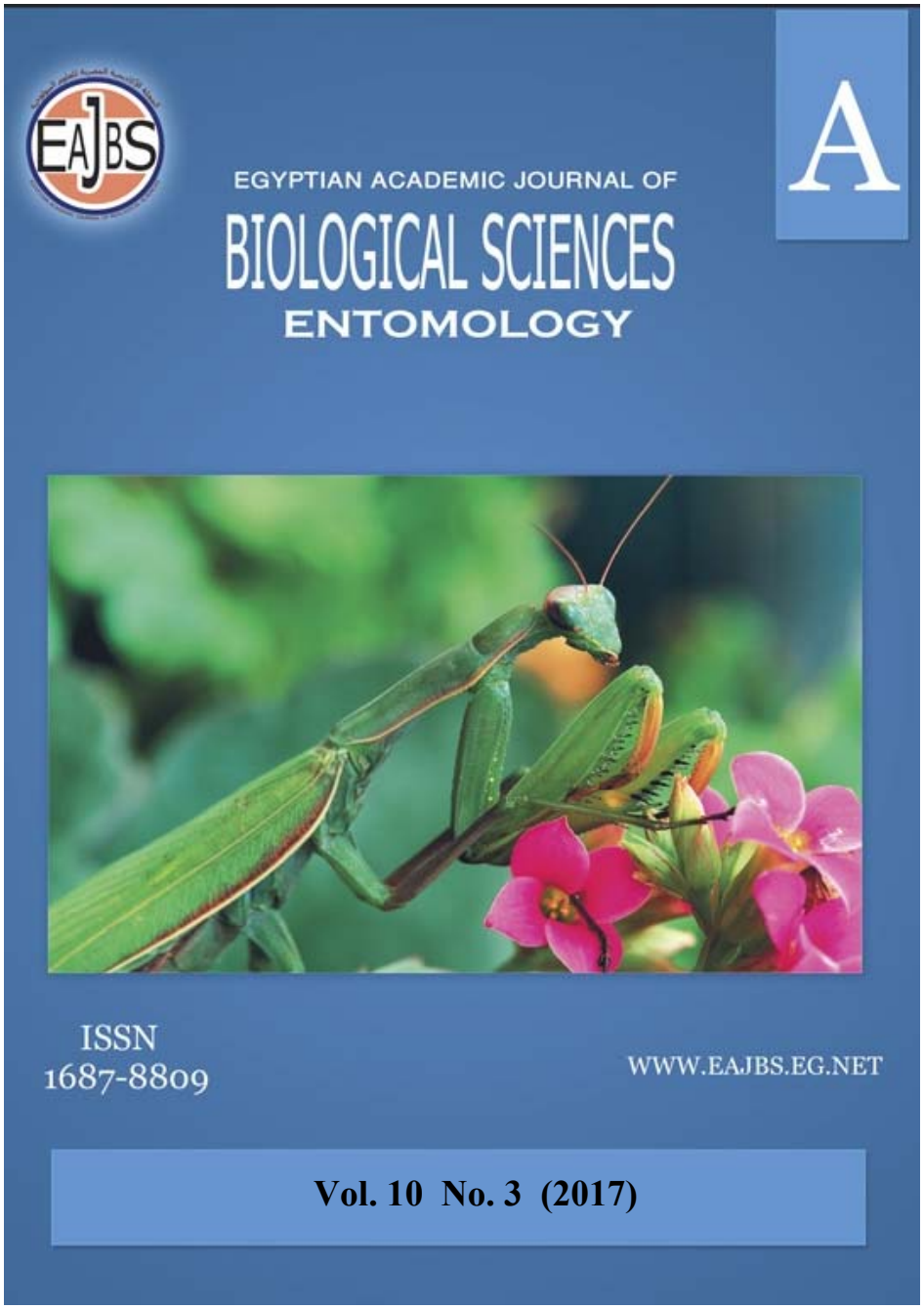

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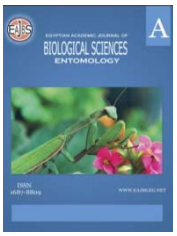

Evaluation the Number , Duration Generation and Efficiency of Abamectin Against Some Pests Infesting Green Bean (*Phaseolus vulgaris L.*) Under Field Condition

Mona. I. Ammar[1]; Samia M. Abozeid[1] and Tarek. A. Abd-El Rahman[2]

1- Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.
2- Central Agricultural Pesticides Laboratory, Agricultural Research Center, Dokki, Giza, Egypt.

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pre-harvest interval (PHI)

ABSTRACT

Experiments were conducted in the experimental Research Station, Qaha, Qalubiya Governorate on the autumn of 2015 and 2016.The current study aimed to evaluation the number , duration generation and efficiency of abamectin against *Bemisia tabaci* (Genn.), *Liriomyza. trifolii* (Burg.), and *Tetranychus urticae* (Koch) infesting green bean (*Phaseolus vulgaris*) under field condition and residue determination of abamectin in green leaves and green pods . During the 2015 season, the whitefly, *B. tabaci* recorded two generations, but in the 2016 season, they were three generations. In ad dation, the leaf miner, *L. trifolii*was recorded three generations during two seasons 2015 and 2106. In casered spider, *T. urticae* gave three generations in the 2015 season but in the second season gave only two generations. Especially, efficiency of Abamectin the results revealed that the highest percentage of reduction of Whitefly, *B. tabaci* after 10 days (64.64 %) and the lowest reduction percentage (22.32%) after 21 day. *L. trifolii*, the highest percentage of reduction was after 21 days (28.64%) and the lowest percentage of reduction (18.17%) after 1 day. In case of *T. urticae*,the obtained data indicated that the highest percentage of reduction of Spider mite after 3 days was (44.04%) while after 21 days was the lowest percentage of reduction (10.33%).Studying of the Abamectin residues on and in green leaves, unwashed green pods, washed green pods and boiling green pods recorded 7.98 ppm, 4.2ppm , 0.5 ppm and not detectable after two hours from spraying , washing processing cause dissipation 88.09 %loss from washed pods but in case boiling processing removed each Abamectin residues . The half-life measured in centuries Abamectin green beans leaves and unwashed green bean pods recorded 22.73 and 17.4 hours, respectively. The interval Preharvest (PHI) of Abamectin on the green beans pods for 17 day.

Recommendation : The paper recommended by abamectin spray on *Phaseolus vulgaris* against *Bemisia tabaci* (Genn.), *Liriomyza trifolii* (Burg.), with prevent green bean pods collected before 17 days from spraying.

INTRODUCTION

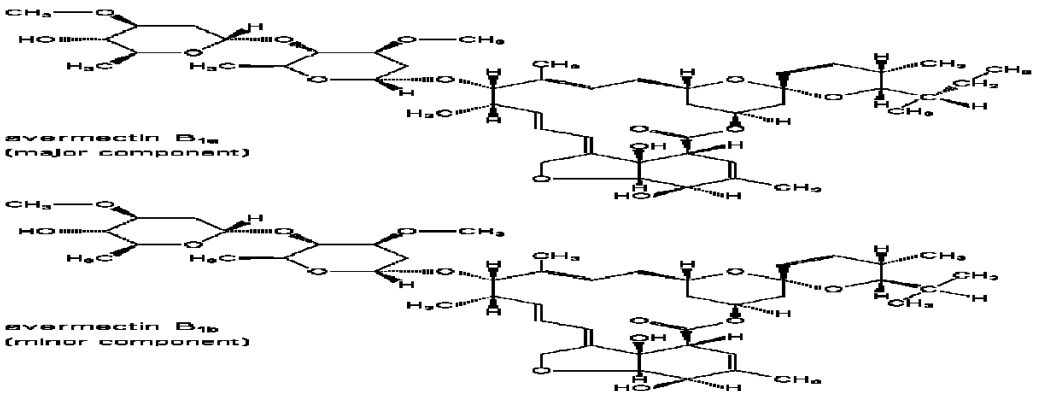
The green bean, *Phaseolus vulgaris* L., is one of the most important crops of family Fabaceae. It is also considered the leguminous vegetable crop in Egypt that cultivated in both the open field and greenhouse. It has a great source for protein.

Green bean can be consumed freshly as green pods or as dry seeds. Recently, in Egypt, the cultivated areas have been increased to intensify the production of green bean in order to cover the exportation demands. It has been demonstrated that the green bean leaves encourage pests development, increase egg production, and increase the pests longevity. That in turn threatens both quality and quantity of the yieldedcrop through causing serious damage either directly by sucking plants juice or indirectly by acting as vectors of viral diseases.

It is well known that green bean is liable to be attacked by many insects belonging to different orders including Lepidoptera, Diptera, Hemiptera, Homoptera, Thysanura and Coleoptera (Awadalla*et al*., 1991; El-Samahy and Saad, 2010; and Saleh, 2011). Moreover, there are other pests cause serious effects on green bean reducing their production and crop quality. These pests are such as, the whitefly, *Bemisia tabaci* (Genn.); the aphid, *Aphis craccivora*(Koch); the thrips, *Thripstabaci* (Lind.); the leaf miner, *Liriomyza trifolii* (Burg.); stem miner *melanagro-myzaphaseoli* (Tryon) in addition to the spider mite, *Tetranychu surticae* (Abozeid, 2011). *Bemisia tabaci* (Genn.), *Empoasca decipiens* (Lind.), and *A.craccivora* (Koch) are considered the main insects that infest the common bean and cause economic losses regarding the quantity and the quality of the crop yield (Shalaby, 2004 and Shaalan, 2005). In addition, *L. trifolii* (Burg.) is considered a very important insect which cause yellowish and dryness of leaves leading to the weakness of metabolism and consequently lack in crop (Schuster and Everett, 1983; Parrella, 1987; and Shalaby, 2004). In Egypt *T. urticae*was considered the major pest of vegetables causing great loss in yield, the effect of which is reducing the photosynthesis and transpiration (Younes *et al.*, 2001). Abamectin used to control motile stages of mites and some other insects on fruits and vegetables such as the leaf miners with limited plant systemic activity. Flufenoxuron is a benzoylurea pesticide which acts as an insect growth regulator and chitin synthesis inhibitor. It is used to control immature stages of insects and phytophagous mites on fruits and vegetables (Alaa Kamel *et al*., 2007).Abamectin provides effective control of mites, thrips, and leaf miners (Lasotaand Dybas, 1991). The current study aimed to evaluation the number, duration generation and efficiency of Abamectin against *B. tabaci* (Genn.), *L. trifolii* (Burg.), and *T. urticae* (Koch) infesting green bean in Qaluobiya governorate during two successive seasons, 2015 and 2016, under field condition and residue determination of Abamectin in green leaves and green pods.

MATERIALS AND METHODS

Materials



Agrmica gold (Abamectin 1.8%) SC, produced by Syngenta Egypt. It is a derivative of the natural Avermectin family produced by fermentation of a soil microorganism *Streptomyces avermitilis*. (Schallman*et al.* 1986) and (Schallman *et al.* 1987), used at a rate of 30 ml / 100litre water.

Field experiments:

Experiments were conducted in the experimental Research Station, Qaha, Qalubiya Governorate on the autumn of 2015& 2016. The seeds were sown in 10th September stayed in the felid to 15th December 2015 and 2016, respectively. An area of about 175 m² approximately was divided into three replicates. Inspection was started 15 days after sowing, and continued weekly till the harvest period, to evaluation the number, duration generation of pests (insect stages and movable stages of spider mite) were counted on ten leaves were collected randomly per replicate/ week at early morning. These samples were collected and kept in paper bags and transferred to examine in the laboratory under binocular and count the numbers and recorded of each investigated pest species.

Number and duration of generations:

The number of pests on green bean leaf for weekly were counted throughout two successive seasons was taken in consideration to estimate the number and duration of seasonal field generations of different pests on green bean at Qaha-Qalubiya Governorate. The method suggested by Audemard and Milaire (1975) and emulated by Iacob (1977) was applied. The graphical representation of figures on semi-Gaussion paper (scale gauss) shows the number of generations for each species represented by regression lines.

Efficiency of abamectin compound against some pests:

The experiment selected in the research station ,Qaha, Qalubia governorate, an area 252 m^2 divided into 6 replicates to pesticide and control treatment, distributed in complete block design, to evaluate reduction percentage of infestation by whitefly, *Bemisia tabaci*, leaf miner, *Liriomyza trifolii*and spider mite, *Tetranychus urticae*. Randomly, ten leaves were collected / plot in the morning before and after 3, 7, 10, 14 and 21 days of treatment in plots, the number of individuals were recorded, reduction percentage was calculated according to the equation adapted by Henderson and Tilton (1955).

Pesticide residue determination in and on leaves and green pods.

An analysis of tested pesticide was carried out in the Central Agricultural Pesticide Laboratory, (CAPL). Standard stock solutions prepared by dissolving pure Abamectin in acetonitrile to final concentration of 500 mg/ml. analysis or for fortification of samples; a stock standard solution was stored at −20ºC.

Sampling for residue analysis:

Sampling was performed by randomly collecting from various places of the experimental plots according to the (FAO/WHO, 1986) recommendations. Green pods (one kg.) were collected from pesticide-treated and the leaves of the treated plant. Samples were taken 2 hours, 1, 3, 7, 10, 14 and 21 days after spraying. During experiment, a control sample was taken in each sampling time. Collected green bean pods to monitoring residues, divided into three groups the first group was green pods unwashed, the second group washed with tap water and the third group green bean pods boiling using method was done by hot water. The samples were homogenized with blender and sub sampling was done where three representative samples of 50 g were taken. Subsamples were then placed into polyethylene containers and frozen at –20ºC.

Extraction and clean-up:

The freeze sub samples were left to reach to room temperature. The homogenization subsamples using the blender, weight 15 g. from it was placed into 50 mL polyethylene tube. Samples were extracted and cleaned up immediately using QuEChERS methodology **(**Anastassiades *et al.* 2003). An aliquot of 2mL was concentrated to dryness. The residue was re-dissolved in 2mL of acetonitrile for analysis by HPLC.

Final determination of pesticides residues:

HPLC analysis was performed with an Agilent 1100 HPLC system (USA), with photodiode array detector. The chromatographic column was C18 Zorbax SB (250 9 4.6 mm, 5 lm film thickness). Flow rate of mobile phase (acetonitrile /Methanol/water = 45/ 40/15 v/v/v) was 1.5 mL/min. and injection volume was 20 L. Detection wave length for detection of Abamectin was set at 245 nm. The retention time of Abamectin ,Avermectin B1a and Avermectin B1b (was about 8.5 and 11.26 min.), Recovery studies were carried out by spiking 3 replicates of untreated date samples (control) with 50, 100, and 150 mg/kg of Abamectin. Samples were analyzed using their prescribed procedure and mean values of the three replicates were calculated. Recovery percentages were satisfactory for the Abamectin and ranged from 92% to 98%. The minimum detection limit of Abamectin was 0.005mg/kg.

The rate of degradation (K) and half-life (t1/2) values were obtained from the following equation of (Gomaa and Belal 1975).

Rate of degradation (K) =2.303 X slope

Half _ life (t1/2) =0.693/(K).

RESULTS AND DISCUSSION

Number and duration of generations of certain pests infesting green bean (*Phaseolus vulgaris* L.).

Whitefly, *Bemisia tabaci*:

Results in Fig. (1), revealed that, *B. tabaci* nymph had two seasonal generations during 2015 season, the first generation was occurred between early-October to early- November and lasted for about 35 days, and the second generation was occurred between mid-November and mid - December and lasted also for about 28 days.In the second season, data revealed that in Fig. (2), *B. tabaci* nymphs had three seasonal generations in season, during 2016 season, the first generation was occurred between early-October to late- October and lasted for about 21 days. Thesecond generation was occurred between late- October to mid-November and lasted also for about 21 days and the third generation was occurred between late - November to mid -December and lasted also for about 21 days, (Table 1).

Table 1: Approximated numbers and duration of seasonal generations of *B. tabaci* nymphs on green bean at Qaha, Qalubiya Governorate during 2015 & 2016 seasons.

	2015			2016		
No. of	date of occurrence		Duration	Approximated date of occurrence		Duration
Generations	From	To	in days	From	To	in days
First	3, Oct.	7, Nov.	35 days	3, Oct.	24, Oct.	21days
Second	14, Nov.	15, Dec.	28 days	24, Oct.	14, Nov.	21days
Third	--	--		21, Nov.	11, Dec.	21days

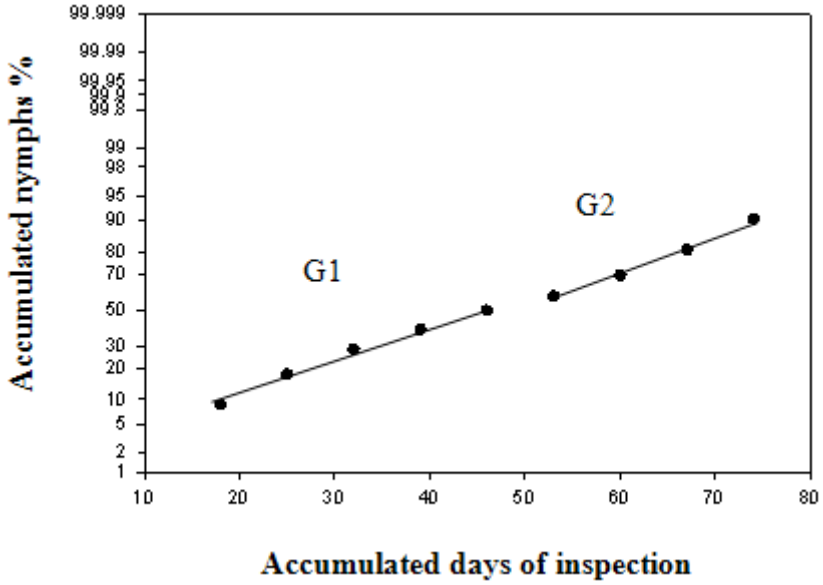


Fig. 1: The sequence of annual generations of *B. tabaci* nymphs on green bean at Qaha, Qalubiya Governorate during 2015

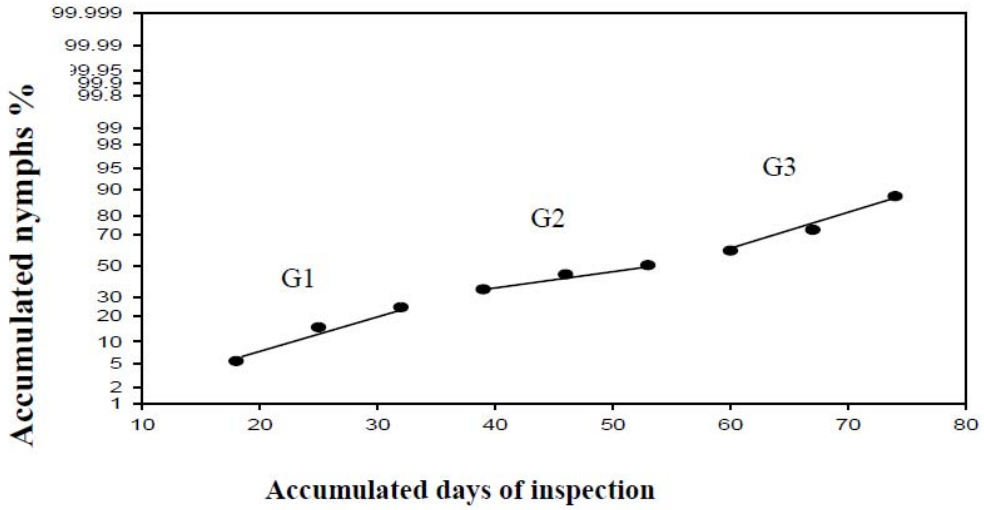


Fig. 2: The sequence of annual generations of *B. tabaci* nymphs on green bean at Qaha, Qalubiya Governorate during 2016 season.

Leaf miner, *Liriomyza trifolii*:

Results in Fig. (3) revealed that, *L. Trifolii* larvae had three seasonal generations during 2015 season, the first generation was occurred between early-October to late - October and lasted for about 21 days. The second generation was occurred between late- October and late- November and lasted also for about 28 days. The third generation was occurred between late- November and mid-December and lasted also for about 21 days. Also, results in Fig. (4) revealed that, *L. trifolii*larvae had three seasonal generations during 2016 season, the first generation was occurred between early-October to late- October and lasted for about 21 days.

The second generation was occurred between late- October to mid-November and lasted also for about 21 days and the third generation was occurred between late-November to mid -December and lasted also for about 21 days. (Table 2).

Table 2: Approximated numbers and duration of seasonal generations of *L. trifolii* on green bean at Qaha, Qalubiya Governorate during 2015&2016 seasons.

	2015			2016		
No. of	Approximated date of occurrence		Duration	Approximated date of occurrence		Duration
Generations	From	To	in days	From	To	in days
First	3, Oct.	24, Oct.	21 days	3, Oct.	24, Oct.	21days
Second	24, Oct.	21, Nov.	28 days	24, Oct.	14, Nov.	21days
Third	21, Nov.	12, Dec.	21 days	21, Nov.	11, Dec.	21days

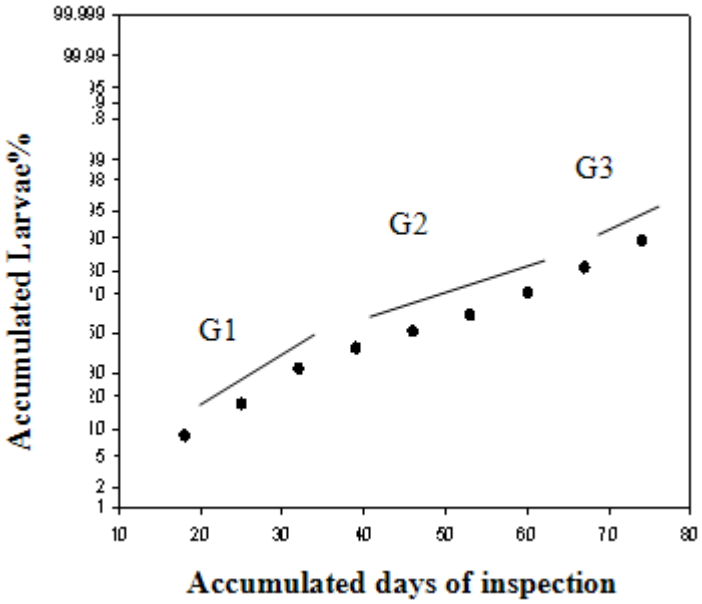


Fig. 3: The sequence of annual generations of *L. trifolii*on green bean at Qaha, Qalubiya Governorate during 2015 season.

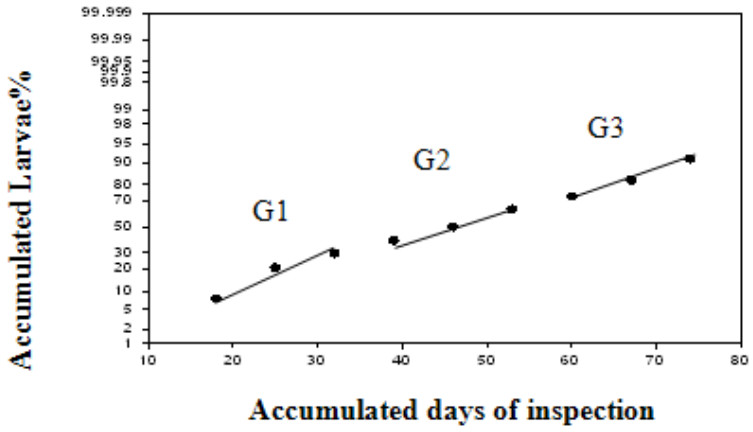


Fig. 4: The sequence of annual generations of *L. trifolii* on green bean at Qaha, Qalubiya Governorate during 2016 season.

Red spider,Tetranychus urticae

Results in Fig. (5) indicated that, *T. urticae* nymphs had three seasonal

generations during 2015 season, the first generation was occurred between early-October to late- October and lasted for about 28 days. The second generation was occurred between late-October to late -November and lasted also for about 22 days. The third generation was occurred between late- November to mid -December and lasted also for about 21 days. In case results in Fig. (6) revealed that, *T. urticae* nymphs had two seasonal generations during 2016 season, the first generation was occurred between late- October to mid - November and lasted for about 21 days. The second generation was occurred between mid-November to mid - December and lasted also for about 28 days.

Table 3: Approximated numbers and duration of seasonal generations of *T. urticae* nymph on green bean at Qaha, Qalubiya Governorate during 2015&2016 seasons.

	2015			2016		
No. of	Approximated date of occurrence		Duration	Approximated date of occurrence		Duration
Generations	From	To	in days	From	To	in days
First	3, Oct.	24, Oct.	28 days	24, Oct.	13, Nov.	21days
Second	31, Oct.	21,Nov.	22 days	14, Nov.	12, Dec.	28days
Third	21, Nov.	12, Dec.	21 days			

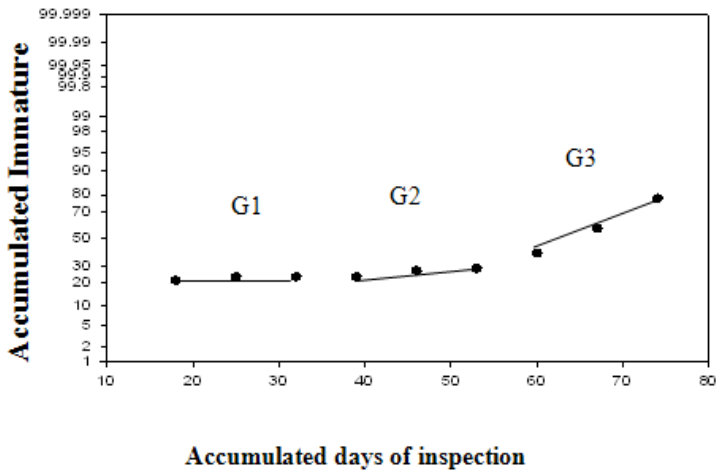


Fig. 5: The sequence of annual generations of *T. urticae* nymph on green bean at Qaha, Qalubiya Governorate during 2015 season.

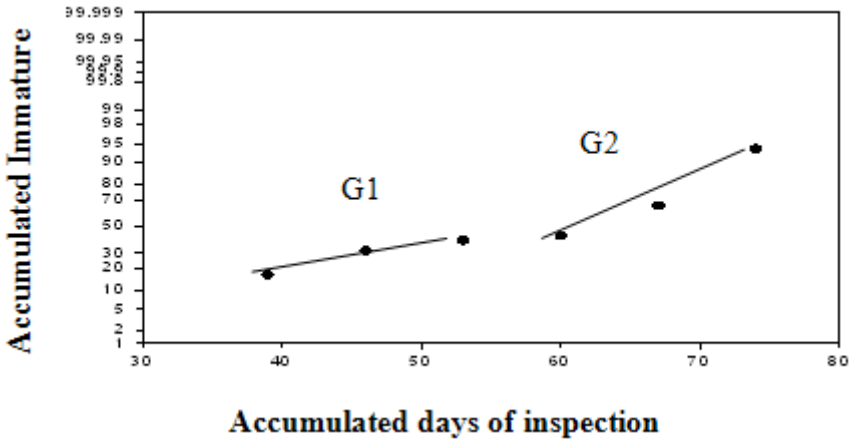


Fig. 6: The sequence of annual generations of *T. urticae* nymph on green bean at Qaha, Qalubiya Governorate during 2016.

Efficiency of Abamectin compound against some pests:

Data illustrated in table (4) represented the efficiency of Abamectin on some pests in different stages infesting green bean (*Phaseolus vulgaris*) under field condition.

Table 4: Efficiency of Abamectin on some pests infesting green bean (*Phaseolus vulgaris*) under field condition.

Time	Mean reduction percentages after spraying		
	B. tabaci	***l.. trifolii***	***T. urticae***
One day	32.72	18.17	35.57
3days	41.44	19.71	44.04
7days	42.24	21.84	34.59
10days	64.64	24.82	29.88
14 days	24.37	27.79	24.74
21days	22.32	28.64	10.33

The obtained data Table (4) revealed that the highest percentage of reduction of Whitefly, *Bemisia tabaci* after 10 days (64.64 %) and the lowest reduction percentage (22.32%) after 21 day.In addition. *liriomyza trifolii*, the obtained data reported that the highest percentage of reduction was after 21 days (28.64%) and the lowest percentage of reduction (18.17%) after 1 day. Especially, *Tetranychus urticae*, the obtained data in Table (4) indicated that the highest percentage of reduction of Spider mite after 3 days was (44.04%) while after 21 days was the lowest percentage of reduction (10.33%).

Residue determination of pesticide in green pods and on green leaves:

The residues of Abamectin and dissipation due to impact of washing and boiling in green bean pods and leaves were shown in Table 5. Abamectin dissipated rapidly after application. The concentration of abamectin one hour after treatment was 4.20 and 7.98 mg/kg in green bean pods and leaves, respectively.

Table 5: Effect of processing methods (unwashed, washed with tap water and boiling) on residues of Abamectin in green beans samples.

Time	Abamectin residues						
	Residue level in leaves (mean ± SD	**Residue level in unwashed Green bean pods (mean ± SD**	**Unwashed green pods**	**Washed green pods**	**Dissipation % in Washed green pods**	**Boiling**	**% reduction**
Zero time	7.98±0.26	4.20± 0.05	4.20	0.5	88.09	N.D	N.D
One day	3.51±0.08	1.71± 0.021	1.71	0.17	90.05	N.D	N.D
3days	1.62±0.04	0.82± 0.04	0.82	0.04	95.12	N.D	N.D
7days	1.30±0.01	0.80± 0.002	0.80	0.04	95.00	N.D	N.D
10days	0.87±0.006	0.64± 0.02	0.64	0.02	93.82	N.D	N.D
14 days	0.72±0.007	0.33± 0.04	0.33	N.D	N.D	N.D	N.D
21days	0.02±0.001	0.008± 0.001	0.008	N.D	N.D	N.D	N.D
T 1/2	17.04	22.73					
PHI (days)	17 days						

MRL= 0.01 mg. kg-1 Reg. (EU) No 600/2010

The residues amount decreased to 1.71 and 3.51 mg/kg, in green bean pods and leaves within the first 24 h after application, respectively. Following that period, abamectin residues in or on green bean pods and leaves decreased to (0.82, 0.8, 0.64,

0.33 and 0.008mg/kg) and (1.62 ,1.30 ,0.87,0.72and 0.021) respectively after 3, 7, 10,14 and 21 days from spraying , respectively. Fig .7 shown, the dissipation rate of Abamectin in green bean pods and leaves. The half-life of Abamectin calculated in green bean pods and leaves treated at recommend dose was 17.4 and 22.73 hours, respectively. European Union MRL for Abamectin in green bean is 0.01 mg/kg. It can thus be concluded that the pre-harvest interval (PHI) of Abamectin on green bean was 17 days after the last treatment.

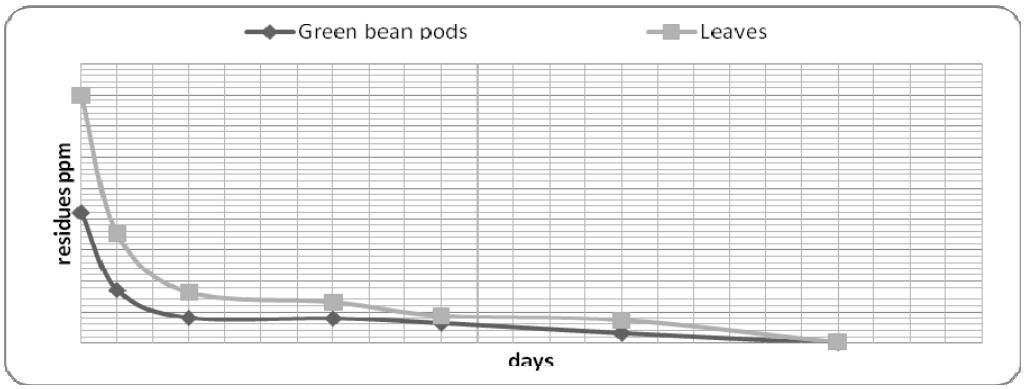


Fig. 7: Rate of abamectin degradation in green bean pods and leaves.

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ARABIC SUMMERY

تقييم التعداد ومدة الجيل وفعالية مبيد الابامكتين ضد بعض الآفات التي تصيب الفاصوليا الخضراء تحت ظروف الحقل

منى إبراهيم عمار[١]- سامية منذر ابو زيد [١] - طارق عبدالعليم عبد الرحمن٢
١- قسم بحوث أفات الخضر والنباتات الطبية و العطرية و الزينة – معهد بحوث وقاية النباتات – مركز البحوث الزراعية.
٢- قسم المتبقيات – المعمل المركزى لمتبقيات المبيدات- مركز البحوث الزراعية

نفذت التجربة فى محطة بحوث قها بمحافظة القليوبية فى الموسم الخريفى ٢٠١٥ ، ٢٠١٦ . يهدف البحث الى دراسة العدد ومدة الجيل وفعالية مبيد الابامكتين على الذبابة البيضاء وصانعة انفاق اوراق الفول والعنكبوت الاحمرالتى تصيب نباتات الفاصوليا الخضراء تحت ظروف الحقل وتقدير متبقيات الابامكتين فى ورق الفاصوليا الاخضر والقرون الخضراء .اتضح من الدراسة ان الذبابة البيضاء سجلت جيلين خلال الموسم ٢٠١٥ بينما فى موسم ٢٠١٦ سجلت ثلاث اجيال ، وعلى الجانب الاخر اوضحت النتائج ان صانعات الانفاق لها ثلاث اجيال فى الموسمين ٢٠١٥ و ٢١٠٦. وفى حالة العنكبوت الاحمرسجل ثلاث اجيال فى الموسم ٢٠١٥ولكن فى الموسم الثانى اعطى جيلين فقط. وبخصوص فعالية الابامكتين سجلت النتائج ان اعلى نسبة خفض فى تعداد الذبابة البيضاء كانت ٦٤.٦٤% بينما اقل نسبة خفض سجلت ٢٢.٣٢ % بعد ٢١ يوم من الرش ، كما سجلت اعلى نسبة خفض فى التعداد لصانعات الانفاق ٢٨.٦٤ % واقل نسبة خفض ١٨.١٧ % ، وفى حالة العنكبوت الاحمر كانت اعلى نسبة خفض هى ٤٤.٠٤ % بعد ٣ يوم من الرش بينما اقل نسبة اصابه بعد ٢١ يوم من الرش كانت ١٠.٣٣ %.

دراسات متبقيات مبيد الابامكتين فى اوراق الفاصوليا الخضراء والقرون الغير مغسولة والقرون المغسولة والمغلية سجلت ٧.٩٨ ، ٤.٢ ، ٠.٥ جذأ فى المليون واختفت متبقيات المبيد فى القرون المغلية كما ان عملية الغسيل سببت فقد ٨٨.٠٨ % من المتبقيات فى القرون المغسولة بعد ساعتين من الرش ، كما اوضحت الدراسة ان فترة نصف عمر أبامكتين المحسوبة في اوراق الفاصوليا الخضراء و قرون الفاصوليا الخضراء كانت ٢٢.٧٣ ، ١٧.٤ ساعة، على التوالي. وكان الفاصل الزمني (Preharvest PHI) من رش الابامكتين على الفاصوليا الخضراء ١٧ يوما.

التوصيات : يوصى البحث برش نباتات الفاصوليا الخضراء بمبيد الابامكتين ضد الذبابة البيضاء وصانعات أوراق الفول والعنكبوت الاحمر كما يوصى البحث بمنع جمع القرون الخضراء قبل ١٧ يوم من رش الابامكتين .