**Faba Beans, Herbicide Tolerance (Group B), MRZ Wimmera (Horsham), Victoria**

**Authors**
Mitch Fromm, Tim Nigussie and Jason Brand

**Aim**
To investigate the tolerance of a newly released faba bean variety PBA Bendoc to post sowing pre-emergence (PSPE) and in-crop application timings of Group B herbicides in comparison with PBA Samira.

**Treatments**
Varieties: PBA Bendoc and PBA Samira
Herbicide treatments: See Table 1.

Other Site Details

| | Horsham |
|---|---|
| **Sowing Date** | 14 May |
| **Planting density** | 20 |
| **Stubble height (cm)** | Standing (20) |
| **Row Spacing (cm)** | 36 |
| **Fertiliser (kg/ha)[1]** | 80 |

[1] MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

**Results and Interpretation**

- Key Messages: Group B herbicide application timing significantly influenced plant height, biomass and grain yield of faba bean varieties. The level of herbicide damage and subsequent yield losses from the herbicide treatments were generally more severe in PBA Samira than PBA Bendoc, and when applied in-crop than PSPE. PBA Samira incurred significant yield loss from all the herbicide treatments except SU1 applied at PSPE and Imi2 applied at PSPE and flowering. In contrast, PBA Bendoc showed improved tolerance and did not have significant yield loss from most herbicide treatments except in-crop application of SU2 and SU1.

- Establishment and Growth: Soil moisture at sowing was favourable for establishment and early growth of faba bean. Plant count at emergence showed that the PSPE herbicide treatments did not have significant impact on establishment (data not shown). Plant growth during the rest of the season was average despite drier spring conditions and a few frost events during the vegetative and reproductive growth stages.

- Herbicide Damage: Visual herbicide damage scores recorded about 19 weeks after sowing showed significant herbicide treatment by variety interaction. The herbicide damage symptoms observed in the trial included stunting of growth, necrosis of leaves and stems, chlorosis and plant death. The level of damage from the herbicide treatments was generally more sever in PBA Samira than PBA Bendoc, and when applied in-crop than PSPE. All the PSPE and in-crop application treatments except PSPE application of Imi1 caused significant damage to the conventional variety PBA Samira (Table 1). However, PSPE application of SU1 and 70 gai/ha of imazethapyr caused only a slight suppression of growth. In contrast, PBA Bendoc showed tolerance to SU1 applied at PSPE, and Imi1 and Imi2 applied at PSPE, 4 and 8 node stages (Table 1). Application of Imi1 and Imi2 at flowering and 20 gai/ha of Sulf at all application timings caused moderate damage in PBA Bendoc (Table 1). Both varieties showed the highest sensitivity to in-crop application of sulfonylurea herbicides, with herbicide damage scores of 67-95 in PBA Bendoc and 93-100 in PBA Samira (Table 1). It was also noted that in-crop application of all herbicides except imazethapyr on PBA Samira and sulfonylurea herbicides on PBA Bendoc at 8 node and flowering stages delayed days to maturity.

- Plant height and biomass at maturity: The herbicide treatments caused significant difference in plant height and biomass at maturity, but these differences were dependent on variety. In the nil treatment, PBA Samira had higher plant height and biomass than PBA Bendoc (Table 2). At maturity, plant height was 76 cm for PBA Bendoc and 84 cm for PBA Samira, and biomass yields were 6.86 t/ha and 8.95 t/ha for PBA Bendoc and PBA Samira, respectively. The effect of the herbicide treatments on plant growth was generally

more severe in the conventional variety PBA Samira than the Group B tolerant variety PBA Bendoc (Table 2). PBA Samira incurred significant biomass reduction from all the herbicide treatments except PSPE application of SU1 and Imi2, and in-crop application of Imi2 at flowering and Sulf at 8 node and flowering stages (Table 2). Similarly, all herbicide treatments except SU1 and Imi2 applied at PSPE significantly reduced plant height. In-crop application of SU2 resulted in plant death (Table 2). In comparison, PBA Bendoc had no significant biomass reduction from all herbicide treatments except in-crop application of of SU2 (Table 2). Similarly, PBA Bendoc had significant plant height reduction only from in-crop application of 4 gai/ha of SU2 and 10 gai/ha of SU1 (Table 2).

- Grain yield and Harvest index: There was significant herbicide treatment by variety interaction for grain yield. The grain yields of the varieties were similar, 4.5 t/ha, in the nil treatments. PBA Samira incurred significant yield loss from all the herbicide treatments except 10 gai/ha of SU1 applied at PSPE and 70 gai/ha of imazethapyr applied at PSPE and flowering (Table 3). PBA Samira incurred severe yield loss (86-100%) from 4 gai/ha of SU2 applied at all timings and 10 gai/ha of SU1 applied in-crop (Table 3). In contrast, PBA Bendoc showed improved tolerance and did not have significant yield loss from most herbicide treatments except in-crop application of SU2 and SU1 (Table 3). In-crop application of SU2 caused the highest yield loss in PBA Bendoc. PBA Bendoc recovered from moderate herbicide damage caused by some of the herbicide treatments and produced grain yield equivalent to the nil treatment. In both varieties, the significant yield loss from some of the treatments despite insignificant biomass reduction was due to flower loss.

Harvest index was significantly influenced by variety and herbicide treatment. Averaged across varieties, harvest index was severely reduced by in-crop application of sulfonylurea herbicides. Among the varieties, PBA Bendoc had higher harvest index than PBA Samira (Table 3).

Table 2. Effect of various Group B herbicides and application timings on **A**. visual herbicide damage scores (0 – no damage, 100 – complete plant death), **B**. Plant height and biomass at maturity and **C.** Grain yield (t/ha) and harvest index of Group B tolerant faba bean variety PBA Bendoc compared with PBA Samira at Horsham in 2019.

**A.**

| | | Plant height (cm) | | Biomass at Maturity (t/ha) | |
|---|---|---|---|---|---|
| **Active ingredient (g/ha)** | **Application Timing** | **PBA Bendoc** | **PBA Samira** | **PBA Bendoc** | **PBA Samira** |
| Nil (0) | | 76 | 84 | 6.86 | 8.95 |
| **Sulfonylureas** | | | | | |
| SU2 | PSPE | 73 | 36 | 7.43 | 1.83 |
| | 4 node | 42 | 0 | 3.83 | 0.00 |
| | 8 node | 39 | 0 | 3.09 | 0.00 |
| | Flowering | 34 | 0 | 2.58 | 0.00 |
| SU1 | PSPE | 78 | 81 | 8.26 | 7.32 |
| | 4 node | 47 | 37 | 6.44 | 3.06 |
| | 8 node | 65 | 40 | 7.85 | 2.91 |
| | Flowering | 55 | 32 | 5.50 | 2.28 |
| **Imidazolinones** | | | | | |
| Imi1 | PSPE | 75 | 78 | 8.80 | 6.30 |
| | 4 node | 77 | 44 | 6.32 | 3.83 |
| | 8 node | 76 | 64 | 8.60 | 6.25 |
| | Flowering | 78 | 62 | 7.46 | 5.37 |
| Imi2 | PSPE | 81 | 79 | 8.95 | 7.53 |
| | 4 node | 80 | 62 | 9.38 | 6.18 |
| | 8 node | 78 | 60 | 7.12 | 6.06 |
| | Flowering | 77 | 74 | 7.77 | 8.12 |
| **Sulfonamide** | | | | | |
| Sulf | PSPE | 75 | 58 | 7.19 | 4.08 |
| | 4 node | 72 | 63 | 8.02 | 6.07 |
| | 8 node | 78 | 62 | 9.56 | 6.92 |
| | Flowering | 72 | 62 | 8.28 | 6.72 |
| LSD $_{ChemTrt}$ (P<0.05) | | *4* | | *1.87* | |
| LSD $_{Var}$ (P<0.05) | | *1* | | *0.50* | |
| LSD $_{ChemTrt*Var}$ (P<0.05) | | 6 | | 2.44 | |

**B.**

| Active ingredient (g/ha) | Application Timing | Herbicide Damage (0-100) PBA Bendoc | PBA Samira |
|---|---|---|---|
| Nil (0) | | 0 | 0 |
| **Sulfonylureas** | | | |
| SU2 | PSPE | 18 | 72 |
| | 4 node | 88 | 100 |
| | 8 node | 95 | 100 |
| | Flowering | 92 | 100 |
| SU1 | PSPE | 2 | 8 |
| | 4 node | 80 | 97 |
| | 8 node | 67 | 97 |
| | Flowering | 67 | 93 |
| **Imidazolinones** | | | |
| Imi1 | PSPE | 0 | 3 |
| | 4 node | 5 | 85 |
| | 8 node | 2 | 77 |
| | Flowering | 13 | 62 |
| Imi2 | PSPE | 0 | 8 |
| | 4 node | 0 | 58 |
| | 8 node | 2 | 65 |
| | Flowering | 10 | 25 |
| **Sulfonamide** | | | |
| Sulf | PSPE | 10 | 52 |
| | 4 node | 20 | 47 |
| | 8 node | 15 | 68 |
| | Flowering | 18 | 65 |
| LSD $_{ChemTrt}$ (P<0.05) | | *5* | |
| LSD $_{Var}$ (P<0.05) | | *2* | |
| LSD $_{ChemTrt*Var}$ (P<0.05) | | 8 | |

**C.**

| | | Grain Yield (t/ha) | | Harvest Index | |
|---|---|---|---|---|---|
| **Active ingredient (g/ha)** | **Application Timing** | **PBA Bendoc** | **PBA Samira** | **PBA Bendoc** | **PBA Samira** |
| Nil (0) | | 4.49 | 4.50 | 0.66 | 0.51 |
| **Sulfonylureas** | | | | | |
| SU2 | PSPE | 3.91 | 0.49 | 0.53 | 0.36 |
| | 4 node | 0.99 | 0.00 | 0.27 | 0.00 |
| | 8 node | 0.43 | 0.00 | 0.17 | 0.00 |
| | Flowering | 0.20 | 0.00 | 0.09 | 0.00 |
| SU1 | PSPE | 4.40 | 4.08 | 0.54 | 0.59 |
| | 4 node | 2.08 | 0.61 | 0.32 | 0.27 |
| | 8 node | 2.03 | 0.40 | 0.26 | 0.14 |
| | Flowering | 1.37 | 0.20 | 0.26 | 0.09 |
| **Imidazolinones** | | | | | |
| Imi1 | PSPE | 4.38 | 3.74 | 0.50 | 0.60 |
| | 4 node | 4.63 | 1.30 | 0.61 | 0.34 |
| | 8 node | 4.89 | 2.01 | 0.58 | 0.32 |
| | Flowering | 4.59 | 2.21 | 0.64 | 0.43 |
| Imi2 | PSPE | 4.75 | 4.00 | 0.53 | 0.57 |
| | 4 node | 4.42 | 2.88 | 0.45 | 0.49 |
| | 8 node | 4.13 | 2.24 | 0.59 | 0.41 |
| | Flowering | 4.52 | 3.98 | 0.58 | 0.49 |
| **Sulfonamide** | | | | | |
| Sulf | PSPE | 4.19 | 1.57 | 0.60 | 0.38 |
| | 4 node | 4.43 | 3.17 | 0.56 | 0.52 |
| | 8 node | 5.18 | 3.15 | 0.53 | 0.47 |
| | Flowering | 4.68 | 2.66 | 0.58 | 0.41 |
| LSD $_{ChemTrt}$ (P<0.05) | | *0.68* | | *0.11* | |
| LSD $_{Var}$ (P<0.05) | | *0.09* | | *0.04* | |
| LSD $_{ChemTrt*Var}$ (P<0.05) | | 0.73 | | ns | |