POSTER SUMMARY

USE OF REMOTE SENSING TO DETERMINE INTRA-FIELD YIELD VARIABILITY

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Abstract

Quantifying infield yield variability is essential to guide field investigations, remediation or adaptive treatments to enhance management of agronomic inputs towards achieving crop yield potentials.

Stalk height measurements can be used as an indication of and to estimate cane yield prior to harvest. Analysis of trial data from the South African Sugarcane Research Institute (SASRI) confirmed the relationship between cane stalk height and crop yield, with strongest association detected for crops of similar genetic, environmental and crop production factors. The analysis supported further investigation into the potential of drone mounted remote sensing using photogrammetry to determine intra-field yield variability. Two separate SASRI field trials containing various treatments and a wide range of yields were surveyed using photogrammetric mapping techniques. This was in addition to the standard SASRI field trial measurements which were used to test and compare the results obtained from photogrammetry against actual field-based yield measurements. In a third collaborative study conducted with Tongaat Hulett, a SASRI variety field trial was scanned with a drone mounted LIDAR (Light Detection and Ranging) system to test the accuracy and suitability of LIDAR to map crop height variability. This study included intensive stalk height measurements acquired before and at time of harvest and correlations between these and the LIDAR derived measurements with the harvested mass of cane from each plot assessed.

The results showed that photogrammetry and LIDAR surveys are potentially useful tools that may be used to identify intra-field variability using crop height as a proxy for yield. Limitations and potential application of the use of these technologies are also highlighted in this work. This research forms part of a SASRI project investigating yield variability mapping using various techniques across a range of commercial harvesting and loading practices.

Keywords: precision agriculture, yield mapping, photogrammetry, LIDAR, drones