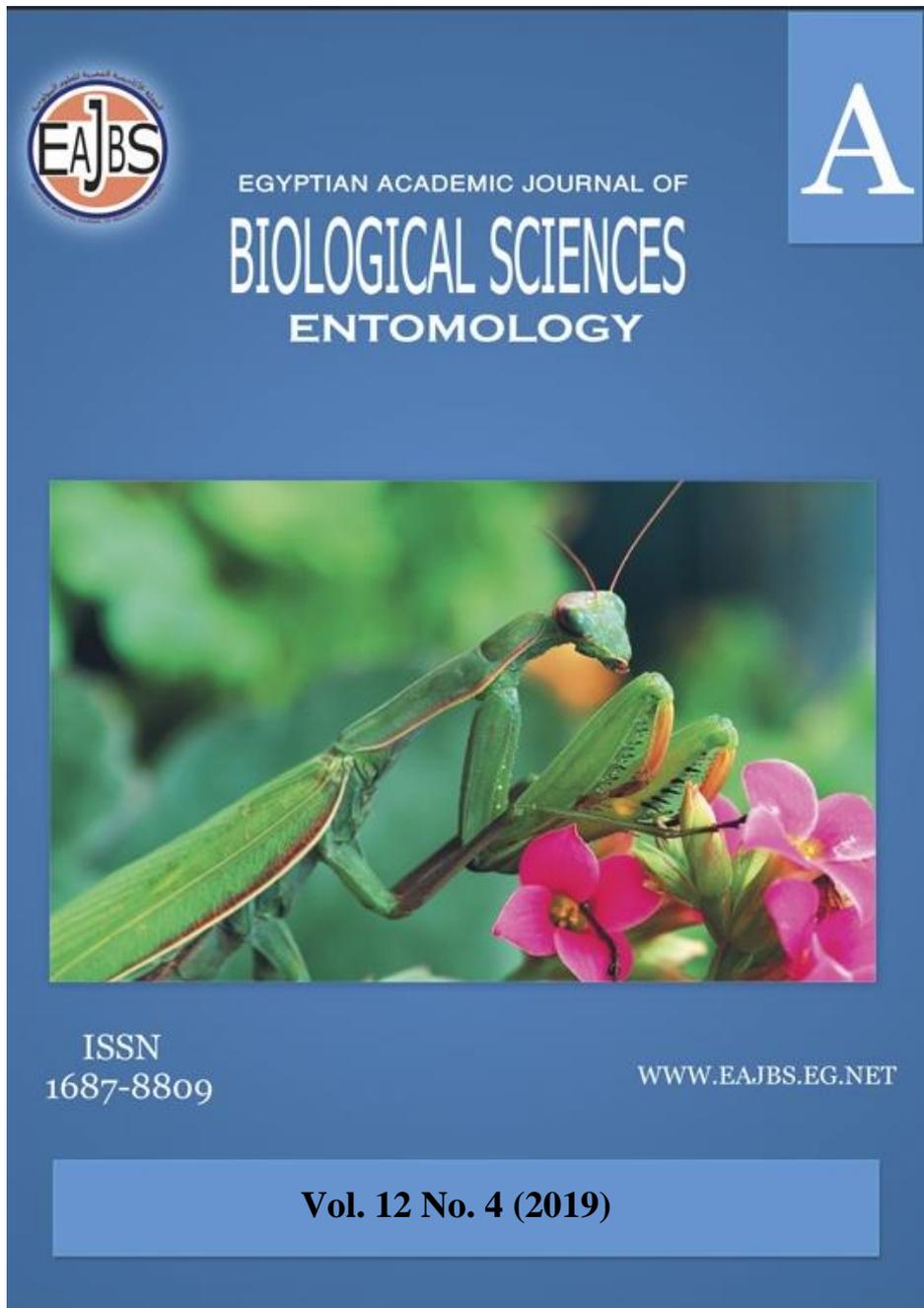


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**Effect of Treated *Duranta* Seedlings by Triacantanol Hormone (TRIA) on the Infestation by *Aphis durantae* and *Tetranychus urticae* under Glasshouse Conditions**

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**ABSTRACT**

This study was carried out to study the effect of treated *Duranta* seedlings *Duranta sp.* fam: Araliaceae by different concentrations of Triacantanol hormone (TRIA) on the infestation by *Duranta* aphid, *Aphis durantae* Theobald (Homoptera: Aphididae) and *Tetranychus urticae* Koch (Fam: Tetranychidae) under glasshouses conditions. This study was carried out at two locations (Governorates), El-Orman Garden (Giza Governorate) and International Garden (Alexandria Governorate) throughout 2018 season.

Three treatments (concentrations) of Triacantanol hormone were done in both the two locations, small concentration (25ppm), medium concentration (45ppm) and high concentration (65ppm), beside fourth treatment which did not treat with any hormone (control). *Duranta* plants which treated with a small concentration of (TRIA) (25ppm) were lower infestation by both *A. durantae* and *T. urticae* comparing to control. *Duranta* plants which treated with a medium concentration of (TRIA) (45ppm) were had no significant effect on the infestation by the two pests compared to control. On the other hand, *duranta* plants which treated with a high concentration of (TRIA) (65ppm) were higher infestation by both the two pests comparing to control.

From obtained results we can recommend using Triacantanol hormone (TRIA) on the Integrated Pest Management (I.P.M) programs by doses showed at this study.

**INTRODUCTION**

*Duranta* plants consider one of the importances, beautiful and famous hedges and ornamental plants all over the world. It is called "Golden dewdrop". They are commonly cultivated as hedges and ornamental plants. Also, *duranta* plants are one of the most permanent green leafy plants, characterized by bright green leaves, which reproduce through the seedlings. *Duranta* is a genus of flowering plants in the verbena family (Verbenaceae). Iram, S. *et al.* (2017) in Pakistan found that *duranta* is a common ornamental plant of the family Verbenaceae that is often grown as a garden hedge in Pakistan. On the other hand, *duranta* plants also cultivated for medicinal purposes in many countries all over the world. Sharma, P. *et al.* (2015) studied the antifungal activity of *duranta* plants against some phytopathogenic fungi as a result of antifungal activity, it was found that the extract of the

leaf which contain also many pharmaceutical drugs. Sung, T. *et al.* (2017) who studied the medicinal uses of duranta plants.

Duranta aphid, *Aphis durantae* Theobald (Homoptera: Aphididae) is the most important pest of duranta plants and many other crops. The adults and nymphs of aphid attack the duranta plants, tender shoots and buds. Aphid populations may increase very rapidly under natural conditions. Ahmed, S. and El-Deeb, M. (2007) found that duranta aphid, *A. durantae* infested duranta plants all over the year, leaves were the highly infested plant part that received aphids attack.

*Tetranychus urticae* Koch (Fam: Tetranychidae) consider one of the most important pests infesting duranta plants both in the open field and under greenhouse conditions. *T. urticae* is a species of plant-feeding mite generally considered to be a serious pest on duranta plants and other ornamental plants. It is the most widely known member of the family Tetranychidae or spider mites and called red spider mite. Gabriel, L. (2005) who reported that *T. urticae* was a serious pest on duranta plants under greenhouse conditions.

Triacantanol hormone (TRIA) considers one of the famous, important and more growth regulators hormones. There are more studies that show the important role of this hormone for growth regulators plants. And its role for change morphological and physiological plant adjectives when used by many concentrations. Srivastava and Srikant (1990) in India studied effect of Triacantanol hormone on photosynthesis, alkaloid, and other parameters in *Papaver somniferum* L. and studied the influence of different foliar application of Triacantanol hormone (TRIA) on growth, CO<sub>2</sub>, exchange rate, total chlorophyll, plant height and weight, fresh and dry weight of the leaves and shoots. This study was carried out to study the effect of treated Duranta seedlings *Duranta sp.* fam: Araliaceae by different concentrations of Triacantanol hormone (TRIA) on the infestation by Duranta aphid, *A. durantae* and *T. urticae* under glasshouses conditions. This study was carried out at two locations (Governorates), El-Orman Garden (Giza Governorate) and International Garden (Alexandria Governorate) during 2018 season.

## MATERIALS AND METHODS

### Experimental Design:

This study was conducted on duranta plants *Duranta sp.* fam: Araliaceae at two locations (Governorates), El-Orman Garden (Giza Governorate) and International Garden (Alexandria Governorate) during 2018 season. Plants were cultivated at both the two locations in the same time in a timely manner for the cultivation of duranta plants in December. At both the two locations we used 100 seedlings in each garden, divided into four treatments each treatment contain 25 seedlings. First treatment we immersion 25 seedlings in low concentration of (TRIA) 25ppm for period 24 hour before cultivated. Second treatment we immersion 25 seedlings in the medium concentration of (TRIA) 45ppm for period 24 hour before cultivated. The third treatment we immersion 25 seedlings in the high concentration of (TRIA) 65ppm for period 24 hour before cultivated. Lastly, the fourth treatment also contains 25 seedlings and did not immersion in any hormone before cultivated and this treatment used as control. These seedlings cultivated under glasshouses conditions at both the two parks. Every garden four plots, a plot for each treatment and in the same area, The area of each plot was 3x5m, this area was completely isolated in the two parks, Then it was conducted all agricultural operations in a manner quite similar at both the two parks. The normal and recommended agricultural practices were applied, also no chemical control against insects were used during the whole experimental period.

After three weeks for cultivated and with the first leaves of the plant began to appear, an artificial infestation by *Aphis durantae* Theobald and *Tetranychus urticae* Koch were done

at the same time at both the two parks. It is proven accurate observations of the infestation with numbers of the two pests in all plants biweekly. Directly counting was done biweekly during the season of *Duranta* plant growing from February month to August month at both the two parks all over all plants.

#### **Statistical Analysis:**

In these experiments, the effect of different concentrations of (TRIA) on the infestation of *Duranta* plants by *A. durantae* and *T. urticae* were subjected to analysis of variance (ANOVA) and the means were compared by L.S.D. test at 0.05 level, using SAS program (SAS Institute, 1988).

## **RESULTS AND DISCUSSION**

This study was carried out to study the effect of treated *Duranta* seedlings *Duranta sp.* by different concentrations of Triacontanol hormone (TRIA) on the infestation by *Duranta* aphid, *Aphis durantae* and *Tetranychus urticae* under glasshouses conditions. This study was carried out at two locations (Governorates), El-Orman Garden (Giza Governorate) and International Garden (Alexandria Governorate) throughout the 2018 season.

#### **El-Orman Garden, Giza Governorate:**

Data tabulated in Table (1) show the population fluctuations of *A.durantae* and *T.urticae* at El-Orman Garden, Giza governorate indicated by half monthly count during the 2018 season on *Duranta* plants at the three treatments (concentrations) of Triacontanol hormone 25 ppm, 45ppm and 65ppm, respectively compared to control.

Data obtained showed that the level of the infestation by both the two pests was different completely between the control and the three treatments (different concentrations of TRIA). Whereas for *A. durantae*, the mean number of aphid in control was (18.3 aphid/leaf), it was (9.3 aphid/leaf) in the first treatment (the low concentration of TRIA 25ppm), (17.3 aphid/leaf) in the second treatment (the medium concentration of TRIA 45ppm) and (22.9aphid/leaf) in the third treatment (the high concentration of TRIA 65ppm).

For *T.urticae* the mean number of pest in control was (11.8 pest/leaf), it was (6.5 pest/leaf) in the first treatment (the low concentration of TRIA 25ppm), (10.7 pest/leaf) in the second treatment (the medium concentration of TRIA 45ppm) and (15.9 pest/leaf) in the third treatment (the high concentration of TRIA 65ppm).

Statically analysis showed that there were highly significant differences between the levels of infestation by both the two pests in different concentrations of TRIA compared to control. Whereas F (0.5) value and LSD value for the infestation by *A. durantae* were (475.85, 1.97), respectively. And for the infestation by *T. urticae* were (235.61, 1.23), respectively .

**Table (1):** Population fluctuations of *A. durantae* and *T. urticae* on *durantae* plants which treated by different concentrations of TRIA at Giza Governorate during 2018 season

Date	<i>A. Durantae</i> (aphid/leaf)				<i>T. urticae</i> (pest/leaf)			
	25ppm	45ppm	65ppm	Control	25ppm	45ppm	65ppm	Control
1/2/2018	7.5	13.7	19.5	15.3	4.8	9.5	13.5	10.3
15/2/2018	9.3	16.8	21.3	17.9	5.5	9.8	15.3	11.5
1/3/2018	10.6	17.8	23.8	19.5	7.6	11.8	17.5	13.2
15/3/2018	12.5	21.7	25.3	22.6	9.4	13.5	18.4	15.4
1/4/2018	13.7	23.3	27.4	25.3	10.3	15.8	20.9	16.7
15/4/2018	15.8	26.5	30.6	27.5	12.5	17.5	22.7	18.5
1/5/2018	13.5	25.1	28.5	25.3	10.3	15.2	20.5	16.9
15/5/2018	11.2	23.2	26.3	23.7	8.6	13.7	18.2	14.3
1/6/2018	9.7	19.7	25.6	20.4	6.8	10.5	16.4	12.4
15/6/2018	7.5	15.8	23.4	16.8	4.2	9.7	14.1	10.3
1/7/2018	6.4	12.3	21.7	13.2	3.8	7.9	13.8	8.9
15/7/2018	5.9	11.2	18.4	11.4	3.4	6.8	11.6	7.3
1/8/2018	3.8	9.1	15.6	9.8	2.2	4.5	10.5	5.3
15/8/2018	2.7	6.4	13.9	7.5	2.0	4.1	8.7	4.6
<b>Total</b>	<b>130.1</b>	<b>242.6</b>	<b>321.3</b>	<b>256.2</b>	<b>91.4</b>	<b>150.3</b>	<b>222.1</b>	<b>165.6</b>
<b>Mean</b>	<b>9.3</b>	<b>17.3</b>	<b>22.9</b>	<b>18.3</b>	<b>6.5</b>	<b>10.7</b>	<b>15.9</b>	<b>11.8</b>
<b>F(0.05)</b>	<b>475.85</b>				<b>235.61</b>			
<b>L.S.D</b>	<b>1.97</b>				<b>1.23</b>			

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

#### International Garden, Alexandria Governorate:

Data tabulated in Table (2) show the population fluctuations of *A. durantae* and *T. urticae* at Alexandria Governorate indicated by half monthly count during 2018 season on the duranta plants.

Data obtained showed that the level of the infestation by both the two pests was different completely between the control and the three treatments (different concentrations of TRIA). Whereas for *A. durantae* the mean number of aphid in control was (14.1 aphid/leaf), it was (6.9 aphid/leaf) in the first treatment (the low concentration of TRIA 25ppm), (13.1 aphid/leaf) in the second treatment (the medium concentration of TRIA 45ppm) and (20.1aphid/leaf) in the third treatment (the high concentration of TRIA 65ppm).

For *T. urticae* the mean number of pest in control was (9.7 pest/leaf), it was (5.1 pest/leaf) in the first treatment (the low concentration of TRIA 25ppm), (8.0 pest/leaf) in the second treatment (the medium concentration of TRIA 45ppm) and (14.3 pest/leaf) in the third treatment (the high concentration of TRIA 65ppm).

Statically analysis showed that there were highly significant differences between the levels of infestation by both the two pests in different concentrations of TRIA compared to control. Whereas F (0.5) value and LSD value for the infestation by *A. durantae* were (325.65, 1.82), respectively. And for the infestation by *T. urticae* were (241.85, 1.43), respectively.

These results agree with those obtained by Heba, M. H. (2013) in Egypt who reported that the plants (*Zea mays*) which treatment with a low concentration of Triacotanol hormone

(35 ppm.) was low infestation by *Euprepocnemis plorans* comparing to control. And the plants which treated with a high concentration of the same hormone (50 ppm.) were high infestation by the same insect comparing to control. Also, Gupta, G. *et al.* (2009) reported the role of TRIA (Triacantanol hormone) in pest control and reported that plants which treated with low concentrations of (TRIA) were less infestation by insects than control plants (which did not treat with any hormone). And also Singh, H. and Bhattacharya, A. (2001) who recorded an efficient role of TRIA in reduction of survivorship and developmental parameters of larvae of *Spilarctia oblique* Walker upon feeding on diets containing TRIA, and they referred to insecticidal activity of TRIA, and they also suggested the incorporation of TRIA in the Integrated Pest Management (IPM) programs for pest control.

**Table (2):** Population fluctuations of *A. durantae* and *T. urticae* on *duranta* plants which treated by different concentrations of TRIA at Alexandria Governorate during 2018 season

Date	<i>A. durantae</i> (aphid/leaf)				<i>T. urticae</i> (pest/leaf)			
	25ppm	45ppm	65ppm	Control	25ppm	45ppm	65ppm	Control
1/2/2018	4.5	10.4	17.5	12.5	3.2	7.4	12.1	8.3
15/2/2018	5.8	12.3	19.3	13.5	4.5	8.3	13.8	9.5
1/3/2018	7.3	14.7	21.8	15.3	5.8	9.8	15.4	11.2
15/3/2018	9.4	16.9	23.3	17.6	7.4	10.5	16.9	13.4
1/4/2018	10.7	18.6	24.4	19.4	8.7	12.3	18.5	14.7
15/4/2018	12.5	19.5	27.6	20.5	10.5	13.5	20.7	15.3
1/5/2018	10.2	17.7	25.5	18.2	9.3	11.4	19.5	13.7
15/5/2018	8.4	15.2	22.4	16.7	7.2	9.7	17.3	11.2
1/6/2018	6.7	14.5	21.5	15.4	5.3	7.5	15.1	9.4
15/6/2018	5.3	12.8	19.5	13.7	3.6	6.8	13.2	8.5
1/7/2018	5.1	9.8	17.8	10.1	2.3	5.3	10.8	6.9
15/7/2018	4.7	9.1	15.4	10.3	1.5	4.2	9.6	5.7
1/8/2018	3.9	7.5	13.6	8.2	1.2	3.5	9.3	4.3
15/8/2018	2.8	4.9	11.3	5.6	0.8	2.4	8.4	3.6
<b>Total</b>	<b>97.3</b>	<b>183.9</b>	<b>280.9</b>	<b>197.0</b>	<b>71.3</b>	<b>112.6</b>	<b>200.6</b>	<b>135.7</b>
<b>Mean</b>	<b>6.9</b>	<b>13.1</b>	<b>20.1</b>	<b>14.1</b>	<b>5.1</b>	<b>8.0</b>	<b>14.3</b>	<b>9.7</b>
<b>F(0.05)</b>	<b>325.65</b>				<b>241.85</b>			
<b>L.S.D</b>	<b>1.82</b>				<b>1.43</b>			

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

These results also agreement with those obtained by Kumaravelu, G. *et al.* (2000) in India who reported that the morphological adjectives (root length, shoot length and plant height) and physiological adjectives (total protein, total sugars, starch and total phenol) were improved when we treated plants with small concentrations of Triacantanol hormone (TRIA) compared to control, and these adjectives decreased compared to control when we treated plants with high concentrations of (TRIA). Shukla, A. *et al.* (2012) in Netherlands studied effect of Triacantanol (TRIA) at low concentrations on growth, plant hormones and total yield in *Artemisia annua* L. and found when treated plants with (TRIA) produced a statistically significant positive effect on artemisinin level as well as on plant height, leaf and herbage yield, but these adjectives decreased when treated plants with high concentrations

of (TRIA). Lastly, these results agreement with those obtained by Eriksen, A. *et al.* (2007) in Oslo (Nerweg) who reported that when treated tomato and maize plants with Triaccontanol hormone (TRIA) caused a significant increase in the dry weight of the tomato plants, leaf area and dry weight measurements of tomato leaves at different stages of development. And Richard, N. and Stanley, K. (2015) in Michigan – United States reported that Triaccontanol hormone (TRIA) increased fresh and dry weight and total reducible nitrogen (total N) of rice (*Oryza sativa* L.) seedlings.

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## ARABIC SUMMERY

دراسة تأثير معاملة شتلات الدورانتا بهرمون تراي أكونتانول (TRIA) على درجة الإصابة بمن الدورانتا *Aphis durantae* والعنكبوت الأحمر *Tetranychus urticae* تحت ظروف الصوب الزجاجية

أشرف صلاح إمام<sup>1</sup> ، صبحى عبد الظاهر محمود إسماعيل<sup>1</sup> وعاطف عبد الرحمن على محمد<sup>2</sup>

1-معهد بحوث وقاية النباتات - مركز البحوث الزراعية- الدقى - الجيزة - مصر

2- قسم افات وقاية النبات - المركز القومى للبحوث - الدقى - الجيزة - مصر.

الهدف من إجراء هذه الدراسة هو معرفة تأثير معاملة نبات الزينة (الدورانتا) بهرمون تراي أكونتانول (TRIA) بتركيزات مختلفة على درجة الإصابة بحشرة من الدورانتا *Aphis durantae* والعنكبوت الأحمر *Tetranychus urticae*. أجريت التجربة فى حديقة الأورمان بمحافظة الجيزة و الحديقة الدولية بمحافظة الإسكندرية خلال عام 2018 تحت ظروف الصوب الزجاجية.

توصلت النتائج المتحصل عليها إلى تباين متوسط تعداد كلا من حشرات من الدورانتا وكذلك العنكبوت الأحمر التى تصيب نباتات الدورانتا وذلك تبعاً لتركيز هرمون تراي أكونتانول (TRIA) الذى تم معاملة النباتات به قبل الزراعة . حيث كانت نباتات الدورانتا التى عوملت بتركيز منخفض من هرمون تراي أكونتانول (25 جزء فى المليون) كانت أقل فى مستوى الإصابة بكلا من *A. durantae* و *T. urticae* مقارنة بالكنترول . أما النباتات التى عوملت بتركيز متوسط من الهرمون (45 جزء فى المليون) فلم تظهر فروق معنوية بين مستوى الإصابة بكلا الأفتين لنباتات الدورانتا المصابة وذلك بالمقارنة بالنباتات الخالية من الإصابة بكلا الأفتين (الكنترول) . وأخيراً فإن النباتات التى عوملت بتركيز مرتفع من الهرمون (65 جزء فى المليون) فكانت أعلى فى مستوى الإصابة بكلا الأفتين وذلك بالمقارنة بالنباتات الخالية من الإصابة بكلا الأفتين (الكنترول) . تشابهت تلك النتائج فى كلا من موقعى الدراسة وإن كانت متوسطات الإصابة بكلا الأفتين بصفة عامة فى حديقة الأورمان بمحافظة الجيزة أعلى منها نسبياً عن الحديقة الدولية بمحافظة الإسكندرية.

ونستخلص من هذه الدراسة أنه يمكن التوصية باستخدام هرمون تراي أكونتانول (TRIA) ليس فقط كمحفز لنمو النباتات وتحسين صفاتها المورفولوجية و الفسيولوجية وإنما يمكن كذلك إدراجه فى برامج المكافحة المتكاملة للحشرات (I.P.M) وذلك بالجرعات الموصى بها فى هذه الدراسة .