**Oral Presentation**

**Mapping of Sugarcane Canopy Nitrogen Concentration from Orbiting Hyperspectral Data**

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**ABSTRACT**

Nitrogen is concerned as the robust indicators of the physiological, susceptibility of pest and crop nutrient stress that could potentially affect to sugarcane yield. In fact, environmental factors and mixed genetic cultivars affect to the variations of canopy nitrogen concentration. The development of hyperspectral remote sensing has offered possibilities to estimate and map the spatial distribution of nutrient quantity. Thus, the methodology for extracting sugarcane Canopy Nitrogen Concentration (CNC) from satellite image without any requirement of the prior genetic cultivars or canopy structure information was needed. The main objective of this research was to evaluate the performances of Support Vector Regression (SVR) for estimating the spatial variations of sugarcane CNC in rangeland. Reflectance spectra were measured over the sugarcane canopy from orbiting EO-1 Hyperion sensor. The results indicated that SVR model based Radius Basis Function (RBF) kernel showed the higher performance for CNC estimation than the models computed by Stepwise Multiple Linear Regression (SMLR) and Spectral Vegetation Index (SVI). The best model was developed by non-linear transformed kernel SVR technique using 11 KPCA components. It yielded the coefficient of determination (*R2*) value of 0.78 and Root Mean Square Error (RMSE) value of 0.035%N. KPCA technique showed the high performance to reduce the high dimensions of spectral data. The narrow spectral wavelengths, centered in the visible-red, shorter of red edge, Far-Near-Infrared (FNIR) and Early-Mid-Infrared (EMIR) regions of the electromagnetic spectrum, are the best sensitive spectral wavelengths for determining CNC in mixed cultivar environments. Most of selected wavelengths are closely related to the changes in chlorophyll-*a*, nitrogen, biomass, LAI, and plant canopy moisture. It can be concluded that SVR is best suit for applying to map the spatial variations of sugarcane CNC in mixed cultivar environments from hyperspectral data.

**Keywords:** Hyperspectral, SVR, Nitrogen concentration, KPCA, Sugarcane