J. Plant Prot. and Path., Mansoura Univ., Vol.8(5): 209 - 214 , 2017

Field Evaluation of some Insecticides on some Cowpea Pests and Their Side Effect on Associated Predator (*Chrysoperla carnea*, steph.).

Moshera Ahmed[2]; A. A. A. Said[1]; A. A. Saleh[1]; W. G. T. Gatwary[2] and Laila R. A. El-Gohary[1].

[1] Pesticides Dept. Faculty of Agric., Mansoura Univ., Egypt.

[2] Plant protection Res. Institute, ARC, Dokki, Giza, Egypt.

ABSTRACT

This study was carried out to field evaluate the efficacy of nine insecticides namely chlorpyrifos, emamectin benzoate, thiacloprid, acetamiprid, imidacloprid, indoxacarb, lufenuron, *Metahrizum ansoplia,* and Kz oil at the recommended rate against aphid, *Aphis craccivora* Koch; whitefly, *Bemisia tabaci* (Genn.); the green bug, *Nizara viridula* L; the cotton leafworm, *Spodoptera littoralis* (Boisd.) and its predator Green lacewing, *C. carnea* (Stephens) under field conditions during 2013 and 2014 Cowpea seasons. Data showed that emamectin benzoate and chlorpyrifos were the highest effect in initial kill, residual effect and mean reduction on *A. craccivora*, *B. tabaci*, *N. viridula* and *S. littoralis*; while Kz oil and *Metahrizum ansoplia* were the lowest effect, during 2013 and 2014 seasons.Imidacloprid, thiacloprid and acetamiprid recorded moderate effect in initial kill, residual effect and mean reduction on *B. tabaci* and *N. viridula* while they recorded low effect on *S. littoralis*. Indoxacarb caused the moderate effect against *S. littoralis* while it recorded low effect on *B. tabaci*.On the other hand lufenuron showed high effect on *A. craccivora* and *S. littoralis* and recorded moderate effect on the *N. viridula*; while it recorded low effect on *B. tabaci*.The most toxic insecticides to *C. carnea* were chlorpyrifos, lufenuron and emamectin benzoate while Kz oil and *Metahrizum ansoplia* were toxic less to the predator on the studied two seasons.

Keywords: Cowpea pests (piercing sucking pests, cotton leafworm and predator, *Chrysoperla carnea*) – insecticides – initial kill – residual effect – reduction percentage.

INTRODUCTION

Cowpea plant (*Vigna unguiculata* L.) is a very important vegetable crop, as a human food in all countries and infested with different pests. The control of these pests is considered an integral part of any strategy. Insecticides are used in a large scale through the world, especially in the developing countries, as a major mean for pest management. Piercing sucking pests are the most serious and destructive pests to invade Cowpea in Egypt. The Cowpea aphid, *Aphis craccivora* Koch., is the most common important pest in infested bean plants from seedlings until harvest time causing damage to the plants and yield (El-Salam *et al*., 2012 and Jaydeep Halder *et al*., 2013); Whitefly, *Bemisia tabaci* (Genn.) suck the cell sap and prohibit the normal crop growth. Beside direct damage, the sucking pests act as vector for virus borne diseases (Munde *et al.*, 2011 and Rashmi Patel and Khare, 2013). The Cotton leafworm, *Spodoptera littoralis* (Boisd.) counted as one of the major pests in Egypt, which attacking cotton, vegetables, fruits, and trees causing millions of Egyptian pounds losses every year and one of the highly destructive insect pests in Egypt (Ahmed, 2014 and El-Geddawy *et al.,* 2014). Green lacewing, *Chrysoperla carnea*, is an important predator of arthropod pests of agricultural crops. The larvae voraciously feed on many soft-bodied arthropods including eggs and early instars of mites, lepidopterans, coleopterans and homopterans (Golmohammadi and Hejazi, 2014). Also Salwa et *al*. (2009), Yogesh and Das (2010) and Amor *et al.* (2012) studied the side effect of some insecticides on population of *Chrysoperla carnea* in cotton field.

The present study aimed to investigate the effect of the nine insecticide chlorpyrifos, emamectin benzoate, lufenuron, thiacloprid, Imidacloprid, acetamiprid, Indoxacarb, *Metahrizum ansoplia* and Kz oil against aphids, *Aphis craccivora* Koch.; the whitefly, *Bemisia tabaci*; the green stink bug, *Nizara viridula* L.; the cotton leafworm, *Spodoptera littoralis* (Boisd.); and their side effect on associated predator the green lacewing, *Chrysoperla canea* (Steph.).

MATERIALS AND METHODS

Tested insecticides:

Nine commercial insecticides were used in this study. The active ingredient trade name, group and recommended field rate of them are shown in Table (1). Field experiments were carried out at Abn El-Aase, Kafr Sakr region, Sharkia Governorate, Egypt on April during Cowpea growing seasons of 2013 and 2014. The experimental are cultivated with Cowpea plants (*Vigna unqulata*) in April to evaluate the efficiency of nine insecticides namely, chlorpyrifos, emamectin benzoate, thiacloprid, imidacloprid, acetamiprid, indoxacarb, lufenuron, *Metarhizium ansoplia* and KZ oil against Cowpea pests. The studied pests were the Cowpea aphid, *Aphis craccivora* Koch; the whitefly, *Bemisia tabaci* (Genn.); the green bug, *Nizara viridula* L.; the cotton leafworm, *S. littoralis* (Boisd.); and associated predators the green lacewing, *Chrysoperla carnea* (Steph.). Experiment was conducted in Randomized Block design. The area of about 1.5 feddan divided to ten treatments included control area, each treatment replicated three times. The plot had an area of 1/20 feddan. Cowpea plants sprayed with tested compounds at the field recommended rates using solo dosal sprayer motor (20 liter water).

Randomly twenty five Cowpea plants of each replicate were inspected in field, the number of *S. littoralis*, and predator *C. carnea*; all instar larvae and *N. viridula* adult and nymphs were counted and recorded just before spraying with insecticides (chloropyrifos, emamectin benzoate, thiacloprid, imidacloprid, acetamiprid and indoxacarb) and after one day (initial kill), 7 and 10 days (residual effect); while after three days (initial kill), 7 and 10 days (residual effect) with lufenuron, *Metarhizium ansoplia* and Kz oil. Twenty five leaves of each replicate were

randomly selected from 25 plants. The numbers of *B. tabaci* adults were counted visually in the early morning. Other 25 leaves were picked up and put in paper bags then transferred to the laboratory and number of *B. tabaci* nymphs and *A. craccivoa* were counted using abinocular stereomicroscope. The reduction percentages of pests were calculated according to Henderson and Tilton (1955) equation.

Table1. Active ingredient, trade name, group and recommended field rate of treated insecticides.

Active ingredient	Trade name	Group	Field recommended concentrations
1- chlorpyrifos 48% EC	Dursban	Organophosphrous	1000 ml / feddan
2- emamectin benzoate 1.90% EC	Pasha	Bio insecticides Manual	250 ml / feddan
3- thiacloprid48% SC	Blanch		120 ml / feddan
4- imidacloprid 20% SP	Imidazed	Neonicotinoides	125 ml / 100 L water
5- acetamiprid 20% SP	Setoprid,		25 g / 100 L water
6- indoxacarb 15% SC	Avant	Oxadiazine	25ml/100 L water
7- lufenuron 5% EC	Match	IGR	40 ml/100 L water
8- *Metahrizum ansoplia* 10% WP	Bioranza	Fungicide	200 g/100 L water
9- Kz oil 95% EC		Mineral oil	1.5 L /100 L water

Field experiments:

Field experiments were carried out at Abn El-Aase, Kafr Sakr region, Sharkia Governorate, Egypt on April during Cowpea growing seasons of 2013 and 2014. The experimental are cultivated with Cowpea plants *(Vigna unqulata*) in April to evaluate the efficiency of nine insecticides namely, chlorpyrifos, emamectin benzoate, thiacloprid, imidacloprid, acetamiprid, indoxacarb, lufenuron, *Metarhizium ansoplia* and KZ oil against Cowpea pests. The studied pests were the Cowpea aphid, *Aphis craccivora* Koch; the whitefly, *Bemisia tabaci* (Genn.); the green bug, *Nizara viridula* L.; the cotton leafworm, *S. littoralis* (Boisd.); and associated predators the green lacewing, *Chrysoperla carnea* (Steph.). Experiment was conducted in Randomized Block design. The area of about 1.5 feddan divided to ten treatments included control area, each treatment replicated three times. The plot had an area of 1/20 feddan. Cowpea plants sprayed with tested compounds at the field recommended rates using solo dosal sprayer motor (20 liter water).

Randomly twenty five Cowpea plants of each replicate were inspected in field, the number of *S. littoralis*, and predator *C. carnea*; all instar larvae and *N. viridula* adult and nymphs were counted and recorded just before spraying with insecticides (chloropyrifos, emamectin benzoate, thiacloprid, imidacloprid, acetamiprid and indoxacarb) and after one day (initial kill), 7 and 10 days (residual effect); while after three days (initial kill), 7 and 10 days (residual effect) with lufenuron, *Metarhizium ansoplia* and Kz oil. Twenty five leaves of each replicate were randomly selected from 25 plants. The numbers of *B. tabaci* adults were counted visually in the early morning. Other 25 leaves were picked up and put in paper bags then transferred to the laboratory and number of *B. tabaci* nymphs and *A. craccivoa* were counted using abinocular stereomicroscope. The reduction percentages of pests were calculated according to Henderson and Tilton (1955) equation.

4- Statistical analysis:

All obtained results were statistically analyzed according to Little and Hills (1975).

RESULTS AND DISCUSSION

Efficacy of tested insecticides:

1- *Aphis craccivora:*

Data in Table (2) showed that, the effect of tested insecticides against *A. craccivora* on Cowpea during 2013 and 2014 seasons. The highest initial kill after one day was obtained by emamectin benzoate which recorded 95.79% followed by 94.97, 77.78, 76.78, 74.38 and 70.30% for chlorpyrifos, imidacloprid, thiacloprid, acetamiprid and indoxacarb, respectively, in the first season 2013; while in the second season 2014 the highest reduction recorded 94.18% for emamectin benzoate followed by 92.71, 80.35, 79.67, 77.45 and 73.01% with chlorpyrifos, imidacloprid, acetamiprid, thiacloprid and indoxacarb, respectively. The highest initial effect after three days with lufenuron were 90.04 and 90.78% of *Aphis craccivora* followed by 57.04, 47.46 and 30.25, 34.19% for Kz oil and *Metarhizium ansoplia* in both 2013 and 2014 seasons, respectively. The highly significant reduction in residual mean were 88.66% with emamectin benzoate followed by 87.51, 84.25, 74.35, 71.89, 70.62, 64.14, 44.20 and 23.51% for chlorpyrifos, lufenuron, imidacloprid, thiacloprid , acetamiprid, indoxacarb, Kz oil and *Metarhizium ansoplia* , respectively. In the second season the highest reduction of residual mean were 87.37% with emamectin benzoate treatment followed by 86.43, 83.71, 75.04, 74.39, 71.33, 57.11, 39.72 and 23.18% for chlorpyrifos, lufenuron, Iimidacloprid, acetamiprid, thiacloprid, indoxacarb, Kz oil and *Metarhizium ansoplia*, respectively. The annual mean reduction cleared the highly significant effect in 2013 and 2014 seasons were 91.04 and 89.64% with emamectin benzoate and 89.99, 88.52 with chlorpyrifos, while the lowest effect were 48.48, 42.30 and 25.76, 26.85% with KZ oil and *Metarhizium ansoplia*, respectively. Throw the study observation emamectin benzoate, chlorpyrifos and lufenuron gave the highest reduction effect with initial kill, residual effect and annual mean while Kz oil and *Metarhizium ansoplia* recorded the lowest reduction with initial kill, residual effect and annual mean in both seasons. The present data were in agreement with data obtained by Darwish *et al.* (2010) who found that the primiphos-methyl and profenofos showed the highest effectiveness against Aphis cracciora and its predators.

The bacterial compound (Dipel 2x) exhibit less effect against *A. craccivora*, Also Abd-Ella (2014) found that neonicotinoid, acetamiprid and imidacloprid were highly effective against Cowpea aphid under field and laboratory conditions. Fening, *et al.* (2014) demonstrated that emamectin benzoate were effective in controlling A. *craccivora* on Cabbage and French beans.

Table 2. Effect of tested insecticides against *Aphis craccivora* during 2013 and 2014 seasons.

Treatments	2013						2014					
	Initial kill		Residual effect		Residual	Annual	Initial kill		Residual effect		Residual	Annual
	1d.	3d.	7d.	10d.	mean	mean	1d.	3d.	7d.	10d.	mean	mean
Chlorpyifos	94.97		90.01	85.00	87.51[b]	89.99 [a]	92.71		87.91	84.94	86.43[a]	88.52 [a]
Emamectin benzoate	95.79		90.39	86.93	88.66[a]	91.04 [a]	94.18		89.48	85.26	87.37[a]	89.64 [a]
lufenuron		90.04	84.03	84.47	84.25[c]	86.18 [b]		90.78	85.86	81.55	83.71[b]	86.06 [a]
Indoxacarb	70.30		67.83	60.45	64.14 [g]	66.19 [d]	73.01		62.25	51.97	57.11 [e]	62.41 [c]
acetamiprid	74.38		71.23	70.01	70.62[f]	71.87 [c]	79.67		76.85	71.92	74.39[c]	76.15 [b]
Imidacloprid	77.78		75.41	73.28	74.35[d]	75.49 [c]	80.35		77.81	72.26	75.04[c]	76.81 [b]
Thiacloprid	76.78		73.21	70.55	71.89 [e]	73.51 [c]	77.45		73.29	69.37	71.33[d]	73.37[b]
Kz. oil		57.04	47.41	40.98	44.20 [h]	48.48 [e]		47.46	42.84	36.60	39.72[f]	42.30 [d]
Metahrizum ansoplia		30.25	25.44	21.58	23.51[i]	25.76 [f]		34.19	26.85	19.50	23.18[g]	26.85 [e]
p.					**	**					**	**
LSD 0.05					0.83	3.33					1.06	3.59

Values followed by the same letter (s) in a column are not significantly different according to Little and Hills (1975).

2- *Bemisia tabaci*:

The results presented in Table (3) indicated that, the highest reduction in the initial kill after 24 h. after application of the tested insecticides in two seasons obtained by emamectin benzoate which recorded 87.52 and 85.78% reduction respectively. The highest reduction in initial kill of *B. tabaci* after three days of treatment was 37.60, 37.01% for lufenuron and Kz oil treatments, while the lower reduction (23.24%) was recorded with *Metarhizium ansoplia* in the first season (2013). In the second season (2014) the highest reduction were 38.83 and 30.28 % with lufenuron and Kz oil compared with the lower reduction 17.20% were recorded with *Metarhizium ansoplia*.

Table 3. Effect of tested insecticides against *Bemisia tabaci* during 2013 and 2014 seasons.

Treatments	2013						2014					
	Initial kill		Residual effect		Residual mean	Annual mean	Initial kill		Residual effect		Residual mean	Annual mean
	1d.	3d.	7d.	10d.			1d.	3d.	7d.	10d.		
Chlorpyifos	83.59		78.09	71.97	75.03[a]	77.88 [a]	79.21		73.38	69.97	71.68[b]	74.19 [b]
Emamectin benzoate	87.52		81.06	73.34	77.20 [a]	80.64 [a]	85.78		75.62	72.08	73.85[a]	77.83 [a]
Lufenuron		37.60	25.31	22.13	23.72[e]	28.35 [d]		38.83	26.98	22.87	24.93[g]	29.56 [e]
Indoxacarb	44.74		39.33	30.77	35.05[d]	38.28 [c]	47.93		38.87	31.86	35.37[e]	39.55 [d]
Acetamiprid	63.24		52.35	46.06	49.21[c]	53.88 [b]	62.72		52.86	44.47	48.67[d]	53.35 [c]
Imidacloprid	66.51		56.26	50.14	52.87 [b]	57.64 [b]	65.36		55.35	45.92	50.64[c]	55.54 [c]
Thiacloprid	64.33		55.26	47.10	51.18[bc]	55.56 [b]	61.24		50.53	46.04	48.29[d]	52.60 [c]
Kz. oil		37.01	41.68	27.95	34.82[d]	35.55 [c]		30.28	40.80	27.22	34.00 [f]	32.77 [e]
Metahrizum ansoplia		23.24	17.41	6.12	11.77[f]	15.59 [e]		17.20	12.00	9.61	10.81[h]	12.87 [f]
P.					**	**					**	**
LSD 0.05					2.25	4.49					1.17	3.6

Values followed by the same letter (s) in a column are not significantly different according to Little and Hills (1975).

The highest residual mean reduction during two seasons were 77.20 and 73.85% for emamectin benzoate followed by 75.03, 71.68; 52.87, 50.64; 35.05, 35.37; 34.82, 34.00 and 23.72, 24.93% for chlorpyrifos, imidacloprid, indoxacarb, KZ oil and lufenuron except acetamiprid and thiacloprid treatments different from season to another, respectively during both seasons. The lowest residual mean reduction was 11.77 and 10.81% with *Metarhizium ansoplia* treatment in 2013 and 2014.

In the same trend, the statistical analysis for data showed that, the highest significant reduction on the annual mean during two seasons were(80.64 and 77.83%) recorded with emamectin benzoate and (77.88 and 74.19) for chlorpyrifos. The moderate reduction were (57.64 and 55.54) for imidacloprid, (55.56 and 52.60) for thiacloprid and (53.88 and 53.35) for acetamiprid. The lowest reduction were (38.28 and 39.55) for indoxacarb, (35.55 and 32.77) for Kz oil, (28.35 and 29.56) for lufenuron and (15.59 and 12.87%) for *Metarhizium ansoplia* during 2013 and 2014 seasons, respectively. Data revealed that, the emamectin benzoate and chlorpyrifos gave the highest reduction annual mean, while imidacloprid, thiacloprid and acetamiprid gave the moderate effects on whitefly population. But indoxacarb, Kz oil lufenuron and *Metarhizium ansoplia* treatments gave the lowest reduction in both seasons. Zezlina and Blazic (2003) found that the Spinosad and abamectin exhibited the highest efficiency against *B. tabaci.* Reddy *et al*. (2007) evaluated the efficacy of a new insecticide acetamiprid against the whitefly, *B. tabaci* also they showed that two sprays of acetamiprid at 40 g. a. i. / ha gave the highest reduction in whitefly population.

In the same trend Yadav *et al.* (2012) found that the highest reduction in mean whitefly population recorded with acetamiprid and imidacloprid treatments.

3-*Nizara viridula*:

Result in Table (4) showed that, the highest initial kill of *Nizara viridula* with emamectin benzoate and chlorpyrifos were (89.62&87.27) and (79.64&86.37%) during 2013 and 2014 seasons, while the neonectoniod compounds gave the moderate initial kill which were (52.00&49.24), (48.65&48.34) and (46.42&44.80%) in two seasons, respectively. But indoxacarb, Kz oil and *Metarhizium ansoplia* treatments showed the lowest initial kill recorded (27.27&31.00), (18.68&26.33) and (16.38&22.08%) in both season, respectively. Statical analysis showed that in the first season, the highest significant residual mean was 70.38 and 69.46% with emamectin benzoate and chlorpyrifos treatments

followed by 56.63, 40.91, 40.65, 34.02, 21.42, 20.34 and 7.96 for lufenuron, imidacloprid, acetamiprid, thiacloprid, *Metarhizium ansoplia*, indoxacarb and Kz oil, respectively. In the second season, the highest residual mean recorded 68.26% with emamectin benzoate treatment followed by 67.28, 55.47, 40.18, 37.41, 30.74, 20.56, 16.23 and 15.57% for chlorpyrifos, lufenuron, imidacloprid, acetamiprid, thiacloprid , indoxacarb, Kz oil and *Metarhizium ansoplia* , respectively. In 2013 and 2014 data cleared that, the highest annual mean reduction were (78.91 & 74.60%) with emamectin benzoate treatment followed by (72.85&73.64),(61.98&60.90),(44.43&41.35),(42.74&41.72), (38.90&36.60), (22.65&24.04), (11.53&19.60) and (10.36&17.74%) for chlorpyrifos, lufenuron, acetamiprid, imidacloprid, thiacloprid, indoxacarb, Kz oil and *Metarhizium ansoplia*, respectively.

Throw the study observation emamectin benzoate, chlorpyrifos and indoxacarb gave the highest reduction, while neonicotinoids (imidacloprid, acetamprid and thicaloprid) gave the moderate reduction, but Indoxacarb, Kz oil and *Metarhizium ansoplia* treatments gave the lowest reduction in *Nizara viridula* during both seasons. Abd-Allah and Ammar (2008) they found that the highest effect was with primiphos-methyl and achook against Tomato whitfly, *B. tabaci* and green stink bug, *N. viridula.*

4. Effect of tested insecticides against *Nizara viridula* during 2013 and 2014 seasons.

Treatments	2013 Initial kill		2013 Residual effect		2013 Residual mean	2013 Annual mean	2014 Initial kill		2014 Residual effect		2014 Residual mean	2014 Annual mean
	1d.	3d.	7d.	10d.			1d.	3d.	7d.	10d.		
Chlorpyifos	79.64		78.67	60.24	69.46[a]	72.85 [b]	86.37		74.00	60.56	67.28[b]	73.64 [a]
mamectin benzoate	89.62		76.22	64.54	70.38[a]	78.91 [a]	87.27		74.39	62.13	68.26[a]	74.60 [a]
Lufenuron		72.70	60.40	52.85	56.63[b]	61.98 [c]		71.77	61.95	48.98	55.47[c]	60.90 [b]
Indoxacarb	27.27		22.67	18.00	20.34[e]	22.65 [f]	31.00		24.79	16.32	20.56[g]	24.04 [e]
Acetamiprid	52.00		42.80	38.50	40.65[c]	44.43 [d]	49.24		41.77	33.04	37.41[e]	41.35 [c]
Imidacloprid	46.42		44.74	37.07	40.91[c]	42.74 [d]	44.80		41.89	38.47	40.18[d]	41.72 [c]
Thiacloprid	48.65		38.60	29.44	34.02[d]	38.90 [e]	48.34		33.31	28.16	30.74[f]	36.60 [d]
Kz. oil		18.68	10.13	5.79	7.96[f]	11.53 [g]		26.33	18.49	13.97	16.23[h]	19.60 [f]
Metahrizum ansoplia		16.58	10.17	4.33	21.42[e]	10.36 [g]		22.08	19.89	11.25	15.57[h]	17.74 [f]
p.					**	**					**	**
LSD 0.05					1.32	3.60					0.81	3.46

Values followed by the same letter (s) in a column are not significantly different according to Little and Hills (1975).

4-*Spodopteralittoralis*:

Data in Table (5) cleared the highest reduction recorded with chlorpyrifos and emamectin benzoate which were (91.90, 90.17) and (90.51, 87.96%) after one day (initial kill) followed by 89.90 and 86.77% with lufenuron after 3 days (initial kill), while indoxacarb treatment gave the moderate reduction recorded 63.37 and 53.55% (initial kill) after one day. The lowest reduction which were (39.98, 35.77), (37.94, 34.11), (34.20, 33.18), (20.33, 19.12) and (18.01 and 20.34) for thicaloprid , acetamiporid, imidacloprid, *Metarhizium ansoplia* and Kz oil treatments, respectively during 2013 and 2014.

Table 5. Effect of tested insecticides against *Spodoptera littoralis* during 2013 and 2014 seasons.

Treatments	2013 Initial effect		2013 Residual kill		2013 Residual mean	2013 Annual mean	2014 Initial kill		2014 Residual effect		2014 Residual mean	2014 Annual mean
	1d.	3d.	7d.	10d.			1d.	3d.	7d.	10d.		
Chlorpyifos	91.90		84.48	80.17	82.33[a]	85.52 [a]	90.17		86.20	76.26	81.23[a]	84.21 [a]
Emamectin benzoate	90.51		77.78	69.88	73.84 [b]	79.39 [b]	87.96		71.02	62.23	66.62 [b]	73.74 [b]
Lufenuron		89.90	80.87	69.50	75.19[b]	80.08 [b]		86.77	77.51	58.82	68.17[b]	74.23 [b]
Indoxacarb	63.37		47.91	32.58	40.25[c]	49.95 [c]	53.55		40.00	20.91	30.46[c]	38.15 [c]
Acetamiprid	37.94		30.61	25.61	28.11[d]	31.39 [d]	34.11		27.68	16.62	22.13 [d]	26.13 [d]
Imidacloprid	34.20		24.22	19.01	21.62[f]	25.81 [e]	33.18		22.77	19.58	21.18[d]	25.18 [d]
Thiacloprid	39.98		31.99	19.98	25.99[e]	30.65 [d]	35.77		25.74	18.51	22.12[d]	27.00 [d]
Kz. oil		18.01	15.00	13.00	14.00 [g]	15.34 [f]		20.34	15.43	10.77	13.10 [e]	14.52 [e]
Metahrizum ansoplia		20.33	18.98	10.00	14.50 [g]	16.44 [f]		19.12	14.60	8.79	11.70 [e]	14.17 [e]
p.					**	**						
LSD 0.05					1.38	3.22					3.62	7.71

Values followed by the same letter (s) in a column are not significantly different according to Little and Hills (1975).

The highest reduction of residual mean was 82.33% with chlorpyrifos treatment followed by 75.19 and 73.84% for lufenuron and emamectin benzoate in the first season. Indoxacarb, acetamiprid, thiacloprid, Imidacloprid, *Metarhizium ansoplia* and KZ oil gave the lowest reduction which were 40.25, 28.11, 25.99, 21.62, 14.50 and 14.00, respectively. The same trend was observed in the second season except for Kz oil which caused high effect than *Metarhizium ansoplia*.The highest reduction of annual mean were (85.52&84.21), (80.08&74.23%) and (79.39&73.74%) for chlorpyrifos, lufenuron and emamectin benzoate treatments in both 2013 and 2014 seasons, respectively. The lowest reduction was recorded with Kz oil and *Metarhizium ansoplia* (15.34, 14.52) and

(16.44, 14.17%) during both seasons. Chlorpyrifos, emamectin benzoate and lufenuron (IGR) gave the highest significant effect against *S. littoralis*, While Indoxacarb gave the moderate effect. In agreement with Abdu-Allah (2010) who found that emamectin benzoate is one of the best bio-insecticides in controlling (CLW) and *S. littoralis* larvae infestations in cotton fields than the conventional insecticides, also Al-Shannaf and Ammar (2011) found that, Radical compound (emamectin benzoate) gave the highest initial reduction percentage in *S. littoralis* and it was the best tool of integrated control of *S. littoralis.*

5- *Chrysoperla carnea* :

Results presented in Table (6) indicated that all treatments showed different degree of efficacy against *C. carnea* on Cowpea after spraying.

The most effective insecticides of experiment were chlorpyrifos, lufenuron and emamectin benzoate they caused (80.10, 80.39), (79.56, 78.00) and (77.48, 79.61) annual mean reduction, respectively. While the lowest effect were obtained with Kz oil and *Metarhizium ansoplia* causing (10.65, 13.86) and (11.23, 13.90) reduction percentages in first and second seasons, respectively.

The efficacy of tested insecticides could be arranged according to the annual mean of reduction in a descending order as follows: indoxacarb, imidacloprid, thiacloprid and acetamiprid with 25.14,19.59, 17.71 and 15.68% in first season, respectively; while acetamiprid, indoxacarb, imidacloprid and thiacloprid recoded 25.17, 23.69,23.68 and 19.24% in second season, respectively.

Table 6. Effect of tested insecticides against *Chrysoperla carnea* during 2013 and 2014 seasons.

Treatments	2013						2014					
	Initial kill		Residual effect		Residual mean	Annual mean	Initial kill		Residual effect		Residual mean	Annual mean
	1d.	3d.	7d.	10d.			1d.	3d.	7d.	10d.		
Chlorpyifos	87.75		80.20	72.35	76.28[a]	80.10 [a]	85.23		79.77	76.18	77.98[a]	80.39 [a]
Emamectin benzoate	80.88		78.54	73.02	75.78 [a]	77.48 [b]	87.03		77.37	74.42	75.90[b]	79.61 [a]
Lufenuron		84.86	79.53	74.28	76.91 [a]	79.56 [a]		82.50	78.50	73.00	75.75[b]	78.00 [a]
Indoxacarb	36.09		23.48	15.85	19.67[b]	25.14 [c]	31.50		24.48	15.1	19.79[c]	23.69 [bc]
Acetamiprid	23.14		13.73	10.16	11.95[d]	15.68 [f]	35.68		23.91	15.97	19.94[c]	25.17 [b]
Imidacloprid	26.98		15.45	16.35	15.90 [c]	19.59 [d]	32.29		22.04	16.71	19.38[c]	23.68 [bc]
Thiacloprid	28.90		17.18	7.06	12.12[d]	17.71 [e]	30.31		16.25	11.17	13.71[d]	19.24 [c]
Kz. oil		14.15	12.00	5.81	8.91[e]	10.65 [g]		19.16	13.12	9.31	11.22[e]	13.86 [d]
Metahrizum ansoplia		17.73	8.62	7.33	7.98[e]	11.23 [g]		23.61	12.63	5.46	9.05[f]	13.90 [d]
p.					**	**					**	**
LSD 0.05					1.22	1.34					0.88	3.67

Values followed by the same letter (s) in a column are not significantly different according to Little and Hills (1975).

The most toxic insecticides on *C. carnea* were chlorpyrifos, lufenuron and emamectin benzoate, while Kz oil and *Metarhizium ansoplia* were less toxic on the predator. Cerna *et al*. (2012) Found that profenofos and imidacloprid were highly toxic to *C. carnea*. The same trend Dilbar *et al*. (2012) Found that deltamethrin and chlorpyrifos were toxic to all instars of *C. carnea* at all treatment intervals with mortality ranging from 40 to 96% and 32 to 92%, respectively. Spinosad, indoxacarb, chlorantraniliprole and emamectin benzoate were found as intermediately toxic in all post treatment intervals.

REFERENCES

Abd-Allah, A.A.A. and Ammar, A.E. (2008). Comparative Studies between Bio and Chemical Insecticides Sprayed with Three Tools of Application on Certain Vegetable Crops against Some Insects at Two Villages in Sharkia Governorate. Agric. Res. J., Suez Canal Univ., 90-100.

Abd-Ella, A. A. (2014). Toxicity and persistence of selected neonicotinoid insecticides on cowpea aphid, *Aphis craccivora* Koch (Homoptera: Aphididae). Archives of Phytopathology and Plant Protection, 47 (3): 366-376.

Abdu-Allah, G. A. L. M. (2010). Laboratory and field evaluation of emamectin benzoate and spinetoram on cotton leafworm larvae. Resistant Pest Management Newsletter, 20 (1): 12-16.

Ahmed, M. A. I. (2014). Evaluation of novel neonicotinoid pesticides against cotton leafworm, Spodoptera littoralis (Boisd.) (Lepidoptera: Noctuidae) under laboratory conditions. Advances in Environmental Biology., 8 (10):1002-1007.

Al-Shannaf, H. M. H. and Ammar, A. E. (2011). Several tools used to control cotton leafworm, Spodoptera littoralis (Boisd.) and American bollworm, Helicoverpa armigera (Hub.) in peanut fields. Bulletin of Faculty of Agriculture, Cairo University, 62 (4):503-510.

Amor, F.; Medina, P.; Bengochea, P.; Canovas, M.; Vega, P.; Correia, R.; Garcia, F.; Gomez, M.; Budia, F.; Vinuela, E. and Lopez, J. A. (2012). Effect of emamectin benzoate under semi-field and field conditions on key predatory biological control agents used in vegetable greenhouses. Biocontrol Science and Technology, 22 (2):219-232.

Cerna, E.; Ail, C.; Landeros, J.; Sanchez, S.; Badii, M.; Aguirre, L. and Ochoa, Y. (2012). Comparison of toxicity and selectivity of the pest *Bactericera cockerelli* and its predator *Chrysoperla carnea.* Agrociencia (Montecillo), 46: (8): 783-793.

Darwish E. T. E., El –Sheikh A. E. and El- Aassar M.R. (2010). Efficiency of certain pesticides against *aphis craccivora* Koch and its associated predators. Minufiya J.Agric. Res., 35: 2213-2227.

Dilbar H.; Amjad A. Ruba; T. Muhammad M. and Muhammad S. (2012). Comparative toxicity of some new chemistry insecticides on Chrysoperla carnea (Stephens) under laboratory conditions. Journal of Agricultural Research (Lahore) , 50: (4) : 509 -515.

El-Gddawy, A. R. M. H.; Ahmed, M. A. I. and Mohamed, S. H. (2014). Toxicological evaluation of selected biopesticides and one essential oil in comparison with indoxacarb pesticide on cotton leafworm, Spodoptera littoralis (Boisd.) (Lepidoptera: Noctuidae) under laboratory conditions. American-Eurasian Journal of Sustainable Agriculture, 8 (2):58-64.

El-Salam, A. M. E. A.; Salem, S. A. and El-Kholy, M. Y. (2012). Efficiency of Nimbecidine and certain entomopathogenic fungi formulations against bean aphids, Aphis craccivora in broad bean field. Archives of Phytopathology and Plant Protection, 45(19): 2272-2277.

Fening, K. O.; Adama, I. and Tegbe, R. E. (2014). On-farm evaluation of homemade pepper extract in the management of pests of cabbage, Brassica oleraceae L., and French beans, Phaseolus vulgaris L., in two agro-ecological zones in Ghana. African Entomology, 22(3): 552-560.

Golmohammadi, Gh. and Hejazi, M. (2014). Toxicity and side effects of three insecticides on adult Chrysoperla carnea (Neu.: Chrysopidae) under laboratory conditions. Journal of Entomological. Society of Iran, 33 (4):23-28.

Henderson, C.F. F.W and Tilton (1955). Test with acaricides against the brown wheat mite J. Econ. Ent., 48 : 157-161.

Jaydeep Halder; Rai, A. B. and Kodandaram, M. H. (2013). Compatibility of neem oil and different entomopathogens for the management of major vegetable sucking pests. National Academy Science Letters, 36: (1) 19-25.

Little, T. M. and F. J. Hills (1975). Statistical methods in agricultural research available from U. C. D. Book store, University, of California, Davis, 241 pp.

Munde, A. D.; Latpate, C. B.; Shinde, S. T. and Badgujar, A. G. (2011). Integrated management of aphids and jassids infesting brinjal. J. Entomol. Res., 35 (1):43-49. 14.

Rashmi Patel and Khare, C. P. (2013). Study the effect of management methods on tomato yellow leaf curl disease (TYLCV). Advance Research Journal of Crop Improvement, 4 (1):44-46.

Reddy, N. A.; Gowdar, S. B. and Chandrashekhar, S. Y (2007). Efficacy of acetamiprid against the whitefly, Bemisia tabaci (Genn.), and incidence of okra yellow vein mosaic virus. Pest Management and Economic Zool., 15 (1):89-92.

Salwa, A. S.; Mona, A. A. E. L. and Abou-Taleb, H. K. (2009). Evaluation of some natural insecticides against some insects infesting cucumber and their predatory insect (Syrphus corollae F.) in the field. Alexandria J. Agric. Res., 54 (3): 49-55.

Yadav, U. S.; Srivastava, R. K.; Singh, R. K. and Yadava, A. (2012). Evaluation of insecticides for the control of whitefly (Bemisia tabaci) vector for Yellow Vein Mosaic Virus disease of mesta. Indian Phytopathol., 65 (4): 418-419.

Yogesh Patel and Das, S. B. (2010). Effect of insecticides on population of Coccinella septumpuctata Linn. and Chrysoperla carnea Steph. in cotton field. Ann. Plant Protec. Sci., 18 (2): 362-365.

Zezlina, I. and Blazic, M. (2003). Testing the efficacy of different insecticides to control onion thrips (Thrips tabaci Indeman, Thysanoptera, Thripidae) in onion crops. Communications in Agric. Appl. Bio. Sci., 68 (4a): 287-290.

تقييم فعالية بعض المبيدات على بعض آفات اللوبيا وتأثيرها الجانبى علي المفترس المصاحب لها أسد المن حقليا.

مشيرة أحمد سيد أحمد[٢] ، على على عبدالهادى سعيد[١]،عادل عبدالمنعم صالح[١]، وفاء غتورى طنطاوى غتورى[٢] و ليلى رجب على الجوهرى[١]

[١]قسم المبيدات كلية الزراعة جامعة المنصورة ، مصر.

[٢]معهد بحوث وقاية النباتات ، مركزالبحوث الزراعية، دقى ،جيزة ، مصر.

أجريت هذه الدراسة بهدف تقييم ٩ مبيدات حشرية وهى : كلوربيريفوس ، إيمامكتين بنزايت ، المركبات النيونيكوتينويدية (ثياكلوبراييد ، أسيتمبراييد ، إيميدا كلوبراييد) ، اندوكساكارب ، منظم نمو حشري (ليوفينيورون)، مركب فطري (ميتاريزيم أنثوبليا) و زيت معدنى (كزد أويل) بالمعدل الموصى به حقليا لمكافحة من اللوبيا، الذبابة البيضاء، البقة الخضراء، دودة ورق القطن و كذلك معرفة التأثير الجانبي لهذه المبيدات على المفترس المصاحب لهذه الآفات أسد المن. أظهرت النتائج أن إيمامكتين بنزايت و كلوربيريفوس كان أكثر المبيدات فعالية فى القتل الفورى والأثرالمتبقى ونسبة الخفض العام لكلا من من اللوبيا، الذبابة البيضاء، البقة الخضراء، دودة ورق القطن بينما كان اقلهم فعالية الزيت المعدنى و ميتاريزيم أنثوبليا خلال موسمى الدراسة ٢٠١٣و٢٠١٤. أظهرت النتائج أن مبيدات ثياكلوبراييد ، أسيتمبراييد ، إيميدا كلوبراييد أعطوا نسب خفض متوسطة في القتل الفوري والأثر المتبقى ونسبة الخفض العام لآفات الذبابة البيضاء والبقة الخضراء بينما كانت فعاليتهم منخفضة تجاه دودة ورق القطن.أشارت النتائج أن مركب إندوكساكارب كان متوسط الفعالية تجاه دودة ورق القطن بينما سجل فعالية منخفض على الذبابة البيضاء، من ناحية أخرى أظهر مبيد ليوفينيورون فعالية عالية ضد من اللوبيا و دودة ورق القطن وفعالية متوسطة ضد البقة الخضراء بينما كان تأثيره ضعيف على الذبابة البيضاء. أوضحت النتائج أن أكثر المبيدات المختبرة تأثيرا على مفترس أسد المن كان كلوربيريفوس ، ليوفينيورون و إيمامكتين بنزايت علي التوالي بينما كان أقلهم تأثير على المفترس الزيت المعدنى والمبيد الفطرى خلال موسمى الدراسة