



EVALUATION OF TYPE, COLOR OF TRAPS AND DIFFERENT ATTRACTANTS IN ATTRACTING AND CAPTURING OF MEDITERRANEAN FRUIT FLY *CERATITIS CAPITATA* (WIED.)

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Abstract

This study was conducted to evaluate the attractiveness of types, colors of traps and different attractants (Trimd, Femilure and Ceranock) to capture Mediterranean fruit fly *Ceratitidis capitata* (Wied.) during the growing season of 2017 in private orchard at Al- Jadiriya in Baghdad. Three traps were used in the study (Jackson trap, local trap and McPhail trap); the results showed there is no significant effect among the types of traps on capturing of the flies with average of 10.33, 10.56 and 10.74 male / trap / week. The color of the traps greatly influenced the numbers of the flies capturing in different traps; the results showed that the yellow traps were highest in attracting and catching the flies of 12.16 male / trap / week followed by the white color reaching 11.75 male / trap / week, and the green color (9.68 male / trap / week), While the red traps had lowest captured insect (9.06 male / trap / week). The results showed that yellow and white colors proved highly effect to capture the males in the trap, while there is no significant effect of the green and red colors on the number of males caught in the trap. Regarding the attractants, Trimd lure was the most effect in the term of male captured with average of 15.33 males / trap / week, followed by Femilure and Ceranock (11.33 and 8.33 insects / trap / week, respectively), the all traps used in the experiment are yellow and white with sexual attractant Trimdlure was an affective method to predict *C. capitata* and estimate population.

Keywords: Femilure, Ceranock, Baghdad, Mediterranean, McPhail trap

Introduction

The Mediterranean fruit fly is one of the most dangerous pest throughout worldwide causing damaging to more than 300 plant species of a wide range of fruit trees including citrus, apple and stone fruits and some vegetables and ornamental plants (Liquido *et al.*, 1991; White and Elson-Harris, 1994). The Mediterranean fruit fly causes heavy economic losses estimating at about 365 million dollars annually in Jordan and occupied Palestine (Enkerlin and Mumford, 1997) and the yield losses could be 100% when the trees left with control (Al- Joboory, 2007). Al-Azzawi *et al.* (1990) pointed out that the fruit fly of the Mediterranean fruit invaded Diyala province in 1947 and caused great economic damage and heavy losses in production, but the protective efforts against it led to disappearing completely. Al-Joboory (2007) pointed out that the conflicts in Iraq after 2003 led to completely destruction of the quarantine system and randomly importing of the fruits from varies countries where the insect is recorded such as Egypt, Lebanon, Iran, Syria and Turkey, causing to the resurgence of the Mediterranean fruit fly in Iraq again in citrus orchards in 2006.

The shape, design, color and height of the trap are important in the control method (Vargas *et al.*, 1997). El-Shiblawi (2012) indicated that he did not observe significant effect in the number of adults captured in the Jackson, Tefrey traps and the local trap, while Cera trap was most effective by capturing the highest number of adults reaching 20 adults/week during the study period. Al- Joboory (2009) showed the superiority of the new fly luring bait (Chinese-made) and the bait of DAB fertilizer in attracting the largest number of adults compared to the bait of Goldben and bait of vinegar. The insect showed different attracting behavior to different colors; yellow and white colors were the superior in attracting the largest number of adults of the insect compared

to orange, while green and blue colors did not attract the flies to the traps.

Materials and Methods

Effect of the trap type

The study was conducted in a private orchard (42 dunums) at Al-Jadriya distract, Baghdad province from the beginning of September to the end of December 2017. The orchard was planted with palm trees, citrus and some apricot tree, peach, fig, olive and mango.

Red Jackson traps, McPhail traps and Local traps (plastic water bottles) 10 x 35 cm, with a hole in the top, and 8 mm diameter holes in three reciprocating lines with three holes per line; a sexual attractive pheromone (male attractant) Trimed lure plug (Agrisense BCS. Ltd. United kingdom) was used inside each trap. The traps were placed on mandarin trees (50 m distance between each tree) at a height of 2 meters; each treatment was replicated three times. The traps were checked weekly, and the number of males caught in the traps were recorded and the pheromones were replaced monthly.

Effect of trap colour

Used Jackson's traps three red, three white, three green and three yellow Use in all traps the sex pheremone Trimedlure plug, traps placed on mandarin trees at a height of 2 meters repeated each treatment three and the treatment away from the other 50 meters and Checked weekly, and the number of males caught in the traps recorded and replaced pheromone every month.

Effect of the different attractants

McPhail traps were used with attractants Trimedlure plug, Femilure (Russell IPM UK) and Ceranock (attractant and killing; containing protein hydrysate and plant extract as attractants and Alpha cypermethrin). Traps were placed on

mandarin trees at a height of 2 meters; each treatment were repeated three times. Each treatment was away from the other 50 meters. the traps were checked weekly, and the number of males captured in the traps were recorded and replaced pheromone every month. Random Complete Block Design (RCBD) was used, and data were submitted for analysis of variance (ANOVA) and analyzed by SAS Softwa 2010. The means were compared by using LSD by 0.05% (Al-Sahuki and Wahib,1990).

Results and Discussion

Results in Table 1 showed that the results showed there is no significant effect among the types of traps on capturing of the flies with average of 10.33, 10.56 and 10.74 male / trap / week. No significant effect among the three types of traps may be due to the use of the same attractant, (the pheromone Trimed lure) which gave evenly releasing of the attractant from different types of traps. Jang *et al.* (2001) stated that the effectiveness of a sex attractant depends on the concentration of the attractant. Al-Fawaer *et al.* (2008) indicated that Jackson and McPhail trap was the most effective in the capturing of male and female respectively. Rose and Castillo (2007) show the type of trap did not affect the numbers of flies captured in the traps in the warm weather due of the large number of the flies, whereas the shape of the trap influenced the attraction due to the impact of the pheromone column. El-Shiblawi (2012) also showed that there were no significant effect for all types of traps used in the study on the numbers of the Mediterranean fruit fly captured in the traps, which used the same sexual pheromone of the Mediterranean fruit fly Trimed lure.

The results of the Table (2) showed yellow traps were the superior in attracting and catching the highest number of the flies, followed by white and green traps reaching 12.16, 11.75 and 9.68 male / trap / week, respectively; while the red traps were last with 9.06 males / traps / week. The color

difference in Jackson trap had a significant effect in catching the Mediterranean, especially the colors that have long wavelengths, which are close to the colors of fruits at fruit maturity stage that are more attractive to the insect. The Mediterranean fruit fly insect showed a different attracting behavior to varied colors of pheromone traps.

The high attraction to yellow and white color may be attributed to the close of the two colors with the color of the plant hosts this is confirmed by Papadopoulous *et al.* (2001) who showed that yellow trap was the most effective in capturing of the fruit flies. While Al-Joboory (2009) confirmed the results of the superiority of yellow and white traps compared to orange and green traps. El-Gendy (2012) indicated that white Jackson traps proved highly effective to capture the male of peach fly *Bactrocera zonata*. Whereas Abu- Ragheef and Al-Jassany (2018) indicated that there were no significant effect between yellow and white Jackson traps in the capturing of number of male peach fly fruit.

The results of Table (3) showed the sex attractant (Trimd lure) generally caught more males reaching 15.33 male/trap/week compared to Femilure and Ceranock (11.33 and 8.33 insect / trap / week, respectively). The concentration of the attractant and the components of the attractant influenced the abundances of the catches of the flies. Draz *et al.* (2016) indicated that the using traps with sex pheromones for fruit flies is one of the most important methods for monitoring and determining the population density. In most of the economically important fruit flies that have been studied so far, significant similarity was found in some olfactory receptors, which may vary in both sexes in the same species. The presence or absence of some types of sensory hairs and their distribution and density of each type of sensor on the antenna affect function of the receptors in the individual species (male and female) (Hu *et al.*, 2010).

Table 1 : Mean numbers of males of *C. capitata* captured by different type of traps.

Sampling date	Red Jackson trap	(Local) trap	McPhail trap	Mean Time
1/9/2017	0.67	1.00	0.67	HG 0.77
8/9/2017	0.67	0.67	1.00	H G 0.77
15/9/2017	0.33	0.67	0.33	H 0.44
22/9/2017	1.33	1.33	1.00	H G 1.22
1/10/2017	2.00	2.33	2.33	G 2.22
8/10/2017	3.67	4.33	4.00	F 4.00
15/10/2017	5.00	6.00	6.00	E 5.8
24/10/2017	5.33	6.33	5.33	E 5.6
1/11/2017	9.67	10.00	9.33	D 9.66
8/11/2017	18.67	19.33	19.33	B 19.11
22/11/2017	20.67	22.00	22.67	A 21.77
1/12/2017	22.00	22.00	22.00	A 22.00
8/12/2017	14.33	14.67	13.67	C 14.22
15/12/2017	10.33	11.67	11.33	D 11.11
22/12/2017	23.00	22.67	23.67	A 23.11
30/12/2017	22.00	22.00	21.33	A 21.77
		Time L.S.D		1.63
Mean traps	A 10.33	A 10.56	A 10.74	
Traps L.S.D		0.68		

Table 2 : Total number of *C. capitata* males captured by various Jackson trap.

Sampling date	Red Jackson trap	Yellow Jackson trap	White Jackson trap	Green Jackson trap	Mean Time
1/9/2017	0.33	0.33	0.33	0.33	G 0.33
7/9/2017	0.67	0.67	0.67	0.33	G 0.58
14/9/2017	0.33	0.00	0.33	0.00	G 0.16
22/9/2017	0.33	0.33	0.00	0.00	G 0.16
1/10/2017	2.00	2.00	2.00	2.00	F 2.00
15/10/2017	2.00	2.00	2.00	2.00	F 2.00
23/10/2017	2.00	2.00	2.00	2.00	F 2.00
31/10/2017	2.00	2.00	2.00	2.00	F 2.00
7/11/2017	18.00	25.33	24.33	20.00	C 21.91
15/11/2017	20.00	24.00	24.33	22.00	C 22.58
23/11/2017	21.67	29.67	29.00	22.67	A 25.75
30/11/2017	14.33	20.67	19.67	15.67	D 17.58
7/12/2017	8.33	14.00	14.00	9.33	E 11.41
15/12/2017	22.33	28.67	27.00	24.33	BA 25.58
22/12/2017	21.00	28.00	26.33	22.67	B 24.5
30/12/2017	9.67	15.00	14.00	9.67	E 12.08
	Time L.S.D				1.09
Mean Colors	C 9.0625	A 12.16	A 11.75	B 9.68	
Colors L.S.D	0.54				

Table 3 : Number of *C. capitata* captured by different attractants in the Jackson trap.

Sampling date	trimdlure plug	femilure	ceranock	Mean Time
1/9/2017	1.00	0.33	0.33	G 0.55
7/9/2017	1.33	0.67	0.33	G 0.77
15/9/2017	0.67	0.67	0.33	G 0.55
23/9/2017	1.33	0.33	0.33	G 0.667
1/10/2017	2.67	1.67	0.67	G F 1.66
8/10/2017	4.33	3.00	1.67	EF 3.00
15/10/2017	6.00	4.67	3.00	ED 4.556
23/10/2017	7.67	5.33	4.67	D 5.889
1/11/2017	9.67	6.00	4.00	D 6.556
8/11/2017	21.67	14.33	11.33	B 15.77
15/11/2017	24.00	16.67	15.67	A 18.778
23/11/2017	24.00	16.67	13.00	A 17.889
1/12/2017	15.00	9.00	8.33	C 10.778
8/12/2017	14.33	10.67	7.00	C 10.667
15/12/2017	24.67	11.00	10.00	B 15.222
22/12/2017	23.33	17.00	13.33	A 17.889
30/12/2017	15.33	11.33	8.33	C 11.667
	Time L.S.D			2.0199
Mean attractors	A 11.58	B 7.60	C 6.019	
attractors L.S.D	0.84			

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