudocercospora viticigena* J. M. Yen, A. K. Kar and B. K. Das, Mycotaxon 16: 68 (1982).

Leaf spots circular to irregular, 1.00-20.00 mm in diameter, distinct on the upper surface, grayish-brown with indefinite dark brown border, frequently confluent. Stromata distinct, small on under surface, well-developed on upper surface, up to 55.00 µm in diameter, olivaceous brown, with external hyphae. Conidiophores, olivaceous brown, loose to densely fasciculate, simple, straight or geniculate, 1-6-septate, (19.68-)24.60-61.50(-83.64)×4.92 µm. Conidial scars distinct and denticulate. Conidia cylindrical to obclavate, straight or mildly curved, smooth, pale olivaceous brown, unthickened and obconically truncated basal end, obtuse at apex, (24.60-)41.82-71.34(-86.10)×2.46-4.92 µm, 4-8 septate (Figure 237 and 238).

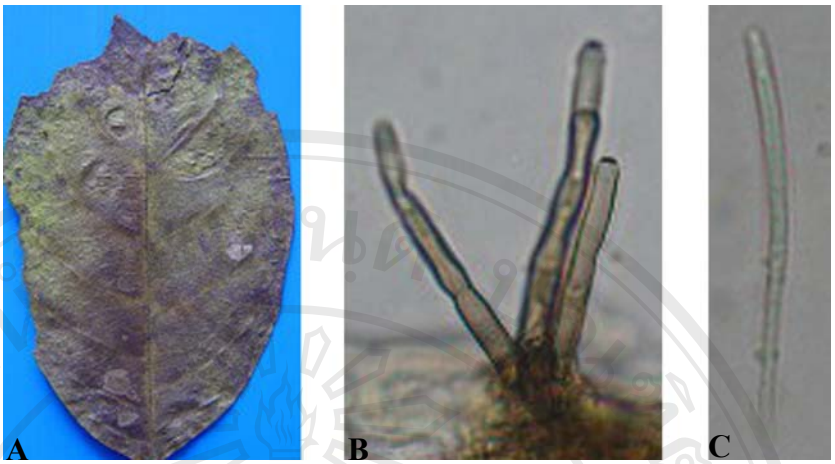

Figure 237 Photograph of *Pseudocercospora viticicola*on *Vitex quinata*: A. Symptom, B. Conidiophores and C. Conidia.

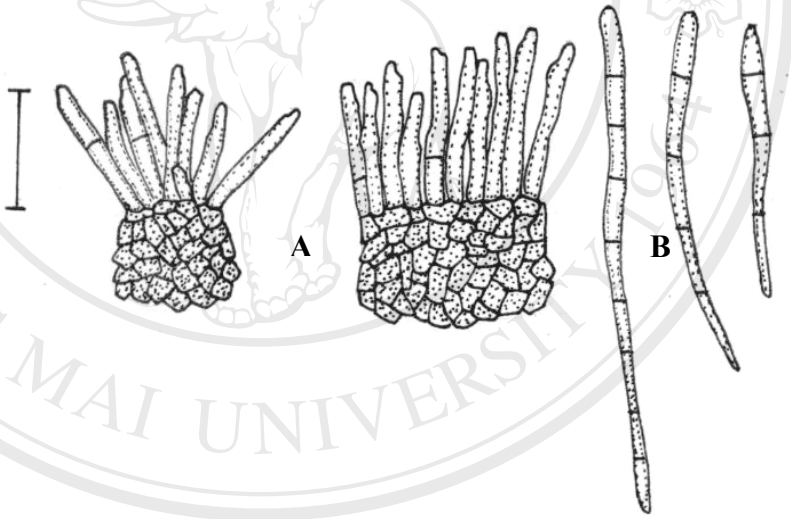

Figure 238 Drawing of *Pseudocercospora viticicola*on *Vitex quinata*: A. Conidiophores and B. Conidia (scale bar = 20 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Vitex quinata*, November 21, 2004, JM, CMU MH 109.

Known distribution: Brazil, China, Cuba, India, Japan, Philippines, Puerto Rico, Singapore, Taiwan, USA and Virgin Islands (Crous and Braun, 2003).

Notes: This is the first record of *Vitex quinata* caused by *Pseudocercospora viticicola*from Thailand. Present specimen is including two genera, *Pseudocercospora* and *Cercospora*.

Cercospora lantanae-camarae [R. C. Rayak and R. K. Rayak]

Leaf spots amphhigenous, scattered, subcircular, 2.00-3.00 mm in diameter or up to 10 mm when coalescent, centre appearing brown with dark reddish brown margin, sometimes becoming greyish brown with dark brown margins. Fruit bodies amphigenous. Stromata lacking to small, rudimentary to slightly developed, subcircular to irregular, brown to dark brown, 7.00-11.00 µm in diameter. Conidiophores solitary, arising from substomatal stromata and emerging through the cuticle, pale olivaceous brown to olivaceous brown throughout, straight to slightly or even tortuous, 2-8 times mildly geniculate, not branched, truncate to subtruncate at the apex, 1-6-septate, very variable in length, 24.00-240.00×3.50-5.50 µm, conidial scars conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, acicular, straight to mildly curved or undulate, hyaline to subhyaline, acute to subacute at the apex, truncate, 4-8 septate, non-constricted at the septa, very variable in length, 50.00-125.00×2.50-3.50 µm, hilum conspicuously thickened and darkened (Figure 239 and 240).

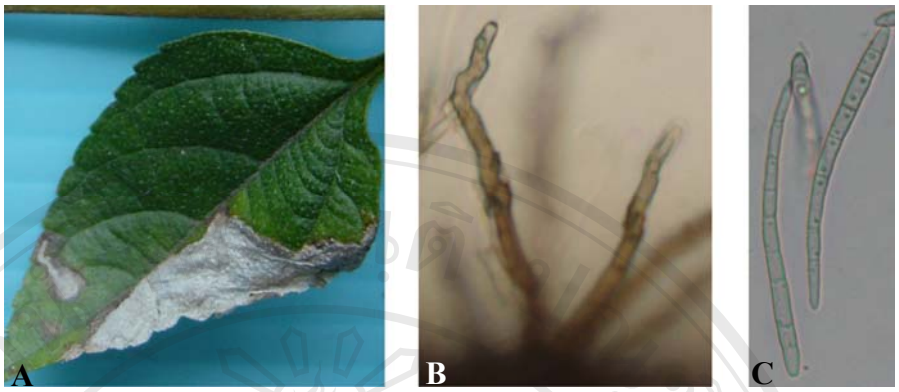

Figure 239 Photograph of *Cercospora lantanae-camarae* on *Lantana camera*: A. Symptom, B. Conidiophores and C. Conidia.

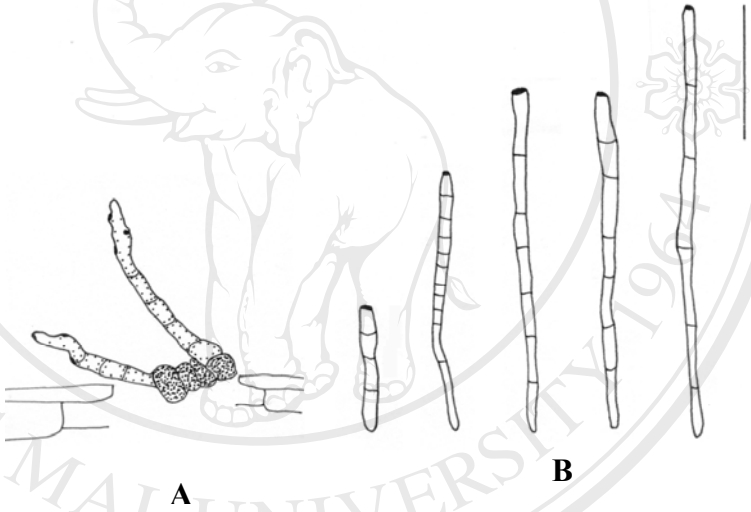

Figure 240 Drawing of *Cercospora lantanae-camarae* on *Lantana camera*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Wiang Pa Pao, Chiang Mai Province. Leaves of *Lantana camera*, November 21, 2004, JM, CMU MH 110.

Known distribution: India (Crous and Braun, 2003).

Notes: The first record of this species from Thailand was made by Petcharat and Kanjanamaneesathian (1989).

Cercospora volkameriae Speg., Revista Mus. La Plata 15: 47. 1908. [T: LEP; LPS 955]. (= *Cercospora apii s. lat.*).

Leaf spots amphhigenous, scattered, subcircular, 2.00-4.00 mm in diameter, centre appearing brown with dark reddish brown margin, sometimes becoming greyish brown with dark brown margins. Fruit bodies amphigenous. Stromata lacking to small, rudimentary to slightly developed, subcircular to irregular, brown to dark brown, composed of a few brown hyphal cells. Conidiophores solitary, arising from substomatal stromata and emerging through the cuticle, pale olivaceous brown to olivaceous brown throughout, straight to slightly or even tortuous, not branched, truncate to subtruncate at the apex, 5-11-septate, very variable in length, (158.53-) 241.46-256.09(-299.99)×4.87-4.87(-6.09) µm, conidial scars large, conspicuous, apical or on shoulders of conidiogenous cells caused by geniculation. Conidia solitary, cylindric, straight to mildly curved, hyaline to subhyaline, subacute at the apex, truncate, 3-7-septate, non constricted at the septa, very variable in length, (14.63-)28.04-31.70(-75.60)×(2.43-)\4.87-4.87(-6.09) µm, hilum conspicuously thickened, darkened, and non-protuberant (Figure 241 and 242).

Figure 241 Photograph of *Cercospora volkameriae* on *Clerodendrum paniculatum*: A. Symptom, B. Conidiophores and C. Conidia.

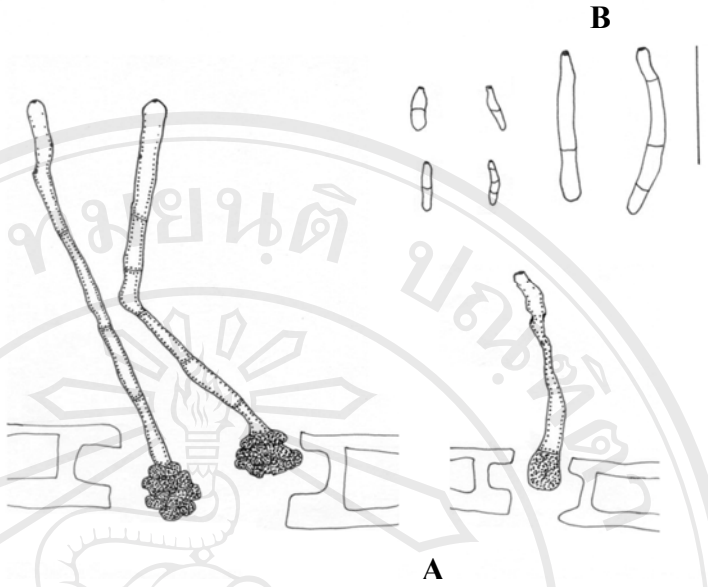

Figure 242 Drawing of *Cercospora volkameriae* on *Clerodendrum paniculatum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Clerodendrum paniculatum*, November 1, 2005, JM, CMU MH 111.

Known distribution: Barbados, Brazil, Brunei, Cuba, Ghana, Guinea, India, Indonesia, Jamaica, Java, Korea, Malawi, Malaysia, Nepal, Nigeria, Sierra Leone, Singapore, Sudan, Taiwan, Tanzania and Togo (Crous and Braun, 2003).

Notes: This is the first record of *Clerodendrum paniculatum* caused by *Cercospora volkameriae* from Thailand.

Cercospora volkameriae Speg., Revista Mus. La Plata 15: 47. 1908. [T: LEP; LPS 955]. (= *Cercospora apii s. lat.*).

Leaf spots epiphyllous, circular to subcircular, 3.00-23.00 mm in diameter, distinct on the upper surface, greyish-brown with blackish brown border line. Stromata distinct, small to medium, moderately to well-developed, dark brown,

subglobular to angular, 27.06-36.90 µm in diameter. Conidiophores emerging from the upper part of stromata, dark brown, densely fasciculate, simple, straight or slightly curved, 2-8-septate, 17.22-113.16×3.69-5.16 µm, with distinct and thickened conidial scars. Conidia acicular, straight, smooth, hyaline, with thickened and truncate hilum, 9.84-184.50×2.46-4.92 µm, 1-16-septate (Figure 243 and 244).

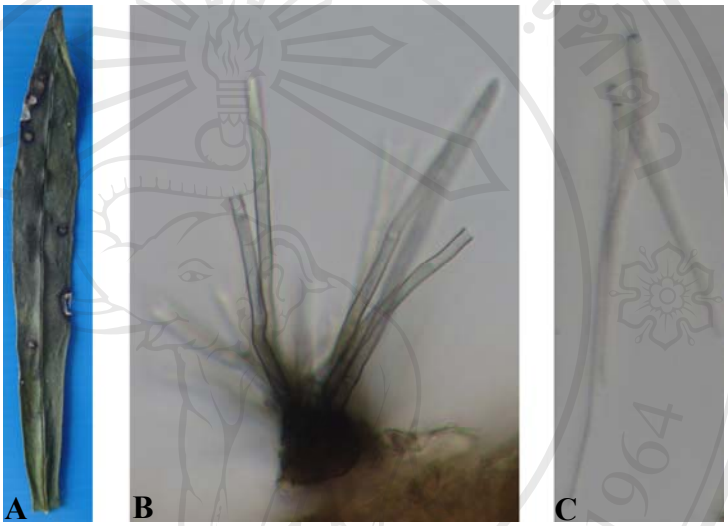

Figure 243 Photograph of *Cercospora volkameriae* on *Clerodendrum indicum*: A. Symptom, B. Conidiophores and C. Conidia.

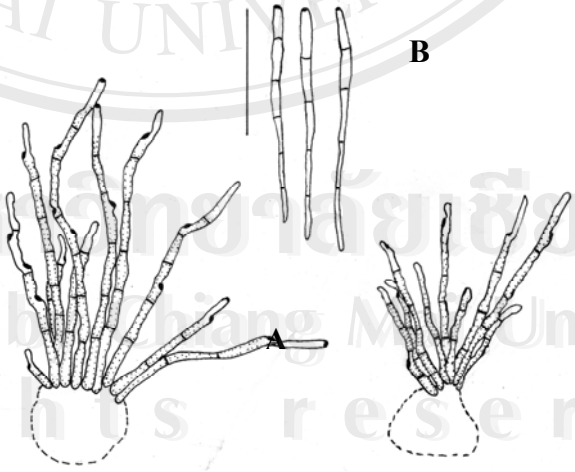

Figure 244 Drawing of *Cercospora volkameriae* on *Clerodendrum indicum*: A. Conidiophores and B. Conidia (scale bar = 40 µm).

Material examined: Thailand, Doi Suthep-Pui National Park, Chiang Mai Province. Leaves of *Clerodendrum indicum*, November 21, 2004, JM, CMU MH 112.

Known distribution: Barbados, Brazil, Brunei, Cuba, Ghana, Guinea, India, Indonesia, Jamaica, Java, Korea, Malawi, Malaysia, Nepal, Nigeria, Sierra Leone, Singapore, Sudan, Taiwan, Tanzania and Togo (Crous and Braun, 2003).

Notes: This is the first record of *Clerodendrum indicum* caused by *Cercospora volkameriae* from Thailand.

Cercospora tectonae F. Stevens (tectoniae), Bernice P. Bishop Mus. Bull. 19: 155. 1925. [T: ILL 15736]. (=*Cercospora apii s.lat*).

Leaf spots angular or suborbicular, vein-limited, 1.00-14.00 mm in diameter, confluent, dull brown to greyish brown or white, with a dark margin. Fruit bodies amphigenous but chiefly epiphyllous. Stromata small to medium. Conidiophores loosely fasciculate, pale olivaceous brown to medium brown, pale brown near the base and almost hyaline at the tip, multiseptate, 0-5 geniculate or conic at the apex, (48.78-)56.09-60.97(-75.60)×(3.65-)4.87-4.87 µm. Conidia hyaline, acicular to obclavate-cylindric, straight to curved, 6-12-septate, subacute at the apex, truncate or long obconically truncate at the base, (42.68-)53.65-80.48(-102.43)×(2.43-)3.65-3.65 µm (Figure 245 and 246).

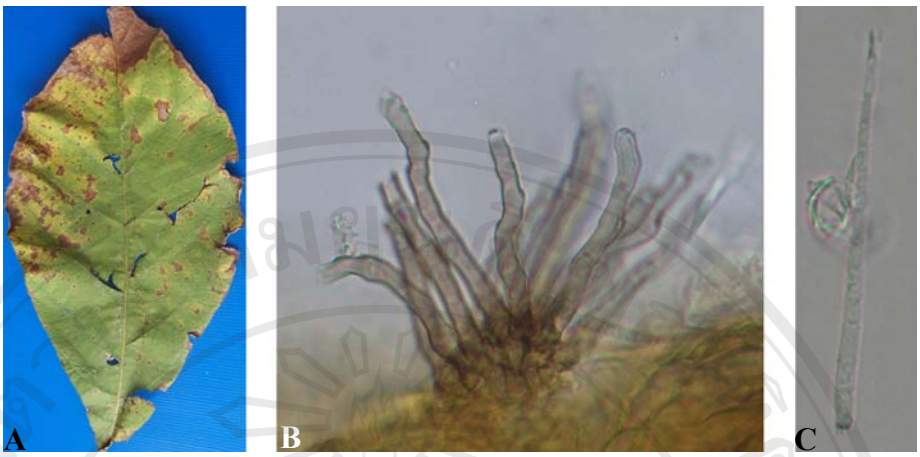

Figure 245 Photograph of *Cercospora tectonae* on *Tectona grandis*: A. Symptom, B. Conidiophores and C. Conidia.

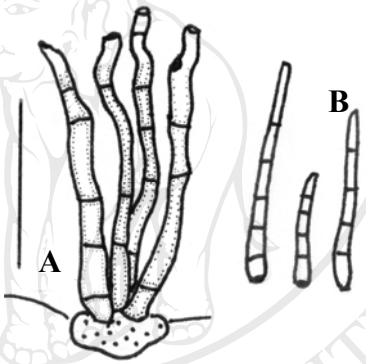

Figure 246 Drawing of *Cercospora tectonae* on *Tectona grandis*: A. Conidiophores and B. Conidia (scale bar = 40 μm).

Material examined: Thailand, Multiple Cropping Centre, Chiang Mai University, Chiang Mai Province. Leaves of *Tectona grandis*, December 1, 2005, JM, CMU MH 113.

Known distribution: Hawaii, India, Taiwan and Trinidad (Crous and Braun, 2003).

Notes: This is the first record of *Tectona grandis* caused by *Cercospora tectonae* from Thailand.