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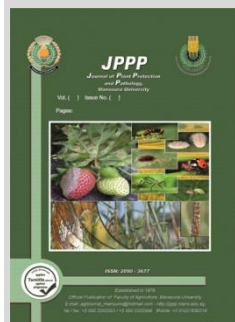
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### Efficiency of Using Triacantanol Hormone (Tria) on Management of *Myzus persicae* Infesting Carnation Flowers under Plastic Greenhouse Conditions

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#### ABSTRACT

Triacantanol Hormone (TRIA) was evaluated against *Myzus persicae* (Sulzer) infesting carnation flowers (*Dianthus caryophyllus* L.) under plastic greenhouse conditions during season 2024. Experiments took place at two different Governorates; Cairo (El-Zohrya Garden) and Alexandria (El-Horya Farm), three different concentrations were used; 25ppm, 50ppm and 75ppm. Results indicated that carnation plants treated by 25 ppm of (TRIA) hormone were less infested comparing to control, while treatment by 50ppm had non-significant effect on infestation. Whereas plants treated by 75ppm were more infested. Further results indicated that individuals fed on carnation plants treated by 25ppm showed bad effects on the physiological vital processes especially on some important internal substances secreted by the insect as; (carbohydrates, total lipids, total proteins and important enzymes such as; Lipase enzyme, Phosphatase enzyme, Chitinase enzyme, Kinase enzyme, Beta esterase enzyme, Alpha esterase enzyme, Digestive enzymes, and Oxidation enzymes). Insects fed on plants treated by 50 ppm had non-significant effect on the internal secretions of the insect, *lastly* individuals fed on plants treated by 75 ppm showed enhanced internal substances secreted by insects.

**Keywords:** Triacantanol Hormone (TRIA), carnation plants, *Myzus persicae*, physiological vital processes, greenhouses

#### INTRODUCTION

(*Dianthus caryophyllus* L.) or Carnation flowers cultivated in open fields and under glasshouse conditions considered an important cut flowers in Egypt and worldwide. Its cultivation increased during the last few years including new reclaimed lands for local consumption and exportation to other countries. *Dianthus* are beloved to humans due to their nice colors, flower style, fragrance and its tolerance to unfavorable weather conditions, Ali et al., (2008).

Green Peach Aphid, *Myzus persicae* (Sulzer) (Hemiptera: Aphididae) are serious insects infesting carnation plants and flowers. *M. persicae* was considered a dangerous pest infesting carnation plants and flowers in Southern Brazil causing many damages in both quantity and quality of flowers crop, Bernardi et al. (2013). The same Aphid, has become a major insect pest for many horticultural crops such as carnation plants and flowers in California According to Jian and Nick (2009).

Multi studies showed the importance of the Growth regulator hormone Triacantanol (TRIA) and its role in growth and change of morphological and physiological properties of plants when utilized in different concentrations. In India (1990), Srivastava and Srikant studied its effect on some parameters in *Papaver somniferum* L. and its influence on total chlorophyll, growth, plant height, CO<sub>2</sub> exchange rate, weight, fresh and dry weight of leaves and shoots under glasshouse conditions.

Current study aimed to evaluate efficiency of using Triacantanol in "three concentrations" on management of *M. persicae* infesting carnation flowers (*D. caryophyllus*) under plastic greenhouses.

#### MATERIALS AND METHODS

##### Experimental:

At two different places; El-Zohrya Garden (Cairo Governorate) and El-Horya Farm (private farm) (Alexandria

Governorate) under plastic glasshouses, Carnation seedlings were planted at the same time in the beginning of September season 2024. We used 100 (one hundred) carnation seedlings in each location, they were divided into four parts, each treatment contained 25 seedlings where we immersed 25 seedlings in low concentration of (TRIA) 25ppm for period of 8 hours prior planting. Another 25 seedlings immersed in medium concentration 50ppm for the same period (8 hours). A third 25 seedlings immersed in high concentration of (TRIA) 75ppm for (8 hours), and 25 seedlings were left without immersion in any hormone as control. The planting area was divided into four big parts, three parts for treated carnation seedlings and the last one for control, the area of each part was 4x6m, well isolated. We applied the known and advised agricultural procedures, using no chemical control against insects throughout our experiment time.

Once the first leaves of the carnation seedlings started to appear after three weeks we artificially infested the plants with *M. persicae*, counting numbers of aphids every week.

##### Laboratory design:

##### - Determining internal substances secreted by the insect:

Laboratory analyses were performed at insect's physiology lab- faculty of science-Ain Shams university. Internal substances mentioned previously secreted by the collected insects (adults and nymphs) were determined applied on aphids fed on treated plants and control.

##### Statistics:

Effect of different concentrations of (TRIA) on Population fluctuation of *M. persicae* infesting carnation flowers was studied, variance (ANOVA) was achieved comparing means by L.S.D. test at 0.05 level, using SAS program (SAS Institute, 1988).

#### RESULTS AND DISCUSSION

We studied influence of treating carnation seedlings with three concentrations (25ppm, 50ppm and 75ppm)

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respectively of Triacontanol Hormone on infestation by *Myzus persicae* (Sulzer) under plastic greenhouses at two different places ; (in Cairo and Alexandria) in season 2024.

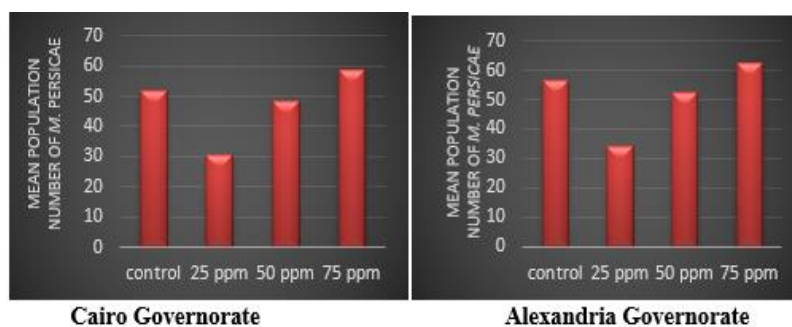
Tabulated Data ,Table (1) and Fig. (1) show population fluctuation of *M. persicae* infesting carnation flowers in both locations, indicating the infestation level after treatment by (25 ppm, 50ppm and 75ppm TRIA) .At Cairo Governorate mean population number of aphids in control was

(51.9individual/flower) and was (30.6 individual/flower) in the first treatment (25ppm), (48.5individual/flower) in the second (50ppm),and (58.9 individual/flower) in the third one (75ppm).While at Alexandria city the mean population number of aphids in control was (56.3individual/flower) and was (33.9individual/flower) in the first treatment (25ppm), (52.2individual/flower) in the second (50ppm) and (62.7 individual/flower) in the third (75ppm).

**Table 1. Population fluctuations of *M. persicae* infesting carnation plants treated by TRIA hormone at Cairo and Alexandria Governorates during season 2024**

Date	Cairo Governorate				Alexandria Governorate			
	control	25ppm	50ppm	75ppm	control	25ppm	50ppm	75ppm
1/10/2023	35.8	16.3	32.9	39.2	39.5	18.3	35.7	43.9
8/10/2023	41.5	21.8	38.2	46.9	43.7	23.5	38.2	48.2
15/10/2023	43.7	24.5	40.3	49.3	49.6	26.0	44.0	53.0
22/10/2023	45.4	26.1	42.7	52.0	53.3	28.4	48.1	58.2
29/10/2023	49.2	28.0	46.2	55.1	55.2	31.0	51.0	61.0
5/11/2023	52.3	31.0	49.1	58.0	57.9	33.8	53.5	64.0
12/11/2023	50.7	28.0	46.3	55.6	52.0	31.7	48.3	60.3
19/11/2023	53.2	32.0	48.2	59.1	55.1	35.0	51.7	63.1
26/11/2023	55.0	35.6	52.5	63.3	58.4	37.9	54.0	67.2
3/12/2023	57.1	38.0	55.0	65.2	62.0	40.1	58.3	70.0
10/12/2023	60.5	40.7	57.1	69.0	65.3	44.0	61.0	72.0
17/12/2023	58.3	33.9	53.8	67.5	62.0	39.7	59.2	70.1
24/12/2023	61.2	35.6	57.2	71.7	65.8	42.1	62.3	72.3
31/12/2023	63.4	37.1	60.1	74.0	68.2	44.3	65.0	74.0
Total	727.3	428.6	679.6	825.9	788.0	475.8	730.3	877.3
Mean	51.9	30.6	48.5	58.9	56.3	33.9	52.2	62.7
%	-	-58.9	6.6	+11.9	-	-60.2	7.3	+10.2
F (0.05)		325.75				415.88		
L.S.D		1.025				1.075		

Means within columns bearing different subscripts are significantly different ( $P < 0.05$ )



**Fig. 1. Mean Population number of *M. persicae* infesting carnation plants treated by TRIA hormone at Cairo and Alexandria Governorates during season 2024**

Thus results obtained indicated that at Cairo Governorate treatment with low concentration of TRIA led to decreasing percentage% of infestation by 58.9% ,treatment with medium concentration had insignificant effect on percentage % of infestation which was only 6.6%,while treatment of plants with high concentration of that hormone (TRIA) gave negative effect on the control process of the insect and increased mean population number of individuals by percentage of 11.9%. As the same trend was achieved at Alexandria governorate, low concentration treatment(25ppm) depressed infestation by 60.2%, while treatment with medium concentration (50 ppm) had no strong variance only 7.3%, and high concentration treatment (75 ppm) raised the insect infestation by 10.2% compared to control.  $F_{(0.05)}$  and L.S.D values were (325.75, 1.025) and (415.88, 1.075) at both governorates respectively.

Heba et al recorded that the plant (*Zea mays*) when treated with low concentration of Triacontanol hormone (35 ppm.) was less infested by *Euprepocnemisplorans* comparing to control, while high concentration (50 ppm.) caused more infection(2013) Egypt. Gupta et al. suggested the facility of (Triacontanol) in controlling pests by using low concentrations

to decrease infection(2009). Insecticidal activity of TRIA was referred to by Singh and Bhattacharya (2001) and its efficient role in reducing survivorship and some parameters of larvae of *Spilartia oblique* Walker when fed on diets containing TRIA, and therefore utility of TRIA in Pest control can be recommended.

#### **Effect of Triacontanol Hormone (TRIA) on the physiological characteristics of carnation plants:**

Table (2) show effect of Triacontanol hormone (TRIA) in many concentrations on the physiological characteristics of plants indicating that feeding insects on carnation plants treated with low concentration of (TRIA) suppressed substances secreted by those individuals as ; (carbohydrates ,total lipids, total proteins and enzymes as; Alpha esterase enzyme and Beta esterase enzyme, Chitinase enzyme, Phosphatase enzyme, Kinase enzyme, Lipase enzyme, Digestive enzymes and Oxidation enzymes) compared to control, while medium concentration of (TRIA) reflected insignificant differences in these internal substances. Whereas high concentration diets of (TRIA) improved secretions of the insect .

**Table 2. Effect of (TRIA) hormone(different concentrations) on the important substances secreted by *M. persicae* during season 2024**

Parameters (mg/100g)	Control	25 ppm	50 ppm	75 ppm	F(0.05)	LSD
Total proteins	26.35 <sup>a</sup>	19.15 <sup>d</sup>	24.35 <sup>b</sup>	29.11 <sup>c</sup>	235.11	1.025
Carbohydrates	10.32 <sup>a</sup>	7.71 <sup>d</sup>	9.44 <sup>b</sup>	13.52 <sup>c</sup>	321.31	1.033
Total Lipids	16.85 <sup>a</sup>	12.34 <sup>d</sup>	15.23 <sup>b</sup>	19.41 <sup>c</sup>	412.72	1.042
Chitinase Enzyme	19.33 <sup>a</sup>	15.87 <sup>d</sup>	18.25 <sup>b</sup>	23.22 <sup>c</sup>	237.98	1.031
Lipase Enzyme	30.15 <sup>a</sup>	25.22 <sup>d</sup>	28.75 <sup>b</sup>	33.51 <sup>c</sup>	421.76	1.065
Phosphatase Enzyme	25.78 <sup>a</sup>	20.11 <sup>d</sup>	23.54 <sup>b</sup>	28.11 <sup>c</sup>	312.75	1.037
Kinase Enzyme	19.75 <sup>a</sup>	13.56 <sup>d</sup>	17.35 <sup>b</sup>	22.53 <sup>c</sup>	231.89	1.056
Alpha Esterase	15.98 <sup>a</sup>	11.65 <sup>d</sup>	13.42 <sup>b</sup>	17.32 <sup>c</sup>	421.77	1.022
Beta Esterase	12.59 <sup>a</sup>	9.22 <sup>d</sup>	11.83 <sup>b</sup>	14.12 <sup>c</sup>	356.81	1.035
Oxidation enzymes	10.98 <sup>a</sup>	7.21 <sup>d</sup>	9.75 <sup>b</sup>	11.15 <sup>c</sup>	289.77	1.073
Digestive enzymes	11.50 <sup>a</sup>	8.25 <sup>d</sup>	10.42 <sup>b</sup>	12.32 <sup>c</sup>	325.11	1.066

Means within columns bearing different subscripts are significantly different (P<0.05)

Data reflects high significant differences between concentrations of secretions of individuals consuming treated plants with (TRIA) hormone versus control .

Results above agree with those found by Shukla *et al.* (2002) in Netherland indicating that treating plants with low concentrations of (TRIA) hormone had bad effects on growth and vital processes of aphids infesting leaves and flowers. Also treating tomato and maize plants with Triacontanol (TRIA) significantly decreased infestation by Green aphids Eriksen *et al.* (2013) Oslo (Norway). Finally Richard and Stanley (2015) in Michigan-United States recorded that treatment of rice (*Oryza sativa* L.) seedlings by Triacontanol hormone (TRIA) had negative effect on different pests associated with them.

## CONCLUSION

In this study we evaluated efficiency of Triacontanol Hormone in controlling management of *Myzus persicae* infesting carnation flowers under plastic greenhouses.

Results obtained indicated that treatment of carnation plants with low concentration of (TRIA) hormone lowered infestation by *M. persicae* and had negative effects on the physiological vital processes of insects, while medium concentration diets had non- significant effect on the same processes ,on the other hand high concentration treatment resulted in more infestation and positive effect on those internal secretions compared to control. Thus usage of this hormone in Pest control can be recommend .

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## تقييم فاعلية إستخدام هرمون ترائى أكونتاتول (TRIA) في عملية مكافحة حشرة من الخوخ الأخضر *Myzus persicae* التي تصيب زهور القرنفل تحت ظروف الصوب البلاستيكية

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### المخلص

دراسة تأثير معاملة شتلات القرنفل *Dianthus caryophyllus* بهرمون ترائى أكونتاتول بتركيزات مختلفة على درجة الإصابة بحشرة من الخوخ الأخضر *Myzus persicae* (Sulzer) وكذلك تأثير هعلى أهم الصفات الفسيولوجية لمحلول الحشرة محل الدراسة *M. persicae* والتي تتمثل في الإفرازات الداخلية الهامة للحشرة مثل (إجمالي البروتين - الكربوهيدرات - إجمالي الدهون - الإنزيمات الهامة) ومقارنتها بالكنترول. أجريت التجربة في (محافظتين) مختلفتين: حديقة الزهري (محافظة القاهرة) و مزرعة الحرية (محافظة الإسكندرية) خلال عام 2024. توصلت النتائج المتحصل عليها في كلا من موقعي الدراسة إلى تبليين متوسط تعداد حشرات المن التي تصيب زهور القرنفل وذلك تبعاً لتركيز هرمون ترائى أكونتاتول الذي تم معاملة الشتلات به. حيث كانت نباتات القرنفل التي تم معاملة بتركيز منخفض من هرمون ترائى أكونتاتول (25 جزء في المليون) كانت أقل في متوسط الإصابة بحشرة المن مقارنة بالكنترول و النباتات التي تم معاملة بتركيز متوسط من الهرمون (50 جزء في المليون) لم يكن له تأثير معنوي على درجة الإصابة بحشرة المن مقارنة بالكنترول. وأخيراً النباتات التي تم معاملة بتركيز مرتفع من الهرمون (75 جزء في المليون) كانت أعلى في متوسط الإصابة بحشرة المن مقارنة بالكنترول كما اتضح من إجراء التحاليل الفسيولوجية للحشرة وكذلك الكنترول أن إستخدام هرمون الترائى أكونتاتول بتركيز منخفض (25 جزء في المليون) أدى إلى تأثير سلبي على هذه الصفات الفسيولوجية والإفرازات الداخلية للحشرة بينما استخدام تركيز متوسط من الهرمون لم يكن له تأثير معنوي على هذه الصفات الفسيولوجية للحشرة مقارنة بالكنترول وعلى النقيض فإن استخدام هرمون ترائى أكونتاتول بتركيز مرتفع أدى إلى تأثير إيجابي على الصفات الفسيولوجية السابق ذكرها للحشرات المعاملة بالهرمون وذلك بالمقارنة بالكنترول. ونستخلص من هذه الدراسة أنه يمكن التوصية باستخدام هرمون ترائى أكونتاتول ليس فقط كمحفز لنمو النباتات وتحسين صفاتها المورفولوجية والفسيولوجية وإنما يمكن كذلك إدراجها في برامج مكافحة متكاملة للحشرات (I.P.M). وذلك بالجرعات الموصى بها في هذه الدراسة .