

# Changes of Spectral Characteristics to Chlorophyll Concentration in Rice Leaves

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## Summary

Field experiments were conducted at the experimental farm of Taiwan Agricultural Research Institute, Wufeng, to identify spectral characteristics in associated with chlorophyll concentration in rice leaves and to establish their quantitative relationships. There were 4 rice cultivars grown in the 1<sup>st</sup> and the 2<sup>nd</sup> crops of 1998. In leaf optical property, transmittance (t) and reflectance (r) were measured by an external integrating sphere in connected to a spectroradiometer, and absorptance (a) was calculated by  $a=1-t-r$ . It was found that 3 wavelengths (664, 652 and 644 nm) in the red light region and 1 wavelength (434 nm) in the blue light region were associated with total chlorophyll in rice leaves. The absorptance was positively correlated, while the reflectance was negatively correlated, to the change of total chlorophyll in both cropping seasons. The determining coefficients ( $R^2$ ) for wavelengths in the red region were greater than that in the blue region, yet the values were cultivar dependent. The relationships between absorptance and reflectance and chlorophyll a and chlorophyll b were also correlated curvilinearly. It was a positive relationship for absorptance and a negative for reflectance. The coefficient of determination for 644 nm was higher than that for 434 nm. Results suggest that optical property of rice leaf may be used to estimate chlorophyll concentration in either cropping season.

Key words: Rice(*Oryza sativa* L.), Spectral characteristics, Absorptance, Reflectance, Chlorophyll concentration.

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