Effect of Semiochemical Attractants on Thrips Sampling

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Introduction

Thrips (Thysanoptera) are damaging pests of a number of important crops in Virginia including: tomato, cotton (Fig. 1), peanut, snapbean, and greenhouse ornamentals. In addition to damage caused by feeding and oviposition, some species of thrips such as western flower thrips *Frankliniella occidentalis* (Fig. 2) can also vector tospoviruses such as tomato spotted wilt (TSWV).

Fig. 1. Thrips injury to cotton seedlings

Fig. 2. Western flower thrips

There are several reasons to monitor for thrips in crops including detection of their initial presence, locating "hot spots" for treatment, predicting outbreaks of tospoviruses, timing of control measures, and assessing the effectiveness of the implemented control measures (Shipp 1995). Because thrips are difficult to sample in the initial stages of an outbreak due to their small size and cryptic behavior, it is useful to develop and optimize monitoring tools (Frey et al. 1994). Currently there are a variety of sampling methods available to growers including sticky cards (Fig. 3) and pan traps (Fig. 4), which are inexpensive and effective for assessing species complex and pest pressure. Such sampling methods reduce the amount of labor required for direct sampling methods such as counting individual thrips on plants.

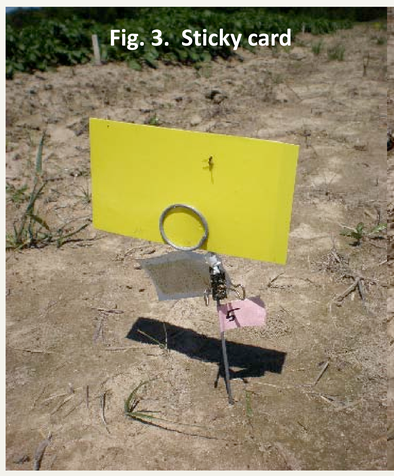

Fig. 3. Sticky card

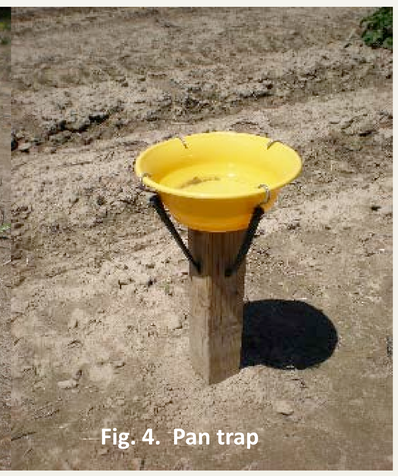

Fig. 4. Pan trap

Thrips exhibit olfactory responses to several plant volatiles, as well as pheromones. Male *F. occidentalis* use sex pheromones to attract females, and may be responsible for inducing additional behavioral responses within this species (Kirk and Hamilton 2004). Plant-produced volatiles, particularly odors given off by flowers such as benzenoids and monoterpenes have been shown to be particularly attractive to thrips (Koschier et al. 2000). Some of these compounds have been synthesized into lures to increase trap catches. Some studies have shown more than 100 fold increase in trap catch when lures are used.

Objective

To assess the effectiveness of a synthetically produced western flower thrips pheromone lure (Syngenta Bioline) and a floral kairomone lure, Chemtica P-178 (AgBio Inc.) for catching thrips in a variety of habitats including tomatoes, potatoes, cotton, and peanuts, as well as grassy areas bordering greenhouses and within greenhouses.

Fig. 5. Potato Field at the ESAREC

Fig. 6. Greenhouse at Chesapeake site

Materials & methods

- The experiment was conducted in 8 habitats including a tomato field (TOM) and potato field (POT)(Fig. 5) in Painter, VA, a cotton (COT) and peanut field (PNT) in Holland, VA, and grassy areas bordering greenhouses and within the greenhouses at two nurseries, one located in Chesapeake, VA (GRA-C & GH-C) and another in Virginia Beach, VA (GRA-VB & GH-VB)(Fig. 6).
- Each plot contained a total of 15 yellow sticky cards (Olson Products, Medina, OH), which consisted of 5 unbaited controls, 5 baited with a synthetically produced western flower thrips pheromone septa (Syngenta Bioline), and 5 baited with Chemtica P-178 floral kairomone lure.
- Sticky cards were installed on stakes at a height of 0.5 m, or placed in pots on bench tops in the greenhouses.
- Cards were changed 2 times per week. Yellow pan trap samples were collected at each site to determine species complex of thrips.

Results

- *Frankliniella* spp. including *F. tritici* (flower thrips), *F. fusca* (tobacco thrips), and *F. occidentalis* (Western flower thrips), were the predominant thrips species caught during this experiment.
- *F. tritici* was the predominant species at most sites (Fig. 7).

Species complex at each location

Location	*F. tritici*	*F. occidentalis*	*Thrips tabaci*	*F. fusca*	Other
POT	47.7%	1.3%	7.5%	0.4%	0.9%
TOM	80.6%	0.0%	8.3%	4.2%	2.8%
GRA-C	77.5%	1.4%	5.2%	4.9%	3.7%
GH-C	60.3%	1.0%	3.4%	7.6%	12.8%
GRA-VB	40.7%	2.8%	1.3%	2.2%	2.2%
GH-VB	45.5%	4.2%	1.9%	6.2%	2.7%
PNT	18.8%	0.0%	18.8%	20.8%	41.7%
COT	38.1%	4.8%	2.0%	22.4%	32.7%

Fig. 7. Thrips species complex at eight experimental locations in eastern Virginia in 2009.

Mean (SE) cumulative catch of flower thrips (*Frankliniella* spp.) per sticky card

Treatment	POT	TOM	GRA-C	GH-C	GRA-VB	GH-VB	PNT	COT
Untreated	10.7 (2.3) b	6.4 (1.2) b	33.8 (7.6) b	7.4 (1.4) b	28.8 (6.6) a	6.7 (1.5) a	18.2 (5.7) b	17.0 (4.7) b
Bioline WFT pheromone	15.3 (3.8) a,b	12.3 (2.7) a,b	36.3 (8.2) b	25.7 (6.3) a,b	59.7 (15.1) a	5.6 (0.8) a	15.7 (4.8) b	21.5 (7.6) a,b
Chemtica kairomone lure	20.7 (5.7) a	14.9 (4.5) a	71.9 (15.3) a	47.8 (14.6) a	75.8 (21.1) a	5.8 (1.4) a	29.2 (9.2) a	27.3 (6.8) a

Mean (SE) cumulative catch of tobacco thrips per sticky card

Treatment	POT	TOM	GRA-C	GH-C	GRA-VB	GH-VB	PNT	COT
Untreated	11.3 (2.2) a	21.0 (3.4) a	3.2 (0.8) a	4.2 (0.6) a	5.2 (1.1) a	1.3 (0.3) a	2.8 (1.2) a	3.2 (0.9) a
Bioline WFTpheromone	11.8 (2.9) a	25.3 (4.8) a	3.7 (1.2) a	6.9 (2.1) a	4.4 (0.7) a	1.6 (0.4) a	2.2 (0.9) a	2.4 (0.8) a
Chemtica kairomone lure	9.1 (2.5) a	17.0 (4.5) a	2.9 (0.8) a	4.5 (0.8) a	4.2 (0.8) a	1.2 (0.3) a	2.7 (1.6) a	2.6 (1.0) a

Fig. 8. Mean cumulative thrips catches on sticky cards at each location

Fig. 9. Mean flower thrips catches at each location

Fig. 10. Mean tobacco thrips catches at each location

Summary

- The Chemtica P-178 floral kairomone lure caught significantly more flower thrips at all locations than the unbaited traps.
- The Syngenta WFT pheromone had an intermediate effect upon flower thrips catches.
- Neither of the lures had a significant effect on catches of tobacco thrips, *F. fusca*.

Acknowledgments

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