

Mid-row banding of Nitrogen to improve nitrogen use efficiency and reduce fertiliser applications in cropping systems.

Trial Hosts: Slade & Curwen Families

Key Messages

- Higher wheat yields were achieved for some treatments that included mid-row banding (MRB) of Nitrogen (N) at South Stirlings, but not in the Kendenup trial.
- At South Stirlings, the combination of MRB applications of N yielded significantly higher than the other treatments.
- MRB of N at both seeding and tillering yielded significantly less at South Stirlings than either combination of MRB and top dressed N applications.
- The two highest yielding treatments at South Stirlings, which included MRB and top-dressing of N, had greater N efficiency because they yielded more grain from the same applied N units (109.5).

Background

Research indicates only 42% of the Nitrogen (N) fertiliser applied is utilised by the crop with the remaining leached, volatilised or washed away. Mid-row banding (MRB) of N at seeding and tillering reduces the contact that N has with the atmosphere leading to reduced volatilisation and a reduced likelihood of rainfall runoff washing it away before it can be utilised. Benefits from MRB include the same or higher yields from less nitrogen being applied, improved nitrogen use efficiency and reduced soil acidification rates.

Method

Two trial sites were setup in 2020, a small plot trial in South Stirlings and a broadacre site at Kendenup. Seeding was completed with the help of Direct Seeding and Harvest and MRB and top-dressing of N was completed with the help of CSBP. Mid-row banding at seeding was completed by using the seeder to place urea in rows then seeding between those rows. Top-dressing at seeding was done by spreading urea over the plots. The MRB at tillering was done with CSBP's trial machine with Flexi-N streamed behind a disc and top-dressing Flexi-N was done with streaming nozzles on a hand boom.

Table 1: Treatments applied at Kendenup

Treatment	At Seeding (8/6/20)
1	Mid-row Banded Urea (125kg/ha)
2	Top Dressed Urea (125kg/ha)

Table 2: Treatments applied at South Stirling

Treatment	At Seeding (8/6/20)	At Tillering (29/7/20)
1	Mid-row Banded Urea (125kg/ha)	Mid-row Banded Flexi-N (100L/ha)
2	Mid-row Banded Urea (125kg/ha)	Top Dressed Flexi-N (100L/ha)
3	Top Dressed Urea (125kg/ha)	Mid-row Banded Flexi-N (100L/ha)
4	Top Dressed Urea (125kg/ha)	Top Dressed Flexi-N (100L/ha)
5	Nil Urea	Mid-row Banded Flexi-N (100L/ha)
6	Nil Urea	Top Dressed Flexi-N (100L/ha)



Results

South Stirlings

All treatments yielded significantly greater than the farmer control of nil urea at seeding and top-dressed flexi-N at tillering. The combinations of a top-dressing (TD) and a mid-row banding (MRB) were statistically equivalent to each other but significantly greater than all other treatments. There was a 340 kg increase from MRB at tillering when nil urea was applied at seeding and a 440kg increase from MRB at tillering when previously top-dressed at seeding. However, there was a 360kg decrease from MRB at tillering when MRB was also done at seeding.

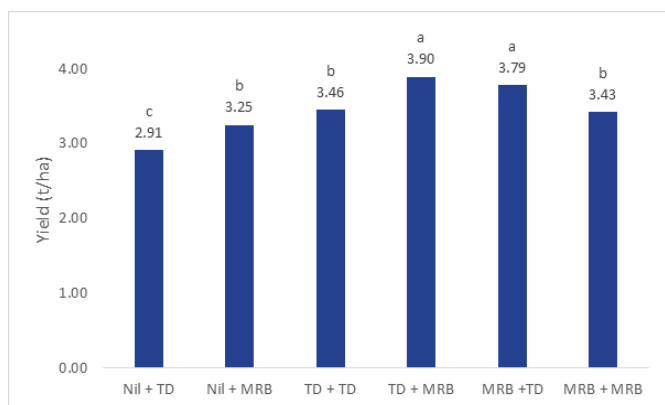


Figure 1. Average grain yields for 2020 at South Stirlings. Columns with different letters on top are significantly different from others.

There were no significant differences in grain protein levels at South Stirlings for the treatments that recieved the same units (109.5) of N. The two treatments that recieved zero urea at seeding had lower protein than the other four treatments. This is expected given they only got a total of 52 N units compared to 109.5.

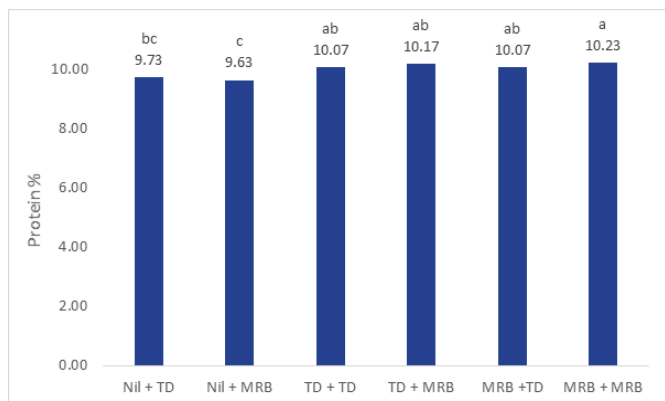


Figure 2. Average Protein % for 2020 at South Stirlings. Columns with different letters on top are significantly different from others.

Kendenup

At the Kendenup site there were no significant differences between MRB or top dressing at seeding time (19/06/20) for grain yield or protein. The late time of sowing likely reduced the yield potential further than expected and N was not a limiting factor.

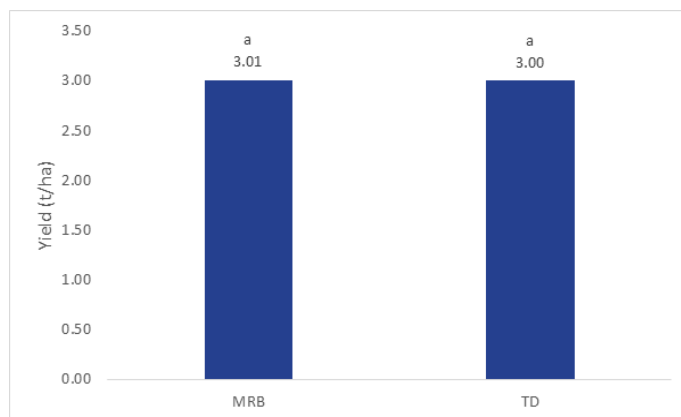


Figure 3. Average grain yield for 2020 at Kendenup. Columns with different letters on top are significantly different from others.

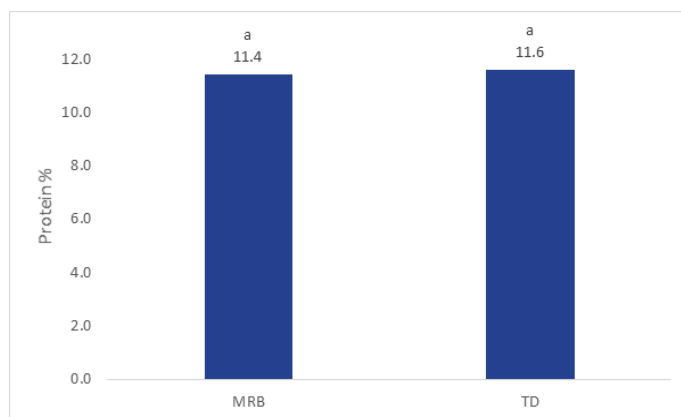


Figure 4. Average protein % for 2020 at Kendenup. Columns with different letters on top are significantly different from others.