

# ESTIMATING CHLOROPHYLL CONCENTRATION OF RICE USING AIRBORNE HYPERSPECTRAL DATA BASED ON SPECTRAL *IN SITU*

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Abstract:

Chlorophylls are the most important pigments for photosynthesis. The amount of chlorophyll per unit leaf area in crop is an indicator of the overall condition of the plant. Healthy plants capable of maximum growth are generally expected to have larger amounts of chlorophyll than unhealthy ones. Estimation of Chlorophyll of rice using hyperspectral data need special algorithm for the great accuracy. Object of this research developed the reflectant *in situ* to model algorithm of estimation Chlorophyll content of rice for airborne hyperspectral.

In this research, several vegetation indices such as normalized difference vegetation index (NDVI), modified simple ratio (MSR) index and the modified chlorophyll absorption ratio index (MCARI, TCARI) and the integrated forms (MCARI/OSAVI and TCARI/OSAVI) were tested using linear regression to achieved model estimation Chlorophyll content of rice. Besides that, Blue/Green/Yellow/Red Edge Absorption Chlorophyll Index and single band reflectance are used.

In the result, there are three models that have strong correlation with chlorophyll of rice. The models are REACI 2 with  $R^2 = 0.41$ , MCARI/OSAVI (699.4, 759.8 and 561.8) with  $R^2 = 0.34$  and Single Band Reflectance (485.6, 515.6, 699.4, 1249.4 and 1291.5) with  $R^2 = 0.53$ . From the three models that achieved are chosen the best model (with  $R^2 > 0,5$ ). Single Band Reflectance (485.6, 515.6, 699.4, 1249.4 and 1291.5) is chosen to up scale to the algorithm of airborne hyperspectral by linear regression. The processing give model algorithm for estimating concentration chlorophyll of rice using airborne hyperspectral data with the RMSE = 2.03 SPAD.

**Key words:** *Chlorophyll, Rice, Hyperspectral, Crop, Estimation*