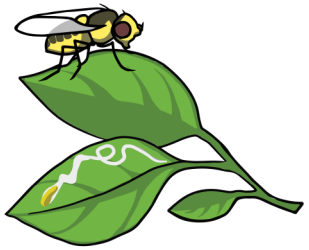
Serpentine leafminer and other exotic leafminers: MT 20005 update

Zarmeen Hassan

6/10/2022



Hort Innovation
Strategic levy investment
VEGETABLE FUND
Queensland Government
AUSVEG
Cesar Australia
NSW Department of Primary Industries
The University of Melbourne
Department of Primary Industries and Regional Development
Northern Territory Government

Exotic *Liriomyza*

Actual size of adult

- Major pests of agriculture in many parts of the world
- Department of Agriculture, Water and the Environment's top 42 pest list

Vegetable leafminer
Liriomyza sativae

Present in Torres Strait Islands (TSI) in 2008 and Seisia, QLD in 2015 – under containment

Serpentine leafminer
Liriomyza huidobrensis

Detected in: Greater Sydney (October 2020)
Fassifern Valley QLD (November 2020)
Weeribee Victoria (June 2022)

American serpentine leafminer
Liriomyza trifolii

Detected (July 2021) in Torres Strait Island QLD, Kununurra WA, Broome, Katherine NT

Found in Potatoes in Lockyer Valley, Queensland

White spiralling “leaf mines”

Liriomyza leafminer hosts

Over 200 host species across at least 15 families, includin

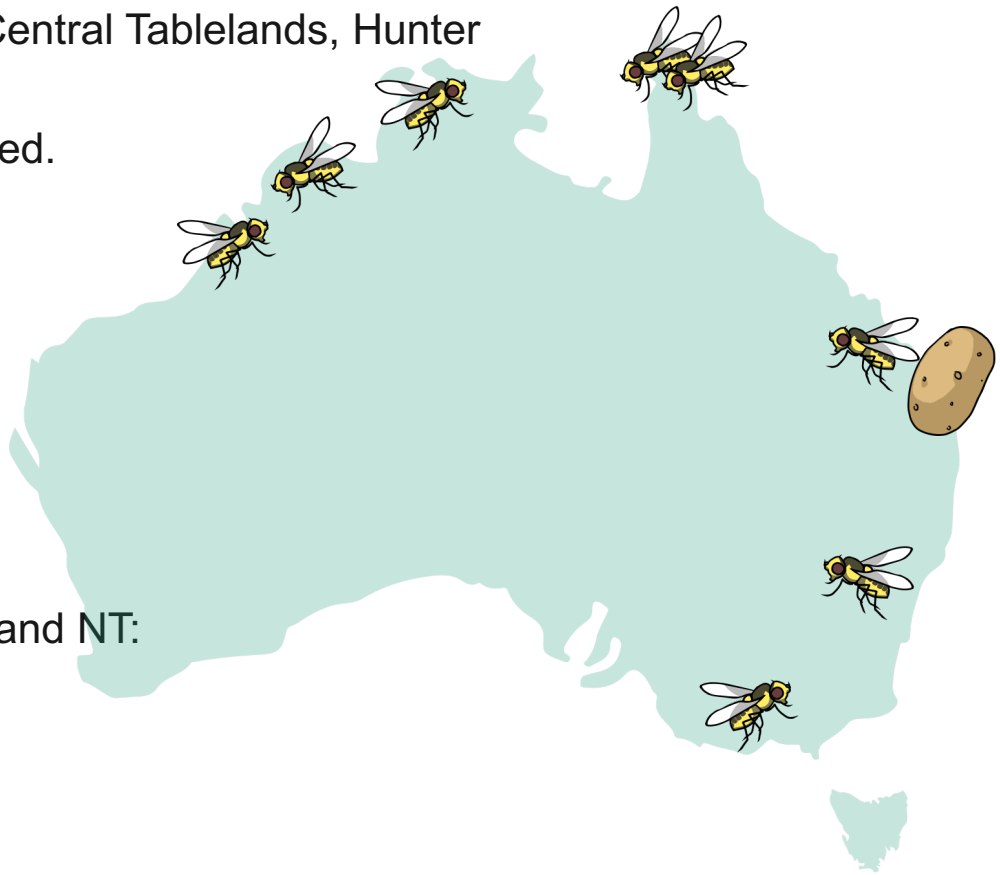
- Onion, garlic and shallots (Alliaceae)
- celery (Apiaceae)
- beetroot and spinach (Amaranthaceae)
- cabbage, broccoli, cauliflower, wombok (Brassicaceae)
- capsicum, tomato, eggplant, potato and petunia (Solanaceae)
- melons, zucchini, cucumber, pumpkins and marrow (Cucurbitaceae)
- lettuce, aster, marigold, chrysanthemum, gerbera and zinnia, sunflower (Asteraceae)
- beans, faba bean and peas (Fabaceae)
- Gypsophila (Caryophyllaceae)
- Grains such as wheat and maize (Poaceae)
- Many wild hosts such as Sowthistle (*Sonchus oleraceus*), Marshmallow weed (*Malva parviflora*)

It will be important to determine the native and weed hosts in Australia!

Current situation

SLM

- Spread across NSW – to Central Coast, Central Tablelands, Hunter Valley, Illawarra, South Coast.
- Greater Sydney Basin significantly impacted.
- QLD detection NOV 2020
  - Fassifern valley
  - Lockyer valley (potatoes)
- VIC detection Jun 2022 - Werribee



ASLM

- Detected in 3 locations across WA, QLD, and NT:
  - Kununurra, WA
  - Broome, WA
  - Torres Strait Islands, QLD
  - Katherine, NT

International Experience SLM impacts on potatoes

Economic injury levels varied according to control costs and commodity values in potato variety

Desiree: 21-28%,
Revolucion: 34-47%,
Canchan: 31-40%,
Maria Tambeña:40-53%,
Tomasa: 55-74%, and Yungay: 40-54%) for the leafminer fly *Liriomyza huidobrensis.*

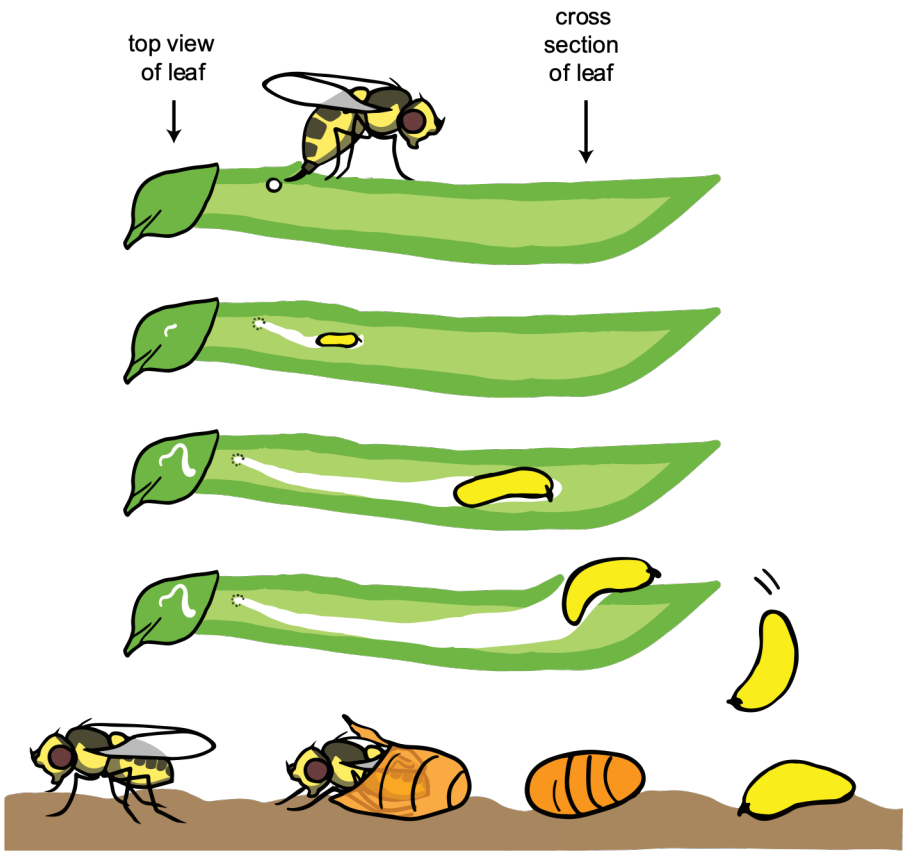
"Pest intensity-crop loss relationships for the leafminer fly Liriomyza huidobrensis (Blanchard) in different potato (Solanum tuberosum L.) varieties"
N. Mujica, J. Kroschel Crop Protection (2013) **47** 6-16

The first documented infestation of *L. huidobrensis* in Indonesia was on potato in West Java in 1994, subsequently invading other regions, Sumatra and South Sulawesi. Yield losses due to this pest may reach 70%, and total crop losses can occur in potato

"Seasonal incidence of Liriomyza huidobrensis (Diptera: Agromyzidae) and its parasitoids on vegetables in Indonesia."
Shepard, B. M. ; Samsudin ; Braun, A. R.

SLM lifecycle

- Four stages (egg, larva, pupa, adult)
- Pupations generally occurs in the soil but will also occur on the plant



Liriomyza lifecycle (E. Pirtle)

SLM damage

- Stippling from feeding and egg lay

Typical stippling on the leaves. Very pale circular spots with distinct hole at one end

SLM damage

White spiraling “leaf mines”

SLM impacts

Impact on plants:

- Leafmining disrupts photosynthesis
- Stippling allows secondary infection (Stemphylium in potatoes)
- Excessive mining can stunt plants, cause fruit failure, or even kill plants
- Young plants are especially susceptible

Impact to business:

- Reduced yield (Early days in QLD as crops are just starting to be harvested. Early indications are that they is little to no effect)
- Loss of marketability
- Costly pest management
- Resistance to chemicals

Above: *L. sativae* damage to melon (left) and marigold (right) (E. Pirtle)

Real world impacts:

- *L. trifolii* cost Californian greenhouse ornamental growers USD **$21 million per year** in early 1980s.
- *L. huidobrensis* caused **70% yield losses** in potatoes in Indonesia in 1995.

QLD situation: Harvesting is just starting but no visible yield losses so far.

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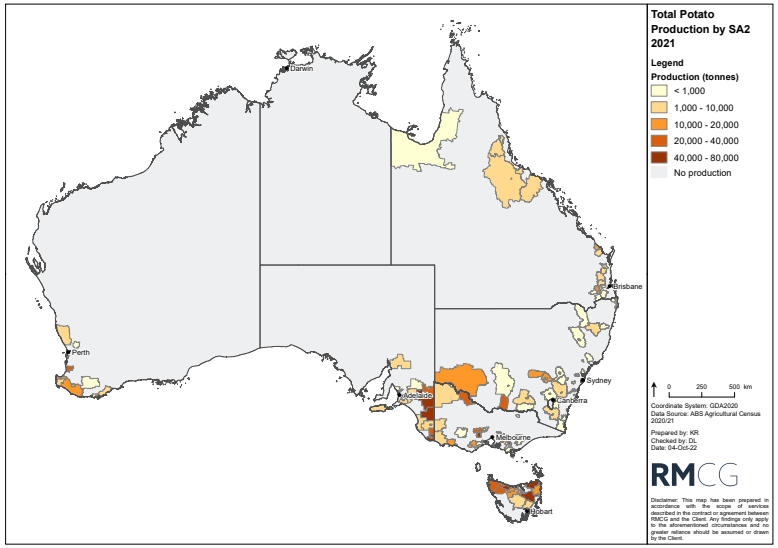
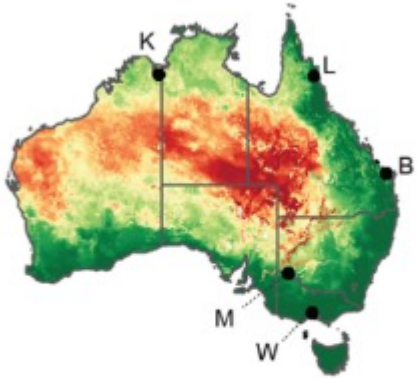
Climatic suitability across Australia,

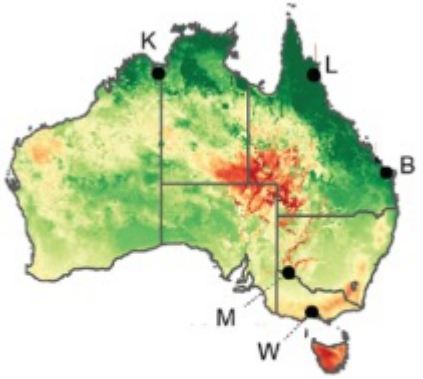


Australian Potato Industry Overview
Doris Blaesing RMCG, May 2021

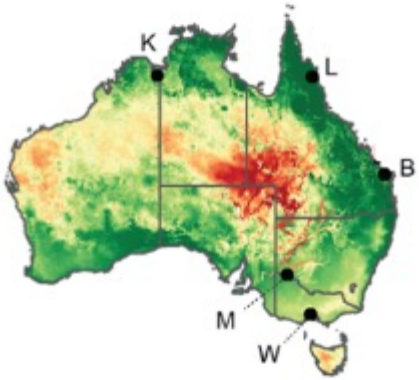
Liriomyza huidobrensis



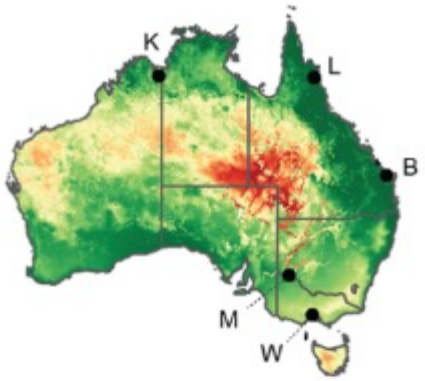
Hemiptarsenus varicornis



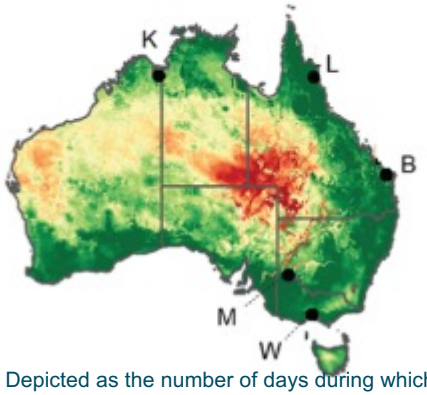
Liriomyza sativae

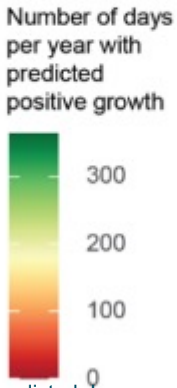


Diglyphus isaea



Liriomyza trifolii





Depicted as the number of days during which positive growth rates are predicted. Image courtesy of Cesar Australia

Management of exotic leafminers

What will IPM look like on my farm?

Foundations of IPM approaches overseas

- **Monitor pest activity:** follow economic thresholds to reduce sprays and allow parasitoid populations to build.
- **Understand role of parasitoids:** know the signs of parasitism; understand the role of reservoirs of parasitoids.
- **Avoid broad-spectrum insecticides:** do not target leafminer flies with inappropriate chemicals; consider effect of chemicals that target other pests

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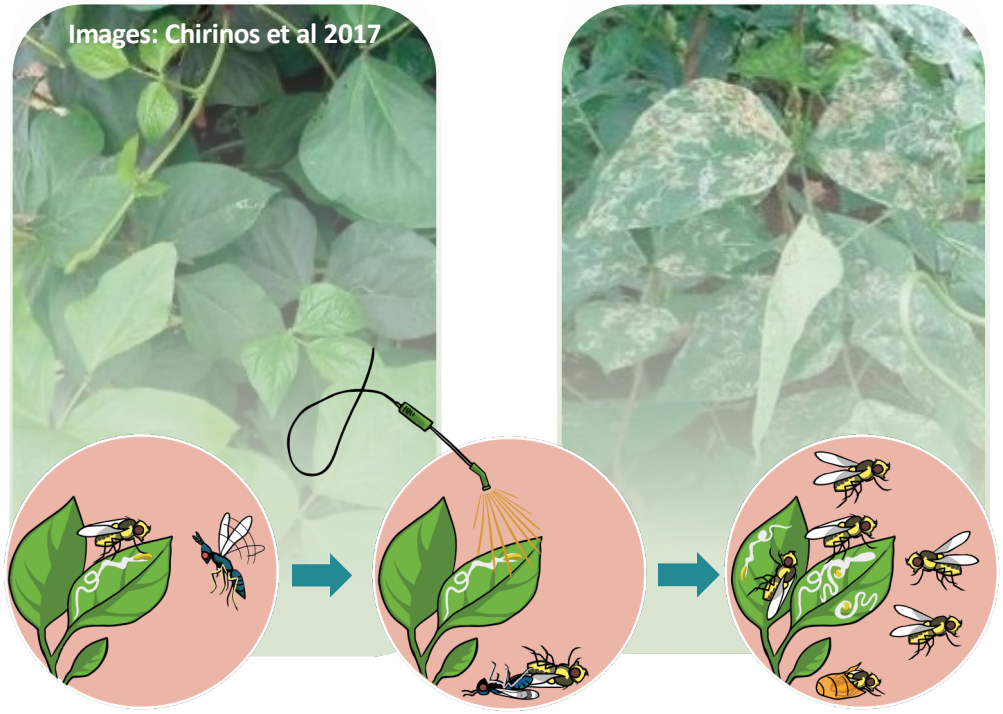
Why such large losses?



Polyphagous leafminers are secondary pests

Losses associated with chemical mismanagement leading to destruction of parasitoids

Above: *Closterocerus species*
Image taken by Dr Elia Pirtle

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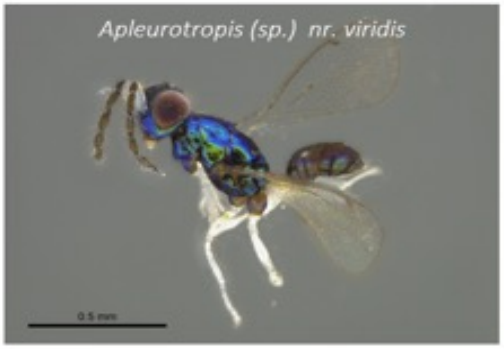
Parasitoids in Australia

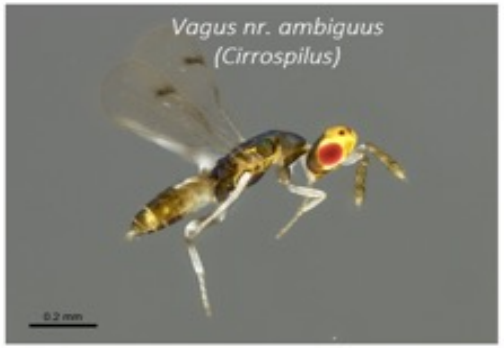
Hemiptarsenus varicornis. Image: Elia Pirtle, cesar Pty Ltd

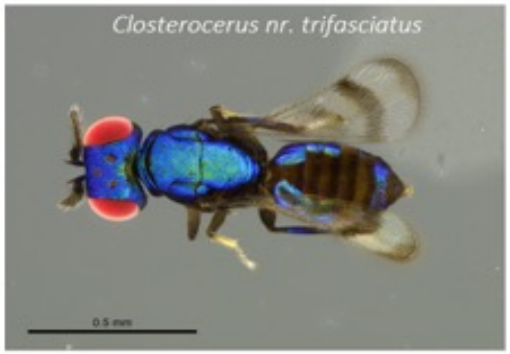
Diglyphus isaea. Image: Elia Pirtle, cesar Pty Ltd

Opius spp. Image: Elia Pirtle, cesar Pty Ltd and John Duff QDAF

Gronotoma sp.: BugGuide.Net

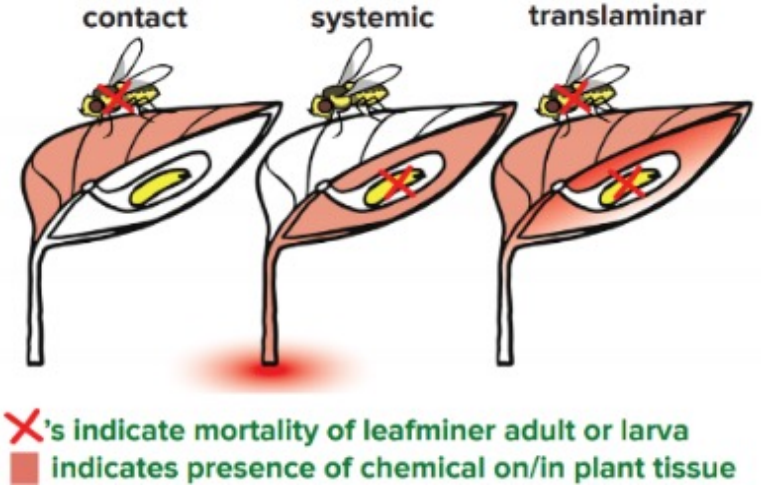






Chemical control options for leafminers

- **Important considerations are:**
  - Potential for resistance evolution
  - Efficacy of chemical against leafminer
  - Potential to disrupt parasitoids



Less disruptive

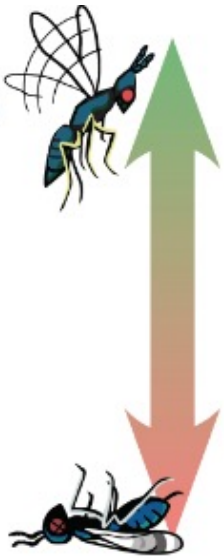
azadirachtin (UN), chlorantraniliprole (28), cyantraniliprole (28), cyromazine (17), indoxacarb (22A)

In the middle

abamectin (6), emamectin benzoate (6), spinetoram (5), spinosad (5)

Most disruptive

organophosphates (1B), synthetic pyrethroids (3A), thiamethoxam (4A)



Permits:

Cyantraniliprole C,S **
Chlorantraniliprole C,S **
Azadirachtin C,S
Cyromazine C,T *
Indoxacarb C,T
Abamectin C,T,S *
Emamectin benzoate C,T
Spinetoram C,T *
Spirotetramat S **
Imidacloprid C,S
Dimethoate C,S
Bifenthrin C

C=contact S=systemic T=translaminar

* Permits available in potatoes

** Products registered in potatoes

https://www.horticulture.com.au/growers/serpentine-leafminer-update/

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Questions/Discussion