TIMING IS EVERYTHING: THE PENALTY FOR SOWING WHEAT LATE IN 2013

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TAKE HOME MESSAGES

- Sowing early increased yields by 0.5t/ha at Watchupga East and Horsham.
- Corack and Mace topped the yields at Watchupga East.
- Cobra and Mace were the highest yielding varieties at Horsham.

KEY WORDS

Late break, Mallee, optimal sowing time, phenology, time of sowing, varieties, wheat, Wimmera.

BACKGROUND

In recent seasons, late breaks have occurred, with small rainfall in March and significant rains not occurring until late May. As a result, growers have sown large proportions of their crops dry in an effort to achieve optimal sowing time. This has been risky and crop establishment has been patchy, particularly in 2013 when there was no stored soil water.

Sowing early can be advantageous, especially in years with dry finishes. It also minimises seasonal risks, such as heat shock during grain filling. Sowing at the optimum time is important, but identifying that optimum time for each variety can be difficult, as can choosing the optimum varieties to sow. Selecting varieties based on their maturity length is a valuable risk management strategy. On many farms growers choose varieties which flower at different times, thereby reducing some of the frost risk associated with early sowing.

It should be noted that because of the late start to the 2013 season, there was no germination of volunteer cereals and weeds until after the crops were sown.

These wheat variety trials were sown in response to members' questions about sowing time, with the aim of optimising production whilst minimising risk of crop failure.

AIM

To compare new and existing wheat varieties and their suitability in the Mallee and Wimmera, either sown dry or after the break.

METHOD

Time of sowing (TOS) by wheat variety trials were established at Watchupga East and Horsham. Table 1 outlines the trial details, applications and treatments. At the Horsham site wheat was grown in 2012 and canola in 2011. The Horsham trial incorporated three Clearfield varieties randomised throughout the trial.

The Watchupga East site had wheat in 2012 and barley in 2011. This trial included five Clearfield wheat varieties sown at both TOS next to the variety trial. Each trial was replicated four times and managed to maximise yield (e.g. weed and disease free). Nitrogen applications were based on crop requirements determined by soil testing and Yield Prophet® reports. Crop biomass was assessed using normalised difference vegetative index (NDVI) at GS49 and GS65 with a hand-held GreenSeeker® crop sensor. Grain yield was measured with a plot harvester and grain analysis (protein, moisture, test weight and screenings) were completed on all grain samples.

Table1. Trial details, applications and treatments in the Watchupga East and Horsham TOS trials.

Location	Watchupga East		Horsham	
Soil type	sandy clay loam		grey cracking clay	
Replicates	four		four	
Trial design	split plot design		split plot design	
Treatments	21 varieties x two TOS		20 varieties x two TOS	
Sowing date				
Early	23/4	emerged following rain on 24 May	8/5	emerged following rain on 22 May
Late	18/6		18/6	
Varieties	Early: Axe, Dart, Emu Rock, Early-mid: Corack, Cobra, Lincoln, Mace, Shield, Spitfire, Wallup Mid: Scout, Elmore CL Plus, Grenade CL Plus, Kord CL Plus, Justica CL Plus, Clf STL Mid-late: Trojan, Magenta, Phantom, Yitpi Late: Lancer		Early: Axe, Dart, Emu Rock Early-mid: Cobra, Corack, Lincoln, Shield, Mace, Wallup Mid: Derrimut, Elmore CL Plus, Gladius, Grenade CL plus, Kord CL plus, Scout Mid-late: Magenta, Phantom, Trojan, Yitpi Late: Lancer	
Target plant density	130 plants/m^2		130 plants/m^2	
Fertiliser (per ha)	**23/4 + 18/6**	Granulock Supreme Z + Impact @ 50kg	**8/5 + 18/6**	Granulock Supreme Z + Impact @ 50kg
	23/4 + 18/6	Urea @ 50kg deep-banded	**8/5 + 18/6**	Urea @ 50kg spread pre-sowing
	9/7	Urea @ 90kg over TOS 1 and 2	**2/7**	Urea @ 90kg over TOS 1
	22/8	Urea @ 90kg over TOS 1 and 2	**14/8**	Urea @ 90kg over TOS 1 and 2
			3/9	Urea @ 90kg over TOS 2

Location	Watchupga East		Horsham	
Herbicides (per ha)	23/4 + 18/6	TOS 1 and 2: Triflur X @ 1.5L + Weedmaster DUO® @ 2L	8/5 + 18/6	TOS 1 and 2: Triflur X @ 2L + Weedmaster DUO® @ 2L + Avadex® Xtra @ 2L
	8/7	Velocity @ 670mL + Lontrel Advanced @ 50mL + Hasten @ 1% over TOS 1	15/8	Velocity @ 670mL + MCPA LVE @ 333mL + Lontrel @ 170mL + Hasten @ 1% TOS 1 and 2.
	8/7	Midas @ 900mL TOS 1 Clearfield wheat	3/9	Velocity @ 670mL + Lontrel @ 170mL + Hasten @ 1% TOS 1 and 2.
	2/9	Velocity @ 670mL + Lontrel™ Advanced @ 50ml + Hasten @ 1% over TOS 2		
	5/9	Midas @ 900mL TOS 2 Clearfield wheat		
Insecticides (per ha)	23/9	Alpha Duo @ 200mL over all wheat	30/9	Alpha Duo @ 300mL over all wheat
Baiting			Mouse off – five applications in season across the site	
Fungicides (per/ha)	4/10	Prosaro @ 300mL	11/9	Prosaro @ 300mL
Seeding equipment	BCG Gason parallelogram cone seeder (knife points, press wheels, 30cm row spacing)		BCG cone seeder (knife points, press wheels, 30cm row spacing)	
Harvested	25/11	TOS 1	16/12	TOS 1 and 2
	3/12	TOS 2		

RESULTS AND INTERPRETATION

Last season the Wimmera and Mallee experienced very little summer rainfall which, coupled with a late break, provided no opportunity for the early sown treatments to germinate. Both sites were sown dry and, being low in nitrogen (N), urea was applied at sowing. Rainfall for the 2013 growing season at Watchupga East achieved a Decile 4, (Table 2). Horsham had a dry start to the year but above average growing season rainfall (GSR).

Table 2. Watchupga East and Horsham rainfall (mm) for 2013 and long-term rainfall average (1874–2012).

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	GSR
Watchupga East	0	26	7	8	18	59	31	33	48	22	220
Average	**22**	**23**	**23**	**23**	**36**	**34**	**35**	**37**	**37**	**35**	**238**
Horsham	0.2	29	5	14	21	78	65	57	71	35	341
Average	**24**	**25**	**23**	**31**	**46**	**49**	**47**	**49**	**46**	**44**	**310**

Watchupga East: time of sowing

Emergence was even across the site; TOS 1 emerged four weeks after sowing following rain in late May, thus achieving the target plant density. A lack of summer rain resulted in volunteer wheat

germinating at the same time as the early sown wheat. TOS 1 yielded 0.6t/ha higher than TOS 2 (P<0.001, LSD=0.1t/ha, CV10.4%) showing the value of dry sowing. The seven highest yielding varieties from TOS 1 and their respective yields from TOS 2 are presented in Table 3. Mace and Corack had the highest average gross income ($/ha) based on their yield and grain quality. High yielding APW varieties can be just as profitable as hard varieties; this was particularly the case with Corack. It had a gross income of $896/ha for TOS1 and $722/ha for TOS2 (Table 3).

Table 3. Watchupga East grain yield (t/ha) and average gross income for the seven highest yielding varieties.

Variety	TOS 1 yield (t/ha)	TOS 2 yield (t/ha)	Grain price ($/t)	Average gross income TOS 1 ($/ha)	Average gross income TOS 2 ($/ha)
Corack (APW)	3.6	2.9	249	896	722
Mace (AH)	3.4	2.7	270	918	729
Shield (AH)	3.2	2.5	270	864	675
Cobra (AH)	3.2	2.3	270	864	621
Scout (AH)	3.2	2.4	270	864	648
Magenta (APW)	3.1	2.3	249	772	573
Yitpi (AH)	3.0	2.5	270	810	675
Average*	3.0	2.4			
Sig. diff.	P<0.001	P<0.001			
LSD (P=0.05)	0.3	0.3			
CV%	5.6	9.5			

*This average is calculated for all varieties in the trial.

Watchupga East: varieties

Corack and Mace were the top yielding varieties at TOS 1, closely followed by Shield, Cobra, Scout, Magenta and Yitpi (Figure 1). Yitpi was a solid performer, but yielded slightly lower than the top seven varieties. Throughout the season it was noticeable that Yitpi was slow to mature. It stayed greener for longer than the other varieties. If the season had experienced a drier finish, Yitpi may have incurred a greater penalty than the early varieties. No significant interactions were observed between TOS and variety, which means that, despite differences occurring between varieties, they all suffered a penalty from delayed sowing.

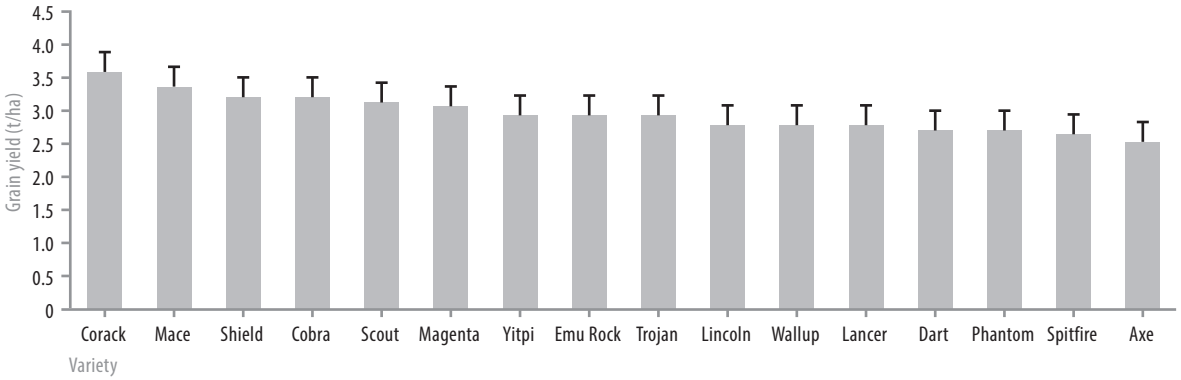

Figure 1. Watchupga East mean grain yield (t/ha) of each variety for TOS 1. Variety: P<0.001, LSD=0.3t/ha, CV5.6%

Grain quality analysis showed a difference in grain protein between the varieties and also for TOS. The later time of sowing had a higher protein than the early time of sowing. All varieties in TOS 2 had protein sufficiently high to achieve H1. However, in TOS 1, no varieties achieved H1 (due to protein).

This was probably due to higher yields with bigger grain causing yield dilution of protein. Test weight was 82.8kg/hL for TOS1, higher than TOS 2 (77.3kg/hL) (P<0.001, LSD=0.5, CV1.7%). There was an effect of variety on grain protein in TOS1 with Yitpi and Phantom, Dart, Mace, Emu Rock and Lincoln having the highest protein. Many of the varieties in TOS 1 reached protein levels lower than 11%, possibly indicating that the site was N limited. Test weights and screenings of all varieties met H1 standards. Mace performed quite well in TOS 2, as did Corack, indicating they are favorably adapted to later sowing (Figure 2) as well the earlier TOS.

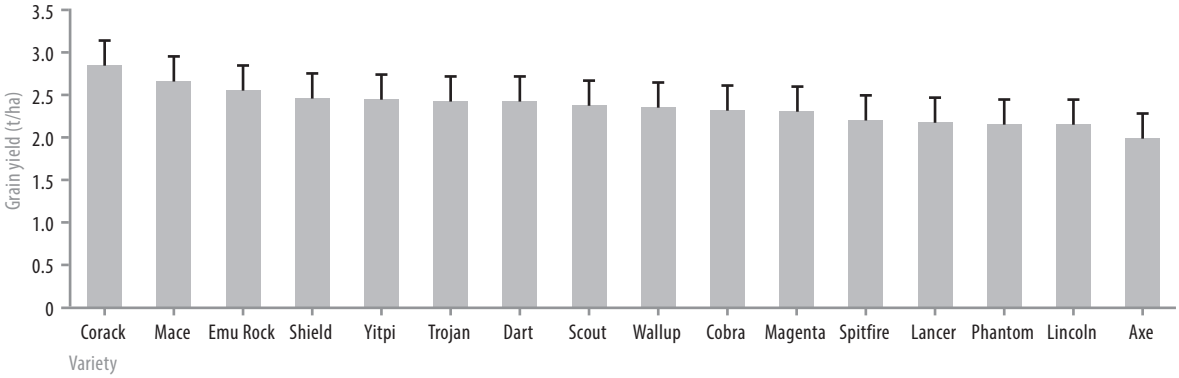

Figure 2. Watchupga East mean grain yield (t/ha) of each variety for TOS 2.
Variety: P<0.001, LSD=0.3t/ha, CV9.5%

Clearfield wheat varieties

Early sowing of Clearfield wheat varieties increased yield by 0.4t/ha compared with later sowing (Table 4). The five varieties grown were: CLF STL, Elmore CL Plus, Grenade CL Plus, Kord CL Plus and Justica CL Plus. No variety yielded higher than any other; any increased yield benefit came from early sowing.

Table 4. Mean grain yield (t/ha) for the early and late TOS in the Clearfield varieties at Watchupga East.

Time of sowing	Yield (t/ha)
TOS 1 (April)	2.3
TOS 2 (June)	1.9
Sig. diff.	P<0.001
LSD	0.1
CV%	8.1

Horsham: time of sowing

Following 5mm of rain, the early sown crop emerged within 14 days. TOS 2 crops were sown into a wet seed bed. The Horsham site received good rain for the month of June with 77mm recorded. This, together with the 88mm of plant available water at the start of the season, meant the paddock was well set up for the remainder of the year. The site was baited five times during the season to control high mice populations. During this period there was some loss of plant numbers. There was a yield increase of 0.6t/ha from sowing early (Table 5). When TOS 2 was sown, TOS 1 was at the 3-leaf stage. Cobra sown early had the highest average gross income ($/ha). Mace sown later had a similar gross income as Mace sown early (Table 5).

Table 5. Horsham mean grain yield (t/ha) for the five top yielding varieties sown at two different times.

Variety	TOS 1 (t/ha)	TOS 2 (t/ha)	Wheat ($/t)	Average gross income TOS 1 ($/ha)	Average gross income TOS 2 ($/ha)
Cobra (AH)	5.7	5.1	270	1,539	1,377
Scout (AH)	5.4	4.6	270	1,458	1,242
Trojan (APW)	5.1	4.7	250	1,275	1,175
Derrimut (AH)	5.1	4.5	270	1,377	1,215
Mace (AH)	4.7	5	270	1,269	1,350
Sig. diff. var x TOS	P<0.001				
LSD (P=0.05) var x TOS	0.3				
CV%	4.10				

Horsham: varieties

Cobra and Scout were the highest yielding varieties for the early TOS (Figure 3). Derrimut and Corack were closely behind and were similar to Scout and Trojan in yield. There was an interaction between variety and TOS; Mace sown later was equal in yield to the early sown Derrimut and Trojan. In TOS 2 Mace and Cobra were no different from each other, also yielding well when sown earlier, indicating they are well adapted to the environment as they have a longer sowing window.

Grain quality results showed no difference between proteins and test weights of the varieties grown at Horsham. There was a difference between the TOS treatments with the later sown treatment having a higher grain protein percent, probably due to TOS 2 yielding less. It was a similar story at Watchupga East with the earlier TOS treatments recording higher test weights then their later sown counterparts. That said, all varieties met H1 specification.

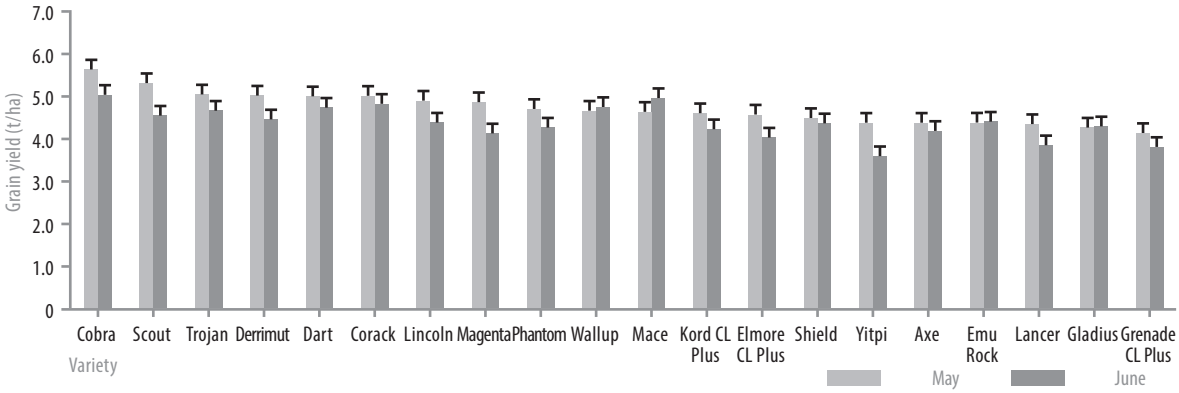

Figure 3. Horsham mean grain yield (t/ha) for the early (May) and late (June) TOS. Variety x TOS: P<0.001, LSD=0.3t/ha, CV4.1%

Yield penalty in 2013 from late sowing

There was some yield penalty associated with the later than optimum TOS for the majority of varieties. At the Horsham site, the mid and the mid-late maturing groups suffered the highest yield penalty. When sown late, short season varieties performed better than early-mid and mid varieties.

At the Watchupga East site, there was a yield penalty for later sowing amongst all maturity groups. TOS, rather than maturity groups, was the main driver of yield loss.

COMMERCIAL PRACTICE

The benefits associated with sowing wheat on time are substantial. However, shorter season varieties are more suited to both early and later sowing, in which yield penalty from delayed sowing is not as great (e.g. Mace).

Previous work by BCG has shown in the majority of years, early sowing pays off. In a season with a dry spring it is crucial to sow on time. In 2013, despite problems with volunteer wheat, the increased yield benefits from sowing on time compensated. The penalty involved with later sowing is much greater than the penalty involved with patchy and delayed establishment.

The best way for a grower to maximise returns is by choosing varieties based on maturity length and sow accordingly.

Rather than selecting the highest yielding variety from a single trial for your region, select the most consistent performers; that is, those varieties that have yielded well over the past few seasons. It is more beneficial for growers to select varieties based on long-term results rather than selecting the winner from the previous season.

ACKNOWLEDGMENTS

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