Differences between healthy and Ganoderma boninense infected oil palm seedlings using spectral reflectance of young leaf data

ABSTRACT

Ganoderma boninense (G.boninense) is the causal agent of basal stem rot (BSR) which significantly reduced the productivity of oil palm plantations in Southeast Asia. At early stage, the disease did not show any physical symptoms that could be seen with naked eyes resulted in detection difficulties. To date, there was no effective detection for this disease, and conventional methods such as manual and laboratory-based required trained specialists as well as time-consuming. Therefore, this study was conducted using hyperspectral remote sensing to investigate the differences in spectral reflectance of young leaf (frond one (F1) of healthy and G. boninense infected oil palm seedlings. The seedlings were inoculated with G. boninense pathogen at five months old. At five months after inoculation, 558 spectral signatures of F1 were extracted from acquired hyperspectral images. Noise removal was done to the extracted spectral signatures to remove outliers in the data. Then, the spectral signatures were averaged and plotted to observe the differences. Differences in reflectance of healthy and G. boninense infected seedlings were seen evidently in the near-infrared (NIR) region. Thus, this study showed evidence that F1 spectral reflectance has the ability to detect early stage of G. boninense infection at oil palm seedlings.