

# CATCHING THRIPS (THYSANOPTERA: THIRIPIDAE) WITH VARIOUS TRAPS

T.Y. Chen, C.C. Chu, and T.J. Henneberry

USDA-ARS, WCRL

Phoenix, AZ

E.T. Natwick

University of California

Holtville, CA

## Abstract

Various traps were evaluated for capture of western flower thrips, *Frankliniella occidentalis* (Pergande). More thrips were attracted to blue sticky cards compared with yellow or white cards. With the addition of blue light emitting diodes (LEDs) thrips numbers on blue cards increased 2.2 fold. The numbers of thrips caught per 10cm<sup>2</sup> on blue sticky cups were 2.4 times more than on blue sticky cards. Blue LEDs increased the efficacy of blue sticky cards for catching thrips and maybe useful in greenhouses for monitoring and thrips control. The higher trap catches and reduced costs indicated that blue sticky cups would be the better choice for thrips monitoring and control.

## Introduction

Several thrips species, including western flower thrips, *Frankliniella occidentalis* (Pergande) are attracted to blue color or white colors (Chiu and Wu 1993, Chu et al. 2000, Lu 1990, Roditakis et al. 2001, Vernon and Gillespie 1990, Yudin et al. 1987). Sticky cards (especially blue) are used to monitor and reduce the thrips population in greenhouses. Sticky cards from the commercial suppliers cost about 50 cents apiece for a 7.6 cm wide x 12.7 cm long. Flat dimension cards limit thrips attraction to two directions. Round plastic blue cups with blue colored exteriors and white interiors cost about 5 cents apiece and the circular shape has attractive surfaces in all directions. Sticky cards and cups equipped with lime green light emitting diodes (LEDs) have been found to catch more sweet potato whiteflies, *Bemisia tabaci* (Gennadius) biotype B (= *B. argentifolii* Belows and Perring), and fungal gnats, *Bradysia coprophila* (Lintner), compared with unlit sticky card and cup traps (Chu et al. 2002, Chu et al. 2003), but do not increase catches of western flower thrips (unpublished data). From this research, we are reporting on the efficacy of blue sticky card traps equipped with blue LEDs and blue sticky cup traps, for western flower thrips.

## Materials and Methods

### Sticky Cards

Yellow and blue sticky cards (7.6 x 12.7 cm) were purchased from Olson Products Co. (Medina, OH). White sticky cards with the same dimensions were made at the laboratory and coated with Tanglefoot<sup>®</sup> (aerosol formula) (The Tanglefoot<sup>®</sup> Co., Grand Rapids, MI).

### Cups

Blue exterior with white interior plastic cups (304 cm<sup>2</sup> of exterior surface area) were purchased from Wal-Mart Inc. (Bentonville, AK). The cups were painted with Tanglefoot<sup>®</sup> (Brush-on formula) on exteriors.

### LEDs and LED Clip Attachment

Blue LEDs (2.5 lumen, NSPB320BS, Nichia America Corp., Mountville, PA) used in the experiments were energized with 220-ohm resistors via a 6V direct current (DC) adaptor (Radio Shack<sup>®</sup> Co., Fort Worth, TX, USA). The adaptor was connected to a standard 110 V alternating current electricity source. One 45° angle blue LED was wired to a 2.0 cm long piece of perforated circuit board. One circuit board with a LED was attached with screws to the tip of the each arm of an 8.5 cm long hair clip. The LED clips were attached to sticky cards with one LED on each side.

### Experiment 1 – Catching Thrips with Colored Sticky Card Traps

The experimental design was 3 treatments with 10 replicates conducted in a broccoli *Brassica oleracea* (L.) (cv. Marathon) field at Maricopa, Arizona. Treatments were blue, yellow or white sticky cards randomly set along a row and 180 cm apart. The sticky cards were mounted vertically on wire stakes, and the bottom edges were about 3 cm above the plant tops. The sticky cards were placed in every other row for a total of 10 rows (replicates). The sticky cards were retrieved and the new cards replaced in field weekly. In this and all experiments reported on, western flower thrips caught were counted in laboratory with the aid of a stereomicroscope.

### Experiment 2 – Catching Thrips with Sticky Blue Cards Equipped with Blue LEDs

The experimental design was paired treatments with 8 replicates conducted in cages in a greenhouse. Eight wooded framed cages, each covered with 72-mesh screen and measuring 130 x 60 x 135cm (length x width x height), were used in the experi-

ment. Five pots of bloomingdale ranunculus *Ranunculus asiaticus* L. (yellow and white flower type mix) were placed in each cage as western flower thrips host plants. Western flower thrips were collected with an aspirator from broccoli field in Maricopa, Arizona. About 50-60 thrips were released into each cage daily during the experiment. Blue sticky cards with or without LEDs were placed in each cage and retrieved weekly. The bottom edges of sticky card were about 3 cm above plant tops.

### **Experiment 3 – Comparison of the Catching Efficacy of Sticky Cards and Cups**

The experiment was designed to compare western flower thrips catches on blue sticky cards and Tanglefoot® exterior coated blue sticky cups. The experiment was paired treatments with 10 replicates, and was conducted in a cotton (*Gossypium hirsutum* L., cv. Deltapine 5415) field at Maricopa, Arizona. Each blue sticky card and cup was randomly set 180 cm apart along a cotton row. The blue sticky cards and cups were mounted vertically on wire stakes, and the bottom edges were about 3 cm above plant tops. Each replicates was set in every other row for 10 rows. The sticky cards and cups were retrieved weekly.

### **Data Analysis**

The numbers of western flower thrips caught in experiment 1 were analyzed with analysis of variance (PROC ANOVA, SAS Institute 2000). The means were distinguished using the least significant difference (LSD) test. The numbers of western flower caught with or without LEDs in experiment 2, and the numbers of western flower thrips caught in experiment 3 were analyzed using *t*-tests. The significant levels were  $p=0.05$  for all the analysis.

### **Results and Discussion**

The thrips caught on traps were mainly *F. occidentalis* although several other species were occasionally observed. In experiment 1, higher numbers of western flower thrips were caught on blue sticky card traps compared with yellow or white sticky card traps (Table 1). Over the 4 week experiment, the thrips capture mean for blue sticky card traps was 516.1, compared with 262.4 caught on yellow and 0.5 by white cards respectively, indicating blue is most attractive to thrips. Results agree with early reports (Chiu and Wu 1993, Lu 1990, Roditakis et al. 2001, and Vernon and Gillespie 1990).

In experiment 2, the blue sticky card-LED traps caught more western flower thrips than blue sticky card traps alone. Over the 4 week experiment, the average number of thrips caught on blue card-LED traps was 44.3 per trap, compared with 19.8 per trap for the blue card sticky trap alone. The results showed that the blue LEDs increased the thrips catches on blue sticky cards by 2.2 fold, and suggest that the blue LED equipped sticky traps may be useful in greenhouses for monitoring and reducing thrips numbers. Field testing of blue card-LED is in progress.

In experiment 3, the blue sticky cups caught more western flower thrips than blue cards. Over the 4 week experiment, the average number of thrips caught on blue sticky card trap was 141.2/10cm<sup>2</sup>, compared with 58.5/10cm<sup>2</sup> on blue sticky cards, a ratio of 2.4. The higher trap catches and reduced trap costs indicate that blue sticky cups would be the better choice for thrips monitoring.

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Table 1. No. ( $\pm$ SE) of *Frankliniella occidentalis* caught on various traps.

Colored sticky cards		Blue sticky cards		Blue sticky cards or cups	
Trap color	No./trap/4wks	Trap type	No./trap/4wks	Trap type	No./10cm <sup>2</sup> /4wks
Blue	516.1 $\pm$ 43.6a	With LED	44.3 $\pm$ 3.4a	Sticky cup	141.2 $\pm$ 11.7a
Yellow	262.4 $\pm$ 15.8b	Without LED	19.8 $\pm$ 2.3b	Sticky card	58.5 $\pm$ 5.2b
White	0.5 $\pm$ 0.2c	—	—	—	—

Means in the same column followed by the different letters are significantly different at  $P = 0.05$  (LSD test).