

## POTENTIAL APPLICATIONS OF REMOTE SENSING TECHNOLOGIES IN OIL PALM NUTRIENT MANAGEMENT

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**ABSTRACT:** This research was conducted to evaluate the capabilities and potentials of utilizing optical sensors in oil palm site specific nutrient management. We evaluated four optical sensor systems to characterize a robust non-destructive technique to predict Nitrogen (N), Phosphorous (P), Potassium (K), Calcium (Ca), Magnesium (Mg) and Boron (B) deficiencies in oil palm leaflets that could be useful in variable rate applications of fertilizers. Four sensor systems used were: i) a handheld reflectance sensor (GreenSeeker<sup>®</sup> 505), ii) a chlorophyll meter (SPAD-502Plus), iii) a fluorescence sensor (Multiplex<sup>®</sup> 3), and iv) a spectroradiometer (FieldSpect<sup>®</sup> 3, Hi-Res). Normalized Difference Vegetation Index (NDVI), leaf greenness, fluorescence indices and spectral reflectance were collected using above sensors, respectively, for leaf samples from 164 randomly selected trees (from three commercial farm plots in Malaysia). Spectral data was processed using the stepwise multilinear regression (SMLR) and artificial neural network (ANN) based classifiers. The ANN performed superior compared to SMLR for most nutrient prediction cases. Although this study was conducted in laboratory and controlled conditions, but the information and knowledge obtained in this study could be

enough valuable to develop and fabricate sensors to mount on hand held data loggers, and other ground based carriers.