

## Crusty Leaf Spot Disease of Mango

T.K. LIM and K.C. KHOO  
Department of Plant Protection,  
Universiti Pertanian Malaysia, Serdang, Selangor, Malaysia.

**Key words:** *Zimmermaniella trispora*; crusty leaf spot disease; mango; *Mangifera indica*

### RINGKASAN

*Sejenis penyakit daun mangga yang menyebabkan bintik-bintik berkerak biasa dijumpai pada pokok-pokok mangga yang telah diabaikan di seluruh Semenanjung Malaysia. Kajian-kajian dengan mikroskop cahaya dan mikroskop pengimbasan elektronik telah menunjukkan bahawa struktur-struktur berkerak itu adalah askostromata kulat Zimmermaniella trispora. Penyakit ini boleh menyebabkan tanda bintik-bintik yang teruk pada daun. Ini adalah kali pertama Z. trispora dilaporkan sebagai parasit pokok mangga di Malaysia.*

### SUMMARY

*A crusty spot disease on mango leaves was found to be ubiquitous on neglected mango trees throughout Peninsular Malaysia. Light and scanning electron microscope studies revealed the crusty structures to be the ascostromata of the fungus, Zimmermaniella trispora. This disease can cause severe leaf spotting of trees. This is the first report of Z. trispora as a leaf parasite of mango in Malaysia.*

### INTRODUCTION

In a survey of mango diseases carried out throughout Peninsular Malaysia during 1979–1982 many new and relatively lesser known maladies of mango were encountered (Lim, 1982). One such malady is a crusty leaf spot observed on mature leaves of mango trees. Isolated trees in kampongs (villages), orchards and budwood nurseries were found to be infected. In all instances, the trees were in a neglected state and had not been sprayed with pesticides or fertilized for a long time.

### MATERIALS AND METHODS

Collections of crusty spot infected leaves were made from various localities throughout Peninsular Malaysia. Semipermanent slides were made by squashing the hard fungal tissue and mounting in lactophenol amended with cotton-blue (aniline blue). Permanent slides were made from 10  $\mu$ m thick cross sections of the crusty fungal and leaf tissue by a standard paraffin method (Sass, 1958).

Micromorphometric observations and microphotographs were made with a Leitz Orthoplan microscope equipped with an Orthomat automatic

camera and Nomarskii interference contrast attachment. One hundred asci and 400 ascospores were selected at random for measurements. Crusty spot infected leaf tissue for scanning electron microscope studies was fixed in 4% buffered glutaraldehyde, dehydrated in a graded acetone series, critical point dried and mounted with conductive glue on copper stubs and coated with gold. Micrographs were taken with a JEOL JSM 35C scanning electron microscope with Agfapan 100 film. Ascospores were removed from crushed fungal tissues, streaked onto potato-dextrose agar (PDA) and incubated at 28°C for 24–36 hrs. Colonies derived from single spores were transferred to fresh PDA. Naturally infected leaf specimens were sent to the Commonwealth Mycological Institute for identification of the fungus (IMI No. 271796).

### RESULTS AND DISCUSSION

The disease was characterised by discrete, solid, round to oblong, dark-coloured crusts of fungal tissue which developed on the adaxial surface of mature leaves (*Fig. 1*). Leaves on the lower half of the tree canopy were more severely infected. The crusts measured 1 mm in diameter and were easily detached from the leaves. The

---

Key to authors' names: T.K. Lim and K.C. Khoo.

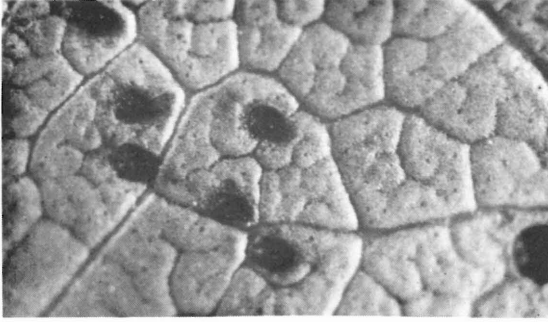


Fig. 1. Crusty outgrowths of *Zimmermaniella trispora* on the adaxial surface of a mango leaf.

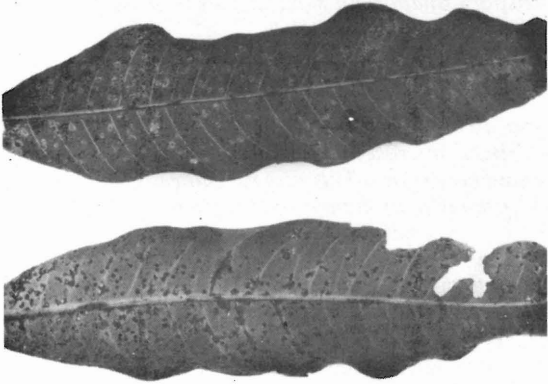


Fig. 2. Symptoms of crusty spot disease on mango leaves: top left – yellow; circular spots on the abaxial surface, bottom right – dark coloured, solid crusts on the adaxial surface.

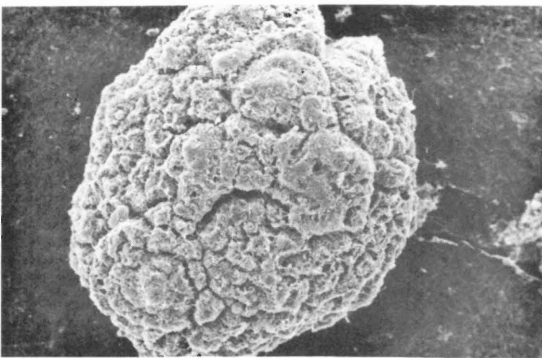


Fig. 3. SEM micrograph of the surface of the hemispheric ascostroma of *Z. trispora*.

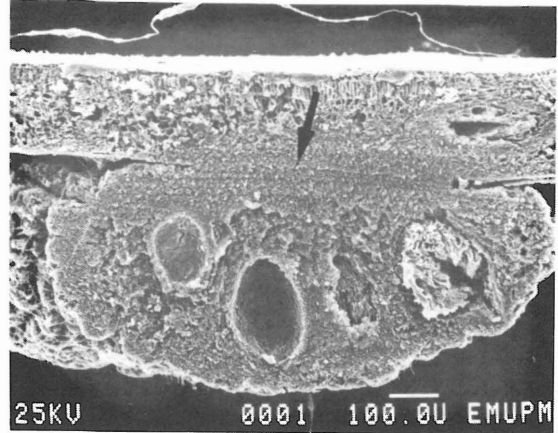


Fig. 4. SEM micrograph of a section of the ascostroma of *Z. trispora* showing the multilocular ascostroma extruding from the hypostroma (arrowed) through the lower epidermis of the mango leaf.

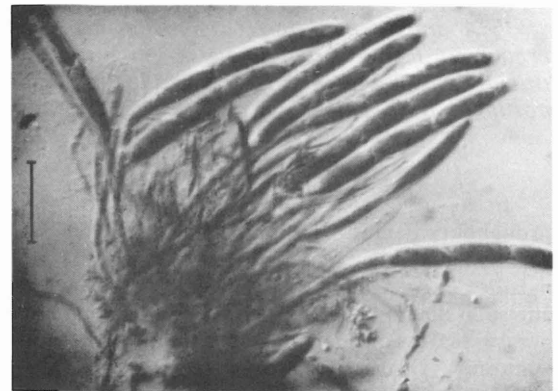


Fig. 5. A fascicle of asci interspersed with sterile paraphysoids of *Z. trispora*. (Bar represents 22  $\mu$ m).

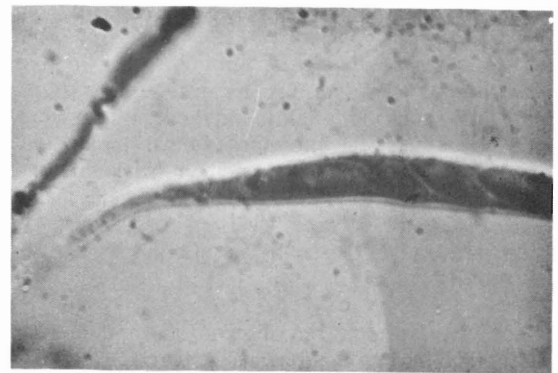


Fig. 6. Ascus of *Z. trispora* with four ascospores. (Bar represents 15  $\mu$ m).

fungus also gave rise to small, yellow, circular spots about 2–3 mm in diameter, each with a dark, necrotic centre on the opposite, abaxial surface of infected leaves (Fig. 2). Often, this crusty spot disease occurred on leaves which were infected with sooty mould and epiphytic green algae.

The structures were the erumpent ascostromata of the ascomycetous fungus, *Zimmermaniella trispora* P. Henn. (Dothideaceae Dothideales). The crusty structure had a rough, convoluted surface with some discontinuous deep fissures (Fig. 3). The fungus stroma originated in the mesophyll and proliferated through the lower epidermis forming a sessile, hemispheric, erumpent portion continuous with the hypostroma (Fig. 4). The ascostromata were multilocular and the locules were obovate to oval and bore fascicles of clavate, hyaline asci interspersed with sterile, filiform paraphysoids (Fig. 5). The mean dimensions of an ascus, from the point of attachment to the apex were 104.37  $\mu\text{m}$  (range 72.00 – 145.00  $\mu\text{m}$ ) and 4.80  $\mu\text{m}$  (range 4.76–4.92  $\mu\text{m}$ ) at its widest width. The ascus bore three, sometimes four hyaline, ellipsoid ascospores (Fig. 6). Ascus with three ascospores and ascus with four ascospores occurred in the frequency ratio of 97:3. The ascospore measured 18.94  $\mu\text{m}$  (range 15.00–24.00  $\mu\text{m}$ ) and 4.70  $\mu\text{m}$  (range 4.68–4.74  $\mu\text{m}$ ) on the average. Non-sporulating greyish-white colonies were obtained from single ascospores on PDA.

This report represents the first record of *Z. trispora* as a leaf parasite of mango. There is a dearth of information on *Zimmermaniella* as a leaf parasite; however, much more is known about *Bagnisiopsis*, a similar and closely related ascomycetous leaf parasite on Melastomaceae (Petraik, 1928; Miller and Barton, 1943; Shirakawa, 1956).

The widespread occurrence of *Zimmermaniella* crusty spot on mango throughout Peninsular Malaysia suggests that the disease is not a recent one. That the disease has not been previously described is probably because little emphasis has been given to local fruit disease research in the past.

The survey indicated that the disease could result in severe leaf spotting of whole trees. Nevertheless, the disease could be considered to be of minor importance especially when compared to other leaf disease like anthracnose caused by *Colletotrichum gloeosporioides*.

#### ACKNOWLEDGEMENTS

Grateful acknowledgements are due to Dr. D.W. Minter of the Commonwealth Mycological Institute for identifying the fungus and to the technical staff of the Electron Microscopy Unit, University of Agriculture Malaysia.

#### REFERENCES

- LIM, T.K. (1982): Maladies of mango in Malaysia. XXI International Horticulture Congress, 29th Aug–4th Sept. 1983, Hamburg, Fed. Republic of Germany. (Abstr. 1367).
- MILLER, J.H. and BARTON, M.G. (1943): Study of *Bagnisiopsis* species on the Melastomaceae. *Mycologia*, 35: 312–334.
- PETRAIK, F. VON, (1920): Uber *Bagnisiopsis* und verwandte Gattungen. *Hedwigia*, 68: 251–290.
- SASS, J.E., (1958): *Botanical microtechnique*. Ames. Iowa State Univ. Press.
- SHIRAKAWA, H.S. (1956): The development of *Cocostroma (Bagnisiopsis) nuda*. *Amer. J. Bot.*, 43: 372–377.

(Received 15 August 1983)