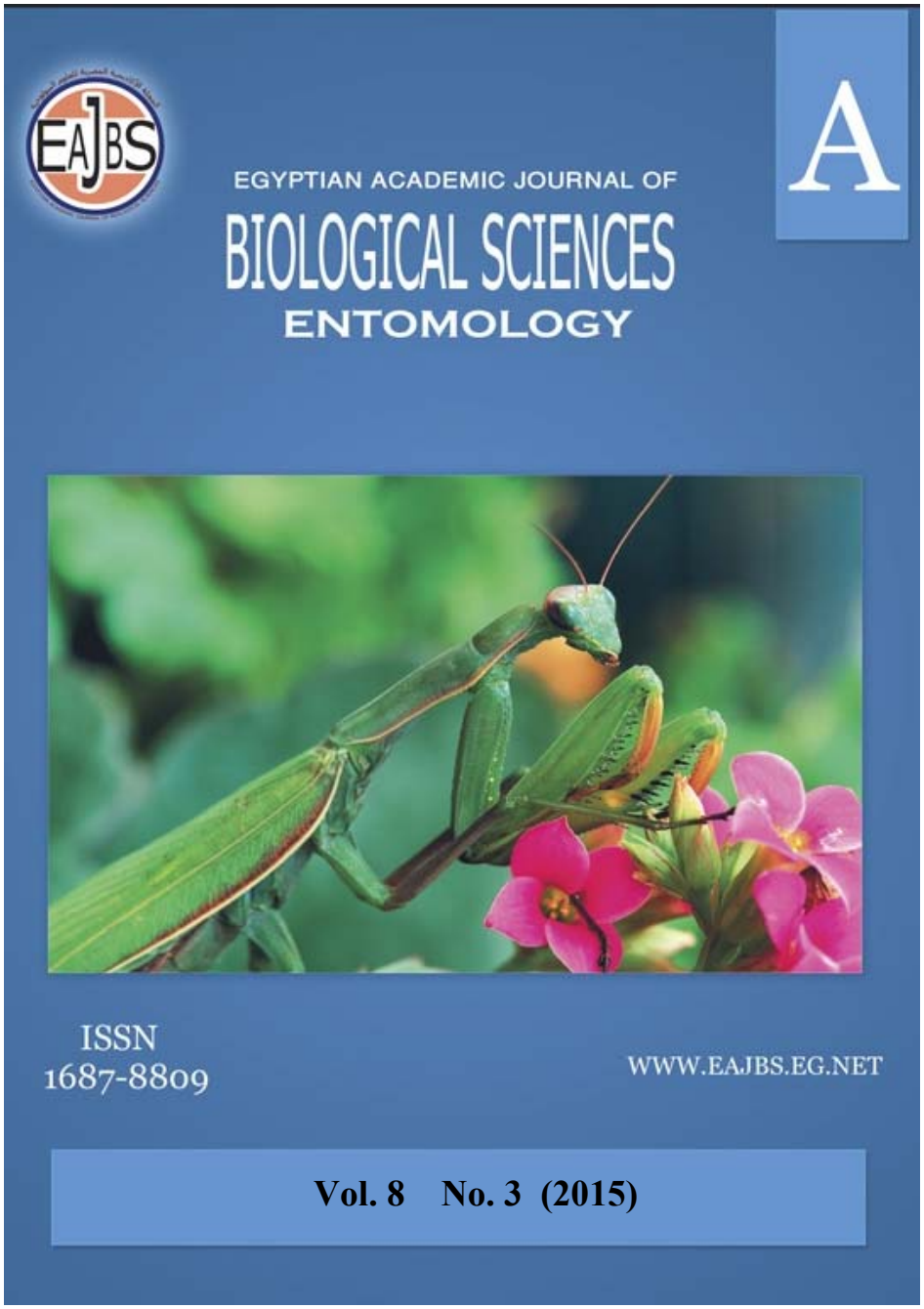

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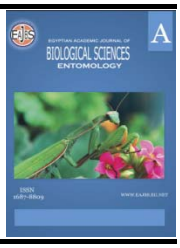

Side Effect of Some Insect Growth Regulators (IGRs) on the Associated Predators of Cotton Leaf Worm, *Spodoptera littoralis* (boisd.) In Cotton Fields

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ABSTRACT

Side effect of six Insect Growth Regulators (IGRs) (lufenuron, teflubenzuron, flufenoxuron, chlorfluazuron, methoxyfenozide and chromafenozide) used against the cotton leafworm, *Spodoptera littoralis* (Boisd.) in cotton field was studied on Coccinellidae spp, *Chrysoperla carnea* and true spiders predators under field conditions during 2013 and 2014 cotton seasons. The obtained results showed that the numbers of all tested predators were decreased after three days of IGRs application and return to increase after seven days in the two seasons. Chlorfluazuron was the most toxic against all tested predators. The percent efficacies of Chlorfluazuron were 37.07, 33.60 and 24.90% for *Chrysoperla carnea*, true spiders and Coccinellidae spp, respectively. While, flufenoxuron (13.89%), teflubenzuron (22.60%) and methoxyfenozide (22.13%) were the lowest toxic against Coccinellidae spp. *C. carnae* and true spiders, respectively. These results recommended that chlorfluazuron was not suitable during the peak of natural enemies.

INTRODUCTION

Insect Growth Regulators (IGRs) are compounds which interfere with the growth, development and metamorphosis of insects. IGRs include synthetic analogues of insect hormones such as ecdysoids and juvenoids and non-hormonal compounds such as precocenes (Anti JH) and chitin synthesis inhibitors. An IGR, therefore, does not necessarily have to be toxic to its target, but may lead instead to various abnormalities that impair insect survival (Siddall, 1976). Most insect growth regulators are selective insecticides that are active against the immature stages of a number of insect species. Most compounds that belong to the IGR class are not stomach or neurotoxic poisons, but have a unique mode of action that disrupts the molting process or cuticle formation in insects or interferes with the hormonal balance of insects (Dhadialla *et al.*, 1998 and Tasei, 2001). They are characteristically slow acting against a narrow range of sensitive stages of the insects' life cycle with detrimental effect against target pests (Casida and Quistad, 1998). Insect growth regulators are generally considered compatible with natural enemy conservation (Liua and Stansly, 2004).

Green lacewing, *Chrysoperla carnea* Stephens is an important natural enemy, belonging to family chrysopidae, orders Neuroptera. The larvae are important predators, especially to control aphids (Michaud, 2001). *C. carnea* has received much attention of farmers and researchers as a biological pest control agent due to its polyphagous and voracious nature, vast geographical distribution (New, 1975.). *C. carnea* reported to give 100 percent lepidopteran pest control in fields, orchards and green houses (Rincon, 1999).Gogi *et al.* (2006) found that bupfenzin (555g $AIha^{-1}$) and lufenuron (49g $AIha^{-1}$) caused reduced the population densities of coccienellids in cotton field after application. Tobozada *et al.* (2015) reported that flufenoxuron and lufenuron were low toxic against *Coccinella undecimpunctata* in cotton field. Alimohamadi *et al.* (2014) found that hexaflumuron had significant effects on the mortality of eggs, but no significant effects on mortality of larvae or pupae the ladybird beetle, *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae)

Spiders are the largest (most diversified) order of terrestrial true predators (Coddington and Levi, 1991). Most species are generalist predators; some are oligophagous (Pekár *et al.* 2012).

This work aims to evaluate the toxicity of some insect growth regulators in different classes (chitin synthesis inhibitors and ecdysone agonist) against Coccinellidae spp., *C. carnae* and true spiders' predators in cotton fields.

MATERIAL AND METHODS

Insect Growth Regulators:

1- Lufenuron (Match 5% EC). The field rate is 160 ml/feddan (feddan = 4200 m^2)
2- Chromafenozide (Virtu 80% WP). The field rate is 25g/feddan
3- Teflubenzuron (Nomoult 15% SC) The field rate is 200 ml/feddan
4- Flufenoxuron (Caseced 10% DC). The field rate is 200 ml/feddan
5- Methoxyfenozide (Runner 24%SC). The field rate is 150 ml/feddan
6- Chlorfluazuron (Atabron 5% DC). The field rate is 400 ml/feddan

Test predators

1- Coccinellidae family includes *Coccinella septempunctata, C. undecimpunctata, Cydonia spp., Hippodamia tredecimpunctata* and *Scymnus spp.* in all stages were counted.
2- Green lacewing, *Chrysoperla carnea* larvae and eggs were counted.
3- True spider, all stages of true spiders were counted.

Experimental design:

The experimental area was about seven feddans was divided to seven block, one block for each compound and control. Each block was divided to four sub blocks (as replicates). The numbers of Coccinellidae predators, *C. carnea* and true spider on 100 cotton plants were counted directly (Twenty five of cotton plants chosen randomly in each replicate) before treatment and examined after 3, 7 and 10 days from treatment. Henderson and Telton (1955) equation was used to calculate the percent efficacy of the predators number.

Statistical analysis

Data were subjected to the analysis of variance test (ANOVA) via Randomized Complete Block Design (F. test) and analysis of variance (one ways classification ANOVA) followed by a least significant difference, LSD at 5% (Cost at Statistical Software 1990).

RESULTS AND DISCUSSION

Effect of the tested IGRs on Coccinellidae

Data in Table (1) show that the efficacy percent of Coccinellidae during 2013 season after three days of Insect Growth Regulators (IGRs)application was 40.30, 39.80, 34.70, 33.50, 32.10, and 24.00% in chlorfluazuron, chromafenozide, lufenuron, methoxyfenozide, teflubenzuron and flufenoxuron, respectively. This result clear that chlorfluazuron is the most toxic insecticide against Coccinellidae spp. after three days of application. After seven days of application the average numbers of Coccinellidae was increase and continued until ten days of application. The mean percentages of efficacy were 27.18, 26.11, 23.18, 19.16, 18.02 and 13.47 % for chlorfluazuron, chromafenozide, lufenuron, teflubenzuron, methoxyfenozide and flufenoxuron, respectively.

Table 1: Reduction percentage of the tested insect growth regulators on some predators in cotton fields during 2013 season

Predators	IGR,s	No. of predators and % efficacy after different time							$Means ± SE	Mean % of efficacy
		Before treatment	3 days	% efficacy	7 days	% efficacy	10 days	% efficacy		
Coccineledae	Lufenuron	32	22	34.70	25	29.30	35	5.50	27.3±6.8[b]	23.18
	Chromafenozide	30	19	39.80	23	30.60	32	7.90	24.7±6.7[b]	26.11
	Teflubenzuron	28	20	32.10	25	19.20	30	7.50	25.0±5.0[b]	19.61
	Flufenoxuron	25	20	24.00	24	13.10	28	3.30	24.0±4.0[b]	13.47
	Methoxyfenozide	30	21	33.50	28	15.60	33	5.00	27.3±6.1[b]	18.02
	Chlorfluazuron	35	22	40.30	28	27.60	35	13.60	28.3±6.5[b]	27.18
	Control	38	40	---	42	---	44	---	42.0±2.0[a]	
F values									2.84*	
LSD									8.24	
Chrysoperla carnae	Lufenuron	18	12	33.30	15	27.50	19	18.80	15.3±3.5[b]	26.55
	Chromafenozide	15	9	40.00	15	30.40	17	12.80	13.7±4.2[b]	27.75
	Teflubenzuron	16	10	37.50	13	29.40	17	18.30	13.3±3.5[b]	28.37
	Flufenoxuron	19	12	36.80	15	31.40	18	27.10	15.0±3.0[b]	31.77
	Methoxyfenozide	14	8	42.90	10	37.90	15	17.60	11.0±3.6[b]	32.78
	Chlorfluazuron	18	9	50.00	13	17.00	17	23.10	13.0±4.0[b]	38.18
	Control	20	20		23		26		23.0±3.0[a]	
F values									3.6*	
LSD									6.2	
True spiders	Lufenuron	18	8	59.60	18	16.70	21	6.70	15.7±6.8[b]	27.65
	Chromafenozide	18	10	49.50	19	12.10	22	2.20	17.0±6.2[b]	21.25
	Teflubenzuron	16	9	48.90	16	16.70	17	15.00	14.0±4.4[b]	26.84
	Flufenoxuron	17	7	62.60	14	31.40	20	5.60	13.7±6.5[b]	33.27
	Methoxyfenozide	15	10	39.40	15	16.70	17	9.30	14.0±3.6[b]	21.80
	Chlorfluazuron	12	6	45.50	10	25.00	14	4.00	10.0±4.0[b]	30.59
	Control	20	22		24		25	6.70	23.7±1.5[a]	
F values									2.1*	
LSD									8.8	

$Means number of predators after 3, 7 and 10 days

Data during 2014 season showed the average numbers of Coccinellidae was reduced with all tested IGRs after three days of application. After seven days the population was increased until ten days of IGRs application. The mean percentage efficacies were 22.62, 19.30, 16.63, 15.75, 14.31 and 13.55 % for chlorfluazuron, methoxyfenozide, lufenuron, chromafenozide, flufenoxuron and teflubenzuron,

respectively. Statistical analysis shows that there is no significant difference between treatments on the mean numbers of predators after three, seven and ten days of application, but there is significant difference between all IGRs and control (Tables 1 and 2).

Table 2: Reduction percentage of the tested insect growth regulators on some predators in cotton fields during 2014 season.

Predators	IGR,s	No. of predators and % efficacy after different time							$^{\$}$Means ± SE	Mean % of efficacy
		Before treatment	3 days	% efficacy	7 days	% efficacy	10 days	% efficacy		
Coccineledae	Lufenuron	21	18	25.00	23	14.81	29	10.08	23.3±5.5^{b}	16.63
	Chromafenozide	22	19	24.43	25	11.62	30	11.21	24.7±5.5^{b}	15.75
	Teflubenzuron	17	14	27.94	20	8.50	25	4.24	19.7±5.5^{b}	13.55
	Flufenoxuron	16	13	28.91	19	7.64	23	6.40	18.3±5.1^{b}	14.31
	Methoxyfenozide	21	18	25.00	20	25.93	30	6.98	22.7±6.4^{b}	19.30
	Chlorfluazuron	22	19	24.43	20	29.29	29	14.16	22.7±5.5^{b}	22.62
	Control	28	32		36		43		37.0±5.6a	
F values									3.58*	
LSD									9.79	
Chrysoperla carnae	Lufenuron	19	14	32.46	18	19.84	21	16.15	17.7±3.5^{b}	22.81
	Chromafenozide	18	15	23.61	18	15.38	19	19.92	17.3±2.1^{b}	19.63
	Teflubenzuron	15	13	20.56	14	21.03	18	8.97	15.0±2.6^{b}	16.84
	Flufenoxuron	17	14	24.51	15	25.34	18	19.68	15.7±2.1^{b}	23.17
	Methoxyfenozide	16	12	31.25	14	25.96	17	19.40	14.3±2.5^{b}	25.53
	Chlorfluazuron	19	12	42.11	14	37.65	18	28.13	14.7±3.1^{b}	35.96
	Control	22	24		26		29		26.3±2.5^{a}	
F values									7.38*	
LSD									6.68	
True spiders	Lufenuron	16	12	28.00	15	25.00	18	20.59	15.0±3.0^{b}	24.52
	Chromafenozide	15	11	29.60	14	25.33	18	15.29	14.3±5.3^{b}	23.40
	Teflubenzuron	16	12	28.00	15	25.00	17	25.00	14.7±2.5^{b}	26.00
	Flufenoxuron	15	10	36.00	13	30.67	15	29.41	12.7±2.5^{b}	32.02
	Methoxyfenozide	13	9	33.54	12	26.15	17	7.69	12.7±4.1^{b}	22.46
	Chlorfluazuron	14	9	38.29	11	37.14	13	34.45	11.0±2.0^{b}	36.62
	Control	24	25		30		34		29.7±4.5^{a}	
F values									15.24*	
LSD									4.37	

$^{\$}$Means number of predators after 3, 7 and 10 days

The obtained data cleared that chlorfluazuron was the most toxic against Coccinellidae predators while flufenoxuron was the lowest toxic (Fig. 1). This result was consistent with Olszak *et al.* (1994). The authors evaluated insect growth regulators (IRGs) (Cyromazyne, Triflumuron, Chlorfluazuron, Teflubenzuron, Diflubenzuron, Flufenoxuron and Fenoxycarb) on different developmental stages of Adalia *bipunctata* and *C. septempunctata.* The authors found that chlorfluazuron was the most dangerous one for almost all larval stages.

Carton *et al.* (2003) evaluated the insecticidal activity of two ecdysone agonists, methoxyfenozide and halofenozide against last-instar larvae of the natural predator *Harmonia axyridis* (Col., Coccinellidae). The authors found that the ecdysteroidal activity of the compounds caused premature induction of larval molting, cessation of feeding and incomplete pupation in affected larvae. Although, compared with previous results with methoxyfenozide and halofenozide in target pests such as the

Colorado potato beetle, *Leptinotarsa decemlineata*, these compounds caused mortality only after application at relatively high concentrations. James (2004) found the effect of buprofezin, a chitin synthesis inhibitor, on development and survival of immature stages of *Harmonia axyridis* (Pallas), very few *H. axyridis* larvae (3.1%) treated with buprofezin reached adulthood, although 65% of treated pupae emerged successfully. On the other hand, Alimohamadi *et al.* (2014) found that hexaflumuron had significant effects on the mortality of eggs, but no significant effects on mortality of larvae or pupae the ladybird beetle, *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae).

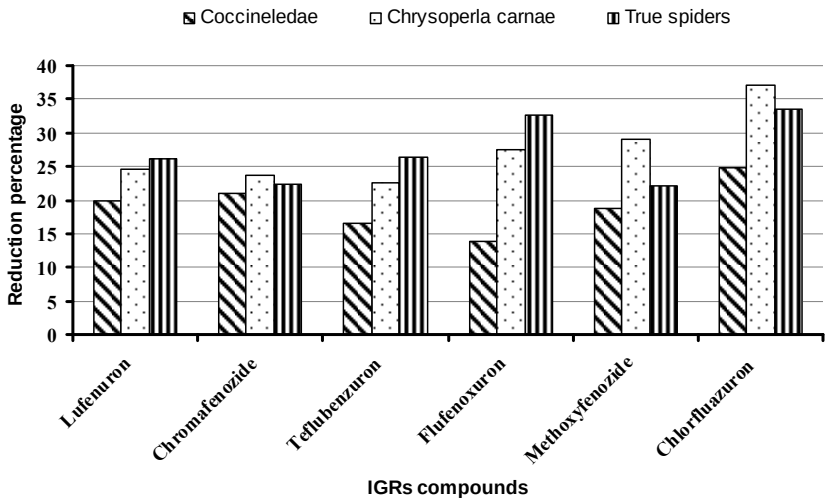

Fig. 1: General means of reduction percentage of the tested IGRs on some predators in cotton fields during 2013 and 2014.

Effect of the tested IGRs on *Chrysoperla carnea*

The average numbers of *C. carnea* was decreased after three days of all tested IGRs treatment during 2013 season. Chlorfluazuron was the most effective on *C. carnea* after three days of treatment followed by methoxyfenozide with percentage efficacy was 50.00 and 42.90%, respectively. After seven days of insecticide treatment the *C. carnea* began to increase till ten days after treatments with all tested IGRs (Table 1). The percent of efficacy were 37.90, 31.40, 30.40, 29.40, 27.50 and 17.00% with methoxyfenozide, flufenoxuron, chromafenozide, teflubenzuron, lufenuron and chlorfluazuron, respectively. The mean percentages of efficacy were 38.18, 32.78, 31.77, 28.37, 27.75 and 26.55% for chlorfluazuron, methoxyfenozide, flufenoxuron, teflubenzuron, chromafenozide and lufenuron, respectively.

During 2014 season the same results approximately was found. The population of *C. carnea* was decreased after three and continued to increase after seven days of IGRs application. (Table 2) chlorfluazuron was the most toxic against *C. carnea (*42.11 and 37.65% after three and seven days, respectively). The mean percentages of efficacies were 35.96, 25.53, 23.17, 22.81, 19.63, and 16.84% for chlorfluazuron, methoxyfenozide, flufenoxuron, lufenuron, chromafenozide and teflubenzuron, respectively. Statistical analysis shows that there is no significant difference among all treatments on the mean numbers of predators after three, seven and ten days of application, but there is significant difference between all IGRs and control (Table, 1 and 2).

Generally, chlorfluazuron was the most toxic to *C. carnea* during the two

seasons (Fig. 1). Rimoldi *et al.* (2008) found that methoxyfenozide did not produce significant mortality in any stages of *Chrysoperla externa*. Dilbar *et al*. (2012) found that lufenuron was intermediately toxic in all post treatment intervals against the larvae of *C. carnea*. Desuky *et al.* (2012) found that methoxyfenozide gave the highest initial effect on *C. carnea*, *Peaderus alfierii* and *Coccinella spp*. that recorded reduction of 39.71, 28.89and 20.95% for respectively. In laboratory experiments, lufenuron exerted no adverse effects on egg survival of the predatory beneficial green lacewing, *Chrysoperla externa* (Bueno and Freitas, 2004). However, the compound caused 100% mortality in neonate larvae that hatched from the Treated eggs. All first and second instar larvae treated with lufenuron died.

Effect of the tested IGRs on true spider

Data in Tables (1&2) showed that population of true spiders was reduced after three days of application during 2013. The percentages of efficacy were 62.6, 59.6, 49.5, 48.9, 45.5 and 39.4% for flufenoxuron, lufenuron, chromafenozide, teflubenzuron, chlorfluazuron and methoxyfenozide, respectively. The results showed that chromafenozide was the most toxic against true spiders followed by chromafenozide. After seven days of application the highest percent efficacy was 31.40% on flufenoxuron while, the lowest one was 12.10% for chromafenozide. After ten days of application the population was increased again. During 2014 the population of true spider was reduced after three and seven days with all tested IGRs. Chlorfluazuron was caused the highest % efficacy after three, seven and ten days of application; the mean percentages of efficacy were 38.29, 37.14 and 34.45%, respectively. Statistical analysis shows that there is no significant difference between mean numbers of predators at all treatments after three, seven and ten days of application, but there is significant difference between all IGRs and control (Table 1 and 2). Generally, the highest harmful on the true spiders was Chlorfluazuron according to the average of two seasons. While, methoxyfenozide was the lowest toxic (Fig. 1).

Desuky *et al.* (2012) found that during 2007 season methoxyfenozide recorded the highest initial and residual effect among all tested IGRs against true spiders, *Orius* spp. and *Scymnus spp*. that manifested (38.63 and 27.27%), (20.63 and 37.50%) and (17.44 and 21.94%), respectively.

Finally, the obtained results cleared that chlorfluazuron was the most toxic against Coccinellidae spp*, Chrysoperla carnea* and true spiders predators. The percent efficacies of Chlorfluazuron were 24.90, 37.07 and 33.60 % for the three predators, respectively. While, the lowest toxic against Coccinellidae spp., *C. carnae* and true spiders were flufenoxuron (13.89%), teflubenzuron (22.60%) and methoxyfenozide (22.13%), respectively (Fig. 1). These results recommended that chlorfluazuron was not suitable during the peak of natural enemies.

REFERENCES

Alimohamadi, N.; M.A. Samih; H. Izadi and S.S. Noghabid (2014): Developmental and biochemical effects of hexaflumuron and spirodiclofen on the ladybird beetle, *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae). J. Crop Prot., 3 (3): 335-344.

Bueno, A.F. and S. Freitas (2004): Effect of the insecticides abamectin and lufenuron on eggs and larvae of *Chrysoperla externa* under laboratory conditions. BioControl, 49(3):277-283.

Carton, B.; G. Smagghe and L. Tirry (2003): Toxicity of two ecdysone agonists,

halofenozide and methoxyfenozide, against the multicoloured Asian lady beetle, *Harmonia axyridis* (Col., Coccinellidae). J. Appl. Entomol., 127 (4): 240–242

Casida, J.E. and G.B. Quistad (1998): Golden age of insecticide research: past, present future. Ann. Rev. Entomol., 43, 1–16.

Coddington, J.A. and H.W. Levi (1991): Systematic and evolution of spiders (Araneae). Annu. Rev. Ecol. Syst., 22, 565–592.

Costat Statistical Software (1990): Microcomputer program analysis Version 4.20. Berkeley, CA:

Desuky, W.M.; E.F. El-khayat; M.M. Azab and M.M. Khedr (2012): The influence of some insect growth regulators and bio-insecticides against cotton leafworm and some associated predators under field conditions. Egypt. J. Agric. Res., 90 (1): 31 – 54

Dhadialla, T.S.; G.R. Carlson and P. Lee (1998): New insecticides with ecdysteroidal and juvenile hormone activity. Ann. Rev. Entomol., 43, 545–569.

Dilbar, H.; A. Amjad; T. Ruba; M.H. Muhammad and S. Muhammad (2012): Comparative toxicity of some new chemistry insecticides on *Chrysoperla carnea* (Stephens) under laboratory conditions. Journal of Agricultural Research, 50 (4): 509.

Gogi, M.D.; R.M. Sarfraz; L.M. Dosdall; M.J. Arif; A.B. Keddie and M. Ashfaq (2006): Effectiveness of two insect growth regulators against *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) and *Helicoverpa armigera* (Hubner) (Lepidoptera :Noctuidae) and their impact on population densities of arthropod predators in cotton in Pakistan. Pest Management Science, 62:982–990.

Henderson, C.F. and E.W. Tilton (1955): Tests with acaricides against the brow wheat mite. J. Econ. Entomol., 48:157-161

James, D.G. (2004): Effect of buprofezin on survival of immature stages of *Harmonia axyridis*, *Stethorus punctum picipes* (Coleoptera: Coccinellidae), *Orius tristicolor* (Hemiptera : Anthocoridae), and *Geocoris* spp . (Hemiptera:Geocoridae). J. Economic Entomology, 97(3):900-904.

Liua, T.X. and P.A. Stanslyb (2004): Lethal and sublethal effects of two insect growth regulators on adult *Delphastus catalinae* (Coleoptera: Coccinellidae), a predator of whiteflies (Homoptera: Aleyrodidae). Biological Control, 30: 298-305

Michaud, J.P. (2001): Evaluation of green lacewings, *Chrysoperla plorabunda* (Fitch) (Neuroptera) augmentative release against *Toxoptera citricida* (Homoptera: Aphididae) in citrus. J. Appl. Entomol., 122: 383-388.

New, T.R. (1975): The biology of Chrysopidae and Hemerobiidae (Neuroptera) with reference to their use as biological agents: A Review Transaction of the Royal Entomological Society of London, 127: 115-140.

Olszak, R.W.; B. Pawlik and R.Z. Zajac (1994): The influence of some insect growth regulators on mortality and fecundity of the aphidophagous coccinellids *Adalia bipunctata* L. and *Coccinella septempunctata* L. (Col., Coccinellidae). J. Appl. Entomol., 117(1-5): 58–63.

Pekár, S.; J.A. Coddington and T.A. Blackledge (2012): Evolution of stenophagy in spiders (Araneae): evidence based on the comparative analysis of spider diets. Evolution, 66(3): 776–806

Rimoldi F; M.I. Schneider and A.E. Ronco (2008): Susceptibility of *Chrysoperla externa* eggs (Neuroptera: Chrisopidae) to conventional and biorational insecticides. Environmental Entomology, 37(5):1252-1257.

Rincon, V.I. (1999): Trichogramma technical bulletin rincon-vitova insectaries, inc. suppliers of beneficial insects since, 1960. P.O.Box, 95, Oakview, CA. 93002.

Siddall, J.B. (1976): Insect growth regulators and insect control: A critical appraisal. Environ. Health Press, 14: 119-126.

Tabozada, E.O.K.; S.A. El Arnaouty and A.H. Heneidy (2015): Indirect toxicity of treated pry with two chitin synthesis inhibitors, on pre-imaginal stages of *Coccinella undecimpunctata* L. (Coleoptera: Coccinellidae) under laboratory and field conditions. Egyptian journal of Biological Pest Control, 25(1):193-197

Tasei, J.N. (2001): Effects of insect growth regulators on honey bees and non-apis bees, a review. Apidologie, 32: 527–545.

ARABIC SUMMERY

التأثير الجانبى لبعض مركبات مانعات الأنسلاخ علي المفترسات المصاحبة لدودة ورق القطن في حقول القطن

علي أحمد السيد و عادل السيد علي عامر و حيد محمود حسين دسوقي
معهد بحوث وقاية النباتات مركز البحوث الزراعية الدقي الجيزة مصر

تم دراسة التأثير الجانبى لست مركبات تتبع منظمات النمو الحشرية والمستخدمة ضد دودة ورق القطن في حقول القطن علي بعض المفترسات التابعة لعائلة ابو العيد ومفترس اسد المن و العناكب الحقيقية خلال موسمي 2013 و 2014 . اوضحت النتائج ان جميع المركبات المستخدمة ادت الي خفض في تعداد المفترسات ثم بدأت هذة المفترسات في الزيادة بعد سبعة ايام من المعاملة. بالنسبة لمتوسط الموسمين كان مركب كلورفلوزورون هو اكثرها سمية علي اسد المن و العناكب الحقيقية و بعض المفترسات التابعة لعائلة ابو العيد حيث سبب خفض في تعدداد المفترسات 37.07 و 33.60 و 24.90% علي التوالي. بينما كانت مركبات فلوفينكسيرون (13.89 %) و تيفلوبنزيرون (22.60 %) و ميثوكسيفينوزيد (22.13 %) اقلهم سمية للمفترسات التابعة لعائلة ابو العيد ومفترس اسد المن و العناكب الحقيقية علي التوالي.