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# Monograph of Tree Diseases in the Philippines with Taxonomic Notes on Their Associated Microorganisms

By

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**Summary**: The occurrence of tree diseases were surveyed and their associated microorganisms have been investigated in the Philippines since 1977. A total of 270 diseased materials were collected from 76 tree species belonging to 61 genera of 30 families from 38 localities in Luzon, Cebu and Mindanao. One hundred thirty four diseases were identified as follows: 19 soil-born diseases, 19 stem and twig diseases and 96 leaf and needle diseases. Among them, 80 diseases in 49 tree species were identified as new diseases from the Philippines. Furthermore, 87 microorganisms and other organic agents closely associated with tree diseases were identified. Among them, 81 species of fungi made up 93% of the total, while the others comprised just 7%. Ten new species of fungi were described during this study, and 37 were newly added to the Philippine mycological flora. The results of this study will serve as a basis for the proper diagnosis and control of forest tree diseases in the Philippines.

## I. Introduction

An intensive survey of tree diseases in the Philippines was initially carried out from February 2 to April 30, 1977, when the senior author stayed at the Laboratory of Forest Pathology, Department of Forest Biological Sciences, College of Forestry, University of the Philippines at Los Baños. Supplemental surveys were conducted from August 3 to October 2, 1977, February 2 to 13, 1981 and January 10 to February 19, 1985. A total of 38 localities were visited from which diseased materials were collected. And, a total of 134 diseases including 80 new ones to the Philippines were recorded on 76 tree species of 61 genera belonging to 30 families.

The identification of microorganisms associated with diseased materials was carried out both in the Laboratory of Forest Pathology, College of Forestry, University of the Philippines at Los Baños, Philippines, and the Laboratory of Forest Pathology, Forestry and Forest Products Research Institute*, Japan. Preliminary results of the surveys and identification of the associated microorganisms have already been reported (KOBAYASHI 1977 a, 1978 a, b,c, d, 1979, 1980 a, b, c, 1981; KOBAYASHI & de GUZMAN 1978, 1985, 1986 a, b, c; KOBAYASHI & ZINNO 1983, 1984; KOBAYASHI *et al.* 1977, 1979, 1982; SUTO *et al.* 1978).

This paper contains conclusive results of the surveys concering tree diseases in the Philippines and identification of their associated microorganisms. The authors hope that this information will serve as a basis for the proper diagnosis and control of forest tree diseases in the Philippines.

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* Before 1978, the Institute was called the Government Forest Experiment Station and was located in Meguro, Tokyo, Japan.

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## II. Materials and methods

### 1. Localities where disease materials were collected

During the present study the authors visited many forest nurseries and plantations in Luzon, Cebu and Mindanao Islands and collected samples of representative tree diseases. Details of the localities visited are shown below and in Fig. 1.

(1) Atok, Benguet Province, Luzon — Atok and Bontok Forest Nurseries, BFD, February 20 and September 1, 1977.

(2) Itogon, Benguet Province, Luzon — i) Boneko Forest Nursery, BFD, February 20, 1977 ; ii) Binga Forest Nursery, BFD, February 20, 1977 ; iii) Dry Creek Plantation, BFD, February 20, 1977.

(3) Bobok, Benguet Province, Luzon — i) Bobok Forest Experimental Nursery and Plantations, Forest Research Institute (FORI), February 21, April 19 and September 2, 1977 ; ii) Natural Forests of BCI, February 21 and September 2, 1977 ; iii) Ornamentals, Guest House of BCI, September 2, 1977.

(4) Baguio-city, Benguet Province, Luzon — i) Pacdal Forest Nursery, BFD and FORI, February 19, February 22, April 18 and September 1, 1977 ; ii) Ornamentals, February 19, February 22, April 17 and September 1, 1977.

(5) Kennon Road, Benguet Province, Luzon — Forest Nursery of Camp 4 Reforestation Project, BFD, February 22, 1977.

(6) Agoo, La Union Province, Luzon — Ornamentals, Guest House of BFD, February 23, 1977.

(7) Alipang, La Union Province, Luzon — Alipang Forest Nursery, BFD, February 22, 1977.

(8) Pugo, La Union Province, Luzon — Duplas Central Forest Nursery and Plantations of Duplas Reforestation Project, BFD, February 22, 1977.

(9) Santa Fe, Nueva Viscaya Province, Luzon — Forest Nursery and Plantations of

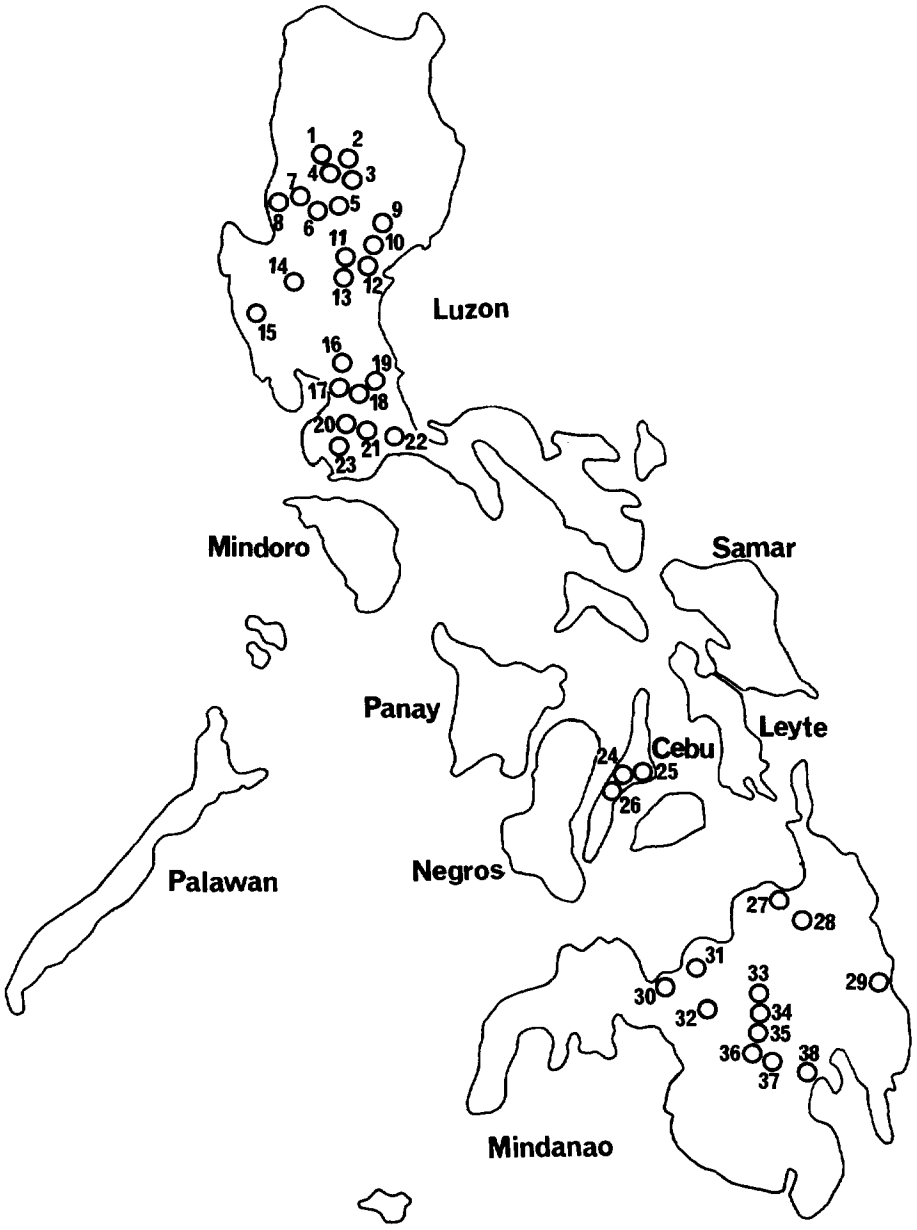


Fig. 1. Localities where disease materials were observed and colleced.

Consuelo Reforestation Project, BFD, March 9, 1977.

(10) Carranglan, Nueva Ecija Province, Luzon — i) Monkit-kit Plantations, RP-J : FDP, January 16 and 17, and February 5, 1985; ii) Forest Nursery and Parcel IIb Plantations, RP-J : FDP, January 16 and 17, 1985; iii) Talatalan Forest Nursery and Parcel IIa Plantations, RP-J : FDP, January 16, February 6, 1985 iv) Camanggahan

Forest Nursery and Plantations, NIA, February 5, 1985; v) Baluarte Central Forest Nursery, Central Trial Plantations and Parcel I Plantations, RP-J: FDP, March 9 and 10, August 11 to September 29, 1977, and January 15, 17, 18, 23 and 25, 1985; vi) Ornamentals, Maringalo Central Office, RP-J: FDP, August 11 to September 29, 1977, and January 14 to February 8, 1985.

(11) Punkan, Nueva Ecija Province, Luzon — Forest Nursery and Plantations of Punkan Reforestation Project, BFD, March 10, 1977.

(12) Pantabangan, Nueva Ecija Province, Luzon — i) Marikit Forest Nursery, BFD, March 8, 1977; ii) Ornamentals, Guest House of NIA, March 9, 1977; iii) Plantations of Pantabangan Reforestation Project, NIA-BFD, March 8, 1977; iv) Saddle Dam Central Nursery, NIA, February 7, 1985; v) Debt Forest Nursery and Parcel III Plantations, RP-J: FDP, January 22, 1985.

(13) Muñoz, Nueva Ecija Province, Luzon — Ornamentals, Campus of the Central Luzon State University, February 7, 1985.

(14) Mayantoc, Tarlac Province, Luzon — Forest Nursery and Plantations, ANZAP, February 8, 1985.

(15) Cabangan, Zambales Province, Luzon — Natural Forests, BFD, August 11, 1977.

(16) Santa Maria, Bulacan Province, Luzon — Plantation of IAFDC, February 12, 1981.

(17) Manila, Luzon — Ornamentals, February 4 and August 3 to 5, 1977.

(18) Makati-city, Rizal Province, Luzon — Ornamentals, February 19, 1985.

(19) Quezon-city, Rizal Province, Luzon — i) Ornamentals, August 14, 20 and 28, and September 18, 1977; ii) Nursery of MSB, February 11, 1985.

(20) Calamba, Laguna Province, Luzon — Agro-Forestry Experimental Farm, UPLB-CF, April 13, 1977.

(21) Los Baños, Laguna Province, Luzon — i) Ornamentals, Campus of UPLB, February 3 to April 29, September 6 to 10, 1977, January 11 and February 11, 1985; ii) Forest Nursery and Plantations, Central Forest Experiment Station, UPLB-CF, February 7, March 17 and April 5, 1977; iii) Forest Nursery, FORI April 1, 1977; iv) Makiling Botanical Gardens, February 4, 1977, January 11 and February 11, 1985.

(22) Quezon National Park, Quezon Province, Luzon — Natural Forests, August 7, 1977.

(23) Taal, Batangas Province, Luzon — Ornamentals, March 6 and April 23, 1977.

(24) Camp 7, Minglanilla, Cebu — Forest Nursery and Plantations of Osmeña Reforestation Project, BFD, March 25, 1977, and February 14, 1985.

(25) Buhisan, Cebu-city, Cebu — Forest Nursery and Plantations of Cebu-city Reforestation Project, BFD, March 25, 1977, and February 13, 1985.

(26) Toledo-city, Cebu — Forest Nursery and Plantations of ACMDC, February 14, 1985.

(27) Nasipit, Agusan del Norte Province, Mindanao — Forest Nursery and Plantations, NALCO, September 14, 1977.

(28) Tungao, Agusan del Norte Province, Mindanao — Forest Nursery and Plantations of Tungao Camp, NALCO, September 15 and 16, 1977.

(29) Bislig, Surigao del Sur Province, Mindanao — i) Central Forest Nursery, Port Lamon Extension Nursery and Plantetions, PICOP, March 21 and 22, 1977; ii) Ornamentals, Guest House of PICOP, March 21 to 23, 1977.

(30) Cagayan de Oro, Misamis Oriental Province, Mindanao — Ornamentals, September 12 and 13, 1977, and February 4, 1981.

(31) Malasag, Misamis Oriental Province, Mindanao — Forest Nursery and Plantations of Malasag Reforestation Project, BFD, September 14, 1977.
(32) Talakag, Bukidnon Province, Mindanao — Forest Nursery of MAFCO, December 6, 1981.
(33) Impalutao, Bukidnon Province, Mindanao — Forest Nursery and Plantations of Impalutao Reforestation Project, September 13, 1977, and February 4, 1971.
(34) Malaybalay, Bukidnon Province, Mindanao — Forest Nursery and Plantations of Malaybalay Reforestation Project, September 13, 1977.
(35) Bancud, Bukidnon Province, Mindanao — Plantations, IAFDC, February 5 to 8, 1981.
(36) Musuan, Bukidnon Province, Mindanao — Ornamentals, Campus of Central Mindanao State University, February 8, 1981.
(37) Cabangahan, Bukidnon Province, Mindanao — Plantations of IAFDC, February 8, 1981.
(38) Davao-city, Mindanao — Ornamentals, Davao Air Port, February 9, 1981.

**2. Examination of the diseased materials collected**

The identification of host trees observed and collected was carried out by the junior author. Scientific and local names of the host trees followed the "Lexicon of Philippine trees" (SALVOSA 1963).

One half of the diseased specimens was kept in the Laboratory of Forest Pathology, College of Forestry, UPLB, Philippines and the other half in the Laboratory of Forest Pathology, FFPRI, Japan. Most of the diseased materials were examined microscopically and slide specimens were prepared at the Laboratory of Forest Pathology, UPLB-CF, and at the Maringalo Central Office, RP-Japan Forestry Development Project for the Pantabangan Area, in the Philippines, utilizing a magnifying scope and a microscope.

The isolation of microorganisms from the diseased materials was carried out mainly at the Laboratory of Forest Pathology, UPLB-CF, Philippines and supplementarily at the Laboratory of Forest Pathology, FFPRI, Japan. The inoculation tests using several important or interesting microorganisms were carried out in both Laboratories, to confirm their pathogenicity and to provide supplemental evidence for their identifccation. The identification of microorganisms was carried out mainly at the Laboratory of Forest Pathology, FFPRI, Japan.

## III. Summarized results of the survey

As shown in Tables 1 to 5, a total of 134 diseases and 2 hyperparasites were observed during the surveys from 1977 to 1985 on 76 species of host plants belonging to 61 genera of 30 families, and finally 270 diseased materials were recorded from 38 different localities in Luzon, Cebu and Mindanao. They were composed of 19 soil-borne diseases, 19 stem and twig diseases and 96 leaf and needle diseases, as shown in Table 5. Among them 80 diseases on 49 tree species were recorded as new diseases from the Philippines.

As shown in Table 1, they are the root-knot nematode disease of *Paulownia taiwaniana* and *Psidium guajava*; charcoal rot of *Pinus caribaea, P. elliottii, P. kesiya* and *P. oocarpa*; root rot in plantation of *Pinus caribaea*; stem rot of *Swietenia macrophylla*; *Botryodiplodia* canker of *Acacia mangium* and *Albizia falcataria*; *Botryosphaeria* canker of *Paulownia taiwaniana*; *Phomopsis* canker of *Acacia auriculiformis, Albizia falcataria* and *Paulownia taiwaniana*; *Cryphonectria* canker of *Eucalyptus deglupta*; 2 dieback

Table 1. Tree diseases observed from 1977 to 1985 in the Philippines

| Tree species | Disease name | Pathogenic agent | Locality *** |
|---|---|---|---|
| *Acacia auriculiformis* | Phomopsis canker* | *Diaporthe eres** | 10-i, v |
| | Sooty mold* | *Meliola koae**c) | 26 |
| *A. mangium* | Botryodiplodia canker* | *Botryodiplodia theobromae* | 10-iv |
| | Powdery mildew* | *Oidium* sp. | 21-ii |
| *Albizia falcataria* | Botryodiplodia canker* | *Botryodiplodia theobromae* | 21-i |
| | Damping-off | *Fusarium oxysporum*, | 2-i, 33 |
| | | *F. solani*, | 2-i, 33 |
| | | *Rhizoctonia solani* | 2-i, 33 |
| | Phomopsis canker* | *Diaporthe eres** | 10-v |
| | Pink disease | *Corticium salmonicolor* | 29-i |
| | Yellow leaf disease | *Camptomeris albizziae* | 21-ii, 33, 34 |
| *A. procera* | Rust | *Ravenelia* sp. | 10-v |
| *Aleurites trisperma* | Sooty mold* | *Asterina punctiformis**c) | 24 |
| *Alnus japonica* | Brown leaf spot* | *Septoria alni** | 1, 2-ii, 3-i(2), 4-i(2) |
| | Rust* | *Melampsoridium hiratsukanum**a) | 1, 2-ii, 3-i(2), 4-i(2) |
| *A. maritima* | Brown leaf spot* | *Septoria alni** | 2-ii, 4-i(2) |
| | Rust* | *Melampsoridium hiratsukanum* | 1, 2-ii, 3-i(2), 4-i(2) |
| *A. nepalensis* | Brown leaf spot* | *Septoria alni** | 1 |
| *Alstonia macrophylla* | Brown leaf spot | *Cercospora alstoniae*** | 24 |
| *Anacardium occidentale* | Pestalotia disease* | *Pestalotiopsis adusta* | 10-v, 14 |
| *Anthocephalus chinensis* | Brown leaf spot* | *Phaeoisariopsis anthocephala*** | 21-ii |
| *Antidesma bunius* | Leaf spot | Unidentified | 21-i |
| *A. ghaesembilla* | Rust | *Crossopsora antidesmae-dioideae*b)* | 10-v, 12-v |
| *Araucaria heterophylla* | Needle blight* | *Phyllosticta brasiliensis** | 10-vi |
| *Artocarpus blancoi* | Cercospora leaf spot | *Cercospora artocarpi* | 25 |
| *Bougainvillea glabra* | Sooty mold | Unidentified | 21-i |
| *Calliandra haematocephala* | Pestalotia disease* | *Pestalotiopsis langloisii** | 21-i |
| *Carica papaya* | Black powdery spot* | *Asperisporium caricae** | 10-iv, 12-v |
| | Mosaic | Unidentified virus | 3-iii |
| *Cassia fruticosa* | Dieback* | *Diatrypella favacea** | 21-ii |
| | Dieback* | *Valsa kitajimana** | 21-ii |
| *C. multijuga* | Rust* | *Ravenelia berkeleyi**b) | 10-v, 12-v |
| *Casuarina equisetifolia* | Damping-off | *Rhizoctonia solani* | 12-i |
| Ceylon bush | Rust | Unidentified | 25 |
| *Chrysophyllum cainito* | Algal leaf spot | *Cephaleuros virescens* | 21-i |
| *Cicca acida* | Rust* | *Caeoma* sp.*a) | 24 |
| *Coffea arabica* | Rust | *Hemileia vastatrix*a)* | 3-i, 20, 23 |
| *Dendrocallamus merillianus* | leaf rust* | *Puccinia* sp.a) | 4-ii, 5 |
| | Hyperparasite on rust | *Ophionectria* sp. | 4-ii, 5 |

Table 1 (continued)

| Tree species | Disease name | Pathogenic agent | Locality*** |
|---|---|---|---|
| *Eucalyptus citriodora* | Powdery mildew* | *Oidium* sp. | 21-ii |
| *E. deglupta* | Brown leaf spot* | *Cercospora eucalypti** | 29-1 |
| | Cryphonectria canker* | *Cryphonectria nitschkei** | 29-i |
| | Damping-off | *Rhizoctonia solani* | 29-i |
| | Root rot | *Fusarium oxysporum,* | 29-i |
| | | *F. solani* | 29-i |
| *E.* sp. | Black powdery spot* | *Phaeoseptoria eucalypti** | 6 |
| *Ficus odorata* | Tar spot | *Phyllachora spinifera* | 24 |
| *F.* sp. | Rust | *Phakopsora fici-erectae*[b)] | 26 |
| | Tar spot | *Phyllachora spinifera* | 24 |
| *Gardenia philastrei* | Yellow leaf spot* | *Mycosphaerella luzonensis*** | 4-i, 21-i(2) |
| *Gliricidia sepium* | Cercospora leaf spot | *Cercospora gliricidiae* | 10-ii, 10-iii, 10-v, 20, 25 |
| *Gmelina arborea* | Brown leaf spot* | *Cercospora gmelinae** | 10-i, 10-ii, 10-v, 25, 26 |
| | Gray leaf spot* | *Guignardia gmelinae*** | 29-i |
| | Sooty mold* | *Meliola clerodendricola* var. *micromera*[c)] | 21-ii, 28 |
| *Gossypium* sp. | Rust | *Phakopsora gossypii* | 12-v |
| *Hydrangea macrophylla* | Anthracnose* | *Glomerella cingulata* | 4-i, 24(2) |
| *Lagerstroemia speciosa* | Brown leaf spot | *Cercospora lythracearum* | 21-i, 24, 29-ii |
| | Mistletoe | Unidentified parasitic plant | 21-i |
| | Rust | Unidentified | 24 |
| *Lansium domesticum* | Anthracnose* | *Glomerella cingulata* | 21-iii |
| *Lawsonia inermis* | Cercospora leaf spot* | *Cercospora lawsoniae-albae** | 21-iv |
| *Leea manillensis* | Leaf spot | Unidentified | 24 |
| *Leucaena leucocephala* | Anthracnose* | *Colletotrichum truncatum* | 32 |
| | Damping-off | *Fusarium oxysporum,* | 4-i, 29-i |
| | | *F. solani,* | 4-i, 29-i |
| | | *Rhizoctonia solani* | 4-i, 29-i |
| | Top-killing | *Fusarium solani,* | 4-i |
| | | *Glomerella cingulata* | 4-i |
| | Yellow leaf disease* | *Exosporium leucaenae** | 10-v, 10-vi, 14, 21-ii, 24, 26, 27, 31 |
| *Litsea* sp. | Leaf spot | Unidentified | 24 |
| *Mangifera indica* | Anthracnose | *Glomerella cingulata* | 10-iii, 12-iv, 19-ii, 21-i, 25 |
| | Gray leaf spot* | *Macrophoma luzonensis*** | 3-iii |
| | Sooty mold* | *Antennellopsis vulgaris**[c)] | 12-iv |
| *Manihot esculenta* | Brown leaf spot | *Cercospora henningsii* | 10-ii, 21-v, 25 |
| *M. glaziovii* | Brown leaf spot* | *Cercospora henningsii* | 29-i |
| *Microcos stylocarpa* | Leaf spot* | *Phyllosticta microcosi*** | 10-v |
| *Mimusopus parvifolia* | Rust | *Uredo* sp. | 29-ii |
| *Morus alba* | Rust | *Aecidium mori*[b)] | 4-i |

Table 1 (continued)

| Tree species | Disease name | Pathogenic agent | Locality*** |
|---|---|---|---|
| *Mussaenda philippica* | Cercospora leaf spot* | *Cercospora philippinensis*** | 21-i |
| *Nerium oleander* | Cercospora leaf spot* | *Cercospora kurimaensis** | 38 |
| *Osmanthus* sp. | Sooty mold | Unidentified | 4-i |
| *Parkia roxburgii* | Tar spot | *Phyllachora parkiae* | 21-ii |
| *Paulownia taiwaniana* | Botryosphaeria canker* | *Botryosphaeria dothidea** | 16, 28 |
| | Cercospora leaf spot* | *Cercospora paulowniae** | 16, 35 |
| | Phomopsis canker* | *Diaporthe eres** | 16, 28 |
| | Root-knot nematode disease* | *Meloidogyne incognita*[d)] | 35, 37 |
| *Persea americana* | Cercospora leaf spot* | *Cercospora purpurea** | 24 |
| *Piliostigma malavaricum* var. *acidum* | Brown leaf spot | *Mycosphaerella piliostigmae*** | 10-v(2), 12-v |
| *Pinus caribaea* | Anthracnose* | *Glomerella cingulata* | 15 |
| | Charcoal rot* | *Macrophomina phaseolina* | 10-v |
| | Damping-off | *Fusarium oxysporum,* | 10-v |
| | | *F. solani* | 10-v |
| | Fox-tail | Physiological disease | 10-v, 28, 29-i, 31, 34, 36 |
| | Needle blight* | *Cercospora pini-densiflorae** | 2-iii, 4-i, 10-v, 14 |
| | Needle blight* | *Volutella pini-caribaeae*** | 29-i |
| | Needle cast | *Lophodermium australe** | 10-v, 36 |
| | Root rot in plantation* | *Pythium* sp. | 29-i |
| | Stem blight* | *Calonectria pini-caribaeae*** | 29-i |
| *P. elliottii* | Charcoal rot* | *Macrophomina phaseolina* | 10-v |
| | Damping-off | *Fusarium oxysporum,* | 10-v |
| | | *F. solani* | 10-v(2) |
| *P. kesiya* | Blue stain* | *Ceratocystis ips** | 3-i |
| | Charcoal rot* | *Macrophomina phaseolina* | 10-v |
| | Damping-off | *Fusarium oxysporum,* | 2-i, 4-i, 10-v, 12-i |
| | | *F. solani* | 2-i, 4-i, 10-v, 12-i |
| | Needle blight* | *Cercospora pini-densiflorae** | 1, 3-i, 4-i(2), 10-ii, 10-iii, 21-ii, 28, 29-i, 33, 34 |
| | Needle cast | *Lophodermium australe** | 3-ii, 34 |
| | Pestalotia disease* | *Pestalotiopsis disseminata** | 10-ii |
| *P. merkusii* | Macrophoma blight* | *Macrophoma micromegala** | 15 |
| | Needle blight* | *Cercospora pini-densiflorae** | 15 |
| | Needle cast | *Lophodermium australe** | 15(2) |
| *P. oocarpa* | Charcoal rot* | *Macrophomina phaseolina* | 10-v |

Table 1 (continued)

| Tree species | Disease name | Pathogenic agent | Locality*** |
|---|---|---|---|
| | Damping-off | *Fusarium oxysporum,* | 10-v |
| | | *F. solani* | 10-v |
| | Needle blight* | *Cercospora pini-densiflorae** | 21-ii |
| *Plumeria alba* | Brown leaf spot* | *Cercospora plumeriae** | 18, 21-i |
| *P. rubra* | Brown leaf spot* | *Cercospora plumeriae** | 21-i |
| *Psidium guajava* | Damping-off | *Fusarium oxysporum,* | 9 |
| | | *Rhizoctonia solani* | 9 |
| | Pestalotia disease* | *Pestalotiopsis heuchereae** | 3-iii |
| | Root-knot nematode disease* | *Meloidogyne* sp.[d] | 9 |
| | Sooty mold | Unidentified | 13 |
| *Pterocarpus indicus* | Anthracnose* | *Colletotrichum truncatum* | 10-v |
| | Brown leaf spot* | *Cercospora pterocarpicola** | 7, 10-v(3), 12-ii, 21-ii(2), 24 |
| | Dieback anthracnose* | *Glomerella cingulata* | 10-v |
| | Leaf blotch* | *Ellisiopsis gallesiae** | 7, 21-ii, 24 |
| | Leaf blotch* | *Robillarda trachycarpi** | 10-v |
| | Stem blight* | *Nectria* sp. | 10-v |
| | Tar spot | *Phyllachora pterocarpi* | 7, 10-v(3), 12-ii, 12-v, 21-ii(3) |
| | Twig blight* | *Phaeoisariopsis* sp. | 10-v |
| *Rubia occidentalis* | Leaf spot | Unidentified | 29-i |
| *Rubus* sp. | Rust | *Hamaspora acutissima*[a] | 24 |
| *Samanea saman* | Powdery mildew* | *Oidium* sp. | 21-ii |
| *Shorea almon* | Hyperparasite on undetermined fungus | *Periconia shyamala** | 29-i |
| | Leaf spot | Unidentified | 29-i |
| *Swietenia macrophylla* | Algal leaf spot | *Cephaleuros virescens* | 21-i |
| | Root rot | *Fusarium solani,* | 7, 24 |
| | | *Rhizoctonia solani* | 7, 24 |
| | Southern sclerotium blight | *Corticium rolfsii* | 24 |
| | Stem rot* | *Botryodiplodia theobromae* | 7, 24 |
| *Tamarindus indicus* | Powdery mildew* | *Oidium* sp. | 19-ii |
| *Taxodium mucronatum* | Needle blight* | *Cercospora sequoiae** | 4-i |
| *Tectona grandis* | Rust* | *Olivea tectonae**[a] | 8, 9, 10-ii, 10-v, 11, 21-i, 21-ii, 24, 25 |
| | Sooty mold | Unidentified | 8 |
| Tiliaceae | Erineum gall | *Eriophyes* sp. | 24 |
| *Trema orientalis* | Leaf spot | Unidentified | 24 |
| *Vitex parviflora* | Brown leaf spot* | *Cercospora viticis** | 25 |
| *Zizyphus mauritiana* | Cercospora leaf spot* | *Cercospora zizyphi** | 26 |

Note) *Newly recorded in this survey　** New species　*** Corresponded to the locality list in page, 98 ～ 101
a) Identified by Dr. HIRATSUKA　b) Identified by Dr. KAKISHIMA　c) Identified by Dr. KATUMOTO
d) Identified by Dr. MAMIYA

Table 2. Host plants of tree diseaess and microorganisms recorded from 1977 to 1985 in the Philippines

| Subdivision or Class | Host plant: Family | Host plant: Number of Genus | Host plant: Number of Species | Host plant: Number of disease | Host plant: Number of Specimen | Microorganism*: Number of genus | Microorganism*: Number of Species | Microorganism*: Unidentified |
|---|---|---|---|---|---|---|---|---|
| Gymnospermae | Araucariaceae | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Pinaceae | 1 | 5 | 23 | 54 | 11 | 12 | 1** |
| | Taxodiaceae | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| Monocotyledon | Gramineae | 1 | 1 | 1 | 2 | 1 | 1 | 0 |
| Dicotyledon | Anacardiaceae | 2 | 2 | 4 | 9 | 4 | 4 | 0 |
| | Apocynaceae | 3 | 4 | 4 | 5 | 1 | 3 | 0 |
| | Betulaceae | 1 | 3 | 5 | 22 | 2 | 2 | 0 |
| | Caricaceae | 1 | 1 | 2 | 3 | 1 | 1 | 1 |
| | Casuarinaceae | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Dipterocarpaceae | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| | Euphorbiaceae | 4 | 6 | 6 | 9 | 4 | 4 | 1 |
| | Lauraceae | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| | Leguminosae | 11 | 14 | 31 | 77 | 22 | 26 | 0 |
| | Lythraceae | 2 | 2 | 4 | 6 | 1 | 2 | 2 |
| | Malvaceae | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Meliaceae | 2 | 2 | 5 | 9 | 6 | 6 | 0 |
| | Moraceae | 3 | 4 | 5 | 5 | 4 | 4 | 0 |
| | Myrtaceae | 2 | 4 | 10 | 12 | 8 | 9 | 1 |
| | Nyctaginaceae | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| | Oleaceae | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| | Rhamnaceae | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Rosaceae | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Rubiaceae | 5 | 5 | 5 | 9 | 4 | 4 | 1 |
| | Sapotaceae | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| | Saxifragaceae | 1 | 1 | 1 | 3 | 1 | 1 | 0 |
| | Scrophulariaceae | 1 | 1 | 4 | 8 | 4 | 4 | 0 |
| | Tiliaceae | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| | Ulmaceae | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| | Verbenaceae | 3 | 3 | 6 | 19 | 4 | 5 | 1 |
| | Vitaceae | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| | Unidentified | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| Total | 30 | 61 | 76 | 134 | 270 | 53 | 85 | 15 |

Note) * Besides these organisms 2 hyperparasitic fungi were recorded on *Dendrocallamus* (Gramineae, 2 specimens) and on *Shorea* (Dipterocarpaceae, 1 specimen).

** Physiological disease.

diseases of *Cassia fruticosa*; twig blight of *Pterocarpus indicus*; stem blight of *Pinus caribaea* and *Pterocarpus indicus*; dieback anthracnose of *Pterocarpus indicus*; blue stain of *Pinus kesiya*; sooty molds of *Acacia auriculiformis, Aleurites trisperma, Gmelina arborea* and *Mangifera indica*; powdery mildews of *Acacia mangium, Eucalyptus citriodora, Samanea saman* and *Tamarindus indicus*; 2 anthracnose diseases of *Hydrangea macrophylla, Lansium domesticum, Leucaena leucocephala, Pinus caribaea* and *Pterocarpus indicus*; rust diseases of *Albizia procera, Alnus japonica, A. maritima, Cassia multijuga, Cicca acida, Dendrocallamus merillianus* and *Tectona grandis*; Pestalotia diseases of *Anacardium occidentale, Calliandra haematocephala, Pinus kesiya* and *Psidium guajava*; yellow leaf disease of *Leucaena leucocephala*; yellow leaf spot disease of *Gardenia philastrei*; gray leaf spot diseases of *Gmelina arborea* and *Mangifera indica*; black powdery spot diseases of *Carica papaya* and *Eucalyptus* sp.; brown leaf spot diseases of *Alnus japonica, A. maritima, A. nepalensis, Alstonia macrophylla, Anthocephalus chinensis, Eucalyptus deglupta, Gmelina arborea, Manihot glaziuvii, Plumeria alba, P. rubra, Pterocarpus indicus* and *Vitex parviflora*; Cercospora leaf spot diseases of *Lawsonia inermis, Mussaenda philipica, Nerium oleander, Paulownia taiwaniana, Persea americana* and *Zizyphus mauritiana*; leaf spot disease of *Antidesma bunius* and *Microcos stylocarpa*; 2 leaf blotch diseases of *Pterocarpus indicus*; needle blight of *Araucaria heterophylla, Pinus caribaea, P. elliottii, P. kesiya, P. merkusii, P. oocarpa* and *Taxodium mucronatum*; Macrophoma blight of *Pinus merkusii*.

On the other hand, a total of 87 microorganisms and other organic agents, which were closely associated with tree diseases, were recorded during these surveys as shown in Tables 3 to 5. Among them, fungi which were composed of 81 species belonging to 50 genera, shared 93% and the others, 7%. With the exception of a Mastigomycotina fungus, the other 3 main groups of fungi such as Ascomycotina, Basidiomycotina and Deuteromycotina shared 26%, 19% and 54% within fungi, respectively. Among the fungi, 10 species were described as new species, namely *Calonectria pini-caribaeae* on *Pinus*, *Cercospora alstoniae* on *Alstonia*, *C. philippinensis* on *Mussaenda*, *Guignardia gmelinae* on *Gmelina*, *Macrophoma luzonensis* on *Mangifera*, *Mycosphaerella luzonensis* on *Gardenia*, *M. piliostigmatis* on *Piliostigma*, *Phaeoisariopsis anthocephala* on *Anthocephalus*, *Phyllosticta microcosi* on *Microcos* and *Volutella pini-caribaeae* on *Pinus*.

Besides these new fungi, 37 species belonging to 24 genera were newly added to the Philippine fungous flora. They are *Antennellopsis vulgaris, Asperisporium caricae, Asterina punctiformis, Botryosphaeria dothidea, Ceratocystis ips, Cercospora eucalypti, C. gmelinae, C. kurimaensis, C. lawsoniae-albae, C. paulowniae, C. pini-densiflorae, C. plumeriae, C. pterocarpicola, C. purpurea, C. sequoiae, C. viticis, C. zizyphi, Cryphonectria nitschkei, Diaporthe eres, Diatrypella favacea, Ellisiopsis gallesiae, Exosporium leucaenae, Lophodermium australe, Macrophoma micromegala, Melampsoridium hiratsukanum, Meliola koae, Olivea tectonae, Periconia shyamala, Pestalotiopsis disseminata, P. heucherae, P. langloisii, Phaeoseptoria eucalypti, Phyllosticta brasiliensis, Ravenelia berkeleyi, Robillarda trachycarpi, Septoria alni* and *Valsa kitajimana*.

Notes on important tree diseases observed in the present surveys will be described in the next chapter, and an enumerated list and description of the microorganisms and other organic agents will be introduced in the fifth chapter.

Table 3. Pathogenic agents associated with tree diseases recorded from 1977 to 1985 in the Philippines

| Pathogenic agent | | | Host | | Distributon of pathogen* | | |
|---|---|---|---|---|---|---|---|
| Group | Genus | Species | Genus | Species | Luzon | Cebu | Mindanao |
| Fungi | *Aecidium* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Antennellopsis* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Asperisporium* | 1 | 1 | 1 (2) | 1 (2) | | |
| | *Asterina* | 1 | 1 | 1 (1) | | 1(1) | |
| | *Botryodiplodia* | 1 | 3 | 3 (4) | 1 (3) | 1(1) | |
| | *Botryosphaeria* | 1 | 1 | 1 (2) | 1 (1) | | 1 (1) |
| | *Caeoma* | 1 | 1 | 1 (1) | | 1(1) | |
| | *Calonectria* | 1 | 1 | 1 (1) | | | 1 (1) |
| | *Camptomeris* | 1 | 1 | 1 (3) | 1 (1) | | 1 (2) |
| | *Ceratosystis* | 1 | 1 | 1 (2) | 1 (2) | | |
| | *Cercospora* | 18 | 18 | 23 (56) | 11 (36) | 10(11) | 6 (9) |
| | *Colletotrichum* | 1 | 2 | 2 (2) | 1 (1) | | 1 (1) |
| | *Corticium* | 2 | 2 | 2 (2) | | 1(1) | 1 (1) |
| | *Crossopsora* | 1 | 1 | 1 (2) | 1 (2) | | |
| | *Cryphonectria* | 1 | 1 | 1 (1) | | | 1 (1) |
| | *Diaporthe* | 1 | 3 | 3 (5) | 1 (4) | | 1 (1) |
| | *Diatrypella* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Ellisiopsis* | 1 | 1 | 1 (3) | 1 (2) | 1(1) | |
| | *Exosporium* | 1 | 1 | 1 (8) | 1 (4) | 1(2) | 1 (2) |
| | *Fusarium* | 2 | 6 | 9 (28) | 2 (21) | 1(1) | 2 (6) |
| | *Glomerella* | 1 | 6 | 6 (12) | 1 (9) | 1(3) | |
| | *Guignardia* | 1 | 1 | 1 (1) | | | 1 (1) |
| | *Hamaspora* | 1 | 1 | 1 (1) | | 1(1) | |
| | *Hemileia* | 1 | 1 | 1 (3) | 1 (3) | | |
| | *Lophodermium* | 1 | 1 | 3 (6) | 1 (4) | | 1 (2) |
| | *Macrophoma* | 2 | 2 | 2 (2) | 2 (2) | | |
| | *Macrophomina* | 1 | 1 | 4 (4) | 1 (4) | | |
| | *Melampsoridium* | 1 | 1 | 2 (12) | 2 (12) | | |
| | *Meliola* | 2 | 2 | 2 (3) | 1 (1) | 1(1) | 1 (1) |
| | *Mycosphaerella* | 2 | 2 | 2 (6) | 2 (6) | | |
| | *Nectria* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Oidium* | 1 | 4 | 4 (4) | 1 (4) | | |
| | *Olivea* | 1 | 1 | 1 (9) | 1 (7) | 1(2) | |
| | *Ophionectria*** | 1 | 1 | 1 (2) | 1 (2) | | |
| | *Periconia*** | 1 | 1 | 1 (1) | | | 1 (1) |
| | *Pestalotiopsis* | 4 | 4 | 4 (5) | 4 (5) | | |
| | *Phaeoisariopsis* | 2 | 2 | 2 (3) | 2 (3) | | |
| | *Phaeoseptoria* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Phakopsora* | 2 | 2 | 2 (2) | 1 (1) | 1(1) | |
| | *Phyllachora* | 3 | 3 | 4 (12) | 2 (10) | 1(2) | |
| | *Phyllosticta* | 2 | 2 | 2 (2) | 2 (2) | | |
| | *Puccinia* | 1 | 1 | 1 (2) | 1 (2) | | |
| | *Pythium* | 1 | 1 | 1 (1) | | | 1 (1) |

Table 3. (Continued)

| Pathogenic agent | | | Host | | Distribution* | | |
|---|---|---|---|---|---|---|---|
| Group | Genus | Species | Genus | Species | Luzon | Cebu | Mindanao |
| Fungi | *Ravenelia* | 2 | 2 | 2 (3) | 2 (3) | | |
| | *Rhizoctonia* | 1 | 6 | 6 (9) | 1 (5) | 1(1) | 1 (3) |
| | *Robillarda* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Septoria* | 1 | 1 | 3 (10) | 1 (10) | | |
| | *Uredo* | 1 | 1 | 1 (1) | | | 1 (1) |
| | *Valsa* | 1 | 1 | 1 (1) | 1 (1) | | |
| | *Volutella* | 1 | 1 | 1 (1) | | | 1 (1) |
| | Unidentified | (6) | 6 | 6 (6) | (4)(4) | (2)(2) | |
| Alga | *Cephaleuros* | 1 | 2 | 2 (2) | 1 (2) | | |
| Nematode | *Meloidogyne* | 2 | 2 | 2 (3) | 1 (1) | | 1 (2) |
| Mite | *Eriophyes* | 1 | 1 | 1 (1) | | 1(1) | |
| Virus | Unidentified | 1 | 1 | 1 (1) | 1 (1) | | |
| Mistletoe | Unidentified | 1 | 1 | 1 (1) | 1 (1) | | |
| Physiologicl disease | | 1 | 1 | 1 (6) | 1 (1) | | 1 (5) |
| Unidentified | | (6) | 6 | 6 (6) | (1)(1) | (3)(3) | (2)(2) |
| Total | 55 | 87 | 61 | 76 (273) | 65 (192) | 25 (36) | 26 (45) |

Note) * Number of species (Number of specimens) ** Hyperparasite

Table 4. Items of fungal pathogens

| Subdivision | Number of diseases | Pathogen | | Host | |
|---|---|---|---|---|---|
| | | Genus | Species | Genus | Species |
| Mastigomycotina | 1 | 1 | 1 ( 1**) | 1 | 1 |
| Ascomycotina | 30 | 17 | 21 ( 58 ) | 28 | 31 |
| Basidiomycotina | 15 | 12 | 15 ( 39 ) | 15 | 16 |
| Deuteromycotina | 70 | 20 | 44 (148 ) | 59 | 72 |
| Unidentified | 6 | | ( 6 ) | 6 | 6 |
| Total | 122* | 50 | 81 (252) | 55 | 70 |

Note) * Included 2 hyperparasites ** Number of specimens

Table 5. Items of tree diseases

| Kind of disease | | Pathogen | | Host | |
|---|---|---|---|---|---|
| | | Genus | Species | Genus | Species |
| Root (Soil-borne diseases) | 19 | 6 | 8 ( 44*) | 8 | 11 |
| Stem and twig (Canker and dieback diseases) | 19 | 14 | 19 ( 29 ) | 10 | 12 |
| Leaf, needle and fruit (Leaf and needle diseases) | 96 | 36 | 76 (197) | 59 | 72 |
| Total | 134 | 53 | 85 (270) | 61 | 76 |

Note) * Number of specimens

## IV. Notes on tree diseases in the Philippines

### 1. Soil-borne diseases

1) Damping-off and Root-rot

Severe damage due to the pre- and post-emergence damping-off caused mainly by *Rhizoctonia solani* Kühn often occurs in the seed boxes sown with fine seeds of species such as *Eucalyptus* spp., *Casuarina equisetifolia, Psidium guajava,* etc. (KOBAYASHI *et al.* 1982). Usually all of the germinated seedlings disappear in a seed box. Collective attack of damping-off does not occur on transplantings in the pots or on seedlings of medium- to large-sized seeds produced by *Pinus* spp., *Albizia falcataria, Swietenia macrophylla, Leucaena leucocephala, Gmelina arborea, Tectona grandis,* etc., and seeds directly sown in pots, owing to the isolation of each seedling from others .

Marked suppression in the growth of seedlings caused by root rot has often been observed in potted seedlings. *Fusarium oxysporum* SCHLECHTENDAHL and *F. solani* (MARTIUS) SACCARDO are the main pathogens associated with root rot (KOBAYASHI *et al.* 1982). A mistake in water management, such as excess or deficiency of watering, is a predisposing factor to root rot development (Plate 1 : F ; 7 : G).

On the seedbeds directly sown with medium- to large-sized seeds of the species mentioned above, damping-off and root-rot caused by *Fusarium* spp. and *Rhizoctonia solani* occur sporadically during the entire stage before transplanting the seedlings to the field (KOBAYASHI *et al.* 1982).

Table 1 shows the species of seedlings affected by damping-off and root-rot and the organisms isolated from the diseased materials. No species of *Pythium* and *Phytophthora* were obtained from the forest nurseries examined. However, a case of root-rot damage caused by *Pythium* sp. was recorded from a young plantation of *Pinus caribaea* in Mindanao (KOBAYASHI 1978 a). Other causal fungi have been commomly reported from tropical and temperate regions including the Philippines.

In the Philippines there are many records of damping-off damage. In 1926, RAMOS first reported damping-off affecting *Camellia* and *Carica papaya* caused by *Pythium debaryanum* HESSE. Damages due to damping-off, foot-rot and root-rot on *Pinus kesiya* and *P. massoniana* caused by *Rhizoctonia solani, Fusarium oxysporum, F. solani* and *Pythium* sp. were recorded by EUSEBIO and QUIMIO (1977), GALO (1957), MADRID (1934), ROLDAN (1932) and ZAMUCO (1955) and effective control was obtained by pouring six-times-dilution of formalin (40%) or fumigating soil with ethylene dibromide (Dowfune W-85). TAMOLANG (1949) recorded the damping-off of *Casuarina equisetifolia* caused by *Rhizoctonia solani.* Coating seeds of *Leucaena leucocephala* with tetramethylthiuram disulfide (TMTD, Arasan) was reported effective in preventing damping-off (DALMACIO 1976). *Schizolobium excelsum, Aenanthera microsperma, Elaeodendron anfractuosum, Cedrela mexicana,* and *Aleurites moluccane* have also been recorded as hosts in the damping-off fungi *Rhizoctonia solani, Fusarium* spp. and *Pythium debaryanum* in the Philippines (RODRIGO 1955 ; ROLDAN 1939). CLARA (1928 a) reported damping-off-like damage on *Sandoricum koetijape* by *Phytophthora phaseoli* THAXTER. Recently, QUINIONES (1978, 1985) noted root rot in *Leucaena leucocephala* and *Pinus caribaea* seedlings caused by *Fusarium solani.* Attack by that fungus resulted in a wilting symptom in the former host

and yellowing symptom in the latter host.

From the literature read and experience gained during the present study, it appears that coating seeds with TMTD or bis-(dimethylthiocarbamoyl) sulfide (Thiuram) before seeding is necessary to prevent pre- and post-emergence rot in seed boxes. After germination, pouring Thiuram or N-(trichloromethylthio)-4-cyclohexene-1, 2-dicarboximide (Captan) over the young seedlings is effective against damping-off. Pentachloronitrobenzen (PCNB) is quite effective in suppressing the spread of *Rhizoctonia,* while hydroxyisoxazol (Tachigaren) is effective against *Fusarium.*

2) Charcoal rot, Black root rot

The symptoms of seedlings infected with the charcoal rot fungus, *Macrophomina phaseolina* (TASSI) GOID., are quite similar to those of *Rhizoctonia solani* and *Fusarium* spp. (KOBAYASHI 1978 a). However, damage by the former can be easily diagnosed because of the formation of minute black sclerotia under the bark of diseased seedlings. In forest nurseries in the Philippines, *Pinus* spp. are the most susceptible hosts (Table 1).

This soil-borne disease is widely known throughout tropical and subtropical regions. In the Philippines, however, no record of charcoal rot damage has hitherto been found in woody plants, though the causal fungus has been recorded in agricultural crops under the name *Macrophomina philippinensis* PETRAK (1923; TEODORO 1937). The same chemicals used to control damping-off seem to be effective in suppressing this disease as well.

3) Southern sclerotium blight

The causal fungus, *Corticium rolfsii* CURZI, is a cosmopolitan and harmful soil-borne pathogen throughout tropical and subtropical regions. Serious damage to *Swietenia macrophylla* seedlings was observed in a forest nursery in Cebu (Plate 1 : D ; 7 : A). The occurrence of this disease is easily detected bacause of the production of numerous shiny brown sclerotia on the base of the stem of diseased seedlings and on the surface of soil surrounding diseased seedlings. Since the spread of this disease is quite rapid, it is necessary to detect it immediately and suppress the spread as early as possible through chemical treatments.

In the Philippines, MEJIA (1953) recorded damage from *Corticuim rolfsii* to *Sindora supa* and he confirmed through inoculation experiment that *Barringtonia asiatica, Berrya cordifolia, Cananga odorata, Cassia fistula, Casuarina equisetifolia, Pterocarpus indicus, Spathodea campanulata, Swietenia macrophylla, Terminalia catappa* and *Vitex parviflora* are all quite susceptible to this disease. Recently, damage to *Swietenia macrophylla* seedlings caused by aforementioned fungus was recorded by several forest nurseries in Luzon and Cebu (GUZMAN & EUSEBIO 1975). Judging from their descriptions and photographs, the disease affecting *Swietenia macrophylla* which was recorded by ROLDAN (1941) is thought to be the same as that observed by the authors. Similar reports came from Taiwan and Sri Lanka (BROWNE 1968 ; CHEN 1967). In forest nurseries, a dosage of PCNB seems to be effective in suppressing the spread of this disease.

4) Root-knot nematode disease

Severe damage caused by the root-knot nematode, *Meloidogyne incognita* (KOFOID et WHITE) CHITWOOD, was observed in young plantations of *Paulownia taiwaniana* in Mindanao (Plate 9 : C). Almost all of the roots were heavily infested with the root-knot nematode and hence, the growth of young trees was suppressed largely because of the formation of numerous galls on their roots. Root-cuttings taken from the diseased trees

did not sprout or they developed weak shoots which gradually died. It seems that the source of the nematode is the infested root residues of maize, *Zea mays,* which has been recognized as a common host of the root-knot nematode. Before *Paulownia* was planted, the plantation was cultivated with maize, a fact which helps to confirm the assumption that the source of the nematode is its infested root residues (KOBAYASHI & GUZMAN 1986 d).

In the Philippines, CATIBOG (1977) investigated plant parasitic nematodes in a forest nursery in Laguna, Luzon. Roots of *Albizia falcataria* and *Leucaena leucocephala* were found to be infested with distinct root-knots caused by *Meloidogyne* sp. Galls of a root-knot nematode were also observed on seedlings of *Psidium guajava* in Nueva Viscaya, Luzon (KOBAYASHI *et al.* 1982).

**2. Rust**

1) Teak rust

A rust disease caused by *Olivea tectonae* (T.S. et K. RAMAKR.) MULDER was widely observed on *Tectona grandis* in Luzon and Cebu (Plate 1 : E ; 12 : F). This disease produces severe losses of young seedlings, a little damage in seedlings more then 2 months old, and none on adult trees. The fungus may have been introduced through seeds containing many minute fragments of rust-infested leaves. The fungus can also be disseminated through diseased leaves which are used as packing materials for seedlings during transportation. At this time no record of the rust has hitherto been found in the Philippines (KOBAYASHI 1977 a, 1978 b, 1986 ; KOBAYASHI *et al.* 1982).

2) Coffee rust

Coffee rust caused by *Hemileia vastatrix* BERK. et BR., the famous enemy of coffee which is cultivated worldwide, also causes severe damage in the Philippines where it has been recorded on *Coffea arabica, C. canephora, C. excelsa* and *C. robusta* since 1890 (HENNINGS 1908 ; TEODORO 1937 ; WATANABE 1977 ; WELMAN 1972). Its epidemic potential increases as the acreage of coffee cultivation increases from small to large plantations. Numerous uredosori are produced on the lower leaf surface with yellow circular spots (Plate 8 : D). Diseased leaves defoliate successively and severely affected trees usually lose almost all of their leaves (KOBAYASHI 1977 a, 1978 b). Besides the Philippines, the rust fungus is also prevalent in Brunei, Burma, China, India, Indonesia, Malaysia, Sri Lanka and Taiwan (Anonymous 1970 ; BILGRAMI *et al.* 1979 ; PEREGRINE & AHMAD 1982 ; PETCH 1922 ; RAGUNATHAM 1923 ; RHIND 1924 ; SAWADA 1922 ; SINGH 1980 ; TAI 1979 ; THOMPSON & JOHNSTON 1953 ; van HALL 1921 ; WELLMAN 1972 ; WILLIAMS & LIU 1976).

3) Alder and mulberry rust

These rust diseases affect young seedlings of alder and mulberry trees which had been introduced for erosion or landslide control in the highland areas of Luzon. *Melampsoridium hiratsukanum* ITO ex HIRATSUKA attacks the leaves of 2 out of the 3 introduced species of alder, *Alnus japonica and* and *A. maritima* (KOBAYASHI 1977 a, 1978 b ; KOBAYASHI *et al.* 1982). Because they remains evergreen in the Philippines, the fungus can be disseminated from one tree to another by uredospores throughout the year without an alternate host.

*Aecidium mori* BARCLAY affects *Morus alba* and infects seriously its leaves and young green shoots (KOBAYASHI 1977 a ; KOBAYASHI *et al.* 1982) (Plate 2 : A). Numerous aecia bursting yellowish orange powdery masses of aeciospores are produced on the diseased leaves, petioles and green stems. These two rust fungi may have originated from foreign countries because there are no previous report on these fungi from the Philippines.

4) Other rusts

Sporadic outbreaks of three rusts, *Revenelia berkeleyi* MUND. et THIRUM. on *Cassia multijuga* (Plate 12 : A), *Revenelia* sp. on *Albizia procera* (Plate 12 : B) and *Phakopsora gossypii* (ARTHUR) HIRATSUKA on *Gossypium* sp. (Plate 11 : A), were observed during the survey. No economic damage has been recorded for the other remaining seven rusts given in Table 1. Among these rusts, only *Phakopsora fici-erectae* ITO et OTANI (Plate 10 : G) has hitherto been recorded from the Philippines (HENNINGS 1908 ; ITO & MURAYAMA 1949 ; SYDOW & PETRAK 1928).

Application of Manganese ethylenebisdithiocarbamate (Maneb) or 1-(4-chlorophenoxy)-3, 3-dimethyl-1-(1, 2, 4-triazol-1-yl)-2-butanone (Triadimefon) is effective in preventing the outbreak of teak and coffee rusts in forest nurseries and young plantations.

**3. Powdery mildew**

In certain forest nurseries in Luzon and Mindanao marked occurrences of powdery mildew were observed on the seedlings of *Acacia mangium, Eucalyptus citriodora, Samanea saman* and *Tamarindus indica* (KOBAYASHI 1977 a, 1986) (Plate 9 : F). Diseased seedlings were covered with white powdery colonies of the causal fungus and their growth was significantly retarded. Since these fungi produce well developed *Oidium* stage and have no perithecial stage, their complete identification can not be made. Only two species of Erysiphales have thus far been identified in the Philippines (TEODORO 1937).

Application of 2, 4-dinitro-6-octylphenyl crotonate (DPC), Meneb or Triadimefon after seedlings have been potted is effective in preventing the outbreak of powdery mildew in forest nurseries.

**4. Sooty mold**

Four of seven sooty molds collected in this survey were identified ; namely *Meliola clerodendricola* var. *micromera* (SPEG.) HANSF. on *Gmelina arborea* (Plate 9 : A), *M. koae* STEV. on *Acacia auriculiformis* (Plate 9 : B), *Asterina punctiformis* LÉV. on *Aleurites trisperma* (Plate 2 : D) and *Antennellopsis vulgaris* (YAMAMOTO) BATISTA et CIF. on *Mangifera indica* (Plate 2 : B), (HANSFORD 1961 ; KATUMOTO 1985 ; KOBAYASHI & GUZMAN 1986 c ; THEISSEN 1913). The remaining three did not develop into their perithecial stage and could not be identified (Plate 12 : G). No severe damage was observed on the host plants during the present survey.

**5. Anthracnose**

1) Anthracnose caused by *Glomerella cingulata* (= *Colletotrichum gloeosporioides*)

Occurrences of the present anthracnose were observed on many woody plants during the survey (Table 1). It was most destructive to mango, *Mangifera indica,* as has already been reported (Anonymous 1978 ; CLARA 1927 ; PALO 1932). Mango seedlings are often abandoned because of serious attacks which kill their shoots and young leaves. On mature leaves many shot holes are formed, but the diseased leaves never die (Plate 8 : A). On severely affected trees, almost all of the young shoots may die and their fruits may also be heavily infected by the fungus. Black dotted fruits completely lose their commercial value.

The fungus causes the top-wilt of young seedlings of the giant ipil-ipil, *Leucaena leucocephala.* Pinkish conidial masses are produced on the wilted parts of the seedlings together with pale pinkish fruitings of *Fusarium solani* (MART.) SACC. Numerous small brown spots are commonly observed on leaves of *Hydrangea macrophylla,* an introduced ornamental flowering bush, in Luzon and Cebu (Plate 7 : H). Under humid conditions,

small pinkish and sticky conidial masses of the fungus are often observed on the spots.

In the Philippines, anthracnose caused by *Colletotrichum gloeosporioides* PENZIG had hitherto been recorded on many herbaceous and woody plants and its causal fungus had been reported under various species names (ARX 1957; TEODORO 1937). Some species of *Agave, Albizia, Alchornea, Aleurites, Alstonia, Areca, Carica, Citrus, Euphorbia, Hevea, Manihot, Pandanus* and *Sesbania* had hitherto been reported as hosts to the fungus in the Philippines (LEE 1921; REINKING 1918; SACCARDO 1914; SYDOW 1913 a, b, 1914 a; TEODORO 1937).

The perfect stage of the anthracnose fungus, *Glomerella cingulata* (STON.) SPAULD. et SCHRENK, was found on the blighted needles of *Pinus caribaea* together with the conidial stage. This represents the first record of the *Glomerella* stage in the Philippines.

2) Anthracnose caused by *Colletotrichum truncatum*

Anthracnose caused serious damage on to the young seedlings of *Leucaena leucocephala* in Midanao (KOBAYASHI & ZINNO 1983, 1984). Leaflets, petioles and green shoots of the seedlings were attacked, causing them to wilt and gradually disappear (Plate 6 : E). Numerous fruit bodies consisting of black hair-like setae with white sticky conidial masses were produced on dead petioles and green shoots. Damage was very slight to seedlings which were more than 3 month old. Seedlings of the nárra, *Pterocarpus indicus,* were also susceptible to the fungus, though its damage characterized by the production of brown leaf spots (Plate 6 : F) was quite slight (KOBAYASHI & ZINNO 1983, 1984).

The fungus, *Colletotrichum truncatum* (SCHW.) ANDRUS et MOORE, is well known as a harmful pathogen to leguminous plants in the world (ANDRUS & MOORE 1935; ARX 1957; ITO & KOBAYASHI 1958; TIFFANY & GILMAN 1954).

Copper fungicides such as Bordeaux mixture and basic copper chloride, organic sulphur fungicides such as zinc ethylenebisdi-thiocarbamate (Zineb) and methyl 1-(buthylcarbamoil)-2-benzo-imidazolcarbamate (Benomyl), and N-tetrachloroethylthio-tetra-hydrophthalimide (Difoltan) can be applied to prevent anthracnose diseases in forest nurseries.

**6. Needle blight**

1) Pine needle blight

Needle blight of pines is one of the most important diseases throughout the tropical and subtropical regions (ITO 1972; KOBAYASHI *et al.* 1979; MULDER & GIBSON 1972). *Pinus radiata* and *P. caribaea* are highly susceptible to needle blight. The causal fungus, *Cercospora pini-densiflorae* HORI et NAMBU, which has been renamed *Cercoseptoria pini-densiflorae* (HORI et NAMBU) DEIGHTON (1976), seems to be a tropical species, though it can cause the same disease in temperate zones. Recently, EVANS (1984) found the perfect stage of the needle blight fungus from Africa (Kenya, Tanzania, Zimbabwe) and Asia (Hong kong, Philippines, Vietnam) on *Pinus caribaea, P. massoniana, P. merkusii* and *P. radiata,* and he described it as a new species, *Mycosphaerella gibsonii* EVANS.

In the Philippines, occurrences of the disease were recorded on two native pines, *Pinus kesiya* and *P. merkusii,* and on two introduced pines, *P. caribaea* and *P. oocarpa* (KOBAYASHI *et al.* 1979). On *Pinus kesiya,* needle blight was commonly observed on seedlings in forest nurseries of Luzon and Mindanao (Plate 1 : B ; 5 : D), but none in plantations and natural forests. The host species seems to be resistant as it ages. Young seedlings of *Pinus merkusii* were heavily infected by needle blight in natural forests. Most

seedlings were killed by the disease, but some survived and grew healthily. Seedlings of the two introduced pines listed above have also been found to be affected with needle blight. Seedlings and outplanted young trees of *Pinus caribaea* were also heavily attacked by the needle blight fungus, and often, young plantations are abandoned because of the successive death of the seedlings.

Spraying Maneb or Bordeaux mixture was effective in suppressing the outbreak of pine needle blight in forest nurseries.

2) Other needle blight diseases

In a forest nursery in Baguio, a serious needle blight of *Taxodium mucronatum* was observed (Plate 6 : B) and its causal fungus was identified as *Cercospora sequoiae* ELL. et EV. (KOBAYASHI 1980 b, c). From information supplied by the nurseryman it seems that the diseased seedlings were introduced from the United States about one year before. Thus, the causal fungus was really introduced with its host.

On *Araucaria heterophylla,* a needle blight caused by *Phyllosticta brasiliensis* LIDER (1943) was recently found, but its damage seems to be slight (Plate 11 : E).

**7. Leaf spot**

1) Leaf spot disease caused by the genus *Cercospora*

Leaf spot disease caused by various species of *Cercospora* were observed on 19 host species belonging to 17 genera during the present survey (Table 1). Among them, two were recognized as new species and will be described in the next chapter as *Cercospora alstoniae* on *Alstonia macrophylla* (Plate 3 : E ; Fig. 7) and *C. philippinensis* on *Mussaenda philippica* (Plate 5 : C ; Fig. 16). Eleven species were newly recorded in the Philippines. They are : *Cercospora eucalypti* CKE. et MASS. on *Eucalyptus deglupta* (Plate 4 : A), *C. gardeniae* BOEDIJN on *Gardenia philastrei* (Plate 9 : D), *C. gmelinae* YEN et GILLES on *Gmelina arborea* (Plate 4 : C), *C. kurimaensis* FUKUI on *Nerium oleander* (Plate 4 : E), *C. lawsoniae-albae* THIRUM. et GOV. on *Lawsonia inermis* (Plate 4 : F), *C. lythracearum* HEALD et WOLF on *Lagerstroemia speciosa* (Plate 5 : A), *C. paulowniae* HORI apud NAMBU on *Paulownia taiwaniana* (Plate 5 : B), *C. plumeriae* CHUPP on *Plumeria alba* and *P. rubra* (Plate 5 : E), *C. pterocarpicola* YEN on *Pterocarpus indicus* (Plate 5 : F), *C. purpurea* CKE. on *Persea americana* (Plate 6 : A) and *C. viticis* ELL. et EV on *Vitex parviflora* (Plate 6 : C) (KOBAYASHI 1979, 1980 a, 1981 ; KOBAYASHI & GUZMAN 1985, 1986 b).

*Cercospora eucalypti* and *C. gmelinae,* which cause a brown leaf spot disease on their respective hosts, can produce severe early defoliatiom in plantations. Growth of *Pterocarpus indicus* seedlings is severely retarded when they are seriously attacked by the brown leaf spot fungus, *Cercospora pterocarpicola. Lagerstroemia speciosa* and *Lawsonia inermis,* which are used as ornamental trees, often lost almost all of their leaves when attacked by *Cercospora lythracearum* and *C. lawsoniae-albae,* respectively.

Three of four remaining Cercosporae, namely *C. artocarpi* SYDOW on *Artocarpus blancoi* (Plate 3 : F), *C. bauhiniae* SYDOW on *Piliostigma malavaricum* var. *acidum* (Plate 9 : E) and *C. gliricidiae* SYDOW on *Gliricidia sepium* (Plate 4 : B), were originally observed in the Philippines (SYDOW 1913 a, 1914 c). The brown leaf spot of cassava *(Manihot esculenta)* (Plate 4 : D) and ceara rubber (*M. glaziovii*) caused by *Cercospora henningsii* ALL., which was recently renamed *Cercosporidium henningsii* (ALL.) DEIGHTON (ELLIS 1976), produces severe leaf blight and early defoliation (BAKER 1914 a ; SYDOW 1917 ; TEODORO 1937). This is one of the most important diseases of the species which is a major

source of starch throughout tropical and subtropical regions (Anonymous 1983 a).

The same chemicals used for the control of pine needle blight are also used to control leaf spot diseases caused by *Cercospora* in forest nurseries.

2) Tar spot caused by *Phyllachora* spp.

Tar spot of *Pterocarpus indicus* caused by *Phyllachora pterocarpi* H. et P. SYDOW is widespread in the Philippines not only in seedlings but also in adult trees. (Plate 11 : C). It has been recorded in Luzon, Cebu, Mindanao and Palawan (KOBAYASHI 1979 ; SYDOW 1914 a ; TEODORO 1937). Since the diseased leaflets remain attached for a long time, no suppression was observed in the growth of seedlings or planted trees. This disease often occurs together with the brown leaf spot disease caused by *Cercospora pterocarpicola.* In the event that the two diseases occur together, the affected leaves defoliate earlier.

The fungus causing tar spot on *Parkia roxburgii* was originally described as *Phyllachora parkiae* HENNINGS from Luzon, Philippines (HENNINGS 1908 ; TEODORO 1937). Diseased leaves become yellowish and gradually defoliate (KOBAYASHI 1979) (Plate 11 : B).

Frequent occurrences of tar spot disease were observed on *Ficus odorata* (Plate 11 : D) and *F.* sp. in Cebu. Many black shiny stroma with a yellowish halo on leaves were observed. The infected leaves remained attached to their branches for a long time. The causal fungus was identified as *Phyllachora spinifera* (KARST. et HAR.) HÖHN. ex REHM (1913). It has been previously collected from Luzon, Mindanao, Samar and Balut Island on certain species of *Ficus* including *F. odorata* (HENNINGS 1908 ; REHM 1913 b ; TEODORO 1937 ; YATES 1917).

3) Algal leaf spot

Many woody plants in the natural forest and some ornamental trees were affected with the algal leaf spot organism *Cephaleuros virescens* KUNZE. Colonies of algae grow well on leaves under dark and humid conditions and arrest photosynthesis of the host plants. Dry and light conditions surrounding host trees are unsuitable for the active growth of the algal colonies. *Swietenia macrophylla* (Plate 3 : D) and *Chrysophyllum cainito* were heavily attacked by the alga in Luzon.

4) Pestalotia disease

Leaf spot diseases caused by *Pestalotia* spp. were observed on *Psidium guajava* (Plate 10 : C), *Calliandra haematocephala* (Plate 10 : D), *Anacardium occidentale* (Plate 10 : B) and *Pinus kesiya* (KOBAYASHI & GUZMAN 1986 c). Their damage were relatively slight. The associated fungi were respectively identified as *Pestalotia heucherae* TEHON et DANIELS (1927), *P. langloisii* GUBA (1961), *Pestalotiopsis adusta* (ELL. et EV.) STEY. (1953 ; GUBA 1961) and *P. disseminata* (THÜM.) STEY. (1949 ; GUBA 1961). The genus of the former two species will be revised to *Pestalotiopsis* and will be treated later.

5) Other leaf spot diseases

Among 12 miscellaneous leaf spot diseases observed on 15 tree species, the causal agent of four of them has not been determined. Three leaf spot diseases were recorded as new to the Philippines, and the causal fungus of the other 4 leaf spot diseases were described as new species.

The yellow leaf disease of *Albizia falcataria* (Plate 1 : A ; 2 : C) and *Leucaena leucocephala* (Plate 7 : F) occurred conspicuosly and seriously in the nurseries (KOBAYASHI 1978 d ; KOBAYASHI *et al.* 1982). Yellowing of the seedlings was distinctly observed from a distance and the growth of the infected young seedlings was significantly suppressed. No

significant reduction in growth was observed on seedlings more than 1 year-old. The respective causal fungi were identified as *Exosporium albizziae* KOBAYASHI (1978 d) and *E. leucaenae* STEV. et DALBEY (1919 ; KOBAYASHI 1978 d). The former will be revised to *Camptomeris albizziae* (PETCH) MASON. This fungus has also been recorded in the Philippines as *Helminthosporium albizziae* PETCH (TEODORO 1937).

Gray leaf spot disease of *Mangifera indica* (Plate 8 : F) and *Gmelina arborea* (Plate 8 : B) were caused respectively by *Macrophoma luzonensis* KOBAYASHI (1981) and *Phyllosticta gmelinae* KOBAYASHI (1980 a, = *Guignardia gmelinae* KOBAYASHI). They caused relatively slight damage.

The brown leaf spot of *Alnus japonica, A. maritima* and *A. nepalensis,* was commonly observed in forest nurseries and plantations throughout the highland areas of Luzon (KOBAYASHI 1977 a, 1978 b). The growth of young seedlings was significantly suppressed by the disease. In plantations, the fungus did not reduce the growth of planted trees. The causal fungus, *Septoria alni* SACC., may have been introduced with its host plants. The brown leaf spot of *Anthocephalus chinensis* was found in a forest nursery in Laguna, Luzon (Plate 10 : E). The disease affected all the seedlings, but no significant reduction on the growth of seedlings was observed. The causal fungus was described as a new species, *Phaeoisariopsis anthocephala* KOBAYASHI (1978 d).

The black powdery spot of *Eucalyptus* sp. (Plate 10 : F) caused severe defoliation of young trees planted for ornamental purpose. The causal fungus was first described as a new species *Phaeoseptoria luzonensis* KOBAYASHI (1978 d), but it will be revised to *P. eucalypti* HANSF. based on the emended concept of the species by WALKER (1962). A black powdery spot disease of *Carica papaya* (Plate 2 : C) is caused by *Asperisporium caricae* (SPEG.) MAUBLANC (ELLIS 1971). Many black powdery masses of conidia are produced on the lower leaf surface of the diseased leaves which gradually defoliate. Fruits of the heavily diseased trees do not ripen naturally and fall off prematurely. The diseased trees become yellowish and are easily recognized from a distance. These are the new diseases recorded in the Philippines (KOBAYASHI 1978 d ; KOBAYASHI & GUZMAN 1986 d).

**8. Canker and dieback**

1) Pink disease caused by *Corticium salmonicolor*

This is one of the most important canker disease in the tropics. The disease spreads throughout the tropical and subtropical regions and causes severe damage on various useful trees, especially rubber, coffee, cacao, citrus and eucalypt (BROOKS & SHARPLES 1914 ; MORDUE & GIBSON 1976). In the Philippines, it has been reported on *Citrus* spp., *Gliricidia sepium* and *Albizia falcataria* (EUSEBIO *et al.* 1979 ; KOBAYASHI 1978 a ; TEODORO 1937). In Mindanao, many plantations of *Albizia falcataria* are being destroyed by the outbreak of this disease. The bark of stems and branches is affected with lesions becoming brown and spreading rapidly. The upper part of the lesions becomes girdled, causing the shoots to wilt and leaves to yellow. Pinkish mycelial mats and fruit bodies develop on the bark below and above the lesions. In seriously affected plantations, the crown of the infected trees is destroyed and the death of many trees can cause significant reduction in most production.

EUSEBIO and his co-workers (1979, 1980, 1981) studied the pink disease of *Albizia falcataria* in Mindanao and they came to the conclusion that selecting planting sites with good soil conditions is most important in avoiding the disease development. Also, to

recover from the infection, the application of Bordeaux mixture on infected trees was an effective control.

2) *Botryodiplodia* canker caused by *Botryodiplodia theobromae*

This canker disease is also one of the most important diseases in the tropical and subtropical regions. Many woody plants are susceptible and their twigs, branches and stems are often killed by the enlargement of lesions (PUNITHALINGAM 1976, 1980).

Sporadic stem rot damage caused by *Botryodiplodia theobromae* was observed on seedlings of *Swietenia macrophylla* in forest nurseries in Luzon and Cebu (KOBAYASHI 1981; KOBAYASHI *et al.* 1982) and stem canker was observed on young trees of *Albizia-falcataria* in the campus of University of the Philippines at Los Baños (Plate 2 : E).

Recently, a serious occurrence of canker disease was noticed in a young plantation of *Acacia mangium* in Nueva Ecija, Luzon (Plate 2 : F). Dark brown to reddish brown lesions usually start from the cracks around the basal part of branches and they soon girdle the stem or branch. On the lesions fruiting bodies of *Botryodiplodia theobromae* were found, but the pathogenicity of the fungus has not been confirmed.

3) *Phomopsis* canker caused by *Diaporthe eres*

In 1983, a serious canker disease occurred suddenly in young plantations of *Acacia auriculiformis* in Nueva Ecija, Luzon. Elongate lesions developed on the bark of the basal part of twigs or branches. Many pycnidial pustules were produced on the bark of longitudinally sunken lesions. The wood beneath the lesions had grayish blue discoloration and was surrounded by black zones, isolating the stained wood from the healthy whitish wood. The perfect stage of the fungus was produced within the diseased bark kept in moist chamber for 3 to 4 months. The fungus was identified as *Diaporthe eres* NIT. based on the morphological characteristics of its perithecial and pycnidial stages. In the Philippines this disease has not been reported.

Because the disease did not occur before 1982 and after 1984, it is assumed that the fungus needs certain predisposing factors to develop the canker disease. The occurrence of half of the amount of rainfall in the rainy season following a long dry season in 1983 may have acted as the predisposing factor for the development of the present canker disease (KOBAYASHI & GUZMAN 1986 a, d).

## V. Enumeration and description of the pathogens parasitic to woody plants in the Philippines

1. ***Aecidium mori*** BARCLAY, J. Asiat. Soc. Bengal 60, Pt. II, 225, 1891. — Plate 2 : A

On living leaves and green shoots of *Morus alba* L. (mulberry, kuwa) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by T. KOBAYASHI (TK) and E.D. de GUZMAN (DG) (TFM : FPH-4958).

Note : The fungus is widely distributed throughout the world. In Asia, it has been recorded on *Morus alba, M. bombycis, M. catayana, M. indica, M. kagayamae* and *M. mongolica* in Burma, China, India, Indonesia, Japan, Korea, the Philippines, Taiwan and Thailand (Anonymous 1970, 1972, 1975; BILGRAMI *et al.* 1979; FISCHER 1937; GIATGONGS 1980; RHIND 1924; SYDOW 1917; TAI 1979; TEODORO 1937).

2. ***Antennellopsis vulgaris*** (YAMAMOTO) BATISTA et CIFERRI, Saccardoa 2 : 66, 1963; KATUMOTO, Trans. Mycol. Soc. Japan 26 : 285, 1985. — Plate 2 : B

Synonym : *Chaetoscorias vulgaris* YAMAMOTO, Ann. Phytopathol. Soc. Japan 19 : 3,

1954 (as *C. vulgare*).

*Antennellopsis vulgaris* (YAMAMOTO) ARX et MÜLLER, Studies in Mycology 9 : 114, 1975.

Anamorph : *Podoxyphium sancheziae* BAT et CIF., Quaderno 31 : 171, 1963.

On living leaves of *Mangifera indica* L. (mango) — Saddle Dam Central Nursery, NIA, Pantabangan, Nueva Ecija, Luzon, February 7, 1985, by TK & DG (TFM : FPH-6012).

Note : The fungus which causes the sooty mold disease of mango, *Mangifera indica*, was identified as *Antennellopsis vulgaris* (YAMAMOTO) BAT. et CIF. (KATUMOTO 1985). At first, many small, black mycelial colonies develop on the upper leaf surface, which later become large and felty. Although the diseased seedlings show a quite dirty appearance, the damage is not so severe.

About 22 species of sooty molds belonging to 17 genera and 5 undetermined species have hitherto been recorded on mangoes. Anong them 3 species of *Antennellopsis* parasitic to mangoes are included, namely *A. elegans* BAT. et CIF., *A. formosa* BAT. et CIF. and *A. mangiferae* MENDOZA (BATISTA & CIFERRI 1963). The last species has been recognized in the Philippines on *Cocos nucifera*. They are distinguishable from the present sooty mold fungus by their smaller ascospores and number of setae around the pseudothecial ostiole. The morphological characters of the present fungus were identical with those of *Antennellopsis vulgaris* (YAMAMOTO) BAT. et CIF. which has been reported only from Taiwan (KATUMOTO 1985 ; KOBAYASHI & GUZMAN 1986 c).

In the Philippines, *Meliola mangiferae* EARLE (SACCARDO 1913) is the other sooty mold fungus which has been reported attacking mangoes in Luzon and Mindanao (BAKER 1914 b ; HANSFORD 1961 ; YATES 1918).

3. ***Asperisporium caricae*** (SPEGAZZINI) MAUBLANC, Lavoura 16 : 212, 1913.—Plate 2 : C ; Fig. 2

Synonyms : *Cercospora caricae* SPEG., Guar. I : 168, 1886.

*Fusicladium caricae* (SPEG.) SACC., Atti. Congr. bot. Palermo, p. 58, 1902.

*Scolecotrichum caricae* ELLIS et EVERH., J. Mycol. 7 : 134, 1892.

*Epicladium cumminsii* MASSEE, Kew Bull. (1898) p. 133, 1898.

*Pucciniopsis caricae* EARLE, Bull. N. Y. Bot. Gord. (1902) : 840, 1902.

Small yellow spots on the upper leaf surface, forming powdery sporodochia and becoming brownish in the later stage ; sporodochia dark brown to blackish, 32–100$\mu$m in diam., composed of compact thick-walled cells and dense fasciculate conidiophores ; conidiophores greenish brown to olive brown, simple, straight or flexuous, smooth, having prominent conidial scars, 22–23 × 5.5–7$\mu$m ; conidia terminal, sympodial, polyblastic, elliptic, rounded at the top, truncate at the basal end, at first hyaline and unicellular, then greenish brown to brown and 1-septated, 15–21.5 × 7–10$\mu$m, with rough warts.

On living leaves of *Carica papaya* L. (papaw, papaya) — Debt Forest Nursery, Parcel III of RP-J : FDP, Conversion, Pantabangan, Nueva Ecija, Luzon, January 22, 1985, by TK (TFM : FPH-5863) ; Camanggahan Forest Nursery, NIA, Carranglan, Nueva Ecija, Luzon, February 6, 1985, by TK & DG (TFM : FPH-5864).

Note : The fungus causes the black powdery spot disease of papaya. This is the first record of the fungus not only from the Philippines but also from Asia. The fungus was first described in Brazil under the name of *Cercospora caricae* SPEG. (SACCARDO 1892). At present, it is distributed throughout the Americas, namely the United States, Bermuda,

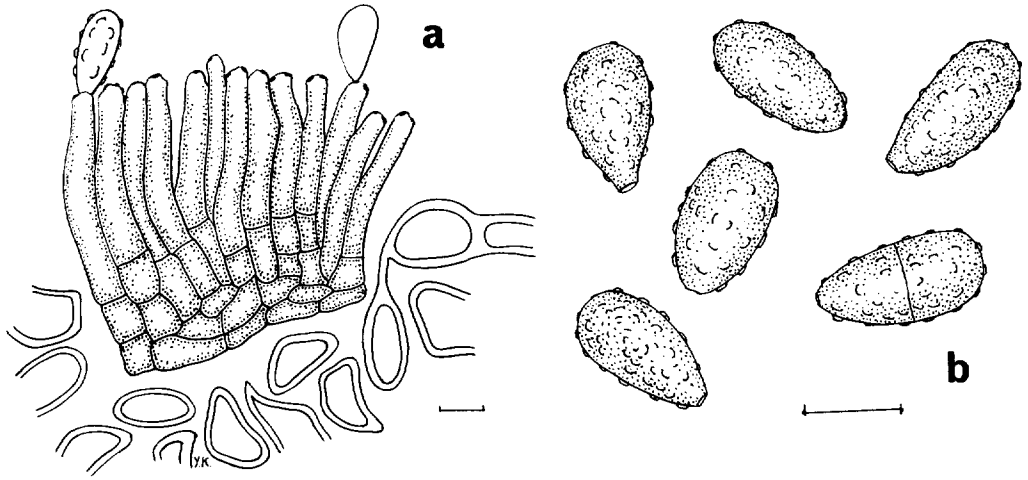


Fig. 2. *Asperisporium caricae* (SPEG.) MAUBL.
Note) a : Sporodochium, b : Conidia (⌙ : 10 μm)

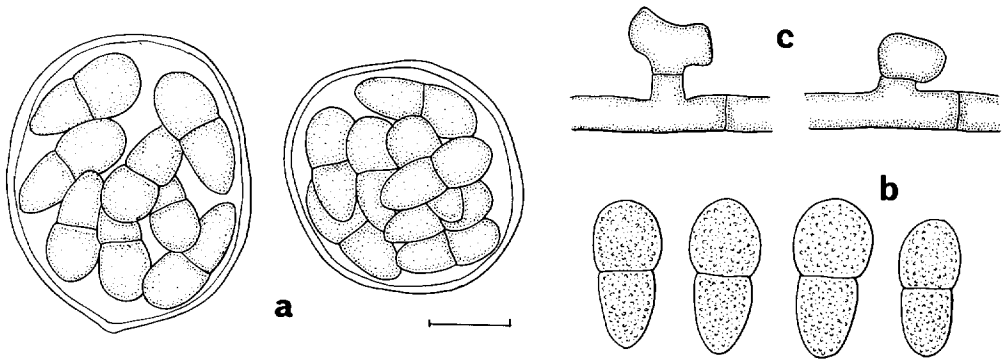


Fig. 3. *Asterina punctiformis* LÉV
Note) a : Asci, b : Ascospores, c : Hyphopodia (⌙ : 10 μm)

Cuba, Costa Rica, Dominica, Jamaica, Panama, Brazil, Colombia, Paraguay and Venezuela (CIFERRI 1961 ; DENNIS 1970 ; ELLIS 1971 ; ELLIS & HOLLIDAY 1972 ; SACCARDO 1985, 1906 ; STEVENS 1927 ; UPHOF 1925). Recently, it was recorded from the Solomon Islands (MCKENZIE & JACKSON 1986).

4. ***Asterina punctiformis*** LÉVEILLÉ, Ann. Soc. Nat. Bot., 3 ser., 4 : 267, 1846 ; KATUMOTO, Trans. Mycol. Soc. Japan 16 : 287, 1985. — Plate 2 : D ; Fig. 3

On living leaves of *Aleurites trisperma* Blanco (bagilumbáng, Philippine-aburagiri) — Plantation of Osmeña Ref. Proj., Camp 7, Minglanilla, Cebu, February 14, 1985, by TK (TFM : FPH-6019).

Note : The fungus causes the sooty mold disease of bagilumbáng, *Aleurites trisperma*. Many small black colonies of the fungus appear on the upper leaf surface and finally cover the whole leaf. The dimension of the asci and ascospores were 35–43$\mu$m in diam. and 20–22.5 × 10–11.5$\mu$m respectively and were accordance with those reported by KATUMOTO (1985) who examined the same material in detail. Among the many species of *Asterina* which have been recorded on Euphorbiaceae plants, the present fungus was identified as *Asterina punctiformis* LÉV. as its morphological aspects were well coincided with the latter (KATUMOTO 1985). Only an undetermined species of *Asteridiella*, causing the sooty mold disease, has hitherto been know on *Aleurites triloba* from Malaysia(JOHNSTON 1960 ; SINGH 1980). This is the first record of the fungus in the Philippines and *Aleurites trisperma* is a new host for the fungus (KATUMOTO 1985 ; KOBAYASHI & GUZMAN 1986 c).

5. ***Botryodiplodia theobromae*** PATOUILLARD, Bull. Soc. Mycol. France 8 : 136, 1982 ; KOBAYASHI, Trans. Mycol. Soc. Japan 22 : 307, 1981. — Plate 2 : E, F ; Fig. 4

On cankered stems and branches of *Acacia mangium* WILLD. — Camanggahan Forest Nursery, NIA, Carranglan, Nueva Ecija, Luzon, February 5, 1985, by TK and DG (TFM : FPH-5999) ; on cankered stem of *Albizia falcataria* (L.) FOSBERG (moluccan sau) — Campus of UPLB-Coll. Agr., Laguna, Luzon, March 3, 1977, by TK (TFM : FPH-5051) ; on stems of seedlings of *Swietenia macrophylla* KING (big-leaf mahogany, oba-

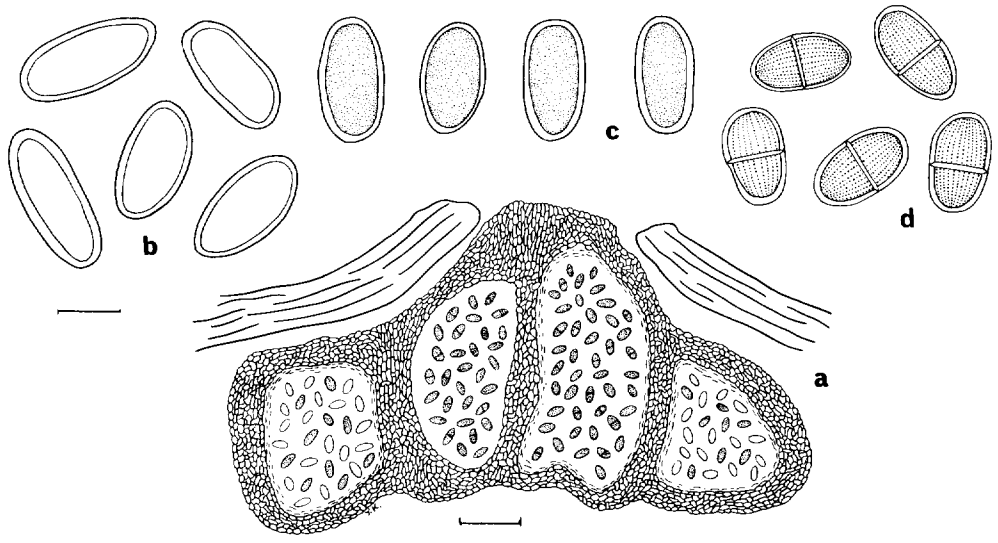


Fig. 4. *Botryodiplodia theobromae* PAT.

Note) a : Pycnidial stroma, b : Immatured hyaline conidia, c : Brown conidia, d : Matured 2-celled conidida (⌙ : a = 100 $\mu$m ; b-d = 10$\mu$m)

mahogani) — Alipang Forest Nursery, BFD, Alipang, La Union, Luzon, February 24, 1977, by TK and DG (TFM : FPH-4949, 5094) ; Forest Nursery of Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK and DG.

Note : The fungus was previously reported as the agent causing the stem rot of mahogany seedlings (KOBAYASHI 1981). Similar types of damage were also recorded on *Syzygium* from Indonesia (TRIHARSO *et al.* 1975). Morphological characteristics of pycnidia produced by the fungus on the canker lesions on *Acacia mangium* and *Albizia falcataria* were identical with those of *Botryodiplodia theobromae* PAT. noted by PUNITHALINGAM (1976, 1980). Typical brown 2-celled conidia measuring 22-28 × 11-14$\mu$m. This is the first record of the fungus attacking *Acacia* and *Albizia* in the Philippines, though it has been recorded on *Anona, Hevea, Ipomaea, Manihot* and *Theobroma* in this country (Anonymous 1926, TEODORO 1937). The canker disease caused by the present fungus has been know on *Acacia decurrens, A. falnesiana, A. mollissima, Albizia falcataria, A. moluccana* and *A. sumatrana* from India, Indonesia, Israel, South Africa and Uganda (Anonymous 1937 ; BILGRAMI *et al.* 1979 ; D'ANGREMOND 1940, 1948 ; MINZ & BEN-MEIR 1944 ; SMALL 1922 ; STEINMANN 1928 ; STEPHENS & GOLDSCHMIDT 1939 ; VENKATARAM 1960).

**6. *Botryosphaeria dothidea*** (MOUGEOT ex FRIES) CESATI et de NOTARIS, Schema sfer. : 212, 1863.

Synonyms : *Physalospora paulowniae* ITO et KOBAYASHI, Bull. Gov. For. Exp. Sta. 49 : 79, 1951.

*Guignardia paulowniae* (ITO et KOBAYASHI) YAMAMOTO et ITO, Sci. Rept. Hyogo Univ. Agr., Agr. Biol. 5 (1) : 11, 1961.

*Dothiorella paulowniae* FRAGOSO, Fungi Horti. Marit. : 42, 1917.

On cankered bark of *Paulownia taiwaniana* Hu et Chung (paulownia, usubagiri) — Plantation of NALCO, Tungao camp, Agusan del Norte, Mindanao, September 15, 1977, by TK ; Plantation of IAFDC, Sta. Maria, Bulacan, Luzon, February 12, 1981, by TK (TFM : FPH-5645).

Note : The fungus causes the stem canker on young paulownia trees. Only the conidial stage was observed on material from the Philippines. Morphological characteristics of the conidial stage were identical with those of the conidial stage of *Physalospora paulowniae* ITO et KOBAYASHI (1951), which was treated as a synonym of *Botryosphaeria dothidea* (MOUG. ex FR.) CES. et de NOT. (KOBAYASHI & KUSUNOKI 1980). This is a new recording of the disease on the paulownia tree in the Philippines, though it has been recorded from Japan on *Paulownia tomentosa* and from Paraguay on *P. taiwaniana* (KOBAYASHI 1984). The fungus has already been recorded in Luzon on *Theobroma cacao,* under the name of *Botryosphaeria minuscula* SACC. and *Physalospora affinis* SACC. (BAKER 1916 ; REINKING 1918 ; TEODORO 1937).

**7. *Caeoma* sp.** — Plate 3 : A ; Fig. 5

Leaf spots subcircular, 5-10 mm in diam., pale yellow at the lower leaf surface, yellowish brown at the upper leaf surface ; peridia gregarious on the upper leaf surface of the spots, 80-120$\mu$m in diam. ; aecia gregarious on the lower leaf surface, 130-440$\mu$m in diam., pustulate ; aecidiospores powdery in mass, pale yellow, elliptic to ovoid, 28-38 × 21-30$\mu$m, with many acicular spines.

Habitat : living leaves of *Cicca acida* (L.) MERR. (íba, amedamanoki) — Mt. Rubas, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5101).

Note : The material has only the aecial state. Although *Phakopsora phyllanthi* DIET was recently recorded on *Cicca acida* (= *Phyllanthus acidus*) in Thailand (LORSUWAN *et al.* 1984), classification of the rust fungus on the Philippine material is withheld until its uredinial and telial stages are found.

8. ***Calonectria pini-caribaeae*** KOBAYASHI et GUZMAN, sp. nov. — Plate 3 : B ; Fig. 6

Peritheciis ramicola, superficiaribus, cum stromatibus basiralis, solitarius vel gregariis, aurantiacus vel brunneo-aurantiacus, subglobosis, 280–300$\mu$m diam, 400–450$\mu$m altis ; paries membranaceis 40–50 $\mu$m crassis ; asci unitunicatis, clavatis vel amplifico-fusoideis, 75–86 × 16–25$\mu$m, 8-sporis ; ascosporidiis irregulariter polystichis, hyalinis, oblong-cylindricis, cur-

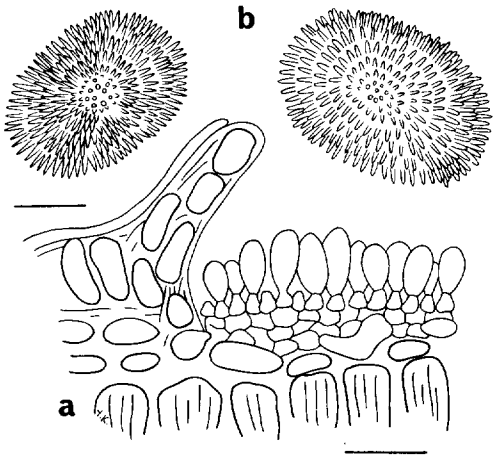


Fig. 5. *Caeoma* sp.
Note) a : Aecium, b : Aeciospores (⌙ : a = 100 $\mu$m ; b = 10 $\mu$m)

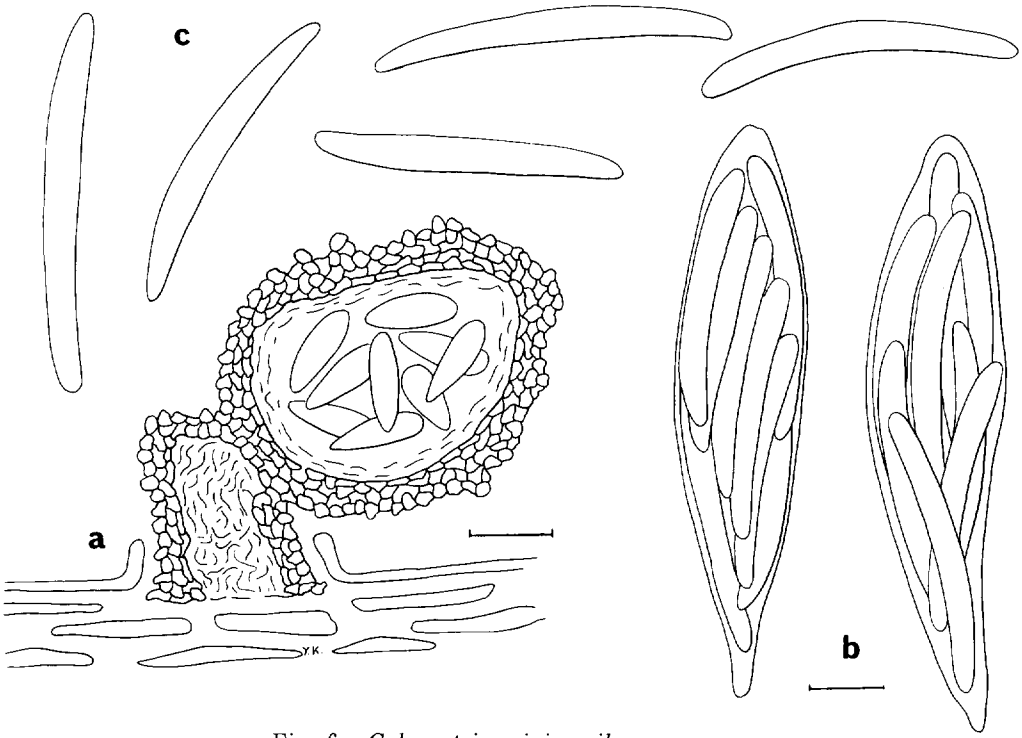


Fig. 6. *Calonectria pini-caribaeae* sp. nov.
Note) a : Perithecial stroma, b : Asci, c : Ascospores (⌙ : a = 10 $\mu$m)

vulis vel crescentibus, utrinque rotundatis, 1- 2-cellularibus, 40-50 × 4.5-6.5$\mu$m.

Habitat : stem of dead seedlings of *Pinus caribaea* Morelet (caribean pine) — Plantation of PICOP, Bislig, Surigao del Sur, Mindanao, March 23, 1977, by TK & DG (TFM : FPH-4954, Holotype).

Perithecia on bark, superficial, with basal stroma, solitary or gregarious, orange to brownish orange, subglobular, 280-300$\mu$m in diam., 400-450$\mu$m in height ; perithecial wall membranaceous, composed of globular to polygonal cells, 40-50$\mu$m in thickness ; asci unitunicate, clavate to broad fusiform, without apical apparatus, 75-88 × 16-25$\mu$m, containing 8 spores as fasciculate or irregularly multiseriate ; ascospores oblong cylindric, length width ratio less than 10 : 1, curved as crescent or allantoid, rounded at both ends, hyaline, 1- 2 cellular, 40-50 × 4.5-6.5$\mu$m.

Note : The present fungus apparently belongs to Hypocreales by its structure and color of perithecium. According to ROGERSOSN's (1970) and ROSSMAN's (1979) concepts, *Calonectria* de NOT. seems to be the only adequate genus for the present fungus, even though the Philippine material has only 0- 1-septate ascospores.

Four species of *Calonectria* have hitherto been know on coniferous trees, namely *C. minuscula* SACC. et SPEG. (SACCARDO 1883) on *Cryptomeria japonica, C. balsamea* (COOKE et PETCH) SACCARDO (1891) on *Abies balsamea, C. gymnosporangii* JAAP (SACCARDO 1926) on *Juniperus* sp. and *C. rutila* KIRSCHSTEIN (1939) on pine wood. However, their size of asci and ascospores differ from the species observed on the Philippine material. On the other hand, 6 species of *Calonectria* have been recorded from the Philippines on several herbaceous plants or broad-leaved trees, They also differ from the species of *Calonectria* observed on *Pinus caribaea* based on the size of asci and ascospores. Among many other species of *Calonectria* described hitherto, no identical species with the Philippine material was found. Therefore, it is described as a new species of *Calonectria*.

**9. *Camptomeris albizziae*** (PETCH) MASON, in HANSFORD, Proc. Linn. Soc. London, 155th Session, 1942-43 (Pt. 1) : 51, 1943. — Plate 1 : A ; 3 : C

Synonyms : *Helminthosporium albizziae* PETCH, Ann. Roy. Bot. Gard. Peradeniya 4 : 306, 1909.

*Heterosporium albizziae* (PETCH) NAITO, Mem Coll. Agr., Kyoto Univ. 47 :51, 1940.

*Exosporium albizziae* KOBAYASHI, Trans. Mycol. Soc.Japan 19 : 375, 1978.

*Stigmina verruculosa* H. et P. SYDOW, Ann. Mycol. 10 : 444, 1912.

On living leaves of *Albizia falcataria* (L.) FOSBERG (moluccan sau, morukka-nemu) — Forest Nursery of Cent. For Exp. Sta., UPLB-CF, Laguna, Luzon, April 5, 1977, by TK (TFM : FPH-4873) ; Forest Nursery of Malaybalay Ref. Proj., BFD, Malaybalay, Bukidnon, Mindanao, September 13, 1977, by TK ; Forest Nursery of Impalutao Ref. Proj. BFD, Impalutao, Bukidnon, Mindanao, September 13, 1977, by TK (TFM : FPH-5065).

Note : The fungus on the Philippine meterials listed above was first treated as a new species of the genus *Exosporium, E. albizziae* KOBAYASHI, because its conidiophore bearing cell had characteristics similar to the genus *Exosporium* (KOBAYASHI 1978 d). After the paper was published, it was found out that the fungus showed characteristics more similar to the genus *Camptomeris* SYDOW (BESSEY 1953, HUGHES 1952 b). Therefore, the fungus causing the yellow leaf disease of *Albizia falcataria* in the Philippines, was revised to *Camptomeris albizziae* (PETCH) MASON, and *Exosporium albizziae* KOBAYASHI was treated

as a synonym of *C. albizziae*.

The present fungus belongs to the subgenus Eucamptomeris BESSEY (1953) in the genus *Camptomeris* SYDOW (1927). It has hitherto been recorded as *Helminthosporium albizziae* PETCH on *Albizia lebbek* from Ceylon, India and the Philippines, as *Heterosporium albizziae* (PETCH) NAITO on *A. julibrissin* from Japan (BESSEY 1953; NAITO 1940; TEODORO 1937; THIRUMALACHAR 1950) and as *Stigmina verruculosa* SYDOW on *Acacia mollissima* from South Africa (DODGE 1950; SYDOW 1912). The fungus was also recorded as *Camptomeris albizziae* (PETCH) MASON on *Albizia coriaria, A. ferruginea, A. grandibracteata, A. lebbek, A. moluccana* (= *A. falcataria*), *Acacia farnesiana* and *A. mollissima* from Asia (India, Pakistan), Africa (Ghana, Sierra Leone, South Africa, Sudan, Uganda) and Central America (Dominica) (BESSEY 1953; CIFERRI 1961; ELLIS 1971; HANSFORD 1943; HUGHES 1952 b, 1953; VENKATARAM 1965).

**10. *Cephaleuros virescens* KUNTZE** — Plate 3 : D

On living leaves of *Chrysophyllum cainito* L. (cainito, staraple) — Campus of UPLB-CF, Laguna, Luzon, March 13, 1977, by TK; on living leaves of *Swietenia macrophylla* KING (big-leaf mahogany, ôba-mahoganii) — Campus of UPLB-CF, Laguna, Luzon, January 11, 1985, by TK and DG (TFM : FPH-5855).

Note: This pathogenic alga also causes the algal leaf spot on various broad-leaved trees (see page 118). These 2 hosts are new records for the present algae .

**11. *Ceratocystis ips* (RUMBOLD) MOREAU**, Rev. Mycol. Suppl. Coloniae 17 : 22, 1952.

Perithecia dark brown to blackish, 250–260$\mu$m diam., with long neck; necks composed of parallely arranged rectangular cells, 270–465$\mu$m in length, 35–40$\mu$m in diam., without the mycelial frill at the top of the ostiole; asci none; ascospores rectangular, hyaline, 3.8–5 × 1.3–2$\mu$m.

On blue-stained and *Ips*-infested wood of *Pinus kesiya* ROYLE ex GORDON (benguet pine, kesiya-matsu) — Plantation of BFD, Bobok, Benguet, Luzon, February 21, 1977, by TK & DG (TFM : FPH-5082, 5102); April 19, 1977, by TK (TFM : FPH-5060); on PDA culture (C-25-1) isolated from *Ips*-infested wood of *Pinus kesiya* (TFM : FPH-5060).

Note : The fungus was dominantly isolated from the *Ips*-infested pine wood (KOBAYASHI *et al.* 1977). It easily developed its ascocarps on a PDA plate or slant cultures. Asci of the fungus could not be observed either on the wood or on the culture. The ascospores were rectangular in shape and have gelatinous sheath. The morphological characteristics of the fungus agree with those of *Ceratocystis ips* (RUMB.) MOREAU in the sense of HUNT (1956). It is widely distributed in North America (USA), Europe (Germany, Poland, Sweden) and Asia (Japan) (HUNT 1956; NISIKADO & YAMAUTI 1933; SIEMASZKO 1939). This is the first record of the fungus in the Philippines and on *Pinus kesiya*. The fungus might have been introduced from North America with its insect vector, *Ips calligraphus* GERMAN.

**12. *Cercospora alstoniae* KOBAYASHI et GUZMAN**, sp. nov. — Plate 3 : E; Fig. 7

Maculis in foliis vivis, irregularibus, griseo-brunneis, 5–10 mm diam; stromatibus amphigenis, olivaceis, 45–85$\mu$m diam; conidiophoris pallideolivaceis, leniter flexuosis, 0–1-septatis, 25–113 × 3–4.5$\mu$m; conidiis oblongo-cylindraceis vel obclavatis, pallidebrunneis vel pallideolivaceis, rectis vel leniter curvatis, truncatis ad basim, attenuatis ad apicem, 3–10-septatis, verruculosis, 45–100 × 3–5$\mu$m.

Habitat : living leaves of *Alstonia macrophylla* WALL. ex DC. (batíno, hard alstonia) — Mt. Rubas, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5077,

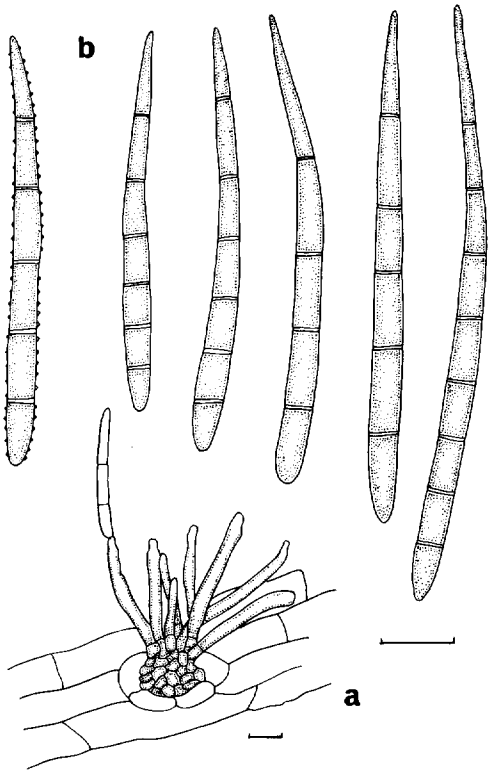


Fig. 7. *Cercospora alstoniae* sp. nov.
Note) a : Stroma and conidiophores, b : Conidia with or without warts (⌙ : 10 μm)

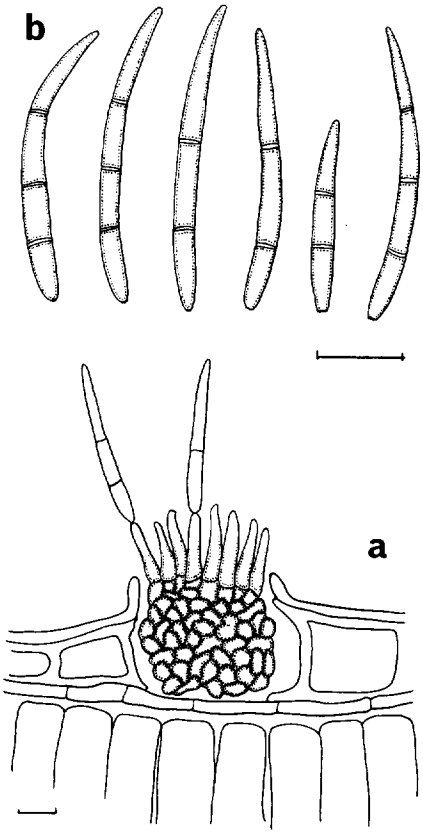


Fig. 8. *Cercospora artocarpi* H. et P. SYDOW
Note) a : Stroma, conidiophores and conidia, b : Conidia (⌙ : 10 μm)

Holotype).

Leaf spots irregular, grayish brown, 5–10 mm in size; stroma amphigenous, olive brown, 45–85μm in diam.; conidiophores pale olive brown, simple, flexuous, 0–1-septate, 25–113 × 3–4.5μm; conidia cylindric to obclavate, pale brown to pale olive brown, straight or slightly curved, truncate at the base, tapering toward the tip, 3–10-septate, 45–100 × 3–5μm, with fine warts.

Note: The fungus causes brown leaf spot of *Alstonia* (KOBAYASHI & GUZMAN 1985). Since no species of the genus *Cercospora* having warted conidia similar to the present fungus has hitherto been described not only on *Alstonia* but also on the other Apocynaceae plants, the present fungus was described as a new species.

**13. *Cercospora artocarpi* H. et P. SYDOW**, Ann. Mycol. 12: 202, 1914. — Plate 3 : F; Fig. 8

Leaf spots at first small, angular and then irregular, pale brown with a dark brown border and a yellowish halo around the spots; stroma epiphyllous, brown to olive brown, 30μm in diam.; conidiophores hyaline to subhyaline, 13–18 × 2.5–4μm, with sterile long hyphae between conidiophores, about 100μm in length; conidia subhyaline, obclavate,

1-3-septate, 35-55 × 3-4.5m, smooth.

On living leaves of *Artocarpus blancoi* (ELM.) MERR. (antipólo, pan-noki)—Buhisan Forest Nursery, Cebu-city Ref. Proj., Buhisan, Cebu, February 13, 1985, by TK (TFM : FPH-5839).

Note : Damage of the *Cercospora* leaf spot caused by the present fungus seems to be slight. Two species of *Cercospora* were recorded on *Artocarpus*, namely *C. artocarpi* P. et H. SYDOW on *A. blancoi* and *C. mehran* KHAN et KAMAL on *A. heterophylla*. The former fungus was originally described in Luzon, the Philippines (SYDOW 1914c) and later in India and Thailand on *Artocarpus blancoi* (CHANDRASRIKUL 1962 ; THIRUMALACHAR & GOVINDU 1954). The latter species was found and described from India (KHAN & KAMAL 1974). The morphological characteristics of the present fungus collected from Cebu quite agree with those of the former. Recently, DEIGHTON (in ELLIS 1976) treated the fungus as *Pseudocercospora artocarpi* (H. et P. SYDOW) DEIGHTON.

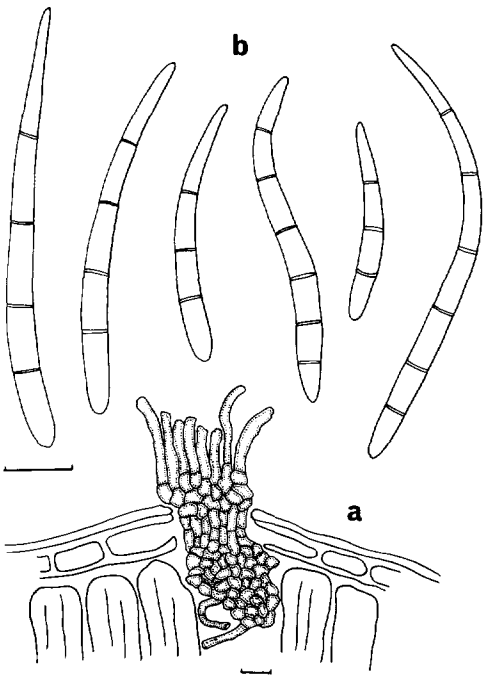


Fig. 9. *Cercospora eucalypti* COOKE et MASSEE

Note) a : Stroma and conidiophores, b : Conidia (⌙ : 10 μm)

14. *Cercospora bauhiniae* H. et P. SYDOW, Ann. Mycol. 12 : 202, 1914.

This is the conidial stage of *Mycosphaerella piliostigmae* KOBAYASHI et GUZMAN (see page 157).

**15. *Cercospora eucalypti* COOKE et MASSEE**, Grevillea 18 : 7, 1899. — Plate 4 : A ; Fig. 9

Leaf spot subcircular, 5-10 mm in size, pale brown to brown ; fruitings amphigenous, stroma chiefly epiphyllous, brown to olive brown, 35-65μm in diam. ; conidiophores short, pale brown to pale olive brown, fasciculate on the stroma or directly branched from the running hyphae on the lower leaf surface, 20-38 × 3-5μm ; conidia subhyaline to pale olive brown, narrowly cylindric to obclavate, straight or slightly ourved, 3-8-septate, 35-73 × 3-4.5μm, tapering toward the tip and subtruncate at the base.

On living leaves of *Eucalyptus deglupta* BL. (bagrás, kamerere) — Plantation of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG (TFM : FPH-5105).

Note : The present fungus causes the brown leaf spot disease of eucalyptus and results in early defoliation and dieback. On *Eucalyptus* 3 Cercosporae have hitherto been described. *Cercospora epicoccoides* COOKE et MASSEE (CHUPP 1953 ; SACCARDO 1892) causes the angular leaf spot disease of *Eucalyptus globulus* and *E. citriodora* in Japan and Taiwan (CHEN 1965 ; KATSUKI 1965). It apparently differs from the present fungus by its symptoms and epiphyllous fruitings. Recently, a new *Cercospora* causing indistinct leaf spots on *Eucalyptus* sp. was described from Paraguay as *C. paraguayensis* KOBAYASHI (1984), however it also differs from the present fungus by its large, multiseptated conidia

and the lack of stroma. Although the dimensions of conidia of the present fungus are somewhat larger than those of *Cercospora eucalypti* CKE. et MASS. (CHUPP 1953 ; SACCARDO 1892), the Philippine fungus was identified as *C. eucalypti* based on the identity of symptoms and other morphological characteristics.

*Eucalyptus deglupta* is a new host for the fungus and this is the first record of the fungus in the Philippines (KOBAYASHI & GUZMAN 1986 b). In Asia, the present species has been reported from India on *Eucalyptus ficifolia* and *E. striata* (BILGRAMI *et al.* 1979, VASUDEVA 1963). It has also been recorded on *Eucalyptus botryoides, E. camaludulensis, E. globulus, E. robusta, E. rostrata, E. trabuti* and *E.* sp. from Argentina, Australia : Brazil, Italy, Paraguay, Peru, South Africa, United States and Zaire (Anonymous 1958 ; CHUPP 1953 ; HINO & TOKESHI 1978 ; KOBAYASHI 1984 ; MAGNANI 1965 ; SALERNO 1957 ; WEHLBURG *et al.* 1975).

16. *Cercospora gardeniae* BOEDIJN, Nova Hedwigia 3(4) : 427, 1961 ; KOBAYASHI, Trans. Mycol. Soc. Japan 21 : 311, 1980 a.

This is the conidial stage of *Mycosphaerella luzonensis* KOBAYASHI (see page 157).

17. ***Cercospora gliricidiae*** **H. et P. SYDOW**, Philip. J. Sci., Bot. 8 : 283, 1913, emend KOBAYASHI et GUZMAN. — Plate 4 : B ; Fig. 10

Leaf spots small, angular, 0.5–2 mm in size, numerous, grayish brown to brown ; stroma amphigenous, chiefly epiphyllous, brown to olive brown, 50–75$\mu$m in diam. ; conidiophores flexuous, pale olive brown, 0–1-septate, 17–45 × 3.5–5$\mu$m ; conidia variable between two extreme types, namely from slender and subhyaline conidia which are 35–58 × 3–5.5$\mu$m in size and have 3–7 septa, to thicker and olive brown conidia which are 20–45 × 4.5–6.5$\mu$m in size and have 3–4 septa.

On living leaves of *Gliricidia sepium* (JACQ.) H.B.K. (kakauáti) — Agro-Forestry Experimental Farm, UPLB-CF, Calamba, Laguna, Luzon, April 13, 1977, by TK & DG (TFM : FPH-5079) ; Plantation of Parcel I, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM : FPH-5837) ; Parcel IIb of RP-J : FDP, Talatalan, Carranglan, Nueva Ecija, Luzon, February 6, 1985, by TK & DG (TFM : FPH-5933) ; Buhisan Forest Nursery of Cebu-city Ref. Proj., Buhisan, Cebu, February 14, 1985, by TK (TFM : FPH-5858).

Note : The fungus causes definite leaf spot. A remarkable characteristic of the fungus is the wide variation in shape and size of the conidia as shown in Fig. 10. If both extreme types of conidia are observed separately, they appear to belong to two different genera. One extreme group is characterized by an olive brown, short and thick conidia shape and can be classified under the genus *Stigmina* or *Coryneum*. The other group has the slender and subhyaline conidia characteristic of *Cercospora*. However, the present fungus could not be classified into two separate groups, because of the continuous variation in shape and the size of the conidia. Similar characteristics had been reported on *Cercospora platanicola* ELL. et EV. (ITO *et al.* 1959) and *C. sequoiae* ELL. et EV. (TERASHITA & KATAOKA 1973).

*Cercospora gliricidiae* H. et P. SYDOW (1913 a) has been reported from the Philippines. According to the original description, this species has dark colored and short-sized conidia measuring 20–50 × 5–9$\mu$m. Because of these characteristics, CHUPP (1953) suggested that the species does not belong to *Cercospora* but to *Helminthosporium* or *Coryneum*. The morphological characteristics of SYDOW's species, especially those of conidia are identical with our fungus showing the *Stigmina* type of conidia. It is our conclusion that

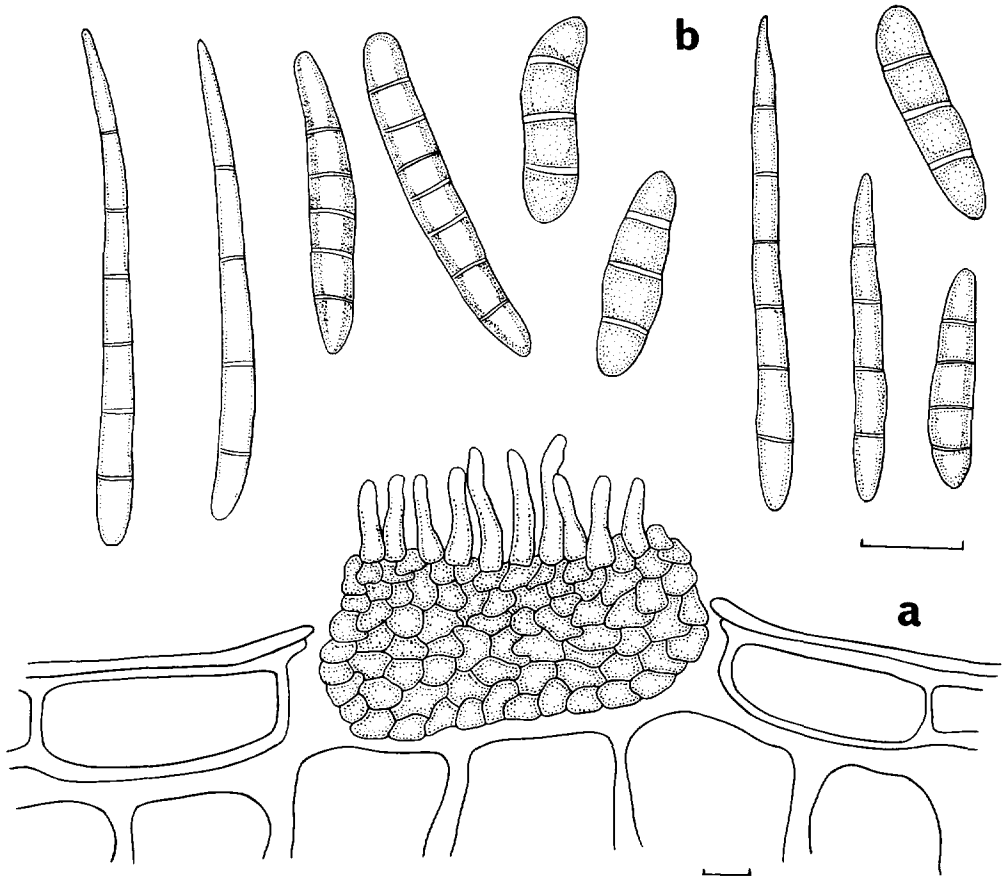


Fig. 10. *Cercospora gliricidiae* H. et P. SYDOW

Note) a : Stroma and conidiophores, b : Conidia showing wide variations (⌙ : 10 $\mu$m)

*Cercospora gliricidiae* should remain under the genus *Cercospora*. Recently DEIGHTON treated this species as *Sirosporium gliricidiae* (H. et P. SYDOW) DEIGHTON (Ellis 1976).

Cebu is a new locality for the fungus in the Philippines, though it has hitherto been collected from various places of Luzon (TEODORO 1937). Besides the Philippines, the fungus has been recorded on the same host (*G. maculata*) in India, Indonesia, Malaysia including Saba and Sarawak, Ghana, Nigeria, Dominica, Puerto Rico and Venezuela (BILGRAMI *et al.* 1979 ; BOEDIJN 1962 ; CHUPP 1953 ; CIFERRI 1961 ; DENNIS 1970 ; HUGHES 1953 ; STEVENSON 1975 ; THOMPSON & JOHNSTON 1953 ; TURNER 1971 ; VASUDEVA 1963 ; WILLIAMS & LIU 1976).

*Cercospora gliricidiasis* FRAGOSO et CIFERRI (1929) recorded in Dominica, Grenada and Trinidad Tobago (BAKER & DALE 1948, 1951) was treated as a synonym of *C. gliricidiae* H.

et P. SYDOW by CHUPP (1953), though DEIGHTON treated it as an independent species, *Cercosporidium gliricidiasis* (FRAG. et CIF.) DEIGHTON (in ELLIS 1976) and added to its distribution, Cuba, Ghana, Jamaica and Nigeria.

*Cercospora atro-purpurascens* CHUPP apud CHARDON et TORO, which was described on the same host from Venezuela (PETRAK 1944), could not be compared with the present fungus, because of no information on its type specimen and its original description. According to STEVENSON (1975) it is found in Puerto Rico and Venezuela.

**18. *Cercospora gmelinae* YEN et GILLES,** Bull. Soc. Mycol. France 91 (1) : 98, 1975. — Plate 4 : C ; Fig. 11

Leaf spots at first small, angular, 1-3 mm, brown to dark brown, then irregular, 5-10 mm in diam., grayish brown with dark brown border, covered with sooty conidial masses being dark greenish brown in color on the upper leaf surface and pale greenish powdery appearance on the lower leaf surface ; stroma chiefly epiphyllous, 32-70$\mu$m in diam., dark greenish brown to olive brown ; conidiophores fascicular on stroma or singly arising from free hyphae running over the lower leaf surface, greenish brown, flexuous, 18-43 × 3.5-4.5$\mu$m ; conidia cylindric to obclavate, greenish brown to olive brown, truncate at the base, 2-13-septate, smooth, 40-85 × 2.5-5$\mu$m, with an average of 59.3 × 4.3$\mu$m.

On living leaves of *Gmelina arborea* L. (yemane, kidachi-yôraku) — Parcel I of RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 15, 1985, by TK (TFM : FPH-5847) ; Mongkit-kit Plantation of RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM : FPH-5846) ; Parcel IIb of RP-J : FDP, Talatalan, Carranglan, Nueva Ecija, Luzon, February 6, 1985, by TK & DG (TFM : FPH-5844) ; Buhisan Forest Nursery, Cebu-city Ref. Proj., BFD, Buhisan, Cebu-city, Cebu, February 13, 1985, by TK (TFM : FPH-5854) ; Plantation of ACMDC, Toledo-city, Cebu, February 14, 1985, by

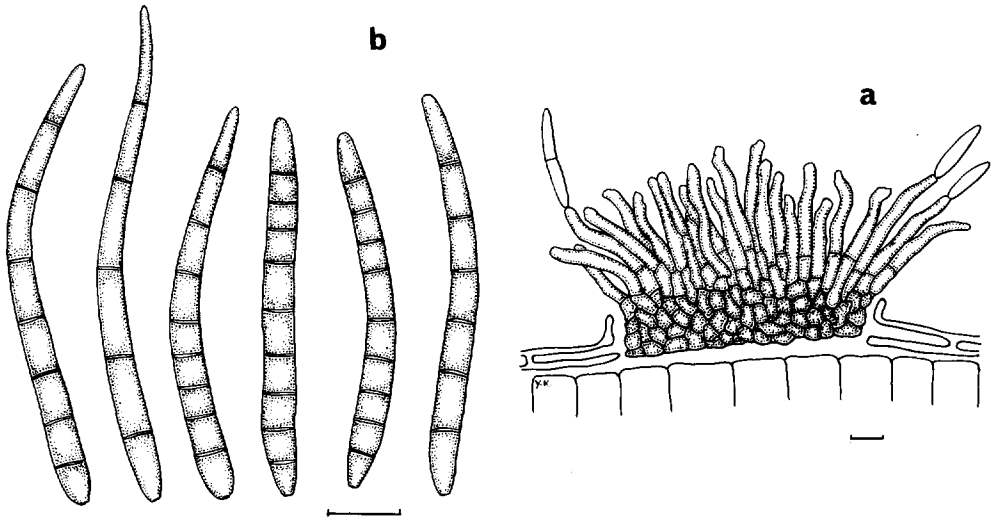


Fig. 11. *Cercospora gmeliae* YEN et GIILES

Note) a : Stroma and conidiophores, b : Conidia (⌙ : 10$\mu$m)

TK (TFM : FPH-5845).

Note : On *Gmelina arborea* 3 Cercosporae, namely *Cercospora volkameriae* SPEG. (CHUPP 1953 ; SACCARDO 1913), *C. ranjita* CHOUDHURY (1958) and *C. gmelinae* YEN et GILLES (YEN 1975), have been known. Among them *Cercospora volkamertae* was first described on *Clerodendron fragrans* in Brazil. It was later recorded as the cause of leaf spot of *Gmelina arborea* from Malawi and Malaysia without any mycological notes (CORBETT 1964 ; LIU 1977 ; PEREGRINE & SIDDIQI 1972). This fungus distinctly differs from the present fungus in its big conidia and conidiophores and in its lack of stroma. *Cercospora ranjita*, which was described on *Gmelina arborea* in India, also differs from the Philippine species in its hypophyllous fruitings consisting of running hyphae and conidiophores without distinct spots and stroma. In addition to these, the size of conidia and number of septum differ from the present fungus.

Symptoms and morphological characteristics of the present fungus quite agree with those of *Cercospora gmelinae* YEN et GILLES originally described from Cote d'Ivoire. This is the first record of the fungus in the Philippines (KOBAYASHI & GUZMAN 1986 b). Recently, QUINIONES and DAYAN (1981) reported a leaf spot disease of *Gmelina arborea* in the Philippines. Judging from their notes and photographs of the disease and its pathogen, the fungus seems better classified as *Cercospora gmelinae*, though they refered it to *C. ranjita* CHOWDHURY. Their fungus develops distinct leaf spots and forms stroma on the spots.

**19. *Cercospora henningsii*** ALLESCHER, in ENGLER's Pflanzenwelt Ost-Afrikas, Tell C, 35, 1895. — Plate 4 : D ; Fig. 12

Synonym : *Cercospora manihotis* HENNINGS, Hedwigia 41 : 18, 1902

Others refer to CHUPP (1953).

Leaf spots subcircular, pale brown to brown, 5–10 mm in diam. ; stroma amphigenous, olive brown, 40–65$\mu$m in diam. ; conidiophores simple, flexuous, pale olive brown, 1–2-septated, 15–45 × 2.5–5$\mu$m ; conidia straight or slightly curved, obclavate, subhyaline to pale olive brown, 3–11-septated, smooth, 45–93 × 4.5–5.5$\mu$m, with truncate basal end.

On living leaves of *Manihot glaziuvii* MUELL-ARG. (ceara rubber, seara-gomunoki) — Port Lamon Extension Nursery, PICOP, Bislig, Surigao del Sur, Mindanao, March 22, 1977, by TK & DG (TFM : FPH-5061) ; on living leaves of *Manihot esculenta* GRANTZ (cassava) — Makiling Bot. Gard., UPLB-CF, Laguna, Luzon, January 11, 1985, by TK (TFM : FPH-5817) ; Salazar Forest Nursery, RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM : FPH-5816) ; Buhisan Forest Nursery of Cebu-city Ref. Proj., BFD, Buhisan, Cebu, February 13, 1985, by TK (TFM : FPH-5818).

Note : On Manihot, 7 species of *Cercospora* have hitherto been described. Among them, *Cercospora cassavae* ELL., *C. manihotis* HENN. and *C. cearae* PETCH were treated as synonyms of *Cercospora henningsii* ALL. by CHUPP (1953). *Cercospora caribaea* CHUPP et CIFERRI (CHUPP 1953 ; VIÉGAS 1945), *C. manihobae* VIÉGAS (1945) and *C. vicosae* MUELLER et CHUPP (CHUPP 1953 ; VIÉGAS 1945) are easily distinguished from the present fungus by their geniculate and long conidiophores and host symptoms. The present fungus was identified as *Cercospora henningsii* ALL. based on morphological characteristics and symptoms. The fungus was recently transferred to the related genus *Cercosporidium* as *C. henningsii* (ALL.) DEIGHTON (in ELLIS 1976). The teleomorph of the fungus was recently redescribed as *Mycosphaerella henningsii* SIVANESAN (1985) with a synonym of *M. manihotis* GHES-

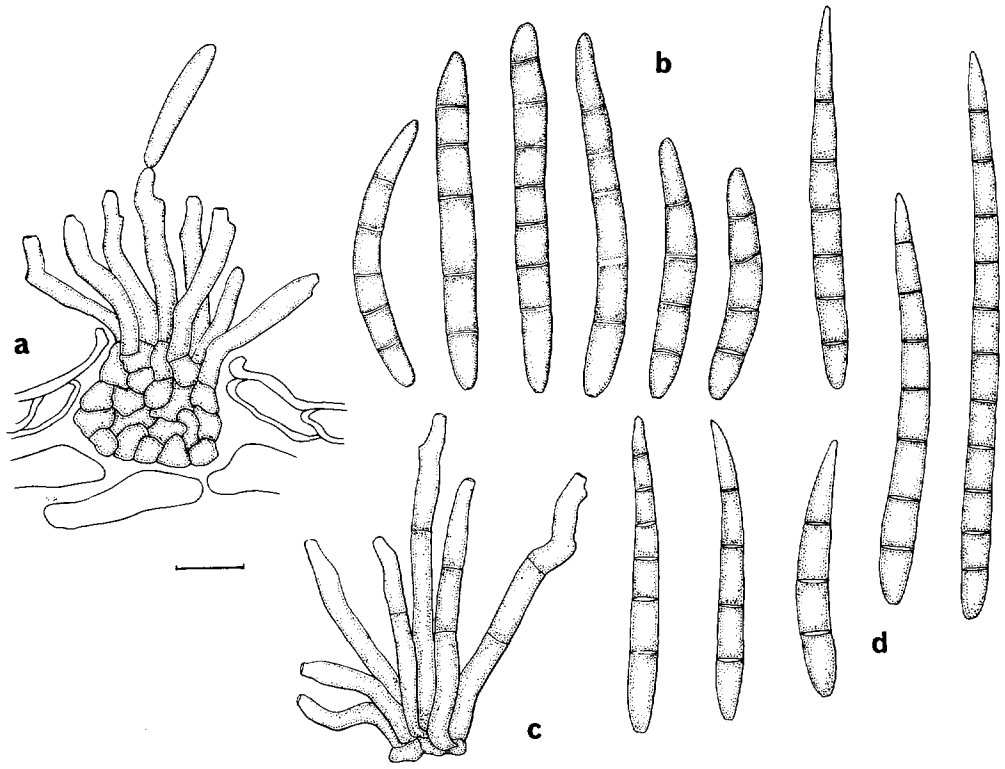


Fig. 12. *Cercospora henningsii* ALL.

Note) a, c : Stroma and conidiophores, b, d : Conidia (a, b : on *Manihot esculenta* ; c, d : on *M. graziuvii*) (⌙ : 10 $\mu$m)

QUIERE et HENRARD 1928 non SYDOW 1901.

The present species causes the brown leaf spot disease of *Manihot*, especially *M. esculenta*. In Asia, it has been recorded in Brunei, China, India, Indonesia, Malaysia, Portugese Timor, Sri Lanka, Taiwan and Thailand, on *Manihot esculenta, M. glaziuvii* and *M. piauhyensis* (Anonymous 1961, 1970 ; BARROS 1973 ; BILGRAMI *et al.* 1979 ; BOEDIJN 1962 ; CHUPP 1953 ; GIATGONGS 1980 ; PEREGRINE & AHMAD 1982 ; RAMAKRISHNAN *et al.* 1971 ; TAI 1979 ; THOMPSON & JOHNSTON 1953 ; TURNER 1971 ; VASUDEVA 1963 ; WILLIAMS & LIU 1976). In the Philippines, it has been collected from Luzon, Sulu and Mindanao on *Manihot esculenta* under two species names, *Cercospora henningsii* ALL. and *C. manihotis* HENN. (REINKING 1919 ; SYDOW 1917 ; TEODORO 1937). *Manihot glaziuvii* is a new host and Cebu is a new locality of the fungus in the Philippines (KOBAYASHI & GUZMAN 1986 b).

**20. *Cercospora kurimaensis*** FUKUI, Bull. Mie Imp. Coll. Agr. & For. 3 : 13, 1933. — Plate 4 : E ; Fig. 13

Synonym : *Cercospora nerii-indici* YAMAMOTO, J. Soc. Trop. Agr. 6 (3) : 605, 1934.

Leaf spots at first indistinct, pale green on the upper leaf surface, then grayish brown, rectangular, 3-5 mm in sizes, finally becoming irregular, 5-10 mm, grayish brown with broad yellowish area ; stroma amphigenous, small, olive brown, 20-38$\mu$m in diam. ;

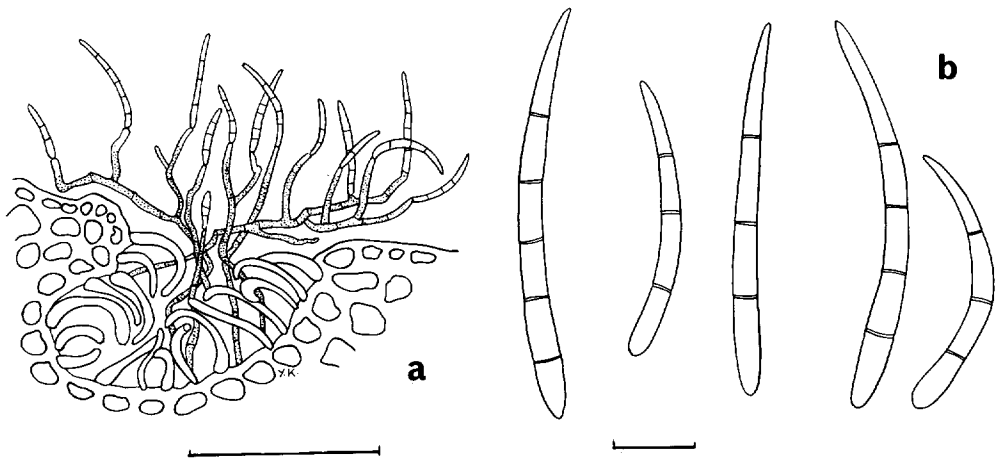


Fig. 13. *Cercospora kurimaensis* FUKUI

Note) a : Conidia formed on running hyphal strands on the lower leaf surface, b : Conidia (⟝ : a = 100 $\mu$m ; b = 10 $\mu$m)

conidiophores on stroma or arising from free hyphae running over the lower leaf surface, pale olive brown, 22–30 × 2.5–3$\mu$m ; conidia obclavate, straight or slightly curved, subhyaline to pale olive brown, tapering toward the tip, with truncate basal end, 30–63 × 2.5–4$\mu$m, with 3–5 septa.

On living leaves of *Nerium oleander* L. (oleander, seiyô-kyôchikutô) — Davao Air Port, Mindanao, February 9, 1981, by TK (TFM : FPH-5198).

Note : On *Nerium,* two Cercosporae have hitherto been known. *Cercospora neriella* SACC. (1881 ; CHUPP 1953) differs from the Philippine fungus in its large, epiphyllous stroma and hyaline conidia. Symptoms and morphological characteristics of the present fungus quite agree with those of *Cercospora kurimaensis* FUKUI described from Japan (FUKUI 1933 ; KATSUKI 1965 ; KOBAYASHI 1973). The fungus is well known as *Cercospora nerii-indici* YAMAMOTO in Hawaii, India, Taiwan, and the United States (Anonymous 1970 ; CHUPP 1953 ; RAABE *et al.* 1981 ; VASUDEVA 1963 ; YAMAMOTO 1934). It was treated as a synonym of *C. kurimaensis* FUKUI by YAMAMOTO and MAEDA (1960). This is the first record of the fungus from the Philippines (KOBAYASHI & GUZMAN 1985).

**21. *Cercospora lawsoniae-albae*** THIRUMALACHAR **et** GOVINDU, Sydowia 16 : 285, 1962. — Plate 4 : F ; Fig. 14

Leaf spots subcircular, 2–5 mm in diam., at first brown, then grayish brown with dark brown border ; stroma amphigenous, within epidermal cells, 17–55$\mu$m in diam,, brown to olive brown ; conidiophores fasciculate on stroma, simple, pale olive brown, straight or flexuous, 15–20 × 3–4$\mu$m, without prominent conidial scars ; conidia acicular to narrowly obclavate, hyaline to subhyaline, straight or curved a little, 2–7-septate, 42–80 × 2–3$\mu$m, smooth.

On living leaves of *Lawsonia inermis* L. (henna, cinamómo) — Campus of FORI in UPLB-CF, Laguna, Luzon, January 11, 1985, by TK & DG.

The fungus causes severe leaf spot disease of *Lawsonia inermis* and forces most of its

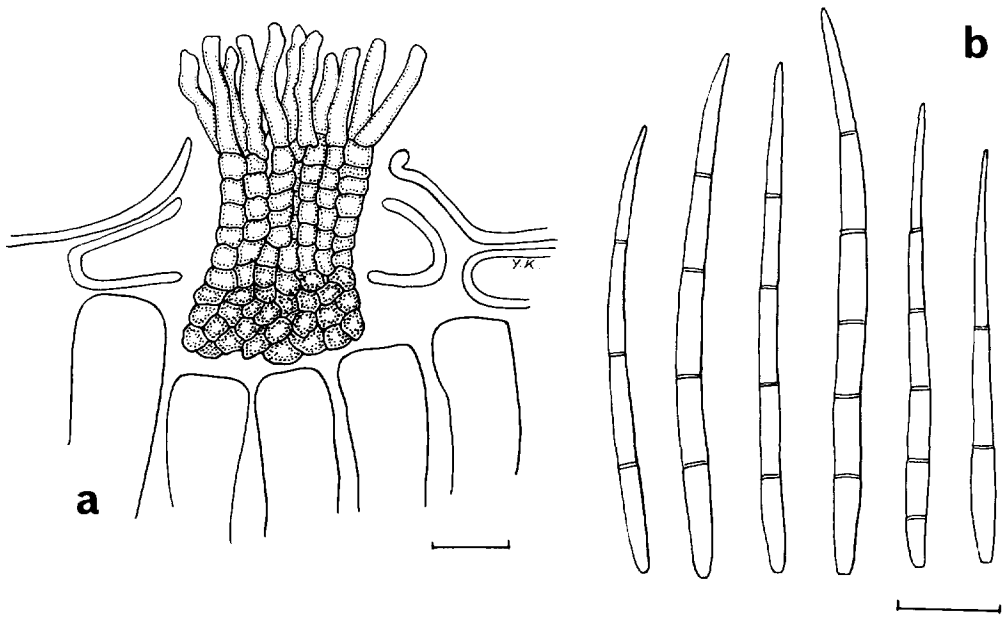


Fig. 14. *Cercospora lawsoniae-albae* THIRUM. et GOV.
Note) a : Stroma and conidiophores, b : Conidia (⌙ : 10 $\mu$m)

leaves to defoliate. The causal fungus was identified as *Cercospora lawsoniae-albae* THIRUM. et GOVINDU based on symptoms and morphological characteristics. This is the only species of *Cercospora* described on *Lawsonia*. QUINIONES and DAYAN (1981) noted a leaf spot disease of *Lawsonia* caused by a species of *Cercospora* from the Philippines. This may be the same disease observed by the authors. This is the first record of its distribution out of India where the fungus was originally described (CHIDDARWAR 1959 ; THIRUMALACHAR & GOVINDU 1962).

**22. *Cercospora lythracearum* HEALD et WOLF**, Mycologia 3 : 18, 1911 ; KOBAYASHI, Trans. Mycol. Soc. Japan 22 : 303, 1981. — Plate 5 : A

Synonyms : Refer to KOBAYASHI (1981).

On living leaves of *Lagerstroemia speciosa* (L.) Pers. (banabá, ôbana-sarusuberi) — Campus of UPLB, Laguna, Luzon, February 9, 1977, by TK (TFM : FPH-4970) ; Guest house of PICOP, Bislig, Surigao del Sur, Mindanao, March 23, 1977, by TK & DG ; Mt. Rubas, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5106).

Note : The fungus causes the brown leaf spot of *Lagerstroemia speciosa* in the Philippines (KOBAYASHI 1981). It has previously been known from Luzon under the name *Cercospora lagerstroemiae* SYDOW (1914 c). Cebu and Mindanao are new localities for the fungus. In Asia, it has also been recorded in Brunei, China, India, Japan, Philippines and Taiwan on *Lagerstroemia indica, L. parviflora, L. speciosa, L. subcostata* and *L. subcostata* var. *hirtella* (Anonymous 1970 ; BILGRAMI *et al.* 1979 ; KATSUKI 1965 ; PEREGRINE & AHMAD 1982 ; TAI 1979 ; TEODORO 1937).

**23. *Cercospora paulowniae* HORI apud NAMBU**, J. Plant Prot. 2 : 79, 1915. — Plate 5 : B ;

Fig, 15

Leaf spots brown to grayish brown, subcircular, 5–10 mm in diam.; stroma amphigenous, olive brown to dark olive brown, 50–75$\mu$m in diam.; conidiophores pale olive brown, simple, somewhat flexuous, 0–1-septated, 10–18 × 3–4$\mu$m; conidia oblong-cylindric to obclavate, truncate at the basal end, hyaline to subhyaline, straight or slightly curved, 4–7-septated, 40–83 × 2–2.5$\mu$m.

On living leaves of *Paulownia taiwaniana* HU et CHUNG (usubagiri) — Plantation of IAFDC, Bancud, Bukidnon, Mindanao, February 7, 1981, by TK; Nursery of IAFDC, Sta. Maria, Bulacan, Luzon, February 12, 1981, by TK (TFM : FPH-5644).

Note: This is the first record of the fungus in the Philippines (KOBAYASHI & GUZMAN 1985, 1986 b). The fungus was first described on *Paulownia tomentosa* in Japan (HARA 1927; KATSUKI 1965; NAMBU 1915). The symptoms and morphological characteristics of the fungus from Philippine materials agree with those of *Cercospora paulowniae*. The fungus has been reported in China and Taiwan on *Paulownia fortunei*, *P. kawakamii* and *P. tomentosa* (Anonymous 1970; SAWADA 1959; TAI 1979).

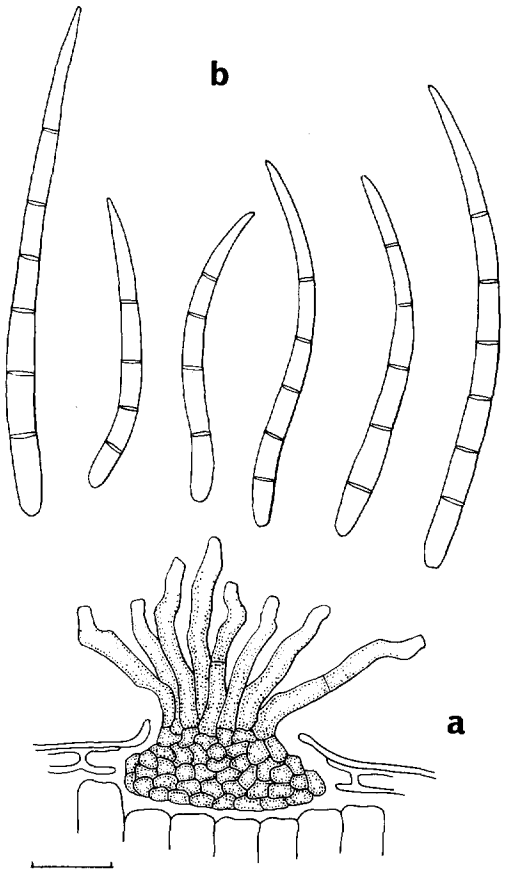


Fig. 15. *Cercospora paulowniae* HORI
Note) a : Stroma and conidiophores,
b : Conidia (⌙ : 10 $\mu$m)

**24. *Cercospora philippinensis*** KOBAYASHI et GUZMAN, sp. nov. — Plate 5 : C; Fig, 16

Maculis in foliis vivis formantibus, majusculis, pallide brunneis, 5–10 mm diam, saepe 2–3-annulatis; caespitulis disseminatis, amphigenis, sed praecique hypophyllis, minutissime punctulatis atrovirentibus; stromatibus intra-epidermatibus, subglobosis, pseudoparenchymaticis, 25–38$\mu$m diam, brunneis vel olivaceo-brunneis; conidiophoris fasciculatis, simplicibus, flexuosis, ad basim olivaceis, ad apicem subhyalinis, 0–1-septatis, 20–30 × 4.5–5 $\mu$m; conidiis cylindro-obclavatis, rectis vel curvatis, pallideolivaceis, basi truncatis, 5–11-septatis, 55–120 × 4.5–5.5$\mu$m, laevibus.

Habita t: on living leaves of *Mussaenda philippica* RICH (Káhoi-dalága) — Campus of UPLB-CF, Laguna, Luzon, January 11, 1985, by TK & DG (TFM : FPH-5815, Holotype).

Leaf spots pale brown, subcircular, 5–10 mm in diam., often with 2–3-concentric rings of dark brown zone; fruitings amphigenous, but numerous on the lower leaf surface,

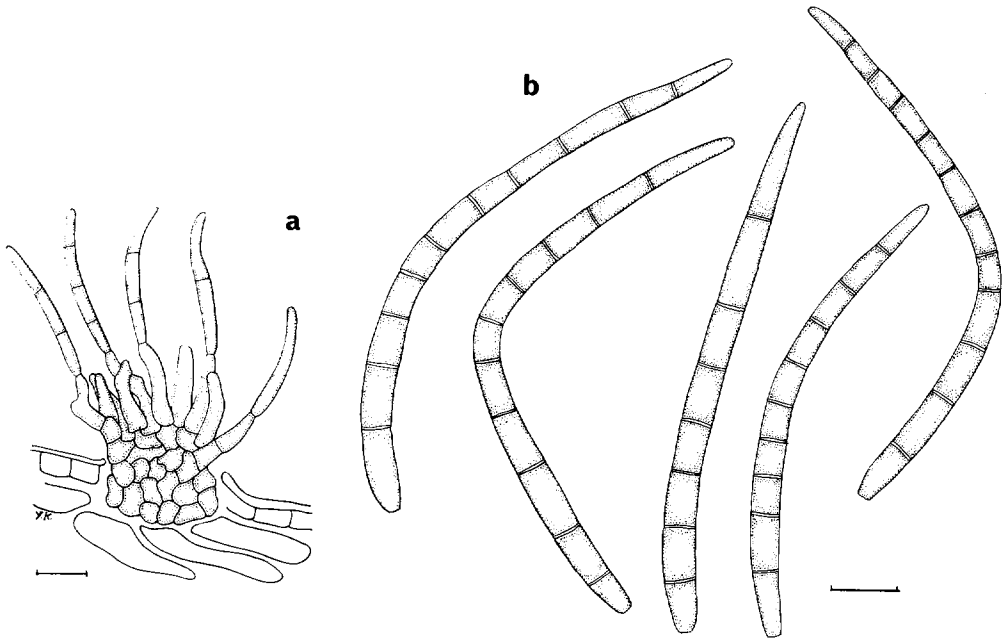


Fig. 16. *Cercospora philippinensis* sp. nov.
Note) a : Stroma, conidiophores and conidia, b : Conidia (⟝ : 10 μm)

scattered as minute dark greenish points ; stroma within epidermal layer, then breaking through it, subglobular, pseudoparenchymatous, brown to olive brown, 25–38 μm in diam. ; conidiophores simple, fasciculate, flexuose, olive brown at the base and subhyaline at the top, 0–1-septate, 20–30 × 4.5 — 5 μm ; conidia cylindric to obclavate, straight or strongly curved, pale olive brown, truncate at the base, 5–11-septate, 55–120 × 4.5–5.5 μm, smooth.

Note : On *Mussaenda, Pseudocercospora mussaenda* KATSUKI (1956) has been known in Japan. However, it differs from the Philippine species in its hypophyllous leaf spots and fruitings, branching and multi-septated conidiophores, thick conidial scars and thick conidia. No other species of *Cercospora* and related genera has been found on *Mussaenda*. Therefore, this fungus from the Philippines is proposed as a new species of *Cercospora*.

**25. *Cercospora pini-densiflorae*** **HORI et NAMBU**, J. Plant Prot. (Tokyo) 4 : 353, 1917 ; KOBAYASHI, SUTO and GUZMAN, Europ. J. For. Pathol. 9 (3/4) : 166, 1979. — Plate 1 : B ; 5 : D

On living needles of *Pinus caribaea* MORELET (caribean pine) — Dry Creek Plantation, Binga, Itogon, Benguet, Luzon, February 21, 1977, by TK & DG (TFM : FPH-4881) ; Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, September 1, 1977, by TK ; Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 17, 1985, by TK (TFM : FPH-5849) ; Plantation of ANZAP, Mayantoc, Tarlac, Luzon, February 8, 1985, by TK & DG. ; *Pinus kesiya* ROYLE ex GORDON (Benguet pine, kesiya-matsu) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG (TFM : FPH-4879) ; Forest Nursery of FORI, Baguio-city, Benguet, Luzon, February

19, 1977, by TK & DG (TFM : FPH-4884) ; Forest Nursery of Bobok Res. Sta., FORI, Bobok, Benguet, Luzon, April 19, 1977, by TK (TFM : FPH-4880) ; Forest Nursery of BFD, Bontok, Benguet, Luzon, September 1, 1977, by TK (TFM : FPH-5070) ; Nursery of Cent. For. Exp. Sta., UPLB-CF, Laguna Luzon, March 17, 1977, by R.E. Dela CRUZ ; Parcel IIb Plantation, RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 17, 1985, by TK (TFM : FPH-6005) ; Forest Nursery of RP-J : FDP, Talatalan, Nueva Ecija, Luzon, January 16, 1985, by TK ; Central Forest Nursery of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG ; Forest Nursery of BFD, Malaybalay, Bukidnon, Mindanao, September 13, 1977, by TK ; Forest Nursery of Impalutao Ref. Proj., BFD, Impalutao, Bukidnon, Mindanao, September 13 1977, by TK (TFM : FPH-4882) ; Forest Nursery, Tungao Camp of NALCO, Agusan del Norte, Mindanao, September 15, 1977, by TK (TFM : FPH-4883) ; *Pinus merkusii* JUNGH. et de VR. (mindoro pine merukushi-matsu) — Central Forest Nursery, RP-J : FDP, Baluarte, Nueva Ecija, Luzon, August 11, 1977, by TK (TFM : FPH-5071) ; Natural Forest of BFD, Cabangan, Zambaras, Luzon, September 9, 1977 ; *Pinus oocarpa* SCHIEDE — Forest Nursery of UPLB-CF, Laguna, Luzon, April 5, 1977, by TK (TFM : FPH-5083).

Note : The occurrence of pine needle blight in the Philippines was first reported by the authors (KOBAYASHI & GUZMAN 1978 ; KOBAYASHI *et al.* 1979). The present fungus was recently transferred to the genus *Cercoseptoria* PETRAK as *C. pini-densiflorae* (HORI et NAMBU) DEIGHTON (1976). As mentioned in page 116, EVANS (1984) found and named the teleomorph of the fungus as *Mycosphaerella gibsonii* EVANS.

Besides the previous notes (KOBAYASHI *et al.* 1979), needle blight caused by the present fungus was recorded in Malaysia and Indonesia on *Pinus caribaea, P. kesiya* and *P. merkusii* (IVORY 1972, 1975 ; ZINNO 1982, 1983). Recently, Dela CRUZ *et al.* (1984) discussed the relationships between the needle blight severity and the nutritional conditions of Benguet pine seedlings.

**26. *Cercospora plumeriae*** **CHUPP,** Monogr. *Cercospora* : 49, 1953 ; KOBAYASHI. Trans. Mycol. Soc. Japan 21 : 313, 1980 — Plate 5 : E

On living leaves of *Plumeria alba* L. (kalachúcheng-puti, shirobana-indosokei) — Campus of UPLB-CA, Laguna, Luzon, March 13, 1977, TK (TFM : FPH-4971) ; Makati-city, Metro Manila, Rizal, Luzon, February 18, 1985, by TK (TFM : FPH-5842) ; *Plumeria rubra* L. (kalachúcheng-pulá, akabana-indosokei) — Campus of UPLB-CA, Laguna, Luzon, March 13, 1977, by TK.

Note : the fungus was first recorded in the Philippines in 1980 (KOBAYASHI 1980 a).

**27. *Cercospora pterocarpicola*** **YEN,** Rev. Mycol. 42 : 145, 1978 (as *ptericarpicola*) ; KOBAYASHI, Trans. Mycol. Soc, Japan 22 : 308, 1981. — Plate 1 : C ; 6 : E, F

Synonym : *Cercospora guzmanii* KOBAYASHI, Trans. Mycol. Soc. Japan 20 : 299, 1979.

On living leaves of *Pterocarpus indicus* WILLD. (nárra, indoshitan) — Forest Nursery of UPLB-CF, Laguna, Luzon, February 7, 1977, by TK & DG (TFM : FPH-4892) ; April 5, 1977, by TK (TFM : FPH-4886) ; Alipang Forest Nursery, BFD, Alipang, La Union, Luzon, February 22, 1977, by TK & DG (TFM : FPH-4893) ; Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 23, 1977, by TK (TFM : FPH-4894) ; Guest house of NIA, Pantabangan, Nueva Ecija, March 9, 1977, by TK & DG ; Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, Janubry 16, 1985, by TK (TFM : FPH-5833) ; Parcel I plantation of RP-J : FDP, Baluarte, Carranglan,

Nueva Ecija, Luzon, January 17, 1985, by TK (TFM : FPH-5834) ; Forest Nursery of Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-4890).

Note : This fungus causes brown leaf spot disease of *Pterocarpus indicus*. It was first described as a new species under the name of *Cercospora guzmanii* KOBAYASHI (1979). Then it was found later to be a homonym of *Cercospora pterocarpicola* YEN (1978) and was treated as a synonym of the latter (KOBAYASHI 1981). The brown leaf spot disease caused by the present fungus was reported on *Pterocarpus indicus* only in Malaysia and Philippines.

QUINIONES and DAYAN (1981) reported a leaf spot disease of the same host in Luzon, Philippines. They identified the causal fungus as *Cercospora canescens* ELL. et MARTIN which is parasitic to *Phaeolus* and other herbaceous legume crops but not to tree legumes. Judging from their brief notes and photographs, their fungus seems to be the same as the fungus described by the authors.

28. ***Cercospora purpurea*** COOKE, Grevillea 7 : 34, 1878. — Plate 6 : A ; Fig. 17

Leaf spots small, angular, 1-3 mm in size, brown to dark brown at first, then irregular, 3-5 mm in size, grayish brown with dark brown border ; stroma amphigenous, brown, 30-38 $\mu$m in diam. ; conidiophores pale brown to brown, flexuous, simple, 25-38 × 3-4 $\mu$m ; conidia slender, cylindric to obclavate, subhyaline to pale olive brown, straight or somewhat curved, truncate at the base, tapered toward the top, 3-8-septated, 40-83 × 2.5-4.5 $\mu$m, smooth.

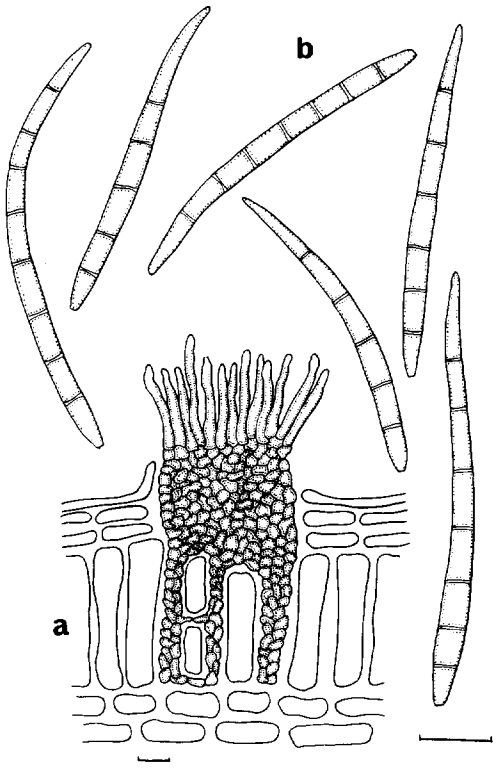


Fig. 17. *Cercospora purpurea* COOKE
Note) a : Stroma and conidiophores, b : Conidia (⌙ : 10 $\mu$m)

On living leaves of *Persea americana* MILL. (avocado) — Camp 7, Minglanilla, Cebu, February 14, 1985, by TK (TFM : FPH-5840).

Note : This is the first record of the fungus in the Philippines and Asia (KOBAYASHI & GUZMAN 1986 b). On *Persea*, 3 Cercosporae, namely *Cercospora lingue* SPEG. (CHUPP 1953 ; SACCARDO 1972), *C. perseae* ELL. et MART. (SACCARDO 1886) and *C. purpurea* COOKE (SACCARDO 1886), have been known. CHUPP (1953) excluded the former 2 species from the genus *Cercospora* based on his re-examination of materials. According to him, *Cercospora lingue* should belong to *Helminthosporium* because of its conidial characters, and *Arthrobotryum* is the adequate genus for *C. perseae* because of its dintinct coremium. The symptoms and morphological characteristics of the fungus from Philippine material agree with those of *Cerco-*

*spora purpurea* COOKE.

This fungus is widely distributed throughout the Americas (Bolivia, Brazil, Costa Rica, Cuba, Guadaloupe, Nicaragua, Panama, Peru, Puerto Rico, the United States, Venezuela — Anonymous 1960 ; ALANDIA & BELL 1957 ; ALBUQUERQUE 1962 ; CHUPP 1953 ; DENNIS 1970 ; HINO & TOKESHI 1976 ; KREISEL 1971 ; LITZENBERGER & STEVENSON 1957 ; MOREZ 1962 ; MÜLLER & CHUPP 1942 ; RUEHLE 1958 ; STEVENS 1927 ; STEVENSON 1975). Two additional areas in Africa (Cameroun and Cote d'Ivoire) and one in Hawaii have been added to its distribution (Anonymous 1960 ; GAILLARD 1971 ; GARNIER 1973 ; RAABE *et al.* 1981).

*Persea americana, P. americana* ver. *drymifolia, P. borbonica, P. carolinensis, P. gratissima* and *P. palustris* are the known hosts of the fungus. DEIGHTON (1976) transfered the present species to the genus *Pseudocercospora* SPEG. as *P. purpurea* (COOKE) DEIGHTON.

**29. *Cercospora sequoiae*** ELLIS **et** EVERHART, J. Mycol. 3 : 13, 1887 ; KOBAYASHI, Ann. Phytopathol. Soc. Japan 46 (1) : 111, 1980 ; 46 (2) : 258, 1980. — Plate 6 : B

On living needles of *Taxodium mucronatum* Ten (Mexican bald cypress, mekishiko-rakuusho) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, September 1, 1977, by TK (TFM : FPH-4887).

Note : This fungus might have been introduced from the United States with its host, *Taxodium mucronatum* (KOBAYASHI 1980 b, c). From various indirect evidences it can be assumed that the fungus had been introduced to Asia (Japan) and South America (Brazil) 80 to 100 years ago with the diseased seedlings (ITO *et al.* 1967 ; KOBAYASHI 1980 c). Sixteen coniferous species and 2 varieties, belonging to 9 genera of Cupressaceae and Taxodiaceae, were reported as the host trees for the fungus (KOBAYASHI 1982). In Asia, the disease has been recorded in China, Japan, Korea and Taiwan (Anonymous 1970, 1972, 1983 b ; TAI 1979).

**30. *Cercospora viticis*** ELLIS **et** EVERHART, J. Mycol. 3 : 18, 1887. — Plate 6 : C ; Fig, 18

Leaf spots scattered, 2–5 mm in diam,: brown to reddish brown, then grayish brown with reddish brown border ; stroma amphigenous, olivaceous, 20–35 $\mu$m in diam. ; conidiophores on stroma, flexuous, olive brown, aseptate, or directly arising from running hyphae on the lower leaf surface, 25–35 × 2.5–4 $\mu$m ; conidia obclavate, subhyaline to pale olive brown, truncate at the basal end, 3–4–septate, 35–48 × 2–2.5 $\mu$m.

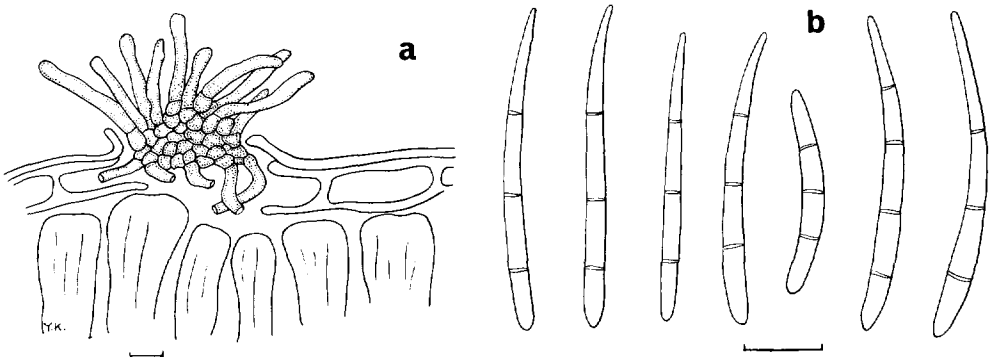


Fig. 18. *Cercospora viticis* ELLIS et EVERHART

Note) a : Stroma and conidiophores, b : Conidia (⌙ : 10 $\mu$m)

On living leaves of *Vitex parviflora* JUSS (moláve) — Forest Nursery of Cebu-city Ref. Proj., BFD, Buhisan, Cebu-city, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5099).

Note : This is the first record of the fungus in the Philippines (KOBAYASHI & GUZMAN 1985), though it has already been reported on *Vitex negundo* in the other Asian countries such as China, Japan and Taiwan (CHUPP 1953 ; KATSUKI 1965 ; KOBAYASHI 1976 ; SAWADA 1944). The fungus from Philippine material was different from *Cercospora weberi* CHUPP (1953), another *Cercospora* species described on *Vitex* from the United States, by its shape and size of conidia and conidiophores. It causes the brown leaf spot of *Vitex*.

31. ***Cercospora zizyphi*** PETCH, Ann. Roy. Bot. Gard. Peradeniya Pt. 5, 4 : 306, 1909. — Plate 6 : D ; Fig, 19

Leaf spots small, 1-3 mm in diam., brown to dark brown ; stroma epiphyllous, olive brown, 20-38 $\mu$m in diam. ; conidiophores pale olive brown, flexuous, simple, 20-43 × 3.5-5 $\mu$m, with clear conidial scars ; conidia cylindric, straight or curved, often S-shaped, pale brown to olive, truncate at the base with scar, 3-9-septate, 35-80 × 3.5-5 $\mu$m, smooth.

On living leaves of *Zizyphus mauritiana* LAM. (manzanitas, indo-natsume) — Plantation of ACDMC, Toredo-city, Cebu, February 14, 1985, by TK (TFM : FPH-5841).

Note : The leaf spot caused by the present fungus produces yellowing and early defoliation. On *Zizyphus*, 4 species of *Cercospora* have been known. Among them *Cercospora jujubae* CHOWDHURY (1946) differs from the present fungus in its hypophyllous fruitings without any spots, large conidiophores and very thick conidia. *Cercospora zizyphicola* YEN (1977) also differs in its slender conidia and amphigenous fruitings without any spots. *Cercospora tandojanensis* KHAN et KAMAL (1974) has hypophyllous fruitings without spot, large conidiophores and thick conidia. The symptoms and morphological characteristics of the present fungus was quite identical to those of *Cercospora zizyphi* PETCH. This is the first record of the species in the Philippines, though *Cercospora jujube* CHOWDHURY was recorded in the Philippines (ELLIS 1976). The present species has been reported on *Zizyphus mauritiana, Z. mucronata, Z. nummularia, Z. oenoplia* and *Z. vulgaris* in India, Sri Lanka and South Africa (BILGRAMI *et al.* 1979 ; CHUPP & DOIDGE 1948 ;

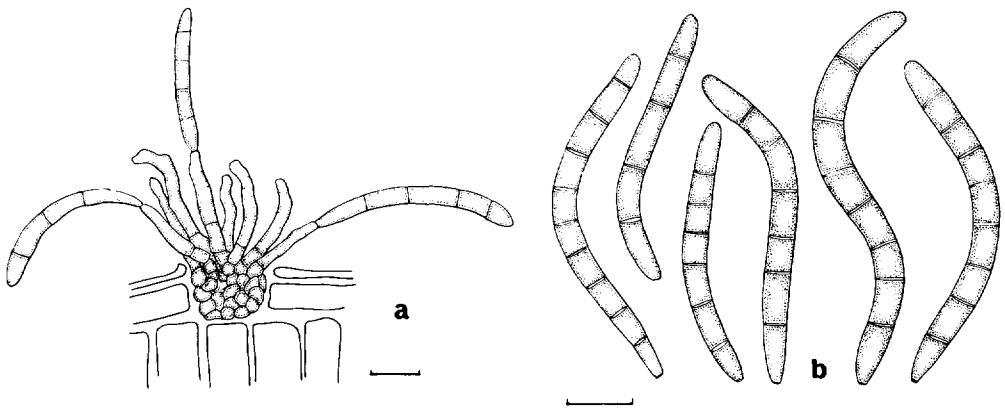


Fig. 19. *Cercospora zizyphi* PETCH

Note) a : Stroma, conidiophores and conidia, b : Conidia (⌙ : 10 $\mu$m)

DOIDGE 1950 ; MUNDKUR & AHMAD 1946 ; VASUDEVA 1963).

32. *Colletotrichum gloeosporioides* PENZIG

This is the conidial stage of *Glomerella cingulata* (STONEMAN) SPAULDING et SCHRENK (see page 150).

**33. *Colletotrichum truncatum* (SCHWEINITZ) ANDRUS et MOORE,** Phytopathology 25 : 121, 1935 ; KOBAYASHI & ZINNO, J. Jpn. For. Soc. 66 (2) : 113, 1984. — Plate 6 : E, F

On seedlings of *Leucaena leucocephala* (LAM.) de WIT (ipíl-ípil, gin'nemu) — Talakag Nursery, MAFCO, Bukidnon, Mindanao, December 4, 1981, by E. UCHIMURA (TFM : FPH-5321) ; on living leaves of *Pterocarpus indicus* WILLD. (nárra, indo-shitan) — Central Forest Nursery, RP-J :FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 23, 1977, by TK (TFM : FPH-5063).

Note : This anthracnose fungus has been recorded from the Philippines under various names ; *Colletotrichum sumbaviae* SYDOW on *Sumbavia rottleroides, Vermicularia capsici* SYDOW on *Capsicum* spp., and *V. xanthosomatis* SACC. on *Xanthosoma sagittifolium* (ARX 1957 ; TEODORO 1937). *Leucaena leucocephala* and *Ptrerocarpus indicus* are the new hosts of the fungus in the Philippines (KOBAYASHI & ZINNO 1984). The fungus also causes anthracnose of *Acacia longifolia* in Argentina and of *Albizia falcataria* seedlings in Indonesia (KOBAYASHI & ZINNO 1983, 1984 ; MERLO 1969 ; ZINNO 1982, 1983). The disease might be considered as one of the most important diseases of young legume tree seedlings in the tropics.

**34. *Corticium rolfsii* CURZI,** Boll. Staz. Catalogia veget. di Roma, n.s., 11 (4) : 365, 1932. — Plate 1 : D, 7 : A

Sclerotial state : *Sclerotium rolfsii* SACCARDO, Ann. Mycol. 9 : 257, 1911.

On seedlings of *Swietenia macrophylla* KING (big-leaf mahogany, ôba-mahoganii) — Forest Nursery of Osmeña Ref. Proj., Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5059).

Note : Southern sclerotium blight caused by the present fungus has long been known in the Philippines, attacking several herbaceous plants belonging to *Adonidia, Eucharis, Helichrysum, Oryza, Saccharum* and *Zea* (CLARA 1925 ; LEE 1921 ; OCFEMIA 1925 ; TEODORO 1937). After the Second World War, the disease was recorded on certain woody plants, namely Sindora supa, *Swietenia macrophylla* and others (GUZMAN & EUSEBIO 1975 ; KOBAYASHI 1978 a ; MEJIA 1953).

**35. *Corticium salmonicolor* BERKELEY et BROOME,** J. Linn. Soc., Bot., 18 : 71, 1873.

Synonyms : Refer to MORDUE and GIBSON (1976).

Anamorph : *Necator decretus* Massee

On cankered stems of *Albizia falcataria* (L.) FOSBERG (moluccan sau, morukka-nemu) — Plantations of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG.

Note : The fungus causes the pink disease which is giving serious damage of *Albizia falcataria* in the Philippines (EUSEBIO *et al.* 1979, 1980). It attacks various woody plants throughout the tropical and subtropical regions. In Asia, it has been recorded in Andaman Is., Brunei, Burma, Cambodia, China, India, Indonesia, Japan, Malaysia including Saba and Sarawak, Sri Lanka, Taiwan, Thailand and Vietnam (Anonymous 1984 ; BILGRAMI *et al.* 1979 ; CHANDRASRIKUL 1962 ; LIU 1977 ; MORDUE & GIBSON 1976 ; PEREGRINE & AHMAD 1982, SINGH 1980 ; TAI 1979 ; TRIHARSO *et al.* 1975 ; TURNER 1971 ; WILLIAMS & LIU 1976).

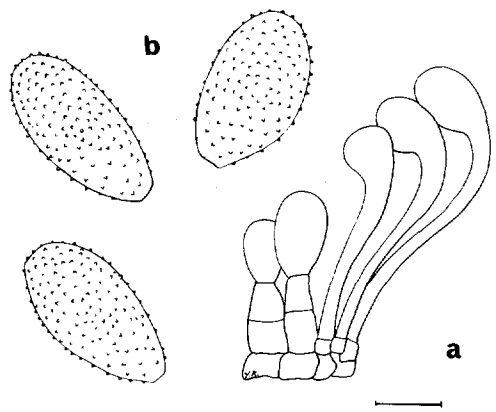


Fig. 20. *Crossopsora antidesmae-dioicae* (RAC.) ARTHUR et CUMMINS

Note) a : A part of uredinium showing young urediniospores and paraphyses, b : Urediniospores (⟼ : 10 μm)

**36. *Crossopsora antidesmae-dioicae*** (RACIBORSKI) ARTHUR et CUMMINS, Philip. J. Sci. 61 (4) : 474, 1936 — Plate 7 : B ; Fig. 20

Synonym : *Uredo antidesmae-dioicae* RACIBORSKI, Parasit. Algen u. Pilze, Javas, II Theil, Bot. Inst. Buitenz. : 33, 1900. *Cronartium antidesmae-dioicae* SYDOW, Ann. Mycol. 14 : 259, 1916 ; SYDOW & PETRAK, Ann. Mycol. 26 : 423, 1928.

On living leaves of *Antidesma ghaesembilla* GAERTN. (binayúyu) — Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 17, 1985, by TK (TFM : FPH-5825) ; Parcel III, RP-J : FDP, Conversion, Pantabangan, Nueva Ecija, Luzon, January 22, 1985, by TK (TFM : FPH-5826).

Note : The present fungus causing the rust of *Antidesma ghaesembilla* was identified by Dr. M. KAKISHIMA, University of Tsukuba. It was originally described as *Uredo antidesmae-dioicae* RAC. on *Antidesma dioica* in Indonesia, and then recorded in China, New Guinea, Phillippine and Uganda on *A. ghaesembilla* and *A. venosum* (RACIBORSKI 1900 b ; SPAULDING 1961 ; TENG 1964 ; TEODORO 1937). Previous records of rust of *Antidesma ghaesembilla* from Luzon indicated that the species was *Cronartium antidesmae-dioicae* SYDOW (ARTHUR & CUMMINS 1936 ; SYDOW 1916 ; SYDOW & PETRAK 1928). The urediniospores and paraphyses of the species from Philippine materials, which measured to be 25-34 × 15-20 μm and 25-43 × 2-2.5 μm, respectively, were identical to those described by RACIBORSKI (1900 b) and SYDOW (1916).

**37. *Cryphonectria nitschkei*** (OTTH) **BARR,** New York Bot. Gard. Mycol. Mem. 7 : 144, 1978.

Synonym : *Endothia nitschkei* OTTH, Mitt. Nat. Ges, Bern, 1868 : 8 ; KOBAYASHI, Bull. Gov. For. Exp. Sta. 226 : 143, 1970.

Stroma first immersed within bark, then erumpent, yellowish orange, 0.5-2 mm in diam., 600-700 μm in height ; perithecia seated at bottom of stroma in a layer, 210-360 μm, in diam., with long neck ; necks blackish, cylindric, 1-2 mm in length ; asci unitunicate, clavate, 55-58 × 9-10 μm, 8-spored, with apical ring at the tip ; ascospores hyaline, elliptic to fusoid, 2-celled, 11.5-15 × 4-5 μm.

On cankered bark of *Eucalyptus deglupta* BL (bagrás) — Plantations of PICOP, Bislig, Surigao del Sur, Mindanao, March 23, 1977, by TK & DG.

Note : *Cryphonectria gyrosa* (BERK. et BR.) SACC. and *C. havanensis* (BRUNER) BARR have been reported in Australia, Brazil, Cuba, Havana, Japan and Surinam on dead or cankered bark of *Eucalyptus* spp. (Anonymous 1968 ; BARR 1978 ; BOERBOOM & MAAS 1970 ; BRUNER 1916 ; DAVISON 1982 ; EHRENCORN 1967 ; KOBAYASHI 1970 ; MAY 1973). However, the

fungus from Philippine material has asci and ascospores larger than those produced by species listed above. Morphological characteristics of the former were similar to those of *Cryphonectria nitschkei* (OTTH) BARR. These species of *Cryphonectria* have long been known under the genus *Endothia* FRIES. Recently, BARR (1978) reconfirmed the segregation of *Cryphonectria* SACCARDO from *Endothia* FRIES based on their ascospore characters. The genus *Endothia* has one-celled and allantoid ascospores, and the genus *Cryphonectria* has two-celled and elliptic to fusoid ascospores.

*Eucalyptus deglupta* is a new host of *Cryphonectria nitschkei* which was newly added to the Philippine mycoflora.

**38. *Diaporthe eres*** NITSCHKE, Pyren. Germ. 245, 1867, emend WEHMEYER, Univ. Michig. Stud., Sci. Ser. 9 : 63, 1933. — Plate 7 : C ; Fig. 21

Anamorph : *Phomopsis cinerescens* (SACCARDO) BUBÁK, *P. imperiales* (SACCARDO) HARA, *P. mendax* (SACCARDO) TRAVERSO

Perithecia immersed within bark, often beneath the collapsed pycnidium, single or

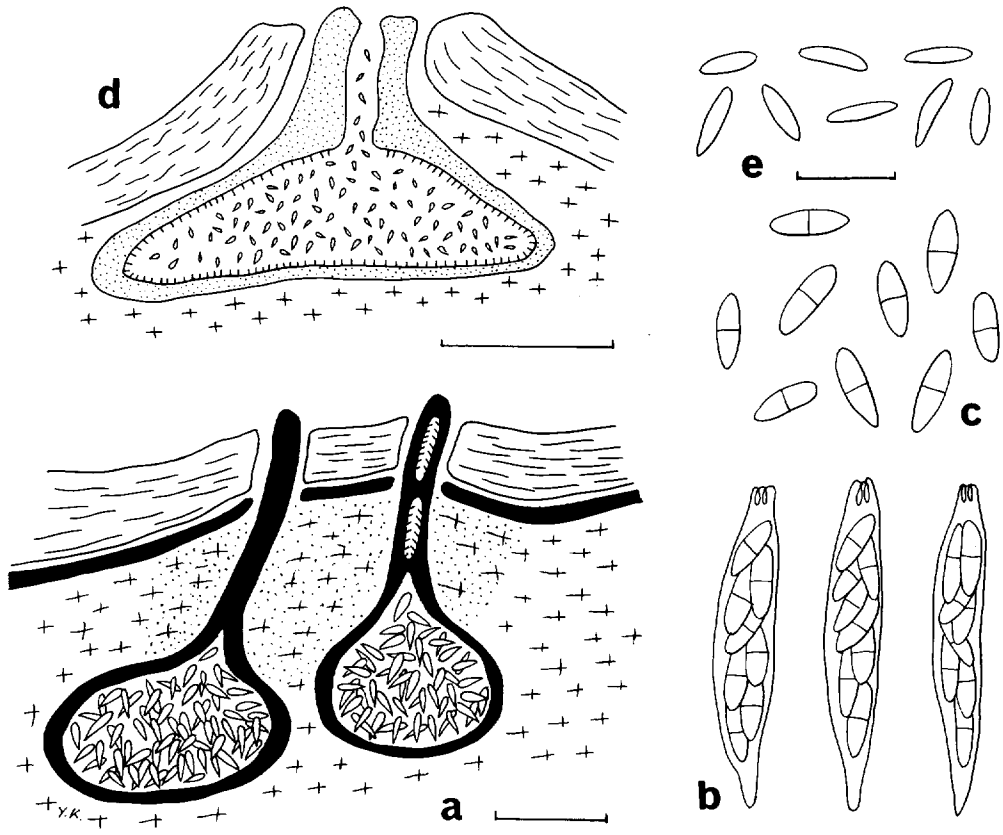


Fig. 21. *Diaporthe eres* NIT.

Note) a : Perithecial stroma, b : Asci, c : Ascospores, d : Pycnidial stroma, e : Pycnospores (A-spores) (⌙ : a, d = 100 μm ; b, c, e : 10 μm)

grouped 2 or 3, black, 180–220 μm in diam., with neck at the top ; necks protruding a little from the bark surface, 250–350 μm ; asci irregularly filled in perithecia, unitunicate, clavate, 8-spored, 35–48 × 6.3–8 μm, with apical ring at the top ; ascospores irregularly biseriate, hyaline, elliptic to fusoid, 2-celled, 9–12.5 × 2.5–4 μm. Pycnidia first in epidermal layer, then erumpent, 100–200 μm in diam. ; conidia (A-spores) hyaline, fusoid, unicellular, 6.5–10 × 2–2.5 μm.

On cankered bark of *Acacia auriculiformis* CUNN. et BENTH. (Papua wattle, kamaba-akashia) — Plantation of Parcel I, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, March 1982 (kept in moist chamber from December 1981), by TK (TFM : FPH-6007). Conidial state only : on cankered bark of *Acacia auriculiformis* — Parcel I, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, December 1981, by A. Yamane (TFM : FPH-6001) ; on dead twigs of *Albizia falcataria* FOSB. (moluccan sau, morukkanemu) — Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 25, 1985, by TK (TFM : FPH-6002) ; on cankered bark of *Paulownia taiwaniana* HU et CHUNG (usubagiri) — Plantation of NALCO, Tungao Camp, Agsan del Norte, September 15, 1977, by TK ; Nursery of IAFDC, Sta. Maria, Bulacan, Luzon, February 10, 1981, by TK (TFM : FPH-5643).

Note : The fungus causes a serious dieback and canker of *Acacia auriculiformis* (see page 118). It was identified as *Diaporthe eres* NIT. sensu WEHMEYER (1933) based on its morphological characteristics, although in our material B-spore (stylospore) was not observed (KOBAYASHI & GUZMAN 1986 a, d).

On *Acacia* four species of *Diaporthe* have been recorded. *Diaporthe gorgonoidea* CKE. et HARK., which was treated as a synonym of *D. medusaea* NIT. by WEHMEYER (1933), has been described on *Acacia* sp. from the United States (SACCARDO 1981). It differs from the present fungus in its clustered perithecia with hair-like long necks protruding from the bark surface. *Diaporthe acaciae* TILAK (1968) which was described on *Acacia arabica* from India, and *D. fasciculata* NIT. which was treated as a synonym of *D. oncostoma* (DUBY) FUCK. by WEHMEYER (1933), are distinguishable from the present fungus by its large asci and ascospores. *Diaporthe oncostoma* was reported on *Acacia* sp. in Bulgaria (GRIGOROVA 1956). Another *Diaporthe, D. sheariana* PETR., described on *Acacia koa* from Hawaii (PETRAK 1952) also clearly differs from the present fungus in its ascospores having appendages on both their ends. *Phomopsis acaciae* CHEN causes leaf blight of *Acacia confusa* in Taiwan (CHEN 1967) has quite similar morphologic characters to the conidial stage of the present fungus. *Phomopsis cinerescens* (SACC.) BUBÁK, being a conidial stage of *Diaporthe eres* sensu WEHMEYER, was recorded on *Ficus ulmifolia* in Negros, the Philippines (SACCARDO 1914 ; SYDOW 1917 ; TEODORO 1937).

On *Albizia, Diaporthe mendax* SACCARDO and its anamorph *Phomopsis mendax* (SACC.) TRAV. have been described on *A. julibrissin* from Italy. WEHMEYER (1933) noted that *Diaporthe mendax* seems to be the same species as *D. eses*. The fungus from the Philippine materials has A-conidia in its pycnidia about 6–10 × 2–2.5 μm. It is quite similar not only to *D. eres* but also to *D. mendax*. Therefore, the *Phompsis* stage collected on *Albizia* in the Philippines was identified as the imperfect stage of *Diaporthe eres* NIT. No other record has been found on *Phompsis* or *Diaporthe* on *Albizia*.

The *Phomopsis* stage on *Paulownia taiwaniana* was identified as *Phomopsis imperiales* (SACC.) HARA which had been found to be the anamorph of *Diaporthe eres* NIT.

(KOBAYASHI & ITO 1957), based on the similarity of morphological characteristics between the fungus on the Philippine and the Japanese materials.

**39. *Diatrypella favacea*** (FRIES) CESATI et de NOTARIS, Schem. Sfer. Ital. 28, 1883. — Plate 7 : D ; Fig. 22

Stroma embedded within bark tissue, then erumpent, wartlike, black on surface, 1-2 mm in diam., 500-700 $\mu$m in height, composed of thick-walled parenchymatous cells, containing several perithecia in a layer ; perithecia 220-420 $\mu$m in diam., with short neck at the tip ; wall of perithecia 40-50 $\mu$m in thickness ; necks erect, 150-220 $\mu$m in length and 130-140 $\mu$m in diam. ; asci unitunicate, clavate with long stalk, arranged in a layer along the perithecial wall, 60-70 × 11-12.5 $\mu$m, containing many ascospores in one ascus ; ascospores unicellular, allantoid or sausage-shaped, hyaline to pale greenish in each spore, but greenish brown in mass, 6-7.5 × 0.5-1.5 $\mu$m.

On dead bark of *Cassia fruticosa* MIL. (yellow shower) — Forest Nursery, Central Forest Experimental Station, UPLB-CF, Laguna, Luzon, March 18, 1977, by TK (TFM : FPH-5080).

Note : On *Cassia* only one species of *Diatrypella, D. cassiae* TILAK (1967), has been known from India, but it apparently differs from the present fungus in its smaller asci and larger ascospores. The present fungus was identified as *Diatrypella favacea* (FRIES) CES. et de NOT. (SACCARDO 1882) based on morphological characteristics quite similar among many hitherto known species of *Diatrypella*. The fungus is well known in Europe (MUNK 1966 ; SACCARDO 1882 ; SANDU-VILLE 1971). The Philippines is a new locality and *Cassia fruticosa* is a new host for the fungus.

**40. *Ellisiopsis gallesiae*** BATISTA et NASCIMENTO, Ann. Soc. Biol. Pernambuco 14 : 21,

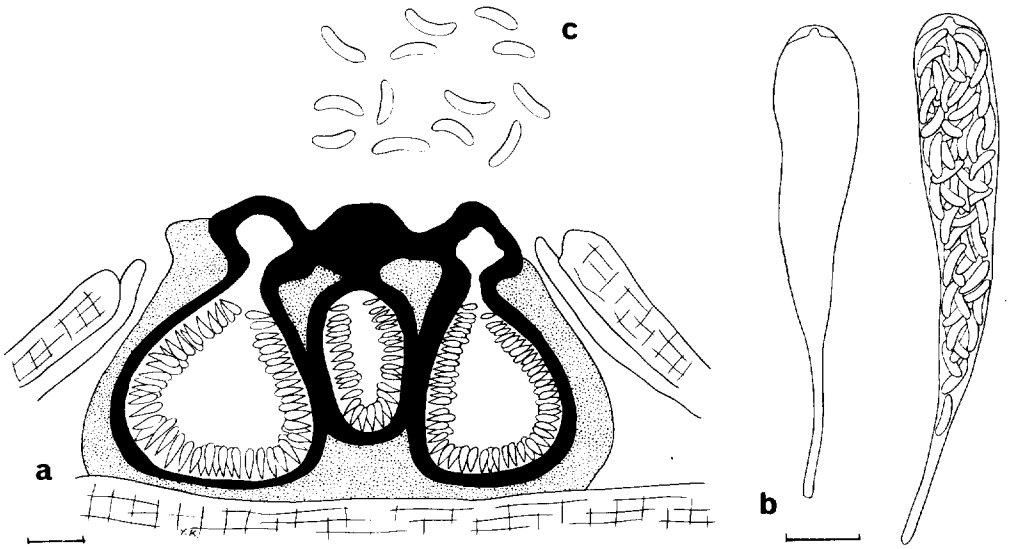


Fig. 22. *Diatrypella favacea* (FRIES) CES. et de NOT.

Note) a : Perithecial stroma, b : Asci, c : Ascospores (⟝ : a = 100 $\mu$m ; b = 10 $\mu$m)

1956 ; KOBAYASHI ; Trans. Mycol. Soc. Japan 20 : 302, 1979.

On living leaves of *Pterocarpus indicus* WILLD. (nárra, indoshitan) — Forest Nursery of Alipang Ref. Proj., BFD, Alipang, La Union, Luzon, February 22, 1977, by TK & DG (TFM : FPH-4891) ; Forest Nursery, Central Forest Experiment Station, UPLB-CF, Laguna, Luzon, March 18, 1977 by TK (TFM : FPH-4899) ; Forest Nursery of Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-4890).

Note : The fungus was first reported in the Philippines and on a new host, *Pterocarpus indicus* (KOBAYASHI 1979).

**41. *Eriophyes* sp.** — Plate 7 : E

On living leaves of unknown species belonging to Tiliaceae — Mt. Rubas, Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG.

Note : Mites belonging to *Eriophyes* cause Erineum gall leaf disease on various broad-leaved trees. The symptoms on the affected host was very conspicuous, but its damage was not so severe. The identification of the mite species could not be determined.

**42. *Exosporium leucaenae*** STEVENS et DALBEY, Mycologia 11 : 5, 1919 ; KOBAYASHI, Trans Mycol. Soc. Japan 19 : 379, 1978. — Plate F

Synonym : *Camptomeris leucaenae* (STEV. et DALBEY) SYDOW, Ann. Mycol. 28 : 222, 1930.

On living leaves of *Leucaena leucocephala* (LAM.) de WIT. (giant ipíl-ípil, gin'nemu) — Forest Nursery of the Central Forest Experiment Station, UPLB-CF, Laguna, Luzon, April 5, 1977, by TK (TFM : FPH-4955) ; Forest Nursery of Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-4870) ; Forest Nursery of Malasag Ref. Proj., BFD, Cagayan de Oro, Misamis Oriental, Mindanao, September 12, 1977, by TK (TFM : FPH-4871) ; Forest Nursery of NALCO, Agusan del Norte, Mindanao, September 14, 1977, by TK (TFM : FPH-4872) ; Central Trial Plantation, RP-J : FDP, Baluarte, Carraglan, Nueva Ecija, Luzon, January 18, 1985, by TK (TFM : FPH-5829) ; Central Office of RP-J : FDP, Maringalo, Nueva Ecija, Luzon, January 15, 1985, by TK (TFM : FPH-5832) ; Plantation of ANZAP, Mayantoc, Tarlac, Luzon, February 8, 1985, by TK & DG (TFM : FPH-5857) ; Plantation of ACMDC, Toledo-city, Cebu, February 14, 1985, by TK (TFM : FPH-5830).

Note : This fungus causes the yellow leaf disease of *Leucaena leucocephala* (KOBAYASHI 1978 d). It was originally described on *Leucaena glauca* (= *L. leucocephala*) in Puerto Rico (STEVENS & DALBEY 1919). Thereafter, it was recorded on *Leucaena leucocephala* in Central and South America, namely Colombia, Dominica, Jamaica, Puerto Rico and Venezuela (Anonymous 1960 ; CIFERRI 1961 ; DENNIS 1970 ; HUGHES 1952 b ; LENNÉ 1979 ; SEAVER & CHARDON 1926 ; STEVENS & DALBEY 1919 ; STEVENSON 1975). LENNÉ (1980) added several hosts besides *Leucaena leucocephala* for the fungus in Colombia. These are *Leucaena collinsii, L. esculenta, L. macrophylla, L. pulverulenta* and *L. channoni.* Recently, QUINIONES and DAYAN (1983) noted a leaf spot disease of *Leucaena leucocephala* caused by *Camptomeris leucaenae* from Luzon. This is the same disease as recorded by the authors.

The causal fungus is well-known at present under the name *Camptomeris leucaenae* (STEV. et DALBEY) SYDOW (ELLIS 1971 ; HUGHES 1952 b ; SYDOW 1930). However, it does not have typical features of the genus *Camptomeris* as already pointed out by BESSEY (1953) who established a subgenus Exosporioides for the untypical species of *Camptomeris.*

Homogeneity or heterogeneity among the species of the genus *Camptomeris* especially on their biological features and relation to their perfect stages should be studied in detail. Therefore, the fungus causing yellow leaf disease of *Leucaena leucocephala* in the Philippines was recorded here as *Exosporium leucaenae* STEVENS et DALBEY. The Philippines is a new locality of the fungus.

**43. *Fusarium oxysporum*** SCHLECHTENDAHL, Flora Berol. 2 : 139, 1824 emend SNYDER and HANSEN, Amer. J. Bot. 27 : 64, 1940. — Plate 7 : G

Isolated from the root of young seedlings of *Albizia falcataria* (L.) FOSBERG (moluccan sau) — Boneko Forest Nursery, BFD, Itogon, Benguet, Luzon, February 20, 1977, by TK & DG ; Forest Nursery of Impalutao Ref. Proj., BFD, Impalutao, Bukidnon, Mindanao, September 13, 1977, by TK ; *Eucalyptus deglupta* BLUME (bagrás) — Central Forest Nursery of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK ; *Leucaena leucocephala* (LAM.) de WIT. (giant ipíl-ípil, gin'nemu) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG ; Central Forest Nursery of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG (TFM : FPH-5100) ; *Pinus caribaea* MORELET (caribean pine) — Central Forest Nursery of RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 1977, by TK ; *Pinus elliottii* ENGELM. (slash pine) — Central Forest Nursery of RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 1977, by TK ; *Pinus kesiya* ROYLE ex GORDON (benguet pine) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG (TFM : FPH-5095) ; Boneko Forest Nursery, BFD, Itogon, Benguet, Luzon, February 20, 1977, by TK & DG ; Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, March 9, 1977, by TK & DG (TFM : FPH-5096) ; Marikit Forest Nursery, NIA-BFD, Pantabangan, Nueva, Ecija, Luzon, March 8, 1977, by TK & DG (TFM : FPH-5090 ; FFPRI : FP-50) ; *Pinus oocarpa* SCHIEDE — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 1977, by TK ; *Psidium guajava* L. (guava, banjiro) — Forest Nursery of Consuelo Ref. Proj., BFD, Santa Fe, Nueva Viscaya, March 9, 1977, by TK & DG (TFM : FPH-5091).

Note : The fungus causes the damping-off and root rot diseases on various herbaceous and woody plants in the Philippines (see page 112).

**44. *Fusarium solani*** (MARTIUS) SACCARDO, Michelia 2 : 296, 1881, emend. SNYDER and HANSEN, Amer. J. Bot. 28 : 740, 1941. — Plate 7 : G

Isolated from the root of young seedlings of *Albizia falcataria* (L.) FOSBERG (moluccan sau) — Boneko Forest Nursery, BFD, Itogon, Benguet, Luzon, February 20, 1977, by TK & DG ; Forest Nursery of Impalutao Ref. Proj., BFD, Impalutao, Bukidnon, Mindanao, September 13, 1977, by TK ; *Eucalyptus deglupta* BLUME (bagrás) — Central Forest Nursery of PICOP, Bisling, Surigao del Sur, Mindanao, March 22, 1977, by TK & DG ; *Leucaena leucocephala* (LAM.) de WIT. (giant ipíl-ípil) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG (TFM : FPH-5100) ; Central Forest Nursery, PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG ; *Pinus caribaea* MORELET (caribean pine) — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva ecija, Luzon, September 1977, by TK ; *Pinus elliottii* SCHIEDE (slash pine) — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 1977, by TK ; *Pinus kesiya* ROYLE ex GORDON (benguet pine) — Boneko Forest Nursery, BFD, Itogon, Benguet, Luzon, February 20, 1977, by TK & DG ; Pacdal Forest Nursery,

BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG (FFPRI : FP-51) ; Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 1977, by TK ; Marikit Forest Nursery, NIA-BFD, Pantabangan, Nueva Ecija, Luzon, March 8, 1977, by TK & DG (TFM : FPH-5090) ; *Pinus oocarpa* SCHIEDE — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 1977, by TK ; *Swietenia macrophylla* KING (big-leaf mahogany, ôba-mahoganii) — Alipang Forest Nursery, BFD, Alipang, La Union, Luzon, February 22, 1977, by TK & DG ; Forest Nursery of Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG. On the stems of young seedlings of *Leucaena leucocephala* (LAM.) de WIT. (giant ipíl-ípil, gin'nemu) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 22, 1977, by TK & DG.

Note : The fungus causes the damping-off and root rot disease of various herbaceous and woody plants (see page 112). It was also observed on the wilted stem and petioles of young seedlings of giant ipíl-ípil, *Leucaena leucocephala*. Macroconidia produced by the fungus were 25–35 × 2–4 μm with 3–5-septa while microconidia 4.5–6.5 × 1.5–2.5 μm.

**45. *Glomerella cingulata*** (STONEMAN) SPAULDING **et** SCHRENK, Bull. Bur. Pl. Indust., U.S. Dept. Agr. 44 : 29, 1903. — Plate 7 : H, 8 : A ; Fig. 23

Anamorph : *Colletotrichum gloeosporioides* PENZIG

Perithecia immersed beneath epidermal layer of needles, breaking through it by ostiole, black, globular, 115–150 μm in diam., 130–175 μm in height ; wall of perithecia composed of thick-walled and dark cells, 12.5–20 μm in thickness ; asci unitunicate, clavate, 60–65 × 10–12.5 μm, 8-spored, with apical apparatus ; ascospores irregularly biseriate,

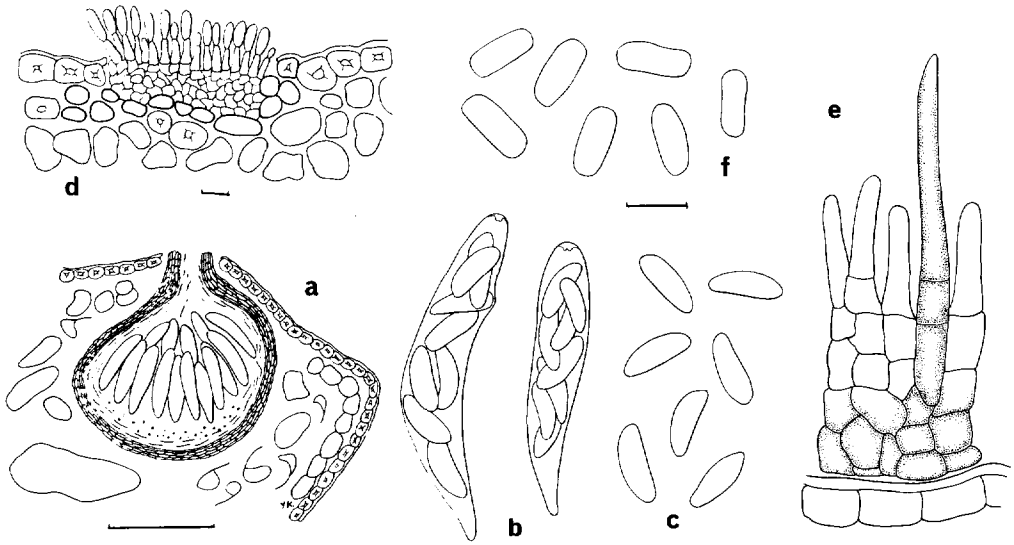


Fig. 23. *Glomerella cingulata* (STON.) SP. et SCHR.

Note) a : Perithecium, b : Asci, c : Ascospores, d : Acervulus, e : A part of acervulus having seta, f : Conidia (a–d, f : on *Pinus caribaea* ; e : on *Pterocarpus indicus*) (⌙ : 10 μm)

hyaline, unicellular, fusoid, somewhat inaequilateral, 12.5–15 × 4.5–6.5 μm.

Conidial stage : acervuli immersed within epidermal layer, then erumpent, 70–350 μm in diam. ; conidiophores hyaline, simple, 10–15 × 4–5.5 μm ; setae simple brown, acute at the tip, 52–73 × 4–5 μm ; conidia elliptic to rectangular, unicellular, hyaline, 12–19 × 4.5–7.5 μm.

On dead needles of *Pinus caribaea* MORELET (caribean pine) — Plantation of ANZAP, Mayantoc, Tarlac, Luzon, February 8, 1985, by TK & DG (TFM : FPH-5819). Conidial stage only : on living leaves of *Hydrangea macrophylla* SER. (ajisai) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG (TFM : FPH-4951) ; Forest Nursery of Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5098) ; February 14, 1985, by TK (TFM : FPH-5852) ; on living leaves of *Lansium domesticum* CORR. (lanzónes) — Forest Nursery of FORI, Campus of UPLB-CF, Laguna, Luzon, April 1, 1977, by TK & DG (TFM : FPH-5074, 5075) ; on living leaves and young shoots of *Leucaena leucocephala* (LAM.) de WIT. (giant ipíl-ípil, gin'nemu) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 22, 1977, by TK & DG (FFPRI-C 2-69) ; on living leaves, shoots and fruits of *Mangifera indica* L. (mango) — Campus of UPLB-CF, Laguna, Luzon, March 11, 1977, by TK ; Talatalan Forest Nursery of RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK ; Saddle Dam Central Nursery, NIA, February 7, 1985, by TK & DG (TFM : FPH-5831) ; Nursery of MSB, Quezon-city, Rizal, Luzon, February 11, 1985, by TK ; Forest Nursery of Cebu-city Ref. Proj., BFD, Buhisan, Cebu, February 13, 1985, by TK (TFM : FPH-5853) ; on dead twigs of *Pterocarpus indicus* WILLD. (nárra, indo-shitan) — Parcel I Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM : FPH-6000).

Note : The morphological characteristics of the perithecial and conidial stages of the fungus on pine are similar to those of *Glomerella cingulata* (STON.) SP. et SCHR. and its imperfect stage, *Colletotrichum gloeosporioides* PENZ., which were recorded on certain broad-leaved trees (ARX 1957 ; ARX and MÜLLER 1954 ; DENNIS 1978 ; KOBAYASHI 1977 b ; KOBAYASHI & SASAKI 1975). Although the *Colletotrichum* stage of the fungus has been known in the Philippines under the various synonymous names as mentioned in the later, this is the first record of the perfect stage in the Philippines. On *Pinus caribaea*, the fungus has been recorded from Fiji and Malaysia (Sabah) (FIRMAN 1972 ; LIU 1977 ; SINGH 1980). In Japan, KITAJIMA (1917) reported *Gloeosporium* sp. as causing anthracnose of the needles of *Pinus densiflora*. Based on his description and figures, the fungus he identified should be included within the ARX's concept of *Colletotrichum gloeosporioides* PENZ.

This is also the first record of the fungus on *Hydrangea* in the Philippines. Anthracnose of *Hydrangea* caused by the present species has been reported from Brunei, Japan and Taiwan (NAKAMURA 1969 ; PEREGRINE & AHMAD 1982 ; SAWADA 1943 a, as *Colletotrichum hydrangeae* SAWADA). On *Leucaena* the fungus causes top-wilt of young seedlings. No record of anthracnose caused by the present species has been found on *Leucaena leucocephala*. The fungus causes a very serious disease on mango (CLARA 1927 ; PALO 1932). The causal fungus of mango anthracnose has previously been identified as *Gloeosporium cingulatum* ATK. (PALO 1932) and *G. mangiferae* HENN. (TEODORO 1937) in the Philippines. *Glomerella cingulata* has been listed on *Pterocarpus indicus* from Brunei (PEREGRINE & AHMAD 1982). Anthracnose of *Lansium domesticum* was first noted in the Philippines by the senior author (KOBAYASHI 1981).

In the Philippines, anthracnose caused by *Colletotrichum gloeosporioides* has been roported on *Citrus* spp. and *Agathis* spp. (QUINIONES 1980, TEODORO 1937). Moreover, the anthracnose fungus has also been recorded on many woody and herbaceous plants, under various species names such as *Colletotrichum agaves* CAV. on *Albizia lebbek, C. arecae* SYDOW on *Areca catechu, C. lebbek* (SYD.) PETR. on *Albizia lebbek, C. pandani* SYD. on *Pandanus veitchii, C. papayae* (HENN.) SYD. on *Carica papaya, Gloeosporium aleuriticum* SACC. on *Aleurites moluccana, G. catechu* SYD. on *Areca catechu, G. heveae* PETCH on *Hevea* sp., *G. limetticolum* CLAUSSEN on *Citrus aurantifolia, G. palmarum* OUDEM. on *Areca catechu* and others (ARX 1957 ; TEODORO 1937).

**46. *Guignardia gmelinae* KOBAYASHI,** Trans. Mycol. Soc. Japan 21 : 314, 1980 — Plate 8 : B

Anamorph : *Phyllosticta gmelinae* KOBAYASHI

On living leaves of *Gmelina arborea* L. (yemane, kidachi-yoraku) — Plantation of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG (TFM : FPH-5058, Holotype).

Note : This fungus causes the gray leaf spot of *Gmelina arborea* (KOBAYASHI 1980). The damage seems to be slight. No other collection and record has been found on this fungus.

**47. *Hamaspora acutissima* P. et H. SYDOW,** Monogr. Ured. III : 80, 1915 — Plate 8 : C

On *Rubus* sp. — Mt. Rubas, Osmeña Ref. Proj., Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-4961).

Note : The present rust fungus, which was identified by Dr. N. HIRATSUKA, Tottori Mycological Institute, was characterized by its long hair-like telia which are more than 6 mm in length. This species was originally described on *Rubus rolfei* from Negros in the Philippines (SYDOW 1915). It was also recorded on *Rubus elmeri, R. frazinifolius, R. moluccanus, R. rolfei* and *R. togallus* from Luzon and Mindanao (TEODORO 1937). In Asia, this rust fungus has been reported on *Rubus calycinoides, R. formosensis, R. laconiato-stipulatus, R. moluccanus, R. nantoensis, R. nesiotis, R. pectinellus* var. *triloba, R. rosaefolius* and *R. setchuensis* in China, Indonesia, Japan, Malaysia and Taiwan (Anonymous 1970 ; ITO 1950 ; SAWADA 1919, 1943 b ; SYDOW 1915 ; THOMPSON & JOHNSTON 1953 ; TAI 1979 ; TENG 1964).

**48. *Hemileia vastatrix* BERKELEY et BROOME,** Gdner's Chron. 1869 : 1157 — Plate 8 : D

On living leaves of *Coffea arabica* L. (arabian coffee) — Forest Experimental Nursery, FORI, Bobok, Benguet, Luzon, February 21, 1977, by TK & DG (TFM : FPH-4963) ; Taal, Batangas, Luzon, April 1977, by TK ; Experimental Farm for Agro-Forestry, UPLB-CF, Calamba, Laguna, Luzon, April 13, 1977 by TK & DG (TFM : FPH-4962).

Note : See page 114.

49. *Leptostroma* sp.

This is the imperfect stage of *Lophodermium australe* DEARN. (see next).

**50. *Lophodermium australe* DEARNESS,** Mycologia 18 : 242, 1926. — Plate 8 : E ; Fig. 24

Apothecia black, fusoid, 600-1200 $\mu$m long, without black line, covered by epidermis on either side with several epidermal cells remaining at the center bottom of apothecia ; asci cylindric to clavate, hyaline, 8-spored, 75-125 × 10-17.5 $\mu$m ; paraphyses filiform, as long as the asci ; ascospores filiform, hyaline, 45-85 × 1.5-3 $\mu$m, with a gelatinous sheath.

On dead needles of *Pinus caribaea* MORELET (caribean pine) — Campus of Mountain

View Univ., Lurugan, Bukidnon, Mindanao, February 5, 1981, by TK (TFM: FPH-5197); Central Trial Plantation, RP-J: FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 17, 1985, by TK (TFM: FPH-5848); *Pinus kesiya* ROYLE ex GORDON (benguet pine) — Plantation of BFD, Dry Creek, Benguet, Luzon, September 1, 1977, by TK (TFM: FPH-5069); *Pinus merkusii* JUNGH. ex de VR. (mindoro-pine) — Natural Forest of BFD, Cabangan, Zambales, Luzon (sent to Central Forest Nursery, RP-J: FDP, Baluarte, Nueva Ecija, Luzon), August 11, by TK (TFM: FPH-5073). Conidial state only: on dead needles of *Pinus kesiya* ROYLE ex GORDON (Thailand seed source) — Plantation of Malaybalay Ref. Proj., BFD, Ancolubug Camp, Malaybalay, Bukidnon, Mindanao, September 13, 1977, by TK (TFM: FPH-5068); *Pinus merkusii* JUNGH. et de VR. (mindoro pine) — Natural Forest of BFD, Cabangan, Zambalas, Luzon, August 11, 1977, (sent to Central Forest Nursery, RP-J: FDP, Baluarte, Carranglan, Nueva Ecija, Luzon), by TK (TFM: FPH-5071).

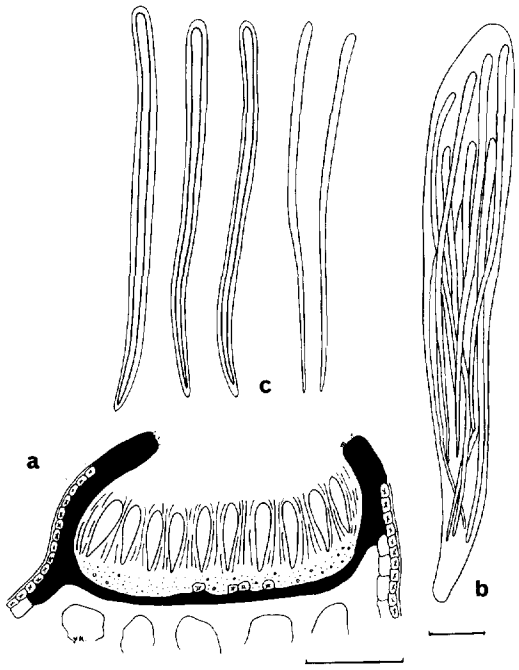


Fig. 24. *Lophodermium australe* DEARNESS
Note) a: Apothecium, b: Ascus, c: Ascospores with or without viscous epispore (⟝: a = 100 μm; b, c = 10 μm)

Note: According to MINTER and MILLER (1978), this species is most prevalent in the tropics. Recently, species of the genus *Lophodermium* inhabiting pines were re-examined and re-described by MINTER and MILLER (1978) and MINTER *et al.* (1978). Judging from their keys distinguishing the species, the species from the Philippines was identified as *Lophodermium australe* DEARN. which was originally described on *Pinus palustris* and *P. taeda* from the United States (DEARNESS 1926). Besides the USA, the fungus is found in Central America, the Caribbean Islands, Hawaii, Brazil, Zambia, Indonesia, Malaysia, Philippines, Australia and Fiji (MINTER & MILLER 1978; SAHO 1984). Other known hosts are *Pinus echinata, P. elliottii, P. glabra, P. merkusii, P. patula, P. pinaster, P. radiata* and *P. resinaria* (BEGA *et al.* 1978; DEARNESS 1926; MINTER & MILLER 1978; RAABE *et al.* 1981; SAHO 1984).

**51. *Macrophoma luzonensis*** KOBAYASHI, Trans. Mycol. Soc. Japan 22: 303, 1981. — Plate 8: F

On living leaves of *Mangifera indica* L. (mango) — Guest House of BCI, Bobok, Benguet, Luzon, September 2, 1977, by TK (TFM: FPH-5103, Holotype).

Note: The fungus causes the grey leaf spot of mango, *Mangifera indica* (KOBAYASHI 1981). It has only been known from its type locality.

**52. *Macrophoma micromegala*** (BERKELEY et CURTIS) BERLESE et VOGLINO, Atti Soc. Veneto-Trentina 1886: 185. — Plate 8: G; Fig. 25

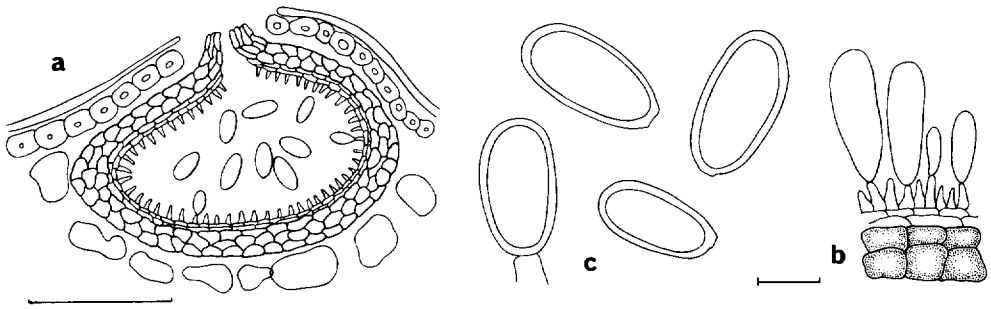


Fig. 25. *Macrophoma micromegala* (BERK. et CURT.) BERL. et VOGL.
Note) a : Pycnidium, b : A part of pycnidial wall, c : Pycnospores (⟝ : 10 μm)

Synonym : *Phoma micromegala* (BERK. et CURT.) SACCARDO, Syll. Fung. 3 : 73, 1884.

Pycnidia immersed beneath epidermal layer of needles, breaking through it by ostiole, black, globular, 200-275 μm in diam., 150-190 μm in height ; wall of pycnidia composed of thick-walled trigonal to angular cells, 20-25 μm in thickness ; conidiophores hyaline, simple, 7.5-10 × 2.5 μm ; conidia hyaline, unicellular, elliptic to ovoid, thick-walled, with a scar at the bottom end, 22-30 × 12-15 μm.

On dead needles of *Pinus merkusii* JUNGH. ex de VR. (mindoro pine) — Natural Forest of BFD, Cabangan, Zambales, Luzon (sent to Central Forest Nursery of RP-J : FDP, Baluarte, Carranglan Nueva Ecija, Luzon), August 11, 1977, by TK (TFM : FPH-5072).

Note : On pines 5 species of *Macrophoma* have hitherto been described. Among them, *Macrophoma acuaria* (CKE.) BERL. et VOGL. (SACCARDO 1884, 1892) apparently differs from the present fungus in its smaller sizes of pycnospores. No description of the dimensions of conidia was found in *Macrophoma strobi* (BERK. et BR.) BERL. et VOGL. (SACCARDO 1884, 1892). *Macrophoma pinea* PASS. (SACCARDO 1892) and *M. pini-densiflorae* SAWADA (1950) also differ in their quite narrower (6.5-7.5 μm) and fusoid conidia. Conidia of the present fungus were 12-15 μm in width and were elliptic to ovoid in shape. Because the size and shape of conidia produced by the fungus from the Philippines fit with those of *Macrophoma micromegala* (BERK. et CURT.) BERL. et VOGL. (SACCARDO 1884, 1892), the fungus was identified as *M. micromegala*. This is the first record of the species in the Philippines and *Pinus merkusii* is a new host of the fungus.

**53. *Macrophomina phaseolina* (TASSI) GOIDÁNICH,** Ann. Sper. Agr., n.s. 1 : 457, 1947.

On stems and roots of the seedlings of *Pinus kesiya* ROYLE ex GORDON (benguet pine) — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, August 12, 1977, by TK (TFM : FPH-4878) ; *P. caribaea* MORELET (caribbean pine) — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, August 12, 1977, by TK ; *P. elliottii* ENGELM. (slash pine) — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, August 12, 1977, by TK ; *P. oocarpa* SCHIEDE — Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, August 12, 1977, by TK.

Note : The fungus causes the black root rot or charcoal rot of seedlings (see page 113). It has been known as *Macrophomina philippinensis* PETRAK (1923). Four pine species

listed above are new hosts of the fungus in the Philippines.

54. ***Melampsoridium hiratsukanum*** Ito ex Hiratsuka, J. Fac. Agr. Hokkaido Imp. Univ. 21 : 9, 1927.

On living leaves of *Alnus japonica* (Thunb.) Steud. (han'noki) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG ; September 1, 1977, by TK ; Plantation around Atok Forest Nursery, BFD, Benguet, Luzon, February 20, 1977, by TK & DG ; Plantation around Binga Forest Nursery, BFD, Itogon, Benguet, Luzon, February 20, 1977, by TK & DG ; Plantation around Bobok Experimental Nursery, FORI, Bobok, Benguet, Luzon, February 21, 1977, by TK & DG ; September 2, 1977, by TK ; *Alnus maritima* Nuttall (Malaysian alder, malay-han'noki) — Atok Forest Nursery, BFD, Atok, Benguet, Luzon, February 20, 1977, by TK & DG (TFM : FPH-4956) ; Binga Forest Nursery, BFD, Itogon, Benguet, Luzon, February 20, 1977, by TK & DG ; Bobok Forest Experimental Nursery, FORI, Bobok, Benguet, Luzon, February 21, 1977, by TK & DG (TFM : FPH-4957) ; September 2, 1977, by TK ; Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG ; September 1, 1977, by TK.

Note : The fungus affects seedlings and young trees of alder which grow as evergreen throughout the year without any alternate host. The rust fungus was originally recorded on *Alnus hirsutus* from Japan (Hiratsuka 1927). Since, it has been reported in China, Equador, Guatemala, India, Korea and Sagharin (Bilgrami *et al.* 1979, Hiratsuka 1927, 1942, Spaulding 1961). Twenty species of *Alnus*, namely *A. acuminata, A. arguta, A. cordata, A. formosana, A. glutinosa, A. hirsutus, A. hirsutus* var. *sibirica, A. incana, A. inokumai, A. japonica, A. jorullensis, A. jorullensis* var. *mirbelii, A. matsumurae, A. maximowichii, A. nepalensis, A. rhombifolia, A. rubra, A. sinuata, A. tenuifolia* and *A. viridis* have been listed as the host plants of the fungus (Bilgrami *et al.* 1979 ; Hiratsuka 1927, 1934, 1969, 1970 ; Kaneko & Hiratsuka 1984 ; Saho 1961 ; Spaulding 1961 ; Togashi & Onuma 1934). *Alnus maritima* is a new host and the Philippines is a new locality for the fungus (Kobayashi *et al.* 1982). The size of urediniospores of the fungus from Philippine materials was 22–28 × 11–15 μm.

55. ***Meliola clerodendricola* var. *micromera*** **(H. et P. Sydow) Hansford,** Sydowia, Beih. 2 : 694, 1961 ; Katumoto, Trans. Mycol. Soc. Japan 26 : 288, 1985. — Plate 9 : A ; Fig. 26

Synonym : *Meliola micromera* H. et P. Sydow, Ann. Mycol. 12 : 552, 1914 ; Yates, Philip. J. Sci. Bot. 13 : 363, 1918.

On living leaves of *Gmelina arborea* Roxb. (yemane, kidachi-yôraku) — Forest Nursery of Central Forest Experiment Station, UPLB-CF, Laguna, Luzon, March 17, 1977, by TK (TFM : FPH-5054 ; YAM-21892) ; Plantation of Tungao Camp, NALCO, Agusan del Norte, Mindanao, September 15, 1977, by TK.

Note : This fungus, which causes the sooty mold of *Gmelina arborea* in the Philippines, was identified as *Meliola clerodendrocola* var. *micromera* (Syd.) Hansf. by Katumoto (1985). It was originally described as *Meliola micromera* H. et P. Sydow on *Gmelina philippinensis* from Luzon (Sydow 1914 b ; Teodoro 1937 ; Yates 1918). Later, Hansford (1961), who examined specimens on *Gmelina philippinensis* from the Philippines and on *G. elliptica* in Indonesia, classified it as a variety of *Meliola clerodendricola* Hennings.

*Gmelina arborea* is a new host of the fungus and Mindanao is a new locality in the Philippines. The dimensions of the asci, ascospores and setae which are 65–70 × 50–58 μm, 32–38 × 10–16.5 μm and 190–205 × 6–7.5 μm respectively, are identical with those observed by

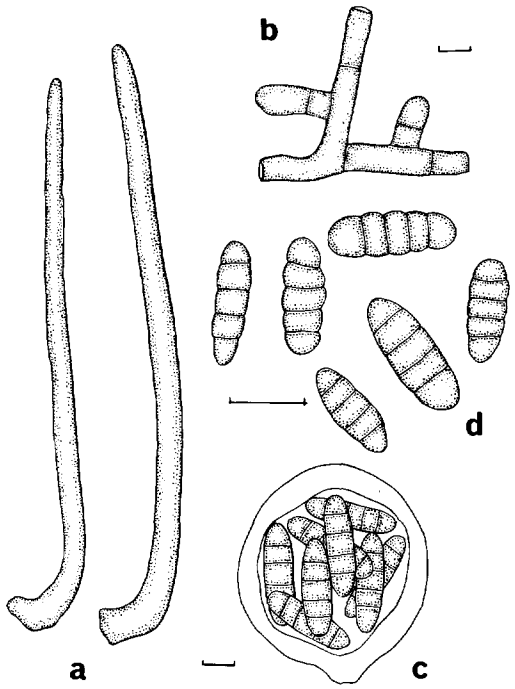


Fig. 26. *Meliola clerodendricola var. micromera* (H. et P. SYDOW) HANSF.

Note) a : Setae, b : Hyphopodia, c : Ascus, d : Ascospores (⌙ : 10 μm)

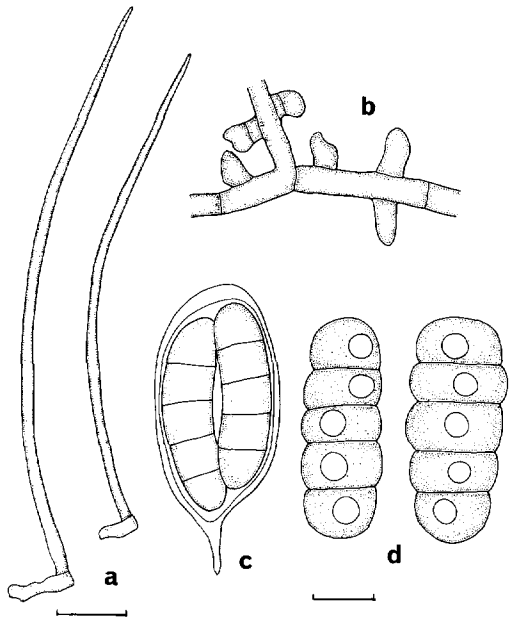


Fig. 27. *Meliola koae* STEVENS

Note) a : Setae, b : Hyphopodia, c : Ascus, d : Ascospores (⌙ : 10 μm)

other investigators (HANSFORD 1961 ; KATUMOTO 1985 ; SYDOW 1914 b).

On *Gmelina*, the other black mildew or sooty mold fungus, *Dimerina graffii* SYDOW was recorded in Luzon, the Philippines (SPAULDING 1961 ; SYDOW 1913 b).

**56. *Meliola koae*** STEVENS, Bull. Bishop Museum 19 : 54, 1925 ; STEVENS & ROLDAN, Philip. J. Sci. Bot. 56 : 62, 1935 ; KATUMOTO, Trans. Mycol. Soc. Japan 26 : 290, 1985. — Plate 9 : B ; Fig. 27

Synonym : *Meliola acaciae-confusae* SAWADA, Rept. Dept. Agr., Gov. Res. Inst. Formosa 51 : 16, 1931.

On living leaves of *Acacia auriculiformis* Cunn. (kamaba-acacia) — Plantation of ACMDC, Toledo-city, Cebu, February 14, 1985, by TK (TFM : FPH-6020, YAM-24236).

Note : This sooty mold fungus was identified as *Meliola koae* STEV. by KATUMOTO (1985). It was originally described on *Acacia koae* from Hawaii (HANSFORD 1961 ; STEVENS 1925). *Meliola acaciae-confusae* SAWADA was treated as a synonym of *M. koae* STEV. by HANSFORD (1961). *Meliola koae* is found in Hawaii, the Philippines and Taiwan on *Acacia confusa* and *A. koae* (Anonymous 1960 ; CHEN 1965 ; HANSFORD 1961 ; RAABE *et al.* 1981 ; SAWADA 1931 ; STEVENS 1925 ; STEVENS & ROLDAN 1935 ; YAMAMOTO 1940). *Acacia auriculiformis* is a new host of the fungus and Cebu is a new locality in the Philippines. The dimensions of asci and ascospores of the fungus from the Philippine material were

37–50 × 19–27.5 μm and 37.5–42.5 × 16.5–19 μm.

Two other species of *Meliola* have been recorded on *Acacia*, namely *M. acaciicola* HANSF. on *A. floribunda* from Equador and *M. brisbanensis* HANSF. on *A. binervata, A. cunninghamii, A. dealbata, A. harpophylla* from Australia and Malaysia (Sabah) (HANSFORD 1961; WILLIAMS & LIU 1976). Undetermined species of *Meliola* were observed on *Acacia auriculiformis* and *A. deccurens* from Brunei and Malaysia including Sabah and Sarawak as the cause of the sooty mold (PEREGRINE & AHMAD 1982; SINGH 1980; TURNER 1971; WILLIAMS & LIU 1976). Besides these *Meliola* species, *Phaeosaccardinula javanica* (ZIMM.) YAMAMOTO causes the sooty mold of *Acacia confusa* in Taiwan (YAMAMOTO 1940, 1961).

**57. *Meloidogyne incognita*** (KOFOID et WHITE) CHITWOOD, Proc. Helminthol. Soc. Wash. 16 (2) : 90, 1949. — Plate 9 : C

On living roots of *Paulownia taiwaniana* HU et CHUNG (usubagiri) — Plantation of IAFDC, Bancud, Bukidnon, Mindanao, February 5, 1981, by TK; Plantation of IAFDC, Cabangahan, Bukidnon, Mindanao, February 8, 1981, by TK.

Note: Numerous galls caused by this root-knot nematode were observed on root cuttings and roots of young trees of *Paulownia taiwaniana*. The nematode was identified by Dr. Yasuharu MAMIYA of the Laboratory of Nematology, Forestry and Forest Products Research Institute, Japan. This is the first record of the nematode-infested paulownia trees in the Philippines. The infection of paulownia roots could have been initiated by the same nematode attacking indigenous susceptible herbs (KOBAYASHI & GUZMAN 1986 d).

**58. *Meloidogyne* sp.**

On living roots of seedlings of *Psidium guajava* L. (guava, banjiro) — Forest Nursery of Consuelo Ref. Proj., BFD, Santa Fe, Nueva Viscaya, Luzon, March 9, 1977, by Y. MAMIYA.

**59. *Mycosphaerella luzonensis*** KOBAYASHI, Trans. Mycol. Soc. Japan 21 : 311, 1980. — Plate 9 : D

Anamorph : *Cercospora gardeniae* BOEDIJN, Nova Hedwigia 3 (4) : 427, 1961; KOBAYASHI, Trans. Mycol. Soc. Japan 21 : 311, 1980.

On living leaves of *Gardenia philastrei* PIERRE (rosál diláu) — Campus of UPLB-Coll. Agr., Laguna, Luzon, February 13, 1977, by TK (TFM : FPH-4973, Holotype); March 13, 1977, by TK (TFM : FPH-4972); Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, April 18, 1977, by TK (TFM : FPH-5076, *Mycosphaerella* stage only).

Note: The fungus causes the yellow leaf spot disease of rosál diláu, *Gardenia philastrei*, and develops its conidial and perithecial stages on the same leaf spots (KOBAYASHI 1980 a). The conidial stage of the fungus, *Cercospora gardeniae* BOEDIJN, was described on *Gardenia florida* from Indonesia (BOEDIJN 1962). *Gardenia philastrei* is a new host and the Philippines is a new locality for the fungus (KOBAYASHI 1980). The conidial stage was recently transferred to the genus *Pseudocercospora* SPEG. as *P. gardeniae* (BOEDIJN) DEIGHTON (1976).

**60. *Mycosphaerella piliostigmatis*** KOBAYASHI et GUZMAN, sp. nov. — Plate 9 : E; Fig. 28

Anamorph : *Cercospora bauhiniae* H. et P. SYDOW, Ann. Mycol. 12 : 202, 1914.

Maculis in foliis vivis formantibus, primo angularibus, dein irregularibus, 5–10 mm diam., brunneis; peritheciis amphigenis, immersis, dein erumpentibus, nigris, subglobosis,

70-90 $\mu$m diam., 70-85 $\mu$m altis ; parietibus 5-8 $\mu$m crassis ; ascis bitunicatis, ellipticis vel clavatis, 8-sporis, 32-40 × 9-12.5 $\mu$m ; ascosporis hyalinis, ellipticis vel oblongis, inaequilateralibus, rotundatis, 1-septatis, 15-19 × 2.5-4 $\mu$m.

Conidial stage (*Cercospora bauhiniae* H. et P. SYDOW) : stroma amphigenous in epidermal layer and mesophyll, then erumpent, dark greenish brown to olive brown, 20-50 $\mu$m in diam. ; conidiophores simple, olive brown, straight or somewhat flexuous, smooth, with distinct conidial scars, 15-33 × 2.5-4.5 $\mu$m ; conidia terminal, sympodial, holoblastic, clavate, olive brown, smooth, 2-8-septate, 30-73 × 3.5-5 $\mu$m, rounded at the tip, basal end truncate, with a prominent scar.

Habitat : living leaves of *Piliostigma malavaricum* var. *acidum* (KORTH.) de WIT (alibángbang) — Plantation of Parcel I, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 15, 1985, by TK (TFM : FPH-5838, Holotype, *Mycosphaerella* only) ; Central Trial Plantation of RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 23, 1985, by TK (TFM : FPH-5850, *Mycosphaerella* and *Cercospora*) ; Parcel III of RP-J : FDP, Conversion, Pantabangan, Nueva Ecija, Luzon, January 22, 1985, by TK (TFM : FPH-5835, *Cercospora* only).

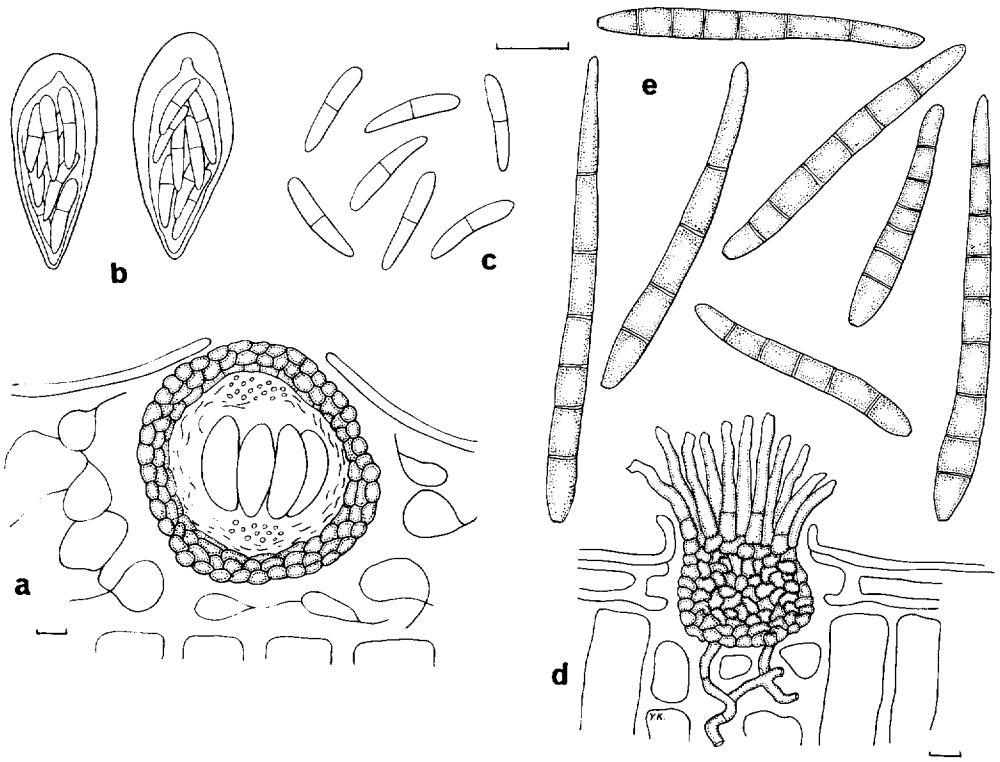


Fig. 28. *Mycosphaerella piliostigmatis* sp. nov.

Note) a : Perithecium, b : Asci, c : Ascospores, d : Stroma and conidiophores, e : Conidia (⌙ : 10 $\mu$m)

Leaf spots brown, at first angular, then irregular, 5–10 mm in diam.; perithecia amphigenous, immersed within mesophyll, then erumpent, black, subglobular, 70–90 μm in diam., 70–85 μm in height; wall of perithecia 5–8 μm in thickness, composed of thick-walled and black cells; asci bitunicate, elliptic to clavate, 8-spored, 32–40 × 9–12.5 μm; ascospores hyaline, elliptic to oblong-elliptic, rounded at both ends, inaequilateral, 1-septate, 15–19 × 2.5–4 μm.

Note: On *Bauhinia* and *Piliostigma* which was separated from the former genus, only one species of *Mycosphaerella, M. bauhiniae* STARB. (SACCARDO 1902), is known. However, this species is different from the present fungus in that the sizes of asci and ascospores are quite smaller. On the other hand, 4 species of *Cercospora* causing leaf spot disease of *Bauhinia* have been previously described. Among them, *Cercospora phaeocarpa* MITTER (SYDOW *et al.* 1937) clearly differs from the present fungus by its annelo-blastic conidiophores. It is now transferred to the genus *Stigmina* as *S. phaeocarpa* (MITTER) ELLIS (1959). *Cercospora variegatae* RAJAK (1982) has big conidiophores and conidia on hypophyllous stroma and *C. bauhiniicola* YEN (1977) has quite slender and acicular conidia. Recently, QUINIONES and DAYAN (1983) reported a leaf spot disease of *Bauhinia purpurea* caused by *Corynespora cassiicola* (BERK. et CURT.) WEI (1950, ELLIS 1971) from Luzon. The symptoms of the disease noted by them seems to be similar to those of the present brown leaf spot disease, but the morphological characteristics of the causal fungus was quite distinguishable from the present fungus by its big conidiophores and chained and long conidia. Morphological characteristics of the conidial stage of the present fungus were identical with those of *Cercospora bauhiniae* H. et P. SYDOW described originally from the Philippines (SYDOW 1914 c, 1917; TEODORO 1937). Therefore, a new name *Mycosphaerella piliostigmae* is given to the present *Mycosphaerella* having the conidial stage *Cercospora bauhiniae* H. et P. SYDOW. Recently, the conidial stage was transferred to the genus *Pseudocercospora* SPEG. as *P. bauhiniae* (H. et P. SYDOW) DEIGHTON (1976).

Although the brown leaf spot disease caused by the present fungus is conspicuous in the field, it does not cause serious defoliation. The disease caused by *Cercospora bauhiniae* has been reported on *Bauhinia galpini, B. macrantha, B. purpurea, B. reticulata, B. variegata, Piliostigma malabaricum* var. *acidum* and *P. thonningii* in Brazil, Colombia, Ethiopia, Ghana, India, the Philippines, South Africa, the United States and Venezuela (BILGRAMI *et al.* 1979; CHANNAMMA & RANGASWANI 1969; CHUPP 1953; DENNIS 1970; DOIDGE 1950; HINO & TOKESHI 1978; HUGHES 1952 a, SYDOW 1914 c, 1917; WEHLBURG *et al.* 1975).

**61. *Nectria* sp.**

On dead twigs of *Pterocarpus indicus* WILLD. (nárra, indo-shitan) — Plantation of Parcel I, RP-J: FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM: FPH-5998).

Note: The fungus belongs to the genus *Nectria* because of its color and the structure of the perithecium and the two-celled elliptic ascospores. Since the asci had already disappeared, the species of fungus could not be determined. The size of ascospores is 11–15 × 3–4.5 μm.

**62. *Oidium* sp.** — Plate 9: F

On living leaves of *Acacia mangium* WILLD — Forest Nursery of Central Forest Experiment Station, UPLB-CF, Laguna, Luzon, February 7, 1977, by TK & DG (TFM: FPH-5092); *Eucalyptus citriodora* HOOK (remon-yûkari) — Forest Nursery of Cent. For.

Exp. Sta., UPLB-CF, Laguna, Luzon, February 7, 1977, by TK & DG ; *Samanea saman* MERRILL (rain-tree, amerika-nemu) — For. Nurs. Cent. For. Exp. Sta., UPLB-CF, Laguna, Luzon, February 7, 1977, by TK & DG ; *Tamarindus indica* L. (tamarind, sampálok) — Nursery of MSB, Quezon-city, Metro Manila, Luzon, February 11, 1985, by TK (TFM : FPH-5822).

Note : As no formation of perithecia was observed on those host plants, the species of these powdery mildew fungi could not be determined. The four tree species listed above are new hosts of powdery mildew in the Philippines.

Recently, a severe occurrence of powdery mildew caused by *Oidium* sp. was reported on *Acacia mangium* from Thailand (TANAKA 1986). This represents the first record of the disease on *Acacia mangium* although it had been recorded on various species of *Acacia* in Australia, Chile, India, Libya, Pakistan, Portugal, Rumania, Sri Lanka, Tasmania and Zambia (AMANO 1986 ; EL-BUNI & RATTAN 1981 ; GIBSON 1975 ; HIRATA 1966 ; KRANZ 1965). Apart from this, *Erysiphe communis* (WALLR.) LINK, *Leveillula taurica* (LEV.) ARN., *Microsphaera alni* (WALLR.) SALM., *M. blumeri* RAO and *Phyllactinia acaciae* SYDOW were reported to be affecting *Acacia* spp. in Afghanistan, Australia, India, Israel, Italy, Pakistan, South Africa, the Sudan, Sweden, Switzerland and the United States (AMANO 1986 ; BILGRAMI *et al.* 1979 ; BOUGHEY 1946 ; TARR 1955).

On *Eucalyptus citriodora*, only two records of the powdery mildew caused by *Sphaerotheca macularis* (WALLR.) JACZ. and *Oidium* sp. have been reported from Australia and Germany (AMANO 1986 ; HIRATA 1966), although many other species of *Eucalyptus* are affected by *Oidium* sp. in Argentina, Australia, Brazil, Denmark, England, Ethiopia, Germany, Iraq, Italy, Japan, Mauritius, New Zealand, Peru, Poland, Portugal, Rumania, South Africa, Sweden, Tasmania, the United States and the USSR (Armenia and Azerbaijan) (AMANO 1986 ; HIRATA 1966 ; ORIEUX & FELIX 1968 ; PADY 1972 ; SAMPSON & WALKER 1982 ; SPAULDING 1961 ; TERASHITA 1955 ; WALKER & MCLEOD 1968). Moreover, *Erysiphe cichoracearum* DC. ex MÉLAT, *E. polyphaga* HAMMARLY, *Sphaerotheca alchemillae* (GREV.) JUNELL, *S. macularis* (WALLR.) JACZ. and *S. pannosa* (WALLR.) LÉV. were recorded on *Eucalyptus* spp. in Brazil, Denmark, Germany, Great Britain, Italy, Mauritius, New Zealand, South Africa and the United States (AMANO 1986 ; BOSENWINKEL 1981 ; HIRATA 1966 ; SPAULDING 1961).

Two records of powdery mildew on the rain tree, *Samanea saman*, have been found from the Philippines. Powdery mildew caused by *Oidium* sp. was reported from a forest nursery of Luzon (KOBAYASHI 1977 a, 1978 c, 1986). QUINIONES and DAYAN (1981) referred to their powdery mildew fungus as the conidial stage of *Erysiphe communis* (WALLR.) LINK.

The powdery mildew caused by *Oidium* sp. and *Erysiphe communis* (WALLR.) LINK seemed to be one of the important diseases of tamarind, *Tamarindus indica*. It has been reported in Ghana, India, Indonesia, Malaysia (Sabah), South Africa, Sri Lanka and Taiwan (AMANO 1986 ; BILGRAMI *et al.* 1979 ; DOIDGE 1950 ; HIRATA 1966 ; SAWADA 1959 ; SIDDARAMAJAH & KULKARMI 1982 ; SINGH 1980 ; WILLIANS & LIU 1976). SAWADA (1959) named the powdery mildew fungus on tamarind as *Oidium oblongisporum* SAWADA. The powdery mildew fungus on tamarind from the Philippines, however, belongs to *Erysiphe polygoni* group judging from the type of germ-tubes.

**63. *Olivea tectonae* (T.S. et K. RAMARKRISHNAN) MULDER,** CMI Descript. pathog. fungi & bacteria, Set 37, No. 365, 1973. — Plate 1 : E ; 12 : F

Uredinial state : *Uredo tectonae* RACIBORSKI, Parasit. Algen u. Pilze Javas 1 : 28, 1900.

On living leaves of *Tectona grandis* L. (teak) — Central Forest Nursery, Duplas Ref. Proj., BFD, Pugo, La Union, Luzon, February 22, 1977, by TK & DG (TFM : FPH-5089) ; Campus of UPLB-CF, Laguna, Luzon, February 26, 1977, by TK (TFM : FPH-5086) ; Central Forest Nursery, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, March 9, 1977, by TK ; Forest Nursery and Plantation of Consuelo Ref. Proj., BFD, Santa Fe, Nueva Viscaya, Luzon, March 9, 1977, by TK (TFM : FPH-4960, 5084) ; Forest Nursery of Punkan Ref. Proj., BFD, Punkan, Nueva Ecija, Luzon, March 10, 1977, by TK (TFM : FPH-5088) ; Central For. Exp. Sta. UPLB-CF, Laguna, Luzon, March 17, 1977, by TK (TFM : FPH-4959) ; Plantation of Osmeña Ref. Proj., BFD, Mt Rubas, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5085) ; Plantation of Parcel IIb, RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 17, 1985, by TK (TFM : FPH-5828) ; Buhisan Forest Nursery, Cebu-city Ref. Proj., BFD, Buhisan, Cebu, February 13, 1985, by TK (TFM : FPH-5827).

Note : The fungus causes teak rust (see page 114). It was originally described as *Uredo tectonae* RAC. from Indonesia (RACIBORSKI 1900 a), and then was recorded in Bangladesh, Burma, India, Pakistan, Sri Lanka and Taiwan (AHMED 1952 ; BILGRAMI *et al.* 1979 ; MULDER & GIBSON 1973 ; SAWADA 1931). The Philippines is a new locality for the fungus with only the uredinial stage (KOBAYASHI 1978 a ; KOBAYASHI *et al.* 1982).

**64. *Ophionectria* sp.** — Plate 10 : A ; Fig. 29

Perithecia aside or within urediniosorus, with hyphal subiculum, yellowish brown to brownish orange, subglobular, 160-240 μm in diam., 190-210 μm in height ; perithecial wall composed of pseudoparenchyumatous cells, 10-15 μm in thickness, with short hyphal appendages or setae (20-25 × 4.5-5 μm) around ostiole ; asci bitunicate, cylindric, with short stipe, 95-108 × 9.5-10 μm, containing 8-spores as somewhat spiral or straight fascicle ; ascospores hyaline, long cylindric, acicular at one end and truncate at the other end, curved at one side or s-shaped, 62-80 × 3-4 μm, 4-9-septated.

Hyperparasitic to the uredosorus of *Puccinia* sp. on *Dendrocalamus merrillianus* (ELM) ELM (bayóg) — Baguio Extension of UPLB-CF, Pacdal, Baguio-city, Benguet, Luzon, February 21, 1977, by TK & DG (TFM : FPH-4968, 5107) ; Kennon Forest Nursery, BFD, Camp 4, Kennon Road, Benguet, Luzon, February 22, 1977, by TK & DG (TFM : FPH-4967).

Note : The fungus is a hyperparasite of bamboo rust, *Puccinia* sp.. It has similar macroscopic characters to Hypocreales and according to ROGERSON's key (1970) it seems to belong the genus *Ophionectria* SACCARDO. However, it does not belong to Hypocreales but to Loculoascomycetes based on its bitunicate asci. Three similar species of *Ophionectria*, which have bitunicate asci and are parasitic to the uredosori of rust fungi, were presented by ROSSMAN (1977), namely *O. urediniicola* TENG (1934), *O. tropicalis* SPEG. (SACCARDO 1891) and *O. erinacea* REHM (1913 a). They were, however, not placed in an adequate taxonomic position. The genus *Ophionectria*, whose species have unitunicate asci and belongs to Hypocreales, is not the appropriate genus of the present fungus. Proper identification of this fungus is now being done by Dr. K. KATUMOTO, Yamaguchi University, and the result will be published by him in near future. Therefore, the present hyperparasite was tentatively classified as a species of *Ophionectria*.

**65. *Periconia shyamala* ROY**, Indian Phytopathol. 18 : 332, 1965. — Fig. 30

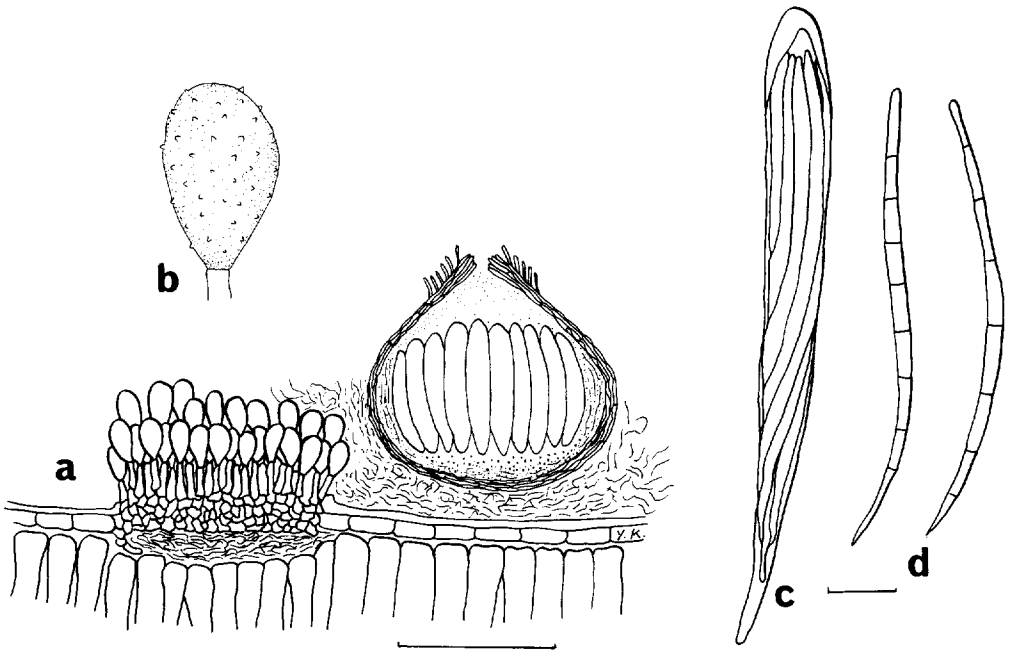


Fig. 29. *Puccinia* sp. and its hyperparasite *Ophionectria* sp.

Note) a : Uredinium of *Puccinia* sp. parasitized by mycelial subiculum of *Ophionectria* sp. having perithecium, b : Urediniospore of *Puccinia* sp., c : Ascus of *Ophionectria* sp., d : Ascospores of *Ophionectria* sp. (⌙ : a = 100 $\mu$m, b ~ d = 10 $\mu$m)

Hyperparasites on an unknown leaf spot fungus ; conidiophores long, simple, hyaline, septate, 300-400 $\mu$m in length and 11-13 $\mu$m in width, with a spherical head bearing phialide radially ; conidia spherical, pale yellowish brown, 16-20 × 15-18 $\mu$m, with minute warts on the surface, often catenate.

On living leaves of *Shorea almon* Foxw. (álmon) — PICOP Plantation, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG (TFM : FPH-5066).

Note : The fungus may be a hyperparasite on the fruiting bodies of an undetermined fungus. Among the species of *Periconia* listed by ELLIS (1971, 1976), the morphological characteristics of the present fungus were identical with those of *Periconia shyamala* ROY (1965). The species has been reported mainly on *Manihot* from India, Sarawaku, the Solomon Is., the New Hebrides Is., Ghana, Sierra Leone, Uganda and Zambia (ELLIS 1971 ; MCKENZIE & JACKSON 1986 ; ROY 1965 ; SINGH 1980 ; TURNER 1971). This is the first record of the fungus in the Philippines.

**66. *Pestalotiopsis adusta*** (ELL. et EV.) STEYAERT, Trans. Brit. Mycol. Soc. 36 (2) : 82, 1953. — Plate 10 : B ; Fig. 31 : a

Synonym : *Pestalotia adusta* ELL. et Ev., Jour. Mycol. 4 : 51, 1883.

Leaf spots at first angular, light brown, 2–5 mm in diam., then irregular, 5–10 mm in size, scattered acervuli as black dots; acervuli amphigenous, flat, 100 $\mu$m in diam.; conidia 5-celled, fusoid, 19–23 $\mu$m in length; two outer cells hyaline, three median cells equally pale olive brown with sizes of 12.5–15 × 5–7 $\mu$m; appendages mostly 3, sometimes 2, 4–7.5 $\mu$m in length; pedicels needle-shaped, 1.5–4 $\mu$m in length.

On living leaves of *Anacardium occidentale* L. (cashew-nut tree) — Central Trial Plantation, RP-Japan, FDP, Baluarte, Nueva Ecija, Luzon, January 18, 1985, by TK (TFM : FPH-5856) ; Plantation of ANZAP, Mayantoc, Tarlac, Luzon, February 8, 1985, by TK & DG.

Note : This fungus causes the brown leaf spot of *Anacardium*. On *Anacardium*, 6 species of *Pestalotia* or *Pestalotiopsis* have been recorded. Three of them, namely *Pestalotia microspora* SPEG. from India (BILGRAMI *et al.* 1979), *Pestalotiopsis paeoniae* (SERVAZZI) STEY. from Nigeria (OLUNLOYO 1975; STEYAERT 1949) and *P. versicolor* (PERS.) STEY. from Tanzania (EBBELS & ALLEN 1979; STEYAERT 1949, 1953), are quite distinguishable from the present fungus by their contrasted color of median cells composed of the 2 upper dark-colored cells and the lower pale-colored cell.

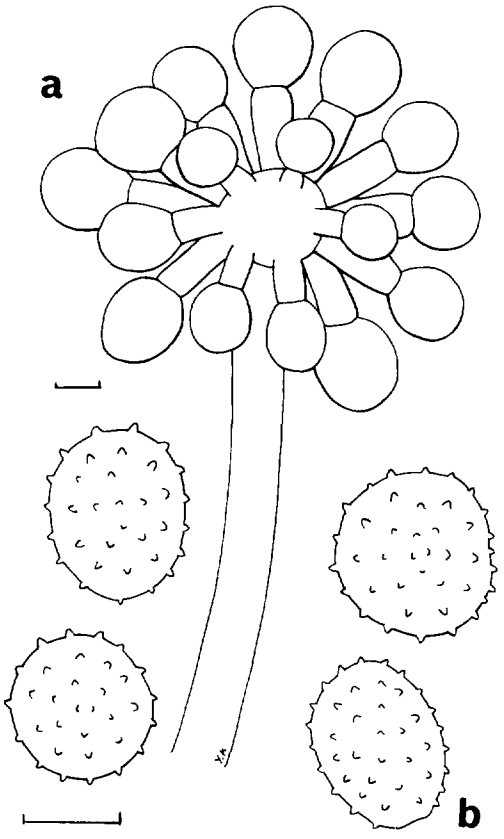


Fig. 30. *Periconia shyamala* ROY
Note) a : Conidiophore and phialides,
b : Conidia (⟵ : 10 $\mu$m)

The other 3 species, namely *Pastalotia heterocornis* GUBA from Brazil and Tanzania (GUBA 1961 ; INTINI & SIJAONA 1983), *P. conglomerata* BRES. from Venezuela (POLANCO 1973) and *Pestalotiopsis disseminata* (THÜM.) STEY. from Brunei (PEREGRINE & AHMAD 1982), have the concolored median cells. However, they also differ by their color of their median cells and the sizes of the conidia.

The morphological characteristics of the Philippine species were identical with those of *Pestalotiopsis adusta* (ELL. et Ev.) STEY. It is widely distributed in the tropical and temperate zones affecting various herbaceous and woody plants (GUBA 1961 ; STEYAERT 1953). In the Philippines, it has also been recorded on *Homalomena philippinensis* and *Pandanus luzonensis* (GUBA 1961). In other parts of Asia, it has been reported in India, Indonesia, Japan and Taiwan on *Bischoffia, Eriobotrya, Hydrangea, Pithecolobium, Prunus* and *Swietenia* (GUBA 1961 ; KOBAYASHI 1977 c ; STEVENSON 1975 ; VERMA 1972).

**67. *Pestalotiopsis disseminata*** (THÜMEN) STEYAERT, Bull. Jard. Bot. Brux. 19 : 285,

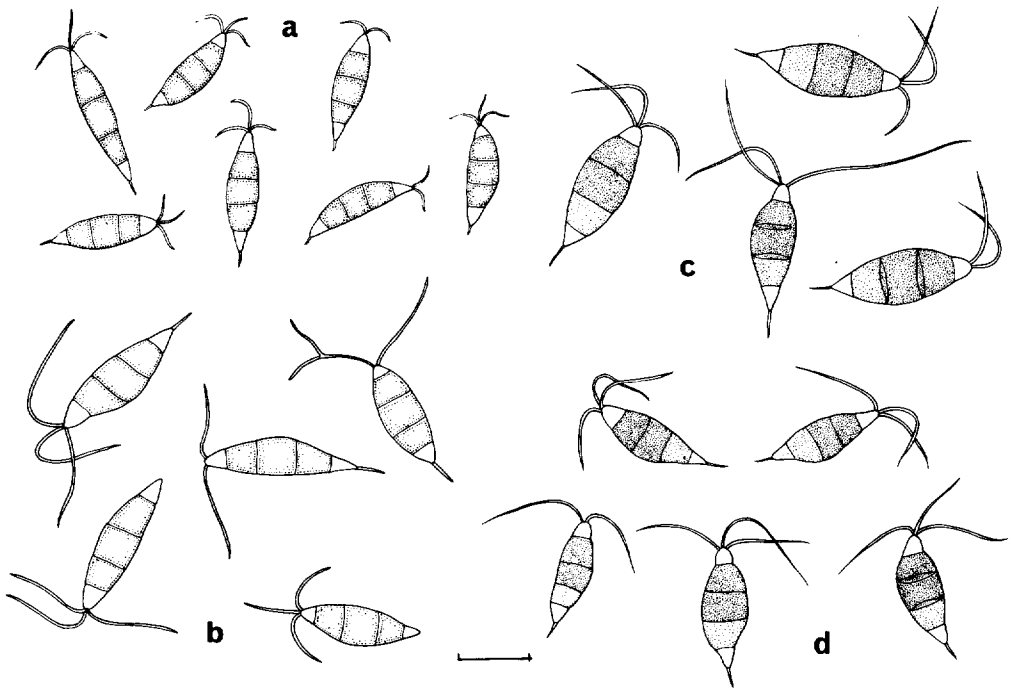


Fig. 31. Conidia of *Pestalotiopsis* spp.

Note) a : *P. adusta* (ELL. et EV.) STEY., b : *P. disseminata* (THÜM.) STEY., c : *P. heucherae* (TEHON et DANIELS) comb. nov., d : *P. langloisii* (GUBA) comb. nov. (⟝ : 10 μm)

1949. — Fig. 31 : b

Synonym : *Pestalotia disseminata* THÜMEN, Inst. Rev. Sci. Litt. Coimbra 28 : 501, 1880 ; SACCARDO, Syll. Fung. 3 : 784, 1884 ; GUBA, Monogr. Monoch. and Pestal. : 139, 1961.

Other synonyms see GUBA (1961).

Acervuli on blighted needles, as pin-point black dots, 125–175 μm in diam., conidia 5-celled, fusoid to elliptic, 18.5–22.5 μm in length ; two outer cells hyaline, three median cells equally pale olive brown to olive brown, with sizes of 12.5–15 × 6–7.5 μm ; appendages mostly 3, sometimes 2, rarely branches, 10–17.5 μm in length ; pedicels needle-shaped, 2.5–4 μm in length.

On dead needles of *Pinus kesiya* ROYLE ex GORDON (benguet pine, keshiya-matsu) — Salazar Forest Nursery, Parcel II, RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM : FPH-6006).

Note : The fungus causes needle blight of pine seedlings and forms fruiting bodies on the dead needles. Among 6 species of *Pestalotia* or *Pestalotiopsis* recorded on pines, *Pestalotia hartigii* TUB. and *P. stevensoni* PECK differ distinctly from the present fungus because of their 2 colored cells of conidia, the major reason why they were transferred to the genus *Truncatella* (GUBA 1961 ; SACCARDO 1884, 1892 ; STEYAERT 1949). *Pestalotia conigena* LEV. and *Pestalotiopsis foedans* (SACC. et ELL.) STEY. have contrasted colored

cells of conidia and belong to a group different from the present fungus (GUBA 1961; SACCARDO 1884; STEYAERT 1949). *Pestalotia macrochaeta* (SPEG.) GUBA and *Pestalotiopsis funerea* (DESM.) STEY. belong to the same group as the present fungus, but they have much larger sizes of conidia (GUBA 1932, 1961; SACCARDO 1884; STEYAERT 1949). The present fungus was identified as *Pestalotiopsis disseminata* (THÜMEN) STEYAERT (GUBA 1961; STEYAERT 1949) on the bases of the morphological characteristics.

This is the first record of the fungus in the Philippines and *Pinus kesiya* is a new host. The fungus is distributed world-wide affecting various host plants. In Asia, it has been reported in Brunei, China, India, Japan and Malaysia on *Albizzia odoratissima, Anacardium occidentale, Elaeis guineensis, Eucalyptus citriodora, E. globulus, Ixora* sp., *Litchii chinensis, Machilus bombycina, Malus pumila* var. *domestica* and *Terminalia arjuna* (BHARALI 1969; BILGRAMI *et al.* 1979; HINO 1964, 1966; LIU 1977; PEREGRINE & AHMAD 1982; SINGH 1980; TAI 1979; WILLIAMS & LIU 1976).

**68. *Pestalotiopsis heucherae*** (TEHON et DANIELS) KOBAYASHI et GUZMAN, comb. nov. — Plate 10 : C ; Fig. 31 : c

Synonym : *Pestalotia heucherae* TEHON et DANIELS, Mycologia 19 : 126, 1927 ; GUBA, Monogr. *Monochaetia* & *Pestalotia* : 210, 1961.

Leaf spots small, angular, defined with nerves, 2–5 mm in size, later grayish brown with a brown band ; acervuli scattered in the spot, amphigenous, first embedded within an epidermal cell layer, then erumpent, 140–170 $\mu$m in diam., they ooze out conidial masses as black spore-horns ; conidia 5-celled, fusoid, 17.5–25 $\mu$m in length, two outer cells hyaline, three median colored cells composed of the upper two dark brown dark olive brown cells and the lower pale brown to brown cell, 12.5–17.5 × 7.5–9.5 $\mu$m ; appendages on the top of the uppermost cell, mostly 3, rarely 2 or 4, 10–28 $\mu$m in length ; pedicels on the lowermost cell, needle-shaped, 2.5–7.5 $\mu$m, hyaline.

On living leaves of *Psidium guajava* L. (guava, banjiro) — Guest House of BCI, Bobok, Benguet, Luzon, September 2, 1977, by TK (TFM : FPH-5104).

Note : The fungus causes the angula leaf spot of guava and does not cause serious damage. Among the species of *Pestalotia* or *Pestalotiopsis* recorded on *Psidium, Pestalotiopsis disseminata* (THÜM.) STEY. from Equador, Puerto Rico and India (GUBA 1961; STEVENSON 1975; STEYAERT 1949), *Pestalotia podocarpi* DENNIS from the United States (DENNIS 1934; GUBA 1961) and *P. olivacea* GUBA from India (DHINGRA & MEHROTNA 1981; GUBA 1961) belong to GUBA's subsection Concolores characterized by having same colored median cells. The conidia of the remaining 3 species, namely *Pestalotia heucherae* TEHON et DANIELS (GUBA 1961; TEHON et DANIELS 1927), *P. zahlbruckeriana* HENN. from the United States (GUBA 1961; SACCARDO 1902), and *Pestalotiopsis versicolor* (SPEG.) STEY. from Mexico and Tanzania (EBBELS & ALLEN 1979; GUBA 1961; SACCARDO 1884; STEYAERT 1949), are characterized by the median cells consisting of two upper dark cells and one lower pale cell. The fungus from the Philippine material was identified as *Pestalotia heucherae* TEHON et DANIELS based on the size and color of the conidia. The fungus was transferred to the genus *Pestalotiopsis* based on the present taxonomic concept about the genus *Pestalotia* and its allies. The Philippines is a new locality for the fungus.

*Pestalotia psidii* PAT. was treated as a synonym of *P. disseminata* THÜM by GUBA (1961), though it is generally recorded as an independent species in Burma, Equador, India, Malaysia, Mozambique, Nigeria, South Africa, Taiwan, Tanzania, Venezuela and Zambia

(Anonymous 1970; BILGRAMI *et al.* 1979; DOIDGE 1950; MORDUE 1976; RILEY 1956; SINGH 1980). It is, of course, different from the species found on *Psidium guajava* from the Philippines.

**69. *Pestalotiopsis langloisii*** (GUBA) KOBAYASHI et GUZMAN, comb. nov. — Plate 10 : D; Fig. 31 : d

Synonym : *Pestalotia langloisii* GUBA, Monogr. *Monochaetia & Pestalotia* : 172, 1961.

Leaf spots light brown to brown, 3–5 mm in size, somewhat angular, with scattered acervuli as small black dots; acervuli amphigenous, subepidermal, breaking through the cuticle; conidia 5-celled, fusoid, 17.5–20 $\mu$m in length; two outer cells hyaline, three median cells brown to olive brown, slightly darker in the upper two cells, somewhat constricted at septa, 11.5–14 × 6.5–8 $\mu$m; appendages usually 3, rarely 2, 7.5–17.5 $\mu$m in length; pedicels needle-shaped, 1.3–2.5 $\mu$m in length, hyaline.

On living leaves of *Calliandra haematocephala* HASSK. (fire-ball) — Campus of UPLB-CF, Laguna, Luzon, February 7, 1977, by TK (TFM : FPH-4950).

Note : The fungus causes the brown leaf spot of fire-ball. Since the infected leaflets remain attached to the rachis of the leaves, the only slight damage is generally observed. On *Calliandra*, no species of *Pestalotia* or *Pestalotiopsis* has so far been recorded. The morphological characteristics of the species from the Philippine material are similar to *Pestalotia langloisii* GUBA (1961). The fungus was recorded on *Eriobotrya japonica, Gardenia* spp., *Paeonia suffruticosa* and *Quercus* sp. from Japan and the United States (GUBA 1961; SHOEMAKER & STARBY 1965). The new epithet *Pestalotiopsis langloisii* (GUBA) KOBAYASHI et GUZMAN was proposed on the basis of the STEYAERT's concept (1949). *Calliandra haematocephala* is a new host and the Philippines is a new locality for the fungus.

**70. *Phaeoisariopsis anthocephala*** KOBAYASHI, Trans. Mycol. Soc. Japan 19 : 373, 1978. — Plate 10 : E

On living leaves of *Anthocephalus chinensis* (LANK.) RICH ex WALP. (Kaátoan bangkál) — Forest Nursery of Cent. For. Exp. Sta. UPLB-CF, Laguna, Luzon, February 7, 1977, by TK & DG (TFM : FPH-4867, Holotype) ; March 18, 1977, by TK (TFM : FPH-4868).

Note : The present brown leaf spot fungus was newly described from the Philippines (KOBAYASHI 1978 b, d). No other collection and record has been found outside of the type locality. The disease causes slight damage except on the very young seedlings of less than 2 months. Recently, QUINIONES and DAYAN (1983) noted a leaf spot disease of *Anthocephalus chinensis* caused by a species of *Cercospora*. Judging from their brief notes and photographs, the fungus identified by them seems to be the same as *Phaeoisariopsis anthocephala*.

**71. *Phaeoisariopsis* sp.** — Fig. 32

Lesions elliptic, grayish brown with densely scattered black and hairy synnemata; conidiophores olivaceous brown, smooth, 105–160 × 4.5–5 $\mu$m; conidia obclavate, conico-truncate at the base, pale olive brown, smooth, 4-6-septate, 50–70 × 4.5–5 $\mu$m.

On living twigs of *Pterocarpus indicus* WILLD. (nárra, indo-shitan) — Plantation of Parcel I, RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 16, 1985, by TK (TFM : FPH-6004).

Note : Only a few lesions were found on young trees of nárra, *Pterocarpus indicus*. No species of *Phaeoisariopsis* has been recorded on *Pterocarpus*. On Leguminosae, 4 species of *Phaeoisariopsis* have been described (ELLIS 1971, 1976), namely *P. griseola* (SACC.)

FERRARIS, *P. indica* (SUBRAM.) DEIGHTON, *P. bonducellae* (HENN.) DEIGHTON and *P. robiniae* (SHEAR) DEIGHTON. Among them, *Phaeoisariopsis robiniae* has smaller conidia while *P. bonducellae* larger than the present fungus. *Phaeoisariopsis griseola* and *P. indica* are somewhat similar to the present fungus based on their conidial length, but with however wider conidia.

**72. *Phaeoseptoria eucalypti*** HANSFORD, Proc. Linn. Soc. NSW. 82 : 225, 1957 ; WALKER, Proc. Linn. Soc. NSW, 87 (2) : 171, 1962. Plate 10 : F

Synonym : *Phaeoseptoria luzonensis* KOBAYASHI, Trans. Mycol. Soc. Japan 19 : 377, 1978.

On living leaves of *Eucalyptus* sp. — Agoo, La Union, Luzon, February 23, 1977, by TK & DG (TFM : FPH-4869, Type of *Phaeoisariopsis luzonensis*).

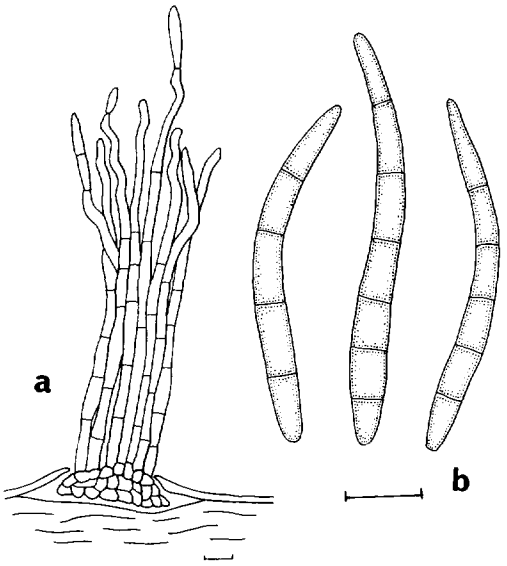


Fig. 32. *Phaeoisariopsis* sp.
Note) a : Coremium, b : Conidia (⌙ : 10 μm)

Note : Comparing the species of *Phaeoseptoria* from the Philippine meterial with HANSFORD's description of *P. eucalypti*, it was noted that the pycnidia of the latter are hypophyllous and are formed within leaf tissue without any spots. On the other hand, the pycnidia of the former were produced amphigenously in the irregularly-shaped leaf spots. Recently, many similar diseased materials caused by a species of *Phaeoseptoria* have been collected from Thailand* (TANAKA 1986) and Japan**. On these materials, the pycnidia of the fungus were formed amphigeneously with or without spots. At first they were formed solitarily mainly on the lower leaf surface without leaf spot, but at more advanced stage many grayish brown spots developed. At this stage numerous pycnidia were found on both the upper and the lower leaf surfaces, and on which many black spore horns were produced. A similar situation was observed on the Australian material***. This fact was also stated by WALKER (1962) who emended the description of *Phaeoseptoria eucalypti*. The morphological characteristics of the species of *Phaeoseptoria* observed from the Philippines, Thailand, Japan and Australia on *Eucalyptus* spp. could not be divided into separate groups. Therefore, *Phaeoseptoria luzonensis* was treated as a synonym of *P.*

* On leaves of *Eucalyptus camaldulensis* DEHN (river red gum)—Sakerat Trial Plantation, Thailand-Japan Cooperative Proj., Nakhon Ratschasima, Thailand, February 21, 1986, by TK (TFM : FPH-6565).

** On leves of *Eucalyptus globulus* LAB. (southern blue gum)—Shizuoka Pref. For. Exp. Sta., Hamakita, Shizuoka, September 16, 1981, by A. FUJISHITA (TFM : FPH-5487) ; September 19, 1984 (TFM : FPH-6077, 6082) ; on *E. rudis*—Yumenoshima, Tokyo, June 11, 1985, by T. KUBONO (TFM : FPH-5989) ; on *E. haematostoma* SM. (white gum)—Yumenoshima, Tokyo, June 11, 1985, by T. KUBONO (TFM : FPH-5990); on *E. microcorys* F.v.M. (tallow-wood)—Yumenoshima, Tokyo, June 11, 1985, by T. KUBONO (TFM : FPH-5991); on *E. tereticornis* SMITH (forest red gum)—Yumenoshima, Tokyo, June 11, 1985, by T. KUBONO (TFM : FPH-5992) ; on *E. blakelyi*—Yumenoshima, Tokyo, June 11, 1986, by T. KUBONO (TFM : FPH-5993).

*** On leaves of *Eucalyptus major* (MARDEN) BLAKELY—Moggil State Forest, near Brisbane, Queensland, Australia, June 12, 1972, by J.L. ALCORN (72083).

*eucalypti* HANSFORD emend. WALKER. Besides these countries, *Phaeoseptoria eucalypti* has been recorded in Hawaii, India and Tasmania on *Eucalyptus delegatensis, E. globulus, E. grandis* and *E. tereticornis* (PADAGANUR & HIREMATH 1973; RAABE *et al.* 1981; SAMPSON & WALKER 1982; SHARMA & MOHANAN 1981).

No other specimens have been collected since 1977 in the Philippines, though many *Eucalyaptus* plantations and nurseries were observed by the authors.

**73. *Phakopsora fici-erectae* ITO et OTANI apud ITO et MURAYAMA,** Trans. Sapporo Nat. Hist. Soc. 18 (3/4) : 85, 1949. — Plate 10 : G

Synonym : *Uredo fici* CAST., in DESMAZIÈRES, Pl. Crypt. 1662, 1848.

On living leaves of *Ficus* sp. (lagnob) — Platation of ACDMC, Toredo-city, Cebu, February 15, 1985, by TK (TFM : FPH-5843).

Note : The present rust fungus was identified as *Phakopsora fici-erectae* ITO et OTANI by Dr. M. KAKISHIMA, University of Tsukuba. There is a lot of confusion in the identification of rust fungi affecting *Ficus*. *Phakopsora fici-erectae* ITO et OTANI has been reported only from China, Japan and Taiwan (ITO & MURAYAMA 1949; ITO & OTANI 1941; TAI 1979). *Uredo fici* CAST. was treated as the uredinial state of *Phakopsora fici-erectae* by ITO and MURAYAMA (1949). On the other hand, *Cerotelium fici* (BUTLER) ARTHUR is well-known in the tropical and subtropical regions as the telial state of *Uredo fici* CAST. (LAUNDON & RAINBOW 1971). It has not been determined whether *Phakopsora fici-erectae* and *Cerotelium fici* are the same species or not. In Asia and Oceania, *Cerotelium fici* has been recorded in India, Indonesia, Iran, Malaysia, Papua New Guinea, the Philippines, Taiwan and Tonga (Anonymous 1970; BAKER 1914 b; BILGRAMI *et al.* 1979; BOEDIJN 1959; DINGLEY *et al.* 1981; ERSHAD 1977; LAUNDON & RAINBOW 1971; SHAW 1984; SINGH 1980; TEODORO 1937).

In the Philippines, *Cerotelium fici* was recorded from Luzon and Bulat Is. (TEODORO 1937). Cebu is a new location record for the *Ficus* rust fungus. The sizes of uredospores of the rust fungus from the Philippines material are 22–25 × 17.5–21.5 μm.

**74. *Phakopsora gossypii* (ARTHUR) HIRATSUKA,** Uredinol. Studies : 266, 1955. — Plate 11 : A ; Fig. 33

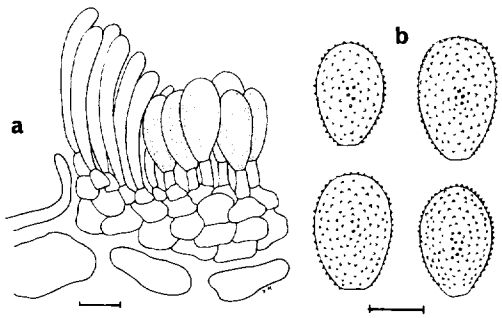


Fig. 33. *Phakopsora gossypii* (ARTHUR) HIRATSUKA

Note) a : Urediniun with paraphyses,
b : Urediniospores (⌙ : 10 μm)

Synonym : *Uredo gossypii* LAGERH., J. Mycol. 7 : 48, 1912.
*U. desmium* PETCH, Ann. Bot. Gard. Peradeniya 5 : 247, 1912.
*Phakopsora desmium* CUMMINS, Bull. Torrey Bot. Cb. 72 : 206, 1945.
Others refer HIRATSUKA (1955) and PUNITHALINGAM (1968).

On living leaves of *Gossypium* sp. (Spanish cotton) — Dept Forest Nursery, Parcell III of RP-J : FDP, Conversion, Pantabangan, Nueva Ecija, Luzon, January 22, 1985, by TK (TFM :FPH-5821).

Note : The present fungus causes a serious leaf rust of woody cotton known as Spanish cotton. The fungus was identified as *Phakopsora gossypii* (ARTHUR) HIRATSUKA by Dr. M. KAKISHIMA, University of Tsukuba. Numerous yellowish brown powdery sori are formed on the lower leaf surface. The uredospores are elliptic to ovoid with truncate end, 20-30 × 15-21.5 $\mu$m and with numerous fine warts on the surface.

This rust fungus is well distributed throughout the world on various herbaceous and woody cotton plants, *Gossypium* spp. In the Philippines, it has been recorded on *Gossypium brasilliense, G. herbaceum, G. hirsutum* and *G.* sp. from Luzon and Occidental Negros (BAKER 1914 a ; SYDOW 1913 a, b ; SYDOW & PETRAK 1928). In Asia and Oceania except the Philippines, it has been reported in China, Fiji, India, Indonesia, Nepal, Papua New Guinea, Taiwan, Tonga and West Samoa on *Gossypium acceuminatum, G. harbadense, G. herbaceum, G. nanking* and *G.* sp. (Anonymous 1970 ; BILGRAMI *et al.* 1979 ; BOEDIJN 1959 ; DINGLEY *et al.* 1981 ; HIRATSUKA 1955 ; MANANDHAR 1977 ; SHAW 1984 ; TAI 1979 ; TRIHARSO *et al.* 1975). Besides these countries, PUNITHALINGAM (1968) added Brunei, Cambodia, New Caledonia, Sri Lanka and Thailand to the geographical distribution of the present rust fungus based on CMI herbarium specimens.

75. *Phomopsis imperiales* (SACC.) HARA. This is the conidial stage of *Diaporthe eres* NIT. (see page 145).

76. *Phomopsis mendax* (SAC.) TRAV. This is the conidial state of *Diaporthe ere* NIT. (see page).

**77. *Phyllachora parkiae* HENNINGS,** Hedwigia 47 : 255, 1908 ; Philip. J. Sci., Bot. 3 (2) : 46, 1908 ; REHM, Philip. J. Sci., Bot. 8 (5) : 396, 1913 ; BAKER, Leafl. Philip. Bot. 7 : 2459, 1914 ; Philip. J. Sci. 46 (3) : 499, 1931 ; KOBAYASHI, Trans. Mycol. Soc. Japan 20 : 306, 1979. — Plate 11 : B

On living leaves of *Parkia roxburgii* DON. (Kupáng) — Forest Nursery, Cent. For. Exp. Sta., UPLB-CF, Laguna, Luzon, March 18, 1977, by TK (TFM : FPH-4888).

Note : the fungus causes the tar spot disease of kupáng, *Parkia roxburgii*. The diseased leaflets become yellowish and gradually defoliate. Its damage, however, is relatively slight. The tar spot disease of kupáng has only been recorded in Luzon, the Philippioes (KOBAYASHI 1979).

**78. *Phyllachora pterocarpi* H. et P. SYDOW,** Ann. Mycol. 10 : 40, 1912 ; Philip. J. Sci., Bot. 9 : 168, 1914 ; KOBAYASHI, Trans. Mycol. Soc. Japan 20 : 301, 1979. — Plate 11 : C

Synonym : *Catacauma pterocarpi* (SYDOW) SYDOW, in THEISSEN & SYDOW, Ann. Mycol. 13 : 387, 1915 ; SYDOW, Ann. Mycol. 15 : 23, 1917.

On living leaves of *Pterocarpus indicus* WILLD. (nárra, indo-shitan) — Forest Nursery of Cent. For Exp. Sta., UPLB-CF, Laguna, Luzon, February 7, 1977, by TK (TFM : FPH-4895) ; March 18, 1977, by TK (TFM : FPH-4889) ; April 5, 1977, by TK (TFM : FPH-4896) ; Alipang Forest Nursery, Alipang Refor. Proj., BFD, La Union, Luzon, February 22, 1977, by TK & DG (TFM :FPH-4891) ; Guest House of NIA Office, Pantabangan, Nueva Ecija, Luzon, March 9, 1977, by TK (TFM : FPH-4897) ; Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, October 15, 1978, by S. ASAKAWA (TFM : FPH-4898) ; January 17, 1985, by TK (TFM : FPH-5833) ; Plantation of Parcel I, RP-J : FDP, Carranglan, Nueva Ecija, Luzon, January 15, 1985, by TK (TFM : FPH-5836) ; Plantation of Parcel III, RP-J : FDP, Pantabangan, Nueva Ecija, Luzon, January 22, 1985, by TK (TFM :FPH-5851).

Note : The fungus causes the tar spot disease. Fruit bodies of the fungus are produced on the upper leaf surface with or without spots. Diseased leaflets turn yellowish but remain attached until maturity. The disease gives the tree a dirty appearance but causes only slight damage. It is widely distributed not only in the Philippines but also in the other foreign countries on various species of *Pterocarpus* (KOBAYASHI 1979).

**79. *Phyllachora spinifera*** (KARSTEN et HARIOT) HÖHNEL, **in REHM,** Philip. J. Sci., Bot. 8 (5) : 397, 1913. — Plate 11 : D ; Fig. 34

Synonym : *Phyllachora ficuum* var. *spinifera* KARSTEN et HARIOT, Rev. Mycol. 12 : 172, 1890 ; SACCARDO, Syll. Fung. 9 : 1014, 1891.

*Catacauma aspideum* f. *spinifera* THEISSEN et SYDOW, Ann. Mycol. 13 : 380, 1915.

*Phyllachora fici-manahassae* HENNINGS, Hedwigia 47 : 254, 1908.

Stroma without spot, epiphyllous, black, shiny, 1-2 mm in diam., 320-490 $\mu$m in thickness, solitary or aggregate, containing several perithecia about 370-500 $\mu$m in diam. and 200-260 $\mu$m in height ; wall of perithecia pseudoparenchymatous to prosenchymatous, outer layer, dark brown, inner layer pale to hyaline, 10-15 $\mu$m in thickness ; asci clavate to oblong cylindric, 8-spored, 65-88 × 9-15 $\mu$m ; ascospores uniseriate to irregularly biseriate, hyaline, unicellular, elliptic, 10-16.5 × 5.5-8 $\mu$m.

On living leaves of *Ficus odorata* (BLANCO) MERR. (pakíling) — Mt. Rubas, Osmeña Ref. Proj., BFD, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5056) ; *Ficus* sp. — Mt Rubas, Osmeña Ref. Proj., BFD, Minglanilla, Cebu, March 25, 1977, by TK & DG (TFM : FPH-5057).

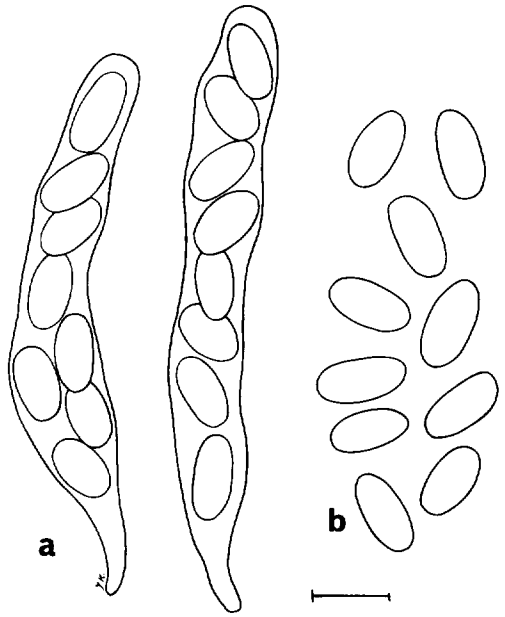


Fig. 34. *Phyllachora spinifera* (KARST. et HARIOT) HÖHNEL

Note) a : Asci, b : Ascospores (⌙ : 10 $\mu$m)

Note : The fungus causes tar spot disease. It was identified as *Phyllachora spinifera* (KARST. et HARIOT) HÖHNEL based on morphological characteristics and is one of more than 40 species of *Phyllachora* described on *Ficus* spp. The fungus was originally described in South Africa on *Ficus ridelii*, and then it was reported in Luzon, Mindanao and Balut Is. of the Philippines on *F. blepharostoma, F. fastigiata, F. fiskei, F. minahassae, F. odorata* and *F. ulmifolia* (HENNINGS 1908 ; REHM 1913 b ; TEODORO 1937 ; THEISSEN & SYDOW 1915). Cebu is the new locality of the fungus in the Philippines.

**80. *Phyllosticta brasiliensis*** LINDER, Mycologia 35 : 407, 1943. — Plate 11 : E ; Fig. 35

Pycnidia scattered on brown blighted needles, black, immersed, globular, 125-140 $\mu$m in diam., 110-125 $\mu$m in height ; conidiophores hyaline, short ; pycnospores hyaline, unicellular, subglobular to ellip-

tic, 9–12.5 × 5–7 μm, with appendage at the apex; appendages hyaline, muscous, 2.5–6.5 μm in length.

On blighted needles of *Araucaria heteropohylla* (SALISH) FRANCO (Norfolk Island pine) — Central Office of RP-J: FDP, Maringalo, Carranglan, Nueva Ecija, Luzon, February 7, 1985, by TK (TFM: FPH-5820).

Note: The fungus causes the needle blight of Norfolk Island pine, *Araucaria heterophylla*. On needles of *Araucaria*, 3 species of *Phyllosticta* and 2 of *Phoma* have been described. Among them, *Phyllosticta araucariaecola* TROTTER (SACCARDO 1931), *P. araucariae* WORONICHIN (SACCARDO 1931) and *Phoma araucariae* TRAVERSO (SACCARDO 1902) are quite different from the present fungus by the smaller sizes of their pycnospores. *Phoma deflectans* SACCARDO (1982) also differs by its cylindric and narrower conidia. The morphology of the present fungus was similar to *Phyllosticta brasiliensis* LINDER (1843) which was described in Brazil on *Araucaria brasiliana*. This is the first record of the fungus in the Philippines and *Araucaria heterophllla* is a new host for the fungus.

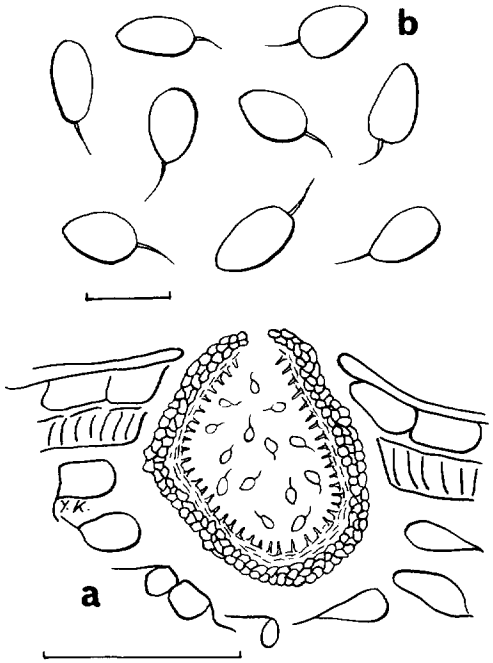


Fig. 35. *Phyllosticta brasiliensis* LINDER
Note) a: Pycnidium, b: Pycnospores (⌙ : a = 100 μm : b = 10 μm)

81. *Phyllosticta gmelinae* KOBAYASHI. This is the conidial stage of *Guignardia gmelinae* KOBAYASHI (see page 152).

**82. *Phyllosticta microcosi* KOBAYASHI et GUZMAN**, sp. nov. Plate 11 : F ; Fig. 36

Maculis in foliis vivis formantibus, suborbicularibus, 3–5 mm in diam, primo brunneis dein griseo-brunneis; pycnidiis disseminatis, amphigenis, nigris, subglobosis, 65–115 μm in diam, 75–115 μm altis; peridiis 5–7.5 μm crassis, compositis ex cellulis irregulariter angularibus; conidiophoris brevibus, simplicibus, hyalinis; conidiis ovoideis, hyalinis, continuis, 9–11.5 × 4.5–5.5 μm.

Habitat: living leaves of *Microcos stylocarpa* (WARH.) BURR. (Kamúling) — Central Trial Plantation, RP-J: FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, August 12, 1977, by TK (TFM: FPH-5067, Holotype).

Leaf spots subcircular, 3–5 mm in diam., brown to grayish brown, scattered pydnidia as black pin-points; pycnidia amphigenous, black, subglobular, 65–115 μm in diam., 75–115 μm in height; wall of pycnidia composed of irregular and thick-walled cells, 5–7.5 μm in thickness; conidiophores short, simple, hyaline; pycnospores ovoid, hyaline, unicellular, 9–11.5 × 4.5–5.5 μm.

Note: The fungus causes the brown leaf spot disease with relatively slight damage. No species of *Phyllosticta* has been found on *Microcos*. On the related plant genus *Grewia*

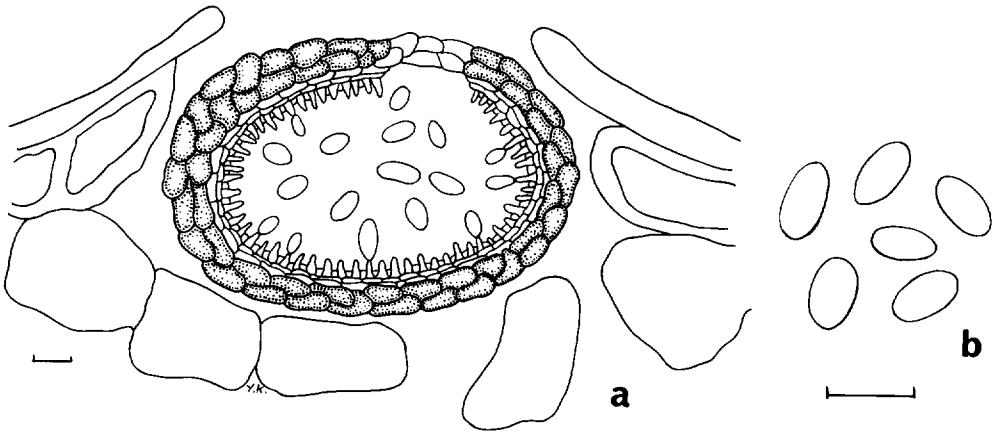


Fig. 36. *Phyllosticta microcosi* sp. nov.
Note) a : Pycnidium, b : Pycnospores (⌙ : 10 μm)

of Tiliaceae, only one species of Phyllosticta, P. grewiae DIED. (SACCARDO 1931), has been described, but it differs from the present fungus in its pycnospores which are smaller and different in shape.

83. *Podoxyphium scancheziae* BATISTA et CIFERRI

This is the conidial stage of *Antennellopsis vulgaris* (YAMAMOTO) BATISTA et CIFERRI (see page 120).

**84. *Puccinia* sp.** — Plate 10 : A ; Fig. 29.

On living leaves of *Dendrocalamus merrillianus* (ELM) ELM (bayog) — Camp 4 Forest Nursery, BFD, Kennon Road, Benguet, Luzon, February 22, 1977, by TK & DG (TFM : FPH-4967) ; Extension of UPLB-CF, Baguio-city, Benguet, Luzon, February 22, 1977, by TK & DG (TFM : FPH-4968, 5107).

Note : Only uredospores were found on these materials. Because several closely similar species of *Puccinia* have been described on bamboos, the specific identify of the rust fungus on the Philippine materials could not be made because of the absence of teliospores. QUINIONES and DAYAN (1981) referred to the uredial stage of the rust of fungus of *Dendrocalamus latiflorus* from Laguna, Luzon as *Puccinia kusanoi* DIETEL.

**85. *Pythium* sp.** — Plate 11 : G

On roots of *Pinus caribaea* MORLET (caribean pine) — Plantation of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG (FPRI : FPH-P 8-12).

Note : Young planted seedlings are affected with root rot caused by the present fungus. Poor drainage condition of the plantation is the predisposing factor to the attack of *Pythium* sp.

**86. *Ravenelia berkeleyi*** MUNDKUR et THIRUMALACHAR, CMI, Mycol. Pap. 16 : 19, 1946. — Plate 12 : A ; Fig. 37

Uredosori amphigenous, orange brown to cinnamon brown, powdery, solitary or

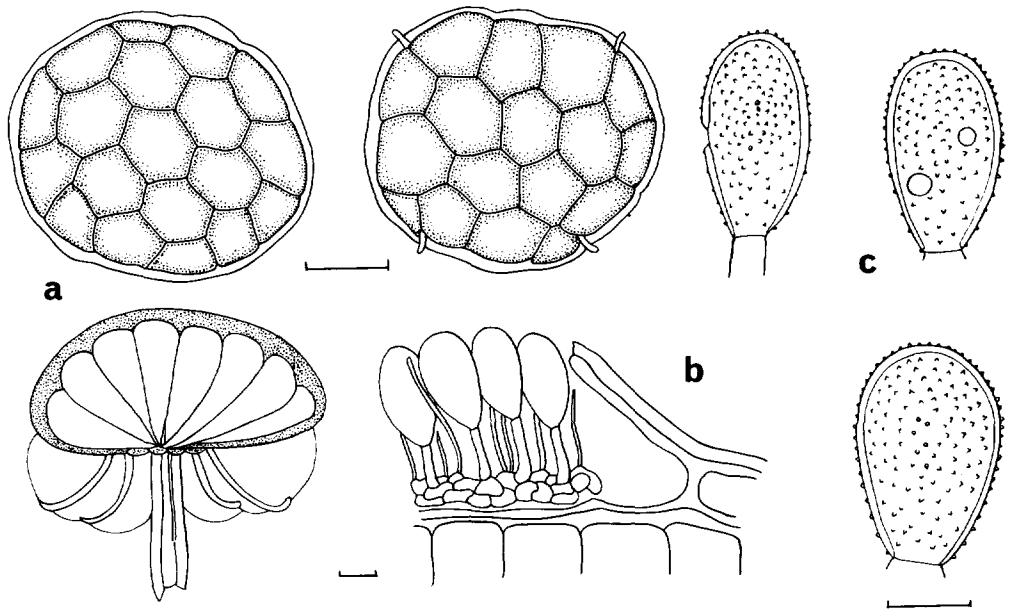


Fig. 37. *Ravenelia berkeleyi* MUNDK. et THIRUM.
Note) a, b : Telium, c : A part of uredinium, d : Urediniospores (⌙ : 10 μm)

gregarious, 210–285 μm in diam., at first without spots, later forming spots 1–5 mm. in diam ; urediniospore oval, pale yellowish to yellowish brown, with several germ-pores, minutely verruculose ; telia amphigenous, black, powdery ; teliospores forming a capitate head with stalk, chestnut-brown to dark brown orange, subcircular at upper surface, hemispheric at side view, 75–108 μm in diam., each spore unicellular, 15–22.5 μm in width ; stalk 20–50 μm in length.

On living leaves of *Cassia multijuga* RICH (malakaturai) — Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, January 23, 1985, by TK (TFM : FPH-5824) ; Dept Forest Nursery, Conversion, Pantabangan, Nueva Ecija, Luzon, January 22, 1985, by TK (TFM : FPH-5823).

Note : The fungus causes serious leaf rust. Thirteen species of *Ravenelia* have been recorded on *Cassia*. The fungus on Philippine materials was identified as *Ravenelia berkeleyi* MUND. et THIRUM. by Dr. M. KAKISHIMA, University of Tsukuba. It has hitherto been known in India and Tanzania (EBBELS & ALLEN 1979 ; MUNDKUR & THIRMALACHAR 1946). *Cassia multijuga* is a new host and the Philippines is a new locality of the fungus.

**87. *Ravenelia* sp.** — Plate 12 : B

On living leaves of *Albizia procera* (ROXB.) BENTH. (aklέng párang) — Central Trial Plantation, RP-J : FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 27, 1977, by TK (TFM : FPH-4966, 5093).

Note : Only uredosori were found on this material. According to Dr. N. HIRATSUKA, Tottori Mycological Institute, the taxonomy of this species is difficult because many species

of *Ravenelia* have been descriced on *Albizia* and they are mainly classified by the morphology of the telial stage. In the Philippines, the rust fungus on *Albizia procera* from Luzon and Mindanao has been identified as *Ravenelia clemensae* SYDOW (in SYDOW & PETRAK 1928).

88. ***Rhizoctonia solani*** KÜHN, Krankh. Kultur. Ursach. Verh. : 222, 1858.

Isolated from the roots of seedlings of *Albizia falcataria* (L.) FOSBERG (moluccan sau) — Boneko Forest Nursery, BFD, Benguet, Luzon, February 20, 1977, by TK & DG ; Forest Nursery of Impalutao Ref. Proj., BFD, Impalutao, Bukidnon, Mindanao, September 13, 1977, by TK ; *Casuarina equisetifolia* FORST. (agohó, mokumaô) — Marikit Forest Nursery, NIA-BFD, Pantabangan, Nueva Fcija, Luzon, March 8, 1977, by TK & DG (TFM : FPH-5097) ; *Eucalyptus deglupta* Blume (bagras) — Central Forest Nursery, PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG ; *Leucaena leucocephala* de WIT. (giant ipíl-ípil) — Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG ; Central Forest Nursery, PICOP, Bislig, Surigao del Sur, Mindanao, Mardh 22, 1977, by TK & DG ; *Psidium guajava* L. (bayábas, guava) — Forest Nursery of Consuelo Ref. Proj., BFD, Santa Fe, Nueva Viscaya, Luzon, March 9, 1977, by TK & DG (TFM : FPH-5091) ; *Swietenia macrophylla* KING (big-leaf mahogany, ôba-mahoganii) — Forest Nursery, Alipang Ref. Proj., BFD, Alipang, La Union, Luzon, February 22, 1977, by TK & DG ; Forest Nursery, Osmeña Ref. Proj., BFD, Camp 7, Minglanilla, Cebu, March 25, 1977, by TK & DG.

Note : The fungus causes the damping-off and root rot diseases on various herbacious and woody plants in the Philippines (see page 112).

89. ***Robillarda trachycarpi*** TASSI, Bull. Lab. Ort. Bot. Siena 1900 : 126 ; SACCARDO, Syll. Fung. 16 : 935, 1902. — Plate 12 :C ; Fig. 38

Pycnidia on irregular brown leaf spot injured by leaf miner insects, immersed at first,

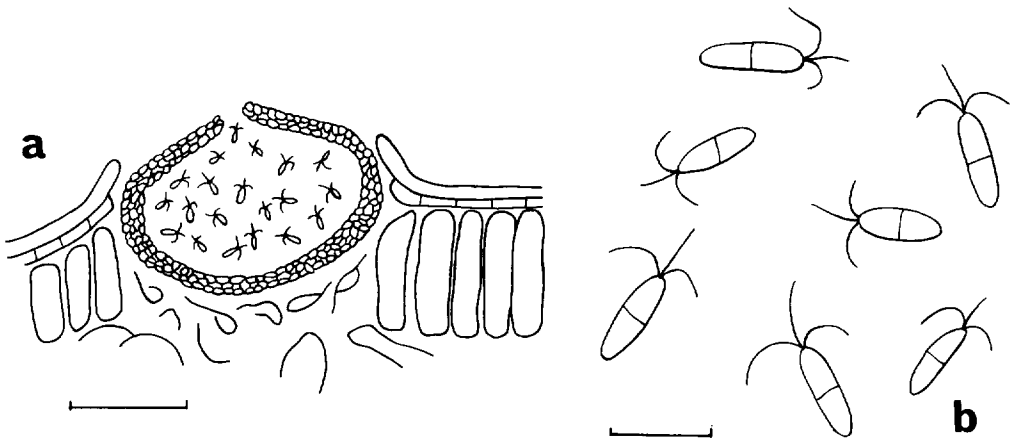


Fig. 38. *Robillarda trachycarpi* TASSI

Note) a : Pycnidium, b : Pycnospores (⌙ : a = 100 μm ; b = 10 μm)

then erumpent, black, globular, 125–165 μm in diam., 85–140 μm in height; pycnospores elliptic, hyaline to plae yellowish, 2-celled, 10–14 × 2.5–3 μm, with 2–3-appendages at the tip of the pycnospore; appendages hyaline, ciliate, 5–10 μm in length.

On living leaves of *Pterocarpus indicus* WILLD. (nárra) — Central Forest Nursery, RP-J: FDP, Baluarte, Carranglan, Nueva Ecija, Luzon, September 23, 1977, by TK (TFM: FPH-5064).

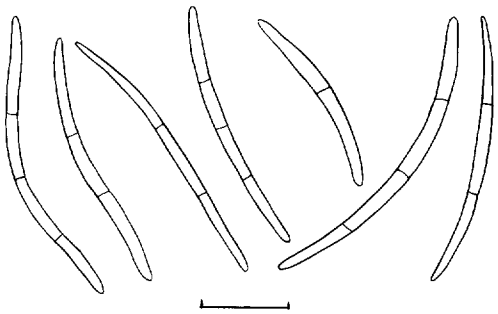

Fig. 39. Pycnospores of *Septoria alni* SACC.
Note) (⟝ : 10 μm)

Note: The fungus produced pycnidia on the dead patches which were caused by leaf miner insect. It may be a secondary parasite or saprophyte. No species of *Robillarda* has been recorded on *Pterocarpus* and on the other Leguminous plants. The fungus was identified as *Robillarda trachycarpi* TASSI which was originally described on *Trachycarpus excelsa* in Italy (SACCARDO 1902). This is the first record of *Robillarda trachycarpi* in the Philippines and *Pterocarpus indicus* is a new host of the fungus.

**90. *Septoria alni* SACCARDO**, Michelia 1: 177, 1878. — Fig. 39

Spots brown to dark brown, irregular, numerous, 2–10 mm in diam.; pycnidia immersed within epidermal layer, then erumpent, subglobular, dark brown to black, 110–200 μm in diam.; pycnospores cylindric to needle shaped, straight or curved, hyaline, 2–5-septate, 25–50 × 1.3–2.5 μm.

On living leaves of *Alnus japonica* SIEB. et ZUCC. (han'noki) — Atok Forest Nursery, BFD, Benguet, Luzon, February 20, 1977, by TK & DG; Binga Forest Nursery, BFD, Benguet, Luzon, February 20, 1977, by TK & DG; Bobok Forest Experimental Nursery and Plantation, FORI, Benguet, Luzon, February 21, 1977, by TK & DG; September 2, 1977, by TK; Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG; September 2, 1977, by TK; *A. maritima* NUTTAL. (malay-han'noki) — Binga Forest Nursery, BFD, Benguet, Luzon, February 20, 1977, by TK & DG; Pacdal Forest Nursery, BFD, Baguio-city, Benguet, Luzon, February 19, 1977, by TK & DG (TFM: FPH-4952); September 2, 1977, by TK; *A. nepalensis* (nepal-han'noki) — Atok Forest Nursery, BFD, Benguet, Luzon, February 20, 1977, by TK & DG.

Note: The fungus causes the brown leaf spot of introduced alders, *Alnus japonica, A. maritima* and *A. nepalensis* (KOBAYASHI 1977 a; 1986; KOBAYASHI *et al.* 1982). It was identified as *Septoria alni* SACC. which is distributed throughout the temperate zone including Japan and Korea (Anonymous 1972, 1984 b; CONSTANTINESCU 1984). The Philippines is a new locality and *Alnus maritima* and *A. nepalensis* are new hosts for the fungus. The fungus may have been introduced from a foreign country along with its host.

**91. *Uredo* sp.**

On living leaves of *Mimusops parvifolia* R. BR. (bansalagin) — Guest House of PICOP, Bislig, Surigao del sur, Mindanao, March 24, 1977, by TK & DG (TFM: FPH-5087).

Note: The identification of the present rust fungus could not be made because of the lack of telial stage. Damage of this rust disease is slight on adult trees.

**92. *Valsa kitajimana* KOBAYASHI**, Bull. Gov. For. Exp. Sta. 226: 102, 1970. — Plate 11:

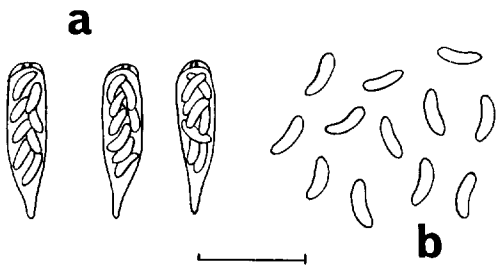


Fig. 40. *Valsa kitajimana* KOBAYASHI
Note) a : Asci, b : Ascospores (⌙ : 10 μm)

D ; Fig. 40.

Perithecial pustules on bark, hilly, scattered or gregarious, 0.5-1 mm in diam. ; perithecia clustered within bark tissue, 500-1050 μm in diam., with long neck ; wall of perithecia membranaceous, black, 30-550 μm in thickness ; necks cylindric, collectively erumpent through bark periderm or ectostroma, 450-600 μm in length, 150-200 μm in diam., with hyaline periphyses ; asci clavate to elliptic, with apical ring at the tip, 14-17 × 3-4.5 μm, 8-spored, arranged irregularly in perithecium ; ascospores allantoid, hyaline, unicellular, 4.5-5.5 d × 1.3 μm

On dead branches of *Cassia fruticosa* MILL (yellow shower) — Forest Nursery of Cent. For. Exp. Sta., UPLB-CF, Laguna, Luzon, February 7, 1977, by TK & DG (TFM : FPH-5052, 5053).

Note : The present fungus was identified as *Valsa kitajimana* KOBAYASHI, a fungus known only in Japan (KOBAYASHI 1970). This is the first record of the fungus in the Philippines and *Cassia fruticosa* is a new host of the fungus.

**93. *Volutella pini-caribaeae* KOBAYASHI,** Trans. Mycol. Soc. Japan 21 : 318, 1980. — Plate 12 : E

On dead needles of *Pinus caribaea* MORELET (caribean pine) — Plantation of PICOP, Bislig, Surigao del Sur, Mindanao, March 21, 1977, by TK & DG (TFM : FPH-4964, Holotype).

Note : No other specimen has been collected since the first record of the fungus in Mindanao (KOBAYASHI 1980 a).

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## Explanation of plates

Plate 1

A : Yellow leaf disease of moluccan sau (*Albizia falcataria*) caused by *Camptomeris albizziae* (PETCH) MASON

B : Needle blight of benguet pine (*Pinus kesiya*) caused by *Cercospora pini-densiflorae* HORI et NAMBU

C : Brown leaf spot of nárra (*Pterocarpus indicus*) caused by *Cercospora pterocarpicola* YEN

D : Southern sclerotium blight of mahogany (*Swietenia macrophylla*) caused by *Corticium rolfsii* CURZI

E : Rust damage of teak (*Tectona grandis*) caused by *Olivea tectonae* (T.S. et K. RAMAKR.) MULDER

F : Root rot damage of bagrás (*Eucalyptus deglupta*) caused by the correlative effect with attack of *Fusarium* spp. and failure of water management

Plate 2

A : Rust of mulberry (*Morus alba*) caused by *Aecidium mori* BARCLAY

B : Sooty mold of mango (*Mangifera indica*) caused by *Antennellopsis vulgaris* (YAMAMOTO) BAT. et CIF.

C : Black powdery spot of papaya (*Carica papaya*) caused by *Asperisporium caricae* (SPEG.) MAUBL.

D : Sooty mold of bagilumbáng (*Aleurites trisperma*) caused by *Asterina punctiformis* LÉV.

E : Canker of moluccan sau (*Albizia falcataria*) caused by *Botryodiplodia theobromae* PAT.

F : Canker damage in a young plantation of *Acacia mangium* caused by *Botryodiplodia theobromae* PAT.

Plate 3

A : Rust of íba (*Cicca acida*) caused by *Caeoma* sp.

B : Stem blight of caribbean pine (*Pinus caribaea*) caused by *Calonectria pini-caribaeae* sp. nov.

C : Yellow leaf disease of moluccan sau (*Albizia falcataria*) caused by *Camptomeris albizziae* (PETCH) MASON

D : Algal leaf spot of mahogany (*Swietenia macrophylla*) caused by *Cephaleuros virescens* KUNZE

E : Brown leaf spot of batíno (*Alstonia macrophylla*) caused by *Cercospora alstoniae* sp. nov.

F : Cercospora leaf spot of antipólo (*Artocarpus blancoi*) caused by *Cercospora artocarpi* H. et P. SYDOW

Plate 4

A : Brown leaf spot of bagrás (*Eucalyptus deglupta*) caused by *Cercospora eucalypti* ELL. et EV.

B : Brown leaf spot of kakauáti (*Gliricidia sepium*) caused by *Cercospora gliricidiae* H. et P. SYDOW

C : Brown leaf spot of yemane (*Gmelina arborea*) caused by *Cercospora gmelinae*

YEN et GILLES

D : Brown leaf spot of cassava (*Manihot esculenta*) caused by *Cercospora henningsii* ALL.

E : Cercospora leaf spot of oleander (*Nerium oleander*) caused by *Cercospora kurimaensis* FUKUI

F : Defoliation of henna (*Lawsonia inermis*) caused by *Cercospora lawsoniae-albae* THIRUM. et GOVINDU

Plate 5

A : Brown leaf spot of banabá (*Lagerstroemia speciosa*) caused by *Cercospora lythracearum* HEALD et WOLF

B : Cercospora leaf spot of *Paulownia taiwaniana* caused by *Cercospora paulowniae* HORI

C : Brown zonate spot of káhoi-dalága (*Mussaenda philippica*) caused by *Cercospora philippinensis* sp. nov.

D : Needle blight of benguet pine (*Pinus kesiya*) caused by *Cercospora pini-densiflorae* HORI et NAMBU

E : Brown leaf spot of kalachúcheng-puti (*Plumeria alba*) caused by *Cercospora plumeriae* CHUPP

F : Brown leaf spot of nárra (*Pterocarpus indicus*) caused by *Cercospora pterocarpicola* YEN

Plate 6

A : Cercospora leaf spot of avocado (*Persea americana*) caused by *Cercospora purpurea* CKE.

B : Needle blight of *Taxodium mucronatum* caused by *Cercospora sequoiae* ELL. et EV.

C : Brown leaf spot of moláve (*Vitex parviflora*) caused by *Cercospora viticis* ELL. et EV.

D : Cercospora leaf spot of manzanitas (*Zizyphus mauritiana*) caused by *Cercospora zizyphi* PETCH

E, F : Anthracnose of ipíl-ípil (*Leucaena leucocephala*) (E) and nárra (*Pterocarpus indicus*) (F) caused by *Colletotrichum truncatum*

Plate 7

A : Damage of mahogany (*Swietenia macrophylla*) seedlings caused by *Corticium rolfsii* CURZI

B : Rust of binayúyu (*Antidesma ghaesembilla*) caused by *Crossopsora antidesmae-dioicae* RAC.

C : Canker of *Acacia auriculiformis* caused by *Diaporthe eres* NIT.

D : Perithecial pustules of *Diatrypella favacea* (FR.) CES. et de NOT. on yellow shower (*Cassia fruticosa*)

E : Symptom on a leaf of unkown species of Tiliaceae caused by *Eriophyes* sp.

F : Fruit bodies (conidial masses) of *Exosporium leucaenae* STEV. et DALBEY, yellow leaf disease fungus, on lower leaf surface of ipíl-ípil (*Leucaena leucocephala*)

G : Wilt symptom of bagras (*Eucalyptus deglupta*) seedlings caused by *Fusarium oxysporum* SCHL. and *F. solani* (MART.) SACC.

H : Anthracnose of *Hydrangea macrophylla* caused by *Glomerella cingulata* (*Ston.*)

SP. et SCHR.

Plate 8

A : Anthracnose of mango (*Mangifera indica*) caused by *Glomerella cingulata* (STON.) SPAULD. et SCHR.

B : Gray leaf spot of yemane (*Gmelina arborea*) caused by *Guignardia gmelinae* KOBAYASHI

C : Rust of *Rubus* sp. caused by *Hamaspora acutissima* P. et H. SYDOW

D : Rust of coffee (*Coffea arabica*) caused by *Hemileia vastatrix* BERK. et BR.

E : Needle cast of caribbean pine (*Pinus caribaea*) caused by *Lophodermium australe* DEARN.

F : Gray leaf spot of mango (*Mangifera indica*) caused by *Macrophoma luzonensis* KOBAYASHI

G : Needle blight of mindro pine (*Pinus merkusii*) caused by *Macrophoma micromegala* (BERK. et CURT.) BERL. et VOGL.

Plate 9

A : Sooty mold of yemane (*Gmelina arborea*) caused by *Meliola clerodendricola* var. *micromera* (SYD.) HANSF.

B : Sooty mold of *Acacia auriculiformis* caused by *Meliola koae* STEV.

C : Root-knot nematode damage of *Paulownia taiwaniana* roots caused by *Meloidogyne incognita* (KOFOID et WHITE) CHITW.

D : Yellow leaf disease of rosál diláu (*Gardenia phyrastrei*) caused by *Mycosphaerella luzonensis* KOBAYASHI

E : Brown leaf spot of alibángbang (*Piliostigma malabaricum* var. *acidum*) caused by *Mycosphaerella piliostigmae* sp. nov.

F : Powdery mildew of tamarind (*Tamarindus indicus*) caused by *Oidium* sp.

Plate 10

A : Rust (*Puccinia* sp.) and its hyperparasite (*Ophionectria* sp. on *Dendrocallamus merrillianus*

B : Pestalotia disease of cashew (*Anacardium occidentale*) caused by *Pestalotiopsis adusta* (ELL. et EV.) STEY.

C : Pestalotia disease of guava (*Psidium guajava*) caused by *Pestalotiopsis heucherae* TEHON et DANIELS

D : Pestalotia disease of fire-ball (*Calliandra haematocephala*) caused by *Pestalotiopsis langloisii* (GUBA) comb. nov.

E : Brown leaf spot of kaátoan bangkál (*Anthocephalus chinensis*) caused by *Phaeoisariopsis anthocephala* KOBAYASHI

F : Black powdery spot of *Eucalyptus* sp. caused by *Phaeoseptoria eucalypti* HANSF.

G : Rust of *Ficus* sp. caused by *Phakopsora fici-erectae* ITO et OTANI

Plate 11

A : Rust of *Gossypium* sp. caused by *Phakopsora gossypii* (ARTHUR) HIRATSUKA

B : Tar spot of kupáng (*Parkia roxburgii*) caused by *Phyllachora parkiae* HENN.

C : Tar spot of nárra (*Pterocarpus indicus*) caused by *Phyllachora pterocarpi* H. et P. SYDOW

D : Tar spot of pakíling (*Ficus odorata*) caused by *Phyllachora spinifera* (KARST. et HARIOT) HÖHN.

E : Needle blight of Norfolk Island pine (*Araucaria heterophylla*) caused by *Phyllosticta brasiliensis* LINDER

F : Brown leaf spot of kamúling (*Microcos stylocarpa*) caused by *Phyllosticta microcosi* sp. nov.

G : Root rot damage of planted caribean pine (*Pinus caribaea*) caused by *Pythium* sp.

Plate 12

A : Rust of malakáturai (*Cassia multijuga*) caused by *Ravenelia berkeleyi* MUND. et THIRUM.

B : Rust of aklêng párang (*Albizia procera*) caused by *Ravenelia* sp.

C : Leaf blotch of nárra (*Pterocarpus indicus*) caused by *Robillarda trachycarpi* TASSI

D : Perithecial pustules of *Valsa kitajimana* KOBAYASHI on dead twig of yellow shower (*Cassia fruticosa*)

E : Needle blight of caribean pine (*Pinus caribaea*) caused by *Volutella pini-caribaeae* KOBAYASHI

F : Rust of teak (*Tectona grandis*) caused by *Olivea tectonae* (T.S. et K. RAMAKR.) MULDER

G : Sooty mold of *Bougainvillea spectabilis* associated with a scale insect

H : Fox-tail of caribbean pine (*Pinus caribaea*)

I : A parasitic plant on *Lagerstroemia speciosa*

# フィリピンの森林病害調査とその病原微生物の分類・同定

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## 摘　要

フィリピンにおいては300万から400万haにも及ぶといわれる荒廃草地や放棄牧場地の緑化・再造林が，天然木材資源の枯渇により大きな課題として取り上げられてきた。天然資源省の下部組織である林業局（Bureau of Forest Development）においても，国策のもと独自に森林造成を進めてきたが，近年はさらに欧米や日本など先進諸国の経済的・技術的援助を受けつつ，国土緑化に一層精力的に取り組んでいる。

しかしながら，苗畑造成や人工造林が急激に進められるにつれ，いっぽうでは病害虫などの生物被害の発生もまた大きな増勢を示してきた。フィリピンの人工造林の歴史は1930年代からみられ，苗畑を含めた森林病害の記録と防除の試みも，決して多くはないが文献に残されている。けれども近年の急激な森林造成面積の増加とそれに伴う病害発生の増大には，フィリピン大学（College of Forestry, University of the Philippines）と森林研究所（Forest Research Institute）各1～2名の樹病研究者だけでは対応しきれないのが実状であった。

たまたまフィリピン大学と熱帯農業研究センター（日本）との研究協力の中でルソン島中北部のケシヤマツ枯損原因解明がとりあげられ，1977年に著者の一人小林が短期派遣研究員として3カ月間フィリピン大学に滞在し，併せて森林病害の調査と病原微生物の分類・同定の研究を共著者のde Guzmanと協力して行う機会を持つことができた。その後，1985年2月までに3回ほど国際協力事業団（日本）の短期派遣専門家としてフィリピンに滞在する機会があり，その中でもフィリピン大学と連絡をとって共同調査研究を行うことができた。

調査はフィリピンのルソン島，セブ島，ミンダナオ島の38地区において行われ (Fig. 1)，樹木病害の調査・観察と病害標本の採取がなされた。採取標本は主としてフィリピン大学林学部の樹病学教室と，パンタバンガン地区日比林業技術協力プロジェクトの事務室とにおいて，スライド標本作成と顕微鏡検査を行い，必要なものはフィリピン大学において分離培養を行った。一部の措葉およびスライド標本と培養は横浜植物防疫所（農林大臣）の許可をうけて林業試験場樹病研究室（東京・目黒区および茨城・茎崎町）において分類・同定の研究に供した。さらに一部の病害についてはフィリピン大学と林業試験場において人工接種実験による病原性の確認を行い，またフィリピン大学およびパンタバンガン地区日比林業技術協力プロジェクトの苗畑において防除の実験も行った。

現在まで分類・同定が終ったもののうち森林病害として重要なものについては逐次公表してきたし（小林 1977 a, 1978 a～d, 1979, 1980 a～c, 1981；小林・Guzman 1978, 1985, 1986 a～c；小林・陳野 1983, 1984；小林ら 1977, 1979, 1982；周藤ら 1978）まだフィリピン大学において病原性確認を行っているも

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(1) 保護部
(2) フィリピン大学林学部森林生物科学科

のもあるが，フィリピンを始めとする東南アジア諸国において人工造林拡大に伴う森林病害の発生が増大していることもあり，これらの病害防除のための基礎資料として未報告の分を含めて1977年以来10年間の研究結果をとりまとめたものである。

Table 1から5に示されるように，本調査においては，ルソン・セブ・ミンダナオ3島の38地区における30科61属76種の木本植物から273点の病害標本が採取記録され，それらは134種類の病気と2種類の重複寄生菌とに類別された。その中ではルソン島が最も多く，43属53種の樹木上に192点の病害試料が得られ，全体の70%を占めた。ついでミンダナオ島では12属13種の宿主上に45点（16%）の標本がえられ，セブ島では25属26種の宿主上に36点（13%）の試料が採取された。土壌病害と胴・枝枯性病害が各19種類ずつで各14%を占め，広葉や針葉に発生する斑点性ないし葉枯性病害が96種類で72%を占めた。これらのうち49樹種上の80種類（60%）の病気がフィリピンで新たに記録された新病害であった。その内訳は次のとおりである（*は新病名，同一病原で複数の宿主がある場合は宿主の方に*を付けた）

土壌病害：

マツ類（ウーカルパマツ・カリビアマツ・ケシヤマツ・スラシュマツ）の微粒菌核病（*Macrophomina phaseolina*）

カリビアマツの林地根腐病（*Pythium* sp.）

ウスバギリの根こぶ線虫類（*Meloidogyne incognita*）

グアバの根こぶ線虫病*（*Meloidogyne* sp.）

胴・枝枯性病害：

アカシアマンギウムおよびモルッカネム*のボトリオディプロディア胴枯病（*Botryodiplodia theobromae*）

イエローシャワーの枝枯病*（*Diatrypella favacea* および *Valsa kitajimana*）

ウスバギリのさめ肌胴枯病（*Botryosphaeria dothidea*）

ウスバギリ・カマバアシアおよびモルッカネム*の胴枯病（*Diaporthe eres*）

オオバマホガニーの茎枯病（*Botryodiplodia theobromae*）

カリビアマツの茎枯病*（*Calonectria pini-caribaeae*）

ケシヤマツの青変病（*Ceratocystis ips*）

ナラ（インドシタン）の枝枯病*（*Phaeoisariopsis* sp.）

ナラの枝枯炭そ病*（*Glomerella cingulata*）

ナラの茎枯病*（*Nectria* sp.）

ユーカリ（バグラス）の黄色胴枯病*（*Cryphonectria nitschkei*）

斑点性および葉枯性病害

アローカリアの褐色葉枯病*（*Phyllosticta brasiliensis*）

メキシコラクウショウの赤枯病（*Cercospora sequoiae*）

マツ類（ウーカルパマツ・カリビアマツ・ケシヤマツ・メルクシマツ）の葉枯病（*Cercospora pini-densiflorae*）

カリビアマツの黒線葉枯病*（*Volutella pini-caribaeae*）

ケシヤマツのペスタロチア葉枯病（*Pestalotiopsis disseminata*）

メルクシマツのマクロホマ葉枯病（*Macrophoma micromegala*）

アカシアマンギウム・タマリンド・レインツリーおよびレモンユーカリのうどんこ病（*Oidium* sp.）

アジサイ・イピルイピル・カリビアマツ・ランソネスの炭そ病（*Glomerella cingulata*）

アボカドの褐紋病（*Cercospora purpurea*）

アメダマノキ（イバ）のさび病（*Caeoma* sp.）

イピルイピルの黄葉病（*Exosporium leucaenae*）

イピルイピルおよびナラ（インドシタン）の炭そ病（*Colletotrichum truncatum*）

インドソケイの褐斑病（*Cercospora plumeriae*）

インドナツメの褐点病*（*Cercospora zizyphi*）

ウスバギリの斑点病（*Ccrcospora paulowniae*）

カシューナッツのペスタロチア病*（*Pestalotiopsis adusta*）

カトアンバンカルの線毛褐斑病（*Phaeoisariopsis anthocephala*）

カホイダラガの褐色輪斑病*（*Cercospora philippinensis*）

カマバアカシアのすす病（*Meliola koae*）

カムリンの褐斑病*（*Phyllosticta microcosi*）

キダチヨウラク（ヤマネ）の褐斑病（*Cercospora gmelinae*）

キダチヨウラクのすす病（*Meliola clerodendricola* var. *micromera*）

キダチヨウラクの灰斑病（*Guignardia gmelinae*）

キョウチクトウの雲紋病（*Cercospora kurimaensis*）

グアバのペスタロチア病（*Pestalotiopsis heucherae*）

クチナシの黄斑病（*Mycosphaerella luzonensis*）

セアララバーの斑点病（*Cercospora henningsii*）

タケ（バヨ）の葉さび病（*Puccinia* sp.）

チークのさび病（*Olivea tectonae*）

ナラ（インドシタン）の褐斑病（*Cercospora pterocarpicola*）

ナラの黒点汚斑病*（*Robillarda trachycarpi*）

ナラの汚斑病*（*Ellisiopsis gallesiae*）

バチノの褐斑病（*Cercospora alstoniae*）

パパイアの黒粉病（*Asperisporium caricae*）

ハンノキ類（ハンノキ・マレーハンノキ・ネパールハンノキ）の褐斑病（*Septoria alni*）

ハンノキ類（ハンノキ・マレーハンノキ）のさび病（*Melampsoridium hiratsukanum*）

ファイヤーボールのペスタロチア病*（*Pestalotiopsis langloisii*）

フィリピンアブラギリのすす病（*Asterina punctiformis*）

ヘンナの褐斑病*（*Cercospora lawsoniae-albae*）

マラカツライのさび病*（*Ravenelia berkeleyi*）

マンゴーの灰斑病（*Macrophoma luzonensis*）

マンゴーのすす病（*Antennellopsis vulgaris*）

モラベの褐斑病（*Cercospora viticis*）

ユーカリ（バグラス）の褐斑病（*Cercospora eucalypti*）

ユーカリの黒粉斑点病（*Phaeoseptoria eucalypti*）

いっぽう．61属76種の宿主樹木上において，2種の重複寄生菌を含め55属87種の病原体が区別された。これらの中では菌類が最も多く，50属81種と93%を占め，線虫・藻類など他は7%と僅少であった。菌類の中では不完全菌類が最も多く，20属44種と54%を占めた。ついで子のう菌類の17属21種(26%)，担子菌類の12属15種（19%）で，鞭毛菌類はわずか1属1種にすぎなかった。この調査の中で既知種に該当するものがなく，フィリピンをタイプロカリティに新種新病菌として記載したものが以下のように10種を数えた。

*Calonectria pini-caribaeae*（カリビアマツ茎枯病菌）

*Cercospora alstoniae*（バチノ褐斑病菌）

*C. philippinensis*（カホイダラガ褐色輪斑病）

*Guignardia gmelinae*（キダチヨウラク灰斑病菌）

*Macrophoma luzonensis*（マンゴー灰斑病菌）

*Mycosphaerella luzonensis*（クチナシ黄斑病菌）

*M. piliostigmatis*（アリバンバン褐斑病菌）

*Phaeoisariopsis anthocephala*（カトアンバンカル線毛褐斑病菌）

*Phyllosticta microcosi*（カムリン褐斑病菌）

*Volutella pini-caribaeae*（カリビアマツ黒線葉枯病菌）。

これらの新種のほかにフィリピンで初めて記録された菌類は24属37種におよび，新種と合わせると54%を占める。フィリピン産新記録種は次のとおりである。

*Antennellopsis vulgaris* (YAMAMOTO) BAT. et CIF.（マンゴー）

*Asperisporium caricae* (SPEG.) MAUBL.（パパイヤ）

*Asterina punctiformis* LÉV.（フィリピンアブラギリ）

*Botryosphaeria dothidea* (MOUG. ex FR.) CES. et de NOT.（ウスバギリ）

*Ceratocystis ips* (RUMB.) MOREAU（ケシヤマツ）

*Cercospora eucalypti* CKE. et MASS.（ユーカリ）

*C. gmelinae* YEN et GILLS（キダチヨウラク）

*C. kurimaensis* FUKUI（キョウチクトウ）

*C. lawsoniae-albae* THIRUM. et GOV.（ヘンナ）

*C. paulowniae* HORI（ウスバギリ）

*C. pini-densiflorae* HORI et NAMBU（ウーカルパマツ・カリビアマツ・ケシヤマツ・メルクシマツ）

*C. plumeriae* CHUPP（インドソケイ）

*C. pterocarpicola* YEN（ナラ）

*C. purpurea* CKE.（アボカド）

*C. sequoiae* ELL. et EV.（メキシコラクウショウ）

*C. viticis* Ell. et Ev.（モラベ）

*C. zizyphi* Petch（インドナツメ）

*Cryphonectria nitschkei* (Otth) Barr（ユーカリ）

*Diaporthe eres* Nit.（ウスバギリ・カマバアカシア・モルッカネム）

*Diatrypella favacea* (Fr.) Ces. et de Not.（イエローシャワー）

*Ellisiopsis gallesiae* Bat. et Nascim.（ナラ）

*Exosporium leucaenae* Stev. et Dalb.（ジャイアント・イピル・イピル）

*Lophodermium australe* Dearn.（カリビアマツ・ケシヤマツ・メルクシマツ）

*Macrophoma micromegala* (Berk. et Curt.) Berl. et Vogl.（メルクシマツ）

*Melampsoridium hiratsukanum* Ito ex Hiratuka（ハンノキ・マレーハンノキ）

*Meliola koae* Stev.（カマバアカシア）

*Olivea tectonae* (T. S. et K. Ramak.) Mulder（チーク）

*Periconia shyamala* Roy（アルモン）

*Pestalotiopsis disseminata* (Thum.) Stey.（ケシヤマツ）

*P. heucherae* (Tehon et Daniels) Comb. Nov.（グアバ）

*P. langloisii* (Guba) Comb. Nov.（ファイヤーボール）

*Phaeoseptoria eucalypti* Hansf.（ユーカリ）

*Phyllosticta brasilinsis* Lind.（アロウカリア）

*Ravenelia berkeleyi* Mundk. et Thirum.（マラカツライ）

*Robillarda trachycarpi* Tassi.（ナラ）

*Septoria alni* Sacc.（ハンノキ・マレーハンノキ・ネパールハンノキ）

*Valsa kitajimana* Kobayashi（イエローシャワー）。

本調査の中で記録された病害には，森林病害として重要なものが数多く含まれている。土壌病害は苗畑での被害が主であり，苗立枯病，微粒菌核病による幼苗の枯損と，根系の腐敗からくる生育不良の被害が大きい。これらの病害の発生には育苗中の水管理の状態が大きく影響を与えるが，またいっぽうでは種子消毒や土壌消毒など薬剤防除効果も大きい。白絹病はマホガニーの苗木養成上最も危険な病気で，直播床に発生してしばしば全滅の被害を与える。早期発見早期防除が鍵となる。キリの根こぶ線虫病は植栽地における被害であるが，とくに植栽地への直挿し分根に大きな被害を与え，発芽率を著しく阻害し，また発芽幼苗の根系に寄生し生育不良をおこす。感染源は感受性の前作物の残根であり，植栽予定地の前作あるいは植生調査が発生回避のためには必要である。

熱帯・亜熱帯では *Botryodiplodia theobromae* および *Corticium salmonicolor* による各種樹木の胴・枯枝性病害が広く知られているが，本調査においては前者によるアカシア・マンギウム若齢林の胴枯れ被害（ボトリオディプロディア胴枯病）が注目された。その樹種では樹冠が重いため風に揺すられてできる枝基部の亀裂から発病し，病斑が枝幹を一周して巻き枯らしになる。風に対する植栽立地の選択が発生回避の基準になろう。後者による赤衣病はモルカッネムの適地を少しはずれたところで大きな被害をもたらしている。病斑の発生そのものには適地，不適地とも差はないが，適地の生育旺盛な樹では病斑は拡大せずに治癒閉塞にいたるものが多く，わずかの枝枯れ程度にとどまる。しかし適地を外れた場所では

樹の病斑拡大阻止能力が落ち，巻き枯らしによる胴枯れや沢山の枝枯れによる樹冠の退廃を招く。このほか，*Diaporthe eres* によるカマバアカシア胴枯病が，ルソン島のパンタバンガン地区植栽林で1983年単年だけ大発生した。これは長い乾季とひき続く雨季の異常少雨による樹勢の衰弱が発生誘因と考えられた。

針葉樹の葉枯性病害ではマツの葉枯病が苗畑における最も重要な病気である。フィリピン在来種のケシヤマツは当年生まきつけ苗では激しい被害をうけるが，齢が増すと抵抗性がでるらしくほとんど発生しなくなる。しかし導入種カリビアマツはより感受性が高く，苗木のみならず植栽幼齢木でも枯死被害をおこす。メルクシマツ（郷土種）の天然林では林床の稚・幼苗には葉枯病のまん延がみられたが，2〜3年以上の若木や成木では全く発生をみず，幼時に感受性の高い個体が淘汰され，生き残ったものはあと罹病することなく生長を続けるものと思われた。マツ苗を養苗する場合本病の予防のため薬剤防除が必要であることが示された。ルソン島北部の一林業苗畑で北米から輸入されたメキシコラクウショウの苗木に，*Cercospora sequoiae* による赤枯病の被害が観察された。植物の輸入検疫が行われている時代においてもなお，北米からフィリピンに赤枯病菌が病苗とともに導入されな事実は，本病の古い時期（1900年代？）における北米からブラジルや日本への導入に間接的な証拠を提供するものとして興味深い。

広葉に発生する多くの斑点性病害の中では，苗畑病害としてモルッカネムとジャイアントイピルイピルの黄斑病，ナラの褐斑病，チークのさび病，ジャイアントイピルイピルの炭そ病が，幼苗の枯損や著しい生育阻害をおこし，これらの発生予防には薬剤防除を必要とする。造林地ではナラ，キダチヨウラク，ユーカリの褐斑病，ジャイアントイピルイピル黄斑病，チークのさび病などが雨季の半ばごろから乾季の初めにかけてまん延し，しばしば早期落葉の被害をおこすが，このために樹が枯死することはない。アグロフォレストリーやファミリープランティングなどで苗畑周辺や造林地の一部に導入されている果樹や特用作物の中では，マンゴーの炭そ病，コーヒーのさび病，パパイヤの黒粉病の被害が良く目立った。

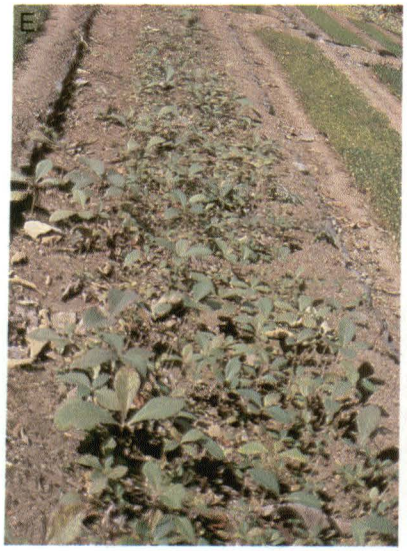
本調査研究を行うにあたって，日本側では熱帯農業研究センター，国際協力事業団，林業試験場海外林業調査科および樹病科の関係各位に，またフィリピン側においてはフィリピン大学林学部，天然資源省林業局およびパンタバンガン地区日比林業技術協力プロジェクトの関係各位に，種々の配慮と協力を頂いたことを記して，心から感謝の意を表する。


A


B


C


D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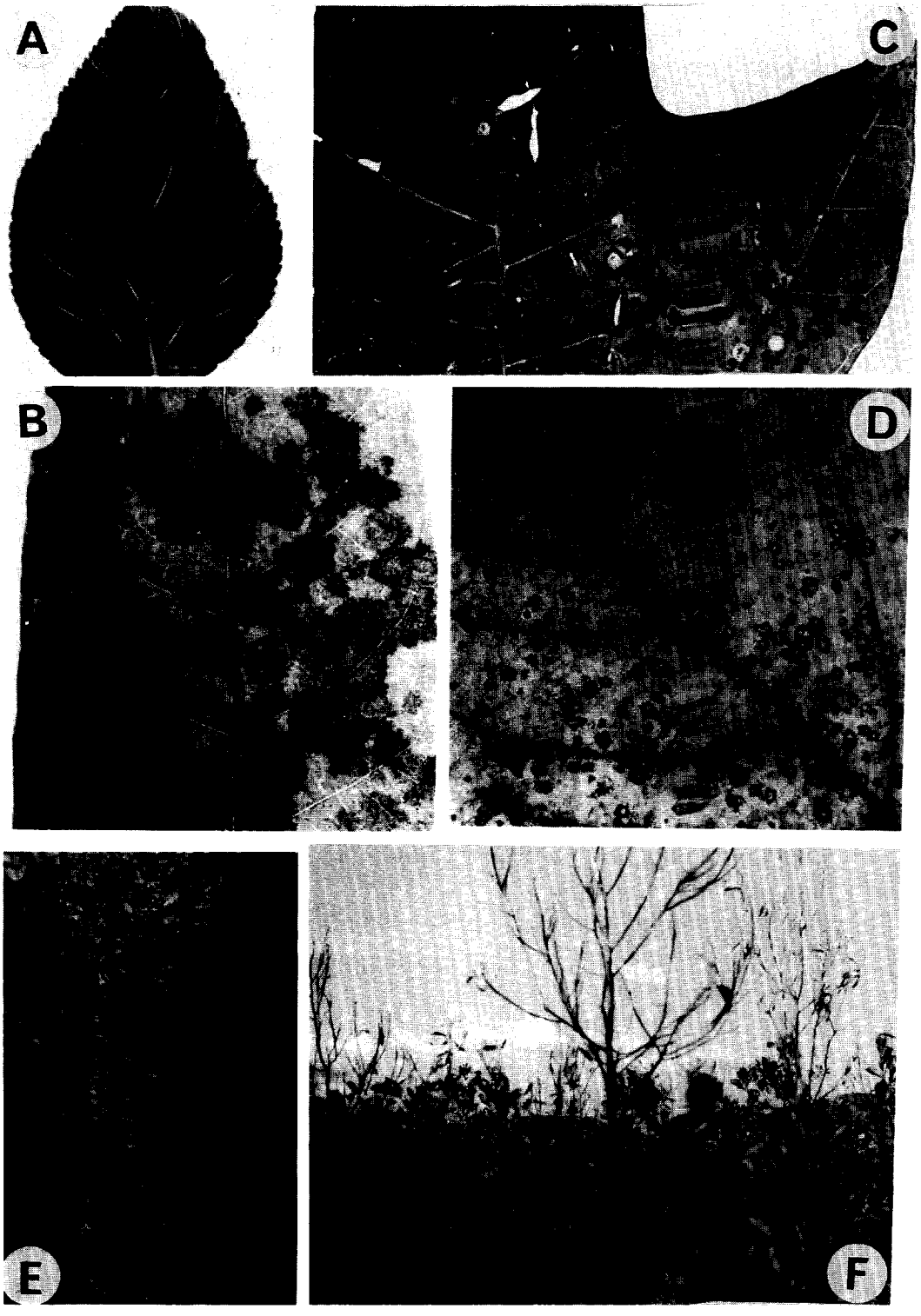
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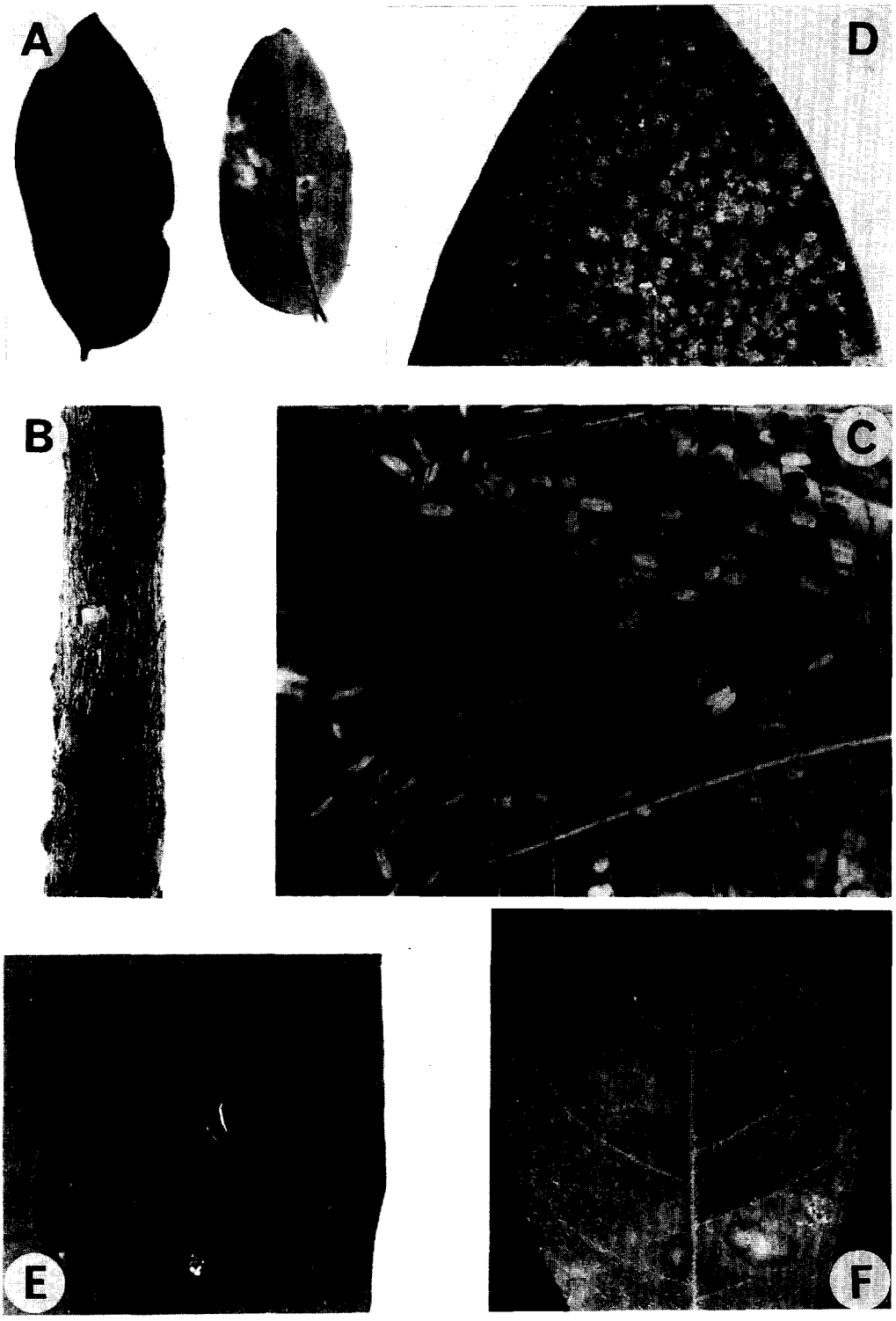
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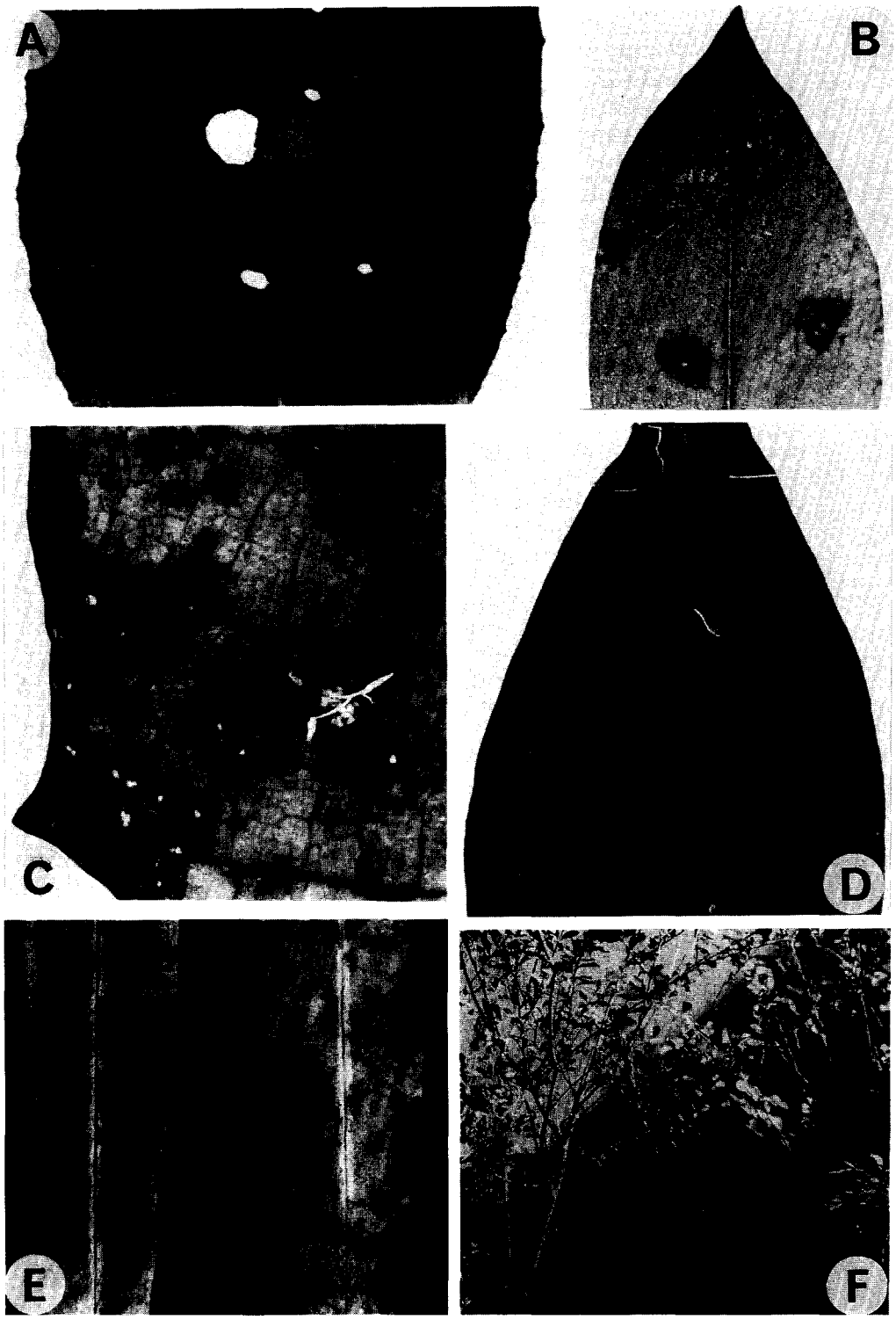
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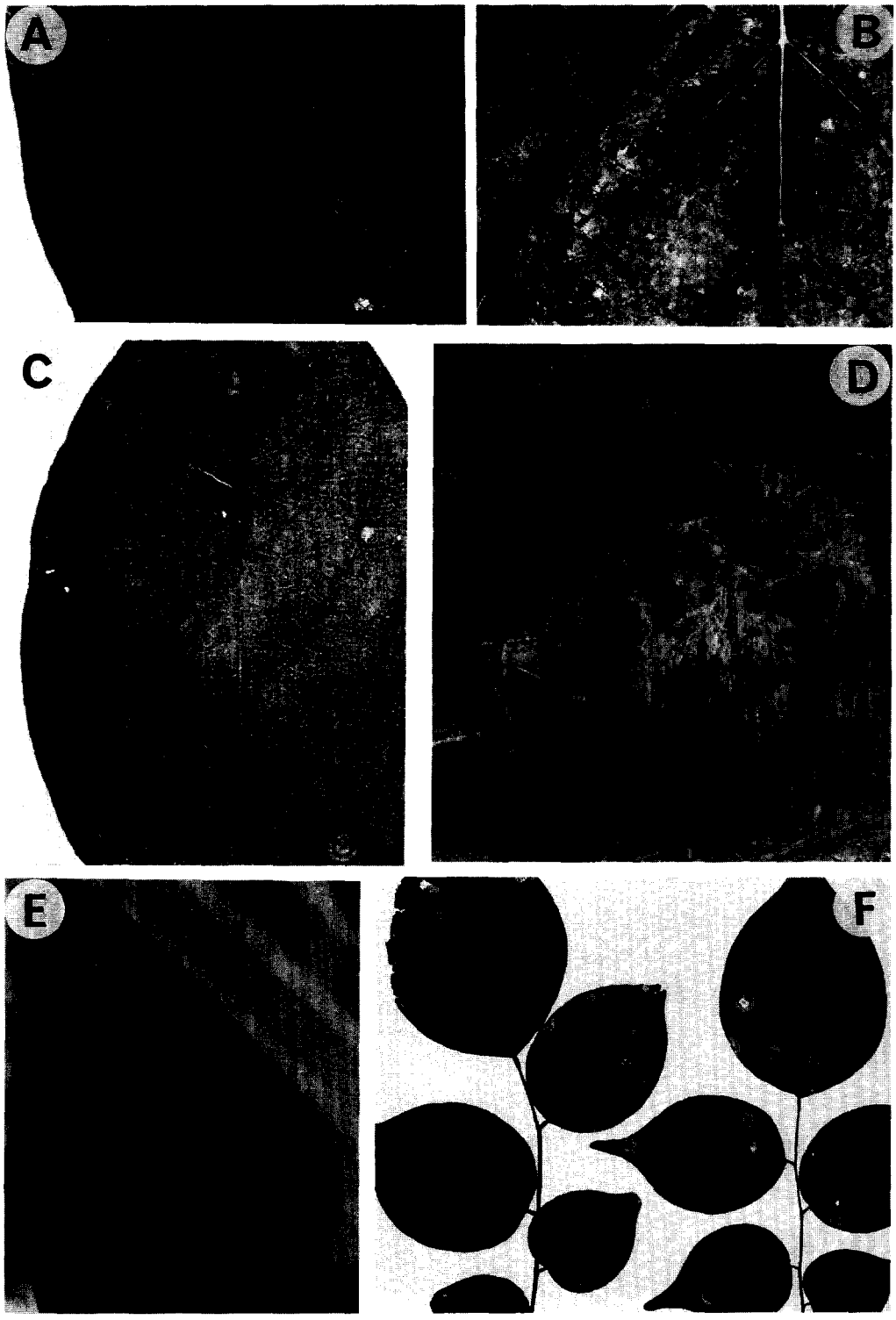
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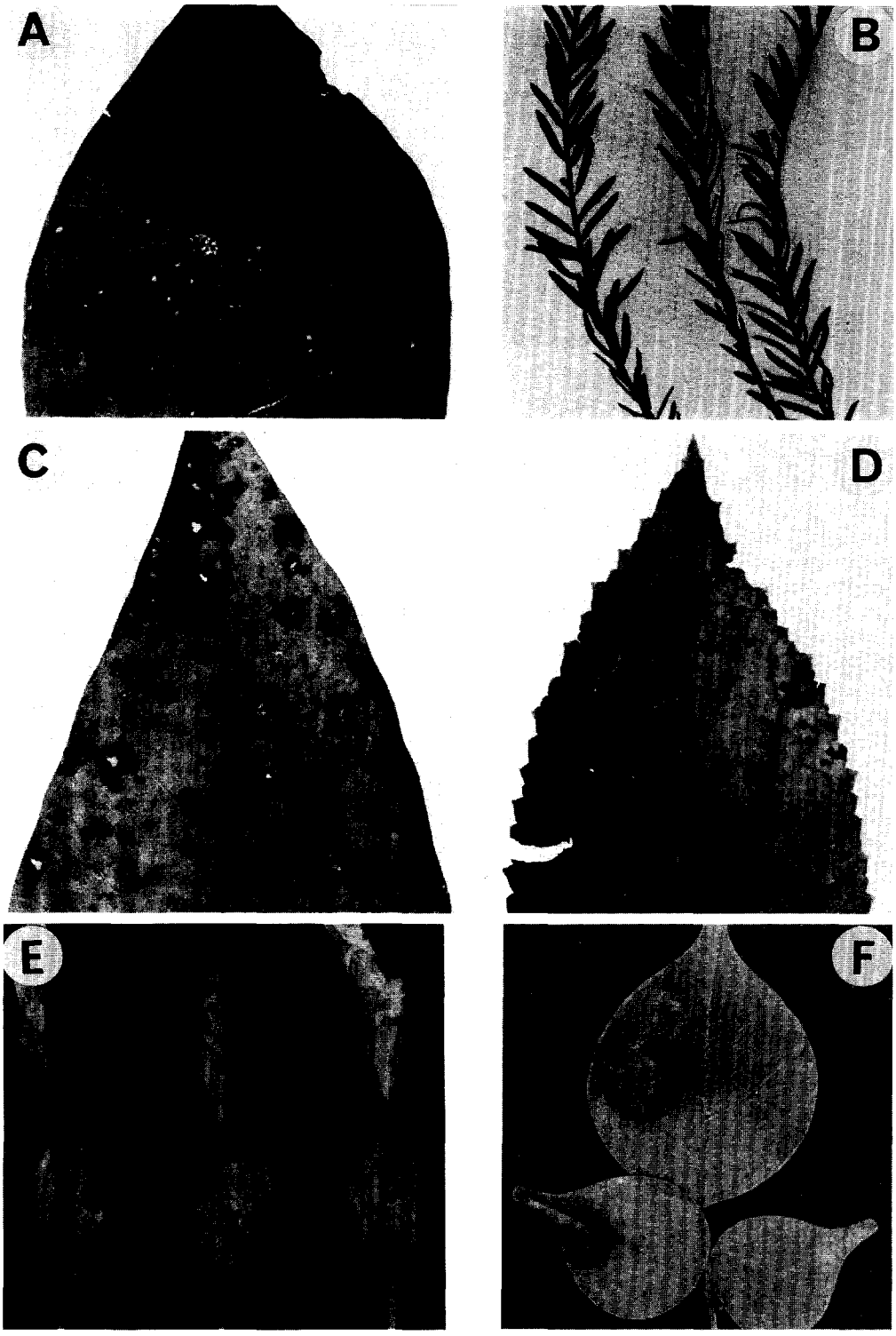
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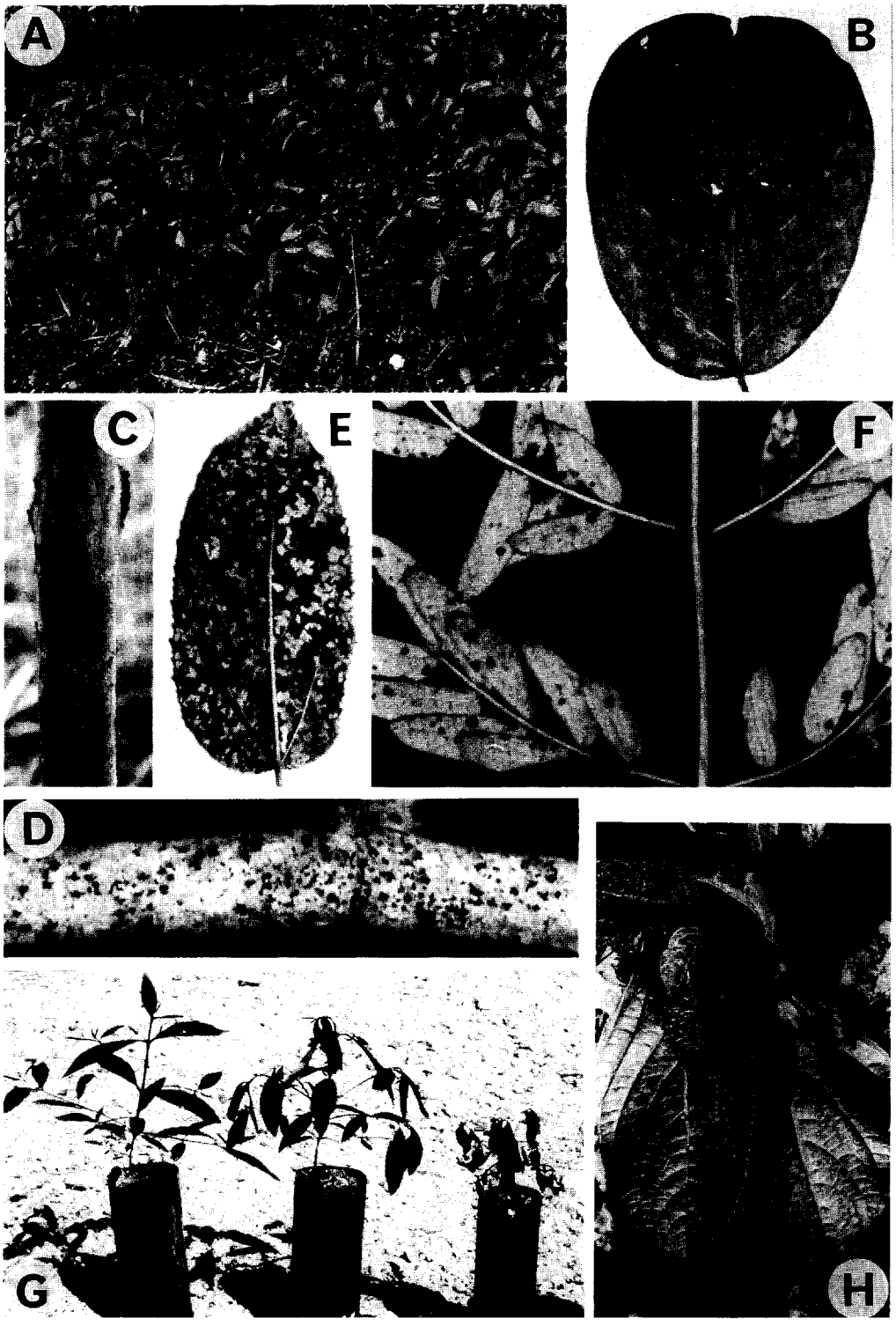
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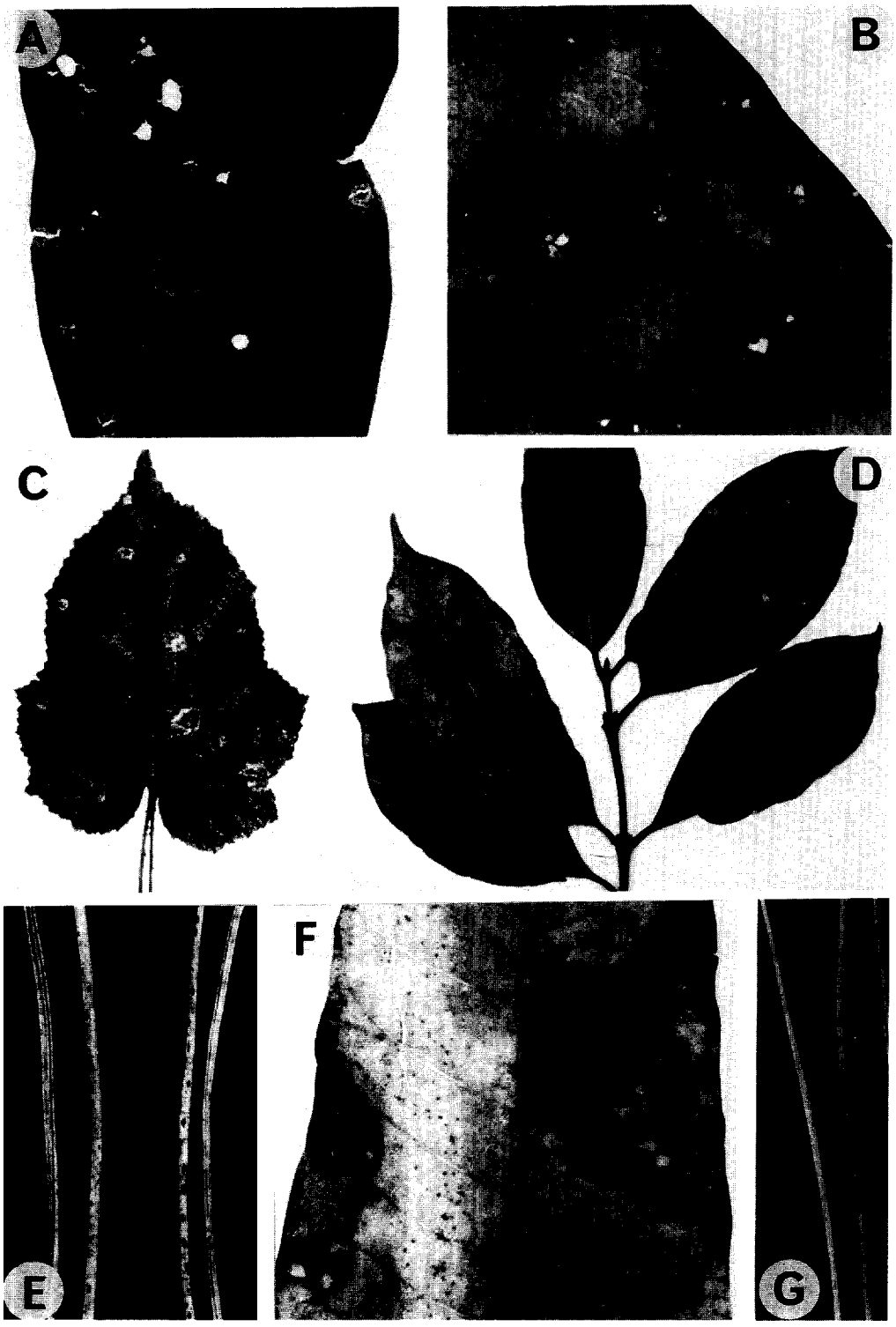
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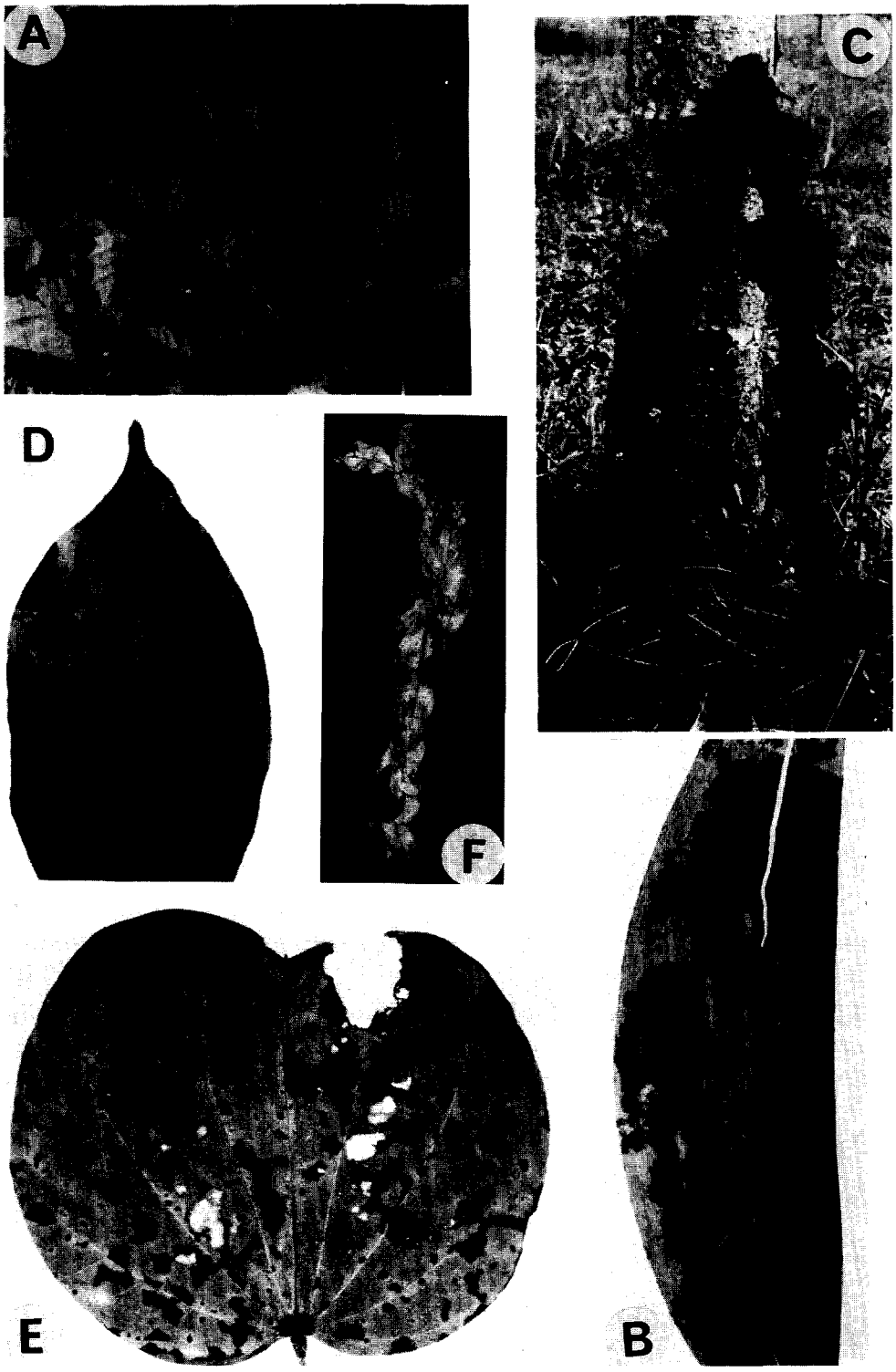
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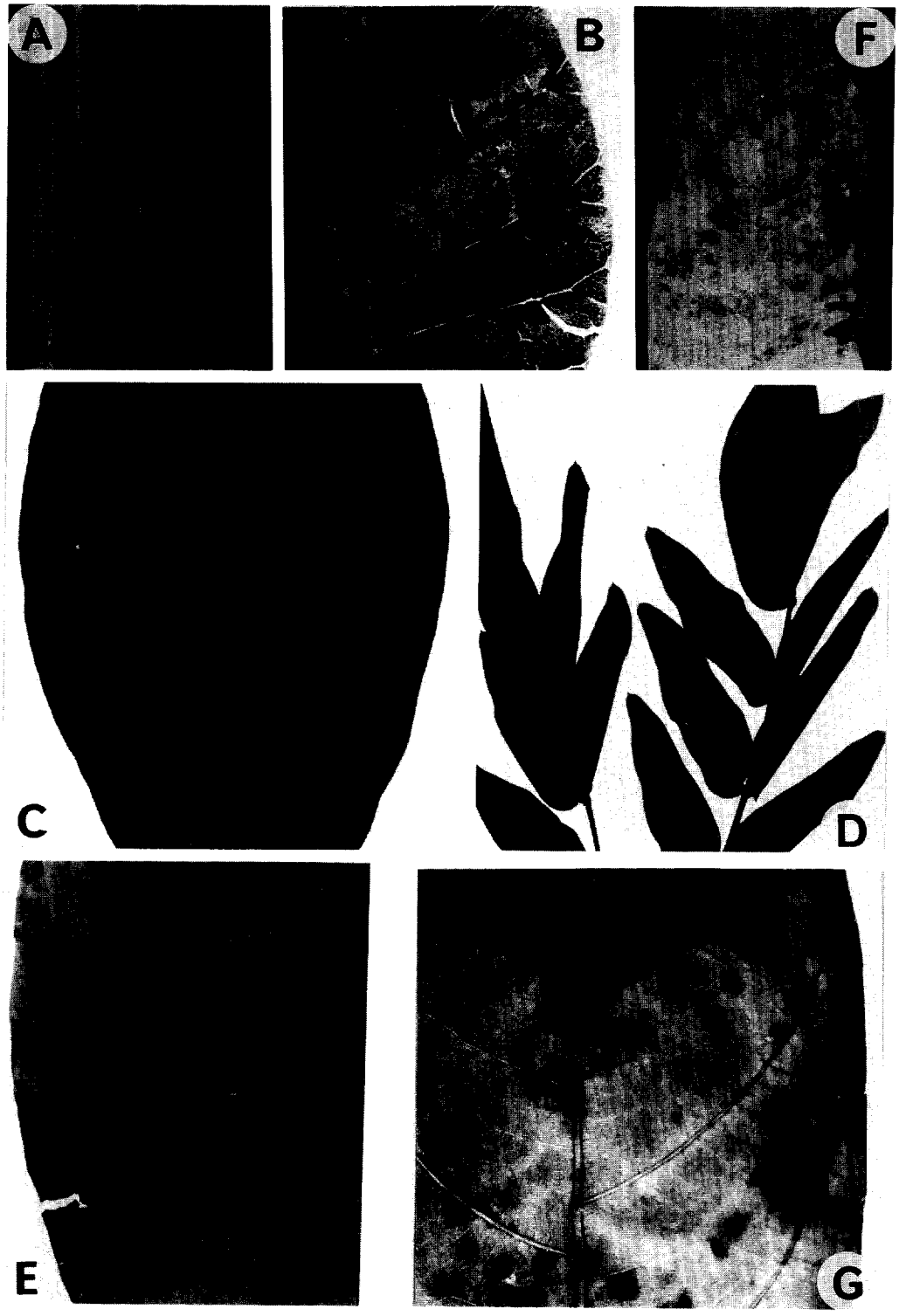
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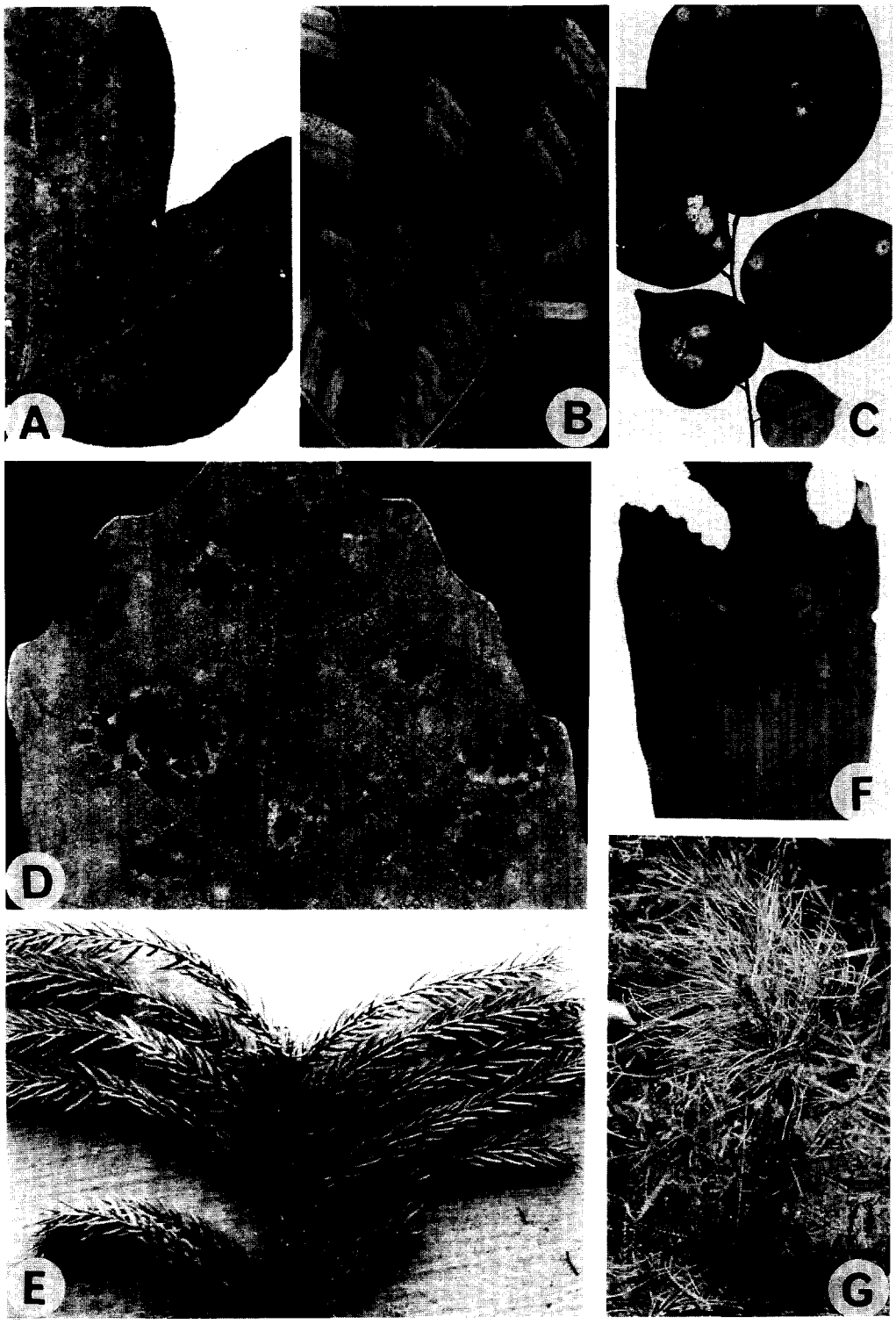
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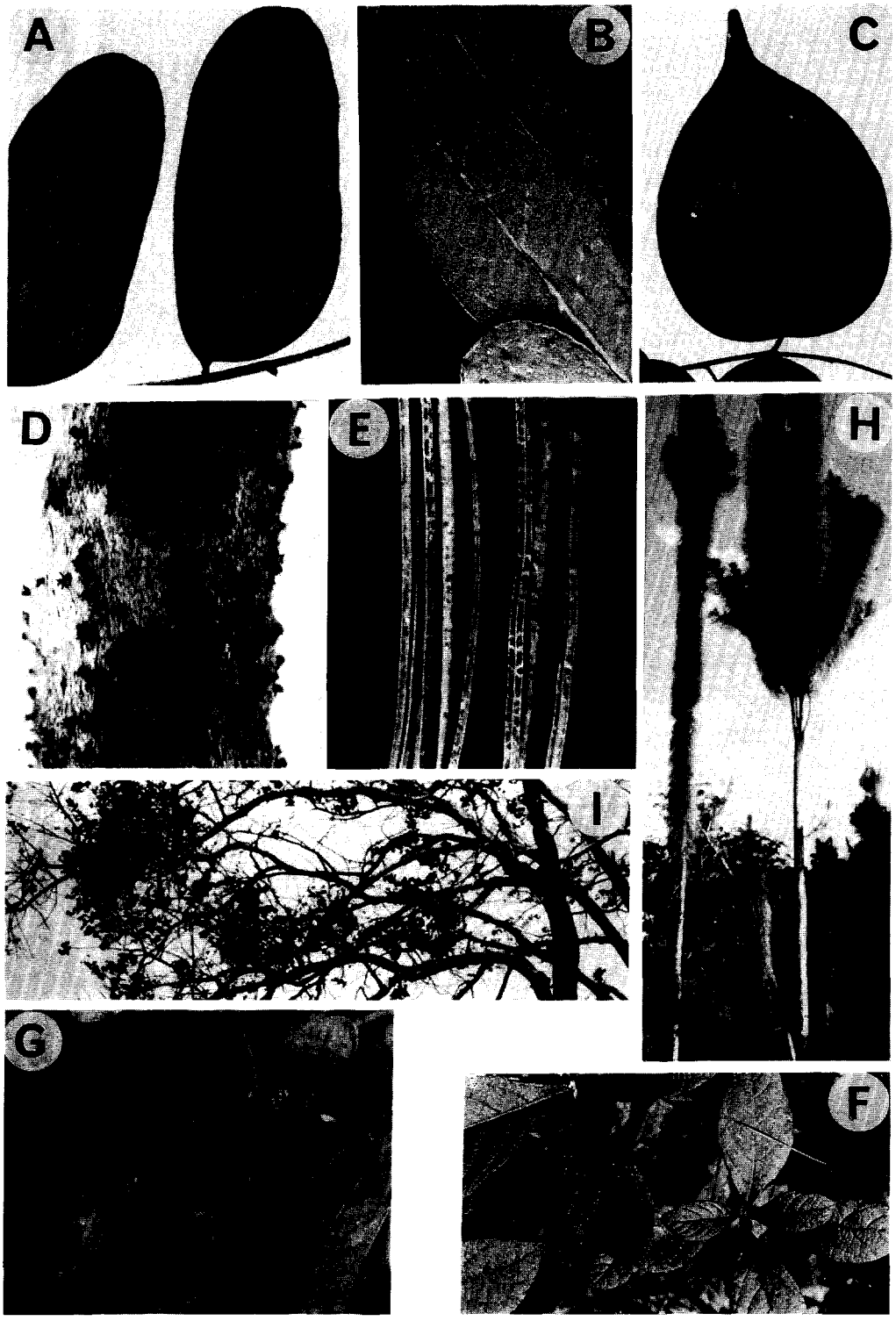
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