

## Samples Received

The testing service screened 143 samples in 2025, similar to the 142 received last year but well below the average of 246 sample per year since the service started in 1991. This is a similar number supplied in several other years during the time of this service. Samples were supplied by 35 different stores or companies with an additional 14 samples supplied directly from farmers.

As usually occurs most samples were ryegrass, however this year a significant number of wild oat samples were also received. Wild oats comprised 41% of samples, the third highest percentage received behind only 2021 and 2022. Wild radish was the third most commonly received species with nine samples. Samples of sowthistle (3), phalaris (3), fleabane (2), brome grass (1), barley grass (1) and wild turnip (1) were also received and tested (Table 1).

Table 1: Total number of samples received since 2023

|                 | 2023      | 2024       | 2025       | 2026       |
|-----------------|-----------|------------|------------|------------|
| Annual ryegrass | 59        | 79         | 70         | 63         |
| Wild oats       | 15        | 52         | 49         | 59         |
| Wild radish     | 6         | 0          | 4          | 9          |
| Phalaris        | 1         | 2          | 13         | 3          |
| Other grass     | 0         | 0          | 5          | 2          |
| Other broadleaf | 0         | 0          | 1          | 7          |
| <b>Total</b>    | <b>81</b> | <b>136</b> | <b>142</b> | <b>143</b> |

## **Summary of Results**

The results obtained from the 2026 resistance screening are similar in most cases to the results from previous years.

### Annual ryegrass

This year, 63 annual ryegrass samples were tested resulting in a total of 398 individual herbicide tests undertaken (Table 2). Of 59 samples tested to five or more herbicides none were tested to the standard cross-resistance test (Hoegrass, Select, Glean, simazine and trifluralin), eleven changed both herbicides within a group and herbicide groups while still only testing five herbicides. The remaining 48 samples either added another herbicide group to the standard groups (2 samples) while 46 changed and added herbicides and groups with up to six additional

herbicides. The most requested herbicides for testing were Select (62 samples) and Roundup (59), followed by Sakura (42 samples), trifluralin (34) and Gramoxone (34). In total 26 different herbicides were screened, along with two aftermarket mixtures showing the customisation of testing by growers or agronomists. The most tested mixture was Roundup and Select with 16 samples with Select and Factor tested to 8 samples.

One sample was tested to only two herbicides, two to three herbicides and one to four herbicides. Thirteen were tested to the standard number of five herbicides, 21 to six, 17 to seven herbicides while one sample was tested to eight herbicides, three to nine and four to eleven herbicides.

Table 2: Number of samples tested to each of seven herbicide groups since 2023

| Group    | 2023 | 2024 | 2025 | 2026 |
|----------|------|------|------|------|
| 1 (fops) | 20   | 28   | 14   | 11   |
| 1 (dims) | 73   | 84   | 72   | 73   |
| 1 (dens) | 12   | 15   | 3    | 18   |
| 2 (SU)   | 23   | 24   | 7    | 17   |
| 2 (Imi)  | 28   | 28   | 20   | 17   |
| 2 (SA)   | 3    | 2    | 2    | 2    |
| 3        | 45   | 58   | 64   | 39   |
| 5        | 36   | 24   | 19   | 16   |
| 9        | 52   | 78   | 67   | 59   |
| 15       | 38   | 79   | 98   | 78   |
| 22       | 13   | 45   | 42   | 34   |

Only 73% of samples tested to a 'fop' herbicide were classed as resistant or developing resistance the lowest percentage since 2001 (Table 3). As in usually the case in recent years, many samples were not tested to the 'fop', or Group 2 herbicides unless specifically requested by the client and as such many of the samples not tested to these groups would most likely be resistant (Table 2).

Twelve percent of samples tested to a 'dim' herbicide were resistant or developing resistance, with only 7% resistant this was the lowest level of 'dim' resistance recorded by the tested service (Table 3). For the third consecutive year all samples screened to 'dim' herbicides were screened to Select and/or Factor and the results for these herbicides were similar to 2022 and 2023. Of the 18 samples screened to Axial 84% were resistant or developing resistance.

Overall, 71% of samples were resistant or developing resistance to a Group 2 herbicide, with 53% to the sulfonylureas and 88% to an imidazolinone (Table 3). As mentioned previously the proportion of samples being tested to the sulfonylureas is decreasing and those samples received but not tested could be more likely to be resistant.

Table 3: Percentage of samples resistant or developing resistance to each herbicide groups since 2023

|          | 2023 | 2024 | 2025 | 2026 |
|----------|------|------|------|------|
| 1 (fops) | 100  | 93   | 93   | 73   |
| 1 (dims) | 13   | 9    | 31   | 12   |
| 1 (dens) | 100  | 94   | 100  | 84   |
| 2 (SU)   | 78   | 65   | 86   | 53   |
| 2 (Imi)  | 68   | 54   | 75   | 88   |
| 3        | 4    | 0    | 2    | 3    |
| 5        | 0    | 0    | 0    | 0    |
| 9        | 21   | 49   | 55   | 37   |
| 15       | 0    | 0    | 0    | 0    |
| 22       | 0    | 2    | 0    | 0    |

Three percent of samples tested were developing resistance to a Group 3 herbicide while none were resistant to a Group 5, 15 or 22 herbicide (Table 3).

Like recent years the most concerning finding is that over one third of the samples tested to Roundup were resistant or developing resistance, (Table 3; 7). For the eighth consecutive year over 20% of samples were resistant or developing resistance to this herbicide, one of, if not the most important herbicides available. Some of these samples have been provided from non-agricultural settings (eg. roadsides, firebreaks) which will increase the risk profile for resistance

#### Cross and Multiple Resistance

Forty-three samples were screened to five or more herbicide groups. However, only two samples were sprayed to the five standard selective herbicide groups ('fop', 'dim', 2, 3 and 5). Of these, both were resistant to the 'fops' and one was developing resistance to trifluralin with no other resistance. Twenty samples were tested to less than five herbicide groups, 15 of which were tested to five or more herbicides (6 herbicides – 6 samples; 5 herbicides – 9 samples). Of these 15 samples, four were susceptible to all tested groups, five were resistant to one group, four to two groups and one to three groups (Table 4).

Of the 43 samples tested to five or more groups, 15 were susceptible to all herbicide groups, 15 resistant to only one group while seven were resistant to two, five to three and one to four groups (Table 4).

The limited testing of the Group 1 'fops' and/or 2 which have the highest level of resistance (Table 3) suggests that the farmers or their agronomists are acknowledging populations are resistant to these groups and are investigating the susceptibility of alternative herbicide groups. With all 63 samples tested to two or more groups only eight were tested to both 'fop' and Group 2 herbicides and 35 to neither, it is probable that many of the 55 samples not tested to both would be resistant to an additional one or two herbicide groups.

Table 4: Number of herbicide groups tested and the number of resistant groups for ryegrass samples

| Resistant groups | 2 | 3 | 4  | 5  | 6 | 7 | 9 | 10 |
|------------------|---|---|----|----|---|---|---|----|
| 0                | 0 | 0 | 4  | 14 | 0 | 0 | 0 | 1  |
| 1                | 1 | 3 | 5  | 10 | 2 | 1 | 1 | 1  |
| 2                | 0 | 2 | 4  | 2  | 4 | 0 | 1 | 0  |
| 3                | * | 0 | 1  | 4  | 1 | 0 | 0 | 0  |
| 4                | * | * | 0  | 0  | 1 | 0 | 0 | 0  |
| 5                | * | * | *  | 0  | 0 | 0 | 0 | 0  |
| Total            | 1 | 5 | 14 | 30 | 8 | 1 | 2 | 2  |

#### Herbicide Groups

Among all samples there were major differences between the various groups and in some cases within the different herbicide groups.

#### Group 1 herbicides

Select was the main herbicide tested, samples were also screened to Hoegrass, Verdict, Topik, Factor and Axial (Table 5).

Table 5: Results for ryegrass samples showing percentage resistant (Res) or developing resistance (DR) to individual Group 1 herbicides.

|               | Tested | Res | DR | %          | Susc |
|---------------|--------|-----|----|------------|------|
| <i>'fops'</i> |        |     |    |            |      |
| Hoegrass      | 2      | 2   | 0  | <b>100</b> | 0    |
| Verdict       | 7      | 5   | 0  | <b>71</b>  | 2    |
| Topik         | 2      | 1   | 0  | <b>50</b>  | 1    |
| <i>'dims'</i> |        |     |    |            |      |
| Select        | 62     | 5   | 4  | <b>14</b>  | 53   |
| Factor        | 11     | 0   | 0  | <b>0</b>   | 11   |
| <i>'den'</i>  |        |     |    |            |      |
| Axial         | 18     | 14  | 1  | <b>84</b>  | 3    |

#### Group 2 herbicides

While most of the samples screened to Group 2 herbicides were screened to Intervix, samples were also screened to Glean, Logran, Atlantis and Rexade (Table 6).

## Other herbicides

Annual ryegrass samples were screened to 14 other herbicides: trifluralin, Stomp, Kerb, simazine, atrazine, Arcade, Boxer Gold, Sakura, Avadex Xtra, Overwatch, Basta, Mateno Complete, Gramoxone and Roundup. Except for, as previously mentioned for Roundup, the observed incidence of resistance to these herbicides was lower than the resistance to the higher risk Group 1 and 2 herbicides (Table 7).

Table 6: Results for ryegrass samples screened to individual Group 2 herbicides

|                       | Tested | Res | DR | %          | Susc |
|-----------------------|--------|-----|----|------------|------|
| <i>Sulfonylureas</i>  |        |     |    |            |      |
| Glean                 | 2      | 0   | 0  | <b>0</b>   | 2    |
| Logran                | 5      | 0   | 0  | <b>0</b>   | 5    |
| Atlantis              | 7      | 7   | 0  | <b>100</b> | 0    |
| <i>Imidazolinones</i> |        |     |    |            |      |
| Intervix              | 17     | 13  | 2  | <b>88</b>  | 2    |
| <i>Sulfonamides</i>   |        |     |    |            |      |
| Rexade                | 2      | 1   | 0  | <b>50</b>  | 1    |

Twenty two of the 59 samples tested to Roundup were found to be resistant or developing resistance. No samples were resistant or developing resistance to the Roundup+Select or Select+Factor mixtures. One sample was developing resistance to trifluralin, but no samples were resistant to Kerb or any of the Group 5 or 15 herbicides.

Table 7: Results for ryegrass samples screened to other herbicide groups.

|                 | Tested | Res | DR | %         | Susc |
|-----------------|--------|-----|----|-----------|------|
| <i>Group 3</i>  |        |     |    |           |      |
| Trifluralin     | 34     | 0   | 1  | <b>3</b>  | 33   |
| Stomp           | 1      | 0   | 0  | <b>0</b>  | 1    |
| Kerb            | 4      | 0   | 0  | <b>0</b>  | 4    |
| <i>Group 5</i>  |        |     |    |           |      |
| Simazine        | 2      | 0   | 0  | <b>0</b>  | 2    |
| Atrazine        | 14     | 0   | 0  | <b>0</b>  | 14   |
| <i>Group 9</i>  |        |     |    |           |      |
| Roundup         | 59     | 15  | 7  | <b>37</b> | 37   |
| <i>Group 15</i> |        |     |    |           |      |
| Arcade          | 15     | 0   | 0  | <b>0</b>  | 15   |
| Boxer Gold      | 19     | 0   | 0  | <b>0</b>  | 19   |
| Sakura          | 42     | 0   | 0  | <b>0</b>  | 42   |
| Avadex Xtra     | 2      | 0   | 0  | <b>0</b>  | 2    |
| <i>Group 22</i> |        |     |    |           |      |
| Gramoxone       | 34     | 0   | 0  | <b>0</b>  | 34   |

One sample was tested to Basta, four to Mateno Complete and five to Overwatch with all susceptible. With significant levels of resistance to other herbicides all of these herbicides are very important, and need to be managed well, through crop and herbicide rotations in conjunction with non-chemical

weed control to maintain their effectiveness for as long as possible.

## State by State

New South Wales and Western Australia supplied all but six samples, with the other samples received from Queensland (3), Tasmania (2) and Victoria (1) (Table 8).

Due to low numbers received from other states only the data for NSW and WA has been analysed separately (Figure 1) and then only for the herbicide groups where more than 10 samples were tested for each state and resistance was detected (1 'dim' and 9) with the extent of resistance similar for both states (Figure 1). This was also reported for the Group 2 herbicides although only three tests were conducted on samples from WA compared with 28 for NSW samples (NSW 71%; WA 67%).

Table 8: Number of ryegrass samples received from each state since 2021.

|     | 2022 | 2023 | 2024 | 2025 | 2026 |
|-----|------|------|------|------|------|
| NSW | 48   | 38   | 44   | 24   | 32   |
| Vic | 5    | 0    | 2    | 2    | 1    |
| SA  | 2    | 1    | 2    | 0    | 0    |
| WA  | 56   | 19   | 25   | 44   | 25   |
| Tas | 1    | 1    | 1    | 0    | 2    |
| Qld | 0    | 0    | 5    | 0    | 3    |

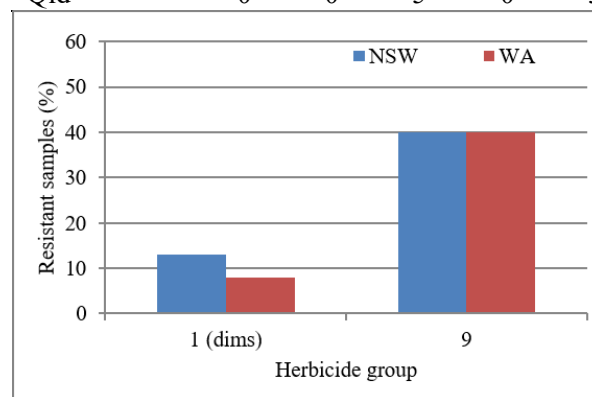


Figure 1: Percentage of ryegrass samples from NSW and WA resistant and developing resistance to selected herbicide groups

## Wild Oats

The number of wild oat samples (59) received was as a percentage (41%) than all but two years, in two of which wild oats resistance screening had been sponsored by Corteva (Table 9). All wild oat samples were received from NSW (47) and Qld (12).

The level of 'fop' resistance was 40%, similar to 2025 but lower than the two years previous (Table 10). Forty-three samples were tested to Topik (26 resistant or developing resistance), 22 to Verdict (5 resistant) and 20 to Elantra Xtreme (5 resistant. For

the 'dim' herbicides, none of the 54 samples tested to Select were resistant or developing resistance, while resistance was recorded in nine of the 36 samples were tested to Axial (Table 10).

Table 9: Number of wild oat samples received and percentage of total samples since 2022

|            | 2022 | 2023 | 2024 | 2025 | 2026 |
|------------|------|------|------|------|------|
| Total      | 232  | 81   | 136  | 142  | 143  |
| Wild oats  | 99   | 15   | 52   | 49   | 59   |
| Percentage | 42.9 | 18.5 | 38.2 | 34.5 | 41.3 |

No samples tested to Atlantis (43), Intervix (29), Rexade (24), Atrazine (7), Avadex (21), Sakura (1), Mataven (6), Gramoxone (7) or Roundup (17) were resistant.

Table 10: Percentage of wild oat samples found to be resistant or developing resistance since 2023 (number tested in brackets)

|          | 2023<br>% (no.) | 2024<br>% (no.) | 2025<br>% (no.) | 2026<br>% (no.) |
|----------|-----------------|-----------------|-----------------|-----------------|
| 1 'fops' | 45 (11)         | 72 (67)         | 40 (47)         | 42 (85)         |
| 1 'dims' | 0 (14)          | 2 (51)          | 0 (30)          | 0 (56)          |
| 1 'dens' | 18 (11)         | 27 (41)         | 21 (38)         | 25 (36)         |
| 2        | 0 (14)          | 5 (20)          | 0 (86)          | 0 (96)          |

Resistance was higher in Qld samples for two herbicides (Verdict and Axial), however with only eight and six Qld samples tested to Verdict and Axial respectively compared with 18 and 19 from NSW care needs to be taken when considering these results (Figure 2).

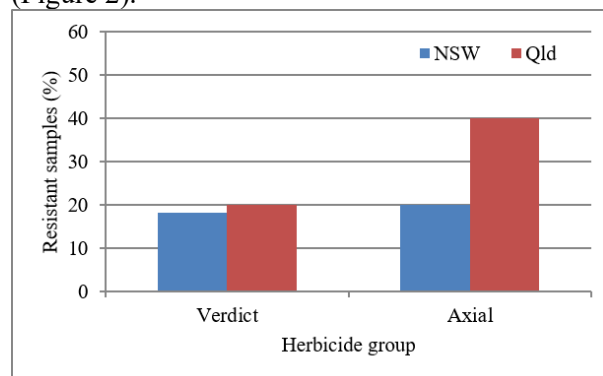


Figure 2: Percentage of wild oat samples from NSW and Qld resistant and developing resistance to selected herbicides

### Broadleaf species

Nine wild radish samples, all from WA, were provided for resistance screening. Resistance or developing resistance was detected to Intervix (2/5), and Brodal (4/4). No samples were resistant to atrazine (1), 2,4-D Amine (4), MCPA LVE 570 (7), Ester 680 (3), Velocity (4), Jaguar (1) Sniper (3) or Roundup (8).

The one wild turnip sample was resistant to Logran and susceptible to Roundup while one of the two fleabane samples was resistant to Sprayseed. The one sowthistle sample tested to date was susceptible to Ally, Intervix, Terbyne, Precept and Roundup. Testing of the other two sow thistle samples is still in progress.

### Other species

Three phalaris samples and one of barley grass and brome grass were received. Resistance was found to Verdict in the barley grass sample and developing resistance to Rexade in a phalaris sample (2 tested). No resistance was recorded to Topik (phalaris), Select (all species), Axial (phalaris), Atlantis (brome grass), Intervix (brome grass) or Roundup (phalaris).

### **Final Observations**

- As normal NSW and WA supplied the most annual ryegrass samples, and all wild oats samples were received from either NSW or Qld.
- For ryegrass samples the level of resistance remained similar to previous years for the major herbicide groups.
- Over a third of ryegrass samples were resistant or developing resistance to Roundup. This is a major concern.
- Wild oat resistance was similar to last year, but a higher number of tests were conducted.
- Resistance was recorded in most of the other species tested.

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Testing forms and annual reports are available at:

<https://www.csu.edu.au/research/gulbali/research/agricultural-innovation/herbicide-resistance>

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