

# Farrer Centre 2001 Herbicide Resistance Testing Service Report

## Samples Received

For the 2001 resistance testing 579 samples were received, nearly a 200 % increase on the number of samples received in 2000. This was the result of the DowTester program which provided 409 samples. The Farrer Centre (FC) still received 170 samples direct from farmers or agents, this was only a slight decrease on the number received in 2000. The majority of these samples were annual ryegrass but a number of wild oat and wild radish samples were received (Table 1).

Table 1: Number of samples received since 1999

	1999	2000	2001
Annual ryegrass	153	159	555
Wild oats	14	32	20
Wild radish		1	4
Brome grass	1	2	
Total	168	194	579

## Summary of Results

The results obtained from the 2001 resistance screening differ markedly in some areas from previous years. This was expected even before the testing had commenced.

Previously all samples received for testing were from paddocks where resistance was **suspected** and the testing was to confirm initial suspicions. This year a large number of samples were provided through the DowTester 2000 program and while resistance would have been suspected in some of these paddocks in many cases the sample was provided for testing because the tests were provided **free** to the farmer.

Two levels of testing were provided through the DowTester program; Group A only, and a full test, depending on the amount of product purchased by the farmer during 2000.

### Annual ryegrass

The DowTester program provided 401 ryegrass samples, of which 172 were tested to the Group A herbi-

cides only. This resulted in over 500 samples being tested for resistance to Group A herbicides and over 300 tests conducted for the three other groups in the standard cross-resistance test (Table 2).

Table 2: Number of samples tested to each of five herbicide groups

	1999	2000	2001
A (fops)	158	149	537
A (dims)	146	147	531
B	121	132	357
C	110	126	330
D	112	125	342

Sixty five percent of the samples tested to a ‘fop’ herbicide were classed as either resistant or developing resistance to that herbicide (Table 3). This is markedly below the results of previous years but the cause of this has been previously explained. However, 87% of samples provided direct to the Farrer Centre were either resistant or developing resistance to a ‘fop’, compared to 56% via DowTester 2000 (Figure 1).

Thirty four percent of samples tested to a ‘dim’ herbicide were classed as resistant or developing resistance. The level of ‘dim’ resistance was comparable between the methods of sample receipt (Table 3, Figure 1).

Thirty one percent of samples were resistant to Group B herbicides. This was higher among the Farrer Centre samples than the DowTester samples. One percent of samples were resistant to simazine (Group C) and eight percent were resistant to trifluralin (Group D) (Table 3, Figure 1).

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

	1999	2000	2001
A (fops)	95	98	65
A (dims)	20	15	34
B	41	32	31
C	2	1	1
D	19	10	8

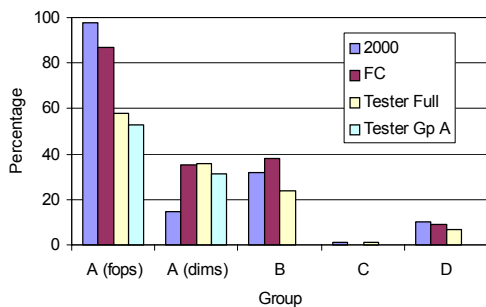


Figure 1: Percentage of samples resistant or developing resistance to each of five herbicide groups from three collection groups.

Figure 1 shows that although the level of resistance to the ‘fop’ herbicides was lower in the DowTester samples the level of ‘dim’ resistance was similar. The level of ‘fop’ resistance detected among the Dow samples was either 60 (group A) or 66 (full) percent of that detected in the Farrer Centre samples. For the ‘dim’ herbicides this was 88 (group A) and 103 (full) percent of the Farrer Centre samples.

Comparison of the level of resistance to only Select amongst the ‘dims’ further emphasises this finding. Thirty-one percent of Farrer Centre samples were resistant to Select compared to 36% of Dow full tests and 32% of Dow group A tests. To participate in DowTester farmers had to purchase either \$2500 (group A only) or \$5000 (full) of Verdict, a herbicide for canola and legume crops. The higher level of resistance to Select, another canola and legume herbicide, detected from the DowTester full tests may be the result of a greater emphasis on canola and legumes among the farmers who bought sufficient Verdict to entitle themselves to the full test.

Resistance to the Group B herbicides was lower in the DowTester samples than in Farrer Centre samples. The major Group B herbicides tested were Glean and Logran. These are used in cereal crops and a increased emphasis on canola or legumes within a rotation is less likely to have an effect on the resistance level of the samples. This was 63 percent of the level of resistance found in the Farrer Centre samples a similar percentage as found in the ‘fop’ herbicides (Figure 1).

### Cross Resistance

The samples received can be divided into several categories when determining the level of cross or multiple resistance. These categories are; Dow full test, Dow Group A test and Farrer Centre cross resistance test.

340 samples were tested to five herbicide groups (Dow full and Farrer Centre cross resistance tests). Of the 340 samples, 45 percent were resistant or developing resistance to two or more herbicides with two samples resistant to four of the groups tested. These samples can be further divided into the two different tests with 229 samples in the Dow tests and 112 from the Farrer Centre tests). In addition 172 samples were tested in the Dow Group A test (Table 4).

Table 4: Results of cross resistance screening showing percentage of samples resistant or developing resistance to different groups and number of tests in each group.

No. of groups	2001				
	DowTester				
	2000 (%)	Total (%)	FC (%)	Full (%)	Gp A (%)
5	0.0	0.0	0	0	na
4	2.5	0.6	0	0.9	na
3	10.8	11.2	10.8	11.4	na
2	35.8	34.4	46.0	28.1	28.5
1	48.4	32.4	36.0	30.6	32.0
0	2.5	21.4	7.2	28.4	39.5
No. of samples	120	340	111	229	172

The samples sent direct to the Farrer Centre had the highest level of cross resistance with over half (56.8%) of samples resistant to two or more herbicide groups and only 7.2% of samples susceptible to all herbicide groups. In comparison 39.5% of Dow full test samples were resistant to two or more groups and 28.4% (full test) or 39.5% (group A) samples were susceptible to all herbicides.

### State by State

Samples were received from five states with the majority of samples coming from four of these, one sample was sent in from Queensland (Table 5).

Table 5: Number of samples received from each state.

	NSW	Vic	SA	WA
DowTester	117	113	98	72
Direct to FC	84	36	29	2
Total	201	149	127	74

The level of resistance detected in samples from New South Wales and Victoria was similar for all herbi-

cide groups except trifluralin. Western Australia had similar results to New South Wales except for ‘fops’ which were lower. South Australia had a similar level of ‘fop’ resistance to Western Australia, and had the lowest level of resistance to all but trifluralin which was level to Victoria (Figure 2). These results were repeated when the samples were divided into DowTester and non-DowTester samples with the exception of Victoria having a lower level of group B resistance for DowTester samples than NSW and WA (Figures 3, 4).

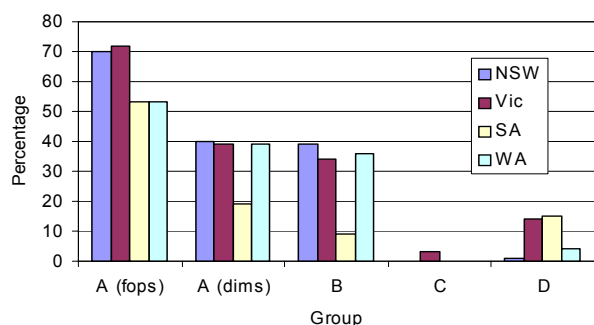


Figure 2: Percentage of samples resistant and developing resistance for each state.

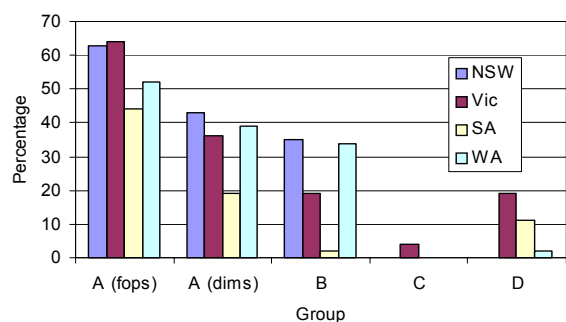


Figure 3: Percentage of DowTester samples resistant and developing resistance for each state.

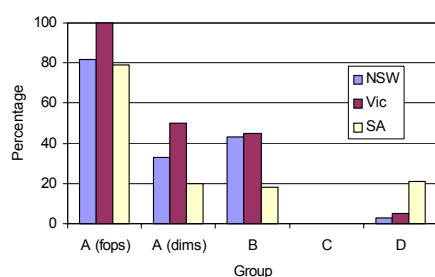


Figure 4: Percentage of samples sent direct to Farrer Centre resistant and developing resistance for each state.

### Group A herbicides

The data below for Hoegrass and Verdict appear markedly different. Previous Farrer Centre trials have shown **100% correlation** between Hoegrass and Verdict resistance in annual ryegrass. The difference here is the result of the different methods via which the samples were provided. All Hoegrass samples were provided direct to the Farrer Centre while all but two

Verdict samples came via DowTester. A comparison of Figure 1 and Table 6 confirms this explanation.

While Hoegrass, Verdict and Select were the main herbicides tested, samples were also screened to Sertin and Achieve. All herbicides had samples which exhibited either resistance (Res) or developing resistance (DR) to them (Table 6).

Table 6: Results for individual Group A herbicides showing percentage resistant or developing resistance to each herbicide.

	Tested	Res	DR	%	Susc
<i>'fops'</i>					
Hoegrass	134	103	14	<b>87</b>	17
Verdict	403	186	43	<b>57</b>	174
<i>'dims'</i>					
Select	500	104	64	<b>34</b>	332
Sertin	22	6	2	<b>36</b>	14
Achieve	9	9	0	<b>100</b>	0

### Group B herbicides

Glean, Logran, On Duty and Oust were screened from the Group B herbicides (Table 7).

Table 7: Results for individual Group B herbicides

	Tested	Res	DR	%	Susc
Glean	239	39	36	<b>31</b>	164
Logran	105	15	8	<b>22</b>	82
On Duty	4	4	0	<b>100</b>	0
Oust	1	1	0	<b>100</b>	0

### Other herbicides

Annual ryegrass samples were screened to five other herbicides, simazine, atrazine, trifluralin, Stomp and Roundup. As these are low risk herbicides for the development of resistance the level of resistance was lower than for the Group A and B herbicides (Table 8).

Table 8: Results for other herbicides

	Tested	Res	DR	%	Susc
<i>Group C</i>					
Simazine	311	0	2	<b>1</b>	309
Atrazine	19	0	0	<b>0</b>	19
<i>Group D</i>					
Trifluralin	340	9	17	<b>8</b>	314
Stomp	2	0	0	<b>0</b>	2
<i>Group M</i>					
Roundup	4	0	0	<b>0</b>	4

## Wild Oats

The level of herbicide resistance detected in samples tested in 2001 was lower than in 2000 for the 'fop' herbicides. Eight of the samples were provided via DowTester and as such the possibility of resistance was expected to be lower as was experienced with the annual ryegrass. The level of 'fop' resistance among the non Dow samples was 78%, nearly identical to the 2000 figures. One sample was developing resistance to Select in 2001, as was the case in 2000, the reduced number of samples tested is the reason for the increased percentage. No samples were found to be resistant to On Duty, Mataven or Avadex BW (Table 9).

Table 9: Level of resistance (%) and number of wild oat samples in 2000 and 2001.

	2000		2001	
	%	Tested	%	Tested
A 'fops'	77	27	41	17
A 'dims'	4	25	8	12
On Duty	-	-	0	5
Mataven	0	25	0	7
Avadex BW	0	18	0	10

## Other weed species

Four wild radish samples were provided for resistance screening in 2001. The wild radish samples were variously screened to Simazine, Atrazine, Eclipse and Brodal, all of which controlled the respective samples.

## Final Observations

- Among the non Dow samples resistance levels remained constant apart from the 'dims' which increased. However, in 1998, 28% of samples were resistant to 'dims' so the increase may not be that great.
- The level of 'fop' and SU resistance was lower among the samples provided via DowTester compared to samples provided direct to the Farrer Centre.
- The level of 'dim' resistance, especially Select was equal or greater among the samples provided via DowTester compared to samples provided direct to the Farrer Centre.
- The linkage of DowTester samples to Verdict

purchases may have selected for samples with a greater possibility of resistance to 'dims' through a greater emphasis on canola and legume crops resulting in higher Sertin and Select use over past years.

- New South Wales and Victorian samples exhibited a higher level of resistance than South Australia and Western Australia.
- The level of 'dim' resistance compared to 'fop' resistance was highest in Western Australia possibly a reflection of a more intense use of 'dim' herbicides in wheat/lupin and wheat/canola rotations.
- A low level of group B resistance in South Australia. Maybe the result of higher pH soils in the cropping areas which result in long plant back periods after using SU herbicides.
- Higher trifluralin resistance in South Australia and Victoria. Possibly due to the use of fallow in areas in those states resulting in increased trifluralin use.

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