

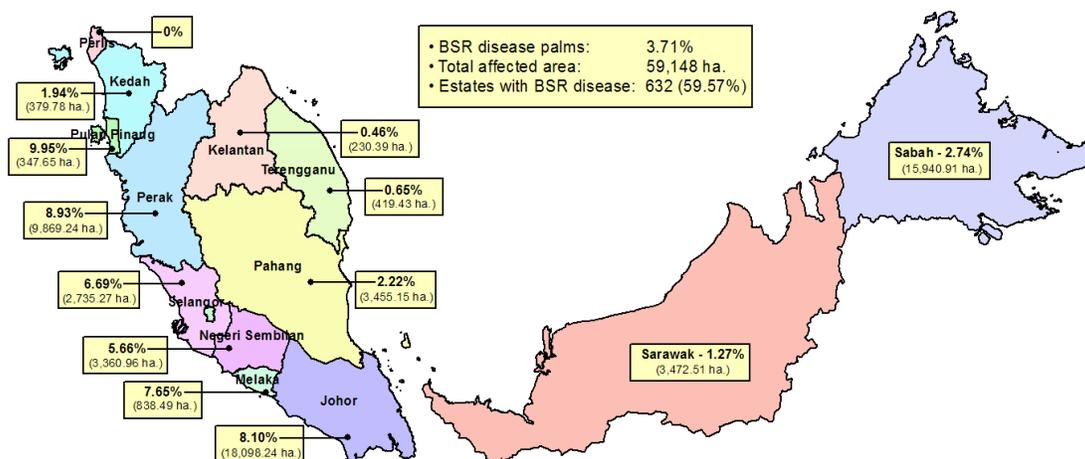
Research and Management of *Ganoderma* Disease in Oil Palm

1.0) Introduction

Oil palm is prone to attack by plant diseases caused by fungi, bacteria, viruses, nematodes, viroids and phytoplasma. Among the major devastating diseases causing serious economic losses are basal stem rot in South-East Asia (SEA), vascular wilt in Africa and diseases such as bud rot, red and sudden wither (or wilt) in South/central America and some emerging diseases; the phytoplasma disease, orange spotting (CCCVd) and cercospora leaf that could be a threat to the oil palm industry in the future. Exotic devastating diseases occurring in one oil palm growing country may spread to other countries (by spores through seeds, pollen and on kernel surface inside the shell) and cause widespread damage.

Among major devastating diseases, basal stem rot (BSR) caused by *Ganoderma* is widespread, occurring in oil palm growing regions of the world and has been identified as the single major devastating disease in SEA, especially in Malaysia and Indonesia. The disease causes severe damage to the affected palms with a consequent loss in yield. BSR is also observed in other countries such as Papua New Guinea, Colombia and Cameroon.

BSR disease causes deaths of more than 80% of plantings midway through their economic life. In 2010, the incidence of BSR disease in Malaysia was 3.71% and the areas affected were 59,148 ha. The estimated yield losses due to *Ganoderma* disease amounted to RM1.5 billion. It can be seen that the *Ganoderma* disease poses a major threat to the oil palm industry in the near future, if no control measures are implemented.



Until June 2014, MPOB has developed and disseminated 34 technologies on *Ganoderma* research for the advantage of oil palm industry related to: Biology (6 technologies); Detection (6 technologies); and Control and management (22 technologies) which have been disseminated to the oil palm industry through seminars, field demonstrations and hands-on training.

2.0) Research findings on *Ganoderma* disease

2.1) Biology and Epidemiology of *Ganoderma* disease

Four species of *Ganoderma* have been identified to be associated with BSR disease in Malaysia, they are:



G. boninense
(pathogenic)



G. zonatum
(pathogenic)



G. miniatocinctum
(pathogenic)



G. tornatum
(non- pathogenic)

2.2) Early Detection of *Ganoderma*

Technologies for the early detection of *Ganoderma* have been achieved through a culturing technique using *Ganoderma* selective medium (GSM), molecular polymerase chain reaction-deoxyribonucleic acid (PCR-DNA), the enzyme-linked immunosorbent assay-polyclonal antibody (ELISA-Pab), Multiplex PCR-DNA Kit, GanoSken tomography. These techniques offer several advantages in providing specificity and sensitivity for detection of *Ganoderma* in oil palm.



Ganoderma selective



Ganosken™ tomography

2.3) Disease Control and Management

For the control of *Ganoderma*, integrated sanitation, biological and chemical controls are suggested. These control measures are aimed at minimising disease incidence in replanting, prolonging the productive life of the infected palm, and delaying the progress of *Ganoderma* infection



Soil mounding



Sanitation by removal
(deboling) of diseased palm



Fungicide hexaconazole
(trunk injection)



Stump treatment with fumigant
(dazomet)



GanoEF biofertilizer
containing endophytic
fungus, *Hendersonia*
GanoEF1



EMBio actinoPLUS
bioorganic fertilizer containing
soil actinomycete,
Streptomyces GanoSA1



GanoCare™