1

2023 North coast NSW herbicide resistance testing

Summer weed focus

- Collections mainly during March 2023
- Mix of random sampling and grower directed sites
- Targeted at grain cropping paddocks

- 51 locations / 122 weed samples collected

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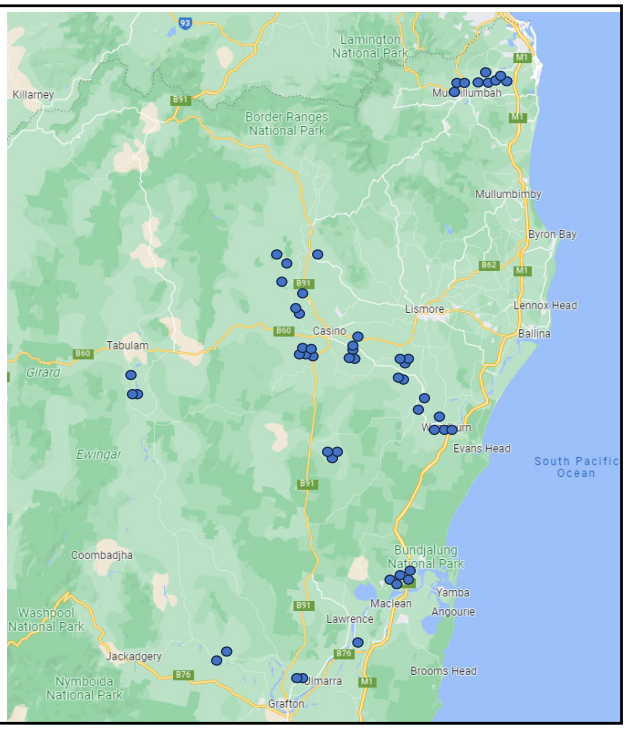
- Collection sites

Soybean	34 locations
Adzuki bean	4
Sugarcane	3
Roadside	3
Teatree	3
Fallow	2
Sorghum	1
Corn	1



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Target weeds

Known to have resistance concerns in other regions

- Feathertop Rhodes (10); barnyard grass (23)
- Fleabane (10); sowthistle (7)

Local 'problem to control' weeds

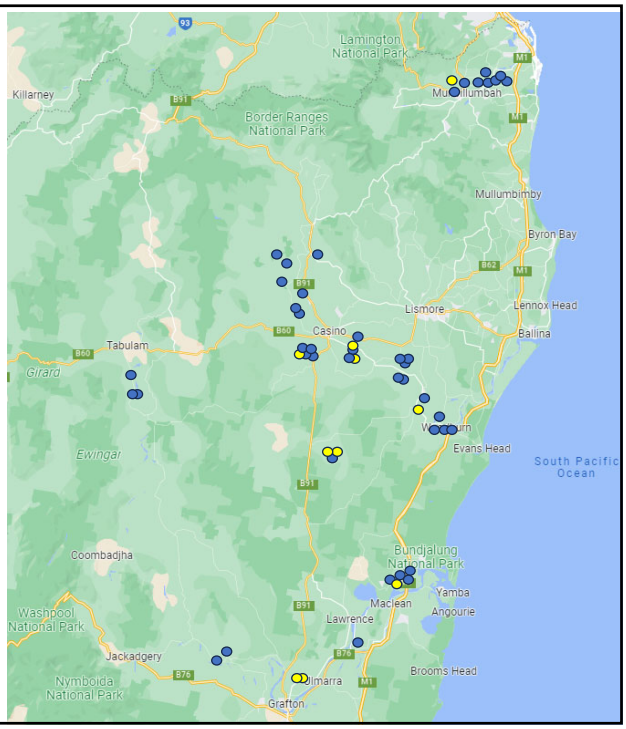
- Rhodes grass (15); crowsfoot (14);
- Cobblers peg/farmers friend (18); bluetop/billygoat weed (6)

Other species collected if present

- Windmill grass (3); giant rats tail (1)
- Other broadleaf (15) Many didn't germinate (need techniques to break dormancy)

4

- Feathertop Rhodes grass



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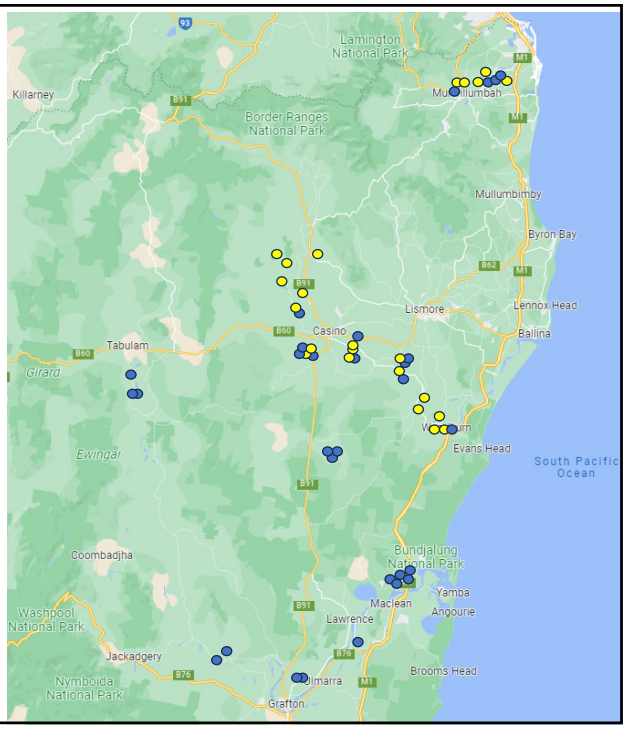
- Barnyard grass



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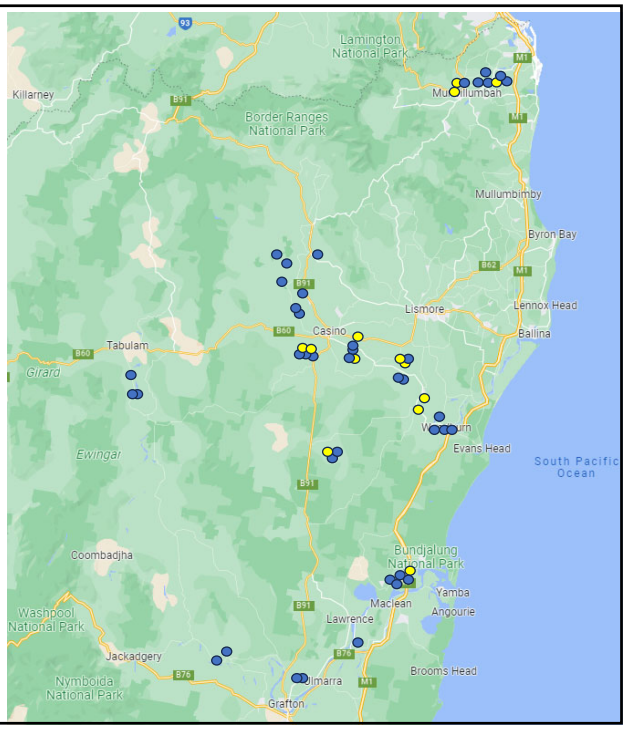
- Rhodes grass



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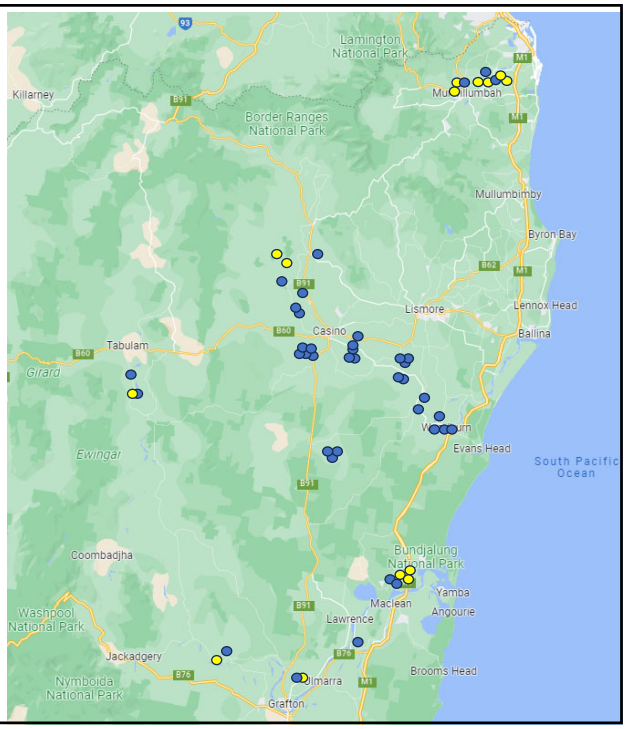
- Crowsfoot grass



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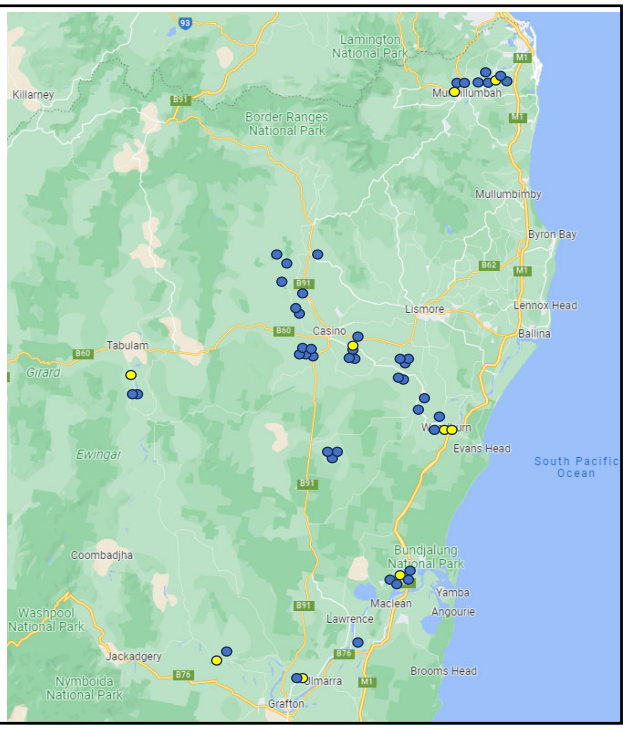
- Fleabane



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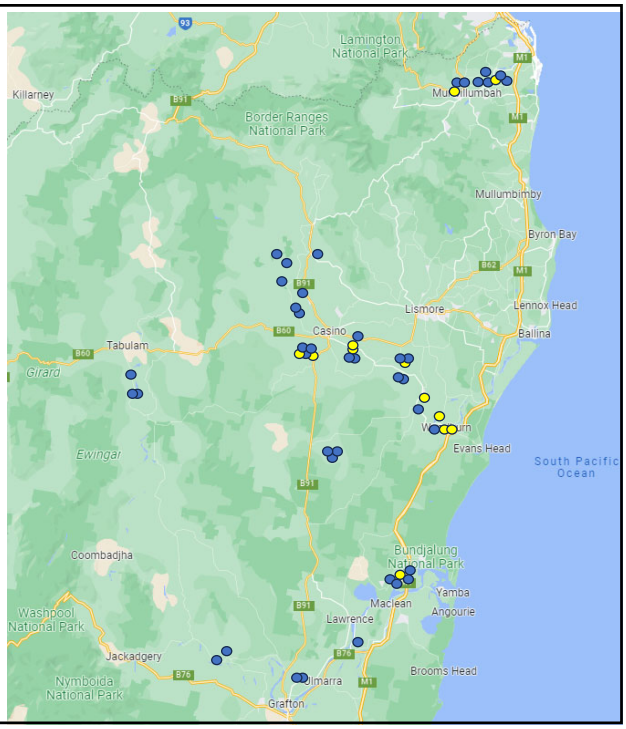
- Sow thistle



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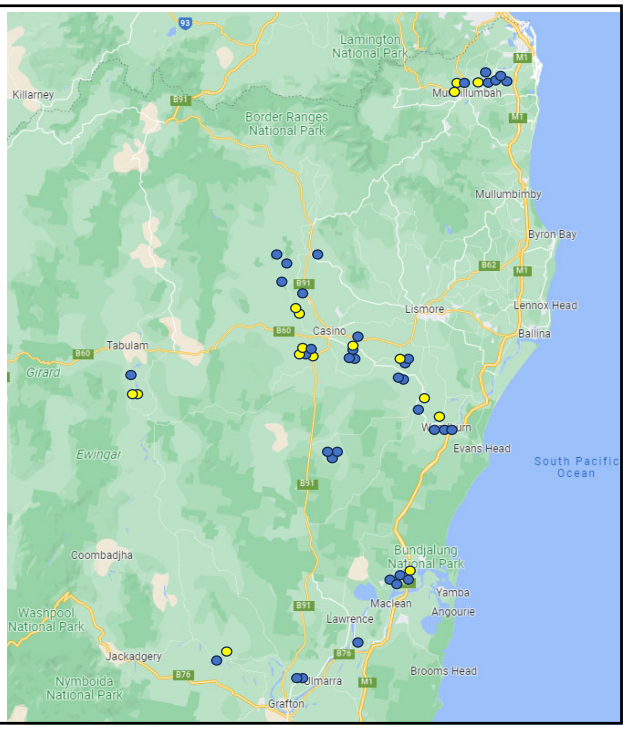
- Cobblers peg / Farmers friend



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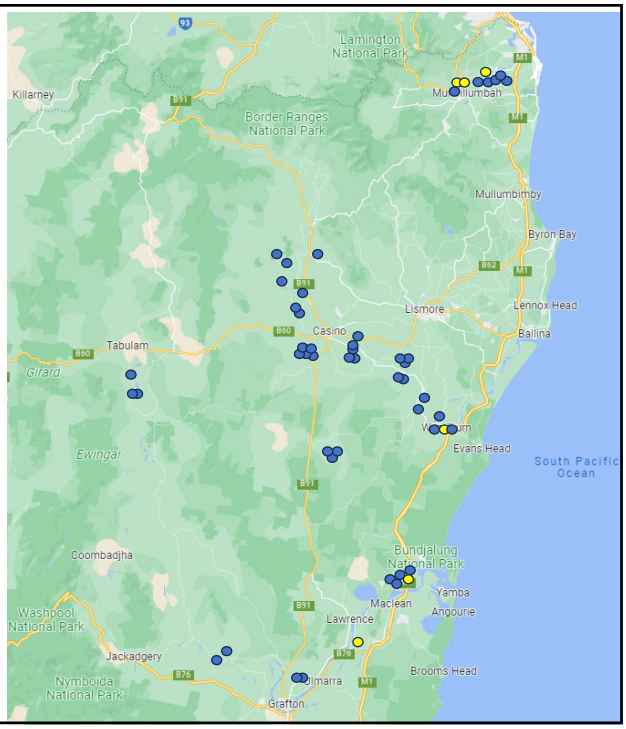
- Bluetop / Blue billygoat weed



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Herbicide tested

Grass weeds

- Glyphosate 2.5L — Roundup Ultra Max (570 g a.e./L) @ 2.5 L/ha
- Glyphosate 5L — Roundup Ultra Max (570 g a.e./L) @ 5 L/ha
- Haloxyfop — Verdict 520 @ 150 mL/ha
- Clethodim — Select 240 @ 300 mL/ha

Broadleafs

- Glyphosate 2.5L — Roundup Ultra Max (570 g a.e./L) @ 2.5 L/ha
- Glyphosate 5L — Roundup Ultra Max (570 g a.e./L) @ 5 L/ha
- 2,4-D — 700 g a.i./L @ 3 L/ha
- Imazethapyr — Kyte 700WG @ 140 g/ha

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Weed size at application

Plants at time of spraying

Left: Cobblers peg

Right: Rhodes grass

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Questions on methodology & sampling?

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Resistance testing - ratings

Susceptible	All individuals controlled
Developing resistance	0-20% survived
Resistant	> 20% survived
Suppression	Not controlled. But plants suppressed

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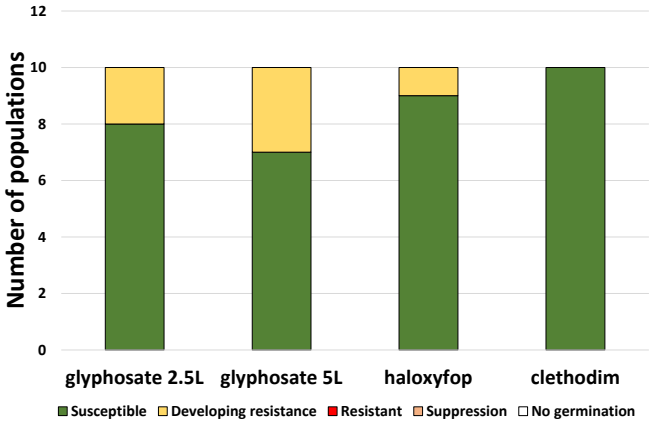
Feathertop Rhodes



- Glyphosate resistance emerging* (although levels considerably behind other grains industry surveys in the north)
- 1 population showing some survival to Verdict (similar to other surveys)

ACTIONS

- Vigilance – detect and remove all plants
- Monitor every herbicide application and ensure plants don't set seed
- Ensure applications applied at robust rate and to VERY small weeds
- Double knock every application in fallow

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* Glyphosate is not registered for control of FTR

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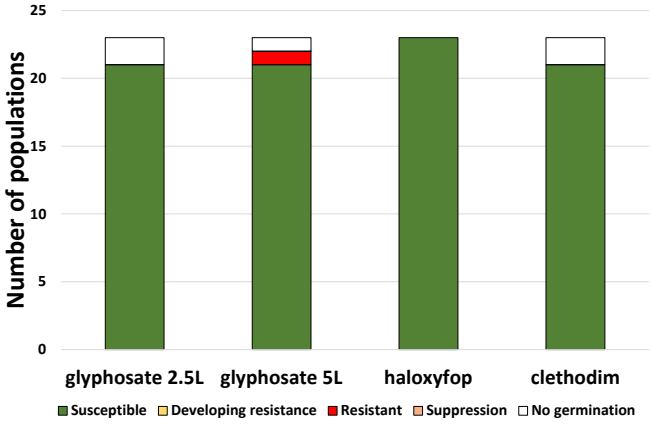
Barnyard grass



- Mostly susceptible (more resistance found in other grains industry surveys in the north)
- 1 population showing resistance to glyphosate

ACTIONS

- Monitor every herbicide application and ensure plants don't set seed
- Ensure applications applied at robust rate and to VERY small weeds
  - Can be very sensitive to moisture stress
- Double knock every application of Group 1 in fallow

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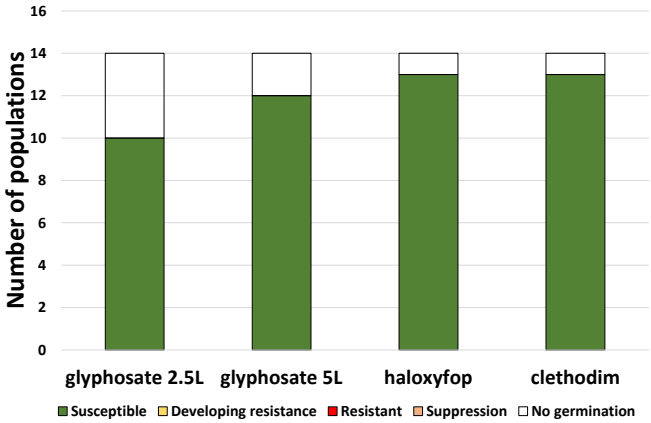
Crowsfoot



- No evidence of resistance found
  (although resistance is widespread in other countries e.g. Asia and Verdict resistance confirmed in the Burdekin)

ACTIONS

- Ensure applications applied at robust rate and to VERY small weeds
  - Very large root system compared to above ground biomass
  - Sensitive to moisture stress
- Double knock every application of Group 1 in fallow

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* Glyphosate is not registered for control of crowsfoot

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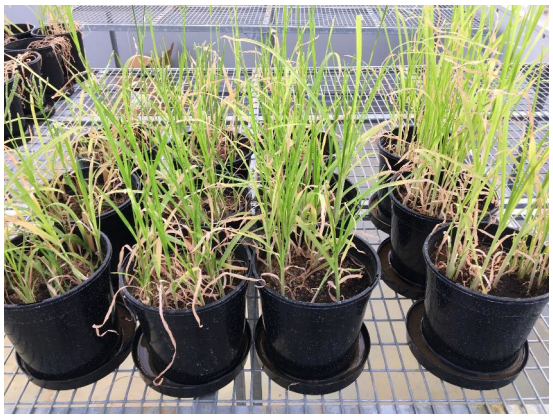
Burdekin 2022 – haloxyfop resistance



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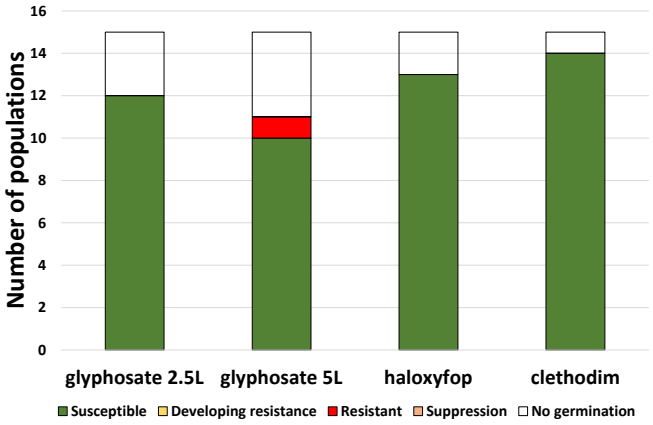
Rhodes grass



- Mostly susceptible, although one population resistant to glyphosate (no other surveys to compare against)

ACTIONS

- Ensure applications applied at robust rate and to VERY small weeds
- Double knock every application in fallow

Clethodim (Select) is registered for a range of grasses in summer pulses, but not specifically Rhodes grass. PER91513 allows the use for clethodim in fallow for control of 'glyphosate resistant/tolerant grasses' when followed by paraquat as a double knock

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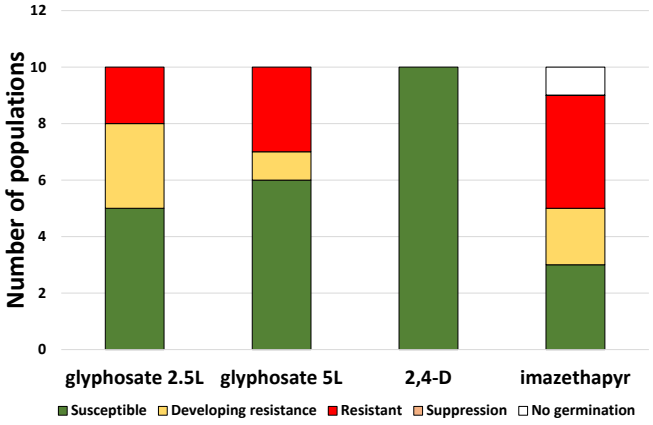
Fleabane



- Significant glyphosate resistance (although below other grains surveys in the north)
- Emerging 2,4-D resistance in other northern surveys
- Imazethapyr not registered / not reliable

ACTIONS

- Wind dispersed – seed is everywhere
- Group 4 herbicides (2,4-D) generally only effective on small (<5cm) rosettes
  - Reliability decreases fast as weed size increases
- Broadleaf tank-mix partners antagonise glyphosate on grass weeds
- Residual herbicides and double knock are key control strategies

Glyphosate is only registered for control of fleabane when used in combination with 2,4-D. Imazethapyr is not registered for fleabane control.

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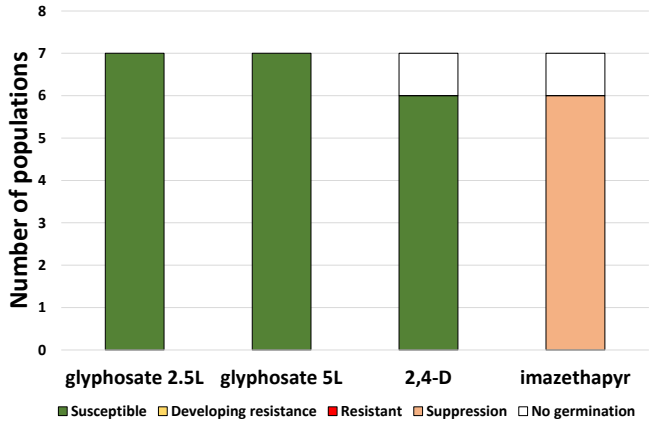
Sowthistle



- No resistance detected (although glyphosate resistance is now widespread in other northern grains regions)
- Imazethapyr – suppression only

ACTIONS

- Wind dispersed – seed is everywhere
- 2,4-D + glyphosate
  - Antagonistic on grass weeds
  - Antagonistic on sowthistle if glyphosate resistance is present

Imazethapyr is not registered for sowthistle control.

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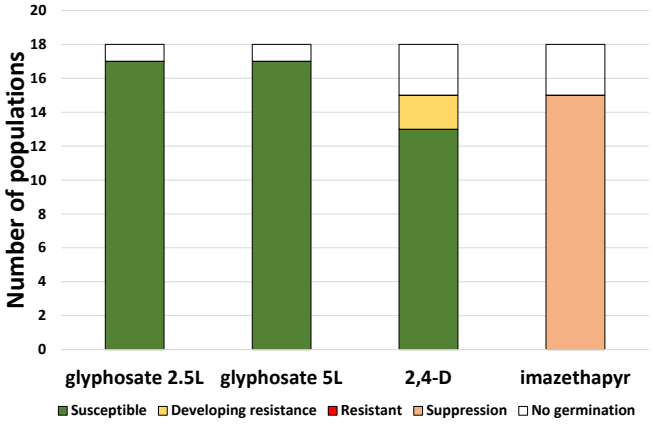
Cobblers peg / Farmers friend



- No glyphosate resistance detected
- Two populations with 2,4-D survivors?
- Imazethapyr – suppression only
- No other resistance survey data to compare

ACTIONS

- Monitor all 2,4-D applications
- Soybean
  - Pre-plant knockdown – VERY small weeds
    followed by
  - Flumetsulam (Broadstrike) at planting
    followed by
  - Bentazone (Basagran) early post-em

Imazethapyr is not registered for sowthistle control.

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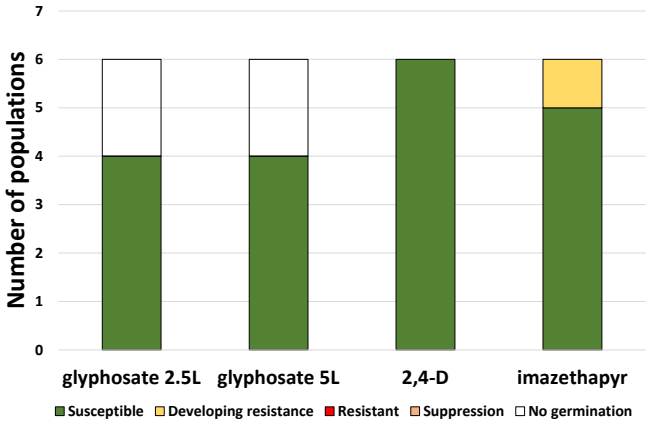
Bluetop / Billy goat weed



- No major evidence of resistance
- Imazethapyr is not registered for bluetop control.
  - One population with survivors!

ACTIONS

- Alternative soybean program
  - Pre-plant knockdown
  - Flumioxazin (Valor) – residual rates at planting
  - Consider acifluorfen (Blazer) – early post-em# if needed

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Aciflurofen is registered for use in soybean for other weeds but not bluetop, however it is registered for bluetop when used in siratro and stylo

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Questions on results?

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If it's not resistance, what else may explain poor results?

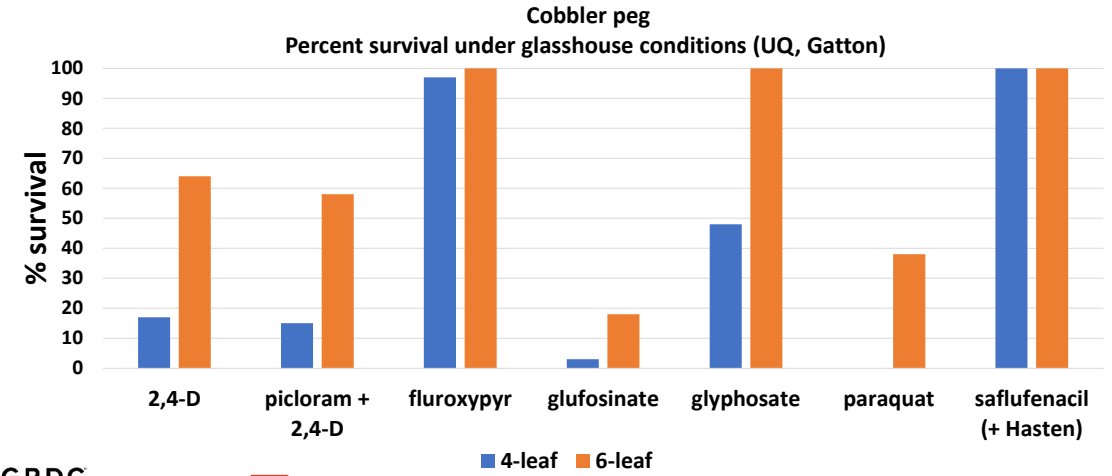
Remember these plants are spoilt:

- They live in air-conditioned comfort, are watered twice daily and fertilized weekly
- Spray application 85L/ha at 5kph with two XR11001VK nozzles aiming for good coverage, drift is not a concern (sprayed in a cabinet)

- Compare this to what occurs in your paddock at spraying
- Herbicides work most effectively on plants that are not stressed

If it's not resistance, what else may explain poor results?

Weed size



Chauhan et. Al. (2019) Seed germination ecology of *Bidens pilosa* and its implications for weed management

Reducing glyphosate performance

Hot / low humidity	↓ performance when Delta T above ~ 8 to 10
Rain	Within about 6 hours of application
Dirt	In spray tank; dust; cultivation too soon
Broadleaf partner herbicides	On grass weeds
Fast acting tank-mix herbicides	e.g. paraquat, glufosinate, Group 14
Wrong adjuvant	Especially oils on grass weeds
Poor conditions for translocation	Dry soil or waterlogging

Helping glyphosate performance

Robust glyphosate rate	
Small weeds	But needs to be > 1-leaf
Ammonium sulphate	Needs to go in tank first
Lower water volumes	50-75 L/ha optimal for small weeds
Double knock	Paraquat or glufosinate application within 5-7 days

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Reducing haloxyfop performance

Broadleaf partner herbicides	Don't mix 2,4-D / Group 14 / paraquat / glufosinate ↓ grass weed control if mixing soybean broadleaf herbicides Sometimes ↓ control with glyphosate
Advanced weeds	Performance ↓ once flowering begins
Poor conditions for translocation	Dry soil or waterlogging. Frost
Rain	Within about 1 hour of application

Helping haloxyfop performance

Robust rate	
Small weeds	2-leaf to 1-2 tillers
Quality crop-oil-concentrate	e.g. Uptake
Good coverage of the crown	80-120 L/ha optimal for small weeds Medium to Medium-Coarse spray quality
Crop competition	Must double knock if using in fallow

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Reducing imazethapyr performance

Advanced weeds	Performance ↓ rapidly with weed size
Rain	Within about 2 hours of application
Poor conditions for crop metabolism	e.g. waterlogging
Don't mix with selective grass herbicides	

Helping imazethapyr performance

Crop competition	Many weeds only suppressed by post-em applications
Small weeds	2-leaf to 4-leaf
Adjuvant for post-em applications	e.g. quality wetter
Ammonium sulphate	Needs to go in tank first
Good coverage of the crown	60-100 L/ha for small weeds

Only apply once pre crop – at planting OR early post-emergent

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Further questions?

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