# Legume and oilseed herbicide tolerance

Kaidy Morgan and Rebekah Allen

Hart Field-Site Group

**Key findings**

- Most IBS and PSPE treatments recorded no effect to slight crop safety effects (rated 1-2), likely resulting from dry conditions reducing herbicide activity. Some treatments caused severe effects in small seed crops including canola and medic, which supports the reason why they are not labelled for use in these crops.
- Pulse and oilseed control was reduced in 2024 compared to other years as a result of poor seasonal conditions limiting some herbicide uptake. Despite the dry season, the more robust herbicides provided high levels of control at Hart (rating 5-6) (Table 4).

## Introduction

This demonstration has two primary objectives and is presented in two distinct protocols, the first is to compare the control of canola and legume varieties. The second is to compare the crop safety of canola and legume species to a range of herbicide products, timings and rates. As a result of dry conditions in the 2024 growing season, herbicide performance in both the control and crop safety plots was compromised. Reduced efficacy of herbicides was observed resulting from plant water stress following application, impacting herbicide uptake for the control of pulses and canola

Observations from 2024 may differ from expected results that would otherwise be seen in more favourable conditions.

## Methodology

The 2024 legume and oilseed herbicide tolerance trial was set up as a demonstration and is a non-replicated matrix (Table 1). Sixteen varieties were sown in strips across seven different crop types including canola, faba bean, field pea, chickpea, lentil, vetch and barrel medic. Forty-six herbicide treatments were applied across all 16 crops at various timings. The trial was sown into a drying soil profile on July 3, with the site receiving 10.6 mm rainfall within seven days prior to sowing.

*Table 1. Trial details for legume and oilseed herbicide tolerance at Hart, SA.*

| | | | |
|---|---|---|---|
| **Plot size** | 2.2 m x 2.0 m | **Fertiliser** | MAP (10:22) + 1% Zn + Impact @ 80 kg/ha |
| **Seeding date** | July 3, 2024 | | |
| **Location** | Hart, SA (Quarter 2) | **Soil type** | Clay loam |

Application timings:

| | | |
|---|---|---|
| 1. | Incorporated by sowing (IBS) | July 3 |
| 2. | Post-seeding pre-emergent (PSPE) | July 3 |
| 3. | Early post-emergent (3-4 node) | August 14 |
| 4. | Post-emergent (5-6 node) | August 22 |
| 5. | Post-emergent Group 14 spike (5-6 node) | August 22 |

Treatments were visually assessed and scored (Table 2) for herbicide effects approximately six weeks after each application from August to October (Tables 3 & 4).

*Table 2. Crop damage ratings and descriptions used for visual assessment of legume and oilseed herbicide tolerance demonstration.*

| | | |
|---|---|---|
| **1** | **No effect** | No herbicide effect evident. |
| **2** | **Slight effect** | Minor or temporary damage as reduced crop vigour and growth. Discoloration, distortion or stunting is negligible. |
| **3** | **Moderate effect** | Moderate damage with recovery likely expected in most, if not all cases. Moderate discolouration, distortion or stunting observed. |
| **4** | **Irreversible effect** | Majority of plants irreversibly damaged. Some discoloration, necrosis (death) of plant tissue and distortion. |
| **5** | **Severe effect** | Most plants dead with the remaining showing signs of severe distortion or necrosis across entire plant. |
| **6** | **Death** | Complete death of all plants although some crop residue may remain. |

Some herbicides used in this demonstration are not registered for crops that have been sprayed. It is important to check herbicide labels before following these strategies used. In 2024, several herbicide treatments displayed varying crop tolerances that were not expected. Care should be taken when interpreting these results, as herbicide effects can vary between seasons and is also dependent upon conditions at application including soil type and weather conditions. This trial is un-replicated and observations are based on visual assessment at one point in time only.

**Results and discussion**

*Crop safety*

Most IBS and PSPE treatments caused minimal crop damage in 2024, likely due to dry conditions reducing herbicide activity (Table 3). Despite reduced damage across most crop types, Mateno® Complete, Terrain® Flow, Sentry® and Reflex® applied as IBS treatments, caused increased damage to canola this season, when compared to 2023 where conditions favoured herbicide activity.

For pulses, crop safety was improved in 2024 across IBS, PSPE and 3-4 node treatments, with Propyzamide®, Tenet®, Luximax® and Mateno Complete (not registered as safe for use in pulses) causing no effect to slight crop effects this season. This unexpected crop safety may not be experienced in seasons where herbicide activity is favoured in wetter conditions, and on-label registrations should therefore be followed.

Ultro® (registered for control or suppression of some grasses) applied at 1700 g/ha was safest across all applied IBS treatments for the crops it is registered in. In both 2023 and 2024 seasons, Ultro provided no effect to slight crop effect on canola and medic, however this use is off-label and is not recommended.

Despite registration for IBS application in canola, Overwatch® applied at 1.25 L/ha caused slight to moderate effects (rated 2-3) in all four canola varieties. Although recovery from these effects can be expected in favourable conditions, severe water stress in 2024 likely impacted recovery, even in cases where crop damage was low.

Balance® + simazine applied PSPE caused crop damage in canola, lentil, vetch and medic (rated 3-6) and had slight-moderate effect on faba bean, field pea and chickpea (rated 2-3). Of all IBS, PSPE and 3-4 node treatments Balance + simazine caused the highest level of visual crop damage. This effect was likely due to Balance having a registration in chickpea only for the control of some broadleaf and grass weeds and despite no registration for volunteer pulse control, some level of control may be achieved with this product. Terbuthylazine, Thistrol Gold® + CanDo® and Intercept® + Hasten® also caused irreversible damage across several crop types (Table 3).

*Pulse and oilseed control*

Pulse and oilseed control was reduced in 2024 as a result of poor seasonal conditions limiting herbicide uptake. Despite the dry season, several treatments provided high levels of control at Hart (rating 5-6) (Figure 1 and Table 4). Talinor® + Hasten when applied at 5-6 node controlled all crop types (rated 5- 6), including off label control of barrel medic. Velocity® + Hasten provided similar control to Talinor + Hasten for canola, beans and peas, however had reduced activity on chickpea (rating 3) and slightly reduced control on lentil, vetch and medic.

Carfentrazone 240 + MCPA Amine 750 was rated 5-6 (severe effect–death) for all four canola varieties, despite only MCPA Amine on label for control. As expected, this treatment performed poorly for other crop types, as this product targets marshmallow, lupin and selected broadleaf weeds only. Field pea control was low (rated 2-4) when treated with Lontrel® Advanced, Ally® + Wetter 1000 or Saracen® + CanDo, despite on-label control. Additionally, Saracen is registered to control volunteer faba bean and lentil in cereals or fallow, however, in 2024 when applied with CanDo (oil adjuvant), it did not provide adequate control (rating 3-4) and follow up herbicides would have been required.

Group 14 efficacy was reduced when compared to previous years. In 2023, high levels of control (rated 5-6) were achieved in most cases, however in 2024, dry conditions causing poor uptake resulted in several treatments recording no control to moderate effects (rated 1-3) across many plant types. Although plant recovery did not occur in 2024, favourable growing conditions are likely to result in re-growth of plants where only moderate damage occurred.

Crucial® (600 g/L glyphosate) applied at 800 mL and 1200 mL performed similarly, with a slight control advantage at the higher rate. Both rates provided good control (rated 5-6) for canola varieties HyTTec Trophy and new Pioneer variety PY421C, however all other crop types would require follow up application, or alternative herbicide options for TruFlex canola variety Nuseed Raptor (tolerant to glyphosate). Achieving control in two of the four canola varieties at 800 mL was surprising, with the lowest recommended on-label rate for canola 1100 mL/ha.

Although Sharpen® is not registered for field pea or lentil control, when applied with Crucial, this tank-mix treatment improved efficacy, with a crop damage rating of 5 (severe effect), outperforming Crucial alone (rated 3-4).

New generation Group 14 spike herbicides Terrad'or® and Voraxor® applied with Crucial performed similarly across all pulse and oilseeds, other than faba bean, where Voraxor did not offer adequate control (rating 3). Chickpea was not effectively controlled by Voraxor this season (rated 4) and would have required follow up herbicide application despite being registered for control. Sharpen + Crucial achieved similar control to the newer Group 14 herbicides across most crop types, with a slight reduction in efficacy recorded in vetch. In 2024, Voraxor and Terrad'or provided an additional level of control across all crop types when compared to Carfentrazone 400, Sledge® or oxyfluorfen 240, particularly for canola, medic and volunteer lentils.

In 2023 all Group 14 herbicides were rated 5-6 (severe effect-death) for chickpea control, however no Group 14 treatments provided effective in-season control for chickpea in 2024, with ratings ranging from 2-4 (slight–increasing effect).

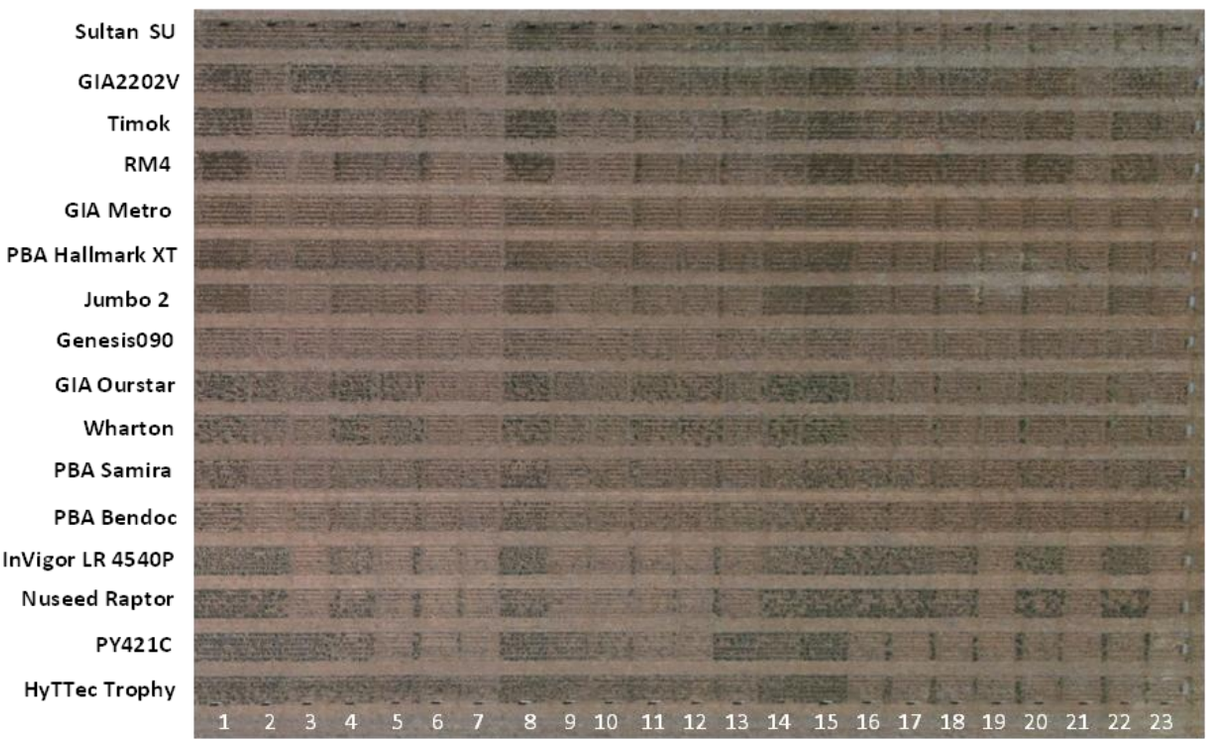


*Figure 1. Pulse and oilseed control section at Hart in 2024. Photo taken on September 23, 2024 showing 16 varieties (top to bottom) and the 23 herbicide treatments in order from Nil (left) through to Voraxor + Crucial + MSO (right).*

*Table 3. Crop damage ratings for the legume and oilseed herbicide tolerance trial at Hart in 2024.*

## Trial layout – CROP SAFETY

| | | | | Canola | | | | Bean | | Pea | | C/pea | Lentil | | | Vetch | | | Medic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **CROP SAFETY** | | HyTTec Trophy | PY421C | Nuseed Raptor | InVigor LR 4540P | PBA Bendoc | PBA Samira | Wharton | GIA Ourstar | Genesis090 | Jumbo 2 | PBA Hallmark XT | GIA Metro | RM4 | Timok | GIA2202V | Sultan SU |
| | **Timing** | **Treatment** | **Rate** | | | | | | | | | | | | | | | | |
| 1 | IBS \| July 3 | **NIL** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | | Sakura | 118 g | 2 | 2 | 3 | 4 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| 3 | | Boxer Gold | 2500 mL | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| 4 | | Propyzamide | 1000 mL | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| 5 | | Tenet | 1800 mL | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 |
| 6 | | Ultro | 1700 g | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 7 | | Reflex | 1000 mL | 5 | 6 | 6 | 4 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| 8 | | Luximax | 500 mL | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 9 | | Overwatch | 1250 mL | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 1 | 2 | 1 |
| 10 | | Sentry | 50 g | 6 | 1 | 5 | 5 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 2 |
| 11 | | Mateno Complete | 1000 mL | 4 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 |
| 12 | | Terrain Flow | 190 mL | 3 | 5 | 5 | 5 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 4 |
| 13 | | Voraxor | 200 mL | 6 | 3 | 5 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 |
| 14 | PSPE \| July 3 | **NIL** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 15 | | Diuron (900 g/kg) | 825 g | 3 | 3 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 16 | | Reflex | 1250 mL | 4 | 6 | 6 | 6 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 5 |
| 17 | | Simazine (900 g/kg) | 825 g | 3 | 5 | 5 | 4 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 5 |
| 18 | | Metribuzin (750 g/kg) | 280 g | 2 | 6 | 6 | 6 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 5 |
| 19 | | Terbuthylazine (875 g/kg) | 1000 g | 2 | 6 | 6 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 6 |
| 20 | | Balance + Simazine | 100 g + 830 g | 6 | 6 | 6 | 6 | 3 | 3 | 3 | 3 | 2 | 5 | 5 | 5 | 4 | 3 | 3 | 6 |
| 21 | 3-4 node \| August 14 | **NIL** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 22 | | Metribuzin (750 g/kg) | 280 g | 1 | 6 | 5 | 6 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 4 | 4 | 1 | 3 |
| 23 | | Broadstrike + Wetter 1000 | 25 g + 0.2% | 6 | 1 | 5 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 2 |
| 24 | | Thistrol Gold + CanDo | 2000 mL + 0.5% | 5 | 4 | 5 | 5 | 3 | 3 | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 2 | 3 | 1 |
| 25 | | Brodal Options | 150 mL | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| 26 | | Spinnaker + Wetter 1000 | 70 g + 0.2% | 6 | 2 | 6 | 4 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 |
| 27 | | Ecopar + Wetter 1000 | 800 mL + 0.2% | 1 | 1 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 2 |
| 28 | | Intercept + Hasten | 750 ml + 0.5% | 6 | 1 | 5 | 5 | 1 | 3 | 3 | 1 | 4 | 4 | 2 | 1 | 4 | 4 | 2 | 2 |

*Table 4. Crop damage ratings for the legume and oilseed herbicide tolerance trial at Hart in 2024.*

**Trial layout – PULSE & OILSEED CONTROL**

| | | | | Canola | | | | Bean | | Pea | | C/pea | Lentil | | | Vetch | | | Medic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **LEGUME & OILSEED CONTROL** | HyTTec Trophy | PY421C | Nuseed Raptor | InVigor LR 4540P | PBA Bendoc | PBA Samira | Wharton | GIA Ourstar | Genesis090 | Jumbo 2 | PBA Hallmark XT | GIA Metro | RM4 | Timok | GIA2202V | Sultan SU |
| | **Timing** | **Treatment** | **Rate** | | | | | | | | | | | | | | | | |
| 1 | 5 - 6 node \| August 22 | **NIL** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | | Lontrel Advanced | 150 mL | 1 | 1 | 2 | 1 | 5 | 5 | 3 | 2 | 4 | 4 | 5 | 5 | 5 | 6 | 6 | 2 |
| 3 | | Ally + Wetter 1000 | 7 g + 0.1% | 6 | 1 | 6 | 6 | 4 | 6 | 4 | 3 | 4 | 5 | 3 | 3 | 5 | 2 | 2 | 1 |
| 4 | | Ecopar + MCPA Amine 750 | 400 mL + 330 mL | 4 | 3 | 3 | 2 | 4 | 4 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 1 |
| 5 | | Carfentrazone 240 + MCPA Amine 750 | 100 mL + 330 mL | 6 | 6 | 5 | 6 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 3 |
| 6 | | Velocity + Hasten | 670 mL + 1.0% | 6 | 6 | 5 | 6 | 5 | 5 | 5 | 5 | 3 | 4 | 5 | 4 | 5 | 4 | 4 | 5 |
| 7 | | Talinor + Hasten | 750 mL + 1 % | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 6 | 6 | 5 | 5 | 6 | 6 | 6 |
| 8 | | **NIL** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 9 | | Saracen + CanDo | 100 mL + 0.5% | 5 | 4 | 6 | 6 | 3 | 6 | 3 | 3 | 5 | 5 | 4 | 4 | 6 | 5 | 5 | 1 |
| 10 | | Paradigm + Uptake | 25 g + 0.5% | 6 | 4 | 6 | 6 | 4 | 6 | 4 | 4 | 6 | 4 | 4 | 4 | 6 | 5 | 5 | 4 |
| 11 | | Quadrant | 1000mL | 6 | 6 | 5 | 5 | 3 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 1 |
| 12 | | Triathlon | 1000 mL | 6 | 6 | 5 | 5 | 3 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 1 |
| 13 | | Rexade + Wetter 1000 | 100 g + 0.25% | 5 | 1 | 5 | 5 | 4 | 6 | 3 | 3 | 3 | 4 | 3 | 3 | 5 | 5 | 4 | 3 |
| 14 | | Brodal Options + MCPA Amine 750 | 125 mL + 125 mL | 3 | 2 | 1 | 2 | 3 | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 2 |
| 15 | Group 14 spike \| August 22 | **NIL** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | | Crucial | 800 mL | 5 | 5 | 1 | 1 | 3 | 2 | 3 | 3 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 2 |
| 17 | | Crucial | 1200 mL | 6 | 6 | 1 | 2 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 4 |
| 18 | | Carfentrazone 400 + Crucial + MSO | 15 mL + 800 mL + 1% | 5 | 5 | 3 | 3 | 3 | 3 | 5 | 5 | 3 | 5 | 4 | 4 | 3 | 3 | 3 | 3 |
| 19 | | Sharpen + Crucial + MSO | 17g + 800 mL + 1% | 6 | 6 | 6 | 6 | 4 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 3 | 5 |
| 20 | | Sledge + Crucial + MSO | 50 mL + 800 mL + 1% | 5 | 4 | 2 | 1 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 3 |
| 21 | | Terrad'or + Crucial + MSO | 15 g + 800 mL + 1% | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 4 | 6 | 6 | 6 | 5 | 5 | 5 | 6 |
| 22 | | Oxyflurofen 240 + Crucial + MSO | 75 mL + 800 mL + 1% | 5 | 5 | 2 | 1 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 3 |
| 23 | | Voraxor + Crucial + MSO | 100 mL + 800 mL + 1% | 6 | 6 | 6 | 6 | 3 | 3 | 5 | 5 | 4 | 6 | 6 | 6 | 5 | 5 | 4 | 6 |