Potential Companion Plants to Protect Against the Invasive Pest, *Thrips parvispinus*, in Greenhouse Ornamentals

Avery Johnson and S. Jandricic
Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Vineland Station, ON

Intro:

Thrips parvispinus (Thysanoptera: Thripidae) was discovered in North America in 2020 and in Ontario in 2021 (Gleason et al. 2023). It has since become a serious pest of tropical ornamental plants in Canada's $900 M greenhouse floriculture industry. The goal of this trial was to develop strategies to be used in an integrated pest management (IPM) program for this invasive pest. We investigated Sweet alyssum (*Lobularia maritima*) and Garvinea (*Gerbera jamesonii* Garvinea hybrid), as potential companion plants – plants that offer protection to the crop – in Mandevilla crops infested with *T. parvispinus*.

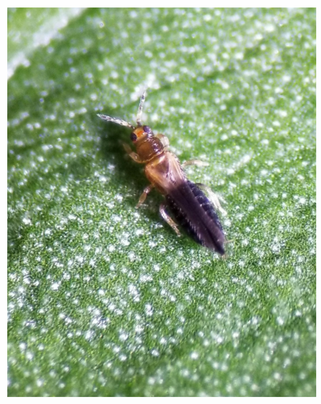

Figure 1. A female *T. parvispinus* on a leaf. Photo credit: A. Summerfield, Vineland Research and Innovation Centre.

Objectives:

1. To see if long-lasting (Garvinea) or fast-growing (Sweet alyssum) plants could be used in the greenhouse ornamental industry as a banker plant to rear large numbers of *Orius insidiosus* (Anthocoridae), a natural enemy of *T. parvispinus*. Banker plants can help reduce the cost of biological control.

2. Alternatively, to determine the attractiveness of these plants as a trap plant for *T. parvispinus* as a mass trapping strategy. Trap plants can function to remove large amounts of pests if more attractive than the crop.

Methods:

- This trial spanned 7 weeks in a crop of 944 Mandevilla with 17 companion pots in a commercial greenhouse.
- Each companion pot was made up of Sweet alyssum around the perimeter of the pot and a singular Garvinea in the middle. Companion plants were placed along the aisle of the crop plants.
- 100 *Orius insidiosus* were added to each companion pot (50 adults per week for 2 weeks).
- Plant taps were conducted every week on the companion plants and a subset of crop plants; numbers of *Orius* and *T. parvispinus* adults and immatures were counted. Sweet alyssum and Garvinea were tapped separately in each pot to determine the contribution of each.
- Differences between plant types were determined using Tukey's multiple means comparisons each week.

Greenhouse Set-up:

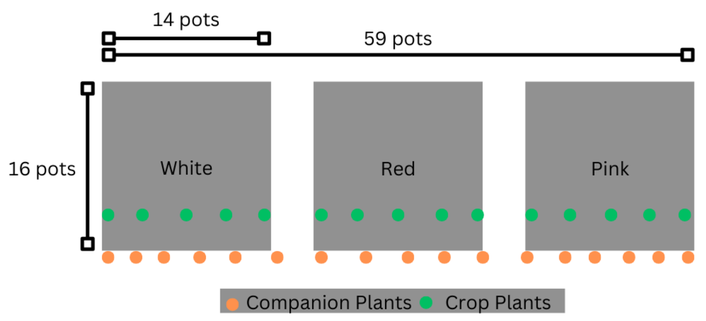

Figure 2. The trial scale and layout within the greenhouse. Both companion plants were in full flower at the time they were set up; crop plants had any flowers removed weekly to reduce attractiveness.

- On Wk 5, each plant species had approximately ¼ of its plant material subsampled (n=4). Plant washes were conducted in the lab to obtain a more accurate count of pest life-stages present, and determine if reproduction was occurring on non-crop plants.
- Companion plants were sprayed with the label rates of the pesticide Success (spinosad) after sampling on Wk 5 and replaced with vegetative Sweet alyssum only after sampling on Wk 6.

Figure 3. A companion plant pot (left) made up of Sweet alyssum (bottom of plant) and Garvinea (tall plant in center) beside a crop plant (right; non-flowering Mandevilla).

Results: Objective

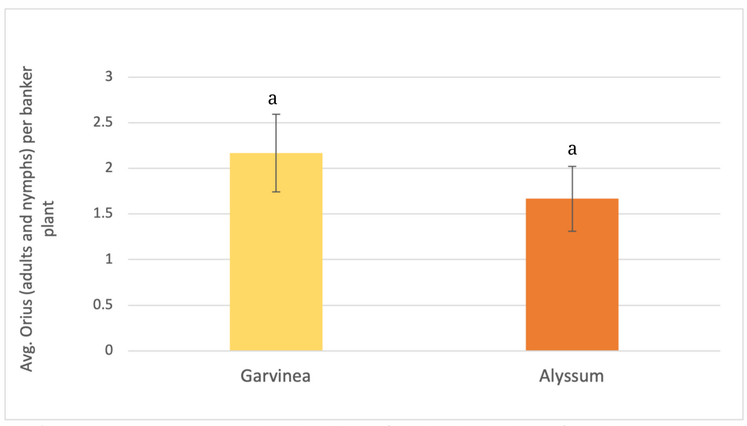

Figure 4. Average number (+/- SE) of *Orius insidiosus* found on each companion plant type (Garvinea and Alyssum) with plant taps over a 4 week period.

- The highest *Orius* numbers were recorded on Wk 5. This was only 87 *Orius* over 17 companion plants, indicating little reproduction on the potential banker plants.
- No *Orius* were ever found in taps on the adjacent crop plants, indicating no movement from banker plants onto the crop.

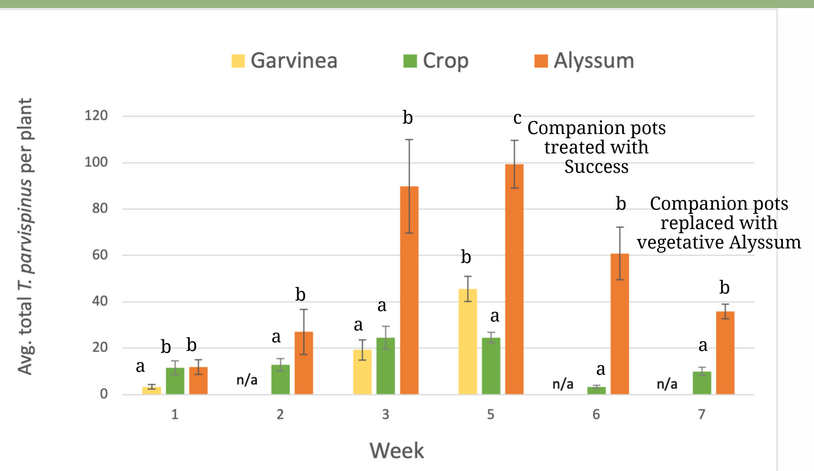

Figure 5. Average *T. parvispinus* per plant as determined through plant taps (+/- SE) on potential companion plants (n=17) compared to the crop (Mandevilla, n=19). Due to logistical constraints in a working greenhouse, only 5 Sweet alyssum pots were sampled on Wk 2 and no Garvinea within the pots were sampled.

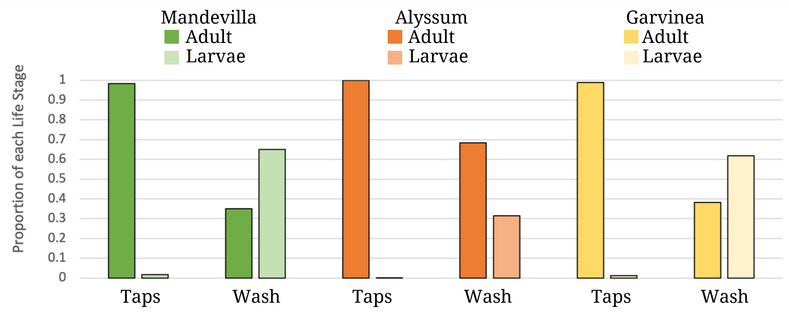

Figure 6. Proportion of *T. parvispinus* life stages found on each companion plant type (Garvinea and Sweet alyssum) and the crop plant (Mandevilla) after 5 weeks in the greenhouse, depending on sampling method.

- Sweet alyssum was equally as attractive as the crop plant to adult *T. parvispinus* on Wk 1 and twice as attractive by Wk 2 (Fig. 5) as evidenced by taps. By Wk 3, thrips numbers on Sweet Alyssum had exploded. Garvinea was less attractive than the crop at this time point.
- Treatment of the companion plants with the pesticide Spinosad significantly reduced the number of *T. parvispinus* on both the Sweet alyssum and the crop plants (Fig 5).
- Replacement of companion plants with vegetative Sweet alyssum on Wk 7 showed this plant was highly attractive to *T. parvispinus* when not in flower (Fig. 5)

- Plant washes indicated that taps were misrepresenting the thrips life stages present (Fig. 6). A high proportion of larvae found in plant washes on Wk 5 indicates *T. parvispinus* is able to reproduce on Garvinea and Sweet Alyssum (previously unreported as host plants in N.A.).

Conclusions:

Objective 1:

- Unfortunately, neither companion plant functioned well as a banker plant for *Orius insidiosus*.

Objective 2:

- The results show the potential of Sweet alyssum as a successful trap plant for *T. parvispinus*, as it was more attractive than Garvinea and the crop.
- However, as *T. parvispinus* can readily reproduce on Sweet alyssum, it could potentially become a source of infestation rather than a sink.
- Trap plants should either be treated with pesticides or bagged and replaced every 2 weeks, before *T. parvispinus* can complete a generation, as in Buitenhuis et al. 2007.
- Further testing is needed on the efficacy of Sweet alyssum as a trap plant when Mandevilla plants are in flower (Fig. 7).

Figure 7. Adult female *T. parvispinus* collecting in a Mandevilla flower.

Acknowledgements:

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References:

Buitenhuis, R, Shipp, J.L., Jandricic, S.E. Murphy, G and Short, M. 2007. Effectiveness of insecticide-treated and non-treated trap plants for the management of *Frankliniella occidentalis* (Thysanoptera: Thripidae) in greenhouse ornamentals.Pest. Manag. Sci. 63: 910-917.

Gleason, J.E., Maw, E. Summerfield, A, Jandricic, S.E. and Brunet, B.M.T. 2023. First records of invasive agricultural pests Thrips parvispinus (Karny, 1922) and Thrips setosus Moulton 1928 (Thysanoptera: Thripdidae) in Canada. J. ent Soc. Ont. 154: 1-12.