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## Attraction of Color Traps to Thrips Species (Thysanoptera: Thripidae) on Brassica Crops in Colorado

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**Abstract:** The thrips species, *Thrips tabaci* Lindeman, *Frankliniella occidentalis* (Pengande), (Thysanoptera: Thripidae), are the most common pests on the cultivated plants. The different color traps were tested to learn attraction of the thrips species on the Canola and Napa cabbage plants in Colorado. The neon yellow, orange, neon orange and neon pink were attractive for the thrips species on the brassica crops. The blue, white, silver, aluminum dull surface and aluminum shiny surface color traps were not attractive for thrips species.

**Key words:** Thrips species, *Thrips tabaci* Lindeman, *Frankliniella occidentalis* (Pengande) (Thysanoptera: Thripidae), color traps, Canola and Napa cabbage plants

### INTRODUCTION

The thrips species, predominantly, *Thrips tabaci* Lindeman, *Frankliniella occidentalis* (Pengande), (Thysanoptera: Thripidae), are the most common pests on the cultivated plants in Colorado<sup>[1,2]</sup>. They are minute, slender-bodies insects with rasping-sucking mouthparts<sup>[3,4]</sup>. The thrips have an ovipositor usually insert their eggs in plant tissues<sup>[3]</sup>. They have several generations per year and most species are serious pests of cultivated plants<sup>[3,5]</sup>. In addition, both nymphs and adults are plant feeder, attacking flowers, leaves, fruits, twigs, or buds and destroyed plant cells during feeding, damaged areas discolour and the leaf, bud, flower, or shoot may wither and die. The thrips species also cause significant injury on Canola<sup>[6]</sup> by rasping the surface of canola buds and sucking up liberated plant fluid.

Sticky color traps are the most useful tools for pest-monitoring program and need to be attractive to the target pest<sup>[7]</sup>. The color trap attractiveness and capture rates of thrips vary according to species<sup>[6]</sup> and trap color<sup>[9,10]</sup>. The yellow sticky traps caught significantly more thrips compared with blue or white traps<sup>[10]</sup> and also attractive to *Scirtothrips perseae* Nakahara<sup>[7]</sup>. On the other hand, the sticky white color traps were also the most attractive trap base colors for western flower thrips, *Frankliniella occidentalis* (Pengande), adults<sup>[7,11]</sup>. Furthermore, the sticky blue plastic cup traps caught the most onion thrips, *Thrips tabaci* Lindeman, followed white plastic cup traps<sup>[12]</sup>. Moreover, the western flower thrips,

*Frankliniella occidentalis* were attracted to blue sticky card traps compared with yellow or white sticky card traps<sup>[13]</sup>.

The purpose of this study was to identify trap color that could be used for monitoring thrips species on the cultivated Brassica crops.

### MATERIALS AND METHODS

All trials conducted during summer 2000 at three different locations in the vicinity of Ft. Collins, Colorado. At the Cargill Oilseed Research Center and Colorado State University Horticultural Field Research Center sites canola was the predominant crop surrounding the trap study. The third site was within an organically managed Napa cabbage field at Grant Family Farms in Waverly, Colorado.

Three trap trials were conducted at the CORC in Ft. Collins, CO. The trap Trial-I was conducted from 5 to 12 July and consisted of six color-traps as treatments; yellow, blue, neon yellow, neon green, neon pink and orange. The second trap trial was repeated during two intervals; the first running (Trial II) was from 16 July to 21 July, the second running (Trial III) was from 18 July to 23 July. Each of them contained eight different color traps as treatments; yellow, blue, neon green, neon yellow, neon orange, neon pink, white and silver.

Two additional trap trials were conducted during the same season at the HFRC Ft. Collins, CO. In the first trial (Trial IV) was conducted from 7 to 14 July and consisted

of eight color-traps as treatments; yellow, blue, neon yellow, neon green, neon pink, orange, white and silver. In the second trial (Trial V) was conducted from 14 to 21 July and also contained eight color-traps as treatments; yellow, orange, neon yellow, neon green, aluminum dull surface, aluminum shiny surface, white and silver. The last trial (Trial VI) was conducted from 1 to 7 August at the GFF in Waverly, CO. With six color-traps as treatments; yellow, blue, neon green, neon yellow, neon orange and neon pink.

A trap consisted of a colored 13 x 8 cm index card covered, each on side, with a transparent sheet stapled to the card. Each of the colored sticky traps placed on wood stake crosses with the horizontal bar 60 cm above the ground. The two outer surfaces of each trap were coated with a thin layer of Tanglefoot<sup>®</sup> (The Tanglefoot Co., Grand Rapids, MI). Each trap-stakes was spaced 6 m apart within the respected Canola or Napa cabbage fields. Upon collection each sticky color trap was wrapped with a clear plastic wrap and transferred to the lab for counts of the captured thrips species. All experimental designs were Randomized Complete Block with four replications. All data were analyzed by analysis of variance (ANOVA) with using the SAS software and means were separated using the Multiple Comparison Tests<sup>[14]</sup>.

## RESULTS AND DISCUSSION

The highest thrips species were caught with neon yellow sticky color traps at six different trials (F=6.575, df=5,12, p=0.001; F=5.814, df=7,24, p=0.001; F=4.608, df=7,24, p=0.002; F=3.741, df=5,18, p=0.017; F=3.016, df=7,24, p=0.020; F=1.966, df=7,24, p=0.0103, respectively) (Table 1 and 2). Previous report by Cho *et al.*<sup>[10]</sup> indicated that yellow sticky traps caught significantly more thrips compared with blue or white traps. And also the most attractive to *Scirtothrips perseae* Nakahara, recorded as an economic pest on the avocados<sup>[7]</sup>. Furthermore, the yellow color traps was more attractive for three thrips species; basswood thrips, *Thrips calcaratus* Uzel, pear thrips, *Taeniothrips in-cortsequem* (Uzel) and native basswood thrips, *Neohydatothrips tiliae* (Hood) comparing with blue, green, red and white color traps<sup>[15]</sup>.

The orange and neon orange sticky color traps were more attractive to thrips at first and second trial (F=6.575, df=5, 12, p=0.001; F=5.814, df=7,24, p=0.001, respectively) (Table 1). The neon pink sticky color traps was also attractive for thrips species at the second and the fourth trial (F=5.814, df=7,24, p=0.001; F=3.741, df= 5,18, p=0.017, respectively) (Table 1 and 2).

According to current study, the blue, white, silver, aluminum dull surface, and aluminum shiny surface color traps were least attractive for thrips species (Table 1 and 2). However, previous report by Chu *et al.*<sup>[11]</sup>

Table 1: Capture of *Thrips* sp. on different colored sticky traps

Trap color	No. of insects (means±SE)/traps <sup>x</sup> <i>Thrips</i> sp.
Trial I	
Yellow	346.3±97.0b
Blue	309.3±46.4b
Neon Yellow	611.0 ±84.3a
Neon Green	231.0±56.0b
Neon Pink	326.8±24.7b
Orange	605.5±40.2a
Trial II	
Yellow	65.3±20.8b
Blue	58.3±7.1b
Neon Green	82.3±9.5b
Neon Yellow	172.8±6.8a
Neon Orange	136.5±35.5a
Neon Pink	134.3±20.9a
White	64.0±11.1b
Silver	74.3±11.0b
Trial III	
Yellow	117.0±16.8c
Blue	81.5±19.6c
Neon Green	115.8±25.4c
Neon Yellow	230.5±29.0a
Neon Orange	146.8±32.9bc
Neon Pink	199.3±6.7ab
White	145.0±18.4bc
Silver	133.0±19.2bc

<sup>x</sup>Means within a column not followed by the same letter (s) are significantly different (p<0.05) by LSD

Table 2: Capture of *Thrips* sp. on different colored sticky traps

Trap color	No. of insects (means±SE)/traps <sup>y</sup> <i>Thrips</i> sp.
Trial IV	
Yellow	504.3±34.0bcd
Blue	320.0±70.3cd
Neon Yellow	1038.8±291.8a
Neon Green	533.5±148.5bcd
Neon Pink	753.0±199.6abc
Orange	817.3±199.1ab
White	379.5±114.6bcd
Silver	213.5±30.1d
Trial V	
Yellow	433.0±163.2ab
Orange	291.0±98.9bc
Neon Yellow	718.0±245.2a
Neon Green	362.0±124.4bc
Aluminum dull surface	325.5±150.6bc
Aluminum shiny surface	289.8±140.9bc
White	148.3±18.9c
Silver	68.3±16.6c
Trial VI	
Yellow	211.3±32.4bc
Blue	145.3±31.2c
Neon Green	322.0±89.2bc
Neon Yellow	746.3±156.8a
Neon orange	498.8±148.5ab
Neon pink	752.3±234.3a

<sup>y</sup>Means within a column not followed by the same letter(s) are significantly different (p<0.05) by LSD

indicated that the sticky blue traps were the most attractive trap base colors for western flower thrips, *Frankliniella occidentalis* (Pengande) can caught the most onion thrips, *Thrips tabaci* Lindeman, followed white plastic cup traps<sup>[12]</sup>. Furthermore, the western flower thrips, *Frankliniella occidentalis* (Pergande), were attracted to blue sticky card traps compared with

yellow or white sticky card traps<sup>[13]</sup>. Previous report by Hoddle *et al.*<sup>[7]</sup> and Chu *et al.*<sup>[11]</sup> indicated that the sticky white color traps was attractive for *Frankliniella occidentalis*. There was no previous report attraction of the thrips species on the sticky silver, aluminum dull surface and aluminum shiny surface color traps and yet there were reports by Brown and Brown<sup>[6]</sup> and Scott *et al.*<sup>[17]</sup> mentioned that the silver mulch or aluminum mulch repelled *Thrips tabaci* (Lindeman) and *Frankliniella* sp. In addition, thrips were the least numerous on tomato plants surrounded by aluminum and red mulch<sup>[18]</sup>. The blue and white color traps were not attractive current study comparing to previous studies. This result might be trial conducted different cultivated crops affecting attraction of thrips species to color traps.

In conclusion, the neon yellow, orange, neon orange and neon pink were attractive for the thrips species on the brassica crops. While blue, white, silver, aluminum dull surface and aluminum shiny surface color traps are not attractive for thrips species.

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