COMMUNICATION I

Ganoderma boninense Pat. from Basal Stem Rot of Oil Palm (Elaeis guineensis) in Peninsular Malaysia

ABSTRACT

Several hundred sporophores of Ganoderma were collected from 5-40 years old palm trees infected with basal stem rot in 5 oil palm estates in Peninsular Malaysia. Based on the morphometric studies of the pores, dessepiments and basidiospores dimensions and other morphological characteristics, the sporophores were identified as belonging to a single species, G. boninense Pat.

INTRODUCTION

The basal stem infection of oil palm (Elaeis guineensis Jacq.) by Ganoderma in Malaysia was first recorded by Thompson in 1931. For many years, the disease was thought to be economically unimportant as only very old palms over 25 years were infected. It was normal practice to leave the infected palm to rot away by itself in the field. Such was the situation until around 1957-1958 when Ganoderma infections were reported to be increasing in many estates and affecting much younger palms of around 5 years old. Basal stem rot was more prevalent in coastal areas than in inland areas and incidence of disease on young palms was higher in areas previously grown with coconut (Turner, 1965a). The disease is now considered to be the most annihilating disease of field palms causing significant losses in Southeast Asia (Turner, 1981). The disease has also been recorded in Indonesia, Nigeria, Ghana, Zaire, Cameroun, Angola, Tanzania and North Rhodesia (Turner, 1981).

The taxonomy of Ganoderma species associated with the disease is still controversial. In Malaysia, several Ganoderma species particular-
The method for preparation of sporophore sections for microscopic examination was adapted from the method by Steyaert (1967). A sample of 10 pores, 10 dessepiments and 50 basidiospores were measured for each sporophore. For each pore, two perpendicular diameters were measured and for each basidiospore, the length and width were taken.

Basidiospores were collected either by squeezing the spores out of the pore layer onto the slides or by placing a clean slide under a sporulating sporophore. The basidiospores were mounted with Canada Balsam. Excess xylene from the Canada Balsam was eliminated by gentle warming. The basidiospores prepared by this method were found to retain their form and size without shrinkage.

The system of Steyaert (1967, 1972) was used for identification of *Ganoderma* species. All specimens identified were re-confirmed by Dr. R.L. Steyaert of Jardine Botanique De L'Etat, Brussel, Belgium.

RESULTS AND DISCUSSION

From macroscopic and microscopic examinations, the sporophores collected could be divided into 2 groups.

Sporophores in the first group measured up to 11 cm in diameter but the majority were about 5 cm in diameter. They were either stalked or sessile. Some were flat and bracket-shaped others were lobed. The dorsal surface was glossy, blackish-brown in colour with concentric markings. The edge was white when fresh. The undersurface was also white. The cuticle was about 70 /\mu m thick, underlain by a fine yellow margin. The bases of the tubes were auburn in colour. The cuticle was made up of globular, stalked elements, somewhat wedge-shaped, 30 - 50 /\mu m long and 5 - 10 /\mu m wide at the terminal globular part. The pores were circular, 110 - 300 /\mu m in diameter. The dessepiments measured 30 - 130 /\mu m and distances between the axes of pores were 185 - 235 /\mu m. Basidiospores were yellowish-brown, ellipsoidal, averaging 8.5 - 11.5 x 5.2 - 6.5 /\mu m.

The sporophores in the second group were much larger, usually measuring up to 15 cm in diameter. They were either stalked or sessile. The dorsal surface was shiny and varnished, orange-coloured in young sporophore, deepening to a dark-brown colour with concentric rings when mature. The growing margin was not white as in the first type but was orange. The cuticle was thin (about 40 /\mu m) with globular elements measuring 60 - 75 /\mu m long and 7 - 12 /\mu m wide at the apex. The context layer was brown and very thick, constituting about 50% of the total thickness of the sporophore. The pores were circular, 90 - 220 /\mu m in diameter, the dessepiments were about 20 - 100 /\mu m thick and the distances between the axes of the pores were 110 - 220 /\mu m. Basidiospores were pale-brown, ellipsoidal, averaging 9.0 - 12.5 x 4.5 - 7.0 /\mu m.

Personal communication with Steyaert confirmed sporophores of the first group to be *G. boninense* Pat. (*Plate 1*) and the sporophores of the second group was suggested to be "G. miniatocinctum Stey.-like".

*Plate 1: Sporophore of G. boninense on infected stem of oil palm.*
It was observed that the morphology and size of the hasidiospore, dessepiment, pore and the distance between the axes of the pores were similar in both G. boninense and G. miniatocinctum. However, the morphology of the sporophores and the measurements of the cuticle thickness were slightly different. It was mainly from these differences especially the orange border in the sporophore that Steyaert (1967) distinguished G. miniatocinctum as a separate species from G. boninense. However, later (1973, personal communication) Steyaert doubted the validity of separating G. miniatocinctum as a new species based mainly on the presence of the orange border. He felt that if the orange border was not permanent, G. miniatocinctum could be considered as a synonym of G. boninense. Since the orange borders of the sporophores of the second group ("G. miniatocinctum-like") were not distinct when the sporophores stopped growing it is very likely that sporophores of this group are also G. boninense.

The measurements of the sporophores and basidiospores of G. boninense in this study were quite similar to those reported by Varghese et al., (1976) for unidentified Ganoderma species from basal stem rots of oil palm. The morphological characteristics of their sporophores and basidiospores (pore size, 122.8-179.8 μm; dessepiment thickness, 81.8-179.3 μm; basidiospore, 6.4-12.5 X 3.6-6.8 μm) conformed with those of G. boninense. They also reported that the morphological and physiological characteristics of the Ganoderma species causing basal stem rot in oil palm were clearly different from the Ganoderma species causing basal stem rot in tea and Hevea rubber.

It is found from the present survey of Ganoderma in the various oil palm estates that G. boninense is not confined to any one area but is present in all the estates surveyed. The species can cause serious infection in palms above 5 years of age.

Steyaert (1967) reported that the hosts of G. boninense (specimens sent by Turner in 1965, collected from the Oil Palm Research Station, Banting) were mainly coconut palms. Now, G. boninense is found to be associated with basal stem rot of oil palm not only in Banting estate but also in many other oil palm estates.

Previous reports by other workers (Varghese et al, 1976; Turner, 1981) suggested that several species and not just one species may be involved in causing the disease but whether the species are all equally virulent and whether dual or multiple infection can occur are not known (Turner, 1981).

ACKNOWLEDGEMENTS

Thanks are due to Dr. R.L. Steyaert of Jardine Botanique De L'Etat Brussel, Belgium for confirming the identification of all the specimens and for his invaluable suggestions and comments.

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REFERENCES


(Received 10 September, 1985)