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New trend for controlling *Thrips tabaci* (Thysanoptera: Thripidae) infesting Onion plants in Egypt

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Abstract:

Onion thrips *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) It is a serious pest of onions. During two successive seasons evaluated the effect of certain insecticides against adults of onion thrips *T. tabaci* were carried out by Al-Alamia Company Farm, Nubaria region, Beheria Governorate, Egypt. The results cleared that the effect of eight insecticides bio-Catch®, admire®, actellic® , 'lannate® , tracer ®, emacit® , nimbecidine® and admiral® towards *T. tabaci* at their recommended rates under field conditions. Admire® was the most efficient among the tested insecticides gave 98.08%, followed by nimbecidine® 94.88% and tracer ® gave 94.34% against thrips adults after seven days of application, at first season. The insecticides recorded significant reduction values of infestation. For the residual effect, the insecticides gave significant reductions in thrips numbers at the 7th day except for bio-Catch® and admiral®, where they gave the lowest values 85.89% and 86.55% of reduction percentage, respectively , at the same too.

Introduction

In Egypt onion is considered one of the most important crops grown. The harvested area during season 2011 recorded about 63,723 (Ha.) according to (FAO, 2011) whereas, the national production was about 2,304,210 tons (FAO,. 2011) according to the Ministry of Agriculture Statistics, Egypt. Pénzes *et al*. (1996), Theunissen and Schelling (1998) and Richter *et al*. (1999) reported that *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) is polyphagous pest which has been recorded from 29 plant families, but is particularly damaging to Brassicaceae, Liliaceae and Solanaceae. Comegeys and Schmitt (1965) found that onion thrips feed by scraping the plant surface and sucking out the cell contents. Whereas, a lot of researchers , Cabrera *et al.* (1997), Schumeterer (1990), Shelton *et al*.(1987) recorded that onion thrips is one of the most important insect pests of onion in the Hispaniola Island and the Caribbean. Cabrera and Velez (2000) reported yield losses of 50% due to thrips infestations. Kendall and Capinera (1987) and Vierbergen and Ester (2000) found that heavy infestation leads to decrease of quality as well as quantitative losses in the yield. Feeding damage in bulbs lowers bulb quality and value for export and has been an

important issue for New Zealand onion exporters since 1997 (Wood, 2001).

So that, cleared the effect of certain pesticides against the onion thrips as new approaches for controlling onion thrips *T. tabaci* .

Materials and methods

The field trials were conducted by cultivating the Onion (*Allium cepa*, L.)) during the two successive seasons, 2012 and 2013 at the Al-Alamia Company Farm, Nubaria region, Beheria Governorate, Egypt. The experimental area was divided into plots, each of which was 100 $m^{2.}$ The plants were grown along distance of 8 cm apart and in rows of 120 cm width. The experimental areas were treated according to the normal agricultural practices and recommendation guidance. Seedlings were sown on 1st January in both 2011 and 2012, seasons.

To evaluate the performance of the tested spry able pesticides on the incidence of thrips population, plants were sprayed with the evaluated compounds to show what extent they might be included in an IPM program of Onion. Treatments included the eight compounds (Table 1) plus an untreated check control. Treatments were applied with knapsack sprayer (20 L) at the rate of 200 Liters / Feddan, to give a complete coverage of whole plants. The compounds were used according to their recommended field rate. Two rows were used as a barrier between each treatment and others. Treatments were arranged in a complete randomized block design with three replicates for each.

Samples were inspected out before and after treatment at periods of 0, 2, 5, and 7 days post treatment to determine the numbers of thrips on 10 plants from each plot. The degree of infestation was estimated by counting the number of living insect (Immature and Adult stages).

The percentages of infestation reduction were calculated according to Henderson and Tilton's equation (1955) as follows:

$$\text{Reduction \%} = \left(1 - \left(\frac{A}{b} \times \frac{c}{d}\right) \times 100\right)$$

Where:

a = Population in treatment after spraying

b = Population in treatment before spraying

c = Population in check untreated (control) before spraying

d = Population in check untreated after spraying

Reduction percentages were calculated after 2, 5 and 7 days after treatment for adult and the immature stages.

Data were subjected to the analysis of variance test (ANOVA) via Randomized Complete Block Design (F. test). The least significant differences (LSD) at the 5% probability level were calculated according to computer program Costat and Duncan's Multiple Range testes modified by Steel and Torrie (1981) to compare the average numbers of inspected pest infestations.

Table (1): List of pesticides and their rates of application during two onion growing seasons of 2012 and 2013.

Compounds			Recommended Rate/ 1 L water
Trade name	**Formulation type**	**Common name**	
Bio-Catch®	in liquid (1x109CFU's/ml)	*Verticillium lecanii*	5 Cm^3
Admire®	24 % FL	imidacloprid	0.5 Cm^3
Actellic®	50%EC	pirimiphos-methyl	5 Cm^3
'Lannate®	90% WP	Methomyl	1.5g
Tracer ®	24% SC	Spinosad	0.25 Cm^3
Emacit®	5% SG	Emamectin benzoate	0.20g
Nimbecidine®	0.03% EC	Azadirachtin	5 Cm^3
Admiral®	10 % EC	Pyriproxyfen	0.25Cm^3

Results and discussion

1. Effect of certain insecticides against *Thrips tabaci* during first season 2012:

The results showed in (Table 2 and Figure 1) reported the influence of insecticides application on thrips populations during the first season 2012. The results recorded the significant effect of the application of pesticides, where after two days from application the highest reduction percentage was achieved by 'lannate® (Methomyl) followed by actellic® (Pirimiphos-methyl) and admiral® (Pyriproxyfen) showing the values of 94.72% , 92.24 % and 91.51% ,respectively. At the same time, the lowest reduction of percentage of number of adult thrips achieved by bio-catch® (*Verticillium lecanii*) (70.00%). After five days from application, obtain results cleared that the most effective reduction of onion thrips was achieved in the first season by admire® (Imidacloprid) (97.58%), while less census has been achieved by emacit® (Emamectine benzoate) (85.45%). The greatest reduction percentage of the number of adult onions thrips was obtained by admire® (Imidacloprid) (98.08%) after seven days of application, while, the lowest reduction percentage was recorded by bio-catch® (*Verticillium lecanii*) (85.89%). Generally, the evaluated treatments approved to be effective against onion thrips.

Table (2): Effect of insecticides on the mean numbers of adult onion thrips *Thrips tabaci* during season 2012.

Treatment	Pre-spray	No. of adult insects			% Reduction		
		2 days	5 days	7 days	% 2 days	% 5 days	% 7 Days
Bio-Catch®	9.6	7.2	2.4	5.8	70^{f*}	92.5^{b}	85.89^{d}
Admire®	14.6	5.6	1.2	1.2	84.65^{d}	97.58^{a}	98.08^{a}
Actellic®	13.4	2.6	4	5.6	92.24^{ab}	91.04^{bc}	90.24^{c}
'Lannate®	18.2	2.4	5.2	9.4	94.72^{a}	91.42^{bc}	87.94^{cd}
Tracer ®	19	6	4.6	4.6	87.36^{c}	92.73^{b}	94.34^{b}
Emacit®	13.2	8.6	6.4	5.6	73.93^{e}	85.45^{d}	90.09^{c}
Nimbecidine®	21	8.8	6	4.6	83.23^{d}	91.42^{bc}	94.88^{b}
Admiral®	13.2	2.8	4.5	7.6	91.51^{b}	89.77^{c}	86.55^{d}
Control	12	30	40	51.4	-	-	-

***Means followed with same letter (s) are not significantly different.**

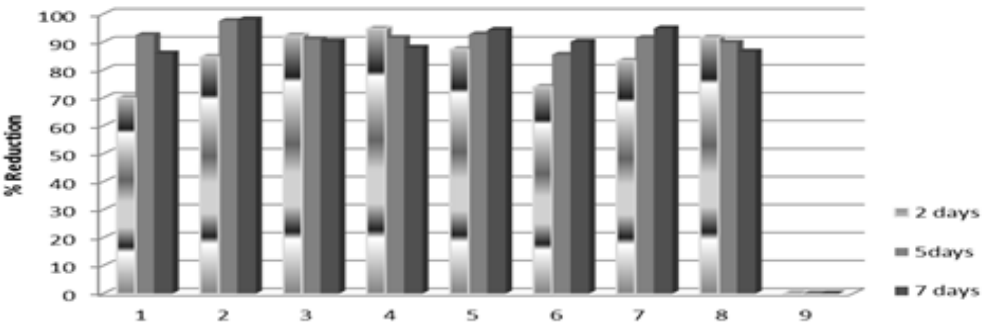

Fig1:Efect of insecticides on the mean number of adult onion thrips during season 2012.

2. Effect of certain insecticides against *Thrips tabaci* during first season 2013:

The obtained results showed in (Table 3 and Figure 2) cleared significant differences between the treatments after interval days. The highest reduction percentage of thrips recorded by admiral® (Pyriproxyfen) followed by 'lannate® (Methomyl) and actellic® (Pirimiphos-methyl) after two days of application. Whereas, the lowest reduction percentage of adult thrips was recorded after the application of bio-catch® (*Verticillium lecanii*) (60.00). After seven days from application the greatest reduction percentage of adult thrips occurred by admire® (Imidacloprid) (95.80%), but the lowest value was achieved by admiral® (Pyriproxyfen) (84.96%).

Our experiments confirmed by the findings of previous investigators, Gandhale *et al*. (1984), Kisha (1979) and Hussain *et al*. (1997), who used synthetic insecticides for the management of onion thrips in different parts of the world and got a considerable knockdown effect. Kisha (1979) found that onion thrips can be controlled by methomyl (0.53 a.i. kg ha-1), malathion (1.0 kg ha-1) and phenthoate (1.08kg ha-1), if applied at 14 days interval. It showed that the residue lasted for 14 days, which confirm the finding of the present studies, although different insecticides were used in different agro- ecological zones. Wheras, Gandhale *et al*. (1984), reported a good control of onion thrips and the residual effect could last for a period of one week or so. Since the examined insecticides lost their effect after 15 days, it is assumed that pre harvest interval supposed to be somewhat longer than over twenty days. However, instrumental residual analysis studies are needed for definite and safe pre-harvest period. Hussain *et al*. (1997) found that methamidophos was the most effective insecticides for the control *T. tabaci* followed by dicrotophos and endosulfan. cypermethrin and monocrotophos. Mahmoud and Osman (2007) found that spinosad, mectin, neemix and biofly gave the best control and continued to give significant reduction in thrips populations till 21 days of treatment compared to the other insecticides. Also, Sadozai *et al.*(2009) found that karate 2.5, thiodan 35 EC, confidor 20 SL, curacron 500 EC and crown 200 SL were significantly better than untreated check in reducing onion thrips on onion bulb crop population. Thiodan proved to be the best one followed by curacron and karate.

Generally, the obtained results of our study cleared that the

differences can be attributed to different modes of action of the insecticides and also to the developmental stage of onion thrips, *T. tabaci*. The best overall results were obtained with admire®, nimbecidine® and tracer ® that are provided excellent control through 7 days period at the recommended rates. The bio-rational insecticides look promising and could be alternative insecticides in the future for controlling onion thrips and be safe at the same time for natural enemies.

Table (3): Effect of insecticides on the mean numbers of adult onion thrips *Thrips tabaci* during season 2013.

Treatment	Pre-spray	No. of adult insects			% Reduction		
		2 days	5 days	7 days	% 2 days	% 5 days	% 7 Days
Bio-Catch®	12.2	10.3	2.1	6.9	60.00^{e}	92.79^{b}	85.45^{c}
Admire®	13.5	4.2	1.1	2.2	85.26^{bc}	96.58^{a}	95.80^{a}
Actellic®	15.2	2.5	3	5.2	92.20^{a}	91.73^{b}	91.20^{b}
'Lannate®	13.4	2	3	7.2	92.93^{a}	90.62^{b}	86.18^{c}
Tracer ®	13.8	3.9	2.8	3.4	86.61^{b}	91.50^{b}	93.66^{a}
Emacit®	16.2	7.9	5.5	5.9	76.90^{d}	85.78^{c}	90.63^{b}
Nimbecidine®	17.9	6.4	4.1	3.9	83.06^{c}	90.41^{b}	94.39^{a}
Admiral®	19.5	2.9	3.9	11.4	92.95^{a}	91.62^{b}	84.96^{c}
Control	18	38	43	70	-	-	-

***Means followed with same letter (s) are not significantly different.**

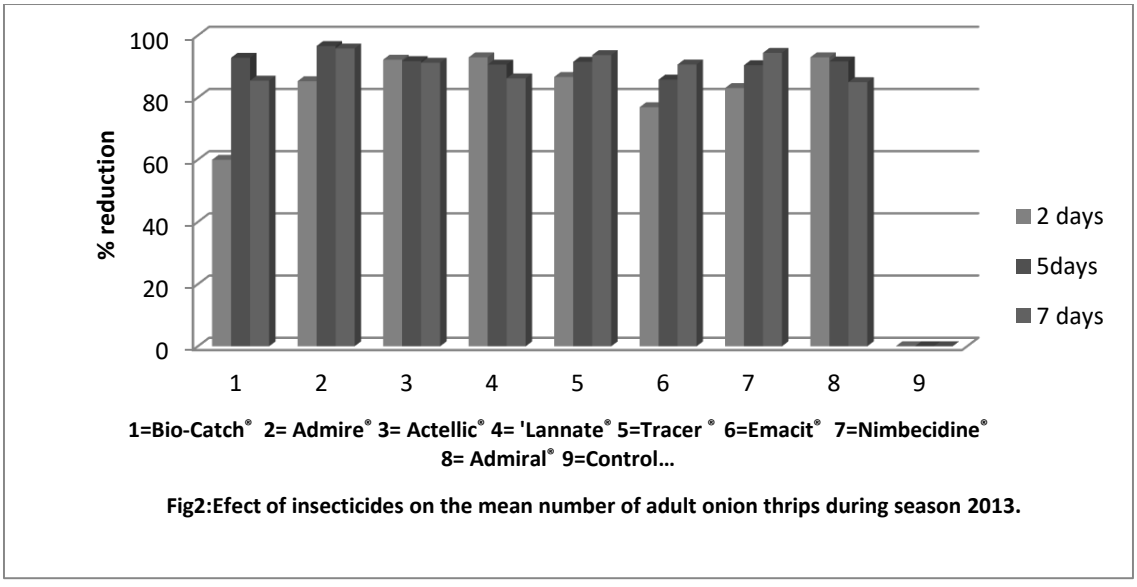

Fig2:Efect of insecticides on the mean number of adult onion thrips during season 2013.

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