PFR SPTS No. 17984

Sustainable Farming Fund (SFF) Project No. 404861, Milestone 6

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1 SUMMARY

This report provides a summary of work undertaken by The New Zealand Institute for Plant and Food Research Limited (PFR) for the Horticulture New Zealand Incorporated led Sustainable Farming Fund (SFF) Project No. 404861, Milestone 6. The goal of the SFF project is to establish self-sustaining populations of a parasitoid, *Tamarixia triozae*, of tomato potato psyllid (TPP), in New Zealand. This report summarises activities for Milestone 6 that involves analysis of monitoring data from post-release surveys March – May 2019 from Canterbury, Hawke's Bay and Clevedon, Auckland.

In summary:

- Parasitised nymphs have not yet been observed or recovered from TPP at the Clevedon release site.
- Parasitised TPP nymphs were observed at four of the six sites where growers or industry personnel had released *T. triozae* adults between December 2018 and February 2019, indicating the parasitoid was reproducing on TPP at these sites.
- In Hawke's Bay, a parasitized nymph was observed on thornapple (*Datura stramonium*) 16.7 km away from the nearest site (Site C, Clive) where *T. triozae* had been released the previous summer (December 2017 – February 2018).
- In Canterbury, a parasitised TPP nymph was found on African boxthorn approximately 0.5 km from the Southbridge release site (Site B, Southbridge). At site A (Motukarara), the parasitoid had been recovered from TPP approximately 60 m away from the release site (Davidson et al. 2019).

2 POST RELEASE SURVEYS TO MAY 2019

2.1 Auckland (Clevedon property)

More *T. triozae* were released at the Clevedon property between December 2019 and February 2019. PFR staff visited the property on 10 April 2019 to search for parasitised TPP. The search was limited to vegetation outside because of the insecticides used in the greenhouses. A small number of TPP eggs and small nymphs were found, and the nymphs were collected and transferred to the PFR entomology laboratory at the Mt Albert Research Centre. No parasitoids emerged (Table 1). We have not been able to confirm whether the parasitoid has established at Clevedon.

2.2 Additional release sites

Growers or industry personnel in Hawke's Bay and Canterbury released adult *T. triozae* either on their properties or at non-crop TPP host plants near their properties from December 2018 to April 2019 (Figures 1 and 2, Table 1). Most of the sites were visited in April 2019 by PFR staff to determine whether the parasitoid was surviving on TPP present on the host plants. The presence of parasitoids was determined based on parasitised TPP nymphs observed in the field. Parasitised TPP nymphs were observed at four of the six release sites in Hawke's Bay and Canterbury. Two sites in Canterbury were not surveyed because the parasitoid was released in April.

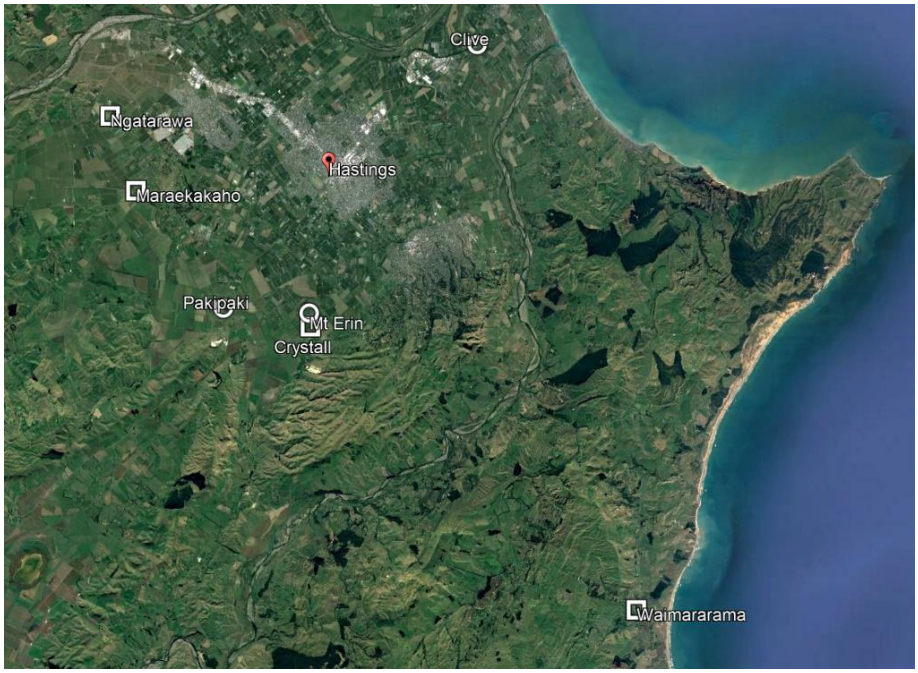

Figure 1. Sites in Hawke's Bay where *Tamarixia triozae* have been released by The New Zealand Institute for Plant and Food Research Limited (PFR) staff between December 2017 and February 2018 (circles) or growers or others (squares) between December 2018 and April 2019.

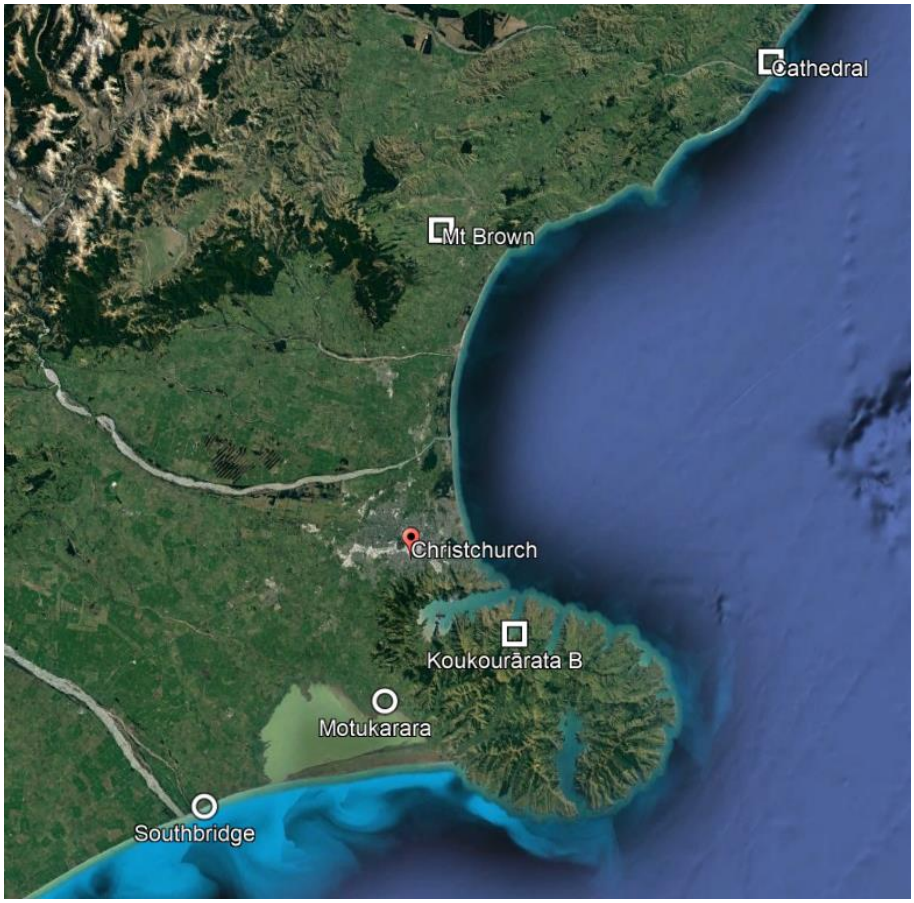

Figure 2. Sites in Canterbury where *Tamarixia triozae* have been released by The New Zealand Institute for Plant and Food Research Limited (PFR) staff between December 2017 and February 2018 (circles) or growers or others (squares) between December 2018 and April 2019.

Table 1. Sites where *Tamarixia triozae* were released by growers or industry personnel between December 2018 and April 2019 and results from follow-up surveys by The New Zealand Institute for Plant and Food Research Limited (PFR) staff for parasitised tomato potato psyllid (TPP) nymphs. Sites that have not been surveyed yet for parasitised TPP are described as 'not determined'.

Region	Site name	Dates of release(s)	Parasitised TPP observed (yes/no/not determined)
Auckland	Clevedon	March – May 2018, Dec 2018 – Feb 2019	No
Hawke's Bay	Crystall	Dec – 18	Yes
	Maraekakaho	Dec – 18	No
	Ngatarawa	Dec 2018 – Feb 2019	Yes
	Waimararama	Dec 2018 – Feb 2019	Yes
Canterbury	Mt Brown	Dec 2018 – Feb 2019	Yes
	Cathedral Rd	Dec 2018 – Feb 2019	No
	Koukourārata A	Apr – 19	Not determined
	Koukourārata B	Apr – 19	Not determined

3 ADDITIONAL ACTIVITES

Spread of *T. triozae* from release sites in Canterbury

TPP host plants, predominantly African boxthorn, were surveyed at Site A (Motukarara) and B (Southbridge), where *T. triozae* adults had been released the previous year, between December 2017 and February 2018.

A parasitised TPP nymph was observed approximately 500 m from the original release site at Southbridge (Site B). Boxthorn, up to 1.2 km from the Southbridge release site had been surveyed and while TPP eggs were found on plants at this distance, no parasitised TPP nymphs were observed.

No parasitised TPP nymphs were found during surveys in March and April 2019 of TPP host plants at Motukarara (Site A), despite observing potato and tomato plants infested with TPP. Potato plants were under mesh, and tomato plants were in a small greenhouse approximately 60 m from the boxthorn hedge where the parasitoid had been released. Thus, the distance we have measured spread for the parasitoid at this site is 60 m from the release site as previously reported (Davidson et al. 2019).

Spread of *T. triozae* from release sites in Hawke's Bay

PFR staff continued the survey of TPP host plants to determine the spread of *T. triozae* from Site C, near Clive in Hawke's Bay, previously reported in Davidson (et al. 2019). The greatest distance parasitised TPP nymphs were found from the release site was approximately 16.7 km (Table 2).

Parasitised TPP nymphs were also observed during a survey of TPP tomato plants from a conventionally managed crop, 1 km from Site A (Mt Erin) and 1.4 m from the Crystall Road site where *T. triozae* had been released more recently than Site A (Table 1). We do not know if the *T. triozae* in this conventional tomato crop spread from site A or the more recent release at Crystall Road. Parasitised TPP nymphs were also found in other conventionally managed potato or tomato crops (Table 2).

Table 2. The number of *Tamaraxia triozae* observed based on exit holes present in tomato potato psyllid (TPP) nymphs or parasitoids in TPP nymphs in the field in Hawke's Bay.

Date surveyed	Distance to closest release site (km, approximate)	Host plant surveyed	No. TPP recovered/ observed	No. *Tamaraxia triozae* recovered/observed
4/03/2019	0.5	Potato (conventional)	<20	1
5/03/2019	1.7	Potato (organic)[1]	>2000	300
25/03/2019	5.0	Tomato (conventional)	39	37
25/03/2019	5.0	Tomato (conventional)	88	78
25/03/2019	1.0	Tomato (conventional)	6	4
4/04/2019	6.2	Apple of Peru (*Nicandra physalodes*)	23	8
4/04/2019	6.8	Thornapple (*Datura stramonium*)	154	15
4/04/2019	6.7	Boxthorn	100	9
9/04/2019	4.8	Thornapple	17	1
9/04/2019	5.0	Thornapple	19	1
10/04/2019	3.7	Thornapple	35	3
10/04/2019	3.0	Thornapple	6	1
10/04/2019	2.8	Boxthorn	2	2
16/04/2019	5.0	Thornapple	64	11
6/05/2019	16.7	Thornapple	5	1

[1] *T. triozae* adults recovered from TPP nymphs reared in the laboratory on host plant foliage collected from the field.

4 FUTURE WORK TO JUNE 2019

Overwintering of *T. triozae* at release sites

Between December 2019 and February 2020 (the timing will depend on numbers of TPP), we intend to visit the sites where *T. triozae* were released by the growers/industry personnel to determine whether the parasitoid has survived over winter. We will revisit the release sites from Year 1 (where *T. triozae* had been released in December 2017 – February 2018) to determine whether *T. triozae* are present at these sites. Given how far the parasitoid has spread in Hawke's Bay it will be difficult to determine if the parasitoids originate from the Year 1 releases, or if they are progeny from the Year 2 releases that have spread to the Year 1 release sites. We will continue to evaluate the spread of the parasitoid in Canterbury.

5 REFERENCES

Davidson M, Sachtleben T, MacDonald F. June 2019. Sustainable Farming Fund (SFF) Project No. 404861, Milestone 6. A Plant and Food Research report prepared for: VRI Board, Horticulture New Zealand Incorporated. Milestone No. 72577. Contract No. 33968. Job code: P/336064/01. SPTS No. 17984.

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