120-AGR

Title: Maize Crop Height Estimation Using UAS Images

Abstract

Unmanned Aerial System (UAS) can provide more efficient alternative to measure crop height than the conventional method, which are often labor-intensive and time-consuming. In this study, we extracted the maize crop height from the UAS data and compared it with ground-based measurements in a maize field. The research field consisted of 64 plots, which had three replications, with four cover crop treatments factors (Rye, Clover, Rye-Clover mixture, and Weedy control) and four nitrogen application schemes (Zero Nitrogen, Adaptive Nitrogen, Recommended Nitrogen and Recommended Nitrogen with Herbicide).

UAS data was collected on June 03, 2024, June 06, 2024, June 12, 2024, June 17, 2024, June 28, 2024, July 3, 2024, July 11, 2024, July 16, 2024, August 1, 2024 and August 09, 2024 with a high-overlap (>80%) at lower altitude to generate digital surface model (DSM) and orthomosaic image by using Structure from Motion (SfM). Digital terrain models (DTMs) were created by interpolating bare ground points extracted from DSM. Crop height models (CHMs) were generated by subtracting the DTM from DSM. Each plot boundary was delineated by QGIS to extract various crop heights such as maximum height, average height, 99% height, 95% height, and 90% height using entire pixels within each polygon shapefile to facilitate data extraction. Ground measurements were collected on June 7, 2024, June 17, 2024, June 28, 2024, and July 11, 2024 and used to validate UAS-based crop height. Crop height related variables such as 99th and 95th percentile heights, and maximum crop height was calculated for each plot using Python. Preliminary results showed a strong correlation between UAS and ground-based height measurements.