

THE RESIDUAL TOXICITY OF ACTARA AND DECIRIN INSECTICIDES TO ADULTS OF STINK BUG *Apodiphus amygdali* (Germar) (HEMIPTERA: PENTATOMIDAE)

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ABSTRACT

The present work was undertaken to study the residual toxicity of the two insecticides Actara and Decirin against adult stink bug *A. amygdali*. The results showed that the type of insecticide, rate of application used and period after spraying of treated trees, all factors influenced the mortality of the adult *A. amygdali*. Actara gave 37.03% and 80.00% mortality at 0.1 and 2.5 mg/gal. application rates, respectively for 1 day. Decirin gave 33.33% mortality for 1 day at rate of 0.1 ml /gal. water, and rise to 83.33% when application rate rise to 2.5 ml/gal.

INTRODUCTION

The fruit trees stink bug *A. amygdali* is one of the pentatomid plant feeding stink bugs, which attacks many of the fruit trees especially plum, apricot, apple, olive, and pear. Furthermore non-fruit trees viz. poplar, pine, planetree, willow bark may also be infested (Muhammed, 1994). Both nymphs and adults feed by sucking plant sap. They are believed to inject toxic substance into the plant when feeding to break down plant tissues (PennState, 2006). It's also noted that sucking juice from the stems, leaves and immature fruits giving rise to host weakness then encouraging to attacks by other insects. Severe infestation leads to fruit degradation (Schuh and Slater, 1995).

The stink bug population in past was controlled with chemicals including, lindane, DDT, dieldrin and parathion (Borden *et al.*, 1952). After that, Thiodan (endosulfan), Cygon 267 (dimethoate), and Carzol SP (formetanate hydrochloride) were reported as possible stink bug controls (Anonymous, 1978).

Khattak *et al.* (2004), evaluate the efficacy of Mospilan 20SP, Actara 25WG, polo 500EC, Tamaron 60SI and confidor 200SL against sucking plant juice insects, whitefly, jassids, and thrips on mungbean. All the tested insecticides reduced the mean percent population of whiteflies even at 240 hours after spray. Hopkins (2005) founded that mortality of *Euschistus servus* (Say) was greater than that of *N. viridula* (L.) when exposed to thiamethoxam alone. Deltamethrin is a synthetic insecticide based structurally on natural pyrethrins, which kills insect on contact and through digestion and rapidly paralyzes the insect nervous system giving a quick knockdown effect (Nica *et al.*, 2004).

Reviewing the literature, the informations available about *A. amygdali* in Iraq and other parts of the world considered as records of this insect on the hosts. The goal of the study is to evaluate the residual toxicity of Actara and Decirin against adult of *A. amygdali* in the field

MATERIALS AND METHODS

1- Insecticides used: Residual toxicity of the two kinds of insecticides were used against adult of *A. amygdali*, these insecticides are:

- 1- Actara 25 WG, (From Syngenta company), the active ingredient is thiamethoxam (second-generation neonicotinoids) class of compounds that have both contact and systemic activity against a variety of pests such as aphids, whiteflies, thrips, stink bugs on vegetables, pome fruits, pears and on companion animals (NAR, 2001). It interferes with the nicotinic acetylcholine receptors in the nervous system of the insect (Maienfisch *et al.*, 2001). Actara having broad activity against pests and claimed to have minimal impact on beneficial (predator) insects (Antunes-Kenyon and Kennedy, 2001) used at rates of 1.0, 1.5 and 2 gm/gallon water.
- 2- Decirin 25 EC (From Chemvet company) belongs to pyrethroid group; the active ingredient is Deltamethrin 25 gm w/v with contact and stomach action. It is broad spectrum insecticide against detrimental insects belonging to several orders, used at rates of 1.0, 1.5 and 2 ml/gallon water.

The insecticides used in the experiment were obtained from the local market.

2- Treatment: The application of each insecticidal treatment was applied in the field at August 2008 by using a low volume type sprayer. For this purpose many pear trees were selected from the orchard of Erbil city center. After 1 hour spraying, 10 individuals of *A. amygdali* were placed on the treated branches within cage of (1m x 1m) made from muslin tied to the branch of the treated trees. Adults of *A. amygdali* used for tested were collected from many fruit and non-fruit trees found in the same situation.

Five replicates were used for each treatment and the mortality counts were recorded after 1, 2, 3, 4 and 5 days after insect exposure to the treated trees. Control mortalities were corrected for by Abbott's formula (Abbott, 1925). Calculated of dosage mortality curves and the estimation of LC_{90} value based on the corrected data were carried out using the standard probit method (Finney, 1971).

RESULTS AND DISCUSSION

Data concerning the residual toxicity of Actara and Decirin sprayed on the pear trees in the field in August 2008 to the adult *A. amygdali* are shown in table (1) and graphically illustrated in figure (1).

The results showed that the type of insecticide, rate of application used and period after spraying of treated trees all these factors influenced the mortality of the adult *A. amygdali*. The mortality increased with the increasing rates of insecticide used. Actara insecticide gave 37.03 and 80.01% mortality at 0.1 and 2.5 mg/gal. application rates respectively, for 1 day of adult exposure to the treated trees. Decirin gave 33.33% mortality for 1 day of adult exposure to the trees sprayed with the insecticide at rate of 0.1 ml/gal. water, whereas the mortality rised to 83.33% when rising the application rate to 2.5 ml/gal.

On the other hand, the increase in exposure period of adults to the treated trees increased the mortality percentage. The exposure of adults to pear trees treated with Decirin at rate of 2.5 ml/gal. water for 1 day after spraying gave 83.33% mortality where the mortality rised to reach 100% after 3 days of exposure period. So Actara

insecticide at the same rate of application gave 80.00% mortality to adult for 1 day after exposure to its deposits on sprayed trees while gave 100% mortality after 4 days.

Based on the Lc_{90} values, results revealed that Decirin insecticide proved to be more effective than Actara. Decirin gave an Lc_{90} values of 3.0 and 2.0 ml/gal after 1 and 2 days exposure period after spraying respectively, while Actara gave Lc_{90} values of 3.45 and 3.2 gm/gal at the same periods respectively.

Results obtained based on Lc_{90} values indicated that the effect of Decirin insecticidal deposits was 1.15 and 1.6 times more than Actara at 1 and 2 days adult exposure to the insecticidal deposits.

Table (1): Residual toxicity of Actara and Decirin insecticides to the adults of *A. amygdali*

Insecticides	Rate of application	% mortality at different interval after spray (in days)				
		1	2	3	4	5
Actara	0.1	37.03	62.96	70.83	71.42	85.71
	1.5	51.35	74.07	83.33	90.48	95.24
	2	73.34	80.00	86.68	100.00	100.00
	2.5	80.01	85.71	91.66	100.00	100.00
Decirin	0.1	33.33	63.33	87.50	100.00	100.00
	1.5	53.33	73.33	100.00	100.00	100.00
	2	70.00	90.00	100.00	100.00	100.00
	2.5	83.33	95.24	100.00	100.00	100.00
Actara	Lc_{90}	3.45	3.2			
Decirin	Lc_{90}	3.0	2.0			

التأثير السمي لكل من مبيدي Actara و Decirin على كاملات البق النتن *Apodiphus amygdali* (Germar) (Hemiptera: Pentatomidae)

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الخلاصة

اظهرت دراسة تأثير سمية متبقيات كل من مبيد الاكتارا Actara ومبيد ديسيرين Decirin على الحشرات الكاملة للبق النتن *A. amygdali* بان لنوع المبيد والتركيز المستخدم منه اضافة الى فترة تعرض الحشرات لمتبقيات المبيد كان لها تأثير معنوي على سمية متبقيات كل من مبيدي الاكتارا والديسيرين

اعطى مبيد اکتارا نسبة موت بلغت ٣٣.٣٣% بعد يوم من تعرض الحشرات لمتبقياته وذلك عند رشه على الاشجار وبتركيز . لغم/غالون ماء وارتفعت النسبة الى ٨٠% عند زيادة التركيز المستخدم الى /غالون، فيما اعطى مبيد الديسيرين نسبة موت بلغت ٣٣.٣٣% وارتفعت النسبة الى ٨٣.٣٣% عند استخدامه بالتركيزين . /غالون ماء على التوالي ولفترة تعريض امدها يوم واحد.

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