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# Makalah Akademia

## THE INFAMOUS GANODERMA DISEASE

By

Muhammad Aidil Ibrahim  
Pusat Pengajian Biologi, UiTM Cawangan  
Negeri Sembilan, Kampus Kuala Pilah, Pekan  
Parit Tinggi, 72000 Kuala Pilah, Negeri  
Sembilan

[aidilbrahim@uitm.edu.my](mailto:aidilbrahim@uitm.edu.my)

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Figure 1: *G. boninense* that was found in the basal area of the oil palm tree

(Source:

<https://doi.org/10.1166/sl.2011.1479>)

Palm oil production is found to be very important in developing countries and the trees, *Elaeis guineensis* were grown throughout the Asian countries primarily in Southeast Asia. Palm oil production has been one of the biggest contributors to the Malaysian economy. In fact, in 2008, about 50% of the palm oil production in the world was produced by Malaysia, and hence, counted as the world's largest palm oil producer and exporter. Unfortunately, there are some factors that may hold back the success of the palm oil industry which is fungus attack mainly by *Ganoderma boninense*. This serious fungal attack can cause Basal stem rot (BSR) where the base of the oil palm tree is infested with fungus and eventually causing it to rot and collapse. In the past 80 years, BSR was known as the most destructive disease of oil palm plantations and caused a severe economic loss in Southeast Asia mainly in Malaysia and North Sumatra.

There are many species of fungi that can infect and cause diseases to plants and crops which have elevated the concern of many authorities. However, the main oil palm disease in Malaysia is Ganoderma disease that causes basal stem rot (BSR).

15 species of *Ganoderma* have been listed previously that were believed to be associated with inflicting BSR to oil palm trees. Seven species have been reported to be found in Peninsular Malaysia. Some researchers had their stands leaning towards pin-pointing *G. boninense* to single-handedly cause the BSR but others suggested otherwise where more than one species of *Ganoderma* that can cause the BSR on oil palm trees. Based on the morphological similarity of the basidiomata and basidiospores, there are two main species of *Ganoderma* which are *G. boninense* and *G. tornatum*. However, in 2000, there were two more candidates of *Ganoderma* species associated with the oil palm tree which are, *G. zonatum* and *G. miniatocinctum*. In a more recent report, only *G. boninense* was found to cause both BSR and upper stem rot (USR) and inflicted a devastating effect on the oil palm trees and were also discovered in younger plants causing a great loss to the economy. Diseased young plants can only survive one to two years before completely dying and three or so years for more mature plants. It was also found that *G. boninense* has the ability to infect seedlings and very young plants of less than a year old in the nursery.



Figure 2: *Ganoderma* in oil palm.

Source: Malaysian Palm Oil Board Website

Obstacles in the early detections are mainly caused by the inevitable confusion between closely related *G. zonatum*, which is less pathogenic to oil palm, and *G. boninense* the major pathogen. Through investigations of intraspecific variability amongst *G. boninense* isolated from either neighbouring or distant trees was found to be of high variety which supports the theory that sexual reproduction plays a vital role in the epidemiology of BSR occurrence. There are reports showing that different strains were found from the isolates of the same locality, however, some researchers stood their ground that the disease is a single taxon.

Another reason why early-stage detection is not very efficient because the cycle consists of a number of alternative and consecutive events. The wood will be exposed after an injury and the cells will oxidize to cause discoloration due to biochemical changes. If the wound remained exposed, the moisture would attract other microorganisms to attach and grow which causes further discoloration. Other possible inhabitants of the wound include other imperfect fungi, bacteria, and ascomycetes which cause additional discoloration and the occurrence of wetwood, redheart, or blackheart. These are the terms used to describe the wetness of the wound area as a result of cell wall erosion. Eventually, the digestion of the cell wall components will occur. The fungi remained inside the endodermis ever since the first stage however their hyphae can only be detected in the latter stages after the cell wall digestions in various cells and tissues.

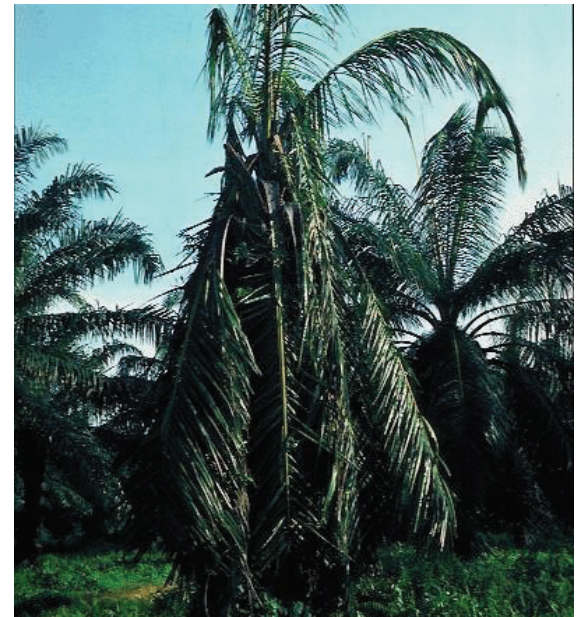


Figure 3: Oil palm wilting due to BSR which was caused by *G. boninense* (Source: PlantwisePlus Knowledge Bank)

The fungi infection on the tissues of the stem area observed as 'black line'. The black line originates from a single mycelium at the stem of the oil palm tree which was initially infected by *G. boninense*. *G. boninense* can also cause infection at the USR where the lesion originates from the front of the leaf propagating towards the stem in the form of observable brown or black lines. *G. boninense* infection can cause serious consequences to oil palm trees which can also affect the Malaysian economy. Researchers have been working around the clock to develop detection methods and also for efficient treatment.

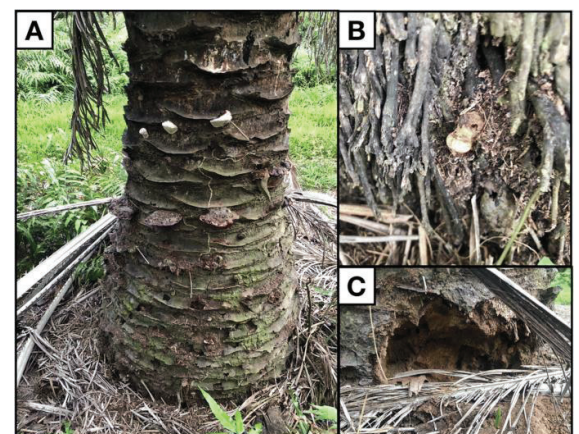


Figure 4: *G. boninense* infesting the basal area of the oil palm tree (A-B) and causing BSR (C) (Source:

<https://doi.org/10.1007/s10658-022-02546-2>). 48