

Optimising profitability of high rainfall zone farming systems

Optimising profitability of high rainfall zone farming systems-survey, grower-scale demonstration trials and field days – 2022 Trial results

Hosts: Slade Family (Mount Barker), Hilder Family (Frankland River), Thomson Family (South Stirling), and Walter Family (Gairdner).

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KEY MESSAGES:

- Four nitrogen trials were sown in 2022, two into wheat and two into canola and each included treatments that increased in-season nitrogen fertiliser by between 25 and 50%. One trial also increased starter fertiliser by 50%.
- The results for all trials showed no conclusive, significant advantage (yield or protein) to increased nitrogen applications with the exception of a 1% protein increase at the Gairdner site.
- Lack of response is possibly a result of nitrogen leaching due to above average rainfall that fell consistently throughout the season in 2022.
- Farmer survey data associated with the project shows that regardless of the 2022 trial results, farmers have lifted nitrogen application on average by 20 kg/ha for wheat between 2019 and 2022.

Background

This project commenced in 2019 with the aim of reducing the gap between actual and potential yields in wheat and canola in the high rainfall zone of WA. It was estimated at that time that the potential yield for wheat was in the range of 6-12 t/ha and 3-5t/ha for canola. However, at the commencement of this project (2019), current crop yields were only about 50% of these potentials at 2.7t/ha for cereals and 1.4t/ha canola (Robertson et al. 2016).

This investment aimed to contribute to the broader GRDC HRZ investment outcome that seeks to affect change so that by 2023, growers have increased the value of the cropping phase in the HRZ farming

system by 10% through addressing both crop yield potential and the gap between potential and realised yield.

Methodology/Treatments

In 2022, four nitrogen nutrition demonstration trials were sown to either wheat or canola. The trials were located in Mount Barker, Frankland River, South Stirling and Gairdner. The trials aimed to determine if nitrogen was a limiting factor to production. NDVI (Trimble GreenSeeker), plant tissue N%, harvest yield and grain protein % were recorded for all treatments (except grain protein in canola).



Results

Gairdner Trial Results

The wheat grain yield results for the Gairdner trial site showed that the standard grower practice (control) yielded slightly higher (0.17-2.1 t/ha), indicating that for the 2022 season there was no yield gain for increasing the in-season N applied (Figure 1). There was a grain protein gain of approximately 1% in the two treatments where additional in-season N was applied (Figure 1). There was not, however, a significant grain protein advantage in applying more than 25% additional in-season N for 2022.

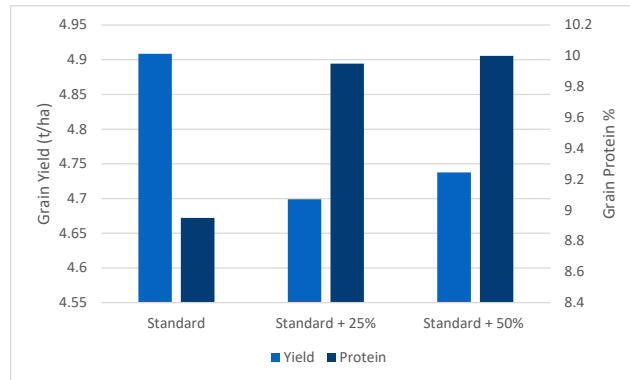


Figure 1: Average Gairdner trial site wheat grain yields and grain protein for each treatment, 2022.

Frankland River

For the Frankland River trial, yield results showed a 0.28 t/ha and 0.32 t/ha advantage for 25% and 50% of additional in-season N applied, respectively (Figure 2). Grain protein was only very marginally higher in the additional N treatments.

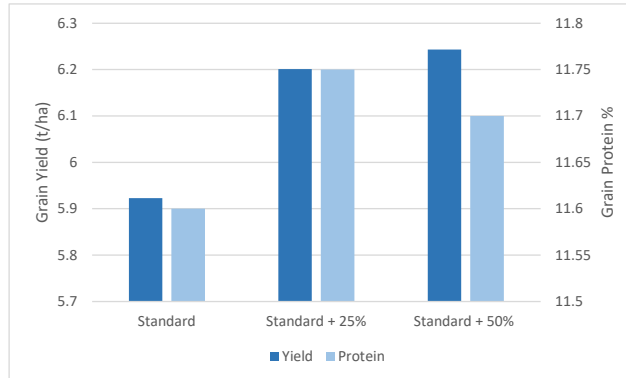


Figure 2: Average Frankland River trial site wheat grain yields and grain protein for each treatment, 2022.

South Stirling Trial Results

The canola yield results for the South Stirling trial site indicate that additional fertiliser, either starter, in-season, or both, did not result in a significant yield advantage for the 2022 season (Figure 3).

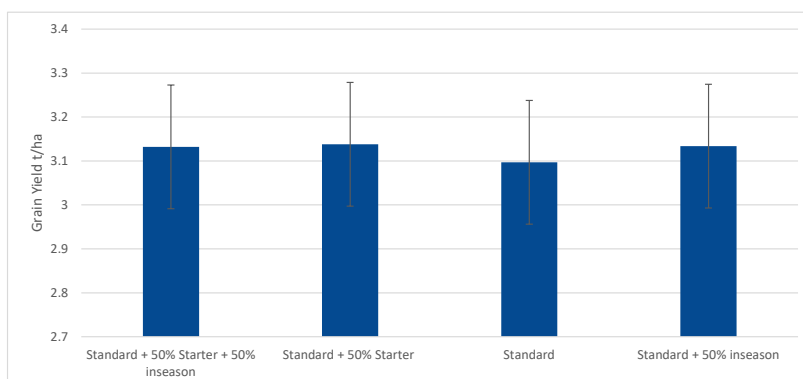


Figure 3: Average South Stirling trial site canola grain yields for each treatment, 2022.

Mount Barker Trial Results

The Mount Barker trial canola yield results show only a 0.15 t/ha yield advantage for the additional 50% (on top of standard grower practice) of in-season N applied for 2022 (Figure 4).

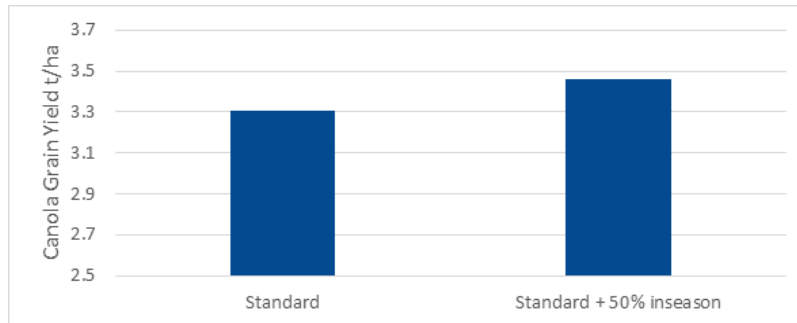


Figure 4: Average Mount Barker trial site canola grain yields for each treatment, 2022.

Discussion

The results showed no conclusive or significant advantage (yield or protein) to increased N applications, apart from protein at the Gairdner site. It should be noted that 2022 was an above average year and two factors may have been at play. The good root growth may have resulted in more existing soil N being scavenged from deeper in the soil profile in the control treatments, effectively equaling the additional N treatments. Or, due to consistent rainfall and some transient waterlogging, N applied may have leached from the profile before uptake by the plants (not giving the expected advantage).

The 2022 trials certainly don't make clear an optimal nitrogen strategy for growers in the high rainfall zone of the region. Given it is unlikely that N can be banked in the sandy soils typical to the southern region of WA, it also shows that the simple (but expensive) solution of additional N is not the sole driver of grain yield.

This is further complicated by the abundance of low protein wheat that is produced in the WA high rainfall zone. The 2022 trial at Gairdner showed no crop yield response to the additional fertiliser, however, there was a slight grain protein response. For this trial, the grain protein levels were still quite low across all three treatments, suggesting the paddock was under fertilised. Again, this could be potentially driven by nitrogen losses in season occurring before the applied fertiliser can be fully utilised. It is clear that nitrogen, whilst being critical to crop production within the high rainfall zone, is not the sole driver of canola and wheat yields.

The project survey results show that growers are increasing their nitrogen rates regardless, and anecdotal evidence from the region suggests that where yield potential is high and crops are looking good, growers have more confidence to push nitrogen rates up to as high as 200 kg/ha in wheat (Hyper yielding awards paddock data).

The full final technical report that collates all the data for this project can be found on the Stirlings to Coast Website: www.scfarmers.org.au/hrz-projects

Acknowledgments

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