Crop establishment with single versus paired row seeding systems

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Key messages

- Paired row seeding systems increased crop emergence compared to single row seeding systems
- Actual seed depth varied significantly compared to target seeding depth for all brands of seeding equipment

Background

Timely sowing and crop emergence are large determinants of grain yield in the West Midlands region, with early emerged crops generally leading to higher yields. Dry seeding conditions and small rainfall events (<10mm) during seeding often lead to the soil not becoming fully wet, and crop emergence being extremely variable. While the use of single row seeding boots has been popular and well understood among growers, it is unclear what impact paired row seeding has on the timely emergence of crops over a range of soil types and seasons. The aim of this study was to evaluate the emergence of crops using paired and single row seeding across the main soil types in the West Midlands region.

This is a two-year project (2018-19) and the results are presented for the 2019 season. A later break to the 2019 season occurred on the 7th June with an average of 19 mm across all sites, with all sites being dry sown prior to this date to either wheat, barley, or lupin. Two different types of seeders were evaluated: an Ausplow DBS, and a 1820 John Deere Airhoe drill, and each had a combination of single and paired row boots fitted to achieve a similar target seeding depth across the bar. Seed depth and plant establishment were assessed 14 days following the season break. Each comparison of single and paired row seeding at each site had the same seed and fertiliser application rate, with application rates varying between soil types and sites. A total of 11 sites and 6 soil types were evaluated in this study for 2019.

Results

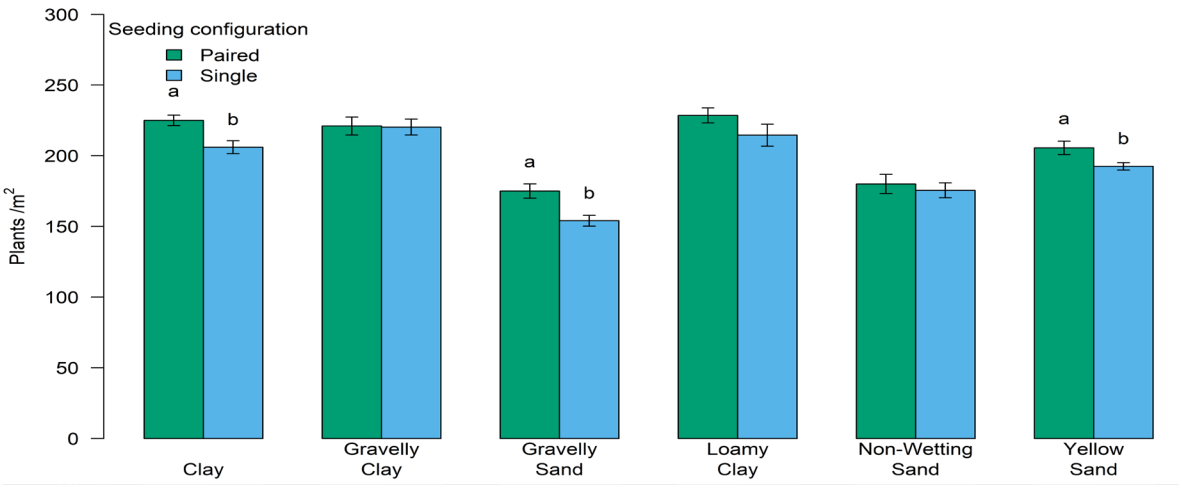

Figure 1: Cereal crop emergence for single and paired row seeding across a range of soil types evaluated in 2019. Error bars represent standard error of treatment mean; letters denote significant difference between seeding configuration for each soil type (P<0.05).

Crop emergence in the 2019 season was similar or increased when the paired row seeding were used in comparison to single row seeding (Figure 1). Depth of seeding was vastly different for all seeders in this study compared to the target seeding depth of 15 mm (Figure 2). The Ausplow DBS seeders tended to place seed deeper in the soil compared to the target seeding depth, while the John Deer Airhoe drill had very shallow seeding depth and with less variation. Trial locations for seeder B had an increased amount of wind erosion occur after seeding and this is likely to have increased seeding depth.

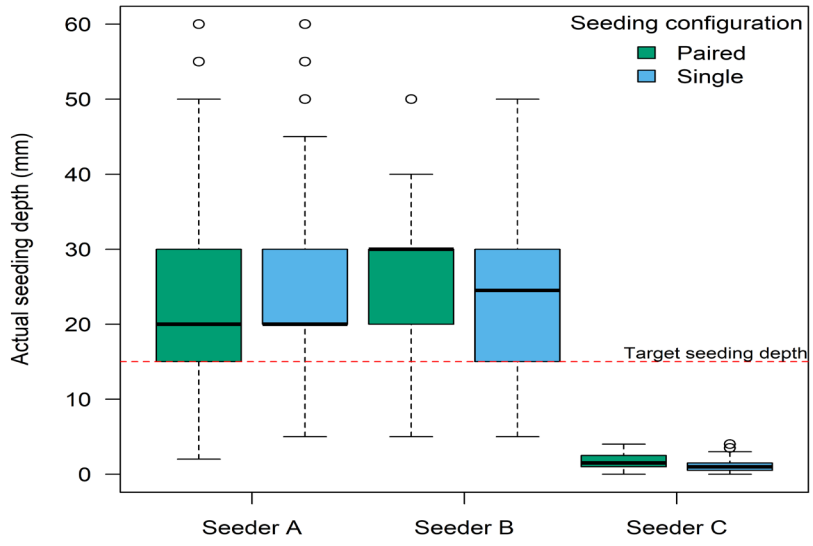

Figure 2: Actual seeding depth versus the target seeding depth of 15 mm for three seeder machines used in the 2018 and/or 2019 seasons. Seeder A and B are both DBS seeders but owned by different growers. Seeder C is a John Deere Airhoe drill. For each boxplot, the bold line indicates the median seeding depth, the coloured box indicates 50% of the data range, whiskers represent 95% of data range and dots represent outliers.

Discussion

Paired row seeding was able to achieve similar or increased crop emergence for nearly all soil types and crop varieties tested in 2018 and 2019 seasons. The only exception to this was the sandy-gravel soil type, where the single row seeding system was signifcantly better in 2018 (see report on WMG website). Plant establishment varied between 150 – 200 plants/m^2 for both seeding systems and was near to the optimum of 160-180 plants/m^2 for optimal establishment to achieve yield potential in this rainfall environment. Therefore, any difference between single and paired row seeding is not likely to affect yield potential and final grain yield (even though this was not measured in the study).

This study evaluated three seeders that had differing configurations of seed boot, press wheel, and seed closing plates. The variability in seeding depth achieved relative to the target seeding depth was significant, and in future this should be closely monitored by growers to ensure that seed is placed at the depth that it is intended. This is important when seeding into or on top of moisture, and for crop species sensitive to seed depth variability such as canola and lupin.

The full report can be found on the WMG website www.wmgroup.org.au

Acknowledgements

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