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INTEGRATED CONTROL OF *Etiella zinckenlla* INFECTED COWPEA IN UPPER EGYPT AND ITS EFFECT ON PRODUCTIVITY.

Mohamed, M. Sh.[1] ;M. A. H Abd El-Hady[1] and W. A. El- Hadary[2]
Horticulture Research Institute, Agriculture Research Center, Giza, Egypt[1].
Plant Protection Research Institute, Agriculture Research Center, Giza, Egypt[2].

ABSTRACT

Field studies were conducted at Shandweel Agricultural Research Station (Sohag Governorate) to evaluate the integration program which include varietal tolerancy of three cowpea cultivars (Kaha-1, Cream-7 and Dokki-126) against the infestation with *E. zinckenella*, also, the effect of *Trichogramma evanescans*, the use Neem extract and Lannate insecticides.

The release of egg parasitoid *T. evanescans* at rat of 30.000 wasps/fed. in cawopea fawned significantly with the Neem in the infested pods and infested seeds. The %infested pods clearly decreased after application of these considered treatments with about 69.21, 75.96 and 75.13% when used *Trichogramma* wips, but these results in Neem about 57.50, 54.55 and 64.93%, respectively, however, the results were about 72.62, 74.18 and 73.56%, respectively when used Lannate compared with the control, in the first season. Insignificant differences in %infested pods were observed between the three cultivars. No significant differences were found in percent reduction of %infested pods, infested seeds and number of larvae/pods between cowpea plants treated with *Trichogramma* and those treated with Lannate insecticide. Could be recommended relesease of egg parasitoid *T. evanescens* to control agents against *E. zinckenella*.

Correlation studies showed highly negative significant among percentage infected pods and seeds traits and each of number of pods/plant, weight of pods/plant, weight of seeds/plant, 100-seeds weight and dry seeds yield/fed., but, it was positive insignificant with number of branches/plant, in the both seasons.

INTRODUCTION

Cowpea (*Vigna unguiculata* L. Walp) is one of the most important legume crops in Egypt. Cowpea provides more than half of the plant protein consumed by many poor people in the tropics and subtropics region, it contributes to animal feed and soil nitrogen. However, as in the case of many other food crops, a wide spectrum of insect pests attacks cowpea both in the field and during storage causing severe economic damage (Prevelt, 1961 and Caswell, 1981). Evaluation studies of cowpea cultivars and/or genotypes were carried out by several authors. In Egypt, many cultivars of cowpea were tested and evaluated. Damarany (1994) showed significant differences among the genotypes (36 cultivars and lines) for all studied characters. Cultivar Cream-7 produced the medium values for pod length, number of seeds/pod, weight of seeds/plant and total yield of seed/fed as compared the

other tested cultivars. Metwally *et al.,* (1998) showed that Cream-7 cultivar was the taller and produced the highest number of leaves per plant, seed index and seed yield/fed., while c.v. Kaha-1 was the shortest and produced the lowest values of branch number, number of leaves/plant and number of seeds/pod. Obiadalla *et al.,* (2007) found that c.v. Cream-7 was medium (51.0 day) in flowering and longest (85.0 cm). Creamy-7 and Dokki-331 produced short pods (12 and 14 cm), medium weight of 100-seeds (13.47 and 13.23 g) and high number of seeds/pod (10.1 and 9.75) as compare to the other cultivars. Dokki-331 produce the high total dry seed yield/fad. (699.3 kg), while Cream-7 gave low dry seed yield (448 kg).

It is subjected to many pest throughout the season, but the most important are the pod borer complex, *Etiella zinckenlla* treitschk as well as the storage bruchids which destory a great number of seeds. Even though, the adults of the *C. boeticus* were very abundant in all the adjacent cowpea fields there were found tn few numbers as caterpillars in pods. Meanwhile, in the case of Etiella, at least two larvae were estblished in each cowpea pod in some harvest times and the larvae fed on more than one seed in the pod either green or ripe one. Many researchers evaluated the seed or pod damage by this pest. Abul Nasr and Awadalla (1957) reported that the damage was extended from dropped blossoms by younger larvae or infested small pods rotten seeds and pods .Others found that the seeds in the infested pod were completely consumed (Singh and Dhooria, 1971). One limabean pod borer larva can feed on more than one seed in a pod (Talekar and Lin 1994). Also, Melo and Silveira (1998) quantified the damage. Our study was carried out to evaluate the *T. evanescens* or Neem for controlling this insect compared with a recommended insecticide. Many authors used successfully the local egg-parasitoid, *Trichogramma evaenscens* for controlling many important lepidopterous insect pests in Egypt having no adverse effect on beneficial species (parasites and predators) and having non toxic to man, plants and animals (Abbas, 1998, Tohamy, 2002, Abbas, 2004, Abo-Sheaesha and Agamy 2004 and Mona *et al.,* 2004). Toto-Djuwarso (1998) indicated that, heavy infestations reduce the quality and quantity of yield .There are several methods available to control this insect such as biological control, and insecticides. Releasing the egg parasitoid Trichogrammatoidea bactrae-bactrae [*T. bactrae*] is another control alternative .The insecticides are effective when sprayed just after egg hatching or during the first instar. However, chemical control is a last resort to be used when all other methods of control have failed.

An insecticide containing azadirachtin a tree (*Azadirachta indica*) extract, was tested against *Culex pipiens* mosquito larvae and pupae in east of the Republic of Algeria under laboratory conditions. The results showed that the Azadirachtin is promising as a larvicidal agent against *Culex pipiens*, naturally occurring bio-pesticide could be an alternative for chemical pesticides (Alouani, *et al.,* 2009). The development of insects growth regulators (IGR) has received considerable attention for selective control of insect for medical and veterinary importance and has produced mortality due to their high neurotoxic effects (Wandscheer *et al.,* 2004).

The aim of this study is to evaluate the tolerant of cowpea varieties to infestation by *E. zinckenella*. Also role of egg-parasitoid, *T. evanescens* or Neem extract as a biological control agents against *E. zinckenella* was evaluated and compared with traditional insecticides.

MATERIALS AND METHODS

Two experiments were conducted at the experimental farm of Agricultural Research Station in Shandawil Sohag Governorate, Upper Egypt during the two successive seasons, 2012 and 2013 to evaluate three cultivars of cowpea for yielding potential and against *E. zinckenella*, in addation to clarify the role of the local egg-parasitoid, *T. evanescens* and neem extract for controlling this insect compared with the recommended insecticide (Lannate).

The experiment was laid out in a split plot design with four replication. Main plots contained the three factors studied (Lannate, *Trichogramma* and Neem) beside untreated (control), these factors were spraying Lannate WP 90% insecticide at dose of 300 g/fed, in addation, the control was left free from any application, releasing of *T. evanescens* at rate of 30,000 wasps/fed., and Neem tree (*Azadirachta indica*) extract, Mix 70% Neem oil at the rate of 10 cm^3 per 20 litter of water. Thoroughly mix solution and spray all plant surfaces (including undersides of leaves) until completely wet. Techniques for mass production of *T. evanescens* were as described before by Hadary (2008). The release bag (5x3cm) which contained three small cards with three ages of parasitized eggs gave three waves of wasps at 3-days intervals, were placed between the upper leaves of cowpea plants. The parasitoid was release alone in six times at 30 days after plant emergence, 10-days intervals at rate of 10 cards/fed., each produced 3000 individuals. Meanwhile, two sprays of Lannate insecticide were applied-with a dose of 75 gm/100 Lw at 15-day intervals-starting, 10 days–after the beginning of flowering. The other 4 replicates was left whithout any treatment (control). The treatment area was one feddan which divided into 16 plots, each plot included 10 rows, 7 m. long with 60 cm distance between rows. Plots were separated from the other by 42 m to prevent connection between the parasitoid and chemical treatments. Four replicates (42 m/each) were used for each treatment including the untreated one. The regular agricultural practices were followed untreated any other chemicals throughout the growing seasons.

The three cowpea cultivars (Kaha-1, Cream-7 and Dokki-126), were arranged at random in the sub-plots. Each plot contained seven rows or ridges. Normal agricultural practices were followed as recommended in the region and the plants were left for the natural infestation.

At harvest-time, samples of ten plants were randomly taken from the five central rows/ridges of each sub-plot to record number of branches, pod length (cm), pod filling%, number of pods/plant, weight of pods and seeds/ plant (g), weight of 100-seeds (g) and seed yield (kg/fed.). Number of infested

pods, number of infested seeds and larva per 50 pods were estimated. Also, the reductioin percentages of infestation after each treatment of release was calculated using the formula (Henderson and Teleton, 1955).

Simple correlation studied among percentage infected pods and seeds traits and each of number of branches/plant, pod length, pod filling, number of pods/plant, weight of pods/plant, weight of seeds/plant, 100-seeds weight and dry seeds yield/fed. in the two seasons.

The data for each experiment were then analyzed by MSTATC (1980) software for comparison of the mean values and the two seasons by LSD test at the 5% level. Response equations were calculated according to Snedecor and Cochran (1981).

RESULTS

Cultivars difference effect:

Data in Table 1 show significant differences in all traits in both seasons. Data clear that Dokki-126 cultivar was the longest pod length and produced the highest values of 100-seed weight, while Cream-7 cultivar produced the heaviest values of number of branches/plant, pod filling%, number of pods/plant, weight of pods and seeds and dry seed yield/fed. Kaha-1 cultivar recorded the lowest values of the most traits. Differences among the three cowpea varieties may be attributed to their genetic differences and interaction between the genetic make up and the environmental conditions. Similar conclusion was reported by Damarany 1994, Metwally, *et al.,* 1998 and Obiadalla *et al.,* 2007.

Table 1. Effect of cultivars on growth, yield and yield components of cowpea in the two seasons.

Traits / Cultivars	No. of branches /plant	Pod length (cm)	Pod filling (%)	No. of pods/ plant	Weight of pods/ plant(g)	Weight of seeds/ plant(g)	100-seed weight (g)	Dry seed yield (kg/fad)
2012 season								
Kaha-1	5.43	11.25	49.30	22.50	98.90	68.98	16.66	632.72
Cream-7	6.40	12.47	56.81	24.75	123.00	77.75	13.95	716.97
Dokki-126	6.40	15.09	37.01	20.75	117.11	75.57	24.44	690.83
$LSD_{0.05}$	0.30	0.21	2.45	1.25	2.42	2.01	2.18	24.20
2013 season								
Kaha-1	5.40	11.46	50.54	22.80	101.46	70.17	17.26	638.74
Cream-7	6.30	12.75	56.55	24.73	125.49	79.06	14.29	722.45
Dokki-126	6.25	15.13	37.58	21.05	119.56	72.51	23.73	700.10
$LSD_{0.05}$	0.48	0.27	2.63	1.23	2.79	2.03	2.88	24.37

Integrated control effect:

Data in Table 2 show that integrated control treatments had significant effect on all traits, in both seasons. Chemical control (Lannate), Biological

control (*Trichogamma*) and Neem treatments gave the maximum values compared with control, in the first and second seasons, respectively. The different between *Trichogamma* and Neem treatments was insignificant in the most traits especially dry seed yield (kg/fed) compared with Lannate treatment in the first season, indicate that we can use biological control in controlling the *E. zincknella.* These results take the same trend with those found by Tohamy, 2002, Abbas, 2004, Abo-Sheaesha and Agamy 2004 and Alouani, *et al.,* 2009.

Table 2. Effect of integrated control on growth, yield and yield components of cowpea in the two seasons.

Traits / Treatments	No. of branches /plant	Pod length (cm)	Pod filling (%)	No. of pods/ plant	Weight of pods/ plant	Weight of seeds/ plant(g)	100-seed weight (g)	Dry seed yield (kg/fad)
2012 season								
Untreated	5.97	12.52	45.27	20.33	95.22	50.89	15.03	542.68
Lannate	6.07	13.07	45.98	23.00	123.48	84.98	20.18	746.40
Trichogamma	6.13	13.35	48.49	24.00	117.72	80.82	19.38	733.22
Neem	6.13	12.81	51.09	23.33	115.59	75.70	19.09	698.40
$LSD_{0.05}$	0.29	0.17	1.67	0.76	0.96	1.56	1.42	19.69
2013 season								
Untreated	5.85	12.62	45.80	20.20	97.17	51.47	15.36	550.94
Lannate	5.95	13.33	45.88	23.37	125.91	85.18	20.81	755.47
Trichogamma	6.09	13.57	48.39	24.17	120.31	82.02	18.67	735.93
Neem	6.04	12.92	52.28	23.70	118.62	76.98	18.87	706.04
$LSD_{0.05}$	0.31	0.19	1.94	0.78	1.16	1.76	2.22	27.65

Interaction effect:

Data in Table 3 clear that the interaction between the three cowpea cultivars and the integrated control under study had significant effect on all traits in the two seasons. The highest values of dry seed yield (kg/fed) were obtained by cultivation of Cream-7 variety in the treatment of lannate (773.60 and 789.60 kg/fed) in the first and second seasons under study, while the lowest values were obtained by cultivating Kaha-1 variety in the control (untreated) treatment. These results were true in the yield components. The different between *Trichogamma* treatments had no significant affect with chemical control in the most traits into this cultivar, especially the yield components traits, in the two seasons under study. These results take the same trend with those found by Tohamy, 2002, Abbas, 2004 and Abo-Sheaesha and Agamy 2004.

Table 3. Effect of cultivars and integrated control interaction on growth, yield and yield components of cowpea in the two seasons.

Interactions \ Traits		No. of branches /plant	Pod length (cm)	Pod filling (%)	No. of pods/ plant	Weight of pods/ plant	Weight of seeds/ plant	100-seed weight (g)	Dry seed yield (kg/fad)
2012 season									
Kaha-1	Untreated	5.20	10.57	45.31	20.00	85.00	43.00	14.17	496.05
	Lannate	5.40	11.63	51.10	23.00	106.00	81.67	18.87	700.00
	Trichogamma	5.60	11.43	47.60	24.00	103.00	78.04	17.07	686.44
	Neem	5.50	11.37	53.22	23.00	101.60	73.20	17.40	648.40
Cream-7	Untreated	6.30	12.30	54.69	23.00	104.67	63.00	12.73	592.00
	Lannate	6.50	12.37	51.49	25.00	133.67	88.63	14.37	773.60
	Trichogamma	6.40	13.03	58.64	26.00	129.33	83.08	14.10	767.09
	Neem	6.40	12.17	61.98	25.00	124.33	76.27	14.60	735.20
Dokki-126	Untreated	6.40	14.70	35.83	18.00	96.00	46.67	18.20	540.00
	Lannate	6.30	15.20	34.90	21.00	130.77	84.63	27.30	765.60
	Trichogamma	6.40	15.60	39.25	22.00	120.83	81.34	26.97	746.12
	Neem	6.50	14.87	38.06	22.00	120.83	77.63	25.27	711.60
	$LSD_{0.05}$	0.18	0.35	1.35	1.53	1.93	3.11	2.84	37.39
2013 season									
Kaha-1	Untreated	5.25	10.67	46.14	20.20	86.63	44.00	14.83	508.02
	Lannate	5.35	11.90	51.07	23.40	109.30	83.03	19.70	706.40
	Trichogamma	5.56	12.00	47.56	24.10	106.10	79.40	16.93	687.80
	Neem	5.43	11.27	57.39	23.50	103.80	74.23	17.57	652.72
Cream-7	Untreated	6.20	12.63	54.62	22.60	106.50	63.27	13.33	589.20
	Lannate	6.30	12.70	51.51	25.20	135.83	89.97	14.97	789.60
	Trichogamma	6.40	13.20	58.85	25.80	132.20	84.87	14.67	768.40
	Neem	6.30	12.47	61.20	25.30	127.43	78.13	14.20	742.60
Dokki-126	Untreated	6.10	14.57	36.63	17.80	98.37	47.13	17.93	555.60
	Lannate	6.20	15.40	35.05	21.50	132.60	82.53	27.77	770.40
	Trichogamma	6.30	15.50	40.37	22.60	122.63	81.80	24.40	751.60
	Neem	6.40	15.03	38.26	22.30	124.63	78.57	24.83	722.80
	$LSD_{0.05}$	0.57	0.39	3.88	1.56	2.32	4.41	4.43	55.30

Biological control effect:

On the cowpea pod worm, *E. zincknella* infestation:

A- Percentage of infested pods:

The efficacy of using *T. evanescens* and Neem on cowpea infestation by the cowpea pod worm compared with Lannate insecticide are shown in Table 4. It show that the percentages of infested pod were in general significantly between treatment in egg-parasitoid-released plots of 13.53, 9.55 and 10.00%, respectively in the three cultivars in the first season while, it was 8.02, 7.54 and 8.91%, respectively in the three cultivars in the second season. Neem plots accounted 18.66, 18.06 and 14.10%, respectively, in the three cultivars in the first season, wherase it was 16.51, 20.23 and 16.91%, respectively in the three cultivars in the second season.The plots treated with Lannate gave 12.03, 10.26 and 10.63%, respectively in the three cultivars in the first season, it was 7.22, 8.41 and 9.31, respectively in the three cultivars in the second season, in the all these compared with the untreated plots

(control). It is lower than in the %infestation pods in Shandweel regions. These results showed that the %infested pods clearly decreased after application of these considered treatments with about 69.21, 75.96 and 75.13%, in the first season, about 82.31, 81.98 and 78.51%, in the second season, when used *Trichogramma* wips, but these results in Neem were 57.50, 54.55, 64.93%, respectively in the first season, about 63.58, 51.66 and 59.20%, in the second season, but the results about 72.62, 74.18 and 73.56%, respectively, about 84.07, 79.90 and 77.75 in the second season, when used Lannate compared with the control. Insignificant differences in % infested pods were observed between cowpea three cultivars.

B- Percentage of infested seeds:

The Neem treatment had relatively lesser effects (52.28, 66.77 and 65.91%) reduction than the *Trichogramma* (81.21, 84.06 and 81.00% reduction), Lannate treatment gave the effect (83.53, 82.73 and 80.70% reduction) in three cultivars, respectively, in the first season, while the Neem treatment had relatively lesser effects (62.18, 58.22 and 56.57%) reduction than the *Trichogramma* (80.34, 79.43 and 75.23% reduction), Lannate treatment gave the effects (79.45, 77.40 and 74.69% reduction) in three cultivars, respectively, in the second season. Insignificant differences were found in reduction percentage of infested seeds between cowpea plants treated with *Trichogramma* and those treated with Lannate insecticide.

C- Number of larvae /pods:

Larval content/pod gave the same trend of the infested seeds. The number of larvae/pod were 0.40, 0.24 and 0.25 for egg parasitoid; 0.37, 0.25 and 0.25 for Lannate treatments, in the first season, these results were the same trend in the second season.

Data tabulated in table 4 indicat the same trend, where the lowest infestation by CPW was found on cowpea in the treatment. Although the present results obviously showed that, there were no significant differences between the effectiveness of the tested biological methods against the infestation by CPW, and Lannate treatment and gave the best result as compared with Neem treatments. Similar results were obtained by Wang (1996), Wang *et al.,* (1996), Abdullah *et al.,* (2001) and Ulrichs *et al.,* (2001). Tohamy and Nagger (2003) they showed that treated with egg- parasitoid, *T. evanescens* at rate of 30000/ fed. Had low pod and seed infested and number of *E. zincknella* larvae/pod in Middle and Upper Egypt.

Table 4. Utilization of *T. evanescens* and Neem for controlling *E. zincknella* compared with Lannate insecticide in three cowpea cultivars on investigation during 2012 and 2013 season.

Cultivars	Treatments	% Infested pods	% Reduction	% Infested seeds	% Reduction	No. of Larvae /pod	% Reduction
	2012 season						
Kaha-1	Untreated	43.95	--	32.80	--	3.20	--
	Lannate	12.03	72.62	5.40	83.53	0.37	88.43
	Trichogramma	13.53	69.21	6.16	81.21	0.40	87.50
	Neem	18.66	57.50	15.65	52.28	0.91	71.56
Cream-7	Untreated	39.74	--	35.09	--	2.22	--
	Lannate	10.26	74.18	6.06	82.73	0.25	88.73
	Trichogramma	9.55	75.96	5.59	84.06	0.24	89.18
	Neem	18.06	54.55	11.66	66.77	0.60	72.97
Dokki-126	Untreated	40.21	--	32.24	--	3.01	--
	Lannate	10.63	73.56	6.22	80.70	0.25	91.69
	Trichogramma	10.00	75.13	6.14	81.00	0.25	91.69
	Neem	14.10	64.93	10.99	65.91	1.22	59.46
LSD at 0.05 A		NS		NS		NS	
B		2.38		1.23		0.26	
AB		4.12		2.14		0.45	
	2013 season						
Kaha-1	Untreated	45.34	--	30.52	--	2.63	--
	Lannate	7.22	84.07	6.27	79.45	0.31	88.21
	Trichogramma	8.02	82.31	6.00	80.34	0.31	88.21
	Neem	16.51	63.58	11.54	62.18	1.50	42.96
Cream-7	Untreated	41.85	--	31.95	--	3.04	--
	Lannate	8.41	79.90	7.22	77.40	0.35	88.42
	Trichogramma	7.54	81.98	6.57	79.43	0.41	86.51
	Neem	20.23	51.66	13.25	58.52	1.00	67.10
Dokki-126	Untreated	41.48	--	33.23	--	2.86	--
	Lannate	9.31	77.75	8.41	74.69	0.26	90.90
	Trichogramma	8.91	78.51	8.32	75.23	0.31	89.16
	Neem	16.92	59.20	14.43	56.57	0.88	69.23
LSD at 0.05 A		NS		NS		NS	
B		1.71		1.53		0.31	
AB		2.95		2.65		0.54	

The results presented in Table 5 indicated that correlation studied showed highly significant negative correlation among percentage infected pods and seeds traits and each of number of pods/plant, weight of pods/plant, weight of seeds/plant, 100-seeds weight and dry seeds yield/fed. While, it had not significance with pod length and pod filling. On the other hand, it was insignificant positive correlation with number of branches/plant, in the two seasons under study. These results are in agreement with those reported by Tewari and Gautam (1989), Oseni, *et al.,* (1992) and Kalaiyarasi and Palanisamy (2000).

Table 5. Correlation coefficients studies between %infected pods and seeds and other traits at 2012 and 2013 seasons.

Traits	No. of branches /plant	Pod length (cm)	Pod filling (%)	No. of pods/ plant	Weight of pods/ plant	Weight of seeds/ plant	100-seed weight (g)	Dry seed yield (kg/fad)
2012 season								
%Infested pods	0.287	-0.109	-0.054	-0.673**	-0.748**	-0.860**	-0.647**	-0.864**
%Infested seeds	0.277	-0.023	-0.103	-0.669**	-0.729**	-0.831**	-0.630**	-0.836**
2013 season								
%Infested pods	0.366	-0.095	-0.063	-0.669**	-0.754**	-0.840**	-0.621**	-0.843**
%Infested seeds	0.324	-0.028	-0.109	-0.651**	-0.747**	-0.824**	-0.591**	-0.829**

***, ** = Significant at 0.05 and 0.01% probability levels, respectively.**

In conclusion, our data suggest that, the integrated control tested methods are more suitable and safe than applying chemical methods for controlling the cowpea pods worm *E. zincknella*.

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المكافحة المتكاملة لدودة قرون اللوبيا على نباتات اللوبيا تحت ظروف مصر العليا وتأثير ذلك على الإنتاجية

محسن شحاته محمد[1] و محمود أحمد حلمى عبد الهادى[1] و وائل عبد السميع الحضرى[2]

معهد بحوث البساتين ـ مركز البحوث الزراعية ـ الجيزة . [1]

معهد بحوث وقاية النباتات ـ مركز البحوث الزراعية ـ الجيزة . [2]

أقيمت تجربة حقلية فى محطة البحوث الزراعية بجزيرة شندويل – محافظة سوهاج خلال موسمى صيف 2012 و 2013م لدراسة مكافحة دودة قرون اللوبيا على ثلاثة أصناف من اللوبيا (قها-1 ، كريمى-7 و دقى-126) تحت ظروف مصر العليا ، استخدمت ثلاثة معاملات للمكافحة هى (الرش بمبيد اللانيت ، إطلاق طفيل الترايكوجراما كمكافحة حيوية والرش بمستخلص نبات النيم) بجانب معاملة الكنترول وعلاقة ذلك بالصفات الإنتاجية للمحصول.

النتائج المتحصل عليها :

- أظهرت الدراسة أن هناك فروق معنوية بين أصناف اللوبيا الثلاثة تحت الدراسة فى كلا الموسمين.
- إطلاق طفيل الترايكوجراما والرش بمستخلص نبات النيم أعطى فروق قليلة وغير معنوية بين تلك المعاملات والرش الموصى به من المبيدات الكيماوية (مبيد اللانيت) لصفات محصول بذور اللوبيا ومكوناته.
- التفاعل بين الأصناف ومعاملات المكافحة أعطى أعلى محصول بذور للفدان عندما تم زراعة الصنف كريمى-7 وتم رشه بمبيد اللانت (المعاملة الكيماوية الموصى بها لمقاومة دودة قرون اللوبيا) ولكن دون فرق معنوى بين التفاعل بين معاملات المكافحة الحيوية والمكافحة الكيماوية مع نفس الصنف.
- أظهرت النتائج أن إطلاق طفيل الترايكوجراما بمعدل 30000 طفيل للفدان فى حقول اللوبيا فى العروة الصيفى أدى إلى الخفض فى نسبة الإصابة بدودة قرون اللوبيا لمحصول القرون للفدان بمقدار (69.21 ، 75.96 ، 75.13%) للاصناف الثلاثة على التوالى ، كما أدى إلى الخفض فى نسبة الإصابة لمحصول البذور للفدان بمقدار (81.21 ، 84.06 ، 81.00%) للاصناف الثلاثة على التوالى مع تحقيق إنتاجية للفدان بمقدار 733.22 و735.93 كجم للفدان فى كلا الموسمين بدون فروق معنوية بينها وبين معاملة الرش الكيماوى الموصى به.
- أظهرت دراسة الإرتباط معنوية عالية سالبة بين صفتى النسبة المئوية للخفض فى نسبة الإصابة للقرون والبذور مع صفات عدد قرون النبات ، وزن قرون النبات ، وزن بذور النبات ، وزن 100 بذرة ، محصول بذور البنات للفدان ، بينما كانت موجبة مع صفة عدد فروع النبات .
- وبناء علي تلك النتائج يوصى بإطلاق طفيل الترايكوجراما بمعدل 30000 طفيل للفدان فى حقول اللوبيا ضمن برنامج المكافحة المتكاملة للمحافظة على البيئة من التلوث وتقليل أو منع استخدام المبيدات الحشرية فى حقول اللوبيا والحصول على أكبر محصول إقتصادى من بذور اللوبيا الجافة .