



Precision Ag Trials

Plant Growth Regulants (PGR) Bute

Although PA tools have been available to Australian grain growers for many years, and the benefits have been well documented, it is estimated that less than 1-% of grain growers utilise PA 'beyond guidance' in any form.

The objective of this GRDC / SPAA funded project is to increase the level of adoption of PA 'beyond guidance' by broadacre farmers. The project specifically aims to increase the level of adoption of variable rate (VR) by growers in the project to 30% by 2013. This goal will be achieved by demonstrating how to use PA tools to growers at a regional level and by increasing the skills of growers and industry in PA to a level where they can then use PA tools in their farming systems to achieve economic, environmental and social benefits.

Trials and demonstrations are conducted on growers' properties and are visited throughout the season using farm walks and workshops to discuss the advantages and disadvantages of PA techniques with the involvement of other regional growers.

This information sheet presents the outcomes of the SPAA trial **on the use of plant growth regulants in wheat and barley** from season 2011.

Aims:

- To assess the effects of plant growth regulants (PGR's) on crop growth and grain yield across variable soils in wheat and barley.

Background:

Canopy management is used to optimise crop growth for the yield potential at a given location. That is, to grow sufficient vegetative crop to realise yield potential, but not excessive bulk such that lodging or haying off occurs. Strategies that can be used in canopy management include fertiliser management, in particular nitrogen, seeding rates and sowing dates. Another tool for manipulating crop growth is with PGR's. These regulants act to shorten the stem of cereal crops and reduce their growth during stem elongation. This may be beneficial where crops are growing unrestrained on soils with high levels of nutrition and no subsoil constraints, but have a limited or negative effect where the crop is already restricted by some other constraint. These trials aim to identify in which zones a yield response is most likely from PGR's.

About the trial:

PGR's were trialled in two paddocks at Bute sown to Fleet barley and Correll wheat. The two paddocks were zoned according to soil type and production potential, with soil types ranging from sandy hills and rises to loam flats. The trial strips were applied through a 36m Hardi boom spray, with each treatment strip

being one pass of the boom sprayer. At the time of application there were high levels of stored soil moisture and a significant rainfall event occurred from August 15th-18th, however there was no significant rainfall from that time until September 27th.

The two paddocks had three treatments applied. These were

1. Cycocel @ 1 L/ha + Moddus @ 200 mL/ha @ GS31 (11/8/2011)
2. Cycocel @ 1 L/ha @ GS31 (11/8/2011)
3. Nil

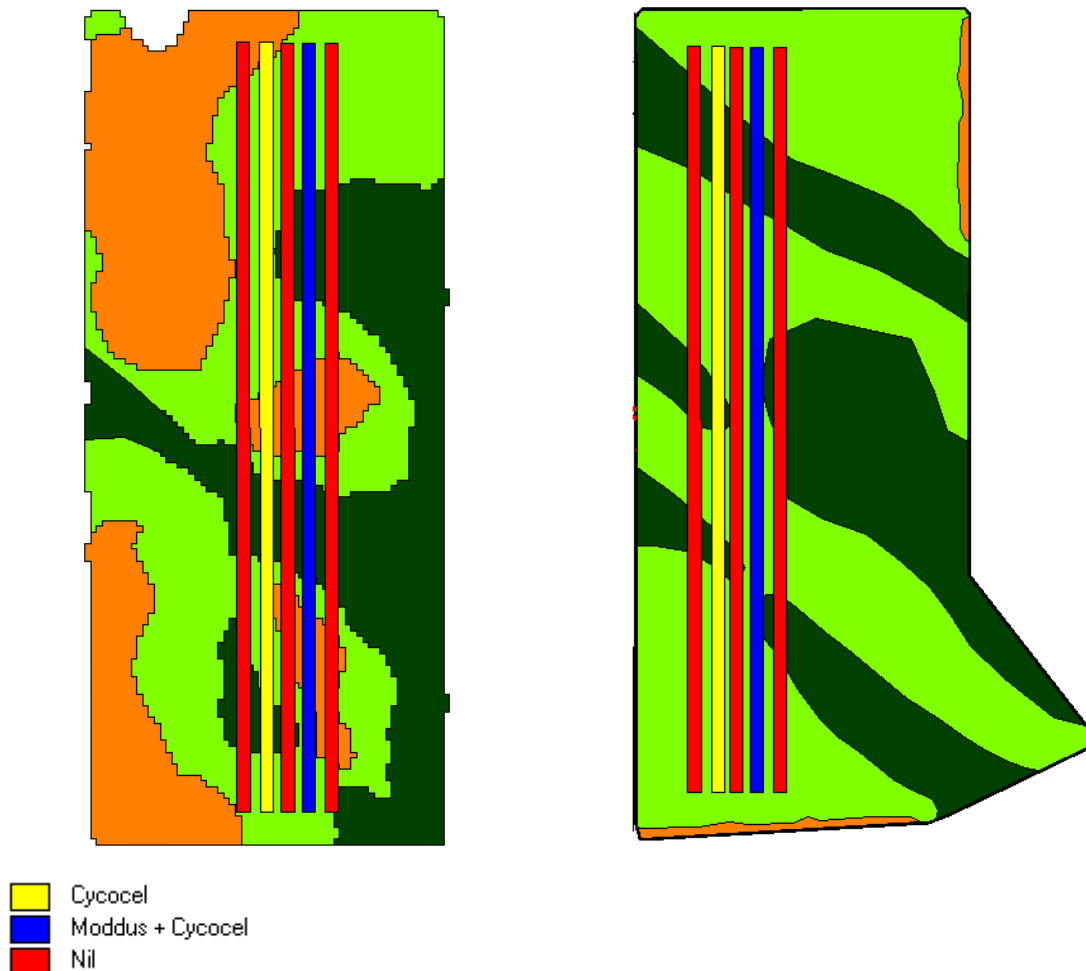


Figure 1: Layout of PGR treatments across production zones in two paddocks at Bute. Ronnie's paddock (on left) was sown to Fleet barley. Race paddock (on right) was sown to Correll wheat.

Assessments:

Crop sensor growth measurements
Crop height measurements at maturity
Grain Yield

Results:

The treatment of Moddus + Cycocel had the greatest growth regulant effect, reducing the height of wheat by 5-10cm and barley by 10-14cm (Table 1) and was visually obvious at ground level and also in the aerial imagery (Figure 2, 3, 4, 5a & d). Cycocel applied alone provided only a small growth regulant effect and was not visually obvious.



Figure 2: Visual comparison of Moddus + Cycocel (left) compared with nil (right) in Correll wheat.



Figure 3: Visual comparison of Moddus + Cycocel (left) compared with nil (right) in Fleet barley. Notice the nil treatment is leaning over further.



Figure 4: The treatment strip of Moddus + Cycocel is obvious against the nil treatment either side.

Table 1: Crop height measurements (cm) at maturity for wheat and barley on two soil types.

Crop	Zone	Nil	Cycocel	Moddus + Cycocel
Wheat	Loam flat	73.6	72.3	68.7
Wheat	Sand hill	86.3	82.0	76.6
Barley	Loam flat	76.5	73.1	62.1
Barley	Sand hill	71.7	74.9	60.4

Yield differences between treatments were not significant for most of the zones along the trial strips (Figure 6b & 7b), with little difference observed between the growth regulant treatments and nil, any yield gains were inconsistent and small. In Ronnies paddock (barley) there were some yield reductions observed with the growth regulant treatments on the southern end of the trial and between Northing 6246990 and 6246783. These were significant and more pronounced in the Moddus + Cycocel treatment, with a yield reduction of 0.2-0.3t/ha. Given the high cost of these treatments (approx \$45/ha for Moddus + Cycocel) and the negative yield effect in some areas the application of growth regulants in the Bute region appears limited, and would have made a loss in season 2011. Had the crop not endured a 6 week dry spell shortly after the growth regulant application the results may have been different, however the final paddock yields were still average for the district, so the crops were not under drought conditions. Potentially in a higher yielding season (> decile 7) there may still be a benefit from the use of growth regulants in this region.

It was hypothesised that the benefits of the growth regulants would be related to the amount of crop growth. It was expected they would have a greater beneficial impact where the crop was identified as being thick and bulky, according to the aerial imagery and that the effects would be less or negative where crop growth was less and possibly already constrained by other factors such as nutrition. If this hypothesis were correct, crop imagery could be used to target growth regulants to areas where a positive response is most likely. There was lower NDVI at the southern end of Ronnies paddock, and this is where a negative yield response was observed, indicating the hypothesis may be correct, however the link is not strong.

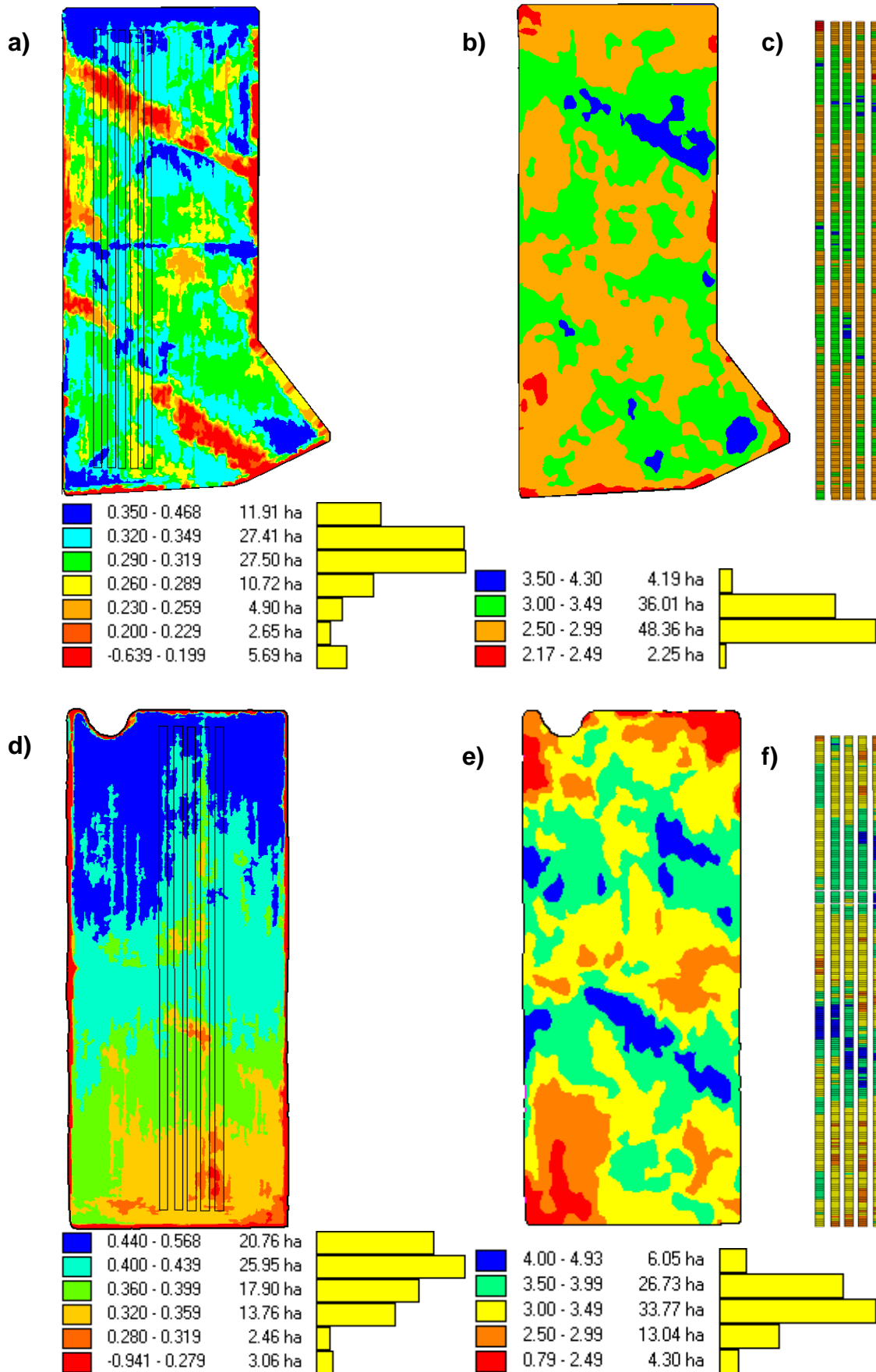


Figure 5 a) Aerial image (NDVI) of Race paddock collected on 29/8/2011, b) wheat yield (t/ha) map for Race paddock, c) yield of individual trial strips in Race paddock, d) Aerial image (NDVI) of Ronnies paddock collected on 29/8/2011, e) barley yield (t/ha) map for Ronnies paddock, f) yield of individual trial strips in Ronnies paddock.

Wheat trial results

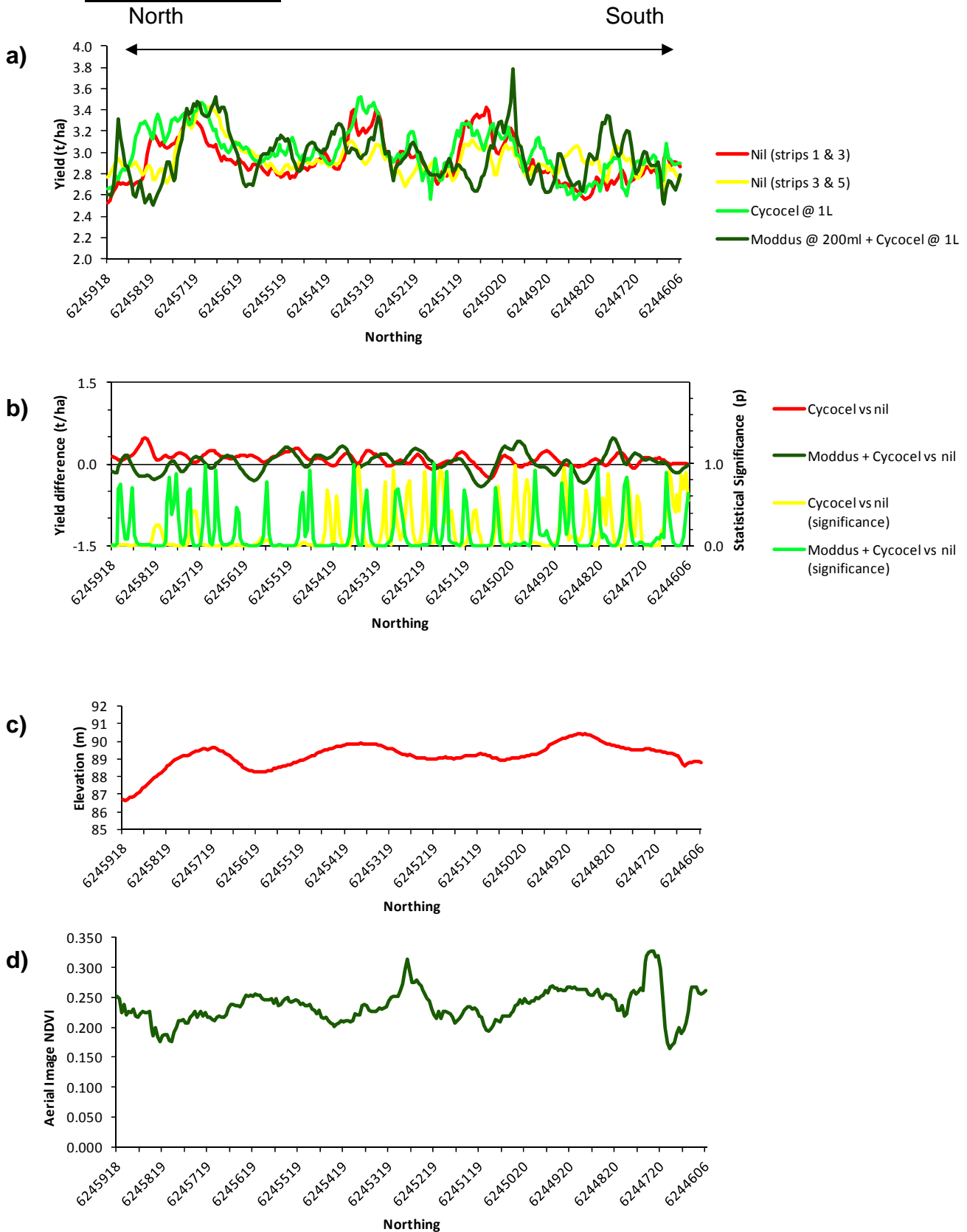


Figure 6 a) The yields of individual trial strips, relative to Northing in wheat, b) the difference in grain yield between growth regulant treatment strips and the nil treatment and the statistical significance of those differences. $P < 0.05$ indicates a statistically significant yield difference, c) elevation along the trial strip, d) NDVI along the trial strip measured from an aerial image at the time of treatment application.

Barley trial results

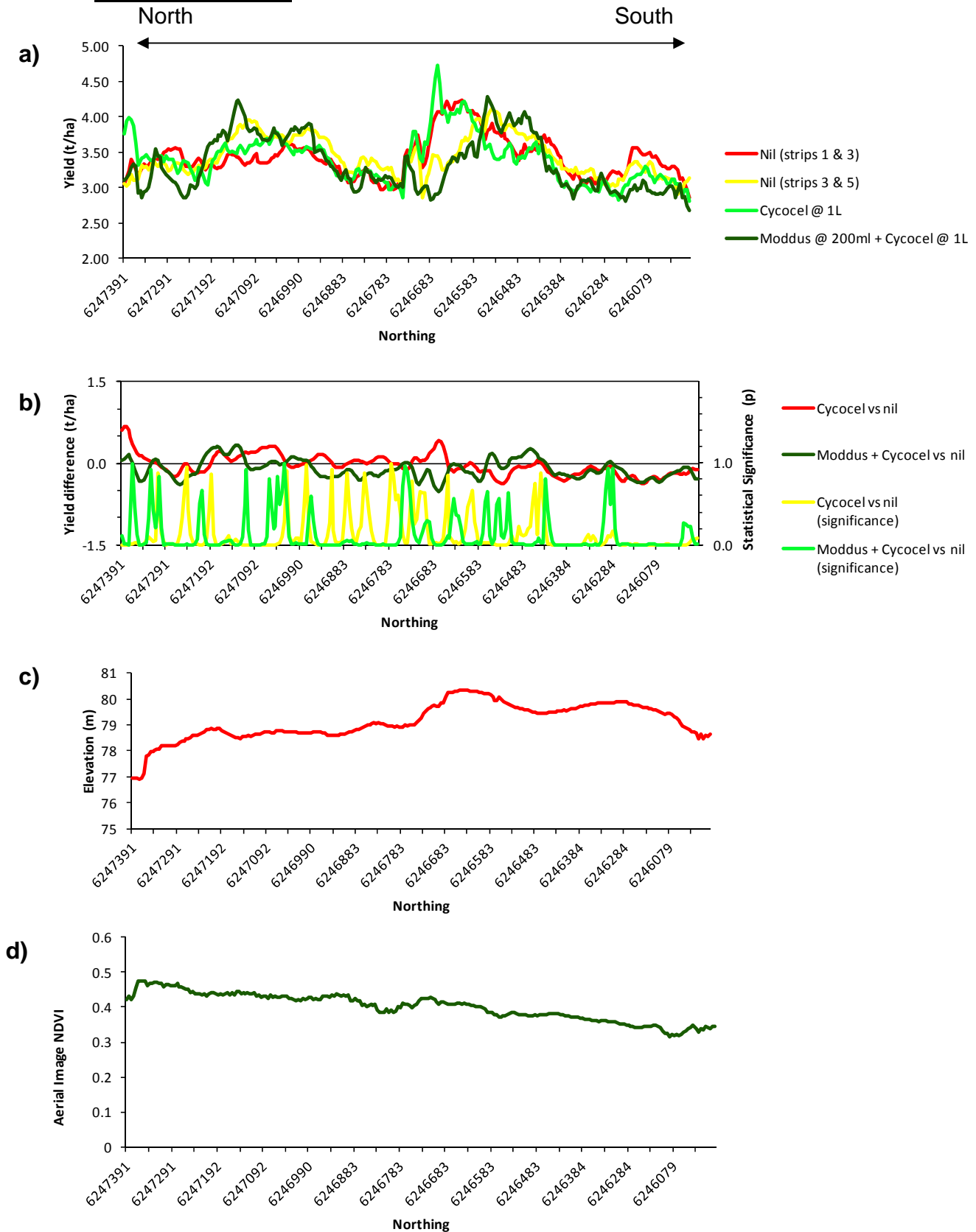


Figure 7 a) The yields of individual trial strips, relative to Northing in barley, b) the difference in grain yield between growth regulant treatment strips and the nil treatment and the statistical significance of those differences. $P < 0.05$ indicates a statistically significant yield difference, c) elevation along the trial strip, d) NDVI along the trial strip measured from an aerial image at the time of treatment application.

Who was involved?

Bill & Max Trengove hosted the trial

Sam Trengove conducted data collection and trial analysis

Ian Oswald-Jacobs (IOJ photography) supplied high resolution aerial imagery

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For more information

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