SAGIT Research Summary

AAC114: Assessing the adaptation of long season wheats in South Australia

IN A NUTSHELL

There is potential to sow long season wheat varieties in many environments in South Australia in response to early season rainfall events. Main season, spring wheats can produce lower yield when sown early. Frost during stem elongation and the reproductive period is one risk when maturity of commercial cultivars is brought forward by early sowing. Grain quality and yield need to be considered equally to ensure profitability of early and very early sowing.

FAST FACTS

THE DATES:
Start: March 2014
Finish: March 2016

PROJECT PARTICIPANTS: Agrilink Agricultural Consultants – Jeff Braun and Mick Faulkner; Agbyte – Leighton Wilksch.

THE PROBLEM:
The trial investigated long season wheats to determine their yield potential, protein levels and profitability. This was to provide growers with alternatives to traditional varieties to enable them to spread their sowing program across a longer timeframe.

THE RESEARCH:
The two year project had sites at Paskeville and Riverton which encountered dry conditions and frost. These conditions are representative of the South Australian cropping environment so the results remain valid.

MORE INFORMATION:

Jeff Braun
Agrilink Agricultural Consultants
0409 094 934
jeffbraun@bigpond.com

BACKGROUND

The potential to sow long season wheat varieties to capitalise on early season rainfall, spread farm sowing programs and reduce exposure to frost were the motivations behind this project. The maturity of currently grown wheat cultivars is largely driven by temperature accumulation with a smaller number being influenced by photoperiod and very few with vernalisation requirements. The ideal seeding date varies both seasonally and between cultivars but most well adapted wheat varieties have maximum yield when sown from very late April until mid-May. There is an opportunity in many seasons to sow from late March to late April but there has been limited success by simply sowing mainstream varieties in this time frame. Late spring and winter types have the maturity drivers to be sown early and still flower in an ideal window.

With two trial sites, one on Yorke Peninsula and the second in the Mid North, the researchers proved there were a number of longer season varieties adapted to early sowing even when terminal drought conditions ensued. The research however highlighted management issues that could be encountered when adopting early sowing including mouse damage and germination of self-sown cereals.

RESEARCH AIMS

The core objectives of the project were to determine:

- If the profitability of wheat in SA can be improved by sowing long season varieties early or very early when opportunities arises.
- If early and very early sowing could be adopted more widely and more frequently to increase production.
- If there are any varieties suited to early and very early sowing currently available that are adapted to SA's soil types and climate.
- If there is potential to improve whole farm profitability by early and very early sowing.

IN THE FIELD

Paskeville has an annual average rainfall of 400mm, and Riverton 525mm. Each site had two times of sowing: very early (28-31 March) and early (28-29 April). Varieties were selected based on their maturity groups (early, mid, late and very late maturity) and their phenological drivers (temperature, photoperiod and vernalisation). Varieties that performed poorly in 2014 in their respective maturity groups were replaced in 2015.

The following varieties were sown over the two years of the trial: Trojan, Mace, Cobra, Forrest, Chara, Beaufort, Osprey, Rosella, Eaglehawk, Gazelle, Estoc, Yitpi, Kiora, Revenue, Naparoo, Lancer, Bolac, Wylah, Whistler, DS Pascal, DS 11.9419, DS 08.0169, Cutlass, LPB11-0032, RAC 2341, VO 7041-39 and Wedgetail.

Each variety was treated with imidacloprid seed dressing to avoid barley yellow dwarf virus. All varieties were sown at 100 seeds/m2 and with 80kg/ha MAP. Nitrogen was applied to all plots at a rate sufficient to prevent nitrogen becoming a limiting factor in the experiment.

RESULTS

The yield varied both between and within sites. Both sites had highly significant variety by time of sowing effects in both years. Yield, protein, simple economics and phenology data were recorded at both sites to determine the project objectives.

Paskeville:

At TOS1, 2014, yields of Beaufort, Bolac, Gazelle, Lancer, Trojan and Yitpi were significantly higher than the other varieties tested. The generally well adapted variety Mace, matured too early at this time of seeding resulting in poor yields. At TOS 2, 2014, Trojan and Yitpi yields were significantly higher. Both varieties have greater photoperiod responsive developmental triggers which allows them to delay development and flower at the optimum time when sown at this time of sowing.

In 2015, Paskeville experienced one of its driest years on record resulting in generally low yields. At TOS 1, 2015, highest yields were achieved by the longer season spring wheats Beaufort, DS 08.0169 and Chara. In TOS 2, 2015, Trojan, Estoc and Lancer were highest yielding varieties. Protein was generally lower at the first time of sowing than the second, as a result of filling grain under more favourable conditions earlier in the season.

Riverton:

At TOS 1, 2014, yields were highly variable, mainly because of frost events in August and September. At TOS 2, 2014, well adapted, early-mid and mid-maturing varieties Cobra, Mace and Trojan produced highest yields. Beaufort, Wedgetail, Rosella and Whistler also produced yields in excess of 5.5t/ha.

At TOS 1, 2105, yield at Riverton was again highly variable due to frosts in June, July and September. Yields varied from 2.5-6.5t/ha. Generally, the early-mid maturing varieties performed poorly this time of seeding as they matured too early and were frosted. At TOS 2, 2015, Trojan, Cobra, Mace and Estoc produced the highest yields. At Riverton, the protein was very high at TOS 1, 2014, for varieties that suffered yield loss due to frost. Varieties that yielded well had significantly lower grain protein levels. The protein of varieties sown at TOS 1, 2015, were highly variable, ranging from 9.6-17.7%.

VALUE FOR GROWERS

Key findings in this project have been:

- Many longer season varieties are well adapted to SA's climate and soil types, often producing yields when sown very early similar to or exceeding those of main season wheat varieties sown later.
- The opportunity exists to advance seeding by up to six weeks in 50 to 75% of years across a range of environments by utilising long season varieties with the correct developmental triggers.
- Profitability of growers can be improved by sowing long season wheats early, especially in large seeding programs where a main season variety cannot all be sown in the ideal seeding window. Similarly, in areas with frost risk that would not normally be sown early and areas that may experience waterlogging, having varieties that can be sown early without maturing too early present good value.
- Choosing varieties that are able to be delivered as a minimum ASW grade ensures that profitability per hectare is optimised.
- Very early sowing, before mid-April, requires varieties with sufficient developmental "holds" to allow flowering in the appropriate window for optimal yield.

SAGIT 25 YEARS 1991-2016

Harvest at the time of sowing trial site in Paskeville in 2014 (above) and Paskeville site manager Agbyte's Leet Wilksch with SAGIT Project Manager Malcolm Buckby, Trustee Max Young and Scientific Officer Allan Mayfield in spring 2015