

## ***Tamarixia triozae* importation, rearing and releases**

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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) staff for the Sustainable Farming Fund (SFF) Project No. 404861, Milestone 2, the release of *Tamarixia triozae* for the first year of the SFF programme. To undertake this milestone, we had to import the parasitoid into quarantine for a second time, receive approval from the Ministry for Primary Industries (MPI) to transfer progeny of the originally imported *T. triozae* out of quarantine, and rear enough of the parasitoid for releases into the New Zealand environment. The tasks related to importation, clearance from quarantine and rearing were funded through the PFR Strategic Science Investment Fund (SSIF).

The goal of the SFF is to establish self-sustaining populations of a parasitoid of the tomato potato psyllid (TPP), *T. triozae*, in New Zealand. The task for Milestone 2 involved releases of *T. triozae* at sites within perennial non-crop TPP host plants (Hawke's Bay and Canterbury). The milestone was completed in February 2018.

The additional work carried out and funded by PFR involved the importation into quarantine of *T. triozae* from sources in Mexico, and obtaining permission from MPI to release the parasitoid from quarantine. This task preceded the SFF releases and was completed by September 2017. Additional work funded by PFR SSIF also included developing a rearing system and maintaining laboratory colonies of *T. triozae* to build capability within PFR.

PFR also contributed to extension activities, supplying information used in press releases, and presenting information about the SFF and PFR *T. triozae* related activities to the TomatoesNZ Board and Tamarillo growers, and to personnel attending a Potatoes New Zealand funded pest identification workshop.

### 2 IMPORTATION AND REARING OF *T. TRIOZAE*

Between June and September 2017 approximately 1000 *T. triozae* adults from Biobest Mexico and another 1000 from Koppert Mexico were imported into the PFR Mt Albert Invertebrate Containment Facility (ICF). A subsample of adults that were screened by Jo Poulton, PFR, for fungi were negative for any fungal hyphae. A subsample was also sent to Darren Ward, Landcare Research, who confirmed all specimens were *T. triozae*. MPI approved release of first generation (F1) *T. triozae* out of containment (Appendix 1). The F1 parasitoids were transferred to an insect rearing facility at PFR, Mt Albert. PFR have subsequently been supplied *T. triozae* to;

1. Bioforce Limited (Pukekohe) to start a colony for ongoing rearing. The SFF funding does not cover the cost of rearing the parasitoid, so helping a commercial company to start a colony is one way to ensure a supply of the parasitoid is available for the duration of and beyond the term of the SFF project to researchers and growers. PFR has also supplied Bioforce capsicum plants with TPP as a food and host source for the parasitoid.
2. Lincoln University for a Master's student (Howard London) and AGMARDT postdoctoral study (Shola Olaniyan)
3. PFR SFF releases in Hawke's Bay and Canterbury,
4. PFR Lincoln and Hawke's Bay to establish a colony at each site.
5. PFR Lincoln, used for gene sequencing analysis.

The samples of *T. triozae* used for the gene sequencing analysis were shown to contain two haplotypes, out of the six haplotypes described by de Leon and Setamou (2010)<sup>1</sup>. The implications of these results are unclear because information of the genetic diversity within *T. triozae* is limited since the individuals analysed by de Leon and Setamou were collected from a single population at Weslaco, Texas, United States of America.

To build PFR capability in the SFF project, we had staff from PFR travel from Lincoln and Hawke's Bay to PFR Mt Albert to learn how to handle and rear the parasitoid. Staff at Lincoln and Hawke's Bay were then able to develop a less intensive rearing system than the one required for rearing *T. triozae* from imported parasitoids in a quarantine facility. To ensure PFR staff are familiar with the parasitoid we will continue to rear the parasitoid until the end of June 2018, after which time external funding we will required to continue rearing the parasitoid at PFR, or find an alternative source of the parasitoid for further releases planned in Year 2 and 3 of the SFF.

PFR SSIF funding for these activities was approximately \$70,000.

### 3 SFF MILESTONE 2

Releases of *T. triozae* were undertaken across two Canterbury sites and three Hawke's Bay sites and took place between August 2017 and February 2018. We chose the release sites because we had previously recorded all life stages of TPP on the boxthorn vegetation throughout the year and the vegetation is not sprayed with insecticides. We have released a total of approximately 1000 parasitoids in both Canterbury and Hawke's Bay over this 7-month period.

For the first release in Hawke's Bay in mid-August 2017 we placed ten capsicum plants across three sites infested with parasitised TPP nymphs beside African boxthorn (*Lycium ferocissimum*). However we could not determine how many parasitoids had emerged from the plants, so made a conservative estimate of approximately 160 - 200 parasitoids from three – four plants based on emergence from plants kept in a controlled temperature room. Similar plants in a controlled temperature room ( $25 \pm 1^\circ\text{C}$ ) resulted in 1600 – 2000 parasitoids two –

<sup>1</sup> de Leon, J. H. and Setamou, M. 2010. Molecular Evidence Suggests That Populations of the Asian Citrus Psyllid Parasitoid *Tamarixia radiata* (Hymenoptera: Eulophidae) From Texas, Florida, and Mexico Represent a Single Species. *Annals of the Entomological Society of America*. 103, 1: 100-110. DOI: 10.1603/008.103.0113.

three plants per rearing cage. We made a more conservative estimate because the plants were placed in the field in Hawke's Bay in winter.

For all remaining releases in Hawke's Bay and Canterbury we have released adults collected from laboratory cultures and transported in plastic vials containing a small amount of honey (supplementary food). The first release at two sites with African boxthorn in Canterbury occurred in early September 2017, when TPP life stages were rare at both sites. TPP were easy to find on the African boxthorn at the time of the remaining releases in Canterbury, which occurred in November 2017, mid and late January, and mid to late February 2018 (Table 1).

Adult parasitoids were released at the Hawke's Bay sites in late November 2017, when all life stages of TPP were easy to find at all three sites, and in mid-January and mid-February when TPP were easy to find at two sites, but rare at one site (Table 1).

**Table 1. The number of *Tamarixia triozae* released in Canterbury or Hawkes Bay near African boxthorn. Unless otherwise stated, *T. triozae* were released as adults from glass vials with a droplet of honey as supplementary food.**

Region	Site	Date released	Approximate number <i>T. triozae</i> released	Tomato potato psyllid status <sup>1</sup>
Hawke's Bay	Site A	16 August 2017	160 – 200 (4 capsicum plants with parasitised TPP nymphs)	Rare
Hawke's Bay	Site B	16 August 2017	160 – 200 (3 capsicum plants with parasitised TPP nymphs)	Rare
Hawke's Bay	Site C	16 August 2017	160 – 200 (3 capsicum plants with parasitised TPP nymphs)	Rare
	Site A	29 November 2017	36	Easy to find
	Site B	29 November 2017	37	Easy to find
	Site C	29 November 2017	33	Easy to find
	Site A	22 January 2018	80	Easy to find
Hawke's Bay	Site B	15 January 2018	87	Rare
	Site C	11 January 2018	118	Easy to find
	Site A	27 February 2018	65	Easy to find
	Site B	27 February 2018	60	Rare
	Site C	13 February 2018	65	Easy to find
	Site A	5 September 2017	88	Rare
	Site B	5 September 2017	63	Rare
	Site A	3 November 2017	75	Easy to find
	Site B	3 November 2017	70	Easy to find
	Site A	15 January 2018	82	Easy to find
Canterbury	Site B	15 January 2018	68	Easy to find
	Site A	31 January 2018	120	Easy to find
	Site B	31 January 2018	90	Easy to find
	Site A	14 February 2018	200	Easy to find
	Site B	12 February 2018	175	Easy to find
	Site A	28 February 2018	30	Easy to find

<sup>1</sup>TPP relatively easy to find indicated relatively abundant populations, TPP rare indicates low populations, or no TPP found at time of release (but had been found on the boxthorn in previous years, hence the reason these release sites were chosen).

## 4 NEXT STEPS

### 4.1 Until end June 2018

In order to determine if *T. triozae* were able to reproduce on wild TPP during the summer season, we will start collecting TPP infested plant material from the Hawke's Bay and Canterbury release sites at the end of March 2018 (SFF - Milestone 3). Plant material will then be transferred to mesh cages and any *T. triozae* adults to emerge will be recorded.

Between February and June 2018, any excess adults from the *T. triozae* colony at Lincoln could be sent to industry people around New Zealand for release at sites where TPP are present and will not be sprayed with insecticides. The Hawke's Bay *T. triozae* colony was discontinued because it has been difficult to maintain and surplus to requirements after the last of the releases in February 2018.

### 4.2 Year 2 of SFF

Post release surveys to determine if *T. triozae* can survive winter in New Zealand, will be carried out in the summer 2018-19; PFR can undertake the collection of plant material from the PFR release sites in Canterbury and Hawke's Bay and rear any collected TPP through to fate.

If there is anyone available at any other sites where the parasitoid was released in March – April 2018 who could collect plant material that has TPP on it, they could send the material to PFR where we could rear the TPP through to fate. Note, there is only a very limited amount of funding available for this activity so we could only afford to receive plant material once or twice from a couple of sites.

Any further *Tamarixia* releases in Years 2 and 3 will depend on availability of the parasitoid.

### 4.3 Additional in-kind activities

We have a student visiting us at PFR Lincoln for 6 months, (March-September 2018). He is keen to be involved in the *Tamarixia* SFF project. He will assist in the autumn post-release surveys. He also intends to carry out laboratory experiments to determine the survival and fecundity of *T. triozae* on TPP on African boxthorn, potato, tomato and/or capsicum plants.

## Appendix 1. Biosecurity Authority/Clearance Certificate issued by the Ministry for Primary Industries for the release of *Tamarixia triozae* progeny from imported parasitoids

### Biosecurity Authority/ Clearance Certificate

Pursuant to Sections 25 and 26 of the  
Biosecurity Act 1993

Ministry for Primary Industries  
Manatū Ahu Matua



**C2017/236613**

CUSMOD Release No.:

BACC No.: B2017/232202

NZCS Entry No.: 0

All Biosecurity Requirements Met?

**YES**

The goods that are covered by the authorities in this document have been cleared for entry into New Zealand.

Any clearance or Authority that is contained in this document, and that relates to agricultural compounds or veterinary medicines, also constitutes permission to remove these goods under the conditions contained within the Agricultural Compounds and Veterinary Medicines Act 1997.

**Authority Issued To:** PLANT FOOD RESEARCH, 120 MT ALBERT ROAD, SANDRINGHAM, Auckland 1025

**Importer:** PLANT FOOD RESEARCH, 120 MT ALBERT ROAD, SANDRINGHAM, Auckland 1025

**Agent:** Federal Express Pacific.Inc, Laurence Stevens Drive, Auckland Airport, Auckland

**Contact:** Ratu Rapana

**Arrival Method:** Flight: QF7523      **Date:** 05/07/2017

**IDENTIFIERS:**

B/L:804562259783;Sub B/L:804562259783;

#### AUTHORITY

**For:** .Released (all Biosecurity requirements met)

**By:** Containment Verifier, -

**Authority Conditions:**

Released as per NOR100160. Release applies to progeny of consignment as per PTI 2017063877.

Species identification verified; NZAC accession number NZAC03018566.

F0 microbe screening completed 12/07/2017. Results sighted and no evidence of microbes detected.

Recommendation for release received from Manager Import & Export Animals on 28/07/2017.

**Std Ref Name:** Permit to Import

**Version Date:**

**Authorising Inspector:** Sorce, Marisa

**Location:** Containment Verifier - Upper North Is      **Date:** 01/08/2017

**GOODS COVERED BY THIS AUTHORITY:**

No.	Line Type	Country of Origin	Line Details
1	Animals	MEXICO	Invertebrate, TAMARIXIA TRIOZAE BURKS,Unknown,Adult,4.000 unit(s)

**Line Identifiers:** B/L:804562259783; Sub B/L:804562259783;

**Issued By:** Marisa Sorce

**Location:** Containment Verifier - Upper North Is 1773-731

**Signed:** 

**Signing Date:** 01/08/2017

## Confidential report for: Horticulture NZ

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### PUBLICATION DATA

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