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EFFECTIVENESS OF CERTAIN PESTICIDAL TREATMENTS AGAINST SOME SUCKING PESTS ATTACKING *Phaseolus vulgaris.*

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ABSTRACT

The objective of present work was to compare the field efficiency of three tested pesticides, Bensultap, Pirimiphos-methyl and Abamectin, against some sucking insect pests, Whitefly, *Bemisia spp*. , the cotton leafhopper, *Empoasca lybica*, Thrips, *Thrips tabaci*, and bean Aphids, *Aphis craccivora*, attacting kidney bean, *Phaseolus vulgaris.*

The field experiment was conducted at Mansoura University experimental station during two period in 2007and 2008. Based on the results of this experiment, at the recommended dose, Bensultap and Pirimiphos-methyl induced excellent control to the all tested sucking pests as the initial kill, persent of reduction was ranging from (91.96 to 99.22) and from (87.67 to 97.48) for tow pesticides, respectively, whereas, Abamectin was the lowest effective one which revealed from 22.91 to 86.64% only.

Concerning residual activity (till 9th days after application), the tested pesticides can be arranged in descending order as follows: Bensultap, Pirimiphos-methyl and Abamectin, recording (67.03-94.52), (63.12-82.65) and (12.33-78.22) present reduction in pests population, respectively.

Keywords: pesticides, *Bemisia spp*, *Empoasca lybica*, *Thrips tabaci*, *Aphis craccivora*, *Phaseolus vulgaris*.

INTRODUCTION

The common bean (*Phaseolus vulgaris* L.) is by far the most important pulse crop (i.e., annual leguminous food crops, such as chickpea, cowpea, lentils, pea and others that are harvested for dry seeds) in the world (Singh, 1999). Among all the major food legumes, the common bean is the world's third most important bean after soybeans (*Glycine max* (L.) Merr.) and peanut (*Arachis hypogea* L.). Common bean is an important source of protein, dietary fiber, iron, complex carbohydrates, minerals, and vitamins for millions of people in developing and developed nations and is one of the basic foods of the indigenous populations of eastern, Southern Africa and South America and Eastern. Bemicia *spp* is now considered as one of the world, s most damaging insect pests (Cahill *et al* 1995).

Bemicia *spp* causes crop losses by direct feeding damage, through honeydew contamination of produce, especially cotton lint and by transmitting more than 60 different plant viruses (Bedford *et al*., 1993).

Aphid feeding often causes leaves to curl and become deformed. Once this happens, control is very difficult because aphids inside the curled leaves are protected from contact with the insecticide. Some aphids are important vectors of plant diseases.

Thrips puncture and consume mesophyll cells of onion leaves. This results reduced in loss of chlorophyll and reduced photosynthesis. Yield reduction in the form of reduced bulb size is the primary effect of thrips feeding.

Insecticides are the only tool for pest management that is reliable for emergency action when insect pest population approach or exceed the action threshold (Metcalf, 1982).Bensultap is a nereistoxin analogue. It is used to control the Calorado beetle and some other insect pests (Matsuda et al., 2001). The compound or its metabolite, the nereistoxin, acts on the nicotinic acetylcholine (nACh) receptor as a partial agonist at low concentrations and as a channel blocker at higher concentrations (Eldefrawi et al., 1980).Actellic is an organophosphorous pesticide containing 2% pirimophos-methyl as the active ingredient. As a broad-spectrum pesticide, Avermectins (i.e. ivermectin, abamectin, doramectin) are a group of fermentation products from a strain of *Streptomyces avermitilis* possessing potent anathematic and insecticidal activities. The relative popularity of the Avermectins among farmers and veterinarians can be attributed to their broad spectrum of activity, convenience and wide margin of safety to the targeted animals. Presently, avermectins are the active components of some insecticidal and nematocidal products used in agriculture and the most used agents in veterinary medicine for several years in prevention of parasitic diseases ([Madsen et al., 1990], [McCracken, 1993], [McKellar, 1997], [Boxall et al., 2003a&b], [Floate et al., 2005] and [Kövecses and Marcogliese, 2005]). The present work is conducted to evaluate the effect of certain pesticidal treatments against whitefly, aphids, thrips and jassied in kidney bean field.

MATERIALS AND METHODS

1-Field experiment:

Field experiment were conducted at Mansoura experimental station during the seasons of 2007and 2008. Kidney bean plant seeds with a variety of Giza 103were cultivated in two different periods at the first week of November 2007 and the third week of march 2008. The normal agriculture practice were followed.

2- Tested compounds:

A . abamectin.

Trade name : Vertimec 1.8% EC (Syngenta Co.)

Chemical name: amixture containing a minimum of 80% avermectin B_{1a} (i):5-O- demethylavermectin B_{1a} and a maximum of 20% avermectin B_{1b} (ii) 5-O- demethyl-25-de(1- methyl-propyl)-25-(1-methylethyl)avermectin B_{1b}.

B . pirimiphos-methyl.

Trade name : Actellic 50 % EC. (Syngenta Co.)

Chemical name : *O*-[2-(diethylamino)-6-methyl-4-pyrimidinyl] *O,O*-dimethyl phosphorothioate .

C. bensultap.

Trade name : Bancol (Sumitomo Chemical Takeda agro Co.)

Chemical name: *S,S*'-[2-(dimethylamino)-1,3-propanediyl di(benzenesulfothioate)]

3- Pesticides treatments:

Four treatments were arranged in complete randomized block design. Four replicates (10.5 m^2 per each) was used for each treatment including the check. A knapsack sprayer CP^3 provided with one nozzle (200 liters water per Fedden) has proved to be sufficient to give a good coverage on the tested phaseolus plants. Each insecticide was used with the recommended dose (RD). Early in the morning visual observations of the leaves were made for direct estimates of bean aphids, whitefly, thrips (Butler et al ., 1988; Naranjo and Flint, 1995).

Samples were made by selecting plants at affixed interval of five steps across rows (Southwood, 1978) Five plants were selected at random in each treatments. Infestation data was recorded before treatment , 1,3, 5, 7 and 9 days after treatments The reduction percentage in insects was calculated according to the equation of (Henderson and Tilton 1955). percent reductions in population were calculated as follows:

% Reduction = $100[1- (T_a * cb / T_b * ca)]$.

where :- T_a = population in treated plants after application.

T_b = population in treated plants before application.

C_a = population in check plants after application.

C_b = population in check plants before application.

3- Statistical analysis:-

Statistical analysis were carried out to determine the differences between treatment and days after spraying by using one way analysis of variance (ANOVA) (Costat, 1990).

RESULTS

1. Efficiency of tested pesticides against *Bemisia spp*.

As indicated in the result given in Table (1) Bensultap and Pirimiphos-methyl induced obvious initial kill (one day after treatment) where the reduction percentage in population was 98.93and 94.90, respectively. Abamectin was the lowest effective on population of whitefly.

It could be concluded that, the higher residual effect on the Whitefly, resulted with Bensultap. In addition, considerable residual effect was also noticed with Pirimiphos-methyl and Abamectin where they exhibited 68.81 and 52.90 %reduction in population.

Generally the second period during march (2008) season was not evaluated by *Bemisia spp***.** because the population density was not reached to the level of economic threshold in the experiment area.

2- **Efficiency of tested pesticides against *Aphis craccivora*** :-

Data in table (2) revealed that, Bensultap was the most effective against *A. craccivora*, while Abamictin was the lowest one, where the reduction percentage were97.55 and 22.91%, respectively, after one day from spraying (Initial kill).

T1-2

As for the residual effect Also Bensultap induced the best results, recording 84.23 reduction percentage in *A. craccivora* , whereas. Abamectin was the lowest effective one, which revealed 12.33 % reduction during the period from 3rd to 9th days after spray application.

As compared with the results obtained in the first period, all pesticides treatments were found significantly affected the population of the bean aphids till 7 days after application recording more than 54.31% reduction. Data revealed that all the tested pesticides induced a high initial kill, where the reduction in population was more than 86.00% for Abamictin. The highest reduction of 92.88% was observed in Bensultap, while Abamectin registered lowest reduction percentage of 54.13 % at the 7th day after application. Results also indicated that after 9 days from spraying, Bensultap gave the highest efficiency in reducing bean aphids population with a residual effect of 93.88%reduction, while, Abamictin was the least toxic one with a residual effect of 59.99% reduction on aphid population.

3. **Efficiency of tested pesticides against *Thrips tabaci*:-**

As indicated in the result given in table (3), Bensultap and Pirimiphos methyl afforded excellent control against ***Thrips tabaci***, reduction percentage were 91.96 and 91.33% after one day of spraying (initial kill), respectively.

With the respect to residual effect, Bensultap remained highly effective, recording 66.20 % reduction in Thrips, population after 7 days of pesticides application.

On the other hand, Abamectin induced a low residual effect, where it showed only 27.90% reduction in Thrips population 9 days after application.

It could be concluded that, Bensultap had the longest residual effect till 9 days after application, recording 67.03 % reduction .

Similar results were obtained in the second period, where Bensultap and Pirimiphos methyl afforded excellent control against *Thrips tabaci* recording 98.57and 92.39 reduction percentage, respectively after one day of spraying (initial kill).

Regarding the residual effect, Bensultap and Pirimiphos methyl had a long residual effect till 9 days after spraying, recording 91.89 and 77.83 % reduction, respectively.

Abamectin gave fluctuation results in which reduction percentages were 51.89,59.59,46.70 and 51.24 after 3, 5, 7 and 9 days of application, respectively.

The highest reduction percentage of 94.52 was observed with Bensultap during the period for 3rd to 9th days after treatment. (table 3).

4. **Efficiency of tested pesticides against *Empoasca lypica*:-**

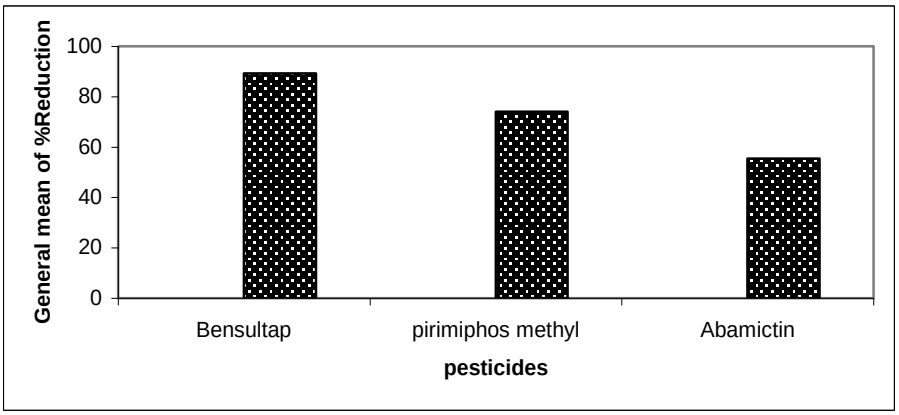
All tested pesticides significantly affected the population of the cotton leafhopper *E. lypica* at the indicated days after application (table 4). Data revealed that all the tested pesticides induced an obvious initial kill, where they exhibited from 84.00to 99.22 % reduction in population. Nine days after treatment, Bensultap gave a high efficiency in reducing the cotton leafhopper population, while, Abamectin was the lowest effective one which revealed 36.84% reduction.

T3-4

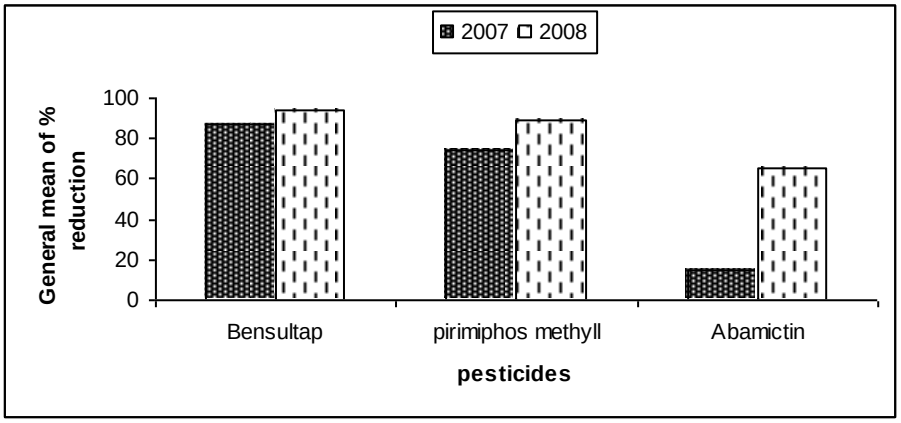
Concerning residual activity, the tested pesticides can be arranged in descending order ASfollows: Bensultap, Pirimiphos methyl and Abamectin recording 92.71, 82.65 and 78.22 % reduction , respectively.

Generally, the first period during November 2007 season was not evaluated by *E. lypica* because the population density was not reached to the level of economic threshold in the experimental area.

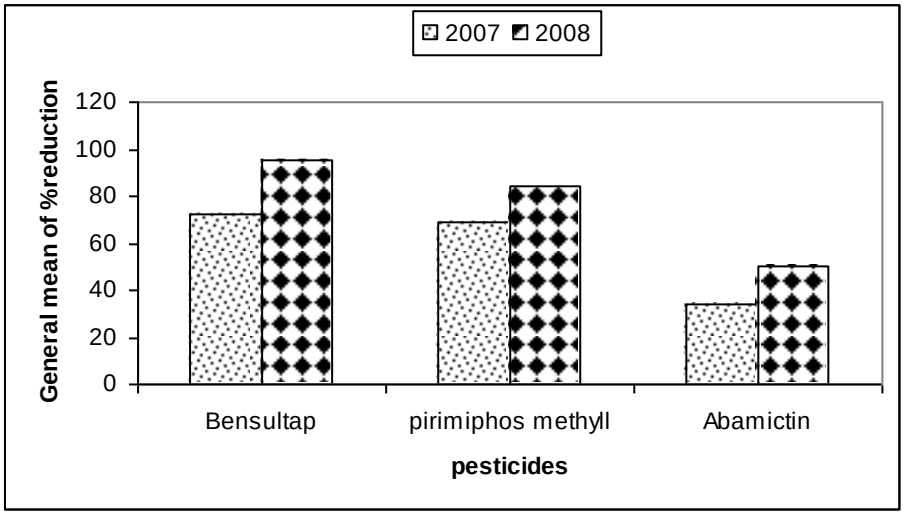
As shown in Figs (1,2,3,4), it can be concluded from the present study that the most effective pesticides for controlling the tested sucking insect pests was Bensultap followed by Pirimiphos methyl and Abamectin.



Fig(1):- General mean of reduction in whitefly, *Bemisia spp.* on kidney bean leaves during November 2007 season:-



Fig(2):- General mean of reduction in bean aphids, *A. craccivora* on kidney bean leaves during 2007and 2008 season:-



Fig(3):- General mean of reduction in thrips, *thrips tabaci* on kidney bean leaves during 2007 and2008 seasons:-

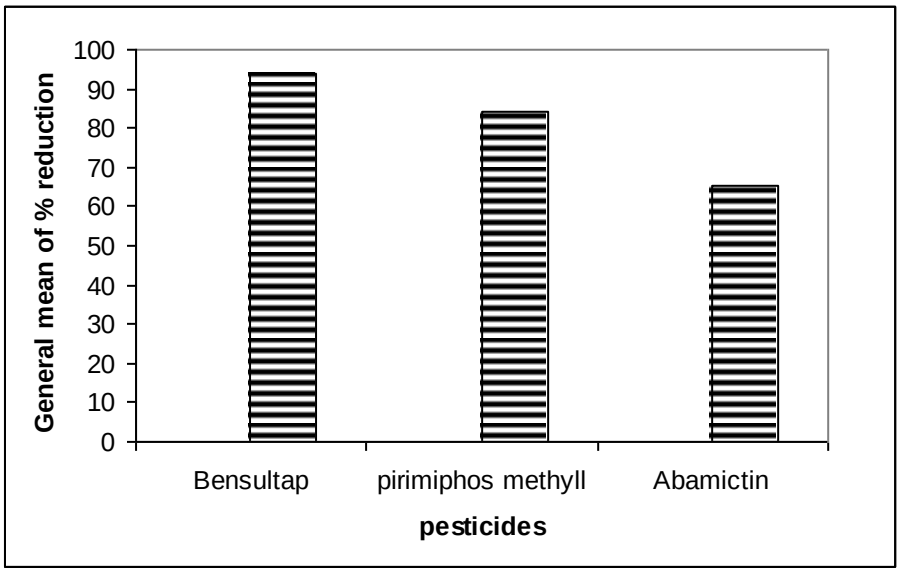


Fig (4):- General mean of reduction in Leafhopper, *E. lypica* on kidney bean leaves during 2007 season:-

DISCUSSION

Results revealed that, insecticides play important role in the mortality of the tested pests.

The efficacy of each pesticides has their own way to influence on the sucking pests attacking the common bean *phaseolus vulgaris*.

Variation in the mean percent reduction in population of the tested insects (*A. craccivora* and *Thrips tabaci)* by pesticides (Bensultap and Pirimiphos methyl), especially, the increase in the efficacy of pesticides in the second period. along the 9 days after application could be because of the special temporary changes in the environmental condition.

Low percent reduction in population was recorded with Abamectin after 9 days of application as compared to the other treatments (Bensultap and Pirimiphos methyl). The fluctuation in the population is due to the time. It is more toxic against *Aphis craccivora* in short period after application.

Based on the result of this experiment, Bensultap and Pirimiphos methyl at the recommended dose induced excellent control to whitefly as the initial kill and residual activity till 9 days after application, whereas, Abamectin at the recommended dose gave satisfactory control against white fly as the initial kill but not to residual effect after application. The same trend was also noticed with Aphids, leafhopper and Thrips.

The results of the present studies are in accordance with the result of El-khawas, M. A. M. *et al*., (2004), who concluded that using natural insecticides containing Abamectin may be recommended when planning and promoting I.P.M Programs against major pests of faba bean plants, as contributing materials containing a degree of safty for man in his surrounding environmental.

Result are also, in agreement with result obtained by Rahil et al., (2004) and Civelek and Weintraub (2003) for Pirimiphos methyl and Bensultap, respectively.

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قياس فعالية بعض المبيدات على بعض الافات الثاقبة الماصة التى تصيب نباتات الفاصوليا.

نشوا مصطفى حسين ، سلوى السعيد نجم ، فؤاد عبد الله حسام الدين شاهين و محمد محمد إبراهيم قاضى .

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هدفت الدراسة الى معرفة التأثيرالمبدئى و تأثير المتبقى لكل من البنسلتاب ،بريموفوس ميثيل و الابامكتين على الافات الثاقبة الماصة و التى تصيب نباتات الفاصوليا ، و قد تبين من النتائج ما يلى:- .

اظهر كل من البنسلتاب ،بريموفوس ميثيل كفاءة عالية فى مكافحة الافات الثاقبة الماصة محل الدراسة حيث حققت نسبة خفض فى تعداد الافات بعد ٢٤ من المعاملة بالتركيز الموصى به يتراوح بين ٩١,٩٦- ٩٩,٢٢% ، ٦٧.٨٧- ٩٧,٤٨% لكل من البنسلتاب ،بريموفوس ميثيل على الترتيب، بينما كان مركب الابامكتين أقل تأثير على الافات المختبرة حيث حقق نسبة خفض فى تعداد الآفات بمقدار يتراوح بين ٢٢,٩١- ٨٦,٦١ % بعد ٢٤ ساعة من المعاملة بالمعدل الموصى به.

كما تبين من النتائج إمكانية ترتيب المبيدات المختبرة طبقا لتأثير متبقياتها على الافات الثاقبة الماصة السابق ذكرها ترتيبا تنازليا كما يلى:- البنسلتاب يليه بريموفوس ميثيل ثم الابامكتين حيث سجلت متبقياتها نسبة خفض فى تعداد الافات المختبرة يتراوح بين (٦٧,٠٣- ٩٤,٥٢%)، (٦٣,١٢- ٨٢,٦٥%)، (١٢,٣٣- ٧٨,٢٢%)على التوالى حتى ٩ أيام مكن المعاملة.

بناء على ما سبق يمكن القول بأن مركب البنسلتاب اكثر المركبات المختبرة تأثيرا على الحشرات المستهدفة للدراسة على مستوى التأثير القاتل المبدئى (بعد ٢٤ ساعة من المعاملة) و كذا تأثير المتبقى (حتى ٩ ايام من المعاملة) يليه مركب بريموفوس ميثيل ثم مركب الابامكتين باستخدام المعدل الموصى به.

Table (1): Efficiency of tested pesticides against the whitefly *Bemisia spp*. on kidney bean leaves during November 2007

Treatment	% Reduction after spraying											Mean of residual effect	General mean of %reduct-
	One day before application	Inilial effect after one day		Residual effect 3		5		7		9			
	Mean	Mean	Reduction	Mean	Reduction	Mean	Reduction	Mean	Reduction	Mean	Reduction		
Bensultap	47.50A[b] ±5.066	1.50C[c] ±1.29	98.93	2.250C[c] ±2.22	95.43	3.50C[d] ±1.29	90.38	4.50C[d] ±2.38	89.74	14.50B[c] ±5.51	71.39	86.74	89.17
Pirimiphos methyl	49.50A[ab] ±4.79	2.50E[c] ±1.73	94.90	3.75E[c] ±0.50	92.87	12.00D[c] ±3.16	75.40	18.50C[c] ±5.51	60.49	29.00B[b] ±4.55	46.49	68.81	74.03
Abamectin	58.00A[a] ±8.83	19.75D[b] ±2.50	65.61	21.50 CD[b] ±4.04	65.51	26.50CD[b] ±2.89	53.64	29.25C[b] ±9.07	45.38	37.75 B[b] ±5.68	47.07	52.90	55.44
Untreated check	52.25AB[ab] ±5.25	51.75AB[a] ±3.77	___	54.25 AB[a] ±3.30	___	51.50 AB[a] ±0.50	___	48.25B[a] ±3.40	___	55.75A[a] ±4.58	___	____	____

*** Means followed by the same small letter in a column for different pesticides or capital letter in row of each pesticides at different times are not significantly different at 5% level of probability (Duncan's Multiple Range test) % Reduction = 100[1- (T_a * cb / T_b *ca)].**

Table (2): Efficiency of testes pesticides against the bean Aphids, *A. craccivora* on kidney bean leaves during 2007 and 2008 seasons:-

Treatment	season	% Reduction after spraying										Mean of residual effect	General mean of %reduc- tion
		One day before application	Inilial effect after one day		Residual effect 3		5		7		9			
		Mean	Mean	Reduction	Mean	Reduction	Mean	Reduction	Mean	Reduction	Mean	Reduction		
Bensu- ltap	2007	52.25A[b] ±8.88	1.25D[c] ±0.96	97.55	2.25CD[c] ±2.87	95.50	6.5CD[c] ±1.73	87.21	9.00C[d] ±0.82	82.56	16.00B[d] ±5.72	71.68	84.23	86.90
	2008	42.25A[a] ±4.11	1.00C[c] ±0.82	97.14	1.25C[c] ±0.50	97.13	2.00BC[c] ±1.41	95.79	3.25BC[d] ±1.50	92.88	5.50B[d] ±3.69	89.73	93.88	94.53
Pirimip- hos methyl	2007	58.75A[ab] ±8.42	6.75C[c] ±2.50	87.67	8.25C[c] ±1.26	84.63	12.50C[c] ±4.43	77.08	20.25B[c] ±4.11	63.43	25.50B[c] ±6.45	57.95	70.77	74.15
	2008	48.00A[a] ±7.70	1.57D[c] ±0.50	97.48	1.75D[c] ±0.95	96.46	3.00D[c] ±1.41	94.44	9.25C[c] ±2.99	82.17	15.00B[c] ±2.94	75.36	87.11	89.18
Abame- ctin	2007	61.25A[ab] ±7.23	44.00C[b] ±4.62	22.91	48.75BC[b] ±4.57	12.91	50.75BC[b] ±4.19	10.74	52.00B[b] ±1.41	9. 93	53.25B[b] ±2.75	15.77	12.33	14.45
	2008	41.50A[a] ±4.12	5.75E[b] ±0.82	86.64	8.50E[b] ±1.91	80.13	15.50D[b] ±2.65	66.80	20.50C[b] ±4.04	54.31	32.25B[b] ±4.11	38.75	59.99	65.32
(Untre- ated) check	2007	69.75A[a] ±6.70	65.00A[a] ±11.19	___	63.75A[a] ±7.09	____	64.75A[a] ±11.59	____	65.75A[a] ±6.85	____	72.00A[a] ±4.76	____	____	____
	2008	40.00B[a] ±5.2	41.50B[a] ±1.00	___	41.25B[a] ±5.91	____	45.00AB[a] ±3.37	____	43.25B[a] ±3.95	____	50.75A[a] ±2.36	___	____	____

*** Means followed by the same small letter in a column for different pesticides or capital letter in row of each pesticides at different times are not significantly different at 5% level of probability (Duncan's Multiple Range test) % Reduction = 100[1- (T_a * cb / T_b *ca)].**

Table (3) Efficiency of testes pesticides against thrips, *thrips tabaci* on kidney bean leaves during 2007 and2008 seasons.

Treatment	Season	% Reduction after spraying											Mean of residual effect	General mean of % reduction
		One day before application	Inilial effect after one day		Residual effect									
					3		5		7		9			
		Mean	Mean	Reduc-tion	Mean	Reduc-tion	Mean	Reduction	Mean	Reduc-tion	Mean	Reduc-tion		
Bensultap	2007	44.25A^{b} ±6.70	3.5C^{d} ±1.73	91.96	6.75C^{cd} ±2.50	85.95	11.25D^{c} ±2.87	76.90	17.75D^{b} ±4.11	66.20	35.00C^{a} ±3.74	39.06	67.03	72.01
	2008	113.75A^{a} ±24.32	1.25B^{c} ±1.26	98.57	3.25B^{c} ±1.71	96.78	4.25B^{c} ±0.50	96.66	8.25B^{d} ±1.26	92.74	11.25B^{d} ±4.27	91.89	94.52	95.32
Pirimiphos methyl	2007	52.75A^{a} ±6.18	4.50C^{c} ±1.00	91.33	10.00C^{c} ±3.65	82.54	22.50C^{b} ±6.95	67.13	33.25C^{a} ±4.86	42.74	38.75C^{a} ±3.50	60.06	63.12	68.76
	2008	115.50A^{a} ±10.25	10.00D^{c} ±3.16	92.39	15.00CD^{c} ±3.56	85.36	15.50CD^{c} ±5.57	88.02	24.00BC^{c} ±4.08	79.22	31.25B^{c} ±7.54	77.83	82.61	84.56
Abamectin	2007	54.50A^{a} ±3.32	29.50B^{c} ±4.93	39.44	33.75B^{c} ±4.50	42.96	41.25B^{b} ±1.50	31.25	45.00B^{b} ±3.16	30.43	51.00B^{a} ±0.82	27.90	33.13	34.39
	2008	113.75 A^{a} ±16.88	38.25C^{b} ±16.50	41.79	36.50 C^{b} ±5.19	51.89	47.25 C^{b} ±3.30	59.59	69.00B^{b} ±11.97	46.70	68.75B^{b} ±7.68	51.24	52.36	50.24
(Untreated) check	2007	49.50C ^{ab} ±3.32	48.75A^{c} ±5.62	___	53.75A^{bc} ±0.96	___	54.50A^{bc} ±5.45	___	58.75A^{ab} ±5.74	___	64.25A^{a} ±3.09	___	___	___
	2008	117.75AB^{a} ±18.55	90.50C^{a} ±14.55	___	104.50BC^{a} ±18.14	___	132.00A^{a} ±14.21	___	117.75AB^{a} ±9.74	___	133.50A^{a} ±16.17	___	___	___

*** Means followed by the same small letter in a column for different pesticides or capital letter in row of each pesticides at different times are not significantly different at 5% level of probability (Duncan's Multiple Range test) % Reduction = 100[1- (T_a * cb / T_b *ca)].**

Table (4) Efficiency of tested pesticides against *E. lypica* on kidney bean leaves during march 2008.

Treatment	% Reduction after spraying											Mean of residual effect	General mean of %reduction
	One day before application	Inilial effect after one day		Residual effect									
				3		5		7		9			
	Mean	Mean	Reduction	Mean	Reduction	Mean	Reduction	Mean	Reduction	Mean	Reduction		
Bensultap	44.50A[a] ±4.51	0.25C[d] ±0.50	99.22	1.75C[c] ±0.96	96.62	2.25C[c] ±0.50	95.57	3.50C[b] ±1.29	93.38	8.50B[d] ±2.38	85.27	92.71	94.01
Pirimiphos methyl	43.50A[a] ±4.51	2.75D[c] ±0.96	91.28	4.75D[c] ±1.26	89.61	6.00D[c] ±2.58	87.93	10.75C[ab] ±2.50	79.20	14.75B[c] ±2.75	73.85	82.65	84.37
Abamectin	44.25A[a] ±0.96	5.00E[b] ±0.82	84.00	11.25D[b] ±3.77	75.81	14.25D[b] ±4.79	71.82	21.75C[ab] ±3.86	58.64	36.25B[b] ±3.86	36.84	60.77	65.42
(Untreated) check	43.75C[a] ±2.87	46.75BC[a] ±0.96	0.00	46.00BC[a] ±4.89	0.00	50.00BC[a] ±3.56	0.00	52.00AB[a] ±6.58	0.00	56.75A[a] ±3.77	0.00	___	___

*** Means followed by the same small letter in a column for different pesticides or capital letter in row of each pesticides at different times are not significantly different at 5% level of probability (Duncan's Multiple Range test) % Reduction = 100[1- (T_a * cb / T_b *ca)].**