Assessing relationships between hyperspectral imagery and wheat parameters

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Reflectance signature in the visible and the near-infrared spectrum is useful for the assessment of plant performance, with potential applications in precision agriculture, high-throughput phenotyping and ecosystem studies and particularly relevant in terms of predictive capacities is the use of hyperspectral sensors. We assessed a total of 100 reflectance spectra from both wheat flag leaves and canopies from a manned aircraft under different nitrogen conditions at two locations in the state of Victoria (Australia). The aim of this study was to evaluate the performance of the reflectance data and vegetation indices using regression algorithms to predict in wheat grain yield and diverse physiological parameters.

Both leaf and canopy-level hyperspectral reflectance spectra showed consistent patterns across the experimental conditions, with effects in reflectance due to soil background.

The best correlations were obtained using canopy level imagery. Indices based on the red and the near-infrared bands were highly correlated with yield and chlorophyll content, as these regions of the spectrum are good indicators of biomass. Nitrogen content and anthocyanins were correlated with bands in the visible region

These results demonstrated the potential of the hyperspectral analysis for studying wheat performance and the use of airborne imagery as high-throughput platforms.