

Demonstration of seeders for direct drilled crops in the Mallee.

This demonstration compared three direct drill seeders for wheat crop establishment; crop yield; and incorporation efficiency of group D herbicides.

Summary

- Three direct drill seeders were compared (Gason, Jenke, Daybreak) to sow wheat into a canola stubble.
- The season was very dry (decile 2) with an average wheat yield of 1.4t/ha in the demonstration.
- There were no differences in crop yield between the three seeders.
- The amount of soil throw (to protect group D herbicides from volatilisation) did vary between the three seeders. The Daybreak disc opener only had minimal soil throw which was probably not sufficient to protect the group D herbicides from volatilisation. The Gason and Jenke tyned implements had significantly more soil throw.
- The group D herbicides (Stomp, StompXtra, Triflur480 and Duet) had no discernible effect on brome grass.

Background

Direct drill cropping into stubble is gaining in popularity in the Mallee. There is a great deal of interest in how direct drill crops are performing and a major part of this concerns the seeder that is used to sow the crop. The type of opener and tyne spacing are critical when considering stubble handling; crop establishment and efficacy of group D herbicide incorporation. It is well accepted that for group D (ie trifluralin) herbicides to work they must be incorporated, or protected by a layer of soil, soon after application. If these herbicides are not protected they will volatilise and be lost. Opener set up and the speed at which the crop is sown has a large impact on how well the herbicide is protected from volatilisation.

In this demonstration we compared three seeders (two tyned implements – a Gason and a Jenke bar; and one disc implement – the Daybreak Disc Opener) – note the seeders were used as set up by the manufacturer and row spacings were different between the seeders. The crops were sown at two speeds. Assessments included crop establishment; efficacy of herbicide incorporation (assessed as the amount of soil throw between the rows) and final grain yield.

Methods

The machinery demonstration was located south-east of Hopetoun, on a Mallee sandy loam overlying a light clay. The paddock was in canola last year and there was 76% standing stubble cover (range 45 to 100% cover) at seeding.

Yitpi wheat was sown at 60kg/ha (150 seeds/m²) on May 12. The seeder comparisons were:

- (i) Gason bar set up with narrow points at 25cm (10 inch) spacing,
- (ii) Jenke bar with a narrow ripping tyne and an off set (2cm) floating narrow opener for seed delivery at 22cm (9 inch) and 35cm (14 inch) spacings, and
- (iii) Daybreak Disc Opener set up at 45cm spacing (18 inch)

The performance of each seeder was compared at 8 and 11 km/hr. For a full description plus photos of the seeder set up see the BCG web site (www.bcg.org.au and go to the Virtual Field Day).

The group D herbicides were applied immediately prior to seeding. The herbicides used were TriflurX at 1.5L/ha (trifluralin 480gai); Duet at 2.3L/ha (trifluralin 125gai and oryzalin 125gai); Stomp at 2.2L/ha (pendimethalin 330gai) and StompXtra at 1.6L/ha (pendimethalin 455gai). The incorporation of these herbicides was assessed by the amount of soil throw between the tynes/discs as the seeder moved through the stubble. The amount of soil throw was assessed by spray painting two square metres of soil/stubble immediately prior to the seeder passing and then assessing the amount of spray painted area covered and also the depth of soil cover.

The site was set up so that the herbicides were applied at right angles to the seeding direction (plot length 24m). Each seeder plot was at least 10m wide (depending on the width of the seeder). Treatments were not replicated, the site was a demonstration only.

Crop establishment and weed counts (primarily brome grass) were assessed during the season. The crops were harvested with a plot harvester in November 2004.

Results

(i) 2004 season

The 2004 started with dry soils as there had been no rain from late December 2003 to May 2004. The season continued to be dry at Hopetoun with only 137mm of growing season rainfall (1 April to 31 October) (a decile 2 season). The crops were sown early and got away to a good start, however by July (late tillering) the crop was water stressed. The lack of moisture imposed a severe stress on the crop from flowering to grain fill (October).

(ii) Seeder Performance

The comparison of seeder performance in relation to establishment and yield of Yitpi wheat is outlined in Table 1. The information provided is for the control (no herbicide) treatment plots.

Table 1. Three seeder types assessed by wheat establishment and grain yield.

Seeder	Type opener	Tyne spacings (cm)	Speed (km/hr)	Establishment (% sown)	Yield (t/ha)
Daybreak	disc	45	8	49	1.5
			11	61	1.2
Gason	tyne	25	8	47	1.5
			11	58	1.6
Jenke	tyne	22	8	83	1.3
			11	90	1.4
		35	8	107	1.5
			11	100	1.2

(iii) Herbicide incorporation

The amount of soil cover achieved (as soil throw) by the three seeders travelling at 2 speeds is presented in Table 2.

Table 2. Description of soil throw achieved by three seeders travelling at two speeds in a sandy loam soil.

Seeder	Row spacing cm	Speed km/hr	% inter-row with soil cover	Depth of soil in inter-row cm	Distribution of soil in inter-row
Daybreak	45	8	30	0.5	Inter-row with no cover 25cm, light cover close to seeding row, often only a sprinkle of soil
		11	50	0.5	Inter-row with no cover 15cm, slightly more soil cover compared to 8km/hr
Gason	25	8	60	1.0	Inter-row with no cover 5cm
		11	95	2.0	Rows covered – soil throw over the top of some rows (hence seed too deep)
Jenke	22	8	100	1.0	Total cover across inter-row
		11	100	1.5-2.0	Inter-row covered , no over throw on top of rows
	35	8	60	1.5	Inter-row with no cover 3cm. Similar disturbance compared to Gason at same speed
		11	80	1.5	Inter-row with no cover less than 2cm

(iv) Brome grass control

Brome grass control as achieved by the four different Group D herbicides (Stomp, StompXtra, Triflur480 and Duet) was assessed during the season. Brome grass was not distributed evenly across the site and large differences in numbers were found which could not be attributed to either herbicide or seeder effect. On average there were 55 plants of brome/m² present at the site (range 0 to 188 brome/m²).

Interpretation

In this very dry season the crops struggled to perform throughout the season. It was difficult to ascertain the impact of seeder performance in yield. The Gason and Daybreak seeders had lower seedling numbers compared to the Jenke bar, but the yields from all three seeders were comparable.

The amount of soil throw from each seeder was assessed to determine the likely coverage required to protect Group D herbicides from volatilisation and hence loss. The Gason and Jenke bar (25 and 22cm spacings) when travelling at 11km/hr achieved full inter-row coverage (full protection against herbicide loss); at reduced speed there was some inter-row which was not covered with soil. The Daybreak Disc Opener at 45cm spacings had very little soil disturbance and it would be expected that the cover was insufficient to protect the herbicides from volatilisation. The seeders were used as set up by the manufacturer – it was not possible to change row spacings. The demonstration showed that by increasing the sowing speed, more inter-row soil coverage to a greater soil depth was achieved. The Disc

Opener was still the least efficient with soil throw – even if it was used at a reduced row spacing it would be unlikely to have sufficient soil throw to protect group D herbicides from volatilisation (the Disc Opener only achieved 0.5cm soil depth in the inter-row and on a % coverage bases even at 25cm spacings it would not have achieved full inter-row coverage).

There was no evidence that the Group D herbicides used in this demonstration (Stomp, StompXtra, Triflur480 and Duet) had any activity on brome grass. Brome grass numbers were very variable across the site but there were no clear trends in control (average number of brome across the site was 55 plants/m²).

Commercial Practice

The three seeders (Gason, Jenke, Daybreak) used in this demonstration had no problem in handling the standing canola stubble at the site. There were no blockages with any of the seeders.

The three seeders varied in the amount of soil throw between and over the row. At a particular speed the disc opener (Daybreak at 45cm spacing) had minimal soil throw, whereas the Gason and Jenke bars had more soil throw (also with a narrower row spacings). At the higher speed (8 to 11km/hr) the amount of soil throw between and over the rows increased significantly. The Gason and Jenke bars had acceptable soil throw over the inter-row to protect Group D herbicides from volatilisation.

A Daybreak disc opener exerts a side force on the soil when in operation and therefore requires additional horse power than a comparative width zero till tyned seeder.

Based on experience in this demonstration the Group D herbicides (Stomp, StompXtra, Triflur480 and Duet) should not be relied on for consistent brome grass control.

For a full description of the site plus photos of the demonstration see the BCG web site (www.bcg.org.au and go to the Virtual Field Day).