Remotely investigation on rice canopy development by using hyperspectral reflectance data associated with biomass and grain production

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Abstract

Recognizing the canopy spectral characteristic by using hyperspectral device is widely and quickly becoming popular as a useful tool to assess in detail the change of physiological properties of plant at every growth stage without much time-consuming. Timely information of canopy spectral reflectance pattern of crop vegetation varies at each growth stage, due to the growth of biophysical processes is changing with time. Field remotely sensed paddy rice canopy spectral from 350 nm up to 1050 nm was regularly measured by using field hyperspectral device since transplanting until harvest May-July 2005 . Coinciding with spectral measurement, the agronomical parameter such as fresh and dry weight of biomass (leaf, stem, root, panicle, grain), Leaf Area Index (LAI), plant height, chlorophyll, nitrogen and carbon content was measured periodically as well during the growing season with different fertilizer applications and cultivars management. Several of Vegetation Indices (VI) was applied from spectral transformations from Green, Red and NIR waveband to improve sensitivity analysis to plant. In finding the best correlation among canopy spectral reflectance with crop development at each stage, these spectral transformations are afterwards examined toward agronomical parameters and biomass production. Canopy spectral reflectance which is measured early in season (May) provided information about soil and water background than plant canopy it self, while canopy spectral reflectance measured in June and July provided information of plant conditions, due to plant canopy completely cover soil surface. The present study was directed to establish the relationships between agronomical parameters of rice and the various of examined spectral indices analyzed from ground based level hyperspectral reflectance data. In addition this study attempt to examine the relationships between established spectral indices across different growth stage with biomass and grain production.