Herbicide Resistance Update

Hart Field Site, 11 Mar 2026, Stanley Flat

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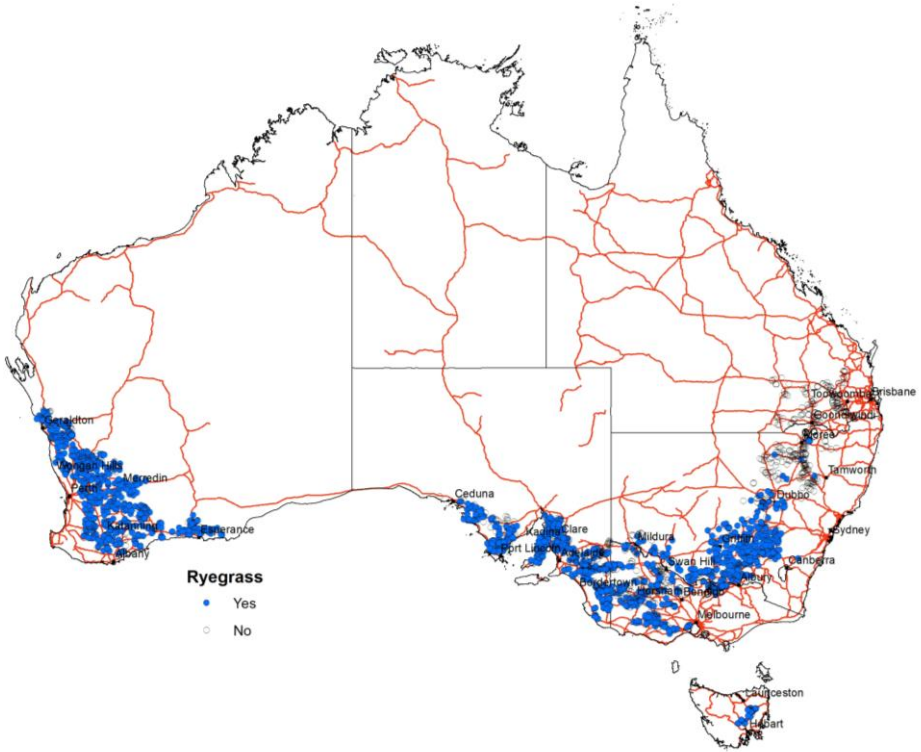
Plant Science Consulting

www.plantscienceconsulting.com.au

National Random Weed Survey (RWS)

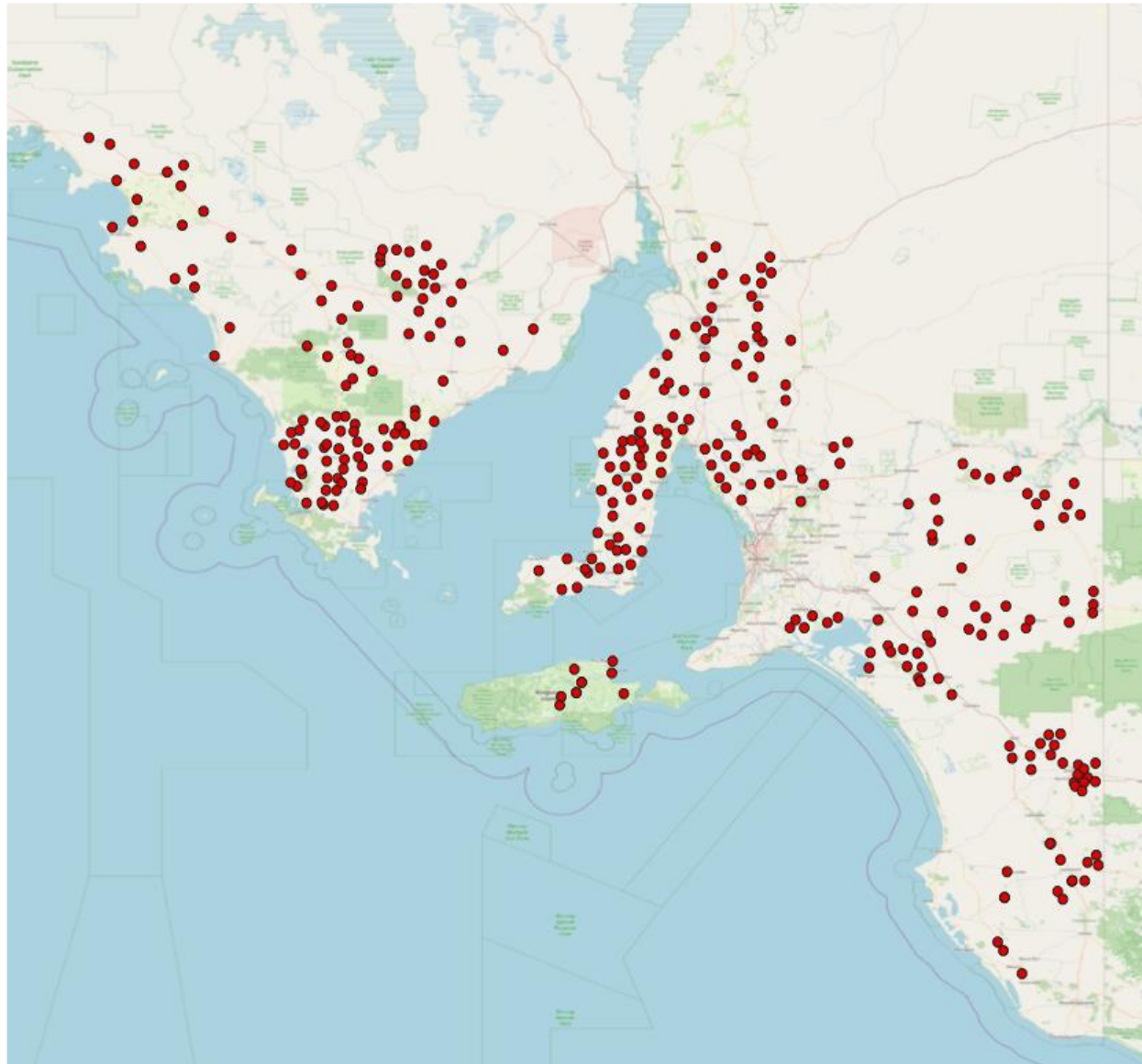
- Random WS conducted across Australia for the past 25 years
- Most recent surveys in 2020 & 2024 using a new national approach
- Collaboration between UA, CSU and AHRI (UWA)
- 7 key weed spp. targeted
- Paddocks randomly selected using grower map files
- Populations tested over winter against key herbicides



Estimated ryegrass density from random WS

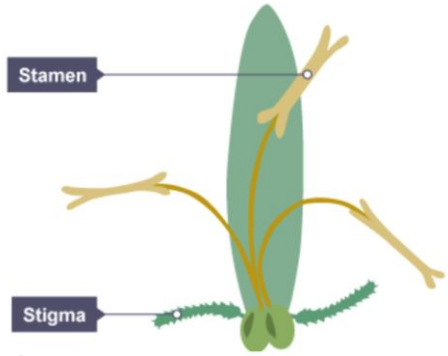
South Australia		(% of sites)	
Survey Year No. of sites		2020 (= 570)	2024 (= 329)
Weed density estimate (plants)			
None:	0	32	17
Very low:	<10 ha^{-1}	17	18
Low:	<1 m^{-2}	23	27
Medium:	1-10 m^{-2}	15	23
High:	>10 m^{-2}	8	10
Very high:	100+ m^{-2}	5	5

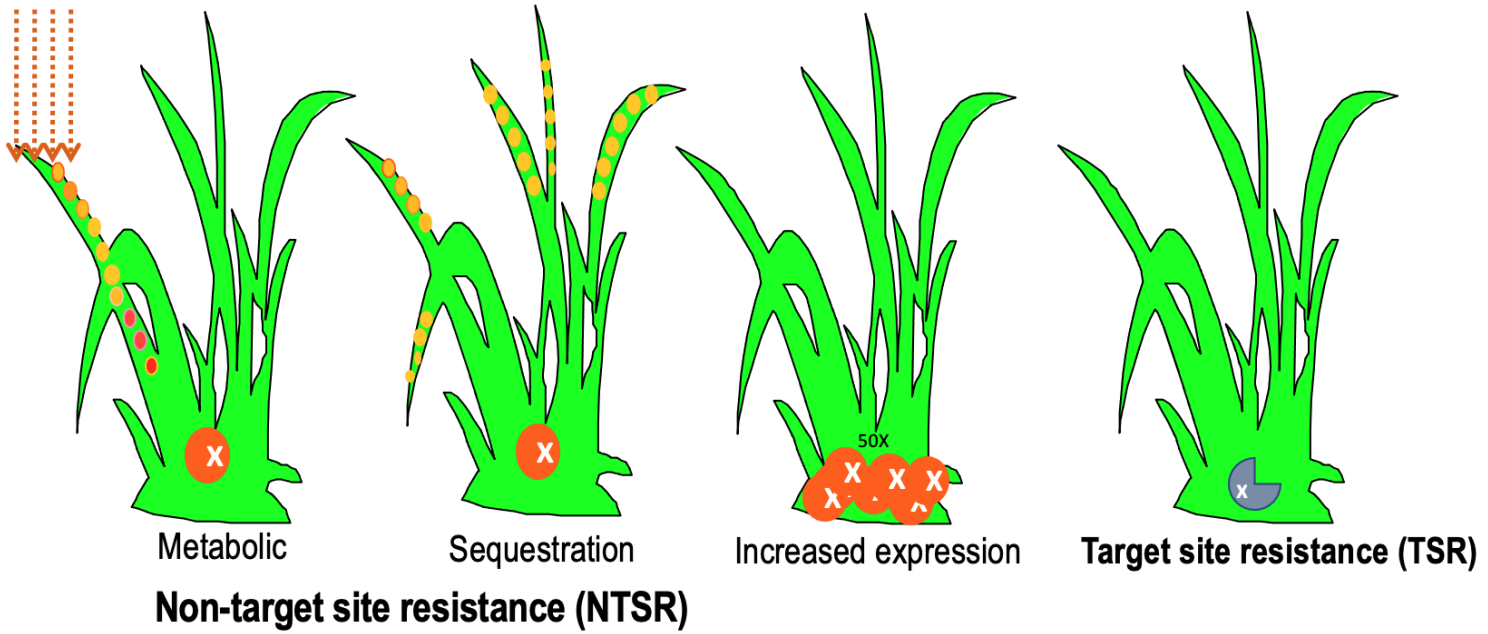
~60-70% of sites in SA had ryegrass densities <1 plant m^{-2}



Why is ryegrass such a problem?

- Genetic variability
- Multiple resistance mechanisms (TSR & NTSR)
- Prolific seed producer (5,000 seeds plant^{-1})
- Obligate out-crosser = accumulation of resistance genes/mechanisms = higher resistance





Ryegrass random survey: Post-emergent

Results from SA (2024)

	% resistant samples: resistant ≥20% survival					
State / Region	Axial MoA 1	Clethodim MoA 1	Hussar MoA 2	Intervix MoA 2	Glyphosate MoA 9	Paraquat MoA 22
SA (2020 > 2024)	66 > 80	14 > 68	85 > 95	68 > 85	14 > 20	0 > 1
Upper North	100	77	100	95	23	0
Mid-North	82	73	100	100	18	0
Yorke Peninsula	97	70	100	95	10	0
Nth-Mallee	33	25	100	100	0	0
Sth-Mallee	67	56	89	68	11	0
Upper EP	27	10	78	61	5	0
Lower EP	94	91	100	76	26	0
Upper SE	100	94	100	82	26	6
Lower SE	100	100	94	94	63	6

Clethodim resistance across SA

Populations collected from 2024 random WS

270 sites (each cell = population)
Red square = Susceptible reference

Concerning levels of clethodim resistance in lentil production systems

Sample- Yorke Peninsula, SA, Jan 2024

Herbicide	Herbicide Group	Paddock Sample F30	
		Survival	Rating
Clethodim 0.5L/ha + 1% Hasten	Group 1 - DIMS	100	RRR
Clethodim 0.75L/ha + 1% Hasten	Group 1 - DIMS	100	RRR
Clethodim 1L/ha + 1% Hasten	Group 1 - DIMS	100	RRR
Clethodim 1L/ha + Factor 180g/ha + 1% Hasten	Group 1 - DIMS	80	RR
Clethodim 1L/ha + Factor 270g/ha + 1% Hasten	Group 1 - DIMS	80	RR
Clethodim 2L/ha + 1% Hasten	Group 1 - DIMS	100	RRR
Factor 360g/ha + 1% Supercharge	Group 1 - DIMS	90	RRR
Glyphosate 1.67L/ha + Clethodim 0.5L/ha + 1% Hasten	Group 9 - M	20	R
Glyphosate 1L/ha	Group 9 - M	60	RR
Glyphosate 2L/ha	Group 9 - M	15	R
Liberty 2L/ha	Group 10 - .	0	S
Liberty 2L/ha + Glyphosate 2L/ha	Group 10 - .	0	S
Boxer Gold 2.5L/ha	Group 15 - Group J	5	R
Sakura 118g/ha	Group 15 - Group K	10	R
Metribuzin 750WG @ 500g/ha	Group 5 - .	0	S
Metribuzin 750WG @ 500g/ha + Clethodim 500ml/ha + 1% Hasten	Group 5 - .	0	S

Ryegrass random survey: Pre-emergent

Results from SA (2024)

	% resistant samples: resistant ≥20% survival					
State / Region	Trifluralin MoA 3	Boxer Gold MoA 15	Sakura MoA 15	Propyzamide MoA 3	Overwatch MoA 13	Luximax MoA 30
SA (2020 > 2024)	38 > 62	1 > 14	0 > 2	0	0	0
Upper North	64	0	0	0	0	0
Mid-North	73	9	0	0	0	0
Yorke Peninsula	86	40	0	0	0	0
Nth-Mallee	25	0	0	0	0	0
Sth-Mallee	74	0	0	0	0	0
Upper EP	37	0	0	0	0	0
Lower EP	53	23	9	0	0	0
Upper SE	79	9	0	0	0	0
Lower SE	69	6	0	0	0	0

Grower testing

Ryegrass samples sent to Plant Sci. Consulting between 2020-2025

			% resistant samples: resistant ≥20% survival (% developing resistance: 1-19% survival)		
	MoA Group	Sample #	National	SA	Mid Nth
Axial 300 ml	1	793	83 (8)	69	*100
Clethodim 500 ml	1	2988	49 (21)	40	66
Clethodim 1000 ml	1	1010	38 (24)	45	53
Clethodim 500 ml + Factor 180 g	1	1304	24 (24)	28	32
Intervix 750 ml	2	1154	75 (12)	70	88
Glyphosate (540) 1.5-2.0 L	9	3626	36 (19)	29	34
Paraquat (250) 1.2 L	22	1413	4 (2)	7	*7
Trifluralin 2 L	3	2107	43 (21)	67	66
Boxer Gold 2.5 L	15	1605	2 (3)	4	6
Sakura 118 g	15	2081	1 (9)	1	4
Propyzamide (500) 1 L	3	1640	0 (0)	0	0

*Small sample size (<20 tested)

Resistance to glyphosate (MoA 9)

Random survey results- 2000 to 2024

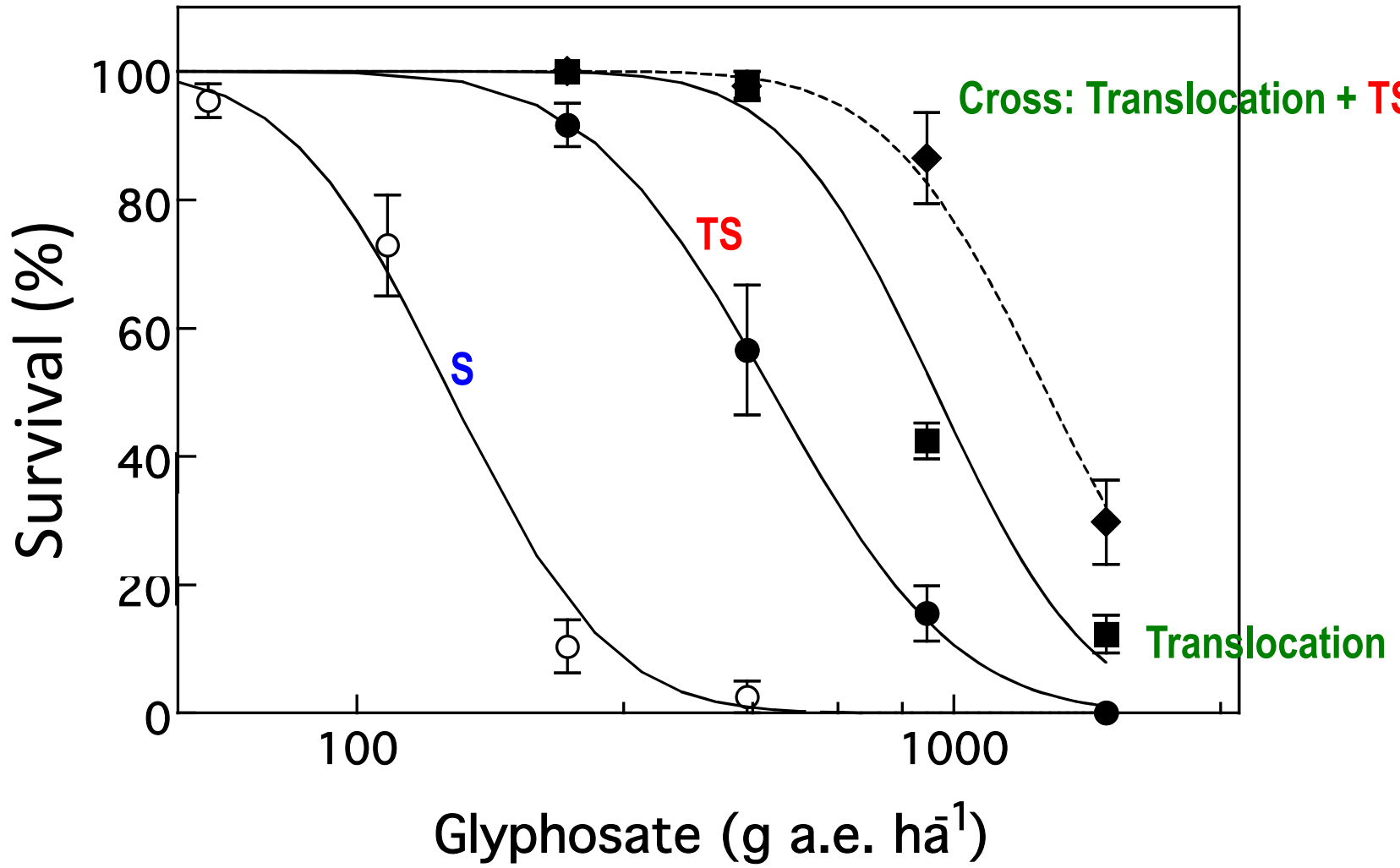
Years	% annual ryegrass resistant to glyphosate (resistant ≥20% survival)					
RWS	NATIONAL	South Australia	Victoria	New South Wales	Western Australia	Tasmania
<2000	-	-	-	-	-	-
2003-2009	<0.5	-	0	0.5	0	0
2010-2014	3	5	4	3	1	0
2015-2019	6	9	16	3	1	0
2020	16	14	22	23	12	0
2024	*	20	*	*	*	*
PSC Grower Testing						
2020-2025	36	29	39	43	32	0

*University of Adelaide to test in 2026

Glyphosate resistance on the rise

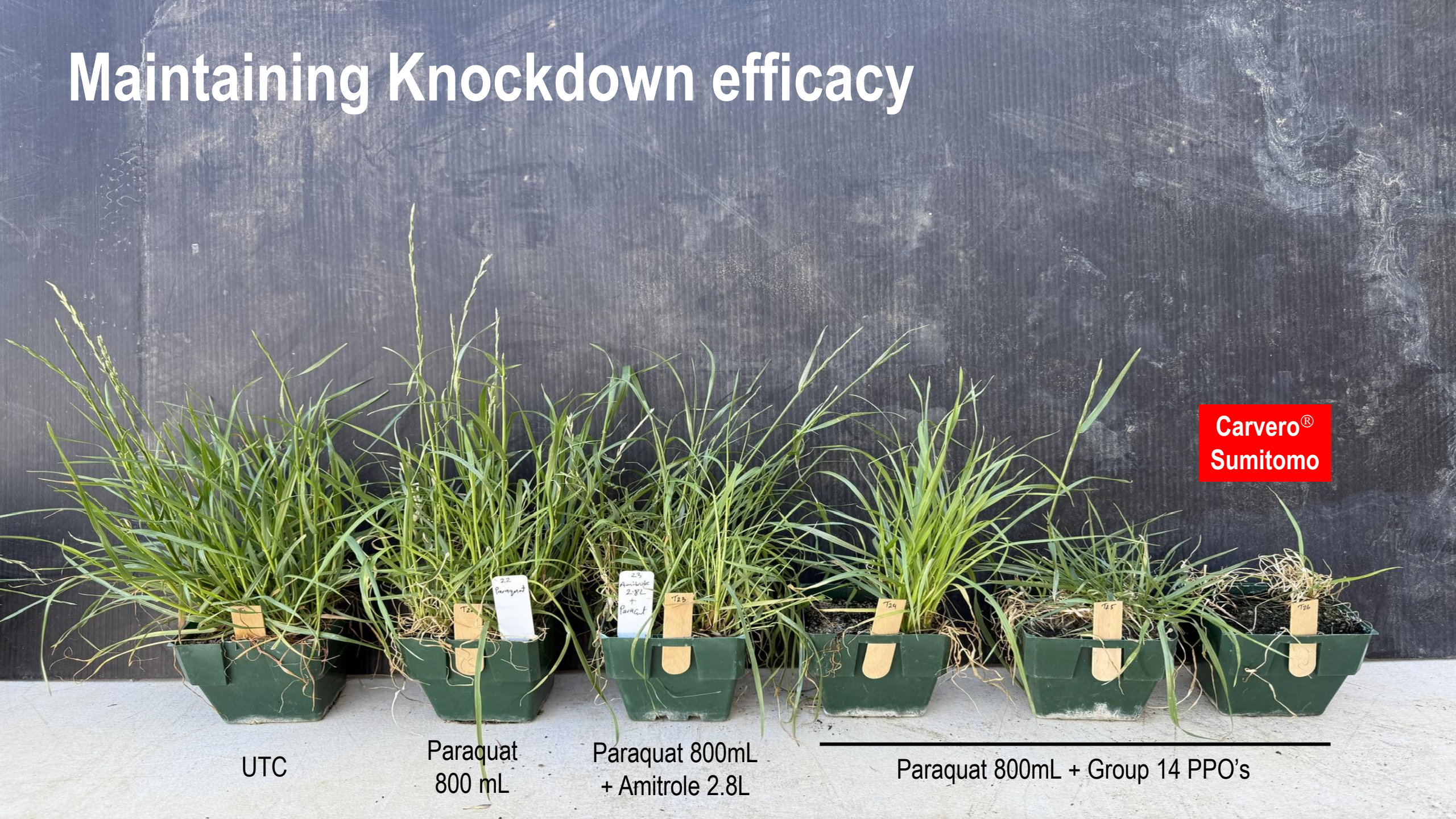
- 40+ years of selection (Roundup released 1976)
- Incursions from existing & old fence-lines
- New rate for control 2L+ (540), was 1-1.5L
- Cross-pollination = accumulation of resistance genes/mechanisms = higher rate

Cross-pollination can increase the level of glyphosate resistance: mechanisms are additive



Adelaide University

Maintaining Knockdown efficacy



Resistance in other grasses

2020 National RWS

		% resistant samples: resistant ≥20% survival (% developing resistance: 1-19% survival)								
Herbicide	MoA Group	Wild oats							Brome grass	Barley grass
		National	SA	VIC	NSW	WA	QLD	TAS	National	National
'Fop'	1	16 (15)	8	12	25	4	21	0	2 (1)	2 (3)
Axial	1	5 (12)	0	0	16	0	5	-	-	-
Clethodim	1	0.3 (1)	0	0	1	0	0	-	2 (0)	1 (0)
'SU'	2	1 (8)	0	0	0	0	2	-	29 (10)	4 (3)
Intervix	2	-	-	-	-	-		-	0	1 (3)
Glyphosate	9	-	-	-	-	-		-	1 (0)	0
Paraquat	22	-	-	-	-	-		-	-	1 (1)

Latest- paraquat resistant fleabane

Sample from Mid-North, SA

Survived double-knock in January 2024:

2L glyphosate (450) + 800mL Amicide Dropzone + 0.8% SOA fb. 2L paraquat (250) + 0.15% Wetter 1000

Resistance in other key broadleaf weeds

2020 National RWS

2024 IHM results for SA (> increase)

% resistant samples: resistant ≥20% survival (% developing resistance: 1-19% survival)											
Herbicide	MoA Group	Indian hedge mustard			Sowthistle						
		SA		VIC	National	SA	VIC	NSW	WA	QLD	TAS
'SU'	2	53	>76	60	73	71	74	83	45	67	25
Intervix	2	40	>60	40	-	-	-	-	-	-	-
Brodal	12	20	>24	40	-	-	-	-	-	-	-
2,4-D	4	3	>36	0	3	0	0	3	0	8	0
Atrazine	5	3	0	0	-	-	-	-	-	-	-
Glyphosate	9	0	0	0	0	0	0	0	0	0	0

Take-home messages

- Resistance to key MoA herbicides continues to increase for ryegrass (i.e. DIM's, glyphosate)
- Residual herbicides (Grp 3, 13, 15, 23 & 30) imperative to ryegrass management
- Resistance in other grasses remains low (i.e. wild oats, brome, barley grass)
- Paraquat resistant fleabane detected from Mid-Nth SA
- Resistance to Grp 4 & 12 herbicides becoming more common for IHM
- Commercial testing- data driven decisions rather than "gut feel"