16a. Irrigated Dual Purpose Crops

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Project Code: DAN00198 “Southern Irrigated Cereal and Canola achieving target yields”

KEY MESSAGES

- Winter canola had greater DM production compared to spring canola.
- Time of sowing significantly influenced canola grain yields.
- Grazing Manning did not result in a yield penalty, but grazing Trojan wheat did; need to be careful not to graze outside of the “safe” grazing window.

This is the second year of the three year GRDC funded project ‘Southern Irrigated Cereal and Canola Achieving Target yields’ (DAN00198). The project is addressing the improvement of advisor and grower knowledge of high yielding cereal and canola varieties under irrigated systems and specific agronomic management that will improve profitability of these crops.

MFMG growers highlighted the need to investigate the management of dual purpose canola and cereal crops under irrigation in the region. As a result of this discussion two trials were established in 2015 at Bool Lagoon looking at the management of canola and wheat under this farming system. The trials compared spring and winter canola varieties, and spring and winter wheat, focusing on the management issues of times of sowing (TOS), grazing (timing and severity) and nitrogen application rates.

Canola Trial

The canola trial compared winter canola variety Hyola 970 CL to the spring canola Hyola 575 CL at four different TOS’s. At each TOS two different grazing intensities were applied (simulated with a mower), a heavy graze and a light graze (Figure 1). Only TOS 3 and TOS 4 had ‘no graze’ controls. Post grazing a nitrogen application of either 300 kg N/ha (High N) or 150 kg N/ha (Low N) was applied. Grazing was aimed to occur after 6-8 leaf stage and before bud elongation was greater than 10 cm. The treatments applied are shown in Table 1. Measurements taken included establishment counts, NDVI, dry matter (DM) production pre and post grazing, biomass at flowering, yield and grain quality. DM production is presented in Figure 2 and grain yield results are presented in Figure 3.

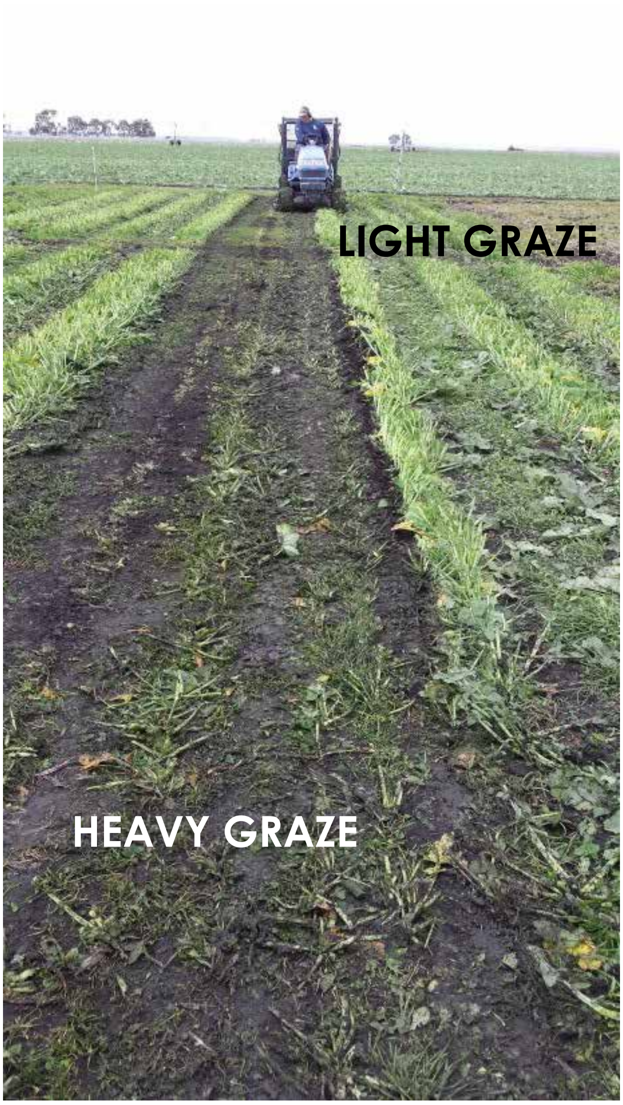

Figure 1. *Example of mower simulating a heavy graze compared to a light graze.*

Table 1. *Canola Treatments applied*

TOS	Variety	Grazing Regime	N-regime
TOS1 18-2-2015	Winter Canola	Light	High
			Low
		Heavy	High
			Low
TOS2 19-3-2015	Winter Canola	Light	High
			Low
		Heavy	High
			Low
	Spring Canola	Light	High
			Low
		Heavy	High
			Low
TOS3 14-4-2015	Winter Canola	Light	High
			Low
		Heavy	High
			Low
	Spring Canola	Light	High
			Low
		Heavy	High
			Low
TOS4 13-5-2015	Spring Canola	Light	High
			Low
		Heavy	High
			Low

As managed the heavy grazing removed more DM than the light graze.

When comparing only the winter canola, Hyola 970 CL TOS 1 had the greatest amount of DM removed ranging from 5.12 t/ha (heavy graze) compared to 4.33 (light graze) and these were significantly greater than all the other Hyola 970 CL TOS treatments.

When comparing only the spring canola, Hyola 575 CL TOS 4 had the greatest amount of DM removed; a result of the plots being grazed too late and removing the growing bud (resulting in subsequent poor yields).

When comparing the two varieties at the same time of sowing and grazing intensity, the winter type had more DM available than the spring type.

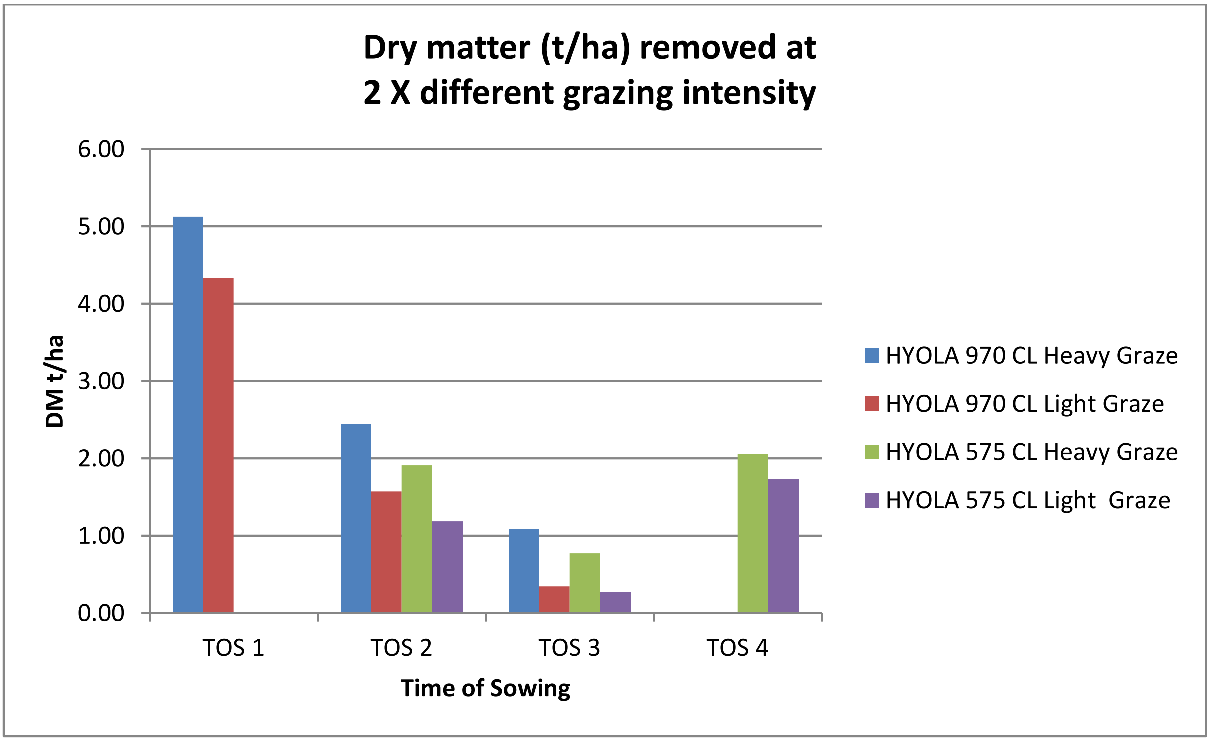

Figure 2. *Comparison of dry matter removed (DM t/ha) between varieties X TOS X grazing intensity.*

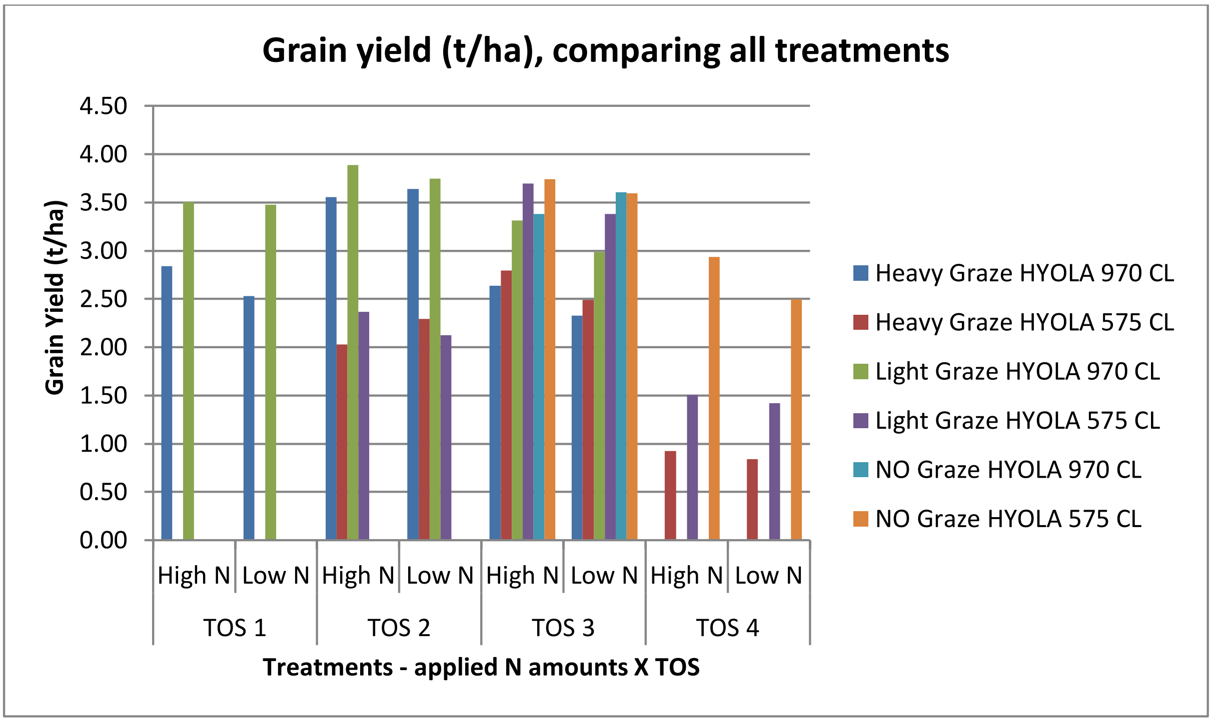

Figure 3. *Grain yield (t/ha), comparison between varieties X TOS X grazing intensity X N application rate.*

All grain yields (except Hyola 575 CL X TOS 2 X Low N) were greater when submitted to a light graze compared to a heavy graze. At TOS 3 a light grazing tended not to result in a yield penalty when compared to the no graze treatment.

Increasing nitrogen from 150 kg N/ha to 300 kg N/ha on average significantly increased spring canola yields. Winter canola yields were not increased significantly, but tended to increase with increased N.

No significant interaction was measured for Hyola 970 CL X TOS X grazing intensity X nitrogen application rate. However, there were individual interactions. HYOLA 970 CL had significantly greater grain yields at TOS 2. Also heavy grazing significantly reduced grain yields compared to light graze and no graze (which were significantly the same).

No significant interaction was measured for Hyola 575 CL X TOS X grazing intensity X nitrogen application rate. However, there were individual interactions. HYOLA 575 CL had significantly greater grain yields at TOS 3, with no graze and light graze being significantly greater than heavy graze. TOS 4 yields were significantly less as it was grazed too late and too hard, resulting in the crop not having the time to recover and express its full potential.

Refer to Best-Bet Management Tips for Spring-type and Winter-type dual purpose canola (after this chapter) for key points when grazing canola.

Wheat Trial

The wheat trial compared mid-late variety Trojan to late variety Manning at four different TOS's, with and without grazing (simulated with a mower and shown in Figure 4). Post grazing a nitrogen application of either 300 kg N/ha (High N) or 150 kg N/ha (Low N) was applied. Grazing was aimed to allow lock up by growth stage 30. The treatments are summarized in Table 2.

Measurements taken included establishment counts, NDVI, dry matter (DM) production pre and post grazing, biomass at flowering, yield and grain quality. DM production is presented in Figure 5 and grain yield results are presented in Figure 6.

Table 2. *Summary of wheat treatments*

TOS	Variety	Grazing Regime	N-regime
TOS1 19-3-2015	Winter Wheat	Grazed	High
			Low
		Ungrazed	High
			Low
TOS2 14-4-2015	Winter Wheat	Grazed	High
			Low
		Ungrazed	High
			Low
	Spring Wheat	Grazed	High
			Low
		Ungrazed	High
			Low
TOS3 14-5-2015	Winter Wheat	Grazed	High
			Low
		Ungrazed	High
			Low
	Spring Wheat	Grazed	High
			Low
		Ungrazed	High
			Low
TOS4 19-6-2015	Spring Wheat	Grazed	High
			Low
		Ungrazed	High
			Low

Figure 4. *Example of grazed (mower simulated) treatment to un-grazed treatment.*

DM production did not significantly vary for Manning at the three difference TOS's but was greatest at TOS 2. Trojan had significantly more DM removed at TO3. When comparing the two varieties at the same TOS and DM removed, Manning had more DM at TOS 2 and Trojan more DM at TOS 3.

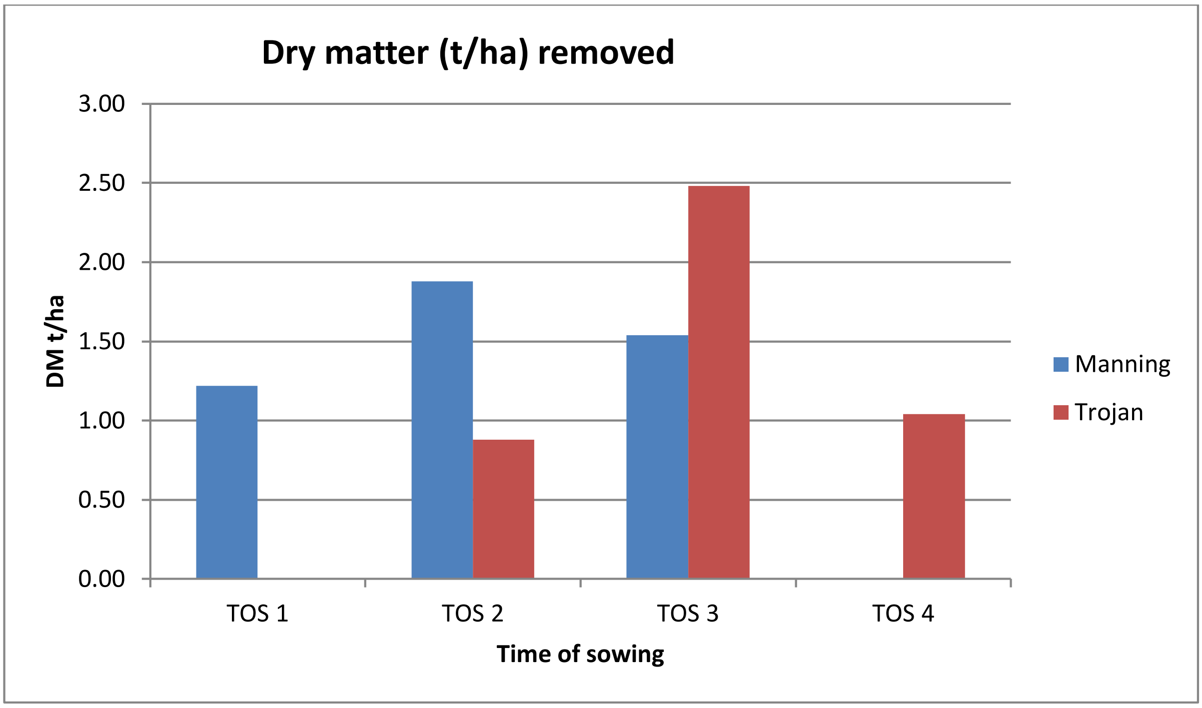

Figure 5.

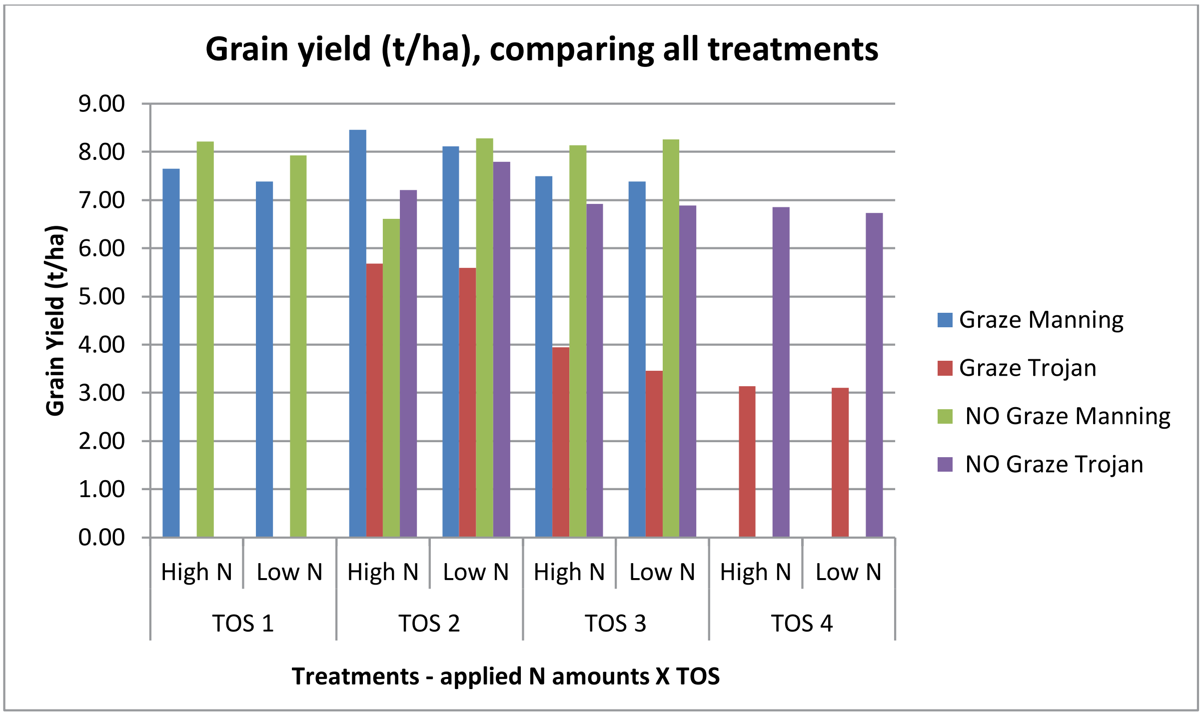

Figure 5.

The highest yielding treatment in the trial was Manning X TOS 2 X grazed X High N (8.46 t/ha + 1.88 DM t/ha) and the lowest was Trojan X TOS 4 X grazed X Low N (3.10 t/ha + 1.04 DM t/ha)

There were no yield penalties for grazing Manning. Manning treatments that were grazed increased in yield with high nitrogen compared to low nitrogen application rates.

Trojan suffered a yield penalty when grazed. The high DM removal at TOS 3 resulted in low yields, but TOS 4 yields were even lower. When grazing crops, need to ensure you are within the "safe" range; ie. well before GS30-31. The 'safe' window for spring cereals is a lot tighter than winter cereals, and it is therefore though that TOS 3 and TOS 4 grazings may have actually been too late in the season, and that some of the developing grain spikelets may have been removed by the grazing process, not allowing Trojan to express its full yield potential.

At the same TOS Manning out-yielded Trojan at both grazed and un-grazed treatments.

Wheat Key Lessons

- Utilise the tools and knowledge accessible on GRDC website and available 'rule of thumb' guidelines
- Sow the correct variety at the correct time to maximize recovery time
- Be prepared to sow early
- Don't graze down to growing point – ensure you are grazing within the "safe" range
- Lock up before stem elongation (growth stage 30)
- Grower needs to consider how the timing of DM availability can best be utilised in livestock program

2016 Trial

The trials will be repeated at Bool Lagoon in 2016. The different grazing intensities for canola will be removed, allowing a graze vs no graze at all times of sowing.

ACKNOWLEDGMENTS

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