

Impact of certain materials against thrips tabaci Lind. (thysanoptera: thripidae) in onion fields in Qalyubia governorate.

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Abstract

To reduce the numbers of thrips and comparison using some chemical pesticides and other non-chemical materials, field studies were carried out to assaying the effectiveness of those materials against nymphs and adults of Thrips tabaci on onion in the Qalyubia governorate during 2014/2015 and 2015/2016 seasons. The results showed that chemical insecticide (Radiant 12%) gave high reductions being 95.1% and 89.5% during the first season while, these were 87.1 and 81.6% during the second season for nymphs and adults of onion thrips, respectively. On the other hand, chemical insecticides Lannate 90, Mospilan and some non-chemical materials such as Garlic and Parsley oil and Chinafill 100 showed intermediate effects against nymphs and adults. The insect growth inhibitor (Admiral) showed a weak impact on nymphs and adults of onion thrips as 14.9% & 14.3% for 1st season and 45% & 34.9% in the second one for adults and nymphs, respectively. In all cases, the difference between the percentages of reduction for Radiant 12% and Lannate 90 was non-significant during the first season of study while, there was a clear significant difference between both Radiant 12% and the other tested compounds during the second season. Also, the obtained results show that, there were no significant differences between reductions by the remaining tested compounds.

Key words: Onion thrips, Thrips tabaci Lind., chemical insecticides, non-chemical insecticides.

Introduction

Onion crop in Egypt is an important field crop for both local consumption and exportation. Onion plantations are oftenly subjected to considerable insect infestations which are affected the quality and quantity. Heavy infestation by *T. tabaci* (more than 40 individuals / plant) cause onion yield loss up to 43% (Sato and Nakano 1990 Fournier et al. 1995). Onion plants usually are subjected to infestation by different insect pests during their different growth stages (El-Sherif 1971 in Egypt; El-Bolok et al. 1990 in Egypt; Gupta et al. 1994 in India; Ciocioal et al., 2002 in Brazil; Szwejde 2005 in Poland and Mahmoud 2008 in Egypt). Several synthetic insecticides have been widely used to control onion thrips in the field (Mayer et al., 1987) because of their effective rate in bringing down pest populations. These chemical insecticides are costly and unsafe to both humans and the environment (Nault et al. 2012; Jensen and Simko, 2001) particularly to smallholder farmers who fail to follow the practices of safe handling and application of pesticide.

The conventional or non-conventional insecticides were used against *T. tabaci* exhibited a high efficiency in controlling the insect (Mousa and Taha 2001; Abdel-Aziz 2002 and Khattak et al., 2006).

The aim of the present work was to study the influence of the chemical and non-chemical insecticides on the onion thrips (nymphs and adult) in the field.

Materials and Methods

This trial was carried out at Experimental Research

Station, Faculty of Agriculture, Benha University during two seasons of 2014/2015 and 2015/2016 to evaluate efficacy of some compounds against onion thrips. The trial started on April 4th and 5th for 2014 and 2015 seasons, respectively when the population of *T. tabaci* (adult and nymph) is known to be high. The onion seedlings (Giza 20 Variety) were planted in December 5th 2014 and 9th 2015. All the area received all agriculture practices and sprayed three times with a recommended fungicide. Seven treatments were distributed in a complete randomized block design and replicated four times. Each plot consisted of four rows each of 12 m long with 10 cm between each other rows and 5 cm between plants. Plots were separated by approximately 1.0 m. to avoid drift of spraying. Other 4 plots were left without any treatment as a check. Samples were randomly as five plants from each plot. Spraying of the materials was carried out in the early morning with counted alive nymphs and adults before spraying and also after treatment with 1, 3, 7 and 10 days. Samples were placed in plastic bags and taken to the laboratory to count the insects using stereoscopic binocular. The insecticides used were as follows:-

Table 1. List of treatments and rates of applications.

Treatments	Rate of application /20 L.
Radiant 12% (Spinetoram)	16 ml
Lannate 90 Methomyl)	30 Gm
Parsley oil (plant oil)	200 ml
Garlic oil (plant oil)	200 ml
Chinafill 100 (Calcined Aluminum Silicate Powder)	200 Gm
Mospilan 20 %SP (Acetamidprid)	5 Gm.
Admiral (Pyriproxyfen 10 Ec)	15 ml

Reduction percentages of population were obtained according to the equation of Handrson and Tilton (1955).

Treatment after x control before

% Reduction = 1-

x 100

Treatment before x control after

Data Analysis

Data collected were analyzed using SAS 9.0 software and least significant difference (L.S.D) was used for treatment mean comparison.

Results and Dissections

1 - Efficacy of the tested compounds during 2014/15 season:

Data in Table (2) show population levels before spraying and reduction percentages of the thrips nymphs and adults caused by chemical and non-chemical insecticides after different periods from treatment. The data revealed that, all the tested compounds reduced the population density in comparison with the control. Regarding the initial

effect (one day after spraying),. Radiant 12% was the highest effective compound resulting in 95.6 and 94.8% reduction followed by Lannate 90 (92.9 and 91.5%), then Mospilan (71.8 and 58.3%), Garlic oil (68.8 and 63.3%), Parsley oil (61.7 and 59.3%) and chinafill 100 (62.9 and 64.8%). On contrary Admiral had the lowest effect (41.8 and 20.3%) on nymph and adult, respectively.

The same observation was found three days after treatment. The highest effects on *T. tabaci* nymphs and adults were 98.2 and 97.8% caused by Radiant 12% treatment. Lannate 90 and Mospilan ranked the second category with 93.7 and 85.2% and 68.9 and 57.4%, respectively. On the other hand, the lowest percentages of reduction were caused by Admiral Treatment as 9.3 and 17.5% for nymphs and adults, respectively.

Regarding the effect seven days after treatment, Radiant 12% exhibited also the highest impact on nymphs and adults population (90.6 and 89.1%). while, Lannate 90, Mospilan, Garlic oil, Parsley oil and Chinafill 100 gave intermediate effectiveness. On the other hand, Admiral showed the lowest percentages of reduction (4.1 and 7.9 %) for nymphs and adults, respectively.

Table 2. Reduction percentages of *T. tabaci* after spraying with certain compounds during 2014/2015 season.

Treatments	Population / plant before treatment	% Reduction after				Overall mean
		24 h.	72 h.	one week	10 days	
nymphs						
Radiant	169.8 a	95.6 a	98.2 a	90.6 a	95.9 a	95.1 a
Lannate	75.5 cd	92.9 a	93.7 a	61.8 ab	62.6 abc	77.8 ab
Mospilan	97 c	71.8 b	68.9 a	42.1 bc	68.9 ab	62.9 bc
Garlic oil	133.8 b	68.8 b	59.6 a	68.3 ab	26.7dc	55.9 bc
Parsley oil	83 cd	61.7 b	2.3 b	58.8 b	37.5 bcd	40.1 cde
Chinafill 100	69.5 cd	62.9 b	12.4 b	27.1 dc	36.8 bcd	34.8 de
Admiral	51.8 d	41.8 c	9.3 b	4.1 d	2.2 d	14.3 e
L.S.D	35.69	19.31	42.83	30.83	41.35	27.76
adults						
Radiant	222.3 a	94.8 a	97.8 a	89.1 a	76.2 a	89.5 a
Lannate	124.3 cd	91.5 a	85.2 a	60.1 ab	14.9 b	62.9 ab
Mospilan	155.8 bc	58.3 ab	57.4 ab	28.6 bc	14.1 b	39.6 bc
Garlic oil	193.5 ab	63.3 ab	53.7 ab	52.9 ab	70.2 a	60.0 b
Parsley oil	130.3 cd	59.3 ab	55.6 ab	59.8 ab	18.1 b	48.2 b
Chinafill 100	129.3 cd	64.8 ab	35.2 b	16.4 bc	28.7 ab	36.3 bc
Admiral	100.3 d	20.3 b	17.5 c	7.9 c	13.8 b	14.9 c
L.S.D	40.72	42.52	48.06	47.14	47.63	28.9

* Values with the same letters in column are not significant different at 5% level of probability (One way ANOVA).

Ten days after treatment, the highest percentages of reduction of *T. tabaci* nymphs and adults were 95.9 and 76.2 % caused by Radiant 12% treatment while the lowest effect was 2.2 and 13.8% caused by Admiral, respectively. The remaining compounds took intermediate position showing 26.7 – 68.9% reduction for nymphs and 14.1 – 70.2% for adults

In general, the chemical insecticide Radiant 12% gave the highest mean percentage of reduction (95.1 and 89.5%) followed by Lannate 90 (77.8 and 62.9%), while Admiral caused the lowest effect (14.3 and

14.9). The remaining tested compounds took intermediate effect on *T. tabaci* nymphs and adults.

The differences between means of reduction in case of Radiant 12% and Lannate 90 were non-significant while, those were significant with Garlic oil, Parsley oil and Chinafill 100 for *T. tabaci* nymphs. For adults, the differences between Radiant 12% and each of Garlic oil and Parsley oil were significant and also Radiant 12% and each of Mospilan, Chinafill 100 and Admiral.

2 - Efficacy of the tested compounds during 2015/16 season:

Data presented in table (3) revealed that, all the tested compounds reduced the population densities of thrips. The initial kill of Radiant 12% was the highest (95.2 and 92.0%), but Garlic oil and Admiral gave low reduction percentages (33.0 and 42.8%) for nymphs and adults, respectively. The remaining compounds,

Lannate 90, Mospilan, Parsley oil and Chinafill 100, took as occurred in the previous season, intermediate position 67.7, 43.1, 43.5 and 54.2% for nymphs and 75.9, 48.3, 64.9 and 62.1% reductions for adults, respectively. The same trend was detected after 3 days for thrips adults while, for the nymphs the trend of effectiveness changed for all the tested compounds except for Radiant 12%.

Table 3. Reduction percentages of *T. tabaci* after spraying with certain compounds during 2015/2016 season.

Treatments	Population / plant before treatment	% Reduction after				Overall mean
		24 h.	72 h.	one week	10 days	
		nymphs				
Radiant	31.5 b	95.2 a	91.9 a	85.2 a	75.9 a	87.1 a
Lannate	34.5 b	67.7 b	58.4 b	42.1 b	38.3 b	51.6 b
Mospilan	36.5 ab	43.1 cd	50.2 b	33.8 b	39.6 b	41.7 bcd
Garlic oil	32.5 b	33.0 d	52.2 b	34.0 b	28.8 b	36.9 cd
Parsley oil	37 ab	43.5 cd	62.1 b	46.5 b	46.6 b	49.6 bc
Chinafill 100	39.5 a	54.2 bc	51.9 b	48.7 b	38.2 b	48.3 bc
Admiral	36.5 ab	42.0 cd	30.8 c	42.1 b	24.9 b	34.9 d
L.S.D	7.22	15.47	18.03	19.93	19.05	13.76
		adult				
Radiant	68 b	92.0 a	83.2 a	79.6 a	71.6 a	81.6 a
Lannate	71.3 b	75.9 b	70.1 ab	61.5 b	47.1 bc	63.7 b
Mospilan	65.7 b	48.3 cd	56.4 bc	41.3 c	40.3 c	46.6 c
Garlic oil	67.3 b	51.3 cd	64.5 bc	49.9 bc	42.4 c	51.3 bc
Parsley oil	76.8 ab	64.9 bc	67.4 bc	64.2 ab	58.4 ab	63.7 b
Chinafill 100	85.8 a	62.1 bcd	65.8 bc	65.6 ab	47.8 bc	60.3 b
Admiral	72.5 b	42.8 d	47.3 c	58.8 b	31.3 c	45.0 c
L.S.D	13.10	15.3	15.45	17.6	17.33	13.67

*Values with the same letters in column are not significant different at 5% level of probability (One way ANOVA).

Seven days after treatments, the highest percentages of reduction in nymphs and adults were 85.2 and 79.6% caused by Radiant 12% treatment, Lannate 90, Garlic oil, Parsley oil Chinafill 100 and Admiral caused intermediate efficiencies 42.1, 34.0, 46.5, 48.7 and 42.1% in case of nymphs and 61.5, 49.9, 64.2, 65.6 and 58.8 % for adults. The lowest reduction percentages in *T. tabaci* population were obtained by Mospilan treatment, 33.8 and 41.3%, respectively.

Regarding the data ten days after treatment, Radiant gave also the highest reduction of *T. tabaci* nymphs and adults with 75.9 and 71.6%, respectively. Lannate 90, Mospilan, Garlic oil, Parsley oil and Chinafill 100, as in previous season ranked of intermediate efficiency causing 38.3, 39.6, 28.8, 46.6, and 38.2% and 47.1, 40.3, 39.4, 58.4 and 47.8%, respectively.. Admiral had the lower efficacy in nymphs and adults population being 24.9 and 31.3%, respectively.

In general, the chemical insecticides gave clear superiority in their effects on *T. tabaci* nymphs and adults (87.1 and 81.6%). The remaining materials gave the lowest effects against the nymphs (34.9 to 49.6%) and the adults (45.0 to 63.7%).

Discussion

The presented findings are in agreed with those obtained by Awadalla et al. (2011) who stated that the

conventional insecticide Sumithion and non-conventional insecticides, Sulfer and Biofly exhibited a high efficiency against the onion thrips population with the highest percentage of reduction. The same authors reported that Radiant 20% and Citrax oil exhibited intermediate efficiency against *T. tabaci* nymphs. Sabra et al. (2005) reported that pirimiphos-methyl showed the highest effectiveness against *T. tabaci* and its associated predators. On the other hand, the present results disagree with Muhammad et al, (2004) who reported that maximum decrease in the population of *Thrips tabaci* occurred one and three days after application was recorded in plots treated with Mospilan 20 Sp and Tamaron.

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تأثير بعض المواد ضد حشرة تريس البصل في حقول البصل بمحافظة القليوبية

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للحد من تعداد التريس ولمقارنة استخدام بعض المبيدات الكيميائية التقليدية بغيرها من المواد غير التقليدية أجريت دراسة حقلية لأختبار فعاليتها ضد الحوريات والحشرات الكاملة لتريس البصل وذلك خلال موسمي ٢٠١٤/ ٢٠١٥ و ٢٠١٥/٢٠١٦ .
أوضحت النتائج ان المبيد الكيماوى رادينت ١٢% أعطى أعلى نسبة خفض ٩٥.١ و ٨٩.٥ % خلال الموسم الاول للدراسة بينما وصل متوسط نسبة الخفض الى ٨٧.١ و ٨١.٦ % خلال الموسم الثانى للدراسة لكل من الحوريات والحشرات الكاملة لتريس البصل على التوالي.
على الجانب الأخر أظهر كلا من المبيدين لانيت ٩٠ و موسيبلان كمبيدات كيميائية وبعض المواد غير الكيميائية مثل زيت الثوم وزيت البقدونس ومركب شاينافل ١٠٠ نسب خفض متوسطة فى تعداد الحوريات والحشرات الكاملة خلال موسمي الدراسة. كما أظهر مانع الانسلاخ أدميرال تأثيرا ضعيفا على التريس بمقدار ١٤.٣ و ١٤.٩ فى الموسم الاول مقابل ٣٤.٩ و ٤٥.٠ % فى الموسم الثانى للحشرات الكاملة والحوريات على الترتيب. وفى كل الحالات كان الفرق بين نسب الخفض فى التعداد لكل من رادينت ١٢% و لانيت ٩٠ غير معنويا خلال الموسم الأول للدراسة ، بينما كان هناك فرق معنوى واضح بين كل من رادينت ١٢% وباقى المركبات المختبرة خلال الموسم الثانى للدراسة. أظهرت النتائج عدم وجود فروق معنوية بين بقية المركبات المختبرة موضوع الدراسة. كما اثبتت هذه الدراسة انه يمكن الأستعانة ببعض المواد الأمانة على البيئة لمكافحة تريس البصل مثل زيت الثوم وزيت البقدونس لمكافحة التريس حيث انها مواد أمانة بيئيا..