Novel Farming Systems – the first year

Ben Jones, Farming Systems Scientist, VIDA Walpeup, Mallee Research Station

Summary

Sowing date, uniform sowing depth and weed control are just as important to maintain yields in a wide row system as in conventional systems. The results in 2001 indicate that the wide-row system has potential at the yield levels typically achieved in the central-northern Mallee.

Introduction

The novel farming systems project had its first year of trials in 2001 at the BCG Systems site. The aim of the project was to use machinery guidance to enable crops to be grown on wide row-spacings, with crops sown into the space between rows in the next year. In theory, the inter-row space provides a disease break (to allow increased cereal crop intensity without having fallows in a separate paddock) or a source of additional water and nutrients to improve the reliability of break crops. This year there was no previous crop and no rotation effects, just row-spacing, which gave some indication of the potential of the system. This year was also the first year's experience with wide-row sowing, inter-row spraying and fertilising – a steep learning curve for the project team.

Methods

Wheat, barley, triticale, lentils and canola were sown in conventional (25cm spacing, 5cm seed spread) and wide row (twin rows with 5cm seed spread, spaced at 12cm, with a 50cm inter-row between twin-row pairs) layouts in 18m x 55m plots, on 21/22 June. Inter-row weeds were controlled on 19 September with 1.0 l/ha glyphosate and 1.0 l/ha gramoxone. A good stand of regenerated medic pasture grew in the inter-row and was successfully controlled in all plots except some lentils, believed to be an interaction between gramoxone and inter-row shading.

Yields were calculated on yield maps of whole plots. A 'benchmark' of wide-row yield as a per cent of conventional yield for each cereal crop was calculated for plots in the same row (rep) at each site. All benchmarks were plotted on the same graph to indicate potential, rather than with the intention of establishing a relationship.

Results and Interpretation

Yield: Agronomy still applies

The conventional yields at Birchip were low (1.46 t/ha Yitpi wheat, 1.31 t/ha Sloop barley) because of late sowing. Wide-row yields were lower (0.99 t/ha Yitpi, 0.94 t/ha Sloop), a combination of late sowing, two weeks delayed emergence of the second row of each inter-row pair (sown shallow), and moisture use by inter-row medic. Lentil (~0.1 t/ha) and canola (~0.2 t/ha) yields in both systems were poor. The usual rules of agronomy apply to wide-row crops; with equipment now built, timing and depth control should be less of an issue in future years.

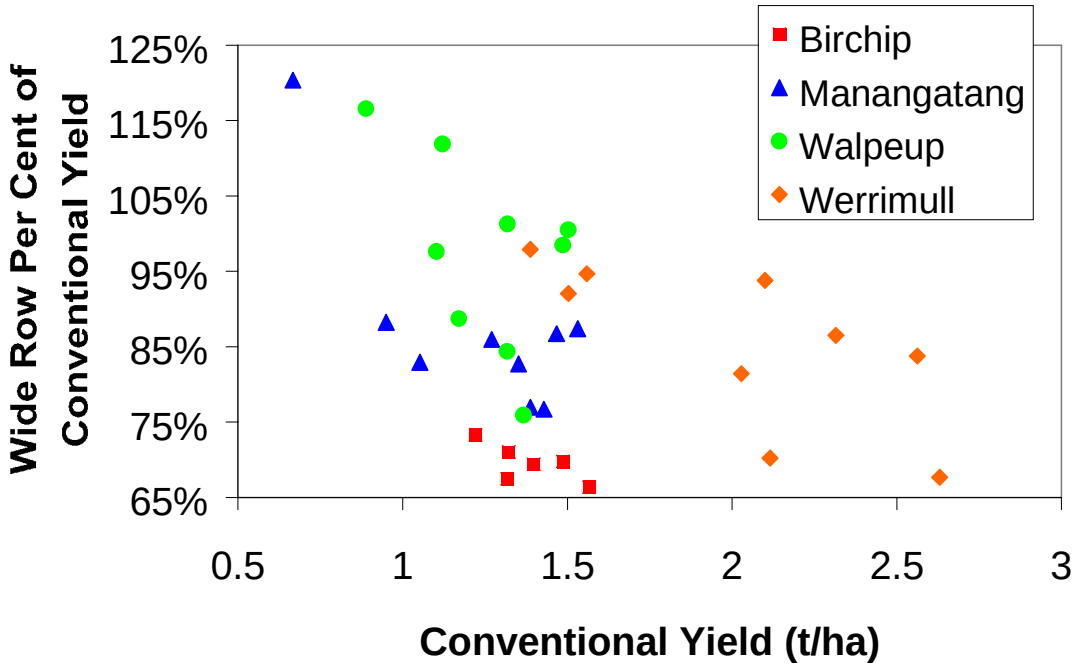
Wide-row yield potential

A benchmark of 70% of conventional yield was set for wide-row crops at the beginning of the project. The aim was to get at least 40% additional cropping gross income if the wide-row system was implemented on a farm currently working at less than 50% cropping intensity (ie. 2 x area x 70% yield). The benchmark was barely met at Birchip (68% wheat, 71% barley), but it was achieved by cereal crops at a range of yield levels at other sites in the project. It is important for the viability of the system that the benchmark be achievable at a wide range of yields, and preferably be exceeded!

Across all sites and crops in 2002, the maximum (potential) for the benchmark decreased with increasing yield (Figure 1), from over 100% below 1.2 t/ha, to 85% at 2.5 t/ha. The high benchmarks at low yield were achieved in areas of the experiment that were highly moisture stressed before flowering. In this case the wide-row plots were visibly less stressed.

The decrease in potential with yield may indicate a limit to the applicability of the system in higher rainfall areas. The many benchmarks over 70% were encouraging, and it is likely that in future years, with a better understanding of the system, these figures may be improved. The benchmark may also decrease as the management of conventional plots improves (eg. closer row-spacing) and rotational effects become evident in future years.

Figure 1. Wide row yield as a percentage of conventional yield at Birchip, Manangatang, Walpeup and Werrimull in 2002.



Working in the inter-row

This year spraying and drilling fertiliser were attempted between crop rows at a stage when crop growth was quite advanced (early stem elongation). These operations highlighted the importance of setting machinery up accurately for inter-row work. The wide-row seeder was set up quite accurately in the shed to drill fertiliser 6cm either side of the twin-rows. In the paddock, it was necessary to increase these tolerances to about 15cm to allow for errors in the seeder set-up, which had been done in the paddock at sowing. Quite a bit of wide-row wheat was excavated in the process, leading to a 0.2 t/ha yield penalty.

There was very little crop damage from the inter-row spray – the crop rows tended to 'steer' the spray shields. The shields were 45cm wide so there was some margin for error, but on some plots there were areas where a 10cm strip of weeds was left unsprayed next to the row. Eliminating errors in seeder set-up, or reducing the tolerance (50-45=5cm) built into the spray shields, may reduce this. The ultimate solution is a single tyne, paired row seeding set up, which will be implemented this year (2002).

Conclusion

The 2001 results indicate that the wide-row system has potential at yield levels achieved in the central and northern Mallee. The 2002 trials will trial the full system, with timely operations, inter-row stubble, and rotational effects.

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