Southern Irrigated Canola Varieties Achieving Target Yields - Hillston 2016

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Introduction

In its third year, this trial at Hillston is a satellite site of the 'Southern Irrigated Cereal and Canola Varieties Achieving Target Yields' project. It aims to test the regional suitability of current commercially available canola cultivars as well as to determine nitrogen application and rate recommendations for specific canola varieties.

Site Details

Location:	Hillston, NSW
Soil type:	Grey clay loam
Sowing date:	27th April, 2016
Available N at sowing:	82 kg/ha (0-60 cm)
0-10cm nutrients:	13 mg/kg Colwell P
Previous crop:	Maize
Rainfall:	95mm January–March + 532mm April–October
In-crop irrigations:	Not irrigated
Starter fertiliser:	100 kg/ha MAP
Nitrogen fertiliser:	150kg N pre-drilled at sowing as urea
Harvest Date:	24th November, 2016

Treatments

12 canola varieties	1. Pioneer®45Y88CL 2. ATR-Gem 3. Hyola®559TT 4. Victory®V3002 5. ATR-Bonito 6. AV-Garnet 7. Pioneer®44Y89CL 8. Pioneer®45Y25RR 9. Nuseed® Diamond 10. Hyola®575CL 11. Hyola®600RR 12. Nuseed® GT-50RR
4 nitrogen rates/timings	1. Very Low – 150kg N/ha at sowing 2. Low – 150kg N/ha at sowing + 50kg N/ha at visible bud 3. Medium – 150kg N/ha at sowing + 100kg N/ha at visible bud 4. High – 150kg N/ha at sowing + 150kg N/ha at visible bud

Results

Measurements that were taken on this trial, and included in this report, are establishment counts (plants/m^2), Normalised Digital Vegetation Index (NDVI), lodging scores, grain yield (t/ha) and grain quality.

Establishment scores and plant counts were taken on 14th June. Establishment was scored from 0 to 9, with 0 being very poorly established and uneven and 9 being very evenly established. The variety Diamond had the highest establishment score of 7.8 and 45Y88CL the lowest establishment score of 5.4.

The target plant density was 40 plants/m^2. There was a significant effect for variety for plant counts. The average plant count of the trial was 26 plants/m^2. Plant density between the varieties varied, with plant counts ranging from 21 plants/m^2 for 45Y88CL and up to 33 plants/m^2 for Hyola 600RR (figure 1). Other varieties to establish well were Diamond and Hyola 575CL.

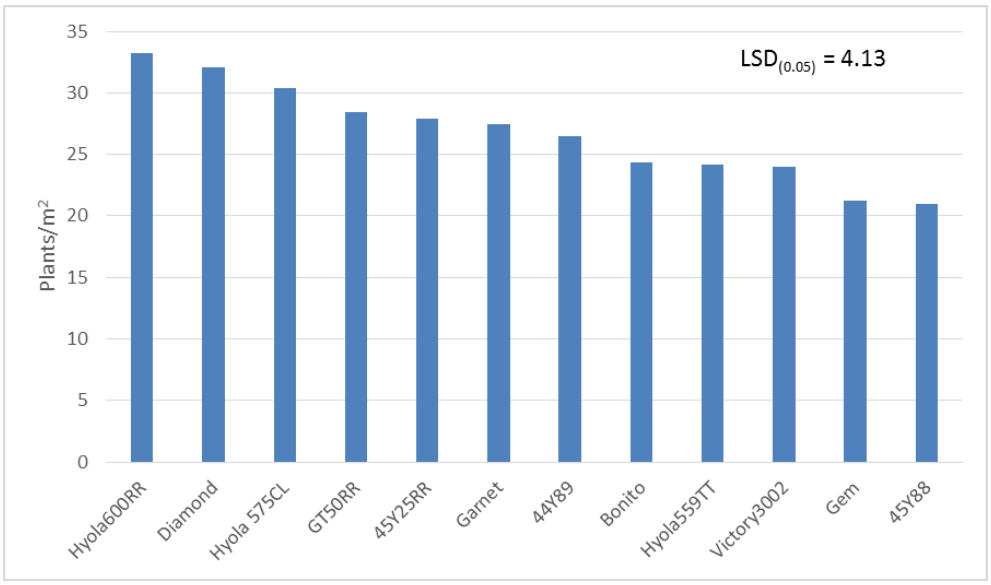

Figure 1: Average plant population (plants/m^2) for each variety and nitrogen treatment.

Crop vigour was measured at full ground cover to flowering using a hand held NDVI. Results showed there was a significant effect for variety for crop vigour. The average NDVI value for the trial was 0.783, with values ranging from 0.729 for Bonito up to 0.803 for Hyola 575CL, (figure 2).

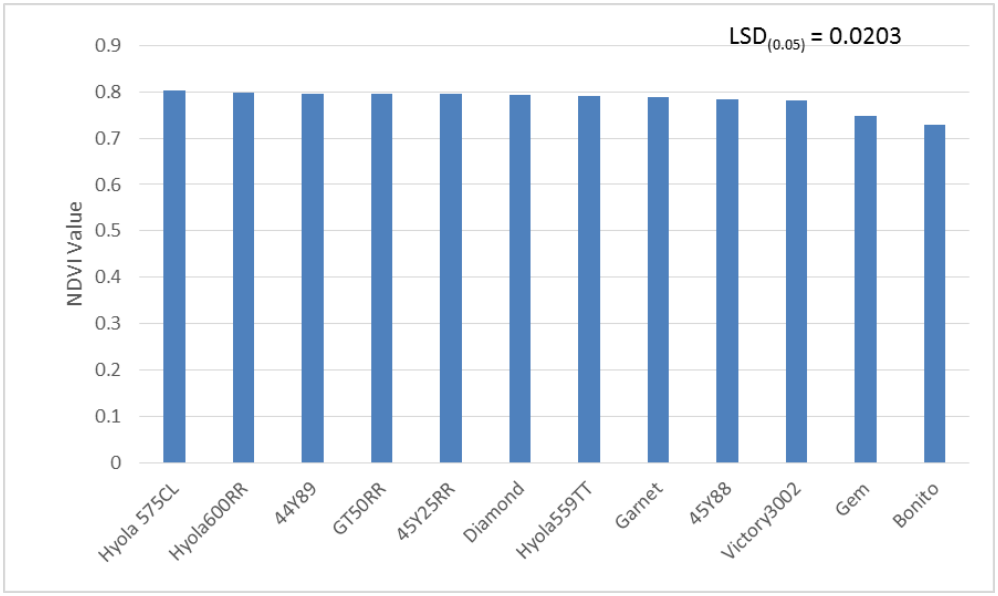

Figure 2: Average NDVI values for each variety

Three lodging assessments were taken from mid-September to mid-November. Lodging was scored on a scale of 0 to 9, with 0 indicating no lodging and 9 flat on the ground. The first lodging assessment was taken before the first irrigation with no differences in lodging observed. The pre-harvest assessment demonstrated a significant variety and N rate effect for lodging. The average lodging score of the trial was 3.49. Hyola 600RR had the highest incidence of lodging with a score of 5.2 and was statistically similar in lodging with AV-Garnet, Hyola559TT and GT50RR. 45Y88CL had the least amount of lodging with a score of 2.1 and was statistically similar in lodging with ATR-Bonito, 44Y89CL, 45Y25RR and ATR-Gem (figure 3).

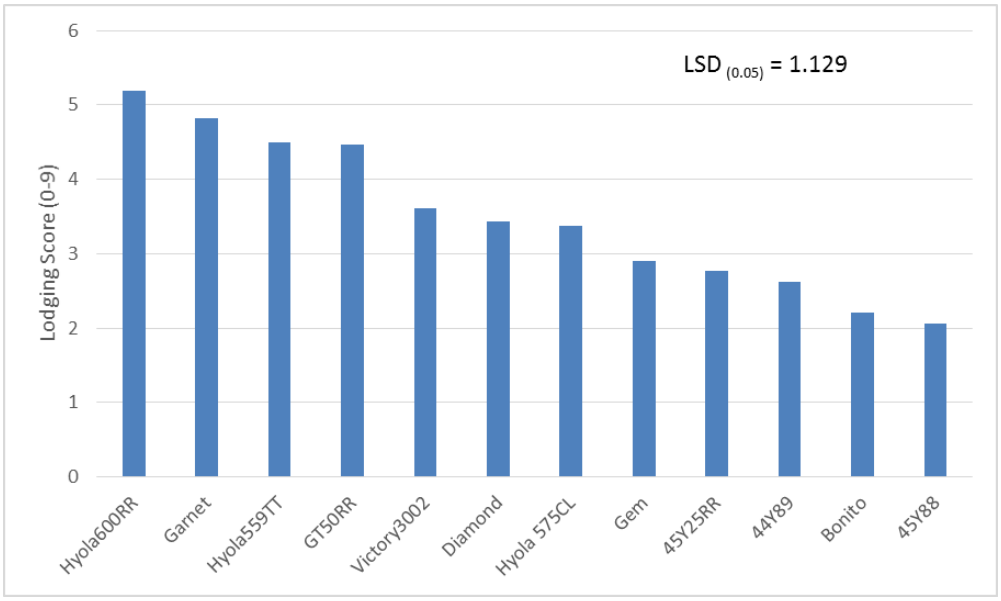

Figure 3: Average lodging scores taken mid-November for each variety

A trend was observed with increasing lodging as the nitrogen rate increased. The highest nitrogen rate treatment had the highest average lodging score of 3.795 but was statistically similar in lodging with the medium and low nitrogen rate treatments. The very low nitrogen rate treatment had the lowest average lodging score of 2.968 and was significantly lower in lodging than the high nitrogen rate treatment.

Grain yield across all varieties and nitrogen rates averaged 2.69 t/ha. Results showed there was a significant effect of variety for grain yield. Grain yield ranged from 2.34 t/ha for Hyola600RR up to 3.11 t/ha for 45Y88CL, (Figure 4). The variety 45Y88CL was the highest yielding canola variety but was statistically similar in yield with 44Y89CL, Diamond, ATR-Bonito, Hyola575CL and 45Y25RR. Hyola600RR was the lowest yielding variety with 2.345 t/ha, but was statistically similar in yield with Hyola559TT, AV-Garnet and ATR-Gem.

The trial demonstrated that the nitrogen rate had no effect on grain yield. The very low nitrogen rate had an average yield of 2.719 t/ha and was statistically similar in yield with all other nitrogen treatments.

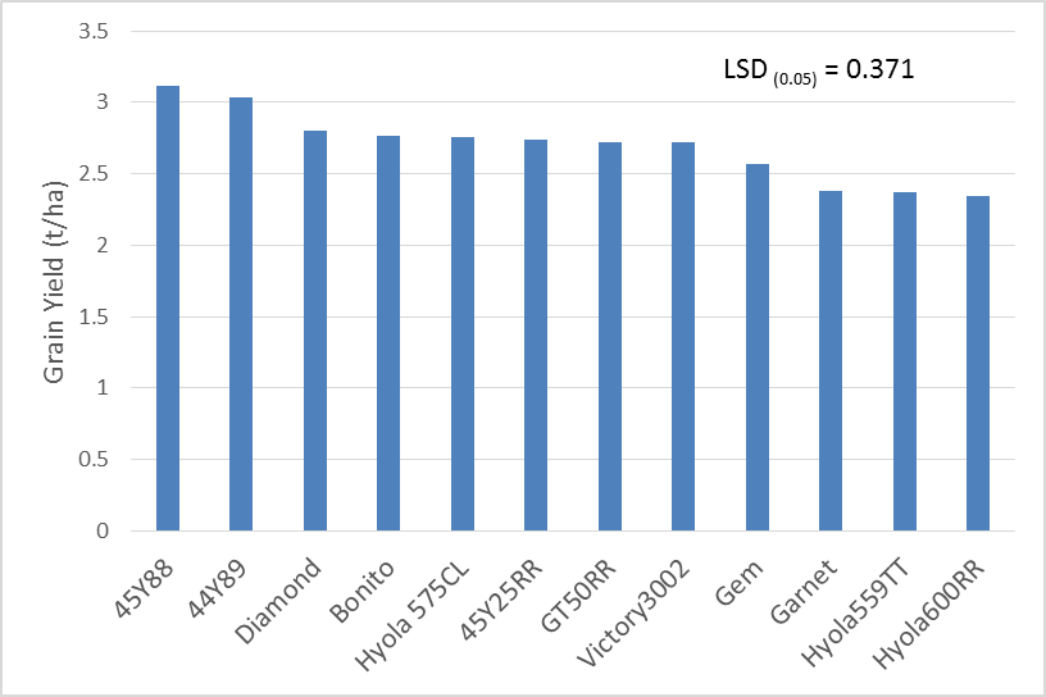

Figure 4: Grain Yield for each variety

An interaction between grain yield and lodging was observed. As lodging increased, a reduction in yield occurred (figure5).

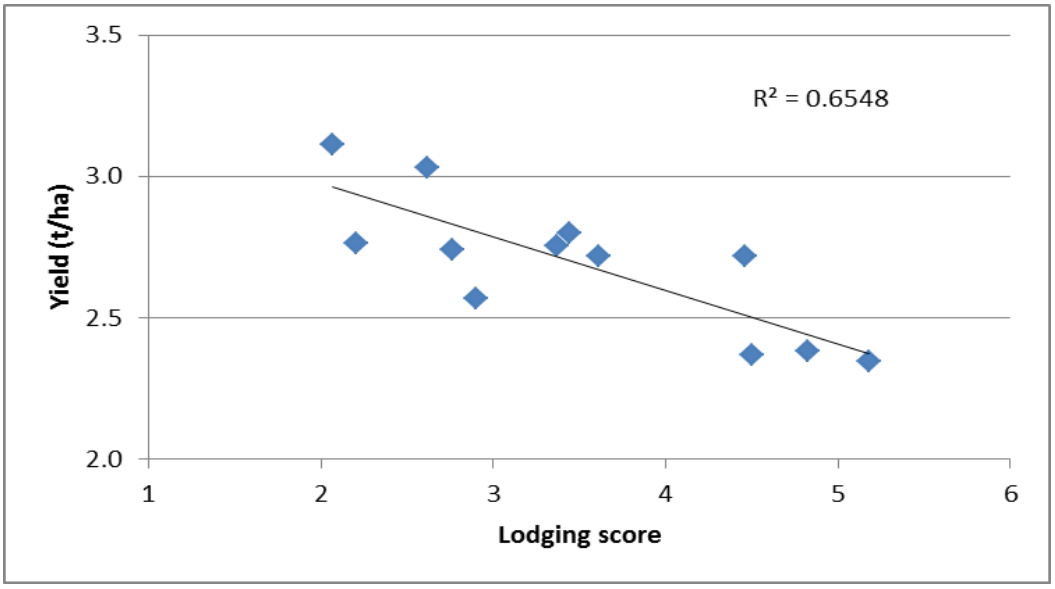

Figure 5. The interaction between grain yield and crop lodging 2016

The average oil content of the trial was 41.6%. Results showed there was a significant effect of variety for grain yield and variety by nitrogen rate. The variety Bonito had the highest oil content with an average of 43.16% and was significantly higher than all other varieties. Hyola559TT had the second highest average oil content with 42.19% and was statistically similar in oil percentage with Victory3002. Hyola575CL had the lowest oil content with 40.29% and was statistically similar in oil percentage with Diamond (Figure 6).

No general trend was observed between nitrogen rate and oil content. The very low nitrogen rate had an average oil concentration of 41.57% which was statistically similar to all other nitrogen treatments including the high rate with an average oil concentration of 41.65%.

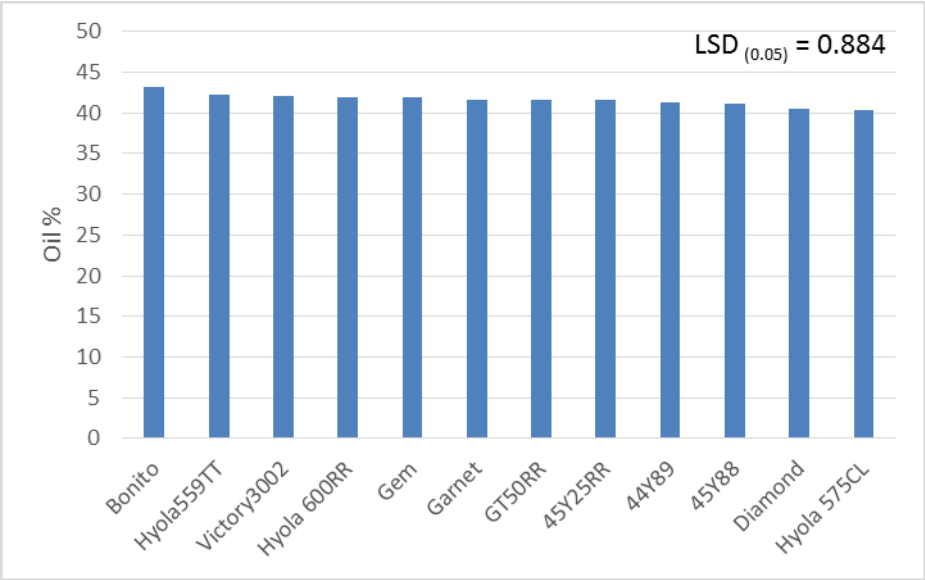

Figure 6: Oil content of each canola variety

Summary

Growing conditions in 2016 were very wet and mild, with rainfall from May to September one of the wettest on record. Growing season rainfall was well above average with 532mm recorded between April and October 2016 for Hillston. The trial established well with all varieties achieving a plant density between 20 and 35 plants/m^2. Plant establishment was backed up by NDVI measurements taken at full grown cover, with the greater the plant population the greater the NDVI value.

Given the season, choosing the right variety proved to be a key factor in 2016. An interaction between yield and lodging was observed with the highest yielding varieties generally having the least amount of lodging. The Clearfield variety 45Y88CL had the least amount of lodging at harvest and was the highest yielding variety in the trial. Other varieties that were high yielding with a low incidence of lodging included Bonito, 44Y89CL and 45Y25RR. The Roundup Ready variety Hyola600RR had the highest amount of lodging in the trial, and was the lowest yielding variety. 45Y25RR was the best performing Roundup Ready variety with its high yield and low incidence of lodging. The TT varieties Hyola559TT and ATR-Gem were all in the lowest yielding group. This trial reinforced the concept that it is difficult to achieve maximum yields using TT varieties, with a yield penalty of about 0.5 t/ha. Bonito however performed well in this trial.

The trial was set up to target a 4 t/ha canola crop, with a very high nitrogen budget. Conditions were at times too wet, causing waterlogging, and the average trial yield in 2016 was 2.69 t/ha, with a top yield of 3.11 t/ha. There were no significant differences in yield and oil content between nitrogen rates in 2016, showing there was no reason to apply more than 150kg N/ha upfront. There was a significant difference in lodging between the different nitrogen rates. The trial demonstrated that increasing the nitrogen rate can increase the incidence of lodging.

Acknowledgements

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