



## CHEMICAL CONTROL OF DATE PALM TREE BORERS, *ORYCTES* SPECIES (COLEOPTERA: SCRABAIDAE: DYNASTINAE)

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### ABSTRACT

The efficacies of the systemic insecticide Confidor 200SL (Imidacloprid) and Actara 240SC (Thiamethoxam) has been studied chemical control to date palm tree borers, *Oryctes* spp. (Coleoptera: Scarabidae: Dynastinae) in field trials using three methods: direct spray, trunk injection and drench at offseason. Field results demonstrated that the direct spray of 5 liter solution (1 ml confidor per liter water) per tree or (1ml Actara per liter water) per tree treated crown tree only unaffected on Arabian Rhinoceros Beetle, *Oryctes agamemnon arabicus* (ARB) larvae. While, field experiments results showed that injection of 40ml per palm tree with a concentration of standard solution (10 ml confidor per liter water) inflected about 85.8% mortality in ARB larvae compared with 100% in 10 ml per palm tree with a concentration of standard solution (5 ml Actara per 5 ml water). Meanwhile, drench of 25 liter per tree having a concentration of 25 ml of Confidor or 5 ml Actara imposed 80% and 75% mortality in larvae respectively. Results of this investigation illustrate the possibility of using Confidor 200 SL (Imidacloprid) or Actara 240 SC (Thiamethoxam) as a chemical control palm borers in IPM programs after yield collection.

**Keywords:** Chemical control, Confidor, Actara, Date palms, Borers, *Oryctes*

### INTRODUCTION

Palm borers, especially *Oryctes* spp. are considered as an economically important insect pest of date palm trees in Iraq and most adapted to climatic conditions of the region (Khalaf *et al.*, 2011). Arabian Rhinoceros Beetle, *Oryctes agamemnon arabicus* caused severe damages to the bases of fronds and bunches making long tunnels inside tissue, which acting as weakening and breaking factors for these parts (Khalaf and Al-Taweel, 2015). Systemic insecticides have been used through soil application and drip irrigation to enhance chemical control measure of many insect pests (Felsot *et al.*, 2002; Timmeren *et al.*, 2012). AlJboory *et al.* (2001) reported the application of Actara 25 WG was evaluated against to control the Dubas bug *Ommatissus lybicus* in date palm trees by using different application techniques: Spray, drench and injection. Amirzade *et al.* (2014) reported the evaluation of three neonicotinod insecticide: Acetamiprid, Thiamethoxam and Imidacloprid against the Common Pistachio Psylla, *Agonoscyta pistaciae* and resulted that thiamethoxam is the best insecticide for control of this pest. Ullah *et al.* (2005) studied the efficacy of Actara 25WG (Thiamethoxam) against

leaf miner, *Phyllocnistis citrella*, Actara reduced percent infestation to zero, 2.30 compared with 7.23, 12.27 in control treatment after 24 h and 1<sup>st</sup>. week respectively. The present study was carried out to evaluate the efficacy of systemic insecticides Confidor 200SL (Imidacloprid) and Actara 240SC (Thiamethoxam) against to date palm tree borers, Arabian rhinoceros beetle, *Oryctes agamemnon Arabicus* (Coleoptera: Scarabidae: Dynastinae) on date palm trees.

### MATERIALS AND METHODS

The present study was conducted in date palm orchard Global positioning system, GPS: latitude 33.12740, longitude 44.82124 located in Almadain district (30km south of Baghdad), planted with mature date palm trees of 25 -30 years old with 6-7 m length and 50 – 55 cm diameter, during 2015 season.

Two systemic insecticides Confidor 200SL (Imidacloprid) and Actara 240SC (Thiamethoxam) were evaluated for their efficacy for the control ARB, *O. agamemnon arabicus* on date palm trees by three application methods: direct spray, trunk injection and drench (Table 1). Five liter solutions of Confidor

0.5 -1ml/liter water or Actara 0.5-1 ml/liter water were sprayed on crown tree (Fig.1). 40 ml solution from 10 or 20 ml/liter water of confidor, 10 ml (5 ml Actara+5 ml water) or 15 ml (10 ml Actara+ 5 ml water) were Injected through tree trunk using syringes 50 ml in size after drilling holes with a brad point drill- bit (diameter, 20 mm and length, 200 mm) 1m above the ground level (Fig. 1). 25 liter solution of confidor 1ml or 2 ml confidor/1 liter water, 25 liter solution of Actara 5 ml/25 liter water or 10 ml/25 liter water were used through drench method by circular channel (diameter, 2 m and depth 25 cm around the tree trunk). Three replicates (trees) were used for each treatment. Larvae of ARB in trees crown were collected after ten days of treated insecticides (Fig.1), dead and life larvae were counted in each treatment. The experimental design was complete randomized block design, and the results were analyzed according to the least significant

differences (LSD) using GenStat 3 program, insecticide activity according to Schneider and Orel.

## RESULTS AND DISCUSSIONS

Population density of ARB larvae: Numbers of ARB larvae in the control and treated trees were 1.7–7.0 per tree in crown tree only (Table 2). The efficacy of two systemic insecticide Confidor 200 SL (Imidacloprid) and Actara 240 SC (Thiamethoxam) was tested against Arabian rhinoceros beetle (ARB), *Oryctes agamemnon arabicus* larvae. The results of the field experiments are presented in (Table 2).

Direct spray: The results of Confidor and Actara were non-effected on ARB larvae used direct spray, present dead larvae were zero in control and all treatment after 10 days treated. It acts by no contact the insecticide larvae to protect themselves

$$\text{Insecticide activity\% (Schneider \& Orel)} = \left( \frac{\text{mortality in treatment\%} - \text{mortality in control\%}}{100 + \text{mortality in control\%}} \right) 100$$



Fig. 1

Control methods of date palm trees: trunk injection (a), direct spray (b) and collecting dead and live larvae of ARB, *Oryctes agamemnon arabicus* in date palm orchards (c).

plant tissues of date palm tree between frond bases and fibers. Trunk injection: Results (Table 2) indicates that the field trials of Confidor and Actara revealed that trunk injection of 40 ml solution from 10 or 20 ml/liter water of Confidor, 10 ml (5 ml Actara+5 ml water) or 15 ml (10 ml Actara+ 5ml water) of each insecticide inflict a high mortality percentage among larvae of ARB reaching 85.8 - 100% and 100 – 100% after 10 days in low - high concentration of Confidor and Actara respectively.

Drench: Results (Table 2) indicated that the field trials of Confidor and Actara revealed that drench 25 liter solution of confidor 1 ml or 2 ml confidor/1 liter water, 25 liter solution of Actara 5 ml/25 liter water or 10ml/25 liter water of each insecticide inflict a good mortality percentage among larvae of ARB reaching 75 - 80% and 80 – 85.8% after 10 days in low - high concentration of Confidor and Actara respectively.

The present results revealed that there was non- efficacy of either of the two insecticide used direct spray method in ARB larvae. Meanwhile, Confidor and Actara reflected by the reducing survival percentage of ARB, *O. agamemnon*

*arabicus* larvae used trunk injection and drench in field trials, but trunk injection method more efficient than drench application. In addition, results indicated that Confidor and Actara could translocate through date palm tissue after injection and drench. El-Sayed (2013) found that using imidacloprid is a systemic insecticide gave a good reduction in population density of *Bemisia tabaci* and *Myzus persicae*. Abdallah and Al-Khatri (1999), Azam *et al.* (2001) reported that the trunk injection as control method of the red palm weevil, *Rhynchophorus ferrugineus*. Abbas *et al.* (2014) have been successfully controlled Date palm white scale, *Parlatoria blanchardii* used thiamethoxam 25WG and other insecticides by direct spray and basin application injecting. In conclusion, the results of this investigation depicted the possibility of using Confidor and Actara as effective against ARB *O. agamemnon arabicus* larvae and probably to other palm borers species in date palm orchards either by trunk injection and drench through IPM program, If well applied with timing to present mature larvae in off season.

**Table 1.**

Types of insecticides using in chemical control of palm borers, *Oryctes* Spp.

Pesticide name	Active ingredient	Company name	Application method	Concentration	Quantity per tree
Control	Water only	-----	----	---	----
Confidor	200 SL, Imidacloprid	Bayer, Germany	Direct spray	0.5 ml/ liter water	5 liter
Confidor	200 SL, Imidacloprid	Bayer, Germany	Direct spray	1 ml/ liter water	5 liter
Confidor	200 SL, Imidacloprid	Bayer, Germany	Trunk injection	10 ml/ liter water	40 ml
Confidor	200 SL, Imidacloprid	Bayer, Germany	Trunk injection	20 ml/ liter water	40 ml
Confidor	200 SL, Imidacloprid	Bayer, Germany	Drench	25 ml/ 25 liter water	25 liter
Confidor	200 SL, Imidacloprid	Bayer, Germany	Drench	50 ml/ 25 liter water	25 liter
Actara	240 SC, Thiamethoxam	Syngenta, France	Direct spray	0.5 ml/ liter water	5 liter
Actara	240 SC, Thiamethoxam	Syngenta, France	Direct spray	1 ml/ liter water	5 liter
Actara	240 SC, Thiamethoxam	Syngenta, France	Trunk injection	5 ml/ 5 ml water	10 ml
Actara	240 SC, Thiamethoxam	Syngenta, France	Trunk injection	10 ml/ 5 ml water	15 ml
Actara	240 SC, Thiamethoxam	Syngenta, France	Drench	5 ml/ 25 liter water	25 liter
Actara	240 SC, Thiamethoxam	Syngenta, France	Drench	10 ml/ 25 liter water	25 liter

**Table 2.**

Effect of chemical control on palm borers, Arabain Rhinoceros Beetle, *Oryctes agamemnon arabicus* in date palm orchards.

Pesticide	Method of application	Concentration	Quantity per tree	Number of larvae per 3 trees after 10 days			% mortality	% Activity (Schneider & Orel)
				Total	life	dead		
Control	-----	---	----	20	20	0	0	0
Confidor	Direct spray	0.5 ml/ liter water	5 liter	14	14	0	0	0
Confidor	Direct spray	1 ml/ liter water	5 liter	11	11	0	0	0
Confidor	Injection	10 ml/ liter water	40 ml	21	3	18	85.8	85.8
Confidor	Injection	20 ml/ liter water	40 ml	20	0	20	100	100
Confidor	Drench	25 ml/ 25 liter water	25 liter	12	3	9	75.0	75.0
Confidor	Drench	50 ml/ 25 liter water	25 liter	10	2	8	80.0	80.0
Actara	Direct spray	0.5 ml/ liter water	5 liter	16	16	0	0	0
Actara	Direct spray	1 ml/ liter water	5 liter	9	9	0	0	0
Actara	Injection	5 ml/ 5 ml water	10 ml	15	0	15	100	100
Actara	Injection	10 ml/ 5 ml water	15 ml	14	0	14	100	100
Actara	Drench	5 ml/ 25 liter water	25 liter	5	1	4	80	80
Actara	Drench	10 ml/ 25 liter water	25 liter	21	3	18	85.8	85.8

LSD at % 12.433

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