

Non-crop host plants: prime real estate for the tomato potato psyllid in New Zealand?

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The problem

Many tree croppers, especially those of you who grow tamarillos, will be familiar with the summer scourge of solanaceous crops, the tomato potato psyllid (TPP) *Bactericera cockerelli*. You may also be aware that TPP is the vector of a pathogenic bacterium, *Candidatus Liberibacter solanacearum* (CLso). CLso is the acknowledged causal agent of Zebra Chip disease in potatoes, which results in stunted growth and reduced yields, as well as discolouration of both raw and fried potato tubers¹. Together, the pathogen and the insect are collectively responsible for significant economic losses across New Zealand's horticulture industry.

A bit about host plants

Most crop hosts of TPP and CLso are short-lived summer annuals (e.g. potato, tomato, capsicum and kumara), but unfortunately many non-crop species also host TPP, including perennials, which have the potential to act as reservoirs of TPP and CLso in the absence of a crop.

This article presents some of the findings of vegetation surveys carried out in Hawke's Bay and Canterbury in 2013-14, which aimed to document key non-crop annual and perennial hosts of TPP in New Zealand. For the purposes of this work, we define a host plant as one on which TPP can complete its full life cycle, from egg to adult².

Survey methods

In spring 2013, commercial potato and tomato crops were selected in Hawke's Bay (North Island) and Canterbury (South Island). The crops were geographically separate within the regions and selected prior to crop emergence or planting. Every three months, 100 m of the crop field margin was walked and specific non-crop plants visually examined for TPP eggs, nymphs and adults over a 30-minute period. We focused on species in the Solanaceae and Convolvulaceae, and other species historically reported as hosts, e.g. Malvaceae^{3,4}.

Why is this work important?

Knowledge of weedy non-crop host plants could assist commercial growers with decisions regarding management of field margins and volunteer plants, particularly in the off-season, and could also be directly translated to the home garden situation – a simple matter of scale.

Knowledge of the exact host range of TPP is of crucial importance to biosecurity agencies, growers and industry, as it allows improved, targeted management strategies and surveillance techniques to be developed. This information is particularly relevant for countries like Australia, where TPP/CLso is not yet present, but where the threat of an incursion via New Zealand is a highly likely situation⁵.

Results

Non-crop weed host plants in the presence of potato and tomato crops on which all TPP life stages were commonly found in Hawke's Bay and/or Canterbury:

African boxthorn

Lycium ferocissimum

Growth form⁶: Perennial (evergreen)

Distribution⁶: Throughout New Zealand, predominantly in coastal areas

Found in survey locations: Hawke's Bay, Canterbury

Images: John Barkla/Jessica Dohmen-Vereijssen (inset)

Poroporo

Solanum laciniatum* or *S. aviculare

Growth form: Perennial (evergreen)

Distribution: Throughout New Zealand

Found in survey locations: Canterbury

Images: Phil Bendle/Anna-Marie Barnes (inset)

Thorn-apple

Datura stramonium

Growth form: Annual

Distribution: North Island and upper South Island

Found in survey locations: Hawke's Bay

Images: H. Zell

Apple of Peru

Nicandra physalodes

Growth form: Annual

Distribution: North Island, upper South Island (occasional)

Found in survey locations: Hawke's Bay

Image: Peter de Lange

Jerusalem cherry

Solanum pseudocapsicum

Growth form: Perennial (evergreen)

Distribution: Occasionally throughout New Zealand in frost-free areas

Found in survey locations: Hawke's Bay

Image: John Sawyer

Field bindweed

Convolvulus arvensis

Growth form: Perennial

Distribution: Throughout New Zealand

Found in survey locations: Hawke's Bay

Image: Mike Lusk

Chinese boxthorn

Lycium barbarum

Growth form⁷: Perennial (deciduous)

Distribution^{8,9}: Occasionally throughout New Zealand



Found in survey locations: Hawke's Bay

Image: Pancrat

Conclusions

Perennial non-crop host plants harboured TPP life stages in Canterbury and Hawke's Bay, year-round and in the absence of crops, with annual non-crop host plants also hosting TPP in Hawke's Bay until late autumn, after the main growing season. Non-crop host plants could therefore be potential reservoirs of CLso – for example, CLso has been detected in both Jerusalem cherry (*Solanum pseudocapsicum*) and thorn-apple (*Datura stramonium*) samples from Hawke's Bay, the first report of the bacterium infecting weed species in New Zealand¹⁰. Although the percentage of CLso-infected weed plants in the general population may be low, the fact they are potential reservoirs for the pathogen and its vector in the absence of a suitable crop host means they may well provide a potential inoculum source for infection of subsequent crops¹⁰.

A wider range of non-crop Solanaceae hosted only *some* TPP life stages during the survey period, but are not reported here. The presence of non-crop TPP host plants around potato and tomato crops presents significant management implications for growers and home gardeners and poses the question – to remove (causing disturbance, and therefore potential dispersal) or not remove?

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Additional images

CRC southbridge 030: TPP nymphs feeding on *Lycium ferocissimum*, Canterbury. (Jessica Dohmen-Vereijssen).

CRC southbridge 024: TPP eggs laid on *Lycium ferocissimum*, Canterbury. (Jessica Dohmen-Vereijssen).

Crazy boxthorn: High-density housing – TPP nymphs on *Lycium ferocissimum*, Canterbury. (Jessica Dohmen-Vereijssen)



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