Department of
Primary Industries and
Regional Development
GOVERNMENT OF
WESTERN AUSTRALIA

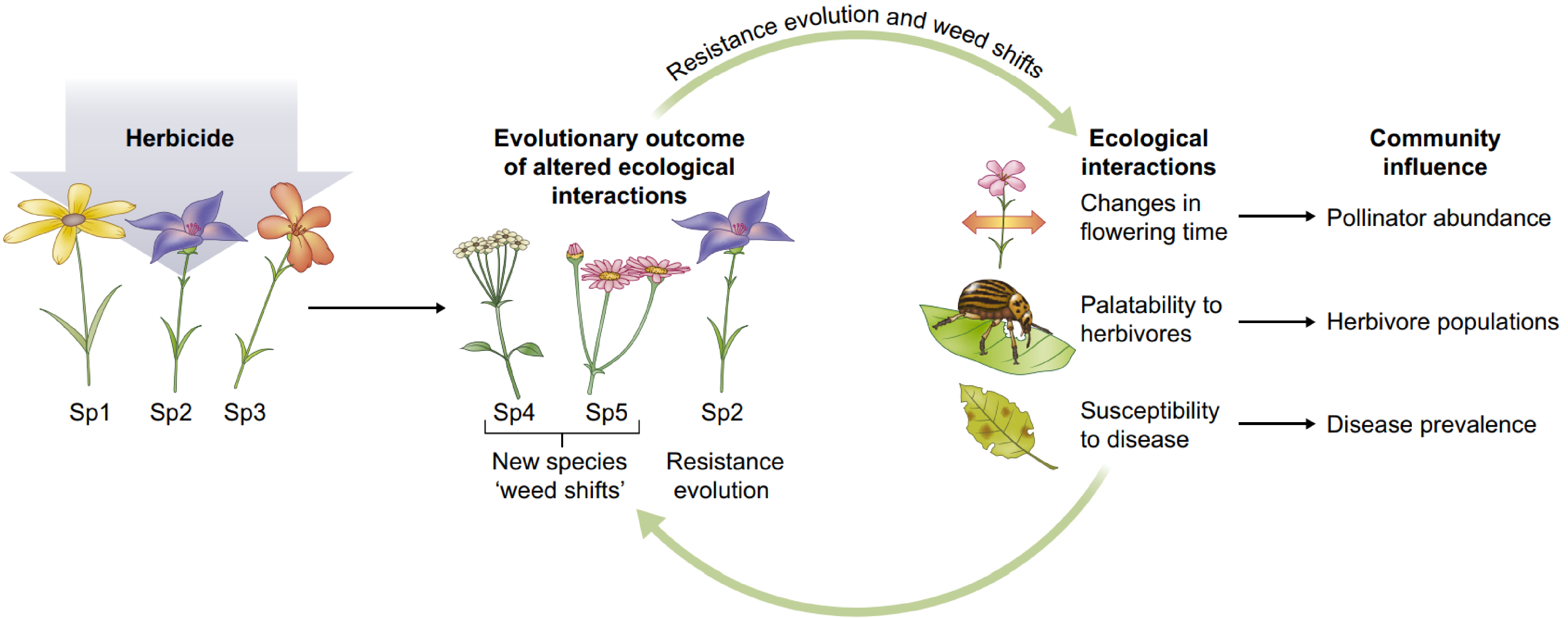
Protect
Grow
Innovate

Translating cropping weed science to Pilbara landscapes

UNDERSTANDING WEED ADAPTATIONS

Dr. Arslan M. Peerzada

Broadacre systems, DPIRD.



Potential eco-evolutionary dynamics within an agricultural weed community.

Baucom, 2019

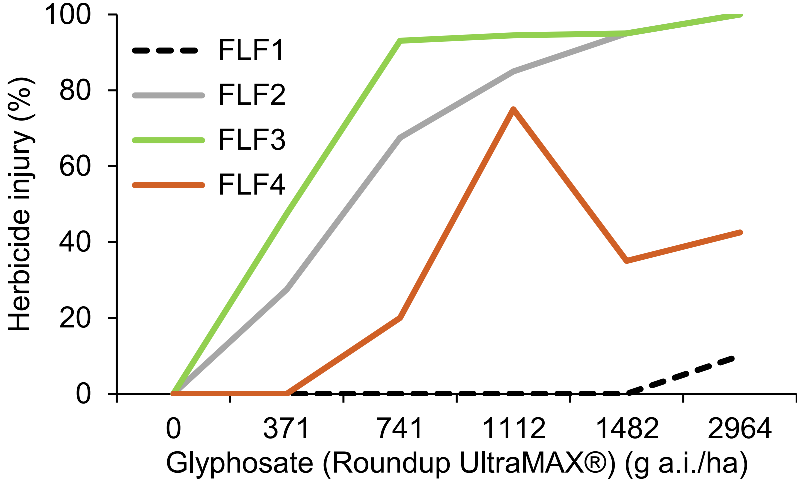
Key weed adaptation traits

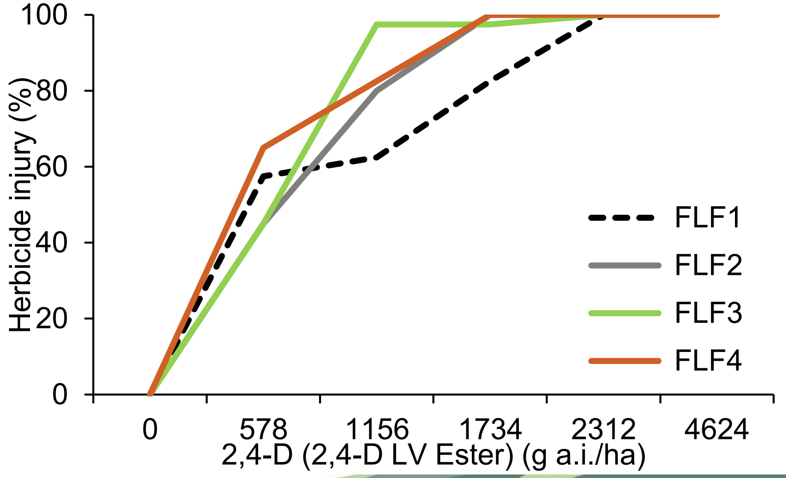
Adaptation trait	🌾 Cropping area weeds	🌵 Pilbara weeds
Drought Tolerance	Moderate–High	Very High
Seed Dormancy	Seasonal	Prolonged
Rapid Seed Production	High	High
Soil Disturbance Response	Cropping/tillage	Mining/pastoral
Herbicide Resistance	Established	Emerging
Dispersal Mechanisms	Wind, machinery, animals	Wind, water, machinery
Genetic Diversity & Plasticity	High	High
Reproductive Strategies	Diverse	Diverse
Seed Longevity	Medium-term	Long-term
Mimicry	Crop mimicry	Rare
Allelopathy	Some species	Some species
Phenotypic Plasticity	Seasonal cues	Extreme microclimates

Herbicide Resistance

Glyphosate-susceptible fleabane

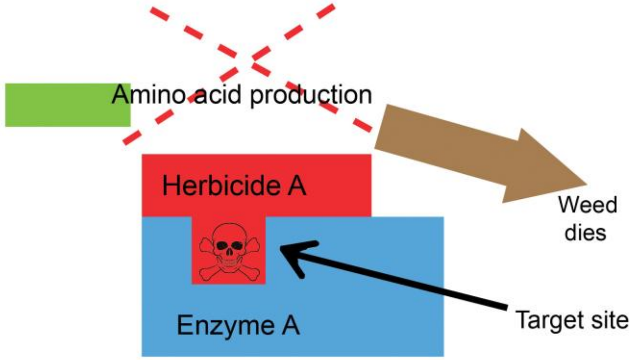
Glyphosate-resistant fleabane

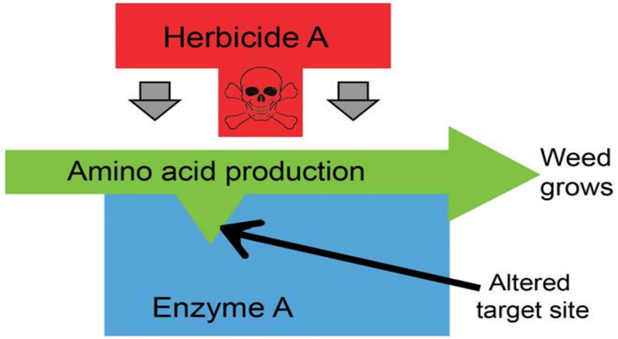




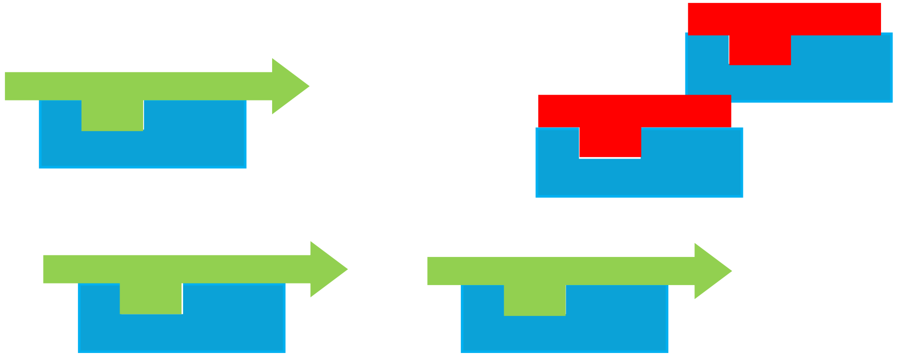
Resistance Mechanisms

1. Target-Site Resistance (TSR)
    - Altered target-site mutation



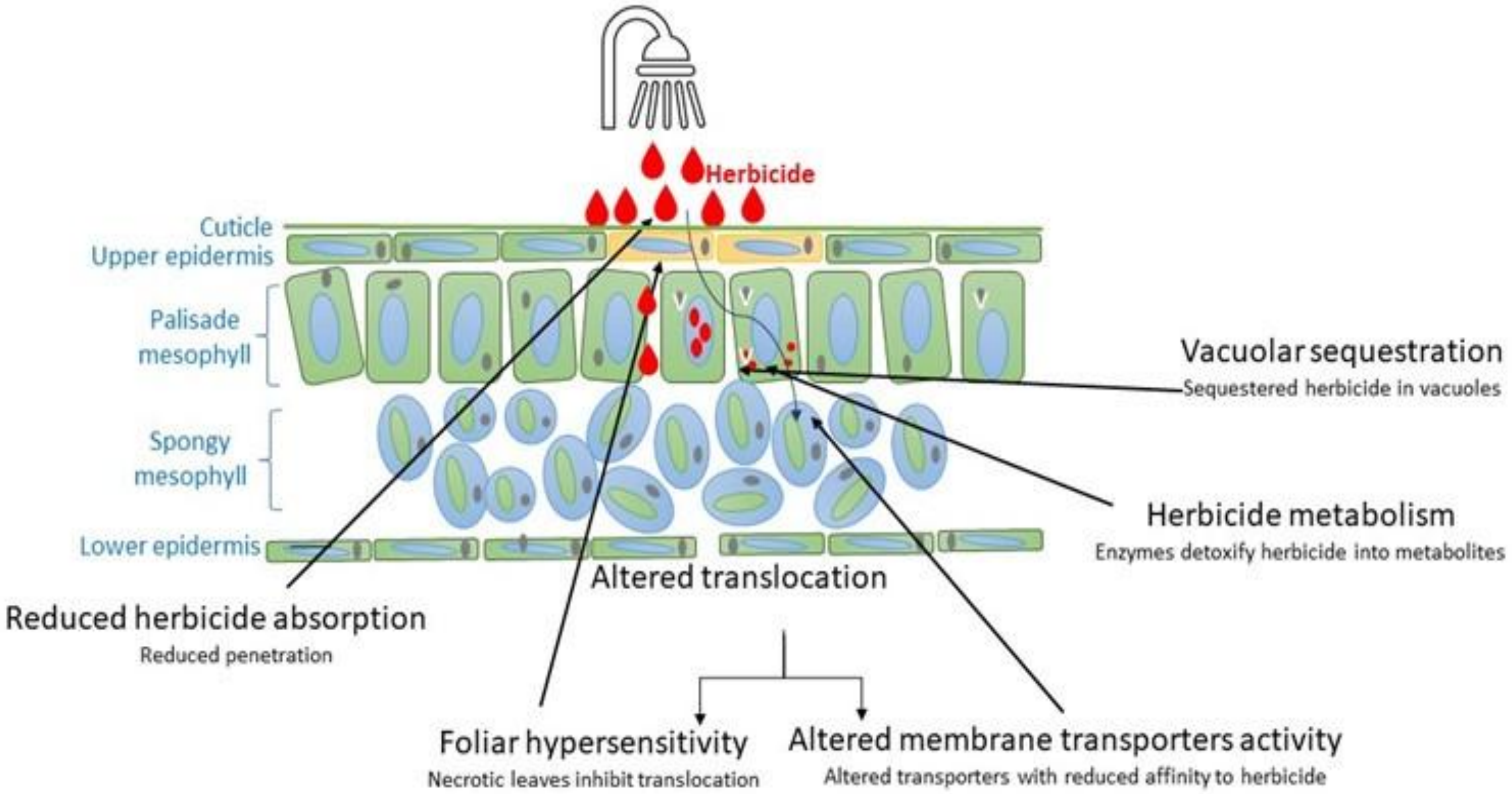


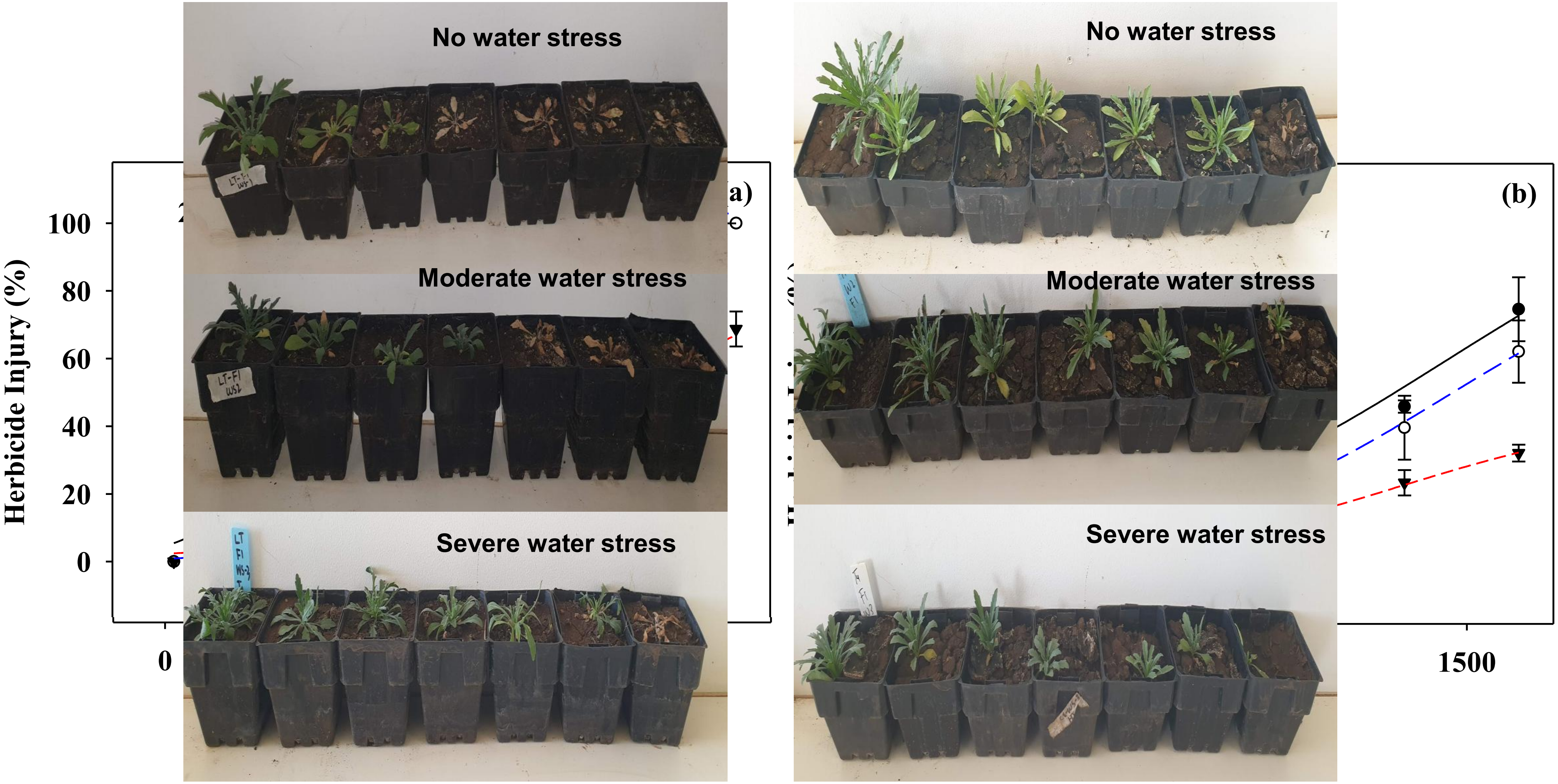
- Overexpression



Non-Target-Site Resistance (NTSR)

- Reduced absorption
- Reduced translocation
- Vacuole sequestration
- Herbicide metabolism.



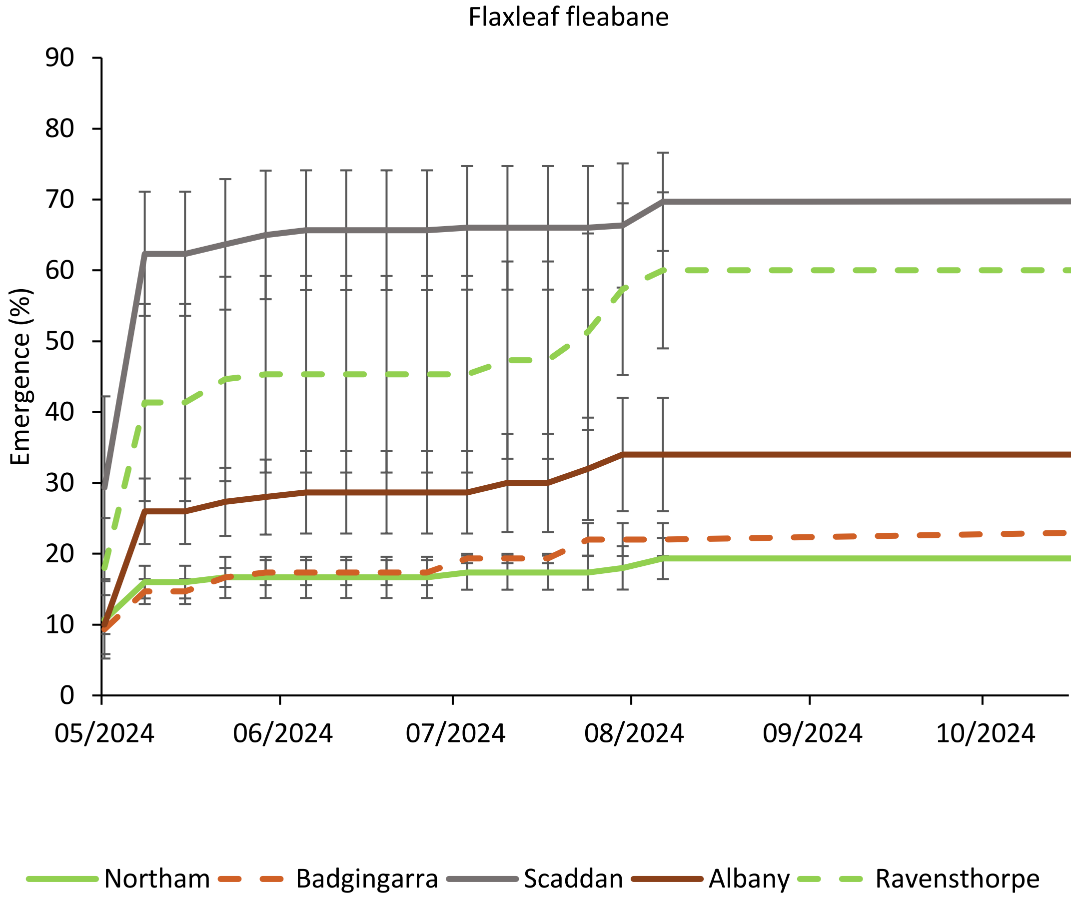


Ambient temperature (28/20 ± 2 °C)

High temperature (34/24 ± 2 °C)

Glyphosate-susceptible fleabane

Glyphosate-resistant fleabane



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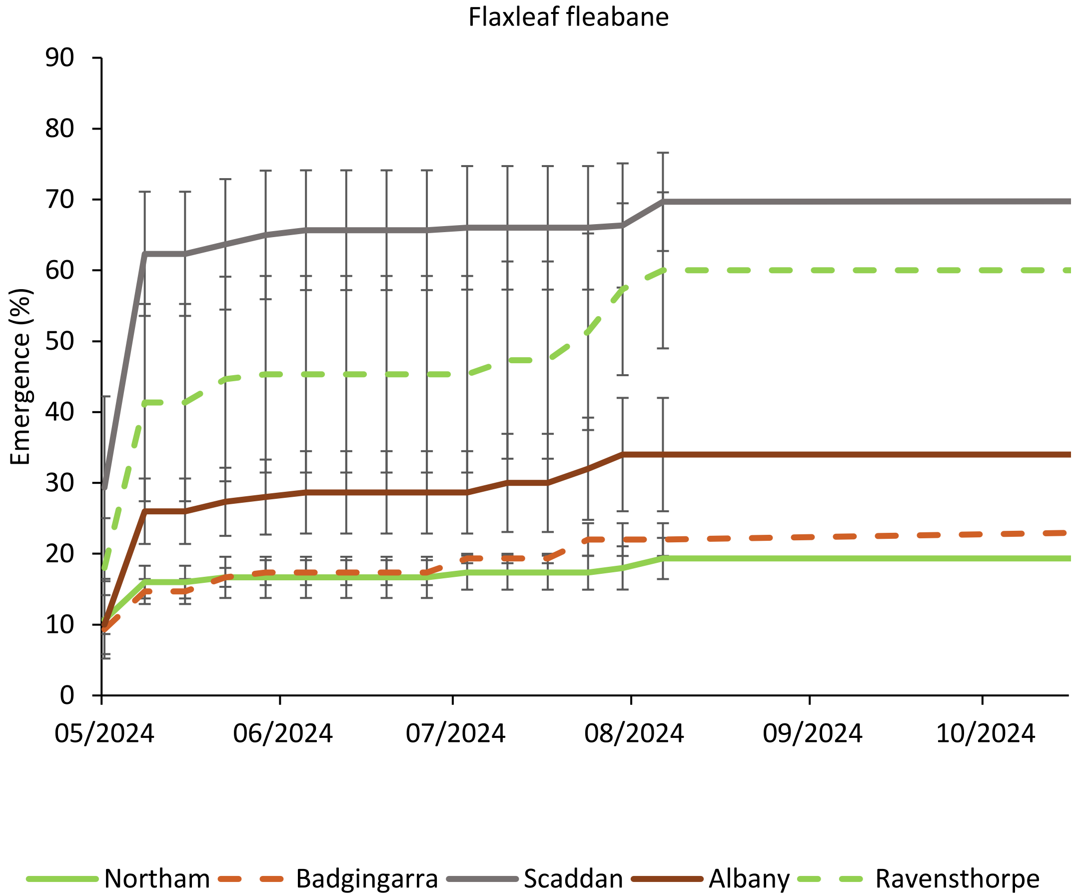

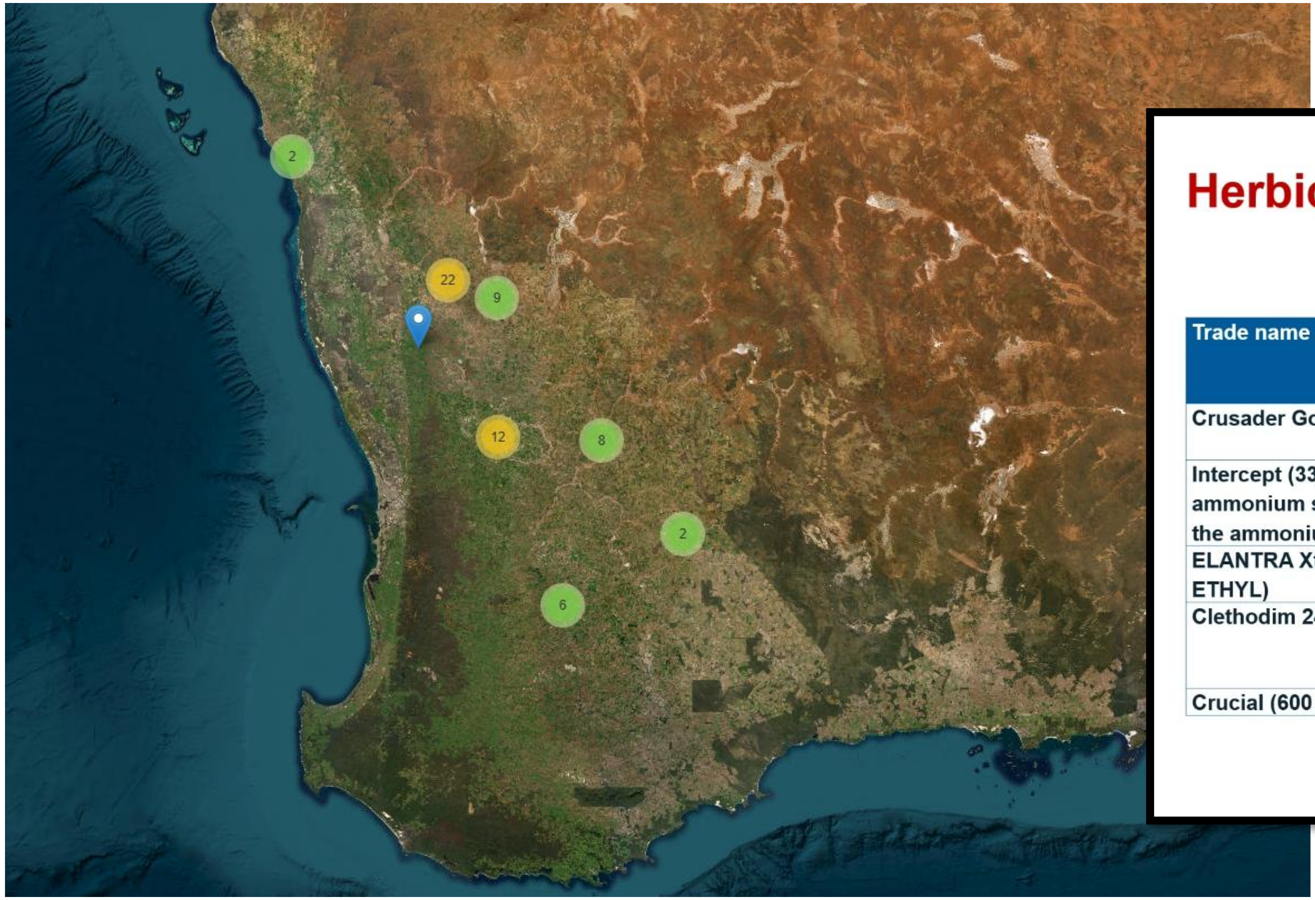

Herbicide treatments for resistance screening

Trade name and active ingredient	Group	Rate	Adjuvant	Weed growth stage
Crusader GoDRI (215 g/kg PYROXSULAM)	**2**	70 g/ha	BS1000 or Chemwet1000 at 250 mL/100 L	GS12
Intercept (33g/L IMAZAMOX present as the ammonium salt 15g/L IMAZAPYR present as the ammonium salt)	**2**	375 mL/ha 750mL/ha	Nufarm CanDo spray adjuvant at 0.5 L/100 L spray solution	GS13
ELANTRA Xtreme (200g/L QUIZALOFOP-P-ETHYL)	**1**	150 mL/ha	Hasten at 1L/100L	GS13
Clethodim 240 (240 g/L CLETHODIM)	**1**	175 mL/ha 250 mL/ha	Always apply with D-C-Trate at 2 L/100 L or similar.	GS13
Crucial (600 g/L glyphosate)	**9**	750 mL/ha		GS13-15

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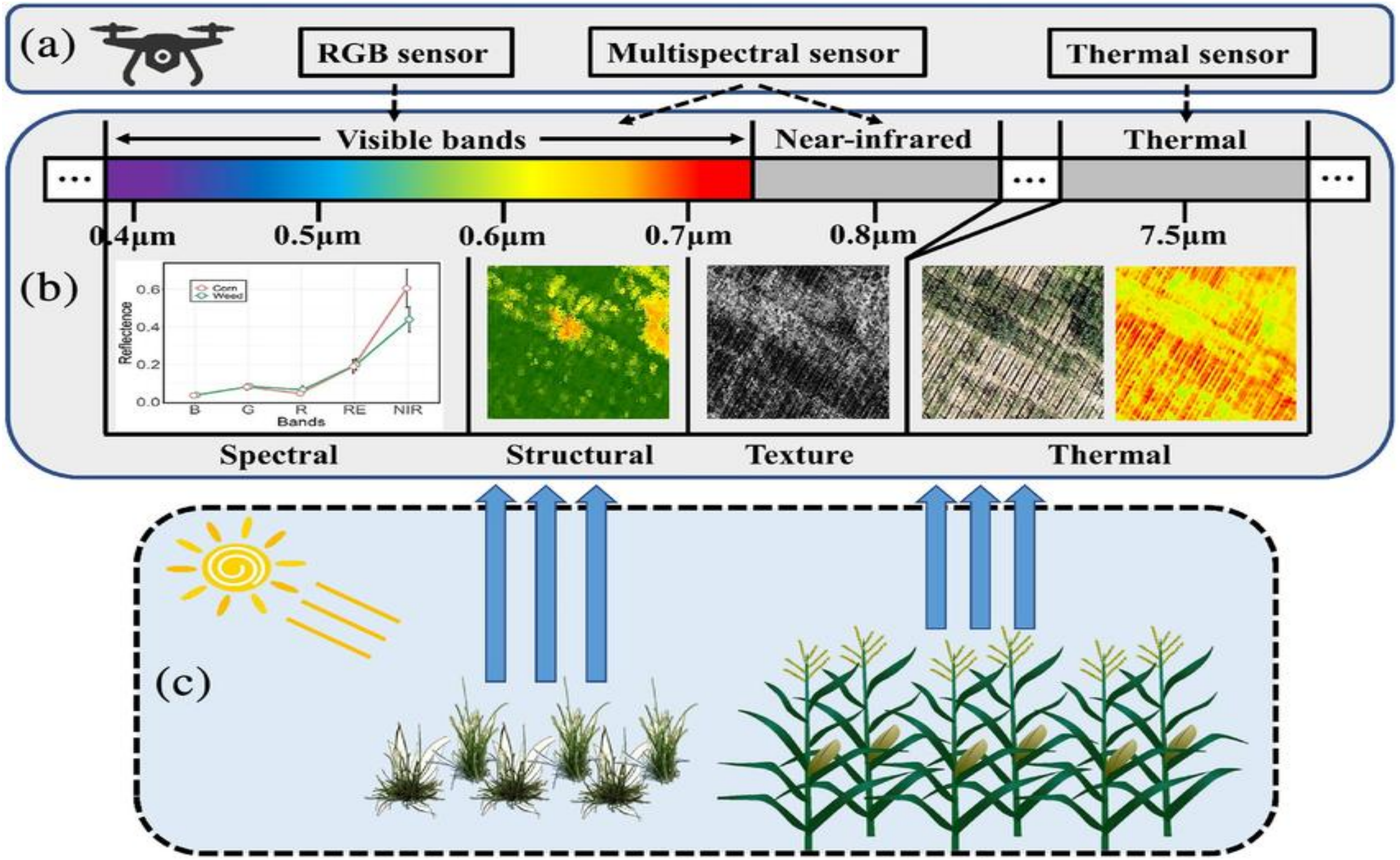
***Populations varying in their tolerance to herbicides are tested for dormancy as well as growth patterns and sometimes competition dynamics.**

Evolving Resistance Mapping – From Field Sampling to Satellites

Key developments

- **Drone and Satellite mapping**
- **Resistance monitoring**
- **Multispectral and Hyperspectral Imaging**
- **Emergence and dormancy prediction**
- **Integration with weed management resistance**

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Thank you

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Important disclaimer