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FIELD TRIALS TESTING THE EFFICACY OF 'CC TRAPS' FOR DETECTING AND MONITORING *SCIRTOTHRIPS DORSALIS* (HOOD) IN HOT PEPPERS IN ST. VINCENT.

*M.A. Ciomperlik*¹, *M. Richards*², *C.C. Chu*³, and *C. Cohen*⁴. ¹ USDA APHIS PPQ CPHST, Moore Air Base, Bldg. S-6414, Route 3 Box 1014, Edinburg, TX 78541-9398, Matt.A.Ciomperlik@aphis.usda.gov; ² Ministry of Agriculture and Fisheries,- St. Vincent and the Grenadines, ³ USDA ARS WCRL, 4135 E. Broadway Road, Phoenix, AZ 85040-8803; and ⁴ Caribbean Area Director, USDA-APHIS, International Services, Central America & Caribbean Region, American Embassy, Santo Domingo, Dominican Republic Unit 5527, APO AA 34041.

ABSTRACT. *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) is a newly identified invasive pest in the Caribbean, and poses a significant threat to agriculture and trade in the region. Methods are needed to detect the presence and to monitor populations of this pest so that they can be effectively managed. Studies were initiated during the wet season in 2004 and continued in the dry season of 2005 to test 'CC' traps designed for detecting and monitoring the pest in hot peppers (*Capsicum chinensis* L.) under field conditions in St. Vincent. The experiments test three different base color traps (blue, yellow and white), the addition of dichlorvos (Vapona) as a killing agent, and the addition of ethylene glycol as an insect preservative. Average weekly catches were low at 0.01 to 0.18 *S. dorsalis* per CC trap per week. A sticky card trap (blue, yellow and white) experiment was also conducted in the dry season. Average weekly catches on the yellow sticky card traps were 19.8 *S. dorsalis* per card per week. The potential benefits and shortcomings of using either or both of these detection methods are discussed.

KEY WORDS: *Scirtothrips dorsalis*, CC trap, sticky traps, thrips, trade, invasive species

RÉSUMÉ. Le thrips *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) est un ravageur qui a récemment envahi les Caraïbes et pose une menace importante sur l'agriculture et le commerce de la région. Des méthodes doivent être développées afin de détecter sa présence et suivre sa population de près pour ensuite le contrôler efficacement. Une étude fut initiée à St-Vincent pour tester le piège « CC » dans la culture de poivron fort (*Capsicum chinensis* L.). Cette étude a débuté durant la saison humide de 2004 et s'est poursuivie jusqu'à la saison sèche de 2005. L'expérience incluait des pièges de trois couleurs différentes (bleu, jaune et blanc), l'ajout de dichlorvos (Vapona) comme agent insecticide, et l'ajout de propylène glycol pour préserver les insectes. Le nombre moyen de *S. dorsalis* attrappé par semaine était relativement bas, soit 0.01 à 0.18 individu par piège « CC ». Une autre expérience fut aussi réalisée en saison sèche pour tester des cartes collantes de différentes couleurs (bleu, jaune et blanc). Le nombre moyen de thrips retrouvés sur les cartes collantes jaunes était de 19.8 individus/carte/semaine. Les avantages et inconvénients d'utilisation des deux méthodes de détection sont discutés.

INTRODUCTION

Scirtothrips dorsalis Hood (Thysanoptera: Thripidae) is a newly identified invasive pest to the Caribbean (Skarlinsky 2003, Ciomperlik, M. A. and D. Seal 2004). It poses a significant threat to agriculture and trade in the region (FNGA 2003). *S. dorsalis* is an economically important pest of chili peppers and other crops, causing physical damage that can range from leaf distortion, stunting and wilting of young leaves and shoots to total defoliation, with potentially heavy crop loss (Ananthakrishnan 1993, CABI/EPPO 1997). The impacts of *S. dorsalis* vary widely from season to season depending on weather factors, hosts, and population density (Ananthakrishnan 1984).

Plant damage symptoms are not readily detectable when pest population densities are low. Therefore, methods are needed to detect the presence and to monitor populations of the pest so that they can be effectively managed. Objectives were to test the efficacy of traps developed by Chu et al. (2005) for detecting and monitoring the pest thrips in commercial hot peppers under field conditions, during both the wet and dry seasons in St. Vincent.

MATERIALS AND METHODS

The experiment was conducted in four commercial hot pepper fields that were infested with *S. dorsalis* as well as *Thrips palmi* (Karny), *Aeolothrips* spp., and *Phlaeothrip* spp. The experimental design was a randomized complete block design with five replicates. Treatments were a complete randomization of CC trap base color (white, blue and yellow), with or without a dichlorvos (Vapona[®]) cube, and with or without ethylene glycol (12 treatments). A blue stripe modified Vapona dispenser (B-Vapona) was the 13th treatment. Traps were hung approximately 22 cm below the plant terminals. Tests were conducted for six weeks during the wet season from October to November in 2004 and four weeks during the dry season from March to April in 2005. CC traps were collected and replaced weekly during the experimental periods.

Sticky traps (yellow, white, and blue) were tested in the same two field locations as CC traps during the dry season in 2005. Sticky traps were placed within the plant row at a height of 0.5 m, approximately 22 cm with the trap bottom below the plant terminals. The experimental design was a randomized complete block design with 10 replicates. Sticky traps were collected and replaced during the four week experimental period. Sticky traps were wrapped in clear cellophane wrap, labeled, and returned to the laboratory for counting.

All data was analyzed by season by ANOVA (Anonymous 1989) using Tukey's HSD for mean separations for the comparison of three trap base color CC traps and orthogonal comparison for the Blue-D vs. CC traps comparison.

RESULTS AND DISCUSSION

The numbers of *S. dorsalis* adults caught in CC traps were low, averaged 0.01 - 0.04 and 0.15 – 0.18/trap/wk for both the wet and dry seasons, respectively (Tables 1 and 2). Efficacy of Vapona dispensers and Vapona cubes in catching *S. dorsalis* and other thrips species were similar to results found in Taiwan (Chu et al. 2005). The addition of ethylene glycol to the CC traps did help by preserving the catches, making identifications of the adult thrips much easier. The CC traps are effective at detecting *S. dorsalis* and other thrips species.

The yellow sticky card traps caught an average of 19.80 *S. dorsalis*/trap/wk as compared to 5.45 and 2.16 *S. dorsalis*/trap/wk for blue and white sticky card traps, respectively (Table 3). Both the sticky card traps and the CC traps effectively captured *S. dorsalis* on pepper plants. However, each type of trap has benefits that may require its use over the other trap type.

The CC trap readily captures adults that are well preserved and easily removed and stored in ethanol for later taxonomic and genetic analysis. The sticky trap can capture more adult thrips than the CC trap; however, they can also capture a large number of unwanted insects. In addition, thrips that are captured on the sticky trap are not easily removed and stored for later analyses. Sticky traps seem to be less labor intensive, require less component assembly and therefore less expertise in trap placement than the CC traps.

Surveys to detect the presence of *S. dorsalis* may need to incorporate both trap types. A scenario that uses sticky traps first to detect the pest, followed by the use of the appropriate colored CC trap or direct plant sampling, would ultimately yield specimens that could be submitted to taxonomic specialists for species verification.

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Table 1. Seasonal mean numbers of thrips caught in various candidate thrips traps in two commercial chili pepper fields, Georgetown, St. Vincent – wet season from 14 October to 29 November 2004.

Variable	Dichlorvos	No./trap/wk			
		<i>S. dorsalis</i>	<i>T. palmi</i>	Aeolothrips	Phleothrips
Blue-D vs. CC traps					
B-Vapona ^a		0.00 a ^c	0.47 a	0.71 a	0.82 a
CC traps		0.02 a	0.08 b	0.11 b	0.15 b
CC traps^b					
White		0.02 a	0.09 ab	0.10 ab	0.11 b
Blue		0.03 a	0.10 a	0.20 a	0.24 a
Yellow		0.02 a	0.03 b	0.03 b	0.09 b
	Yes	0.02 a	0.12 a	0.17 a	0.22 a
	No	0.03 a	0.03 b	0.06 b	0.07 b
White	Yes	0.02 a	0.17 a	0.13 a	0.15 a
White	No	0.02 a	0.02 b	0.08 a	0.07 a
Blue	Yes	0.02 a	0.18 a	0.32 a	0.36 a
Blue	No	0.03 a	0.03 b	0.09 a	0.11 a
Yellow	Yes	0.02 a	0.02 b	0.06 a	0.16 a
Yellow	No	0.03 a	0.04 a	0.00 a	0.03 a

^a Dichlorvos dispenser + blue stripes.

^b CC-trap base color.

^c Means not followed by the same letter are significantly different by orthogonal comparison for B-Vapona vs. CC traps and by Tukey's HSD for CC trap treatment, $P = 0.05$. Means of ethylene glycol treatment was higher than control sometimes. Means of three way interactions were not significantly different.

Table 2. Seasonal mean numbers of thrips caught in various candidate thrips traps in two commercial chili pepper fields, Georgetown, St. Vincent – dry season from 23 March to 13 April 2005.

Variable	Dichlorvos	No./trap/wk			
		<i>S. dorsalis</i>	<i>T. palmi</i>	Aelothrips	Phleothrips
Blue-D vs. CC traps					
B-Vapona ^b		0.08 a ^c	1.44 a	0.25 a	0.40 a
CC traps		0.11 a	0.44 b	0.10 a	0.13 b
CC traps					
White		0.07 a	0.59 a	0.09 ab	0.13 ab
Blue		0.16 a	0.56 a	0.18 a	0.20 a
Yellow		0.11 a	0.16 b	0.03 b	0.05 b
	Yes	0.16 a	0.70 a	0.18 a	0.23 a
	No	0.07 b	0.18 b	0.02 b	0.03 b
White	Yes	0.09 b	0.98 a	0.16 b	0.24 ab
White	No	0.05 b	0.21 b	0.03 b	0.03 c
Blue	Yes	0.28 a	0.94 a	0.34 a	0.38 a
Blue	No	0.04 b	0.18 b	0.03 b	0.03 c
Yellow	Yes	0.12 ab	0.18 b	0.05 b	0.00 c
Yellow	No	0.11 ab	0.00 b	0.00 b	0.00 b

^a Dichlorvos dispenser + blue stripes.

^b CC-trap base color.

^c Means not followed by the same letter are significantly different by orthogonal comparison for B-Vapona vs. CC traps and by Tukey's HSD for CC trap treatment, $P = 0.05$. Means of ethylene glycol treatment was higher than control sometimes. Means of three way interactions were not significantly different.

Table 3. Seasonal mean numbers of thrips caught in white, blue, and yellow sticky card traps in two commercial chili pepper fields, Georgetown, St. Vincent – dry season from 23 March to 13 April 2005.

Sticky trap color	No./trap/wk			
	<i>S. dorsalis</i>	<i>T. palmi</i>	Aelothrips	Phleothrips
White	2.16 c ^a	10.84 b	1.87 b	1.80 b
Blue	5.45 b	34.85 a	11.18 a	18.97 a
Yellow	19.80 a	9.54 b	2.03 b	3.29 b

^a Means not followed by the same letter are significantly different by Tukey's HSD, $P = 0.05$ and $df = 2$ or 182, 44. Means of three way interactions were not significantly different.