Digital photos for measuring canopy cover

This trial was funded by the GRDC (SFS 00017) in collaboration with Nick Poole (Foundation for Arable Research NZ) and the Mid-North High Rainfall Group (Mick Faulkner and Jeff Braun).

Key findings

- Digital photos collected up to GS31 and processed for green ground cover provided a good measure of crop biomass and N uptake.
- Images collected after GS31 had poorer relationships with crop growth.

Why do the trial?

To test the ability of readily available camera technology to measure canopy cover.

How was it done?

Images were collected with a 5 mega pixel digital camera held 1.5m directly above the canopy. Images were collected at GS22, GS31, GS32, GS33, GS39 and GS65. The images were of the nitrogen treatments in the canopy management trial at the Mid North High Rainfall Site at Tarlee. The images were processed to determine the number of 'green' pixels in the image using a USDA-ARS and USGS Weed Cover Calculator that uses an Excess Green – Excess Red algorithm.

Results

Digital camera images can be used to provide a measure of canopy ground cover (Figure 1 & 2). This only works well at early growth stages though. When the leaves overlap and the canopy closes the digital imagery is not able to detect changes in canopy size, this occurred after GS31 in this trial (Figure 2). At the early growth stages the digital imagery results have a good relationship with Greenseeker NDVI (Figure 3).

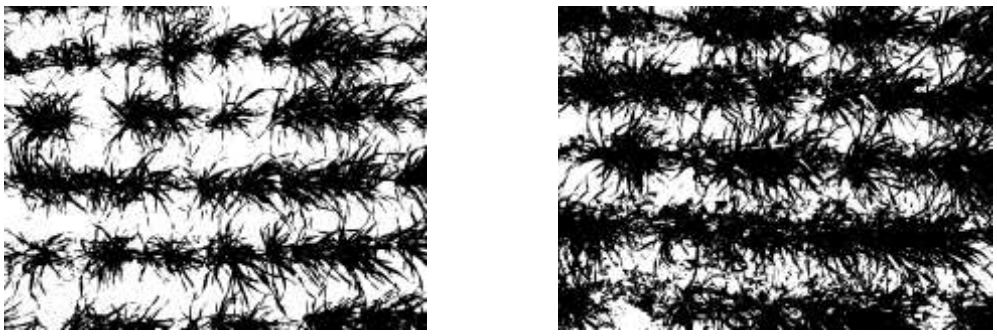

Figure 1: example of processed digital images collected at GS31, where black represents green canopy and white background soil and stubble. The image on the left has 44% cover and the image on the right 66% cover.

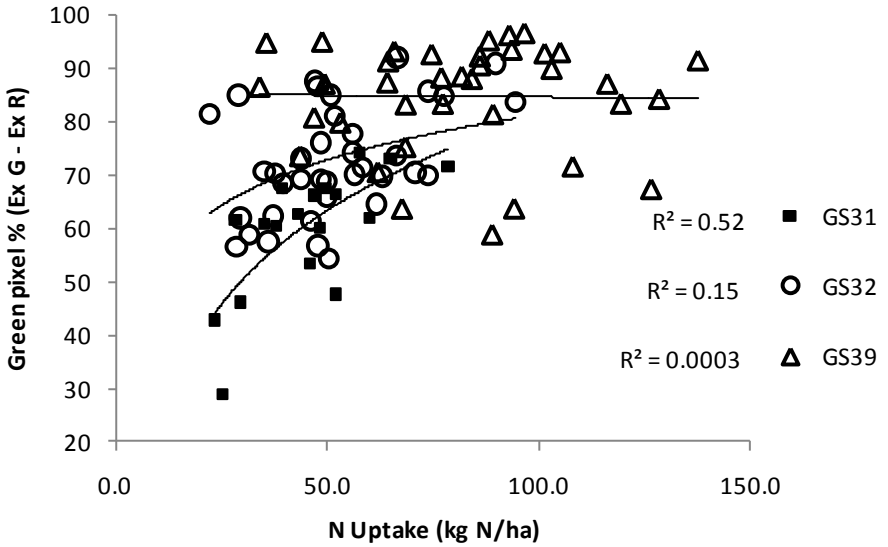

Figure 2: The relationship between nitrogen uptake of the plant and green pixel cover measured from digital photos at three growth stages.

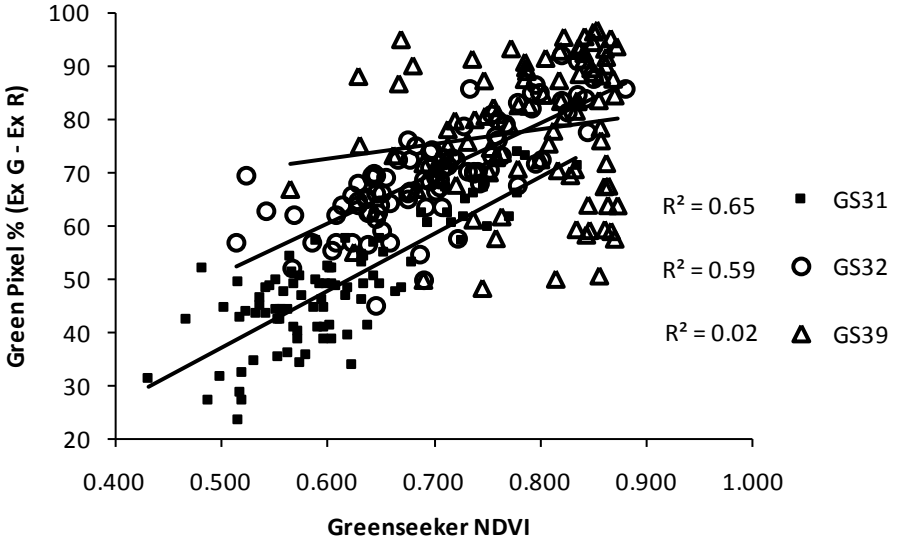

Figure 3: The relationship between Greenseeker NDVI and green pixel cover measured from digital photos at three growth stages.