# ABSTRACT

Leaf Area Index (LAI) is commonly defined as the total area of a leaf per unit area of the ground. LAI is an important variable for characterizing plant canopy related to the interception of solar radiation. Direct measurement of LAI by destructive sampling is tedious, time-consuming, and labor-intensive. With the advance of remote sensing, studies have explored multispectral and hyperspectral remote sensing image data and LiDAR point clouds as individual sources to estimate LAI indirectly. This study investigates the estimation of LAI for maize row crops over the growing season based on features derived from high resolution LiDAR and hyperspectral data acquired simultaneously from a UAV platform. Support vector regression models (SVR) are developed using cross validation and evaluated relative to the contribution of the multi-modality remote sensing data. The study is based on data acquired for experiments in plant breeding and evaluation of nitrogen management practice trials conducted at the Agronomy Center for Research and Education (ACRE) in 2021 and 2022, respectively. Reference data for the models were collected using a LI-COR® LAI-2200-C Plant Canopy Analyzer. Including both LiDAR and hyperspectral data sources in the SVR model improved the $R^2$ (relative to 1:1 comparison line), RMSE and Relative RMSE (rRMSE) values for both the plant breeding and nitrogen management practice trial experiments.