Effectiveness of Lambada cyhalothrin, thiamexam and profenophos insecticides against certain sucking insect pests and the red spider mite in soybean, and its side effect on grain yield

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ABSTRACT: The effectiveness of three different insecticides (i.e. lambada cyhalothrin, thiamexam and profenophos) was evaluated at recommended rate for controlling certain sucking insect pests of soybean, namely: *Aphis glycines, Bemisia tabaci* and *Thrips tabacea*. As well as the red spider mite *Tetruncus Urticae*. Trials were conducted under field conditions in Beni- suef Governorate, Egypt during two successive seasons 2019 and 2020. Each insecticide was applied 3 times, with 15 days intervals using knapsack sprayer. The obtained data indicated that all the tested insecticides were sufficient to controlling the population of tested pests. Also, significant differences were noted among the three applied sprays of insecticides compared to control treatments. On the other hand, the topmost seed yield was attained in the plots treated with these insecticides in different periods of treatments compared with control treatments.

KEYWORDS: soybean Lambada cyalothrin, thiamethoxam, profenophos, *Aphis glycines, Bemisia tabaci thrips tabaci and Tetruncus Urticae* .

1.INTRODUCTION:

Soybean (Glycine max) is an important grain legume crop in the world because of its high protein and oil content (Singh et al. 1990). It's exploited both as subsistence and a marketable crop and is used in mortal and beast nutrition. The sucking insects like Aphis glycines, Bemisia tabaci, thrips tabaci and Tetruncus Urticae are considerable significance in soybean plant. They play obliteration every time by desaping the leaves and reducing the crop vitality, which results in lower number of flowers and reduced yield. About 40 – 50 per cent of the crop is damaged only due to the attacks of sucking insects. These insects have been mainly controlled with conventional insecticides. (Tufail et al.(1995), Hamed etal.(1997), Saleem and Khan(2001), Saleem et al. (2001) Insecticides use in soybean increased. Particularly, operations of neonicotinoid insecticides, thiamethoxam and imidacloprid, and a pyrethroid insecticides cyfluthin. Neonicotinoids act as a nicotinic acetylcholine receptor and therefore have specific exertion against the nonentity nervous system (Maienfisch et al., 2001). They are extensively less toxic to humans than the organophosphorus and carbamate insecticides. Several primary target nonentity pests for neonicotinoids insecticides content have been shown a high eventuality for resistance development (IRAC 2008).

The points of present study to estimate the effectiveness of thelambada cyalothrin, thiamethoxam and profenophos at the recommended rates on Aphis glycines, Bemisia tabaci, thrips Tabacae, Tetruncus urticae under field condition.

2.MATERIALS AND ETHODS:

2.2.Insecticides Used

2.2.1.Lambada cyalothrin 5 EC50ml/ 100litre water

2.2.2.Thiamethoxam(Actara 25WP) 200gm/ fed

2.2.3.Profenofos(Selecrons72E.C) at 750 cm/ fed

2.3.Experimental design

The trials were carried out at Beni suef Governorate, Egypt during the 2019 and 2020 soybean growing seasons. The experimental area was about 1400 m2, divided into equal plots including untreated check of 350 m2. To estimate the effectiveness of the insecticides at full recommended rates, the experimental field was planned according to a complete randomized block design with four replicates for each treatment, each treatment entered 3 sprays at 15 days intervals using knapsack sprayer at full, recommended rate after dilution in water. The spray of insecticides was applied as soon as the pest frequency is noted. For assessing the infestation of soybean by some sucking insect pests, Samples were collected weekly in early morning from treatments plots area before spray and continued at quotidian intervals after treatment till the

Table (1): the mean reduction percent of *Aphis glycines* after field application of different insecticides treatments on soybean Glycine max during 2019 and 2020 growing season

***Aphis glycines* 2019**				
treatments	1-spray	2-spray	3-spray	%mean reduction
Lambada cyalothrin	97.56	92.25	90.02	93.27
thiamexam	94.47	95.54	92.25	94.08
profenofos	98.77	97.78	95.55	97.36
LSD at 5 %	1.28	1.18	2.31	2.23
***Aphis glycines* 2020**				
Lambada cyalothrin	95.15	94.14	97.27	95.52
thiamexam	92.23	89.29	91.15	90.89
profenofos	97.17	95.34	94.21	95.57
LSD at 5 %	1.13	2.14	3.12	2.12

end of each season. Samples were kept in tightly unrestricted cloth kerchief bags and transferred to the laboratory for examination as, 25 soybean leaves per replicate were chosen from the bottom, middle, and the top of the soybean leaves per treatments. The upper and lower flake shells were examined precisely beforehand at the morning of insects, and *Tetruncus urticae* counts were recorded. The Samples were checked to determine the population of *Aphis glycines, Bemisia tabaci, thrips tabacea and Tetruncus Urticae* as well as the percent of infestation at the same day. The reduction percent of the population was estimated by using Henderson and Tilton's equation(1955). Means were determined for significance at 0.05 using LSD test.

2.4.Assessment of Yield

At the time of harvesting, the grain yield was recorded separately for each treatment from each test plot and tagged for yield assessment. The final grain yield was determined by collect all the harvest of the seeds from all plot treatments separately for estimation of the grain yield per treatments as flowing

Increase in yield over control (%) = $\frac{\text{Yield in treatment} - \text{Yield in control}}{\text{Yield in control}} \times 100$

3.RESULTS:

Data in table(1) indicated that effectiveness of over mentioned insecticides against A*phis glycines* were was set up superior with a average reduction of insects population reached to 97.56, 94.47and 98.77% in treated plot in nonentity population after 1st spray Also, a significance influence of the insecticides was further seen after 2- spray and 3-spray of the treatment with an average reduction in population reached to 92.25, 95.54 and 97.78 % after 2- spray and 90.02, 92.25 and 95.55 % after 3-spray independently as against separate population in untreated control in (2019) season, independently. After alternate season (2020) in the same table sprays of insecticides, the reduction in Aphis glycines population was observed in treatments with a reduction of 95.15, 92.23 and 97.17 % at 1st spray. While after the alternate spray, a significance average reduction in the pest population was further seen, with a average reduction percent reached to 94.14, 89.29 and 95.34 %.Among the 3rd spray of tested conditions, was set up superior over of the conditions with a percent reduction of 97.27, 91.15 and 94.2 % in nonentity's population, respectively

Regarding *Bemisia tabaci* in Table (2) the observation was recorded after one, 2 and 3 sprays of the insecticides'. All insecticides were set up effective against the pest but variation in the degree of pest control was observed. The post treatment effect, after 1- spray, indicated a significant reduction in the population of insect in the insecticides treated plot than control control. The average number of pest reduction was 89.76, 87.25 and 91.32 % also, after alternate spray of insecticides, farther reduction reached to 85.21, 87.27 and 92.18 %. But at 3- spray 90 02, 85.15 and 89.43 % reduction in insecticides treated plot in (2019) season. A significance reduction in the pest population due to insecticides treatment was seen in (2020) season after 1st- spray, 2nd spray and 3rd-spray of the operation with a record of 91.16, 87.27 and 92.31% at 1- spray, while at 2- spray the average number of pest reduction was 92.12, 89.18 and 94.24 %, also, at 3- spray average number of pest reduction was 95.35, 91.14 and 92.27 % respectively.

Regarding *Trips tabace* in Table (3) the observation was recorded after one, 2 and 3 sprays of the insecticides. All insecticides were set up effective against the pest but variation in the degree of pest control was observed. The post treatment effect, after 1- spray, indicated a significant reduction in the population of insects in the insecticides treated plot than untreated control. The average number of pest reduction was 95.56, 97.27 and 98.47, also,

after alternate spray of insecticides, farther reduction reached to 94.24, 93.34 and 95.58. But at 3- spray 92.12, 95.55 and 94.45% reduction in insecticides treated plot in (2019) season. A significance reduction in the pest population due to germicide treatment was seen in (2020) season after 1st- spray, 2nd spray and 3rd- spray of the operation with a record of 92.12,, 89.29 and 95.11 at1- spray, while at 2- spray the average number of pest reduction was 95.15, 88.28 and 97.14, also, at 3- spray average number of pest reduction was 97.37, 93.12 and 95.27, respectively.

Table2: Reduction percent of *Bemecia Tabace* after field aplication of different insecticides treatments during 2019 and 2020 growing seasons

***Bemecia Tabace* 2019**				
treatments	1-spray	2-spray	3-spray	% mean reduction
Lambada cyalothrin	89.76	85.21	90.02	88.33
thiamexam	87.25	87.27	85.15	86.55
profenofos	91.32	92.18	89.43	90.97
LSD at 5 %	1.28	1.18	2.31	2.23
***Bemecia Tabace* 2020**				
Lambada cyalothrin	91.16	92.12	95.35	92.87
thiamexam	87.27	89.18	91.14	89.19
profenofos	92.31	94.24	92.27	92.94
LSD at 5 %	1.12	1.32	2.12	1.11

Table 3: Reduction percent of *Trips tabace* after field aplication of different insecticides treatments during 2019 and 2020 season.

***Trips tabace* 2019**				
treatments	1-spray	2-spray	3-spray	%mean reduction
Lambada cyalothrin	95.56	94.24	92.12	93.97
thiamexam	97.27	93.34	95.55	95.38
profenofos	98.47	95.58	94.45	96.16
LSD at 5 %	1.28	1.18	2.31	2.23
***Trips tabace* 2020**				
Lambada cyalothrin	92.12	95.15	97.37	94.88
thiamexam	89.29	88.28	93.12	89.89
profenofos	95.11	97.14	95.27	95.84
LSD at 5 %	1.13	1.14	2.12	1.12

Data in table(4) indicated that effectiveness of over mentioned insecticides against *Tetruncus urticae* was set up superior with a average reduction of insects population reached to 98.78,91.17 and 95.57 in treated plot in nonentity population after 1st spray Also, a significance influence of the insecticides was further seen after 2- spray and 3- spray of the treatment with an average reduction in population reached to 97.74,94.24 and 98.58% after 2- spray and 94.14, 91.15 and 98.48 after 3- spray independently as against separate population in undressed control in (2019) season, independently. A significance reduction in the pest population due to insecticides treatment was seen in (2020) season after 1st- spray, 2nd- spray and 3rd- spray of the operation with a record of 92,.12, 98.29 and 94.11 % at1- spray, while at 2- spray the average number of pest reduction was94.25,87.68 and 97.74 % , also, at 3- spray average number of pest reduction was 97.47, 85.55. and 95.52 %, respectively.

Table 4: Reduction percent of *Tetruncus urticae* after field operation of different insecticides treatments on soybean Glycine outside during 2019 and 2020 growing seasons

***Tetruncus urticae* 2019**				
treatments	1-spray	2-spray	3-spray	% mean reduction
Lambada cyalothrin	98.78	97.74	94.14	96.88
thiamexam	91.17	94.24	91.15	92.18
profenofos	95.57	98.58	98.48	97.54
LSD at 5 %	2.28	1.18	2.31	2.23
***Tetruncus urticae* 2020**				
Lambada cyalothrin	92.12	94.25	97.47	94.61
thiamexam	89.29	87.68	85.55	87.50
profenofos	94.11	97.74	95.52	95.79
LSD at 5 %	1.13	2.14	2.12	2.22

Data in table (5) showed the significant difference was attained in mean yield among the insecticidal treatment. The advanced mean grain yield was attained in all the insecticidal treatment in comparison to control treatments.profenofos recorded the topmost mean grain yield of 1465.32 kg/ feddan with 30.13 % increase in mean yield over control. Thiamethoxam treatments also recorded good range of mean yield 1470.92 kg/ feddan with 30.63 % increase in yield over control. Lambada cyalothrin gave 1430.66 kg/ feddan with 27.05 % increase in mean yield over control treatments, respectively

Table 5: Effect of some insecticide on average grain yield of soybean (kg) during 2019 and 2020 season.

Treatments	Rate of application	Yield Kg/ feddan	Yield Increased over control	% Yield Increased
Lambadacyalothrin	50ml/100litre	1430.66	304.67	27.05
Thiamethoxam	200gm/ fed	1470.92	344.93	30.63
profenofos	750cm/fed	1465.32	339.33	30.13
Control	-	1125.99	-	
LSD at 5%	-	105.33	-	

4. DISCUSSION:

In this study, Lambada cyalothrin, thiamethoxam, and profenophos at full recommended in 1st spray,2nd spray and 3rd spray showed significant goods for the mean reduction percent on *Aphis glycines,Bemisia tabaci, thrips tabaci and Tetruncus Urticae* populations. In addition, the effectiveness and residual effect of this germicide persisted up to 15 days after treatments. In addition, when outbreaks do in populations, insecticides treatments are the only effective tactic to suppress this pest and consequently stinking nonentity pests constantly got killed. The attained results are in agreement with those of several investigators**. HEMANT SWAMI1** et ***al*** **(2019)** Evaluate the efficacy of different biopesticides, viz., Nomuraea rileyi at 1x108 conidia/ lit, Beauveria bassiana at 1x109 CFU/ml minimum at 5 ml/lit, Metarhizium anisopliae at 1x109 CFU/ml minimum at 5 ml/lit, dipel at 1 kg/ha, spinosad 45 SC at 0.5 ml/lit, neem seed kernel extract (NSKE) at 5% and neem oil at 2% against foliage feeders of soybean namely, semi looper (Chrysodeixis acuta) and tobacco caterpillar (Spodoptera litura). The result revealed that all treatments were significantly superior over control. The mean larval population of C. acuta and S. litura ranged from 1.29 to 9.37 and 0.92 to 6.98 larvae per meter row length (mrl) at 3, 7 and 10 days respectively after the application of treatments. The treatments comprising Spinosad 45 SC at 0.5 ml/lit proved highly effective in reducing the population of C. acuta and S. litura with lowest overall mean

larval population of 4.71 and 3.02 larvae per mrl, respectively. Against *C. acuta* NSKE at 5% was least effective and against S. litura neem oil was observed as least effective with maximum over all mean larval populations of 7.75 and 4.97, respectively

Ayesha Akter1, *et al* (2015). Indicate that the Sumialfa 5EC at 2ml/L of water showed the best performance on growth and yield of soybean (Patel et al., 2019) cited that Thiacloprid at 60ga/ ha was effective insecticides agianst *Bemisia tabaci.* Also, they indicate that topmost yield of13.13 q/ ha, were recorded in the plot treated with Triazophosat 320ga.i. ha. The lowest yield of 8.13 q/ ha was recorded in control treatments**. (Tarun Kumar, *et al,* 2019)** concluded that Thiamethoxam 25 WG at 100 g/ ha was the most effective treatment followed by Imidacloprid17.8 SL at 500 ml/ ha, Acetamiprid 20 SP at 100 g/ ha,Quinalphos 25 EC at 1500 ml/ ha and Difenthiuon 50 WP at 600 g/ ha. Triazophos 40 EC at 1000 ml/ ha on belt beetle and stem porer and recorded the topmost grain yield of1441.66 kg/ ha with40.65 increase in yield over control. Other remaining treatments also recorded well range of yield i.e.1333.10 to1441.66 kg/ ha with30.08 to40.65 per cent increase in yield over control. Treatment T7 i.e. Triazophos 40 EC@ 1000 ml/ ha was provident and most profitable recorded (19.80) ICBR. This was followed by Thiamethoxam 25 WG at 100 g/ ha(16.14), Acetamiprid 20 SP at 100 g/ ha(15.71) and Difenthiuon 50 WP at 600 g/ ha was also provident and recorded14.81**. (Dominic, D *et al* 2012).** Cited that Both imidacloprid and thiamethoxam reduced thrips density compared with undressed soybean,Thiamethoxam was than imidacloprid in reducing adult thrips density at 5 wk after planting, and no significant differences in yield among any of the treatments or in the undressed controls**.(Dattatray Shirale 2009**). Cited that triazophos 40 ECat 800 ml/ ha doubly recorded less number of whiteflies at three, seven and ten days after scattering. **(Patil *et al*.1993)** reported that triazophos 40EC at 0.6kga.i. per ha as a voguish treatment reducing whitefly population in cotton reported that *B. thuringiensis* and *B. bassiana* recorded further yield than control. **(Reshma R, *et al,* 2015).** Cited that Emamectin benzoate5SG at 0.002 Triazophos 40 EC at0.06, Emamectin benzoate 5 SG at0.002, Fenvalrate 20 EC at0.01, Triazophos 40 EC at0.06 and Flubendiamide 20 WG at0.01 Triazophos 40 EC at0.06 were proved to be significantly effective in managing nonentity pests of soybean and attained comparatively topmost yield, net financial return and ICBR. All conditions proved safer to lady boo beetle andnon- phytotoxic. Hence, also concluded that above combinations set up salutary for the operation of soybean pest. (Salunke et al.(2004) reported that carbosulfan 25 DS 30 g/ kg seed, followed by thiamethoxam 70 WS at 3 g/ kg seed gave yield of soybean(27.57 kg/ ha)**. (Rajput *et al* 1996)** reported that two insecticides Quinalphos(0.05), followed by monocrotophos(0.05) gave maximum grain yield ranged from20.80 to22.43 kg/ ha. (Dahiphale et al ., 2007) reported that seed yield of soybean(2231 kg/ ha) was attained with phorate 10Gl**. (Balaji Vikram *et al*.2012)** reported that difenthiuron 50 WP, profenophos 50 EC and emamectin benzoate 5 SG replied in advanced grain yield of2800.00 to 3,100.00 kg/ ha. **Raju *et al.(* 2013**) scattering of recommended germicide Quinalphos 25 EC at 1500 ml/ ha was provident and utmost profitable recording(15.09). Also, our results indicate conditions were effective as flake treatments at 1st spray, 2nd spray and 3rd spray on Aphis glycines, thrips, whiteflies, and tranychus. Other investigators reported that imidacloprid showed satisfactory control of stinking pests**. (Maienfisch et al, 2001).** Such a difference in performance between imidacloprid and thiamethoxam has been reported the attained results are in agreement with those of several investigators. Misra(2002) set up that imidacloprid as thiamethoxam proved significantly superior against aphids(Aphis gossypii) and jassids) Amrasca biguttula) in okra**. Also,(El- Naggar and Zidan 2013).** Cited that all conditions convinced original effect after two weeks of treatment and, imidacloprid proved to be effective against aphids, jassids, and white cover. It could reduce for foliar sprays by at least four operations**. Also, these findings are in complete conformity with those of (Tufail et al. 1995, Saleem and Khan(2001),** who reported good control of sucking insects with this insecticides. Confidor 20 SL(imidacloprid) 250 ml/ acre was nearly inversely effective against the sucking insects like jassid, whitefly and thrips. **Hamed *et al*.(1997), Saleem and Khan(2001) and Saleem *et al*.(2001),** who set up this insecticides truly effective against the stinking insects of cotton in yield due to insecticides. **(Patil and Phadv(2014)** set up that significantly advanced yield Triazophos 40 EC at 800 ml/ ha was set up most superior in reducing the damage of belt beetle and stem cover and gave the topmost yield(2061 kg/ ha). **(Tarun Kumar *et al*.(2019)** recorded maximum yield(1960 kg/ ha) with Triazophos 40 ECat 750 ml/ ha treated field.Generally, work showed that tested conditions can be used effectively to control Aphis glycines, thrips, whiteflies, and mite and increase in yield soybean fields Effect of newer insecticides in

combination with Triazopho. were proved to be significantly effective in managing the major insect pests of soybean and obtained comparatively highest yield, net monetary return**. Vidya Simaiya *et al* (2018).**cited that the pods per plant, seeds per pod, grain yield per plant and seed index were higher in combined application of indoxacarb14.5SC 87g ai/ha + imazathapyr10SL 100g ai/ha followed by rynyxypyre20SC 120g ai/ha + imazathapyr 10SL 100g ai/ha. The seed yield (1.89t/ha) was significantly higher with application of indoxacarb14.5SC 87g ai/ha +imazathapyr10SL 100g ai/ha than all treatments except application of rynyxypyre20SC 120g ai/ha + imazathapyr10SL 100g ai/ha (1.69t/ha). **Harish Kumar Netam1, *et al* (2013)** reported that Imidacloprid 600 FS when applied as seed treatment at the rate of 0.75 g.a.i/kg seed was most effective against the sucking pest's upto four week of seed germination with least 6.71 insect/plant. It was followed by Imidacloprid 600 FS at 0.60 g.a.i./ kg seed and Thiamethoxam 70 WS at 2.1 g.a.i./kg seed with 9.66 and 11.02 sucking pests/plant. **Mishra ,S.K. and Vikas Gupta (2017).** Evaluate the effectiveness of Flubendiamide 480 SC, Indoxacarb 14.5 Sc , Spinosad 45 SC, Thiodicarb 75 WP , Emmamectin benzoate 5 SG , Rynaxypyre 20 Sc , Fipronil 5% SL, Imidacloprid 17.8 SL, Thiomethoxom 25% WG, Chloropyriphos 20 EC.insecticides against tobacco caterpillar, Spodoptera litura. They cited that all the insecticides were capable of keeping the population of Spodoptera litura larvae at the minimum level and significant differences were noted among the treatments at 1, 2, 3 and 7 days after first and second spray of insecticides compared to untreated check. The treatment (Flubendiamide 480 SC) exhibited its superiority by registering the lowest larval population of 0.90 and 0.20 per meter row length during first and second spray, respectively. The overall order of effectiveness of these insecticides against S.litura was found to be Flubendiamide 480 SC > Indoxacarb 14.5 Sc > Spinosad 45 SC > Thiodicarb 75 WP > Emmamectin benzoate 5 SG > Rynaxypyre 20 Sc > Fipronil 5% SL > Imidacloprid 17.8 SL > Thiomethoxom 25% WG > Chloropyriphos 20 EC. The highest seed yield of 16.88 q/ha. was obtained in the plots treated with Flubendiamide 480 SC. The next effective treatments was Indoxacarb 14.5 SC followed by Spinosad 45 SC recorded 14.90 and 14.77 q/ha. The protection efficiency was higher being 88.27 percent with 11.72 percent losses in seed yield in Indoxacarb 14.5 SC. Maximum yield loss 43.72 percent was noticed in untreated crop against 11.72 to 37.79 percent in different insecticidal treatments**.** **Motaphale A.A. et al (2017),** revealed that at three days after first and second sprays the rynaxypyr (64.52%) and emamectin benzoate (58.84% reduction) respectively proved to be the most effective. At seven days more percent reduction in larval population found in chlorpyriphos (53.76 %) and quinalphos (58.59%) where as at 14 days the diflubenzuron (59.72%) and quinalphos (53.42%) found to be the more effective after first and second sprays rational against Spodoptera litura in soybean, respectively. Significantly higher seed yield was recorded in rynaxypyr 20 SC followed by spinosad 45SC. The highest gross income and net profit was recorded in rynaxypyr 20 SC. **Sanjeev, K. D., (2020).**The seed yield per plant was significantly high for the lambda-cyhalothrin-cum-thiamethoxam (LT) (20.51 g) and low for the fenitrothion (11.51 g). This results showed that the type of insecticide could significantly affect the yield of the soybean.

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فعالية المبيدات الحشرية لامدا سيهالوثرين وثيامثوكسام والبروفينوفوس ضد بعض الآفات الحشرية الماصة والعنكبوت الأحمر في فول الصويا وتأثيرها الجانبي على محصول الحبوب

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معهد وقاية النباتات . الجيزة. الدقي . مصر

الملخص العربي:

تم تقييم فعالية ثلاثة مبيدات حشرية مختلفة (لامبادا سيهالوثرين، ثيامكسام وبروفينوفوس) بالمعدل الموصى به لمكافحة بعض الآفات الحشرية الماصة لفول الصويا، وهي: *Aphis glycines*، *Bemisia tabaci* و *Thrips tabacea* . وكذلك حلم العنكبوت الأحمر *Tetruncus urticae*. أجريت التجارب في ظل ظروف حقلية في محافظة بني سويف، مصر خلال موسمين متتاليين 2019 و2020. تم تطبيق كل مبيد حشري 3 مرات، بفاصل 15 يومًا باستخدام الرشاش الظهري أشارت البيانات التي تم الحصول عليها إلى أن جميع المبيدات الحشرية المختبرة كانت كافية للسيطرة على أعداد الآفات المختبرة. كما لوحظ وجود فروق معنوية بين الرشات الثلاث المطبقة من المبيدات الحشرية مقارنة بمعاملات المقارنة. ومن ناحية أخرى، تم الحصول على أعلى إنتاجية من البذور في الأراضي المعاملة بهذه المبيدات الحشرية في فترات مختلفة من المعاملات مقارنة بمعاملات المقارنة.