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STUDIES ON THE EFFECTIVENESS OF SOME BIOINSECTICIDES ON APHIDS INFESTING POTATO AND TOMATO PLANTS (FAM: SOLANACEAE)

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ABSTRACT: A field experiment was conducted of Dirab Negm, district, Sharkia governorate, Egypt, during 2019 growing season to evaluate the effect of four bioinsecticides namely propargite (Skanmite, 73% EC), abamectin (Spiner 10% sc), thiamethoxam 15.24% + abamectin 3.23% (Agreflex 18.6% sc.) and B.T (Protecto 9.4% wp) against the green peach aphid *Myzus persicae* (Sulzer) attacking potato and tomato plants, using different doses. Summarized results revealed that m Agrofex recorded annual or seasonal average effects expressed as highest reduction percentages on aphid infestation (74.67%) followed by Skanmite (73.65%), Protecto (73.51%) and Spiner (69.59% against aphid infesting potato plants, the same order of the efficiency of the tested bioinsecticides was noticed in tomato plants except as with in position between Skanmite and Protecto.

Key words: Bioinsecticides, aphids, infesting potato, tomato plants.

INTRODUCTION

The green peach aphid *Myzus persicae* (Sulzer) (Homoptera: Pemphigidae) is a serious pest of many crops and vegetable crops and fruit trees and also has been considered as an insect pest of economic importance in young terminal apple leaves (Mangoud, 2009). Potato and tomato is the world's most important food crops with annual production of nearly 300 million tons produced by more than 12 million hectares (Marting *et al.*, 1990). Many pests attack potato and tomato plants from sowing till harvest.

Forty strains of *Bacillus thuringiensis* were assessed against *M. persicae*, an aphid that is considered one of the most pests affecting the agricultural economy these strains have the

potential to be used as an alternative to control *M. persicae* under field and covered conditions (Marycarmen *et al.*, 2004; Xiao *et al.*, 2016; Actaro 25 Wg (thiamethoxam) significantly suppressed the peach aphid *Myzus persicae* (Khon *et al.*, 2011 and Kumao *et al.*, 2016) in different vegetable crops. The present work aimed to evaluate the effects of some bioinsecticides with different doses on the green peach aphid *Myzus persicae* infesting potato and tomato plants under field condition.

MATERIALS AND METHODS

Efficiency Incidence of Some Compounds on *Myzus persicae* Infested Potato and Tomato Plants

Used compounds and application programs

Trade name	Active ingredient	Recommended rote / feddan	The producing co.
Skanmite 73% Ee	Proargite	65cm ³ /100LH ₂ O	Yong nong biosciences
Spiner 10% s.c	Abamectin	15 cm /100 H ₂ O	Manufacture .co.
Agreflex 18.6%	Thiamethoxam +abamectin 3.32%	15.24% 240 cm/feddan	Syngenta agro
Protecto 9.4% wp	<i>Bacillus thuringiensis</i>	19/11 H ₂ O	Biocided Producing Plant Protection Institute Research

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Experimental design

The field experiments were conducted at Diarb Negm District, Sharkia Governorate, Egypt in potato, *Solanum tuberosum* L. and Tomato the potato and tomato were planted at the first week of February during 2019 growing seasons.

The area of 7875m² (45 kerat) cultivated by potato and tomato each 3937.50 m² was divided into four replicates each 0.94 kerat for each treatment and untreated one and distributed as completely randomized block design for 2019 season. Treatment plots were sprayed using akanapask motor sprayer, 20 liters in capacity and using 200 liter volume of insecticidal solution per fedd.

The treatments were received normal agricultural practical treated according to the ministry of agriculture recommendation for both crops different concentration of pesticides were tested according to the dosage used for each individual compound the potato and tomato crops were sprayed after 50 days of planting on the level 10 insects leaf for treated and untreated plants. The treatment plots were sprayed 3 times consecutively for each tested biocide at days innervate in the first spray half to the recommended dose was used, while in the second and third spry the recommended and 1.50 of recommended dose were used, respectively, the numbers of aphid was counted visually individual on 30 plant leaves replicate of both crops selected from 10 plants from treated and untreated plots all of its treatments for potato and tomato plants were examined before and after 4 consecutive periods of spraying 24 hours , 3, 5 and 7 days, and the population of the insects in each treatment as well as the untreated plots were counted.

Statistical Analysis

The efficiency of tested treatments was measured as a percentage of reduction in population density of pest aphids using the equation of **Henderson and Tilton (1955)**.

RESULTS AND DISCUSSION

Effects of the Teasted Compounds on *M. persicae* Infested Botato and Tomato Plants During 2019 Season

Data presented in Tables 1 and 2 show clearly that, all the tested biocides revealed a phieidal action the efficiency was increased with

increasing the number of sprays and the increasing of used dosages.

Effects on aphids infested Botato plants

Regarding the first spray (at a half of recommended) dose it was found that the all tested biocides recorded to 70% reduction percentages after 24h, thin increased to reach 78.40 m 77.10 , 76.00 and 76.00% after 3 days of sparing for skanmitem spiner m Agreflex and protecto, respectively.

These reduction percentages were decreased

Gradually to reach 69.50, 65.80, 64.70 and 64.60% after seven days of spaying. Concerning the second and third sprays (recommended dosages), the same trend was fount with exception that the initial effect of agrofex and protecto was higher than their effects in first spray with 2-7% the annual or seasonal average effects of the tested biocides revealed that Agrofex recorded the highest reduction percentages in aphid infestation (74.67%) followed by shanmite (73.65%), protecto (73.51%) and spiner (69.59%).

Effects of tested compounds on *M. persicae* infested Tomato plants during 2019 season

The results in Table 2 showed that the effect of four tested compounds as a recommended dose against aphid which infested the tomato crop decreased its population numbers. The highest initial mean of reduction percentage of Agriflex was 84.19% recorded, followed by protecto 80.01 % sakamite 69.51% and spiner 64.32% after 24 hours of treatment Also results indicated that of the four tested compounds effects against aphid insect after three days of sparying decreased significantly aphids population, where the Agriflex compound recorded the highest mean of reduction percentage 84.49%, followed by protecto, 81.40% m skanimite compounds 71.41 % while the lowest mean of reduction rate of 65.57 % recorded for spiner, also data cleared that the effect of tested compounds after five days of spraying caused decreased significantly aphids numbers especially with Agriflex which recorded the highest mean of reduction of 90.45 % followed by protecto (79.27%), skanmite (72.12%) and the spiner record a lower reduction rate of (65.33)% after 7 days of spraying . Agriflex recorded the highest mean of

Table 1. Reduction percentages (days) in the numbers of *Myzus persicae* on potato plants spraying 3 times with different biocides as experimental program during 2019 season

Treatments	1/2 Recommended dose (first spray)					Recommended dose (second spray)					1 1/2 Recommended dose (third s)				Annual seasonal average	
	24H	3d	5d	7d	Average	24h	3d	5d	7d	Average	24h	3d	5d	7d		
Skanimite	68.30	78.40	74.10	69.50	74.58	68.90	72.30	68.80	65.10	68.78	75.40	81.60	78.80	78.80	77.60	73.65
Spiner	68.80	77.10	67.80	65.80	69.88	63.80	87.40	64.80	63.10	64.78	73.60	77.40	75.00	70.40	74.10	69.59
Agreflex	68.80	76.00	67.10	64.70	69.15	83.15	85.70	81.90	77.60	82.18	70.60	75.10	74.60	70.40	72.62	74.67
Protecto	68.50	76.00	64.60	69.23	79.20	81.70	78.60	75.40	78.73	73.60	74.20	74.50	68.10	72.50	67.8	73.51

Table 2. Reduction percentages (days) in the numbers of *Myzus persicae* on Tomato plants spraying 3 times with different biocides as experimental program during 2019 season

Treatments	1/2 Recommended dose (first spray)					Recommended dose (second spray)					1 1/2 Recommended dose (third s)				Annual seasonal average	
	24H	3d	5d	7d	Average	24h	3d	5d	7d	Average	24h	3d	5d	7d		
Skanimite	54.62	75.14	77.84	70.14	69.44	69.51	71.41	72.12	77.49	72.63	68.73	73.50	77.77	75.44	73.86	71.98
Spiner	81.88	70.24	68.54	66.32	71.75	64.32	65.57	65.33	63.19	64.59	74.49	78.25	73.07	71.2	74.35	70.23
Agreflex	70.49	72.59	68.54	67.7	69.85	84.19	84.49	90.45	78.4	84.29	75.73	65.24	77.93	71.59	72.62	75.59
Protecto	74.75	68.60	68.54	69.21	70.28	80.01	81.40	79.27	75.65	79.08	76.55	65.85	78.75	68.95	72.55	73.79

reduction (78.04%) followed by skanmite (77.49%) and protecto (75.65%) but the biocide spiner recorded a lower reduction rate (63.17%) the results also showed that the effect of the tested.

Compounds at the half of the recommended dose of some biocides tested against aphids in the Tomato crop after 24 hours of spraying the mean number of aphids were decreased significantly and recorded (81.88%) the highest percentage of reduction for spiner followed by (74.75%) for protecto while the Agriflex recorded (70.49%) reduction then skanmite which has the lowest rate of reduction (54.62%) the results also indicated that the effect of the tested compounds at the same dose of spraying after 3 days skanmite caused the highest percentage reduction of the insect (75.14%) followed by (72.59%) of the agriflex, while spiner recorded (70.24%) but protecto recorded the lowest reduction rate (68.60%) the results in the same table indicated that the effect of the tested compounds against aphid numbers after 5 days of effect of skanmite decreased significantly but still recorded the highest percentage of reduction (77.84%) followed by (68.54%) for the other tested compounds: the data indicated that the effect of the tested compounds after 7 days of spraying was significantly decreased the highest reduction was 70.14% for skanmite followed by 69.21% for protecto then Agriflex (67.67%) while the lowest reduction rate was (66.32%) for spiner which recorded the highest mean effect.

At one and half of recommended dose : date in Table 2 showed that the highest average reduction in the population after a five days of spraying spiner recorded an average of 74.35% while protecto record 72.55% after 7 days of spraying .

Regarding the annual or seasonal effects of the tested biocides, it was found as could be noticed in Table 2 Agriflex recorded the highest reduction percentage in aphid in festation (75.59%) followed by protecto (73.79%), skanmite (71.98%) and spiner (70.23%) the above mentioned results are harmony with these obtained by **Marey *et al.* (2004)** reported that many strains of *B. thuringiensis* were assessed against *M. persicae*, an aphid that is considered one the most destructive pesta affecting the

agriculture economy. They caused mortality rates ranging from 64.4 to 88.9 % at 10 ng/ml these strains have the potential to be used as an alternative insecticides to control *M. persicae* under field covered conditions.

Kayser *et al.* (2004) analyzed the mode of imidacloprid displacement by established neonicotinoids and newly synthesized analogues in the aphids *M. persicae* and *Aphis caraccivora* the present date that cleared the direct competitors share the binding site with imidacloprid, where as non-competitive compounds, like *Thiam ethoxam* bind to a different site or in different mode.

Khon *et al.* (2011) and Kumara *et al.* (2016) recorded that afield studies revealed that both the insecticides provado-1.6 F (imidocloprid) and Actara 25 wg. (thiamethoxam) significantly suppressed the peach aphid *MyZus persicae*.

Xiao *et al.* (2016) found that insect bioassay test demonstrated *Bacillus thuringiensis* had significant inhibition of peach potato aphids (*M. persicae*) simultaneously.

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دراسات على فعالية بعض المبيدات الحيوية على حشرة المن التي تصيب بعض محاصيل العائلة الباذنجانية (البطاطس – الطماطم)

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تم دراسة تأثير أربعة مركبات علي حشرة المن التي تصيب نباتات البطاطس والطماطم بجرعات مختلفة (نصف الجرعة – الجرعة الموصي بها – واحد ونصف من الجرعة الموصي بها) تحت الظروف الحقلية وقد لخصت النتائج لما يلي: على نباتات البطاطس، أوضحت النتائج أن أعلى نسبة خفض لتعداد حشرات المن بعد الرشة الأولى سجلت بمتوسط خفض 68.30 و 68.90 و 75.40% لمركب سكانميت عند الرش بنصف الجرعة وعند الرش بواحد ونصف من الجرعة الموصي بها بينما عند رش النباتات بالجرعة الموصي بها لجميع المركبات سجل مركب أجري فيليكس أعلى نسبة خفض في تعداد حشرات المن بمتوسط نسبة خفض 83.50% كما أشارت النتائج المتحصل عليها بعد رش نباتات البطاطس بثلاث رشات وأوضحت أن مركب أجري فيليكس هو أفضل المركبات المختبرة وسجل أعلى متوسط خفض موسمي بمتوسط نسبة خفض 74.67 يليه مركب سكانميت بمتوسط نسبة خفض 73.65%. بينما سجل مركب البرفكتو نسبة خفض 73.51% وسجل مركب سبينر متوسط نسبة خفض 69.59% مقارنة بالقطع الغير معاملة وتشير النتائج إلى أن مركب أجري فيليكس هو أفضل المركبات المختبرة والمستخدمه في مكافحة حشرات المن علي نباتات البطاطس. على نباتات الطماطم، أوضحت النتائج المتحصل عليها بعد رش النباتات بتركيز نصف الجرعة أن مركب سبينر سجل أعلى نسبة خفض بمتوسط خفض 83.88% إبادة موزعة في تعداد حشرات المن وعند رش النباتات بالجرعة الموصي بها سجل مركب أجري فيليكس أعلى نسبة خفض، في تعداد حشران المن بنسبة خفض 86.19%، 86.29% خفضاً في تعداد حشرات المن، بينما عند رش النباتات بتركيز واحد ونصف من الجرعة الموصي بها فقد سجل مركب البروتكتو أعلى نسبة خفض في تعداد حشرات المن بنسبة خفض 76.55%. وأشارت النتائج المتحصل عليها بعد رش نباتات الطماطم بثلاث رشات تركيزات مختلفة إلي المتوسط العام الموسمي للمركبات المختبرة علي حشرات المن علي نباتات الطماطم وأوضحت أن مركبات أجري فيليكس سجل أعلى نسبة خفض موسمي في تعداد حشرات المن بنسبة خفض 75.59% تلاه مركب البروتكتو وسجل نسبة خفض 73.79% ثم مركب سكانميت وسجل نسبة خفض 71.98% ووتشير النتائج إلي أن مركب اجري فيليكس يعد من أفضل المركبات وأكثرها تخصصاً في مكافحة الحشرات (المن) علي نباتات الحفر.

الكلمات الإسترشادية: بعض المبيدات الحيوية، حشرة المن، محاصيل العائلة الباذنجانية.

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