AUSTRALIAN Glyphosate Sustainability Working Group

Glyphosate Resistant Weeds in Australia.

Glyphosate resistance was first documented for annual ryegrass (*Lolium rigidum*) in 1996 in Victoria. Since then glyphosate resistance has been confirmed in 11 other weed species. Resistance is known in 8 grass species and 4 broadleaf species. There are 4 winter-growing weed species and 8 summer-growing weed species. The latter have been selected mainly in chemical fallows and on roadsides.

Weed species	Year first documented	Number of confirmed populations
Annual ryegrass (*Lolium rigidum*)	1996	858
Barnyard grass (*Echinochloa colona*)	2007	103
Liverseed grass (*Urochloa panicoides*)	2008	4
Fleabane (*Conyza bonariensis*)	2010	64
Windmill grass (*Chloris truncata*)	2010	11
Great brome (*Bromus diandrus*)	2011	5
Wild radish (*Raphanus raphanistrum*)	2013	2
Sowthistle (*Sonchus oleraceus*)	2014	28
Red brome (*Bromus rubens*)	2014	1
Sweet summer grass (*Brachiaria eruciformis*)	2014	1
Prickly lettuce (*Lactuca serriola*)	2014	1
Feathertop Rhodes grass (*Chloris virgata*)	2015	5
Tridax daisy (*Tridax procumbens*)	2016	1
Winter grass (*Poa annua*)	2017	2
Tall fleabane (*Conyza sumatrensis*)	2017	3
Willowleaf lettuce (*Lactuca saligna*)	2017	2
Barley grass (*Hordeum glaucum*)	2017	2

The most number of resistant populations is for annual ryegrass followed by barnyard grass and then fleabane.

Glyphosate resistant annual ryegrass has occurred in the following situations:

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	39	NSW
	Winter grains	556	Vic, SA, WA, NSW
	Summer grains	1	NSW
	Irrigated crops	1	SA
	Pasture	1	WA
Horticulture	Tree crops	14	NSW, SA
	Vine crops	26	SA, WA
	Vegetables	3	Vic
Other	Driveway	6	NSW, Vic, SA, WA
	Fence line /Crop margin	92	NSW, SA, Vic, WA
	Around buildings	2	NSW
	Irrigation channel /Drain	14	NSW, SA, Vic
	Airstrip	1	SA
	Railway	2	WA, NSW
	Roadside	100	SA, NSW, WA

Glyphosate resistant fleabane has occurred in the following situations:

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	16	NSW, Qld
Horticulture	Vineyard	1	SA
Other	Around buildings	1	NSW
	Irrigation channel /Drain	10	NSW
	Railway	3	NSW
	Roadside	33	SA, NSW, Qld, Vic

Glyphosate resistant awnless barnyard grass has occurred in the following situations:

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	100	NSW, Qld, WA
Other	Around buildings	1	NSW
	Irrigation channel /Drain	2	NSW, Qld

The glyphosate resistant windmill grass populations are from chemical fallows (3) and roadsides (8). The glyphosate-resistant liverseed grass, sowthistle, sweet summer grass and prickly lettuce populations occurred in summer chemical fallow situations. Glyphosate resistant feathertop Rhodes grass populations are from chemical fallows (3) and roadsides (2). Glyphosate resistant tall fleabane has occurred on roadsides. Glyphosate resistant winter grass has occurred in turf and glyphosate resistant

willowleaf lettuce has occurred in vegetables. Glyphosate resistant great brome, red brome and wild radish have occurred in winter grain cropping.

Glyphosate-resistant annual ryegrass populations by states:

State	Number of populations
NSW	244
SA	235
Vic	172
WA	207

Glyphosate-resistant fleabane populations by states:

State	Number of populations
NSW	38
QLD	13
SA	7
Vic	6

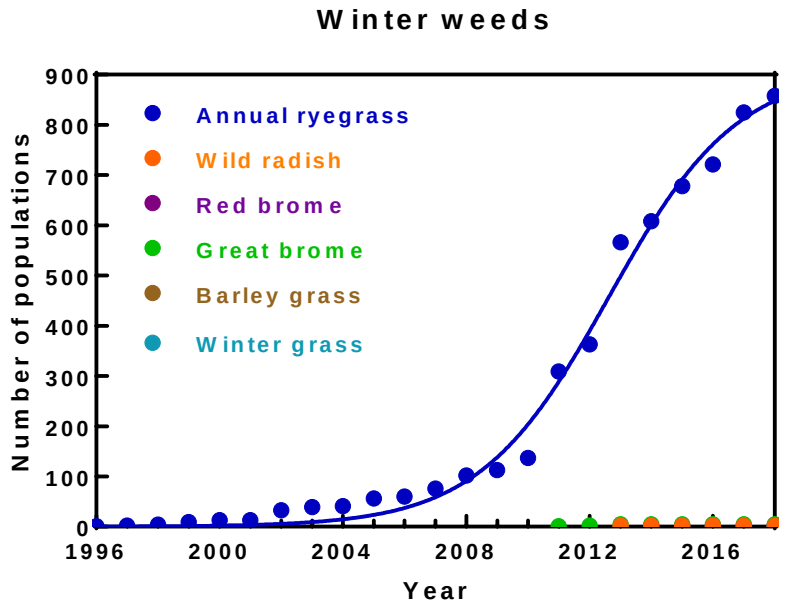
Glyphosate-resistant barnyard grass populations by states:

State	Number of populations
NSW	72
QLD	30
WA	1

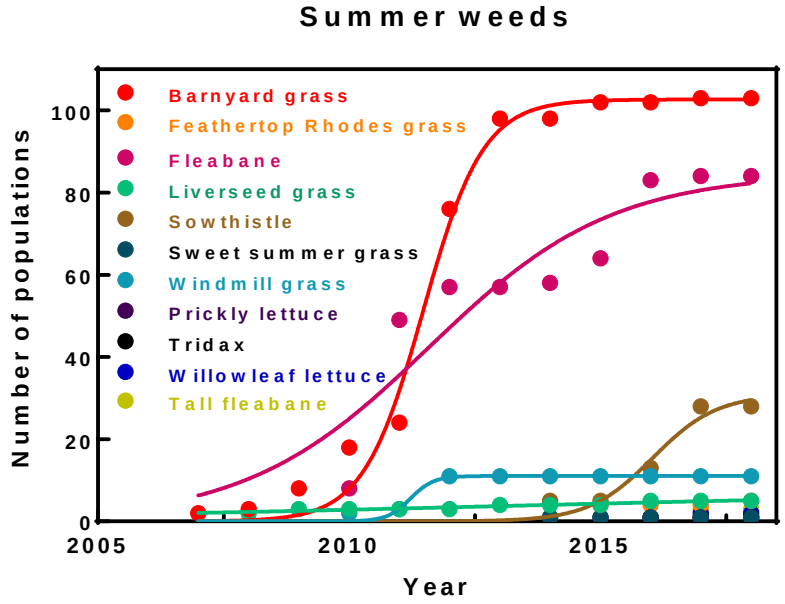
Glyphosate-resistant windmill grass populations by states:

State	Number of populations
NSW	4
VIC	6
WA	1

The increase in confirmed cases of glyphosate resistance in winter weeds between 1996 and 2018 is:



The increase in confirmed cases of glyphosate resistance in summer weeds between 2007 and 2018 is:



All of the glyphosate resistant weed populations have occurred in situations where there has been intensive use of glyphosate, often over 15 years or more, few or no other effective herbicides used and few other weed control practices are used. This suggests the following are the main risk factors for the evolution of glyphosate resistance:

- Intensive use of glyphosate – every year or multiple times a year for 15 years or more
- Heavy reliance on glyphosate for weed control
- No other weed controls

Farming practices in chemical fallows the northern cropping region are heavily dependent on glyphosate for weed control. Therefore, it is highly likely that unconfirmed populations of glyphosate resistant summer and winter weeds are present in this system.

Farming practices under the vines in vineyards across Australia are heavily dependent on glyphosate for weed control. Therefore, it is highly likely that unconfirmed populations of glyphosate resistant annual ryegrass are present in this system.

These unconfirmed glyphosate-resistant populations are not recorded on the register of glyphosate resistant populations in Australia.

Acknowledgements: I would like to thank all the weed researchers across Australia who have provided data used in maintaining this register.