

## **Occurrence and spatial distribution of Ganoderma species causing upper and basal stem rot in oil palm**

### **ABSTRACT**

Oil palm is an important oil producing crop. The sustainability of oil palms in Southeast Asia region, including Malaysia, is threatened by a basidiomycete fungus, *Ganoderma* species, which causes upper stem rot (USR) and basal stem rot (BSR). There was limited information on USR compared to BSR, and better understanding is needed to distinguish between USR and BSR. Information on site specific occurrence and distribution of the disease are important for better experiment planning and effective site specific management. Hence, two study plots, consisted of 15 and 16 hectares, were established in Betong (18-year-old palms) and Miri (11-year-old palms) plantation, respectively, which were located in Sarawak, Malaysia. Each palm was examined for presence of the stem rot disease based on appearance of external symptoms. The number and location of infected palms within each plot were recorded. Geographical Information System (GIS) and geostatistical tools were used to graphically present the disease distribution separately between USR and BSR, and combined USR and BSR distribution. It was found that both USR and BSR were associated with *Ganoderma* species and showed similar symptoms, except for the different elevation point of infection. Infected palms were mainly identified by appearance of *Ganoderma* basidiomata on the stem and dissection on the stem revealed that the infection was at a single point of the stem, and there was no connection between infection of USR and BSR. In general, relatively higher disease occurred in Miri compared to that in Betong. USR and BSR coexisted in both plantations with higher USR compared to BSR occurrence recorded in Miri, and vice versa in Betong. Geostatistical analysis revealed weak spatial dependence for all the data analysed, and the infections were relatively at closer distance (denser occurrence) in Miri compared to that in Betong. Weak spatial dependence indicated that both USR and BSR occurred randomly, which suggested that USR and BSR disease spread probably through basidiospore dispersal at greater distance, instead of root to root infection. This study provided clear information on the disease occurrence, spatial distribution, and mode of disease spread at both study

sites which were useful in future studies to investigate factors associated with the diseases outbreak and site specific disease management.