

How do we enable the greater use of beneficial natural enemies in canola production systems?



CANOLA
ALLIES

Sarina Macfadyen, Maarten Van Helden, Svetlana Micic, Zorica Duric, Joanne Holloway, Wei Xu, Hazel Parry

Australia's National Science Agency





Multi-organisational project

Five years



Department of
Primary Industries and
Regional Development



Government
of South Australia
Primary Industries
and Regions SA



Department of
Primary Industries and
Regional Development

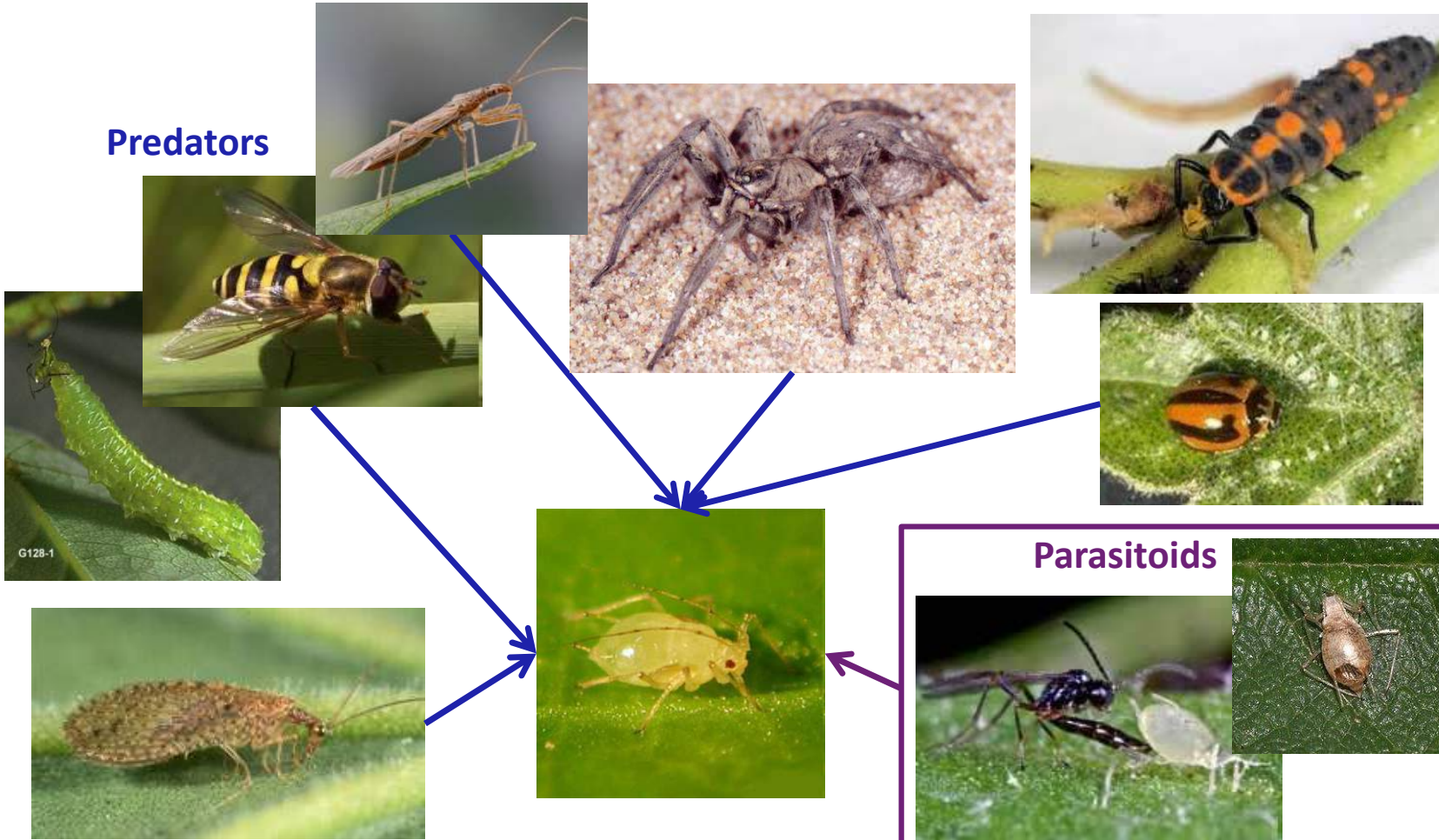
Murdoch University
Biological Services (key partner on project)
PhD students aligned with the project (Precious
will present next)
Fantastic advisory group





Beneficial invertebrates

Predators





Canola production challenges

Australia has a reputation for canola produced with high sustainability standards. High reliance on chemical pesticides for pest control

2013: EU restricted the use of three neonicotinoid insecticides: clothianidin, imidacloprid and thiametoxam. 2020: Restriction on certain pesticides if part of EU accreditation scheme.

Fipronil on seed. Fipronil is persistent in the environment, has been banned in other countries.

Phase out of Chlorpyrifos (organophosphate pesticide).

Resistance (sometimes widespread) for major pests.
Push towards early sowing, dry sowing



Image credit: Isobel Roberts



Opportunities



More insecticide applications:

■ +ve pattern at site

■ -ve/no pattern at site

Fewer pests



vacuum
sweep
pitfall

Small plot
trial site
2010

Less plant damage



chewing
sucking
seedling loss

Yield gain



- Canola can compensate for high levels of pest damage.
- Mass flowering = high biodiversity
- Sustainability credentialing schemes coming online.
- BUT, growers cannot move from a state of high reliance on broad-spectrum pesticides to high reliance on beneficials overnight, incremental steps are important.



Enabling transitions

Limited Management of beneficials

Growers use broad-spectrum pesticides applied prophylactically, on seed and as sprays.

Growers are highly reliant on pesticides to control pests.

No monitoring for pests as no site-specific application of pesticides used.

Agronomic decisions (rotation, stubble, crop type and variety, planting date) not influenced by pest control.

Biological control providers focus on products for other industries.

Researchers conduct foundational research but rarely is this communicated to growers.

2023: 89% of canola fields
2030: 20% of canola fields

Passive management of beneficials

Growers and agronomists consult a beneficial impact table as part of pesticide choice discussions, softer options used routinely.

Monitoring for late-season pests takes place, and sprays are avoided or delayed based on thresholds.

Agronomic decisions (rotation, stubble, crop type and variety, planting date) sometimes influenced by pest control.

Native vegetation remnants and roadside verges maintained to conserve habitats for beneficials.

Biological control providers have products relevant to canola pests.

Researchers conduct foundational and applied research and often work directly with industry groups to communicate findings.

Researchers understand the biodiversity of beneficials on farm and can explain what is needed in habitats to conserve species.

2023: 10% of canola fields
2030: 60% of canola fields

Active management of beneficials

Growers will pay more for pesticide products that are soft on beneficials. Prophylactic treatments avoided.

Monitoring for pests and beneficials takes place, and sprays are avoided or delayed based on thresholds.

Agronomic decisions (rotation, stubble, crop type and variety, planting date) are regularly influenced by pest control.

Growers and agronomists will consider augmentative releases or attractants to increase beneficial populations in-field.

Biological control providers have products relevant to canola pests and facilitate deployment at scale.

Native vegetation remnants and roadside verges weeded and managed to provide high quality habitats for beneficials. NRM groups may also be involved in this activity.

Researchers conduct foundational and applied research and work directly with industry groups to communicate findings.

Researchers investigate methods to increase the biodiversity of beneficials on farm and improve ecosystem service delivery.

Researchers are actively engaged in novel trap technology development for beneficials, modelling, and selection of beneficials with important traits (e.g. ability to find hosts, resistance to pesticides etc.).

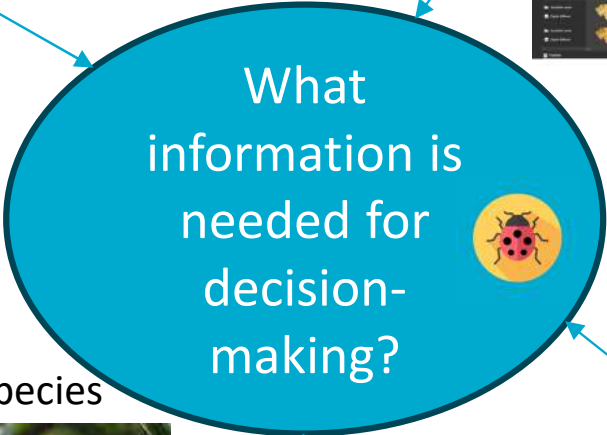
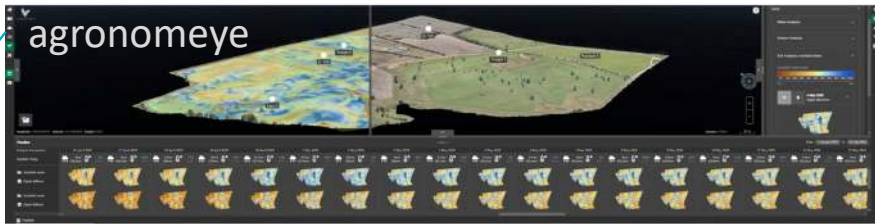
2023: 1% of canola fields
2030: 20% of canola fields

Surveillance for beneficials

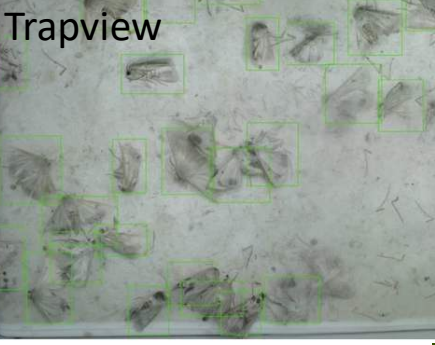
Passive eDNA traps – sample mostly pests, lots of information from limited sites



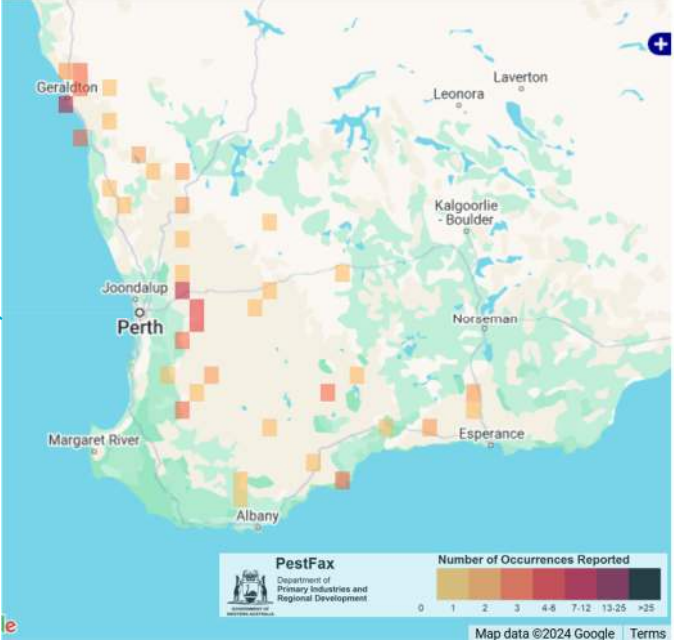
Spatial layers to identify opportunities/patterns



Automated traps – focus on individual pest species



WA Beneficial records for 2024



Sentinel sites ("sprayed" and "unsprayed" at each location), 2024



Tamworth



Wagga Wagga



Katanning

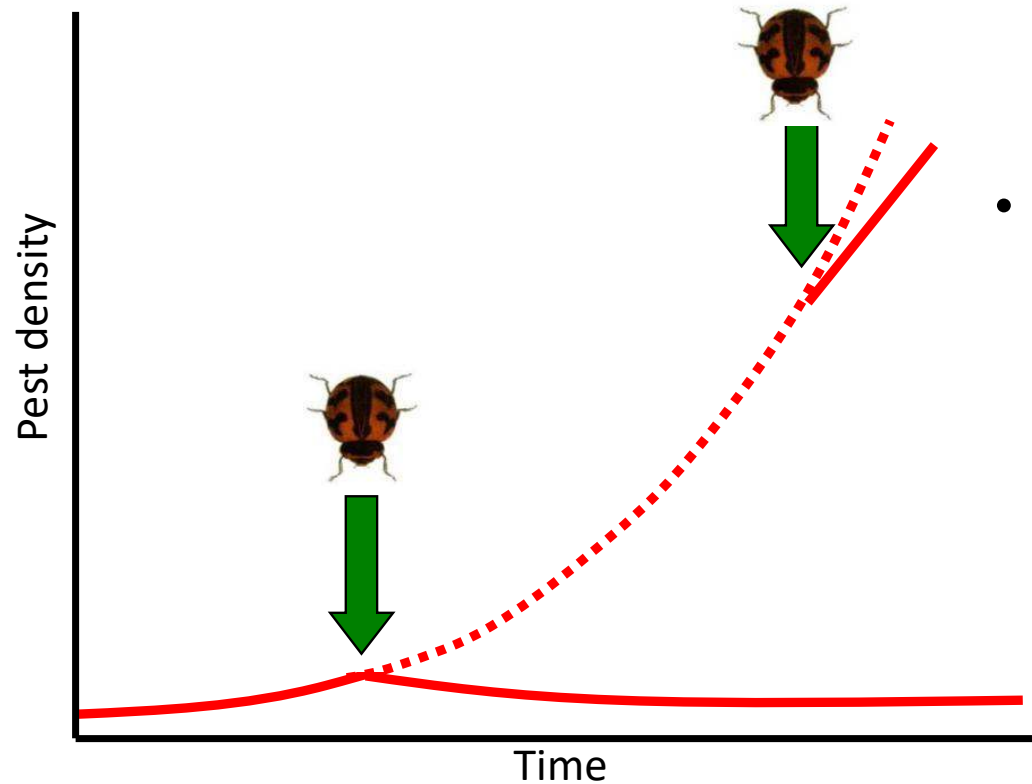


Rosedale



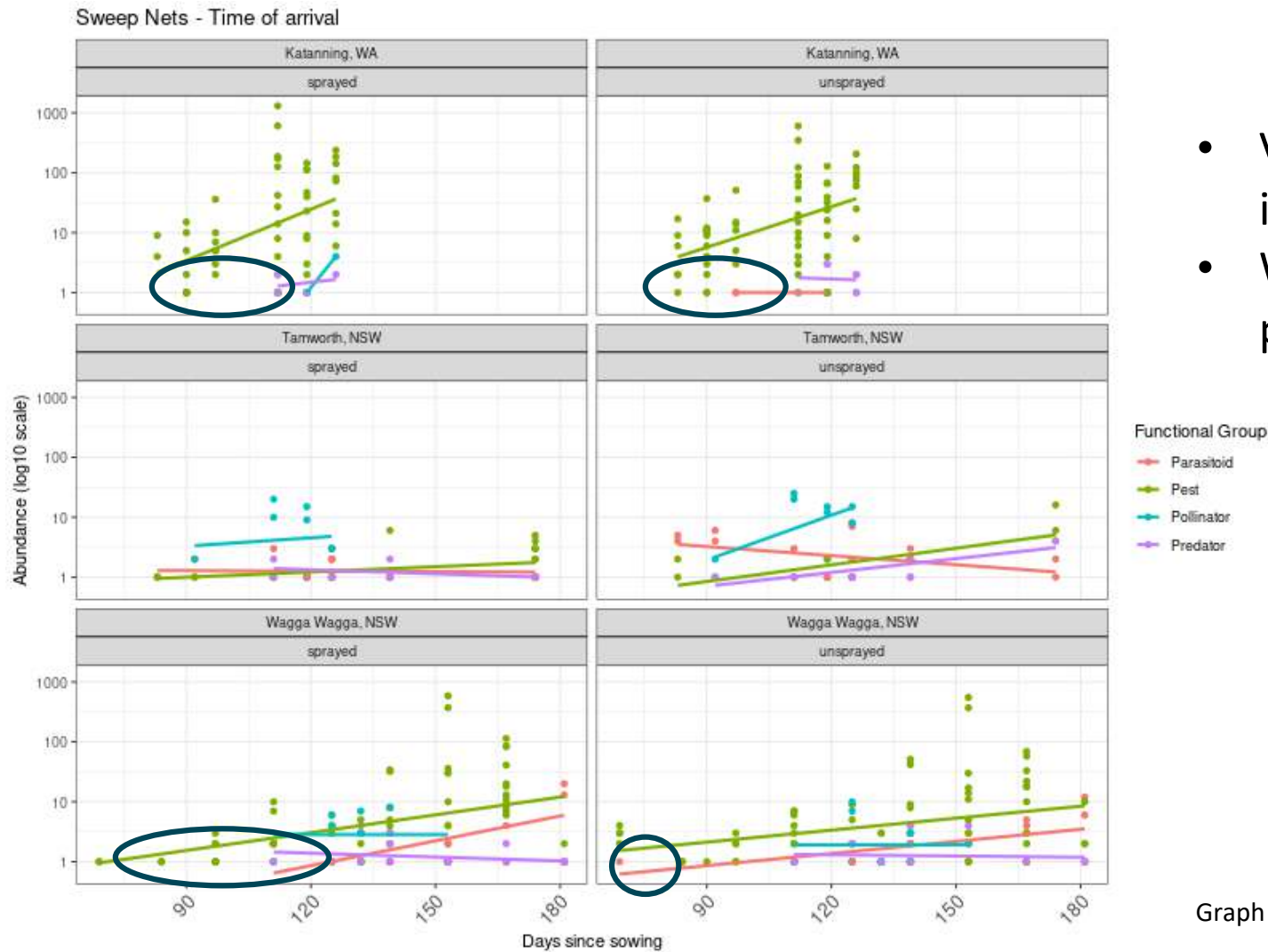
Northam

Time of arrival



- Important for season-long pest suppression
- Canola growers tell us that beneficials arrive too late (and in low densities) to have an impact
- Why?

Sweep net data 2024, sentinel sites



- Very early data – interpretation may change!
- What factors lead to these patterns?

Graph prepared by Jessa Thurman

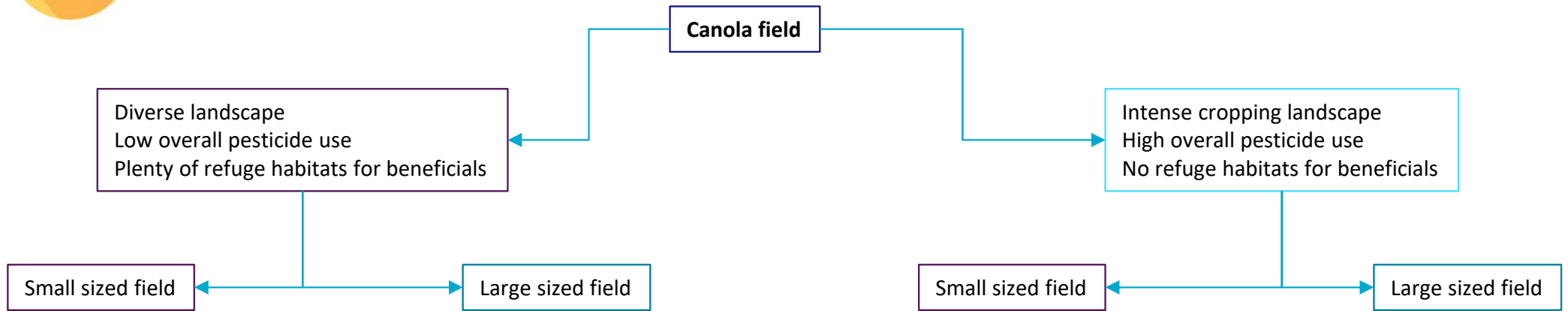
Aphid mummies 2024, plant counts, sentinel sites

	May	June	July	August	September	October	Total
Katanning WA							
sprayed		0	0	0	0	0	0
unsprayed		1	0	0	0	0	1
Northam WA							
sprayed		0	0	0	11	57	68
unsprayed		0	0	0	46	69	115
Tamworth NSW							
sprayed	0	0	0	1	0	1	2
unsprayed	0	0	1	0	0	0	1
Wagga Wagga NSW							
sprayed	0	0	0	0	14	3	17
unsprayed	0	0	4	0	5	11	20
Rosedale SA							
sprayed	0	0	0	0	26	110	136
unsprayed	0	0	5	0	51	230	286

Incorporation of data like this into “indicators”



Where we want to be in 5 years; Tailored actions



Action: careful and limited use of “soft” pesticides

Action: Consult outputs from Spatial Agripest Management Platform Pest risk framework (delivered through Agtech partners), planting time optimized

Action: careful and limited use of “soft” pesticides

Action: attractants to make sure beneficials active in field

Action: In certain years plan to mass release

Action: Consult outputs from Spatial Agripest Management Platform Pest risk framework (delivered through Agtech partners), planting time optimized

Action: careful and limited use of “soft” pesticides

Action: Inoculative releases of beneficials early in the season, to build populations

Action: Create refuge habitats on field margin/nearby fields

Action: Consult outputs from Spatial Agripest Management Platform Pest risk framework (delivered through Agtech partners), planting time optimized

Action: careful and limited use of “soft” pesticides
Action: Inoculative releases of beneficials early in the season, to build populations

Action: attractants to concentrate beneficials in field in a target area

Action: Create refuge habitats on field margin

Action: Consult outputs from Spatial Agripest Management Platform Pest risk framework (delivered through Agtech partners), planting time optimized

Thanks to our great team: Danae Ward, Dusty Severtson, Andy Hulthen, Xiaobei Wang, Shovon Sarkar, Maryam Ehsangar, Rachel Golledge, Rachel Wood, Precious Mavende, Jessa Thurman, Paul Melloy

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Tailoring Practices for Beneficials in Canola Systems

<https://research.csiro.au/canolaallies/>