

Exploring the utility of Sentinel-2 for estimating maize chlorophyll content and leaf area index across different growth stages

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Abstract

This study investigated the utility of Sentinel-2 spectral data for estimating leaf area index (LAI), leaf and canopy chlorophyll content of maize at different growth stages. Vegetation indices based on the visible-near infrared and red-edge regions of the spectrum were computed from Sentinel-2 imagery acquired within one or two days of field data collection. Results showed that green chlorophyll index (CIgreen) and red-edge chlorophyll index (CIred-edge), using the red-edge variant centred at 705 nm, consistently showed higher relationship to maize LAI with r^2 of 0.65 and 0.63 during the early stages of growth, respectively, and an r^2 of 0.79 and 0.81 during tassel stage, respectively. Regarding canopy chlorophyll content the results indicated the spectral advantage of the Sentinel-2 sensor with the presence of two red-edge bands for continuous monitoring of maize chlorophyll content. Overall, the results indicated that maize biophysical variables can be monitored at satellite level using Sentinel-2 data.