Growing long season wheats on the south-coast of WA

KEY POINTS

- Early autumn rainfall provides an opportunity to establish crops much earlier than currently practiced in the southern high rainfall zone (HRZ) of WA.
- Winter wheats can be sown from early to late April depending on soil moisture conditions.
- Early sown winter wheats can provide valuable grazing opportunities for mixed farmers in the southern HRZ of WA, with minimal yield penalties.
- Winter wheats have much less risk from frost damage when sown earlier compared to spring type varieties due to their vernalisation requirements.
- Stirlings to Coast Farmers research has shown that winter wheats (E.g. Illabo and DS Bennett) can grow equivalent yields to mid and fast maturing wheats (E.g. Trojan and Sceptre) sown late April onwards.

FIGURE 1: Photo of the second time of sowing at the Kendenup plot trial in 2018. The photo was taken on August 15, 2018.

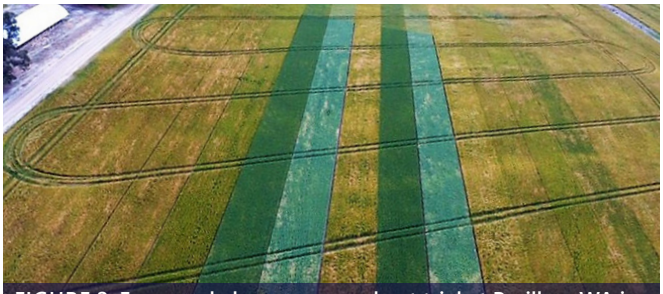

FIGURE 2: Farm-scale long season wheat trial at Perillup, WA in 2017. This was the highest yielding farm-scale trial grown in the project between 2016-2018. Seeding date was April 27

Introduction

When selecting a variety and sowing time combination, the intention is to match plant development with seasonal pattern and most importantly to get the crop to flower during the optimal period for yield. The optimal flowering period is a trade-off between increasing drought and heat, and declining frost risk. There is no 'perfect' time to flower where these risks are nil, only an optimal time when risks are minimised and yield potential maximised. Winter rainfall in southern WA is declining, and season breaking rains are inconsistent. Despite winter rainfall declining, southern growers, often get opportunities to sow early through summer and early autumn rainfall events.

Winter wheat has a vernalisation requirement, which means the plant needs a certain period of cold temperatures before they will develop past tillering. At early sowing dates, flowering time will be more consistent in a winter wheat compared to a spring wheat variety. When spring wheat, such as Sceptre, is sown early, it flowers early, which means it has a high risk of frost damage. Winter wheat sown in late March will not flower much later than when planted in April. SCF secured funding through the Royalties for Regions, Agricultural Innovation Fund, to investigate if winter wheat could provide benefits to cropping systems in the southern high rainfall zone of WA.

Winter wheat extends the sowing window until much earlier in the growing season compared to the narrow sowing window for traditional spring varieties. When growers seed earlier, if conditions allow, more crops are going to be planted within their optimal sowing window, which means whole-farm crop yields will increase. SCF conducted a combination of small plot trials, with two times of sowing, and broad-scale farmer trials between 2016-18. The research was conducted on a range of wheat maturities from slow winter types (DS Bennett) to fast spring types, like Sceptre. Trials covered a range of seeding times, which enabled SCF to explore which maturity types suited the environment on the south coast of WA.

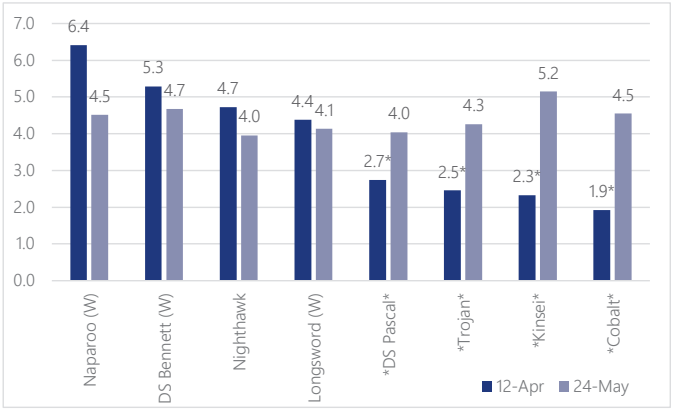

FIGURE 3: Small plot yields for the 2018 long season wheat trial located at Kendenup, WA. The first time of sowing (TOS) was April 12, and required 13mm of irrigation to ensure germination. The second TOS was May 10, 2018. (W) indicates a winter-type maturity. *Variety* Indicates yield reduction due to frost

TABLE 1: Summary of grain yields from the broad-scale long-season wheat trials in 2018. Sites encountered a range of environmental conditions, including frosts. (W) indicates a winter type wheat variety. NB: Cobalt (4.3d ▲) at Perillup suffered Kangaroo damage reducing yield and DS Pascal (1.3b) suffered frost damage.

Location	Perillup	Kojaneerup	West Kendenup	South Stirlings
Sowing date	April 27	May 4	Mya 9	April 12
GS Rainfall	414mm	221mm	362mm	256mm
ADV.0008 (W)	6.7ab			3.4a
Cobalt	4.3d▲	3.6b	4.6b	
DS Bennett (W)	7.3a	3.3bc		3.3a
DS Pascal	5.5bc	3.2c	3.7d	1.3b*
Kinsei	5.8bc		4.3bc	
Longsword (W)	5.1cd	3.3bc	4.2c	3.3a
Trojan		2.7d	4.3bc	
Plant Barley		4.8a	6.1a	

TABLE 2: Summary of small plot trial data for Stirlings to Coast Farmers long-season wheat project between 2016-18. Displays average yields for the winter and spring type wheats over two different sowing dates. *2.84* Indicates frost damage reduced yields in the first time of sowing

Year	Variety	TOS 1	TOS 2	Seeding Date	Location
2016	Winter	6.87	5.79	TOS 1- 28 April	Kendenup
2016	Spring	6.97	6.02	TOS 2- 26 May	Kendenup
2017	Winter	5.29	4.86	TOS 1- 20 April	Manypeaks
2017	Spring	5.23	5.46	TOS 2- 10 May	Manypeaks
2018	Winter	5.36	4.44	TOS 1- April 12	Kendenup
2018	Spring	*2.84*	4.39	TOS 2- May 24	Kendenup

Discussion

- Winter wheat yields were comparable or better than spring wheat when sown early (April 12,20 and 28th) in our research.
- Winter wheat yields were significantly higher than average spring wheat yields when sown on April 12, 2018. The yield difference was likely due to frost events damaging spring wheat yields, while not affecting the winter varieties.
- Sowing earlier only resulted in higher yields in 1/3 years for spring varieties. The first sowing date in 2017, was April 28, which is not much earlier than standard grower practice in southern WA.
- Sowing earlier resulted in higher yields for winter wheat in all three seasons (2016-18).
- Our limited data from sowing earlier than April 12 suggests there can be a penalty from seeding winter wheat too early. Critical factors to consider are variety season length and soil moisture.

Conclusion

- SCF research shows winter wheat can be sown earlier without the risk of frost damage yet still yield competitively with spring wheat sown at their standard time. Sowing earlier provides an opportunity to spread the seeding window out, which means planting more hectares in the ideal sowing window.
  Planting more hectares in the optimum seeding window will increase whole-farm yields and profits.
- In 2018, we experienced multiple frost events at the Kendenup plot site, and this showed the value of seeding winter wheat early (April 12) compared to spring varieties. Winter wheat has a stable flowering time regardless of the sowing date because they require vernalisation (cold period) before they develop beyond tillering.
- Winter wheat is an opportunity crop to take advantage of early soil moisture. Even in perfect conditions, winter wheat is not likely to exceed a grower's total spring wheat program.

Key terms

- **WINTER WHEAT:** Winter wheat requires a vernalisation period for them to progress beyond the tillering phase. For example, DS Bennett, Naparoo, Longsword
- **VERNALISATION:** Induction of the plant's flowering process due to prolonged exposure to cold temperatures.
- **SPRING WHEAT:** Wheat that does not require vernalisation which means it can be sown in the autumn so it can flower in spring—for example, Mace, Sceptre, Trojan, DS Pascal.
- **PHOTOPERIOD:** This refers to the time that a plant is exposed to light in 24 hours.
- **OPTIMAL FLOWERING TIME:** Defined as the time that minimises the combined risk of frost, drought and heat stress and therefore maximises grain yield.

Tips for growing winter wheats

1. Ensure there is adequate soil moisture for even germination. Ideally, moisture to last until the autumn seasonal break.
2. SCF research indicates the ideal sowing time for long-season wheat varieties in southern WA is April 7-21.
3. Sow into a paddock with a low weed burden because ryegrass will germinate too late to be controlled in the knockdown.
4. In paddocks with grass weed pressure, use pre-emergent herbicides that have longer residual control on ryegrass (E.g. Sakura).
5. When planning to graze, growers should seed a minimum of 100kg/ha to maximise early-season biomass for feed.
6. Apply nitrogen after grazing to maximise the re-growth of the crop.

TABLE 3: Examples of wheat varieties and sowing windows on the south coast of Western Australia

	Winter wheats	Slow Maturing Spring Wheat	Mid-Maturing Spring Wheats	Fast-Maturing Spring Wheats
Sowing Window	*Mid-March - Mid April*	*Mid-April- Late April*	*Late April- Mid May*	*Mid May onwards*
Variety Examples	Accroc	Beaufort	Kinsei	Corack
	DS Bennett	DS Pascal	Magenta	Mace
	Longsword	Nighthawk	Rockstar	Sceptre
	Naparoo		Trojan	
	Revenue		Yitpi	

This project was made possible through the support of the Department of Primary Industries and Regional Development's Grower Group Development Fund

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA