

EFFECT OF SEEDING SYSTEMS AND HERBICIDES ON CROP ESTABLISHMENT AND RYEGRASS CONTROL

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Key Messages

- New pre-emergence herbicides provided effective control of annual ryegrass under both knife point and disc systems.
- Good crop safety was observed with pre-emergence herbicides under knife-points; however, herbicide damage was evident under discs and was due to shallow seeding depth.

Why do the trial?

Increasing frequency of populations of annual ryegrass resistant to trifluralin is of growing concern to farmers across the southern Australian wheat-belt. Given the importance placed on trifluralin for controlling ryegrass under current farming practices, there is an urgent need to identify alternative pre-emergence herbicide options. Consequently a trial was undertaken to evaluate the efficacy and crop safety of alternative pre-emergence herbicides under knife-point and disc seeding systems.

How was it done?

The trial, established at Roseworthy Campus, was sown to Correll wheat (90 kg/ha) on 4-5 June. Herbicide treatments were –
 Triflur-X @ 2.0 L/ha
 Triflur-X @ 1.5 L/ha + Avadex Xtra @ 1.6 L/ha
 Triathlete @ 2.0 L/ha
 Boxer-Gold @ 2.5 L/ha
 Bay-191 @ 118 g/ha
 Untreated

The treatments were applied using an all-terrain vehicle at a spray volume of 100 L/ha and incorporated by sowing. An untreated control was used to determine background weed populations. Seeding systems were chosen on the basis of extent of soil disturbance and included:

- Austil single undercut disc (zero disturbance)
- K-Hart V disc + yetter rippled coulter (low disturbance)
- Conserva-Pak knife-point with vertical shank (intermediate disturbance)

- 16 mm narrow knife-point with C shank (intermediate disturbance)

All treatments received 100 kg/ha of DAP fertiliser and were sown on 25 cm spacings with press wheels. Seeding speeds were 12 km/hr for disc treatments and 8-9 km/hr for tine systems. As the previous crop was faba beans, stubble levels across the site were low (<2 t/ha).

Ryegrass populations were assessed 6 weeks after sowing by counting the number of plants in three randomly placed quadrats (25 cm 25 cm) in each plot. Assessments of wheat density were made by counting the number of plants in a 1 m length of a crop row at three locations in each plot. Seeding depth was estimated for each seeding system by randomly sampling 50 wheat seedlings from each herbicide untreated plot.

What happened?

Crop establishment

Excellent crop safety with pre-emergence herbicides was shown under narrow-point, Conserva-Pak and K-Hart seeding systems (Figure 1). In contrast, crop establishment was reduced with herbicides Triflur-X (54% of the untreated control), Triflur-X + Avadex Xtra (62%) and Triathlete (61%) under the low soil disturbance Austil disc system. Herbicide damage with the Austil system was a combination of shallow seeding depth (Figure 2) and limited displacement of herbicide from the seed furrow. In combination this can result in seedlings germinating in close proximity to the concentrated herbicide band, reducing establishment. Importantly, new pre-emergence herbicides Boxer Gold and Bay-191 were safe on the emerging wheat crop, regardless of the seeding system. However, it is noteworthy that soil conditions at and following herbicide application were dry and less conducive to herbicide mobility and consequent crop damage.

Figure 1 Effect of seeding systems and pre-emergence herbicides on wheat emergence (% of untreated control). Untreated mean wheat density = 170 plants/m²

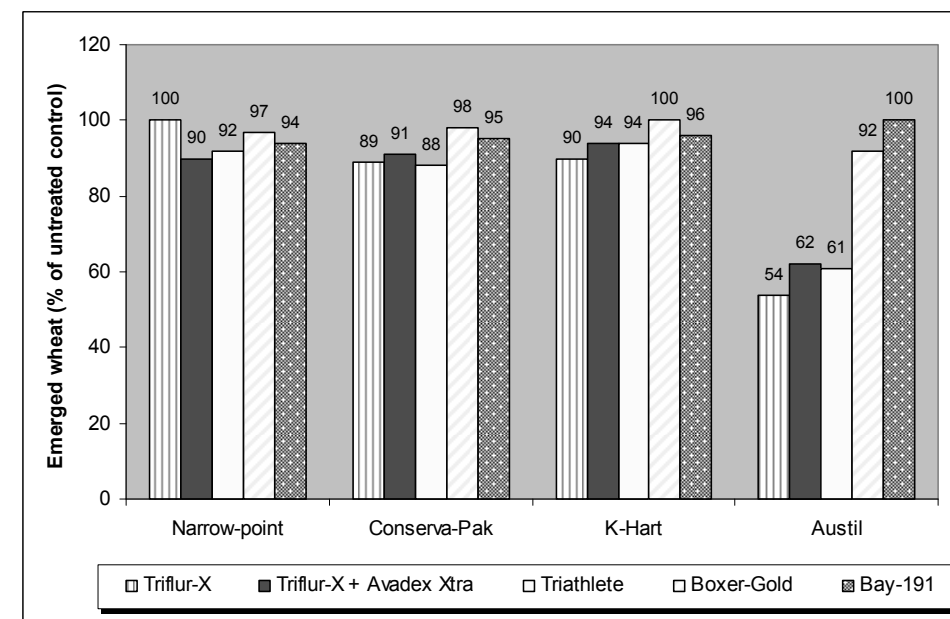
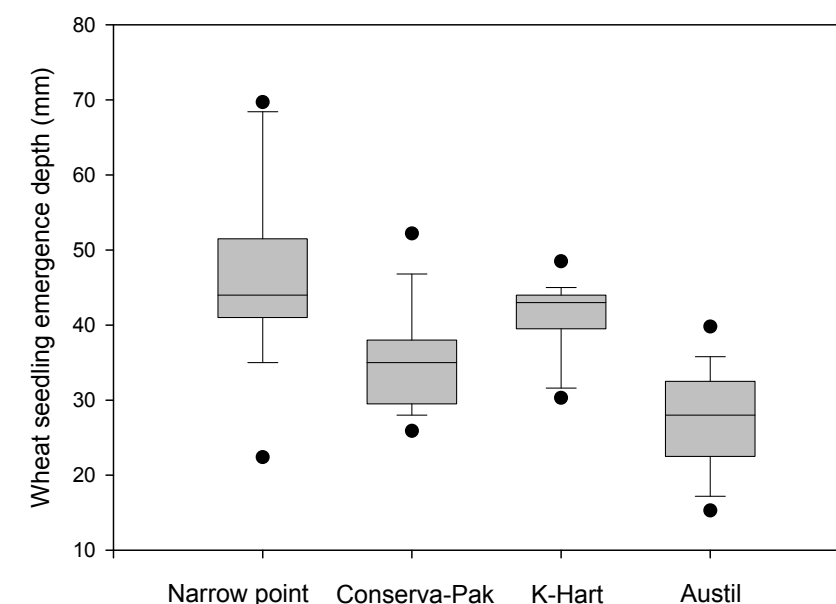


Figure 2 Effect of seeding systems on depth of seeding (mm). Horizontal line within each box-plot represents median seedling depth, with dots representing minimum and maximum depth.



Ryegrass control

Similar levels of ryegrass control (72 to 88%) were obtained with the pre-emergence herbicides under both knife-point and disc systems (Figure 3). Ryegrass control was highest (88%) when herbicide Triathlete was incorporated by the Conserva-Pak system. Interestingly, ryegrass control with Triflur-X (72%), Triflur-X + Avadex Xtra (81%) and Triathlete (77%) was not compromised under the low soil disturbance Austil disc system. Poor ryegrass control may have been expected with these treatments as they all contain trifluralin, a volatile active ingredient

that requires soil incorporation to maintain soil activity. Although soil surface conditions were dry and not ideal for herbicide activation, herbicides Boxer Gold and Bay-191 provided effective ryegrass control across seeding systems (73 to 84%). Furthermore, residual activity of Bay-191 reduced growth and root development of ryegrass survivors (Figure 4). This would significantly reduce the capacity of ryegrass to compete with the crop and would also reduce seed production by the ryegrass.

Figure 3 Effect of seeding systems and pre-emergence herbicides on percentage (%) ryegrass control. Untreated mean ryegrass density = 237 plants/m².

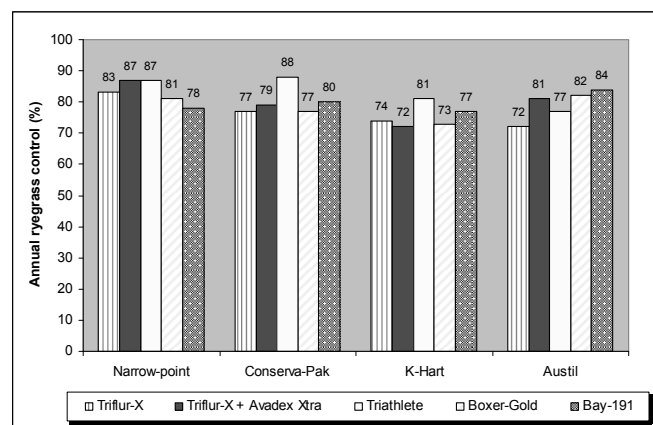
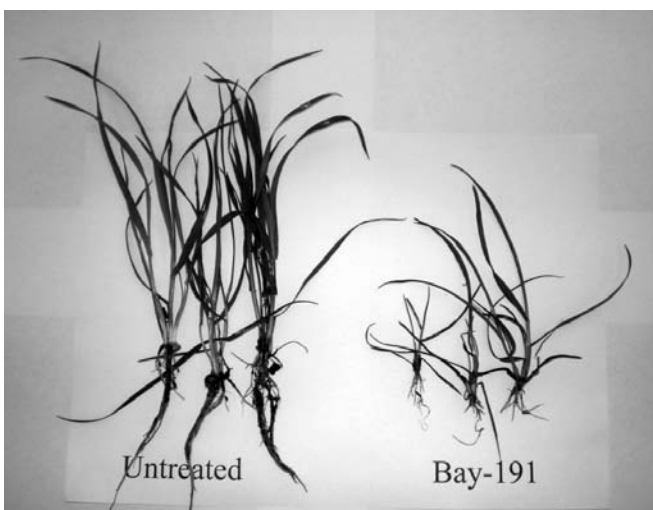


Figure 4 Effect of new pre-emergence herbicide Bay-191 on ryegrass growth and root development (right)



What does this mean?

These results have shown that new pre-emergence herbicides Boxer Gold and Bay-191 provided a safe and effective alternative to trifluralin for controlling ryegrass in wheat established under both knife-point and disc systems under the conditions of this trial. However, further research is required to evaluate these seeding system herbicide interactions across a number of ryegrass populations, soil types, environments and conditions around seeding.

Boxer Gold is currently available (released 2008) with Bay-191 and Triathlete likely to be available within the next few years. It is also worth keeping in mind that while Triathlete (trifluralin + cinmethylin) provides another option, it may not be suited in situations where ryegrass has strong resistance to trifluralin. In any circumstance growers should take

a long-term approach to weed management, and endeavour to keep weed numbers low. A diverse rotation of crops, herbicides, and non-chemical strategies should be employed to prolong the life of existing and new chemical groups.

Acknowledgements

Grains Research and Development Corporation for providing project funding. We also thank Jack Desbiolles and Dean Thiele for their assistance in trial preparation and Bayer, Nufarm and Syngenta for supplying herbicides.

Category:

3. "Almost ready" – we know the basics, just fine tuning the edges.

Location

Roseworthy Campus

Rainfall

Av Annual: 430 mm

Av GSR: 320 mm

2008 Total: 329 mm

2008 GSR: 255 mm

Paddock History

2007: Faba beans

Soil Type

Sandy clay loam over medium calcareous clay

Plot size

1.5 m x 8 m x 4 replications

For further information

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