
Attraction Effect of Thrips (Thysanoptera :Thripidae) to Sticky Trap Color on Orchid Greenhouse Condition

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Thongjua, T., Thongjua,J., Sriwareen,J. and Khumpairun, J . (2015). Attraction Effect of Thrips (Thysanoptera :Thripidae) to Sticky Trap Color on Orchid Greenhouse Condition. Journal of Agricultural Technology 11(8): 2451-2455.

Various sticky trap color were evaluated for attraction and catching thrips, Thrips palmi Karny, (Thysanoptera: Thripidae) and other insect on orchid greenhouse of RMUTSV in Thungsong district, Nakhon Si Thammarat Province, Thailand from January 2015 to March 2015. The experimental design was using RCBD with 4 replications and 7 methods (trap color) were : 1) yellow 2) purple 3) white 4) green 5) black. 6) blue and 7) orange. To determined and counted the number of thrips and other insect from color traps every 2 week (14 days) for 4 times. Four species of insect that found on trap were thrips (Thysanoptera : Thripidae), pomace fly (Diptera: Drosophilidae), ant (Hymenoptera : Formicidae) and mosquito (Diptera :Culicidae) with the ratio of 43 : 30 : 15 : 12, respectively. The most effectiveness of sticky trap color for catching thrips were yellow traps, with the average numbers at 18.19 thrips /trap/14 days, followed by blue, green, orange, white and black traps with the average numbers at 10.81, 9.69, 9.43, 9.25 and 8.25 thrips /trap/14 days, respectively and the lowest effectiveness trap color was purple, with the average number at 7.38 thrips /trap/14 days.

Keywords: orchid , sticky color trap, Thrips palmi Karny

Introduction

Orchid is one of the economically important flowering plant both for domestic and export. Thailand is the world's largest producers. The demand for this flowering plant has gradually increased in both domestic and international markets. One of the major problems in qualitative production is thrips orchid (Thysanoptera, Thripidae). Thrips are very small sucking insects that feed on the most tender parts of orchids. Thrips feed on emerging flower buds and the infested buds may or may not open. Their piercing mouth parts sucked the juices from the flower so it was ruined long before it even opened bud blast on emerging inflorescences. Thrips cause the buds developing on an inflorescence to blast when they break through the cell walls and suck the juices causing the flowers to abort. Flowers may be deformed exhibiting stippling, browned edges and water soaked spots. Some thrips feed on the undersides of leaves, particularly on thin leaved orchids . Leaves may appear pitted, stippled, silvery or bleached. The initial

damage appears as a small chlorotic spot. Small brownish specks of excrement may be visible on the undersides of leaves.(Sue, 2010).There are many species of thrips feed on orchids; western flower thrips (*Frankliniella occidentalis*), Cuban laurel thrips (*Gynaikothrips ficorum*), greenhouse thrips (*Heliethrips haemorrhoidalis*), flower thrips (*Frankliniella bispinosa*), Onion thrips (*Thrips tabaci* L.), the plague thrips (*Thrips imaginis* B.), citrus thrips (*Pezothrips kellyanus*(B.), *Dichromothrips corbetti* (P.), *D. spiranthidis* (Bagnall) and *D. australiae* , *Thrips palmi* K., *Frankliniella* sp. and *Limothrips cerealium* (H.) , *Helionothrips errans* (W.) (APPD, 2008 ; Mound, 2002)

Trapping methods are principal tools in insect pest management programs. The ability to attract specific arthropod species is depending on the different trapping equipments. Attractive colors incorporated into various traps have been tried for a number of decades in population monitoring or direct control of thrips throughout the world, among the colored traps light traps (Norris, et. al., 2002), sticky traps and water traps. (Lewis, 1959; Kirk, 1984)

Different color preferences of many species of thrips have been studied by numerous scientists to enhance the attractiveness and sensitivity of various traps (Lewis, 1997; Wickramarachchi, 2004). Yudin et al. (1987) mentioned that the colors used in color traps for thrips management should exhibit a high correlation between trapped thrips counts and actual populations in the field. However there were only a few studies that had attempted to relate the insect counts on color traps and infestation level of the surrounding crops (Lewis, 1997; Wickramarachchi, 2004). Furthermore, only a few publications were available on the use of attractive colors for direct control of thrips (Kawai, 1987; Wickramarachchi, 2004).

The objective of this study was conducted to determine the attraction effect of thrips' population to sticky trap color and efficacy of color sticky trap catches in estimating thrips abundance in orchid foliage .

Materials and methods

The study was conducted in the orchid (genus *Paphiopedilum*) nursery of Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat, at young leave stage. Planning process was Randomized Complete Block Design(RCBD)with 4 replications and 7 methods (trap color) were : 1) yellow 2) purple 3) white 4) green 5) black. 6) blue and 7) orange with the following steps :

1. Preparation sticky traps: Boil castor oil and add the turpentine, carnuova wax, stir well, then lift off the heat and set cool.

2. Seven colors (yellow, purple, white, green, black, blue and orange) were tested as treatments to determine the attractiveness of thrips. Specific colors were provided using special plastic color cards, called

“future board” in Thailand. Each card was double-sided with the size, 21 cm.wide x 29 cm. long

3. Attached horizontally with 2 screws to the top ends of 30-cm high bamboo stick. Fixed bamboo stick in the orchid pot such that trap bottoms were 15 cm. above the ground.

4. Placed trapping randomly (RCBD) among the plants in the greenhouses

5. Traps were cover on both sides with a plastic bag, Paint on the plastic bag with the adhesive.

6. Replace the plastic bag and check the amount of thrips and other insects from different colors trapped every two weeks (14 days), for four times, recorded the numbers of thrips. Means number of thrips captured on sticky traps was compared by using analysis of variance (ANOVA) and means difference were compared by using the Duncan’s Multiple Range Test (DMRT).

Results

A survey of sticky trap in orchid nursery were showed that the most numbers of insect was thrips (Thysanoptera : Thripidae), pomace fly (Diptera: Drosophilidae), ant (Hymenoptera : Formicidae) and mosquito (Diptera :Culicidae) with the ratio of 43 : 30 : 15 : 12, respectively (Table 1). Two species of thrips ; Thrips palmi K. and Dichromothrips corbetti were found as the dominant species. The numbers of thrips at the first, second, third and fourth surveying, that found on sticky traps were between 12.00 to 34.75 , 6.75-20.25, 2.75-7.50 and 4.25-7.00 thrips /trap/14 days, respectively. (Table 1).

Table 1. Types and average numbers of insect (insect / trap/14 days) found on sticky traps in orchid greenhouse of RMUTSV in Thungsong district, Nakhon Si Thammarat Province, Thailand from January - March 2015.

Types of insect	average numbers of insect (insect/trap/14 days)							total	ratio
	yellow	purple	white	green	black	blue	orange		
thrips	18.19	7.38	8.25	9.69	9.43	10.81	9.25	72.76	43
pomace fly	7.06	5.50	8.20	9.19	6.25	5.06	8.69	49.95	30
ant	3.19	3.79	4.75	3.25	3.19	2.80	3.57	24.54	15
mosquito	2.54	3.78	3.21	2.84	2.90	2.40	2.38	20.05	12
total	30.98	20.45	24.41	24.97	21.77	21.07	23.89		
ratio	18	12	15	15	13	13	14		

The yellow sticky traps were the most attractive on thrips with 18.19 thrips /trap/14 days and other sticky color traps were no significantly ($p < 0.05$) amount of thrips (Table 2).

Table 2 Average numbers of thrips (thrips / trap/14 days) found on sticky traps in orchid greenhouse of RMUTSV in Thungsong district, Nakhon Si Thammarat Province, Thailand from January - March 2015

trap color	Numbers of thrips ^{1/} (thrips / trap/14 days)				Average
	1 st	2 nd	3 rd	4 th	
1: yellow	34.75 ^a	20.25 ^a	7.50 ^a	7.00 ^a	18.19 ^a
2: purple	13.25 ^b	8.00 ^b	4.00 ^{abc}	4.25 ^a	7.38 ^b
3: white	12.00 ^b	7.75 ^b	6.50 ^{ab}	6.75 ^a	8.25 ^b
4: green	23.00 ^{ab}	6.75 ^b	4.50 ^{abc}	4.50 ^a	9.69 ^b
5: black	20.50 ^b	7.25 ^b	5.25 ^{abc}	4.75 ^a	9.43 ^b
6: blue	19.75 ^{ab}	16.00 ^a	3.25 ^{bc}	4.25 ^a	10.81 ^b
7: orange	18.25 ^{ab}	11.25 ^b	2.75 ^c	4.75 ^a	9.25 ^b
F-test	*	**	ns	ns	*
C.V.(%)	40.10	26.59	46.01	45.46	37.30

^{1/} average from 4 traps

number in the column with same letters not significantly different ($p > 0.05$)

1st = the first surveying, 2nd = the second surveying, 3rd = the third surveying,

4th = the fourth surveying

ns non significantly different ($P > 0.05$) * significantly different ($P < 0.05$)

** significantly different ($P < 0.01$)

Discussions

The attraction effect of sticky traps color on thrips population found that yellow were significantly more attractive for thrips. Mark. et al (2002) reported that Yellow was most attractive to *Scirtothrips perseae* and white cards captured mostly *Frankliniella. orizabensis* and *F. occidentalis*. Capture rates on blue cards declined across the course of four trials for *S. perseae* and *F. occidentalis*.

Gharekhani, et. al. (2014) was study the influence of the color and height of sticky traps in attraction of *Thrips tabaci*(Lindeman) and predatory thrips of family *Aeolothripidae* on garlic, onion and tomato crops. Results indicated that yellow sticky traps were the appropriate one for thrips monitoring, which was installed at 70 cm in height above the ground.

The yellow color traps were significantly more attractive for vector of sesame phyllody phytoplasma, *Orosius orientalis* (Kersting et al., 1997) and potato leafhopper, *Empoasca fabae* (De Gooyer et al., 1998). The study of Thein et. al. (2011) found that the yellow and orange color sticky traps were significantly attractive for leafhopper, *Empoasca decipiens* in cotton. The red colour sticky traps caught more *Scaphoideus titanus*, grapevine *flavescence doree*, phytoplasma vector than white, yellow or blue.

Acknowledgement

This research project had been supported by Office of National Research Council of Thailand (NRCT).

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