Brome grass seed retention declines over harvest

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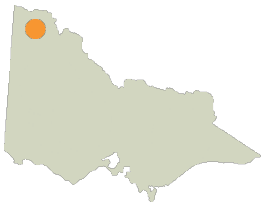

Why was the trial done?

In recent years brome grass has proliferated as a weed in Mallee farming systems, because of lack of effective herbicides for its control in cereals, intensification of cropping systems, especially wheat on wheat, and early seeding made possible by the adoption of conservation tillage. The purpose of this experiment was to quantify how much brome grass seed was retained on plants at different times of harvest. This information is required to develop effective harvest weed seed control (HWSC) strategies using tools such as chaff carts, narrow windrow burning and seed destruction systems.

How was the trial done?

The experiment was located at Ouyen, Victoria, in a Hindmarsh barley field with a significant brome grass (*Bromus diandrus*) population. The experiment involved measuring brome grass seed retention on three occasions, when barley was mature and ready for harvest and 14 and 28 days later (7 November, 21 November, 5 December 2014). On each harvest date the number of brome grass seeds above 15 cm from the soil surface (Above harvest height), 0-15 cm from the soil surface (Below harvest height), and seed on the soil surface (On ground) was measured. These measurements were then used to determine the potential effectiveness of HWSC tactics across the harvest period.

Key Messages

- On average for the three harvest dates there were 12 brome grass plants per m^2, over 1000 brome grass seeds per m^2 and 88 seeds per brome plant.
- The proportion of brome grass seed retained above the 15 cm harvest height was 59%, 38%, and 30% for the measurements on 7 November, 21 November and 5 December 2014 respectively.
- Harvesting the crop on these dates, combined with HWSC would potentially result in 41%, 62% and 70% of brome grass seed being added to the seed bank, and possibly more if seeds above 15 cm were dislodged in the harvesting operation.
- These measurements indicate insufficient brome grass seed is retained above harvest height, especially with later harvests, to expect control techniques such as seed carts and seed destructors to be effective on their own. However, when used as part of an integrated weed management program, these techniques will undoubtedly assist in achieving brome grass control.
- Research is continuing with MSF and the University of Adelaide to evaluate the effectiveness of a range of brome grass control approaches.

Background

As noted on the previous page, effective brome grass (*Bromus diandrus*) control in Mallee farming systems is an increasing concern, especially if Group B herbicide resistance becomes widespread. As part of the GRDC project "Maintaining profitable farming systems with retained stubble in the Mallee" and the Mallee CMA "Sustainable Brome grass management for no-till farming in the Central Mallee project", the department is working in collaboration with MSF and the University of Adelaide to fill knowledge gaps that can be used to develop an integrated weed management program for brome grass in the Mallee.

About the trial

The experiment was located at Ouyen, Victoria, in a Hindmarsh barley field with a significant brome grass (*Bromus diandrus*) population. The experiment involved using a commercial grain harvester with or without HWSC at three times of harvest (7 November, 21 November, 5 December 2014), with the six treatments replicated in four blocks. Plots were 320 m by one harvester width (12.2 m). Prior to each harvest, samples were collected from within four quadrats (0.5 m x 0.6 m) located in areas with visually similar brome density within and across replicates. Within each quadrat, brome grass plants were counted and then three samples were collected per quadrat being careful not to dislodge brome seeds: plant material above 15 cm from the soil surface (Above harvest height); plant material 0-15 cm from the soil surface (Below harvest height); and seed on the soil surface collected by vacuum cleaner (On ground). The number of brome grass seeds in the three samples were counted. Additional measurements were made at harvest that are not completed yet and measurements will be made in 2015 to assess the effectiveness of HWSC.

Results

In the quadrat samples measured on the three harvest dates there were (Mean ± SE) 11.6 ± 1.1 brome grass plants per m^2, 1019 ± 216 brome grass seeds per m^2 and 88 ± 7.9 seeds per brome plant. The proportion of brome grass seed retained on plants above 15 cm was greatest at barley maturity, and significantly lower at subsequent harvest dates (Table 1 and Figure 1). The proportion of brome grass seed that would escape HWSC (below 15 cm and on the soil) was least at the first harvest date (41%) and increased at later dates.

Table 1 Percent (±SE) of brome grass seed retained on plants and on the soil before each harvest

		Percent brome grass seed		
Harvest date	**Days after barley maturity**	**Above harvest height (>15 cm)**	**Below harvest height (<15 cm)**	**On soil**
7 November	0	58.5±5.4	7.8±2.1	33.7±4.7
21 November	14	38.4±4.9	6.6±3.3	54.6±5.4
5 December	28	29.9±3.4	4.8±1.7	65.3±4.1

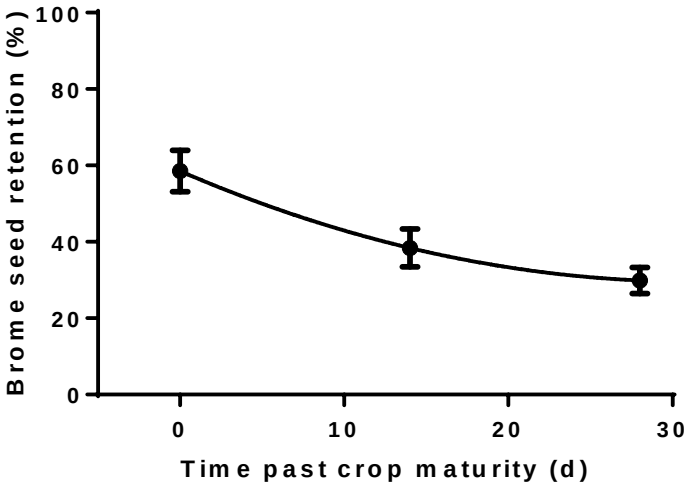

Figure 1. Seed retention above harvest cutting height (>15 cm) of brome grass at 0, 14 and 28 d after barley crop maturity. Bars represent SE values around the mean.

Implications for commercial practice

This trial showed that the potential effectiveness HWSC tactics declines over harvest with the proportion of the brome seeds returning to the seedbank increasing from approximately 40% to 70% over a one month harvest duration. These results indicate that insufficient brome grass seed is retained above harvest height, especially with later harvests, to expect HWSC techniques to be effective on their own. However, when used as part of an integrated weed management program, these techniques will undoubtedly assist in achieving brome grass control. Research is continuing with MSF and the University of Adelaide to evaluate the effectiveness of a range of integrated brome grass control approaches.

Acknowledgements

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