

Control of ryegrass with pre-emergent herbicides

This trial was funded by GRDC and conducted in collaboration with the Birchip Cropping Group and the University of Adelaide.

Key findings

- Boxer Gold IBS + PSPE or Trifluralin IBS + Avadex Xtra IBS + Dual Gold PSPE gave the best pre-emergent annual ryegrass control in 2009.
- Boxer Gold or Dual Gold applied PSPE significantly improved ryegrass control in the crop row.

Why do the trial?

Hart has conducted many years of research on pre-emergent herbicides and the control of annual ryegrass. A summary of the results generated (Table 1) shows that good control of group D (trifluralin) resistant ryegrass can be achieved. It also shows that older herbicides can be just as effective as some of the newer, more expensive herbicides.

Table 1: Ryegrass % control for pre-emergent herbicide treatments at Hart in the years from and including 2003 to 2008.

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | Average |
|--|------------------------------|------------|------------|------------|------------|------------|------------|
| Rate of Trifluralin 480 L/ha | 1.0 | 1.2 | 1.2 | 1.5 | 1.4 | 1.4 | 1.3 |
| Number in the nil (plants per sq m) | 564 | 145 | 282 | 95 | 31 | 65 | 197 |
| Herbicide treatment | % ryegrass controlled | | | | | | |
| Nil | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Trifluralin 480 IBS | 86 | 60 | 80 | 49 | 70 | 17 | 60 |
| Avadex Xtra 1.6L/ha IBS | | | 45 | 52 | 57 | | 51 |
| Dual Gold 0.5L/ha IBS | | | 55 | 42 | 47 | | 48 |
| Trifluralin480 + Glean 10g/ha IBS | 93 | 76 | 83 | | | | 84 |
| Trifluralin480 + Avadex Xtra 1.0L/ha IBS | 83 | 71 | 85 | | 70 | | 77 |
| Trifluralin480 + Avadex Xtra 1.6L/ha IBS | | | 81 | 54 | 69 | 74 | 70 |
| Trifluralin480 + Dual Gold 0.5L/ha IBS | | 76 | 85 | 52 | 64 | 52 | 66 |
| Trifluralin480 + Avadex Xtra 1L/ha + Dual Gold 0.35L/ha IBS | 93 | 75 | 90 | 59 | 76 | | 79 |
| Trifluralin480 IBS + Dual Gold 0.35L/ha PSPE | 90 | 86 | 87 | | | | 88 |
| Trifluralin480 IBS + Dual Gold 0.5L/ha PSPE | 96 | 90 | 91 | 52 | 83 | 67 | 80 |
| Trifluralin480 IBS + Dual Gold 0.25L/ha IBS + Dual Gold 0.35 L/ha PSPE | | 79 | 94 | 44 | 77 | | 74 |
| Boxer Gold @ 2.5L/ha | | | | 72 | 81 | 76 | 76 |
| Sakura (BAY-191 118g/ha) | | | | 88 | 80 | 79 | 82 |
| LSD (0.05) | 17 | 21 | 15 | 17 | 16 | 27 | |

However, regardless of herbicide efficacy a common paddock observation is the lack of annual ryegrass control within the crop row. Techniques to improve the control of ryegrass within the crop row include modifying seeding equipment to leave a layer of treated soil in the row or to apply pre-emergent herbicides after sowing and before emergence (PSPE), in a separate spray application.

In past trials PSPE treatments specifically using S-metolachlor (Dual Gold) have produced good ryegrass control, depending on soil moisture. Hence, this trial aims to compare the effect of different pre-emergent herbicides applied pre sowing and post sowing on wheat establishment and ryegrass control and to specifically improve the control of ryegrass in the crop row.

How was it done?

| | | | |
|---------------------|---------------------------|-------------------|---------------------------|
| Plot size | 1.4m x 10m | Fertiliser | DAP @ 70 kg/ha + 2% Zn |
| Seeding date | 22 nd May 2009 | Variety | Catalina wheat @ 70 kg/ha |

The trial was a randomised complete block design with 3 replicates and 16 herbicide treatments (Table 2). Active ingredients of the herbicides used in the trial are listed in table 3.

To ensure even ryegrass establishment across the trial ryegrass seed was broadcast at 25 kg/ha ahead of seeding and tickled in with a shallow pass with the seeder prior to herbicide application. The ryegrass used was harvested from paddocks in 2007 and is approximately 30% resistant to trifluralin.

The seeding equipment used was a 6 row plot seeder on 225mm (9”) spacing with narrow points and press wheels.

Pre-sowing herbicides were applied within 1 hour of sowing and incorporated by sowing (IBS), the post sow pre-emergent (PSPE) herbicides were applied 3 days after sowing following 12mm of rain the previous night. Follow up rain was negligible until 12 days later, when 25mm was received.

Crop emergence was measured by counting plants along 2 metres of row in each plot.

Ryegrass was counted within the seed row, on the shoulder of the furrow and on the rise between 2 furrows. 0.1 of a square metre was counted in each of the 3 areas in every plot.

Table 2: Pre-emergent herbicides, rates and timings

| Treatment | |
|-----------|---|
| 1 | Nil |
| 2 | Trifluralin 480 1.4L/ha IBS |
| 3 | Avadex Xtra 3.0L/ha IBS |
| 4 | Trifluralin 480 1.4L/ha IBS + Avadex Xtra 1.6L/ha IBS |
| 5 | Trifluralin 480 1.4L/ha IBS + Dual Gold 0.5L/ha IBS |
| 6 | Trifluralin 480 1.4L/ha IBS + Avadex Xtra 1.6L/ha IBS + Dual Gold 0.35L/ha PSPE |
| 7 | Trifluralin 480 1.4L/ha IBS + Dual Gold 0.35L/ha PSPE |
| 8 | Boxer Gold 2.5L/ha IBS |
| 9 | Boxer Gold 1.5L/ha IBS + Boxer Gold 1.0 L/ha PSPE |
| 10 | Boxer Gold 1.5L/ha IBS + Dual Gold 0.35L/ha PSPE |
| 11 | Trifluralin 480 1.4L/ha IBS + Boxer Gold 1.5L/ha IBS |
| 12 | NUL1493 0.75L/ha IBS |
| 13 | NUL 1493 0.5L/ha IBS + NUL 1493 0.35L/ha PSPE |
| 14 | Sakura 118g/ha IBS |
| 15 | Sakura 118g/ha IBS + Dual Gold 0.35L/ha PSPE |
| 16 | Sakura 118g/ha IBS + Avadex Xtra 1.6L/ha IBS |

Table 3: Pre-emergent herbicides and active ingredients

| Herbicide | Active ingredients |
|------------------------|--|
| Trifluralin 480 | trifluralin 480g/L |
| Dual Gold | S-metolachlor 960g/L |
| Avadex Xtra | tri-allate 500g/L |
| Boxer Gold | S-metolachlor 120g/L + prosulfocarb 800g/L |
| NUL-1493 | experimental |
| Sakura (BAY-191 850WG) | pyroxasulfone |

Results

No herbicide treatment significantly affected wheat plant establishment compared to the untreated. However, in previous trials, the herbicides NUL1493 0.75L/ha IBS and Avadex Xtra 3.0L/ha IBS have caused significant crop damage. The average crop density achieved in 2009 was 117 plants per square metre.

All treatments produced significant control of ryegrass between the crop rows and ranged between 60% (Trifluralin 480 1.4L/ha IBS) and 89% control (Sakura 850WG 118g/ha IBS + Avadex Xtra 1.6L/ha IBS) (Table 4). Treatments giving better than 85% control ryegrass between the crop rows were:

- Trifluralin 480 1.4L/ha IBS + Dual Gold 0.5L/ha IBS
- Trifluralin 480 1.4L/ha IBS + Boxer Gold 1.5L/ha IBS
- NUL1493 0.75L/ha IBS
- Sakura 850WG 118g/ha IBS + Avadex Xtra 1.6L/ha IBS.

All treatments containing Dual Gold produced lower ryegrass control in the inter-row (76%) highlighting the solubility and movement of this herbicide.

Trifluralin 480 1.4L/ha IBS produced 31% control on the shoulder of the press wheel furrow, however, this difference was not significant, with all treatments averaging 59% control. The greatest control in this area of the plot came from NUL1493 0.50L/ha IBS + NUL 1493 0.35L/ha PSPE or Trifluralin 480 1.4L/ha IBS + Avadex Xtra 1.6L/ha IBS + Dual Gold 0.35L/ha, averaging 75% control (Table 4).

Ryegrass control in the crop row was generally poorer compared to the other areas measured, averaging only 56% compared to 79% control on the inter-row. This matches paddock observations. However, all PSPE treatments (averaging 70% control) were significantly better compared to IBS alone (averaging 51% control) at controlling ryegrass in the crop row. Of the IBS treatments Avadex Xtra 3.0L/ha IBS, NUL1493 0.75L/ha IBS and Sakura 850WG 118g/ha IBS + Avadex Xtra 1.6L/ha IBS produced the best in-row control averaging 63%.

Trifluralin 480 1.4L/ha IBS produced the worst control of the treatments in all areas of the crop row (41% overall control compared to the untreated) (Table 4). This result was expected as the ryegrass sown was 30% resistant to trifluralin. The treatments listed below all achieved at least a 75% reduction in the ryegrass plant population across the whole row.

- Trifluralin 480 1.4L/ha IBS + Avadex Xtra 1.6L/ha IBS + Dual Gold 0.35L/ha PSPE
- Boxer Gold 1.5 IBS + Boxer Gold 1.0 PSPE
- NUL1493 0.75L/ha IBS
- NUL1493 0.5L/ha IBS + NUL1493 0.35 PSPE
- Sakura 118g/ha IBS + Avadex Xtra 1.6L/ha IBS

A further 3 treatments produced at least 70% control across the whole row (Table 4).

Overall, for the control of Group D resistant ryegrass there are a number of effective pre-emergent herbicide options available. For the greatest control of in-row ryegrass PSPE applications are the most effective. However, these present a higher risk to crop safety, depending on soil type and rainfall after application.

Table 4: Pre-emergent herbicide treatments, ryegrass plant number and % control at Hart in 2009. Plants per square metre values are expressed as the number of ryegrass plants in a square metre between the crop rows, on the crop row shoulder or in the crop row.

| Treatment | Ryegrass between crop rows | | Ryegrass on crop row shoulder | | Ryegrass in crop row | | Overall control | |
|---|----------------------------|-----------|-------------------------------|-----------|-----------------------|-----------|-----------------------|-----------|
| | plants/m ² | % control | plants/m ² | % control | plants/m ² | % control | plants/m ² | % control |
| 1 NIL | 553 | - | 243 | - | 163 | - | 320 | - |
| 2 Tri 1.4L IBS | 220 | 60 | 167 | 31 | 180 | 0 | 189 | 41 |
| 3 Ava 3L IBS | 107 | 81 | 120 | 51 | 67 | 59 | 98 | 69 |
| 4 Tri 1.4L + Av 1.6L IBS | 143 | 74 | 97 | 60 | 93 | 43 | 111 | 65 |
| 5 Tri 1.4L + DG 0.5L IBS | 73 | 87 | 100 | 59 | 80 | 51 | 84 | 74 |
| 6 Tri 1.4L + Av 1.6L IBS + DG 0.35L PSPE | 123 | 78 | 63 | 74 | 40 | 75 | 75 | 76 |
| 7 Tri 1.4L IBS + DG 0.35L PSPE | 170 | 69 | 137 | 44 | 60 | 63 | 122 | 62 |
| 8 BG 2.5L IBS | 120 | 78 | 93 | 62 | 107 | 35 | 107 | 67 |
| 9 BG 1.5L IBS + BG 1.0L PSPE | 97 | 82 | 73 | 70 | 33 | 80 | 68 | 79 |
| 10 BG 1.5L IBS + DG 0.35L PSPE | 107 | 81 | 90 | 63 | 73 | 55 | 90 | 72 |
| 11 Tri 1.4L + BG 1.5L IBS | 83 | 85 | 120 | 51 | 90 | 45 | 98 | 69 |
| 12 NUL 1493 0.75L IBS | 73 | 87 | 87 | 64 | 57 | 65 | 72 | 77 |
| 13 NUL 1493 0.5L IBS + NUL 1493 0.35 PSPE | 87 | 84 | 60 | 75 | 43 | 73 | 63 | 80 |
| 14 Sak 118g IBS | 147 | 73 | 103 | 57 | 87 | 47 | 112 | 65 |
| 15 Sak 118g IBS + DG 0.35L PSPE | 133 | 76 | 103 | 57 | 40 | 75 | 92 | 71 |
| 16 Sak 118g IBS + Av 1.6L IBS | 63 | 89 | 83 | 66 | 57 | 65 | 68 | 79 |
| LSD (0.05) | 85 | 48 | 83 | 66 | 140 | 75 | | |