"Canopy Management Trial 2012"

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Key Outcomes:

- Time of Sowing (TOS) 1 yielded the same as TOS 2 and both were higher than TOS 3
- Protein was low for all treatments, but higher than average proteins were produced with later applications of nitrogen
- Maximum yield in the trial (6.9 t/ha) was achieved at less than 10.5% protein

Trial Objectives: To determine optimum management strategies for wheat based on time of sowing

Trial Duration: 2012

Location: Navan **Farmer Co-operators**: Pat & Mary Connell

Soil Type: Black Cracking Clay

Paddock History: 2010 Wheat
2011 Oats Hay

Monthly Rainfall:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
18	11	55	16	42.5	76.5	38	46.5	29	21.5	4.5	10

Yield Limiting Factors: Dry Spring

Type of Trial: Replicated small plot trial

Trial Design: Randomised Complete Block Design

Treatments:

The canopy management trial consisted of the following treatments:

Time of Sowing x 3 – TOS 1 (28/4/2012), TOS 2 (17/5/2012) & TOS 3 (6/6/2012)

Varieties x 4 – Phantom, Mace, Scout & SUN 521C

Sowing Densities x 4 – 50, 100, 200 and 300 seeds/m2

Nitrogen Applications x 4 – Nil N, 50N Seeding, 100N Seeding and 100N GS 31

All plots were sown with 80 kg/ha triple superphosphate, with nitrogen being applied as urea. All plots were harvested using a small plot harvester, with sub-samples kept for protein analysis.

Results:

Table 1: Variety Yield x All TOS, MNHRZ 2012

	Mace	Phantom	Scout	SUN 513C
TOS 1	5813.3	5603.0	5592.6	4507.3
TOS 2	6061.1	5324.8	4954.4	4338.6
TOS 3	5278.0	4953.1	5534.0	5365.9
	LSD (P=0.05) - 272.1			

Figure 1: Variety Yield x Nitrogen application, TOS 1, MNHRZ, 2012

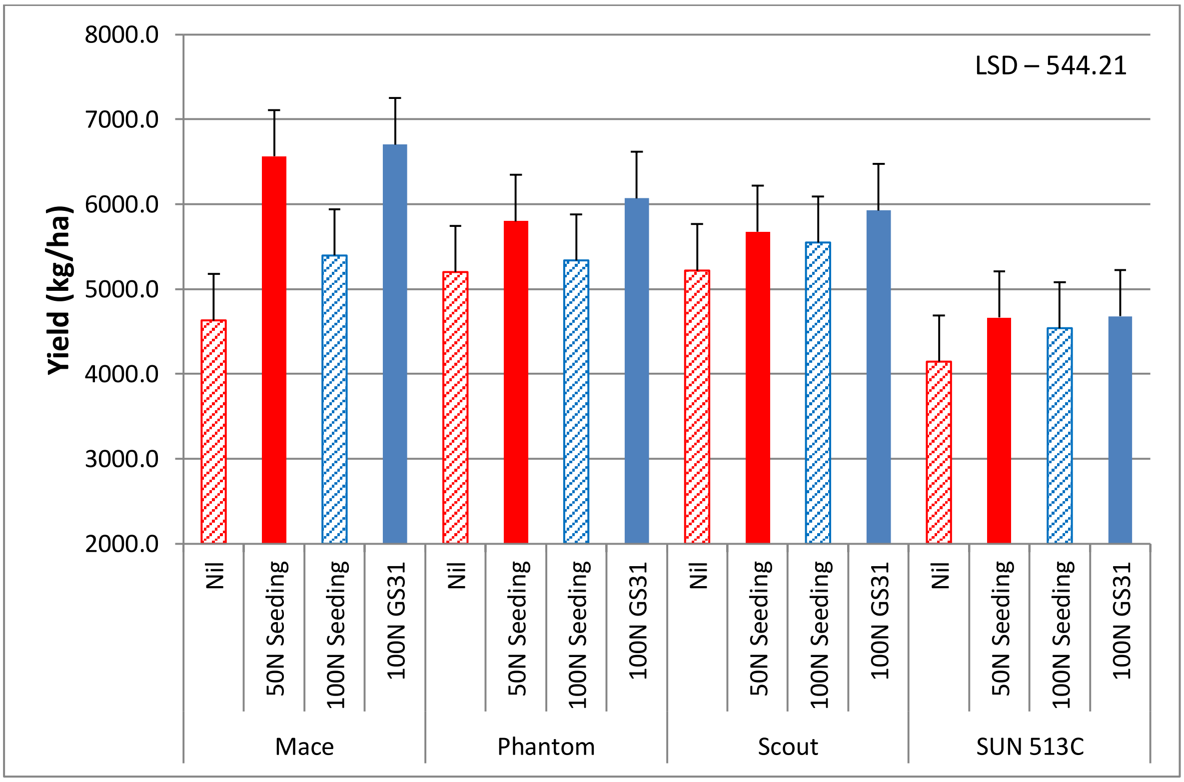

Figure 2: Variety Yield x Nitrogen application, TOS 2, MNHRZ, 2012

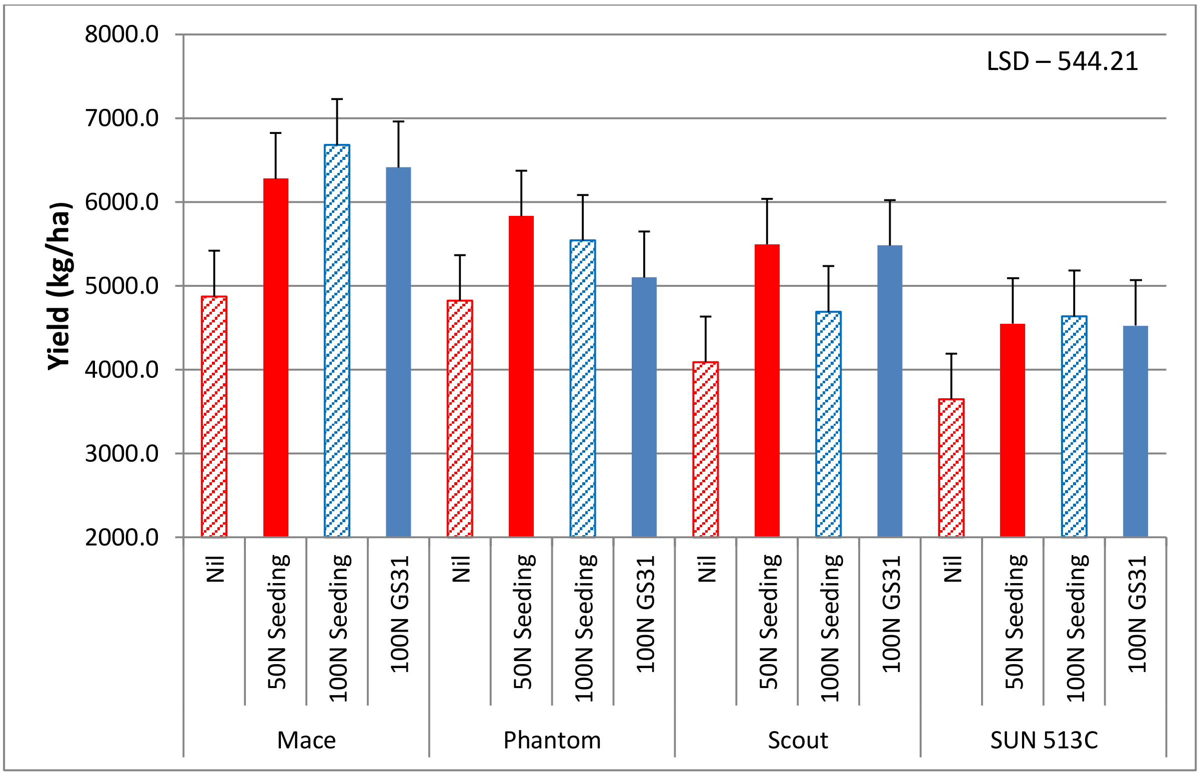

Figure 3: Variety Yield x Nitrogen application, TOS 3, MNHRZ, 2012

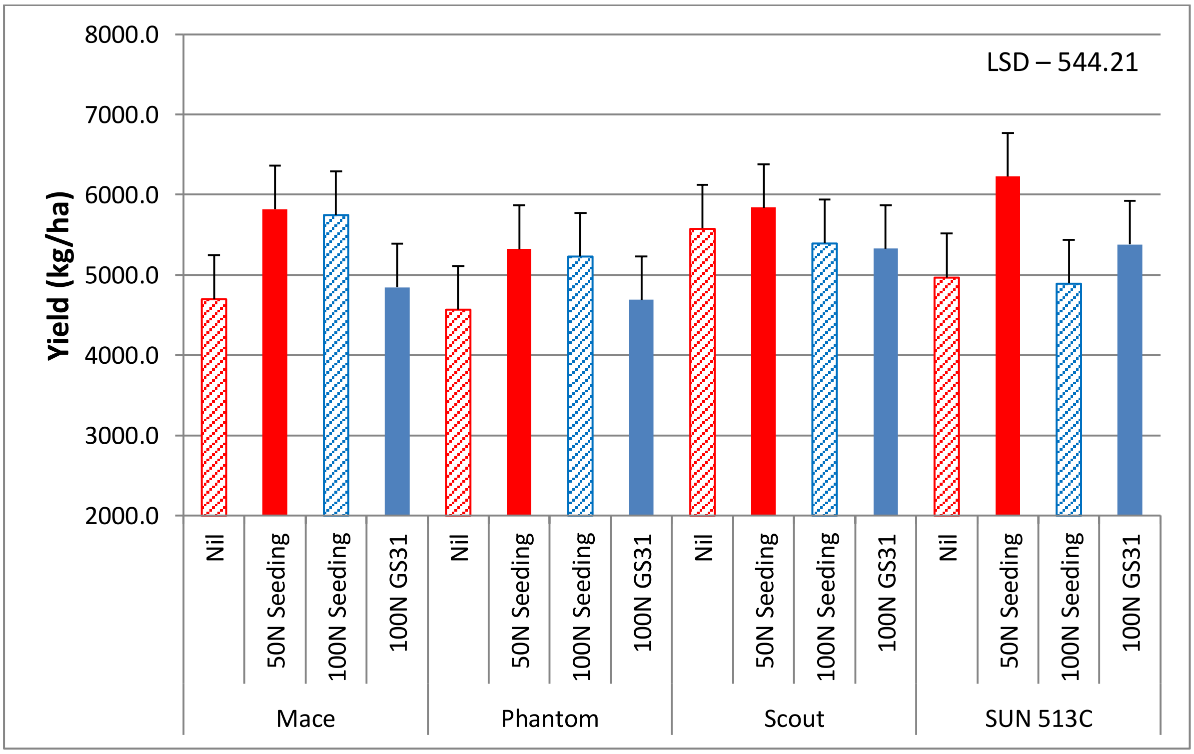

Table 2: Variety Protein x Nitrogen application, All TOS, MNHRZ 2012

		TOS 1	TOS 2	TOS 3
Mace	Nil	4.1	4.8	5.2
	50N Seeding	6.8	6.7	7.0
	100N Seeding	5.1	7.7	8.9
	100N GS31	7.7	8.4	7.9
Phantom	Nil	5.9	6.3	7.1
	50N Seeding	6.1	7.6	8.4
	100N Seeding	6.8	9.1	10.8
	100N GS31	8.5	7.6	8.7
Scout	Nil	5.4	5.4	7.1
	50N Seeding	5.7	6.7	8.4
	100N Seeding	5.6	9.3	10.4
	100N GS31	8.7	9.8	9.0
SUN 513C	Nil	7.2	6.8	8.1
	50N Seeding	8.0	8.7	9.8
	100N Seeding	8.5	11.7	11.4
	100N GS31	11.5	10.2	9.3
	LSD (P=0.05)		*0.96*	

Comments:

Time of Sowing

From the results in **Table 1**, there was a large difference in varietal yields based on time of sowing. All varieties performed well at TOS 1, except SUN 513C, which, being a late season winter wheat, was surprising given it had ample time to develop and fill grain from this sowing date. Scout and Phantom achieved their highest average yields at this time of sowing.

At TOS 2, Mace produced the highest yield in the trial averaging a little over 6 t/ha, which was an excellent result considering the poor spring. Phantom, Scout and SUN 513C produced yields that were slightly lower than TOS 1, but still significantly different.

TOS 3 resulted in Mace and Phantom producing significantly lower yields than all other times of sowing, whereas SUN 513C produced significantly higher yields. This may be

attributed to late rains coinciding with grain fill in this variety. The yield of Scout at TOS3 was equal to the first time of sowing, indicating a degree of flexibility of this variety.
Whilst sowing in early May did not always result in the highest yields, it certainly provides the crop ample opportunity to fill grain, especially in a dry year. The later times of sowing are more likely to produce plants prone to terminal moisture stress and high temperatures during grain filling.

Protein levels in this trial were extremely low. It could be a result of several factors. The spring of 2012, despite being dry was extremely mild. Low temperatures during grain fill favour carbohydrate deposition in the grain at the cost of protein. Additionally, the very dry conditions resulted in no mineralisation in spring and soil moisture being extracted from depth where there was very little mineral nitrogen. Nitrogen rates (despite protein levels less than 10.5% in most cases) were deemed adequate for maximum yield, as plots that received 200 kg/ha of nitrogen yielded less than those with 100 kg/ha N applied, and produced protein around 8%!

Nitrogen Management

When sown early, all varieties (other than SUN 513C) appear to have achieved their highest yields when nitrogen application was delayed until GS 31 (although not significant in some cases). This is the result of the rapid early growth of tops and roots. This increased biomass can result in increased water use and potential for haying off in spring. Adding nitrogen at seeding accelerates this early biomass production, resulting in more tillers and leaf area, not all of which contribute to grain yield. A tactic used to delay biomass accumulation when wheat is sown early is to reduce seeding rates. Longer vegetative periods allow the development of more leaves prior to the reproductive stages of the crop. More leaves equals more ear bearing tillers are produced. Although not significant in this trial, previous results from the MNHRZ trial site suggest seeding rates as low as 50 seeds/m^2 can achieve optimal yields when sown early.

The same varieties when sown at TOS 2 did not appear to favour any particular nitrogen application rate or timing. Provided nitrogen was adequate, high yields were able to be achieved as this time of sowing provided the ideal amount of time for the roots to reach maximum depth for maximum water use, but not grow too much unproductive bulk in the process. The exception to this was Scout which appeared to produce significantly lower yields where nitrogen was applied at seeding. This may suggest that Scout may suffer adversely from high amounts of vegetative growth prior to the reproductive phase of growth and grain filling.

TOS 3 saw the yields of GS 31 applied nitrogen treatments suffer considerably when compared to seeding applications. When sown late, wheat has a much shorter duration of tillering prior to stem elongation. It also results in slower root growth, which may in turn lead to poor utilisation of moisture stored deeper in the profile. Applying nitrogen early in the season (and increasing seeding rates) are excellent ways of compensating for this lack of vegetative production and root growth. Highest yields for TOS3 in this trial were often achieved with 50 kg/ha N at as the yield potential was significantly less due to moisture stress.

Acknowledgements

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