

Association of copper and zinc levels in oil palm (*Elaeis guineensis*) to the spatial distribution of *Ganoderma* species in the plantations on peat

ABSTRACT

Nutrients are essential for normal physiological processes in plants, and they play important roles in defence mechanisms against pathogens. Oil palms cultivated on peat are more prone to nutrient deficiency, especially micronutrients, and this may affect their susceptibility to *Ganoderma* species, the major threat to the sustainability of oil palm throughout South-East Asia. This study was conducted to investigate the association of copper (Cu) and zinc (Zn) in mature oil palm to the spatial distribution of *Ganoderma* species in the plantations on peat. Foliar samples (frond 17) of oil palm from two plantations (Betong and Miri) on peat in Sarawak, Malaysia, were collected based on the spatial distribution pattern of *Ganoderma*, and total Cu and Zn were quantified spectrometrically. The experiment was conducted twice at a 1-year interval. The concentrations of Cu and Zn were significantly lower in oil palms from infected areas in contrast to those from uninfected areas. In addition, oil palms in infected areas in Miri suffered Cu and Zn deficiencies. Furthermore, Cu and Zn were significantly lower in the oil palms in Miri that had higher *Ganoderma* occurrence, as compared to those in Betong, which had significantly higher Cu and Zn but lower *Ganoderma* occurrence.

Keyword: Copper; *Ganoderma* species; Geographical information system (GIS); Nutrient-disease interactions; Oil palm; Plant defence mechanisms; Spatial distribution; Zinc