

The development of spectral indices for early detection of Ganoderma disease in oil palm seedlings

ABSTRACT

Field spectroscopy is a rapid and non-destructive analytical technique that may be used for assessing plant stress and disease. The objective of this study was to develop spectral indices for detection of Ganoderma disease in oil palm seedlings. The reflectance spectra of oil palm seedlings from three levels of Ganoderma disease severity were acquired using a spectroradiometer. Denoising and data transformation using first derivative analysis was conducted on the original reflectance spectra. Then, comparative statistical analysis was used to select significant wavelength from transformed data. Wavelength pairs of spectral indices were selected using optimum index factor. The spectral indices were produced using the wavelength ratios and a modified simple ratio method. The relationship analysis between spectral indices and total leaf chlorophyll (TLC) was conducted using regression technique. The results suggested that six spectral indices are suitable for the early detection of Ganoderma disease in oil palm seedlings. Final results after regression with TLC showed that Ratio 3 is the best spectral index for the early detection of Ganoderma infection in oil palm seedlings. For future works, this can be used for the development of robust spectral indices for Ganoderma disease detection in young and mature oil palm using airborne hyperspectral imaging.