

B. Safe timings for phenoxy herbicides' application:

MCPA, 2,4-D and dicamba are the main phenoxy herbicides used in wheat. Wheat tolerance to these herbicides depends on the stage of ear development. Wheat is most sensitive to these herbicides at the double ridge/floral initiation stage of ear development. Spraying advice is based on leaf and tiller development, but not all varieties have the same correlation between leaf/tiller and ear development. Thus different varieties become safe to spray at slightly different growth stages. Long season varieties take longer to reach the safe stage.

- To use higher rates of MCPA amine (2.0 L/ha) and 2,4-D amine-625 (1.3 L/ha) in Wyalkatchem (b), Westonia, Amery, Tincurrin, Kulin apply these herbicides at Z15-Z16 (5-6 leaves on the main stem). For EGA Eagle Rock (b), Carnamah (b), Bumper (b), Camm (b), Brookton, Karlgarin (b) and Cranbrook apply at Z16-Z17 and in Calingiri, Fortune (b) and Spear apply at Z17-Z18. At these stages floral initiation will be completed in the above varieties.
- In addition, if plants are under severe water stress, the internal development can also be delayed by about one leaf. Again, add one leaf to those leaf numbers mentioned above for the different varieties, to allow for this.
- Do not apply these phenoxy herbicides between flag leaf emergence and the soft dough stage on any variety. Generally MCPA amine is safer than 2,4-D amine, especially on later developing varieties.
- Dicamba (and mixtures with 2,4-D or MCPA) should be applied not later than Zadoks stage 30 (pseudo-stem elongation, but first node not yet above soil surface).

C. Waterlogging and crop safety

- A number of products, including Group A and B herbicides are tolerated by wheat because they are metabolised within the seedling. If a seedling's growth is retarded by waterlogging, cold or any other factor, its metabolism is reduced, and toxic levels of herbicide can accumulate within the plant. There were many cases of such damage in 1999.
- There have also been many examples of trifluralin reducing emergence where the paddocks were waterlogged. It is suspected that this was due to increased uptake by the coleoptile from the wet soil. If there is any

chance of extreme waterlogging just after seeding, crop damage is more likely. In areas where this is likely safer products, or post-emergent spraying, are recommended.

2008 herbicide tolerance trial results

A field trial was conducted in 2008 at Mullewa Research Station to evaluate the herbicide tolerance of recently released wheat varieties to twenty nine herbicide treatments (Table 5). Nine wheat varieties were included (Axe (b), Bumper (b), Espada (b), Fortune (b), Gladius (b), Janz, Magenta (b), Zippy (b) and Wyalkatchem (b)). The trial was sown on 11 June into moist seedbed conditions on a red loamy soil (pH 6.2 measured in CaCl₂). Total rainfall from June to November was 129.6 mm. Rain fell every month (≥5.2 mm) between June and October with the wettest month in July (50% of the total rainfall with 17 rainy days). Refer to Table 5 for yield results.

Key messages

- The new wheat varieties – Axe (b), Bumper (b), Espada (b), Fortune (b), Gladius (b) and Magenta (b) showed good tolerance to a range of commonly used herbicides/mixtures.
- Eighteen of the twenty nine treatments tested caused a significant yield reduction in the new short season variety Zippy (b).
- The herbicides Dual® Gold, Ally®, Hussar® and Kamba® caused a yield reduction in many of the varieties in the trial.
- The data presented here are first results for Axe (b), Bumper (b), Espada (b), Fortune (b), Gladius (b), Magenta (b) and Zippy (b) in WA and further testing is required to confirm the results.

Herbicide injury and yield effects

- Triflur® X reduced the plant establishment of Espada (b) significantly and biomass of all the varieties slightly (5%). This treatment resulted in significant yield loss in Bumper (b) and Zippy (b) only. Stomp® reduced the yield of Axe (b) significantly without any visual effects.
- Dual® Gold 250 mL/ha resulted in significant yield loss in Fortune (b), Gladius (b) and Zippy (b). Addition of Diuron 1 L/ha to Dual® Gold 250 L/ha resulted in a significant improvement in crop safety for Fortune (b) and Gladius (b), but not in Zippy (b).

Table 5 Effect of herbicides on grain yield (% of untreated control) of wheat varieties at Mullewa in 2008

| No. | Herbicides (rate/ha) | Axe ϕ | Bumper ϕ | Espada ϕ | Fortune ϕ | Gladius ϕ | Janz | Magenta ϕ | Zippy ϕ | Wyalkatchem ϕ |
|-----|--|------------|---------------|---------------|----------------|----------------|-----------|----------------|--------------|--------------------|
| 0 | Untreated control | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | >> Grain yield - kg/ha | 2659 | 2241 | 2619 | 2717 | 2802 | 2429 | 2429 | 2650 | 2753 |
| 1 | Logran B Power® 50 g | 100 | 97 | 105 | 99 | 102 | 100 | 101 | 97 | 103 |
| 2 | Stomp® 330 1.8 L | 94 | 98 | 97 | 102 | 103 | 102 | 98 | 96 | 102 |
| 3 | Triflur® X 3 L | 93 | 91 | 95 | 95 | 99 | 98 | 94 | 91 | 101 |
| 4 | Dual® Gold 0.25 L | 99 | 97 | 98 | 89 | 94 | 99 | 101 | 93 | 103 |
| 5 | Diuron 1 L + Dual® Gold 0.25 L | 97 | 93 | 94 | 105 | 101 | 97 | 99 | 93 | 97 |
| 6 | Boxer® Gold 2.5 L | 102 | 103 | 107 | 97 | 102 | 95 | 95 | 97 | 104 |
| 7 | Glean® 20 g | 98 | 106 | 97 | 97 | 97 | 104 | 100 | 94 | 94 |
| 8 | Axial® 0.3 L | 97 | 97 | 99 | 99 | 101 | 105 | 98 | 100 | 102 |
| 9 | Jaguar® 1 L | 100 | 94 | 106 | 97 | 99 | 100 | 97 | 98 | 99 |
| 10 | Monza® 25 g | 98 | 104 | 94 | 100 | 102 | 101 | 102 | 96 | 94 |
| 11 | Hoegrass® 375 2 L | 98 | 95 | 95 | 103 | 99 | 102 | 101 | 98 | 95 |
| 12 | Cheetah® Gold 1 L | 100 | 99 | 98 | 97 | 101 | 100 | 93 | 91 | 98 |
| 13 | Hoegrass® 200 mL +Achieve® 200g | 102 | 107 | 106 | 98 | 100 | 99 | 102 | 93 | 102 |
| 14 | Achieve® WG 380 g | 100 | 106 | 102 | 100 | 102 | 103 | 101 | 95 | 99 |
| 15 | Ally® 7 g | 98 | 100 | 93 | 102 | 94 | 103 | 97 | 92 | 92 |
| 16 | Atlantis® OD 0.33 L | 95 | 103 | 106 | 94 | 101 | 101 | 100 | 90 | 103 |
| 17 | Broadside® 1 L | 97 | 101 | 104 | 102 | 100 | 106 | 105 | 94 | 98 |
| 18 | Hussar® 200 g | 96 | 91 | 95 | 93 | 99 | 93 | 96 | 92 | 102 |
| 19 | Tigrex® 1 L | 99 | 101 | 104 | 94 | 99 | 97 | 95 | 93 | 100 |
| 20 | Buctril® MA 1.4 L | 99 | 103 | 98 | 101 | 105 | 110 | 102 | 98 | 94 |
| 21 | Affinity® 50 g + MCPA 0.5 L | 103 | 106 | 102 | 98 | 100 | 100 | 107 | 98 | 102 |
| 22 | Precept® 300 1 L | 101 | 103 | 105 | 107 | 102 | 102 | 108 | 99 | 101 |
| 23 | Eclipse® 5 g + MCPA LVE 0.5 L | 97 | 100 | 93 | 97 | 100 | 102 | 98 | 95 | 95 |
| 24 | Diuron 0.35 L + MCPA (Amine) 0.4 L | 96 | 106 | 98 | 97 | 103 | 100 | 98 | 93 | 103 |
| 25 | Paragon® 0.5 L | 101 | 103 | 100 | 97 | 99 | 100 | 105 | 92 | 101 |
| 26 | MCPA amine 50% 2 L | 101 | 97 | 97 | 95 | 98 | 99 | 99 | 89 | 97 |
| 27 | 2, 4-D amine 625 1.3 L | 101 | 100 | 102 | 90 | 99 | 104 | 100 | 92 | 102 |
| 28 | 2, 4-D LV ester 680 0.8 L | 102 | 95 | 97 | 95 | 105 | 95 | 95 | 100 | 96 |
| 29 | Kamba® 500 0.5 L | 86 | 94 | 95 | 91 | 93 | 94 | 94 | 92 | 101 |
| | Isd (0.05) Herbicides v/s Untreated Control | 5 | 8 | 7 | 7 | 5 | 7 | 7 | 5 | 6 |
| | Isd (0.05) Herbicides v/s Herbicides | 6 | 10 | 9 | 9 | 7 | 8 | 9 | 7 | 8 |
| | CV (%) | 5 | 8 | 6 | 7 | 5 | 6 | 7 | 6 | 6 |

Treatments 1-6 applied before seeding, 7-13 at Z12-Z13, 14-24 at Z13-Z14 and 25-29 at Z15-Z16.

Treatment 1 was applied with Hasten® 0.5% v/v, 7 + BS® 1000 0.1%, 8 + Adigor® 0.5%, 10 + DC Trate® 2% v/v, 13 & 14 + Supercharge® 0.75%, 12, 16 & 22+ Hasten® 1.0%, 11, 15 & 20 + BS® 1000 0.25%, 23+ Uptake® oil 0.5%.

Figures in bold are significantly lower yielding than the untreated control.

- Jaguar® and Broadside® each at 1 L/ha caused slight spotting (10–15%) of the leaves across all the varieties. Broadside® also caused dropping leaves in all the varieties, but a yield reduction was only recorded for Zippy (b).
- Cheetah® Gold 1 L/ha resulted in slight spotting/yellowing (10–15%) of the leaves and an estimated 10% biomass reduction across all varieties during early crop growth stages. This treatment resulted in a significant yield loss in Magenta (b) and Zippy (b) only.
- Ally® 7 g/ha caused differential yellowing and biomass reduction in the different varieties and Axe (b) appeared to be the most affected during early crop growth stages. Interestingly, a significant yield reduction was recorded only for Espada (b), Gladius (b), Wyalkatchem (b) and Zippy (b).
- Achieve® WG 380 g, Achieve® 200 g + Hoegrass® 200 mL, Tigrex® 1 L, Diuron 0.35 L + MCPA 0.4 L, Paragon® 0.5 L and MCPA (amine) 2 L/ha caused a significant yield reduction in Zippy (b) only, where as Glean® 20 g/ha caused a significant yield reduction in Zippy (b) and Wyalkatchem (b), Monza® 25 g and Buctril® MA 1.4 L/ha caused a significant yield reduction in Wyalkatchem (b), Atlantis® 0.33 L/ha caused a significant yield reduction in Axe (b) and Zippy (b), Hussar® 200 g/ha caused a significant yield reduction in Bumper (b), Fortune (b), Janz and Zippy (b) and Eclipse® 5 g + MCPA 0.5 L/ha caused a significant yield reduction in Espada (b) and Zippy (b). All of these significant yield reductions were recorded without any noticeable visual negative effects.
- Kamba® caused drooping leaves/flaccidity symptoms across all the varieties and resulted in a significant yield loss in Axe (b), Fortune (b), Gladius (b), and Zipp (b).
- 2,4-D amine 625 1.3 L/ha resulted in more ear head deformities in Bumper (b) (15%) and Fortune (b) (10%) compared to Wyalkatchem (b) (3%). A significant yield loss was recorded in Fortune (b) and Zippy (b) only. Interestingly, 2,4-D LV ester 680 (xtra) 0.8 L/ha was safe on all varieties tested.
- Timing of phenoxy herbicides like MCPA and 2,4-D is critical as they often produce morphological abnormalities in vegetative parts and the ear. Product label recommendations are based on the number of

leaves on the main stem, however wheat is most sensitive to phenoxy herbicides at the double ridge stage of ear development (the point at which the ear first starts to form). Labels do not take into account differences in the timing of ear development between varieties. Previous observations indicate that stress during early crop growth stages (e.g. moisture stress) can also affect internal ear development rates. Product labels state that MCPA LV Ester up to 0.5 L/ha can be used from 3 leaf stage to flag leaf just visible (Z13-Z33) and from 0.5 L to 2.1L/ha between Z15-Z33. 2,4-D Amine 50% up to 1.6L and 2,4-D LV Ester 680 up to 0.8L/ha can be used from Z15-Z33. Previous research in WA indicates that the safer timing of application of higher rates of phenoxy herbicides in Carnamah (b) and Calingiri starts from Z15.8-Z16.5 and Z16.7-Z17.8 respectively. Bumper (b) and Fortune (b) are similar in maturity to Carnamah (b) and Calingiri, respectively. Therefore delaying application of higher rates of phenoxy herbicides on Bumper (b) until 5.8–6.5 leaves and Fortune (b) until 6.7–7.8 leaves is advised to avoid ear deformities and yield loss (despite labels stating 5 leaves on main stem). Most of the varieties including Bumper (b) and Fortune (b) had 5.5 leaves on the main stem when the Z15-Z16 treatments were applied.

- The yield loss in Gladius (b) from the Ally® and Kamba® (dicamba) treatments is consistent with South Australian trial results (<http://www.nvtonline.com.au/herbicide-tolerance>).

Time of sowing and phenology data

The results of time of sowing experiments and phenology experiments conducted in 2008 are summarised in Tables 8 to 18. When making variety and/or agronomic decisions, growers should use this information in conjunction with other information sources on performance over a range of years.

Note for Tables 8-18:

- * = Screenings are preliminary as they include whole and cracked grain.
- ^ = Gross income was calculated on the average yield and quality for each treatment using Cash price basis – Base rate AH \$304.5, APW \$292.5, ASW \$267.5, ASWN \$267.5 and ASFT \$317.50.

N/A = Results not available at time of printing..