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## Performance of Certain Insecticides against *Pegomia mixta* on Sugar Beet Crop in Egypt

Massoud, M. A.<sup>1</sup>, A. Abdel-Megeed<sup>1</sup>., R. A. Shower<sup>1</sup>, A.S.T. Barakat<sup>2</sup>, M. K. Abdelfatah<sup>1</sup> and A.M. Kordy<sup>1</sup>

1-Plant Protection Dept., Faculty of Agric. (Saba Basha) – Alex. Univ., Egypt.

2-Field Crop Pests Research Dep., Plant Protection Research Institute, Agricultural Research Center, Sabahia, Baccous, Alexandria, Egypt.

\*E-Mail: [aagric@yahoo.com](mailto:aagric@yahoo.com)

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### ABSTRACT

The present study was carried out throughout the two successive seasons of 2018/2019 and 2019/2020 at Nubaria region, Behaira Governorate, Egypt. Results revealed that during the first season (2018/2019), the general mean of reduction percentages throughout the whole inspection period showed that profenofos and spintoram were the most effective treatments against *P. mixta* which infest sugar beet where the highest general mean of reduction percentage were 92.43% and 83.22% reductions, followed by reductions of 66.76%, 62.10% and 58.57% for azadirachtin, Tuflobenzuron and Emamectin benzoate., respectively, without significant variations. The least effective was diazinon 42.43, Indoxacarb 30.08, Lambda-Cyhalothrin 28.81%, and thiamethoxam 12.43%, subsequently, without significant differences. Moreover, in the second season (2019/2020), the highest general mean of reduction percentage showed profenofos and spintoram recorded the highest general means of 91.55%, and 68.36% reductions, successively, followed by mean reductions of 65.08%, 64.44%, and 52.2% for Emamectin benzoate, Diazinon, and tuflobenzuron, respectively, without significant variations. The least effective ones have corresponded to Azadirachtin 48.27%, Indoxacarb 24.67%, Lambda-Cyhalothrin 16.24%, and thiamethoxam (11.55%) subsequently, with significant differences.

The economics and profits were calculated for some insecticides singly to give comparatively high yields compared to the control. The insecticide of Spintoram, indoxacarb, and Azadirachtin gave high root yields of 40, 39 and 39 ton/fed, in respect, on average, especially the insecticide of Spintoram represented the highest production of sugarbeet yield and the averages of top yields were 7, 6 and 6 kg/fed for the insecticide of spintoram, indoxacarb, and azadirachtin, respectively. Spintoram gave the highest (L.E. 25390) net returns/fed. and subsequently indicated the utmost profit of one Egyptian pound of L.E 9.26. Azadirachtin recorded L.E. 23902 and L.E. 7.39 for the net returns/fed. and the profits of one Egyptian pound investment, in sequence, compared to the untreated check.

## INTRODUCTION

Sugar beet (*Beta vulgaris* L.) is one of the main two sugar crops in Egypt. It is cultivated in 608.6 thousand feddans with an average production of about 18.5 tons per feddan in 2018/2019 (Annual report of sugar crops council, 2020). Indeed, the gap between consumption and sugar production was estimated at 5000 tons (Afifi, 2001). Thus, increasing the cultivated area and maximizing yield production of sugar beet have been considered as strategic goals of the ministry of agriculture in Egypt. The importance of this crop is not only to produce sugar but also to use its top in feeding animals due to the high nutritive value of the sugar beet canopy. Besides, sugar beet thrives well in poor, saline, alkaline, and calcareous soils; especially, in the newly reclaimed soils.

Sugar beet plants are attacked by numerous insect pests during their different growth stages (Mousa, 2005, El-khouly, 2006, Amin *et al.*, 2008 and Fouad, 2011). Sugarbeet crop attracts considerable numbers of the sugar beet fly, *Pegomia mixta* Vill. (Diptera: Anthomyiidae) which negatively decreases the quantitative and qualitative sugar yield. This sugarbeet fly is a very serious insect pest that threatens sugarbeet plants (Zarif and Hegazi, 1990, Cooke and Scott, 1993 and Kandil, 2016). *P. mixta* is a key pest of sugar beet in Egypt since it causes great damage and crop loss (Al-Habshy *et al.*, 2018). The insect has 3-4 peaks of eggs, while the larval population recorded 2-3 peaks of abundance. The highest average number of eggs and larvae observed in April. (Awadalla *et al.*, 1991 and 1992; Youssef 1994; Abou-Attia 1999; Abou-ElKassem 2010 Bazazo 2010 and Bazazo *et al.* 2017) (Al-Habshy *et al.*, 2018).

Therefore, the current study aimed to evaluate the efficacy of some novel insecticides that represent different chemical groups singly on the larvae of the sugarbeet fly, *Pegomia mixta* Vill. during the winter seasons of 2018/2019 and 2019/2020., and calculate the economics and profits of applying some insecticide mixtures against both the abovementioned insect pest infesting sugar beet plants in the two seasons of 2018/2019 and 2019/2020.

## MATERIALS AND METHODS

### Field Design:

Field experiments were carried out on a private farm in Nubaria region, Egypt (30.6667°N 30.0667°E). These field experiments were conducted during the two winter growing seasons of sugar beet in 2018/2019 and 2019/2020. The experimental plots were cultivated with sugar beet seed (Lodata cv.) as a polygerm type on 5<sup>th</sup> October in both seasons. However, the harvesting date was on 25<sup>th</sup> April in the 1<sup>st</sup> and 2<sup>nd</sup> seasons.

A complete block randomized design with three replications was used. The replicate area was 21 m<sup>2</sup> (1/200 fed), with 6 m in length and 3.5 m width i.e. six ridges. Sugar beet balls were hand sown 1ball/hill using the dry sowing method on one side of the ridge in hills 15 cm apart and irrigated immediately after sowing directly. All other agricultural practices were applied at the recommendations of the Egyptian Ministry of Agriculture.

### Field Experiments:

Nine insecticides were tested singly against the larvae of the sugarbeet fly, *P. mixta* during the winter seasons of 2018/2019 and 2019/2020. The insecticides were sprayed when the infestation reached the economic threshold level according to the recommended doses of the Egyptian Ministry of Agriculture. These insecticides were applied at the recommended doses of the Egyptian Ministry of Agriculture against the sugar beet fly, *Pegomia mixta*.

Buffer areas of two ridges between every two adjacent plots were planted with sugar beet plants to avoid any contamination or interference of spray drift. The evaluated chemicals with their rates of applications were shown in Table (1).

**Table 1:** Rates of the used insecticides during the two sugarbeet winter seasons of 2018/2019 and 2019/2020.

Chemical group	Active ingredient	Trade name	Application rate
Spinosynes	Spinetoram	Radiant 12% SC	100 cc/ Feddan
Organophosphates	Profenofos	Selecron 72% EC	750 cc/ Feddan
Oxadiazine	Indoxacarb	Avaunt 15% SC	105 cc/ Feddan
Avermectines	Emamectin benzoate	New claim® 5% WG	100 g/ Feddan
Pyrethroids	Lambda-Cyhalothrin	Axon® 5% EC	200 cc/ Feddan
Organophosphates	Diazinon	Diazinon 60% EC	750 cc/ Feddan
Diacylhydrazines	Tuflobenzuron	Nomolt 24% SC	1/2 cc/ Feddan
Limonoids (Triterpenoides)	Azadirachtin	Achock ® 5 % EC	5 cc/ 1 liter water
Nicotinoid	Thiamethoxam	Actara® 25% WG	20 g/ 100 liter water

EC =Emulsifiable Concentration, SC =Suspension Concentration and WG =Granules or Tablets Water Dispersible.

**Sampling Technique:**

For counting the occurrence of *P. mixta* (larvae)/ 15 plants were collected at random from each plot before treatments and at 1, 3, 5, 7 and 10 days after initiating the insecticidal spray.

**Infestation Reduction:**

The infestation of both insects has investigated pre-treatment and after 1, 3-, 5-, 7-, and 10-days post-treatment, the mean reduction percentages were calculated according to Henderson and Tilton (1955). the equation as follows:

$$\text{Reduction \%} = 1 - \left[ \frac{A}{B} \times \frac{C}{D} \right] \times 100, \text{ where}$$

R: % Mean reduction of the insect population.

A: % Mean no. of larvae in treatment after spraying.

B: % Mean no. of larvae in treatment before spraying.

C: % Mean no. of larvae in untreated check (control) before spraying.

D: % Mean no. of larvae in check after spraying.

**Economics and Profits of Certain Singly Insecticides as Compared with Control against *P. mixta* Infesting Sugarbeet Plants During the Second Sugarbeet Winter Season of 2019/2020:**

In this regard, the experiment was carried out in the same private field, for computing the economics and profits for *P. mixta* by applying some singly insecticides. The experimental area was divided longlidunally into 3 blocks; in turn, each block was subdivided into 10 plots of 21 m<sup>2</sup>, each. Buffer areas of two ridges between every two adjacent plots were planted with sugar beet plants to avoid any contamination or interference of spray drift. Each insecticide was applied once coinciding with the economic thresholds (ETs) for *P. mixta*. Sugarbeet plants were sprayed with some insecticides singly by using a Knapsack sprayer (20 l), at the rate of 400 liters / feddan.

Singly insecticides, root yields (Ton/fed.), top yields (Kg/fed.), % sucrose, roots income (L.E / Fed.), top yield income (L.E / Fed.), gross income (L.E / Fed.), input costs

(total costs) included both insecticide costs (L.E / Fed.) and labour costs (L.E / Fed.), net returns (L.E / Fed.), additional returns over the untreated control, and profit for one Egyptian pound investment (L.E / Fed.). These consequent calculations were done, in order, to determine the most profitable singly insecticides to be followed by the growers according to the procedure of Le-Docte (1927) and Kandil (2016).

#### Statistical Analysis:

Data of this study were subjected to the regression line analysis for the determination of the analysis of variance ANOVA using "F" Test following the Randomized Complete Block Design (RCBD), with three replications for each treatment for the remaining experiments. The least significant differences (L.S.D) at the  $0.05 \leq$  level were determined according to a computer program (Costat software, 1988) and Duncan's Multiple Range Testes modified by Steel and Torrie (1981) to compare the mean numbers of the different treatments of the inspected insects.

## RESULTS AND DISCUSSION

### Effect of some insecticides against the sugarbeet fly, *P. mixta* infesting (Lodata) cv. sugarbeet plants during both seasons of 2018/2019 and 2019/2020.

The included results in Tables (2 and 3) pointed to the reduction percentages of the sugarbeet fly, larvae of *P. mixta* after 1, 3, 5, 7, and 10 days from initiating the spray of the assigned chemicals on sugarbeet plants during the two successive winter seasons of 2018/2019 and 2019/2020.

Results of the first season of 2018/2019 were listed in Table (2) and shown in Fig. (1). Data referred to the tested compounds, efficacy on the key insect pest, as they have been varied according to their mode of action, for example, as a general mean, profenofos and spintoram came on the top of all the treatments, in recording the highest general means 92.43% and 83.22% reductions, followed by reductions of 66.76%, 62.10% and 58.57% for azadirachtin, Diazinon and Emamectin benzoate, respectively, without significant variations. The least effective was Tuflobenzuron 42.43%, Indoxacarb 30.08%, lambda-cyhalothrin 28.81%, and thiamethoxam 12.43%, subsequently, without significant differences also as shown in (Table, 2 and Fig. 1).

In the second season of 2019/2020, the statistical analysis showed that profenofos and spintoram topped all the tested treatments, as they recorded the highest general means of 91.55%, and 68.36% reductions, successively, followed by mean reductions of 65.08%, 64.44%, 52.20% and 28.27% for emamectin benzoate, diazinon, tuflobenzuron, and azadirachtin, respectively, without significant variations. The least effective ones were corresponded to indoxacarb 24.67%, Lambda-Cyhalothrin 16.24%, and thiamethoxam (11.55%) subsequently, with significant differences, as concluded in (Table, 3 and Fig. 2).

Results of this study, to some extent, were in agreement with those of other researchers. For example, in Egypt, Bassyouny and Khalafalla (1996) reported that carbosulfan was significantly effective than profenofos against the sugarbeet fly, *P. mixta* in both irrigated and non-irrigated sugarbeet fields. It appeared also that irrigation did not significantly affect the toxicity of carbosulfan to the considered insect pest. Abo El-Ftooh *et al.* (2012) observed that all the tested insecticides in two locations significantly reduced the population density of *P. mixta* on sugar beet plants compared to the check treatment. The population has been increased as the elapsed time increased in the treatment of Selecron 72%<sup>®</sup> and was the most effective chemical against *P. mixta* followed by Tracer 24%<sup>®</sup>, Vertimec 1.8%<sup>®</sup>, and Nudrin 90%<sup>®</sup>. Kandil (2016) found that profenofos, chlorantraniliprole, azadirachtin, and imidacloprid were the most potent chemicals among all treatments against *P. mixta* during 2014/2015 and 2015/2016 winter seasons.

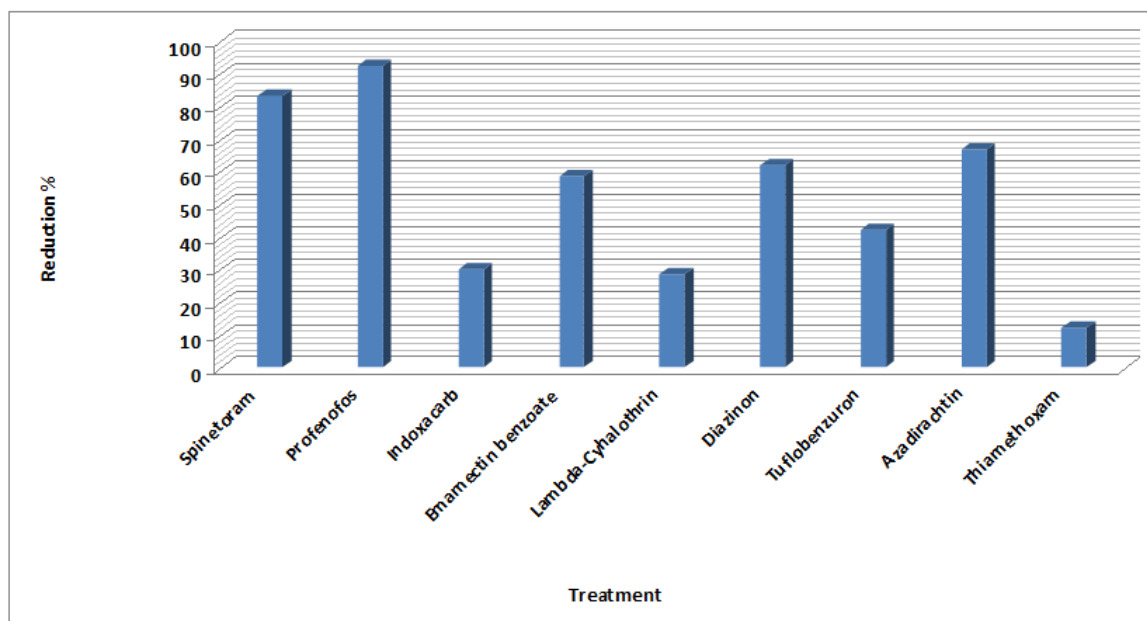
**Table 2:** Efficacy of some insecticides sprayed singly beside the larvae of *P. mixta* infesting (Lodata) cv. sugarbeet plants during the first season of 2018/2019.

Treatments	Pre-treatment	1 <sup>st</sup> season (2018/2019)										General mean Reduction percentages (%)
		Reduction percentages (%) of the sugar beet fly, <i>P. mixta</i> after 1, 3-, 5-, 7- and 10-days post initiating the insecticidal spray										
		1 day		3 days		5 days		7 days		10 days		
A	A	R	A	R	A	R	A	R	A	R		
Spinetoram	10.93a	4.66a	59.39abc	2.2a	57.22abc	0.00a	100a	0.00a	100a	0.00a	100a	83.32 <sup>a</sup>
Profenofos	10.60a	3.00a	73.01a	0.3a	89.13a	0.00a	100a	0.00a	100a	0.00a	100a	92.42 <sup>a</sup>
Indoxacarb	12.53a	8.40a	33.65bcd	5.46a	36.70bcd	2.53a	56.54bc	2.13a	17.41cd	2.13a	6.17c	30.09 <sup>cdef</sup>
Emamectin benzoate	11.06a	8.33a	28.27cde	3.33a	85.43a	1.66a	51.69bc	0.93a	47.46bc	0.00a	100a	62.57 <sup>abc</sup>
Lambda-Cyhalothrin	11.00a	6.80a	41.12abcd	2.33a	68.95ab	1.73a	28.05cd	1.73a	6.22d	1.93a	0.00c	28.86 <sup>def</sup>
Diazinon	12.13a	11.20a	12.06de	9.66a	21.84de	2.33a	76.62ab	0.00a	100a	0.00a	100a	62.10 <sup>abcd</sup>
Tuflobenzuron	13.13a	13.66a	0.00e	9.33a	33.48cde	2.66a	73.25ab	0.93a	65.70b	0.60a	39.74b	42.43 <sup>bcd</sup>
Azadirachtin	11.80a	4.33a	65.05ab	3.33a	30.30cde	2.13a	38.01c	0.00a	100a	0.00a	100a	66.67 <sup>ab</sup>
Thiamethoxam	11.46a	10.13a	12.51de	8.33a	19.92de	6.80a	23.43cd	6.80a	1.90d	6.93a	4.38c	12.43 <sup>ef</sup>
Untreated Check	9.20a	9.66a	-	10.66a	-	11.00a	-	11.73a	-	12.13a	-	-
LSD 0.05												33.57

**A:** mean number of larvae / plants.

**R:** reduction percentage of infestation after insecticide application.

\* Means followed by the same letter(s) in each column are not significantly different at  $P \leq 0.05$  level.



**Fig. 1.** General mean reduction percentages against the larvae of *P. mixta* infesting (Lodata) cv. sugarbeet plants during the first season of 2018/2019.

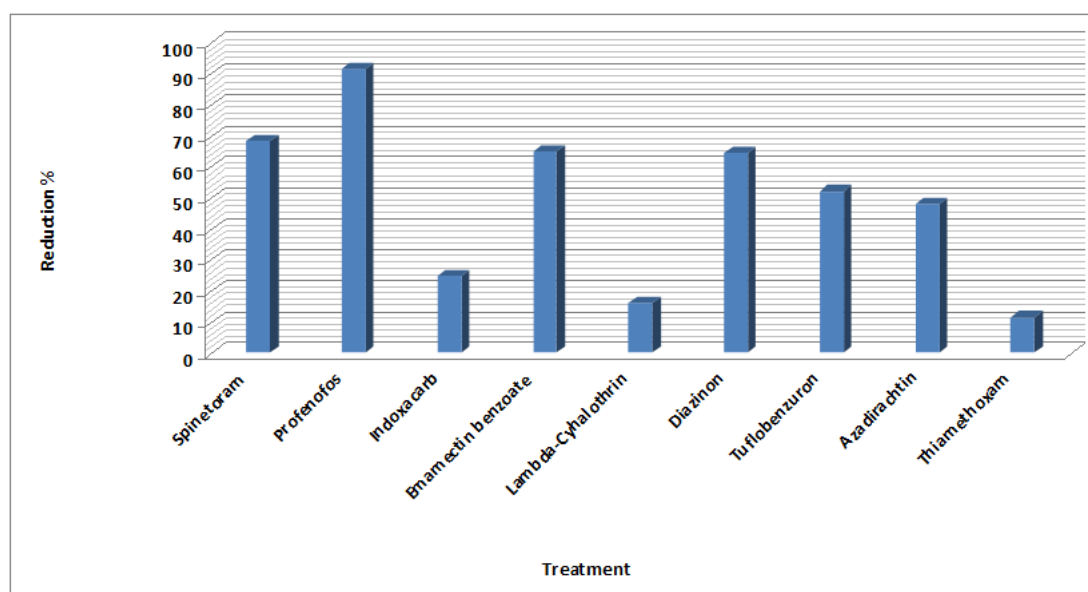
**Table 3:** Efficacy of some novel insecticides sprayed singly against the larvae of *P. mixta* infesting (Lodata) cv. sugarbeet plants during the second season of 2019/2020.

Treatments	Pre-treatment	2 <sup>nd</sup> season (2019/2020)										General mean Reduction percentages (%)
		Reduction percentages (%) of the sugar beet fly, <i>P. mixta</i> after 1, 3-, 5-, 7-, and 10-days post initiating the insecticidal spray										
		1 day		3 days		5 days		7 days		10 days		
		A	R	A	R	A	R	A	R	A	R	
Spinetoram	11.33a	8.00a	30.33ab	5.33a	35.11bc	1.33a	76.59ab	0.00a	100a	0.00a	100a	68.36 <sup>ab</sup>
Profenofos	12.80a	5.46a	57.78a	0.00a	100a	0.00a	100a	0.00a	100a	0.00a	100a	91.55 <sup>a</sup>
Indoxacarb	12.13a	10.66a	13.02b	4.33a	60.44b	2.80a	8.01bc	2.80a	1.91b	1.20a	0.00b	24.67 <sup>cd</sup>
Emamectin benzoate	10.66a	8.00a	25.72ab	5.66a	25.35cd	1.55a	74.31ab	0.00a	100a	0.00a	100a	65.08 <sup>ab*</sup>
Lambda-Cyhalothrin	10.00a	8.80a	12.90b	5.33a	41.01bc	4.13a	27.32cd	4.80a	0.00b	5.13a	0.00b	16.24 <sup>cd</sup>
Diazinon	11.66a	9.00a	23.60ab	6.00a	35.07bc	2.33a	63.57b	0.00a	100a	0.00a	100a	64.44 <sup>ab</sup>
Tuflobenzuron	12.66a	13.13a	0.00b	10.33a	23.38cd	2.66a	75.84ab	0.00a	100a	0.00a	100a	59.84 <sup>ab</sup>
Azadirachtin	12.00a	8.40a	30.71ab	5.46a	36.70bc	2.53a	56.54bc	2.13a	17.41b	0.00a	100a	48.27 <sup>bc</sup>
Thiamethoxam	11.46a	10.13a	12.51b	8.33a	19.92cd	6.80a	23.43cd	6.80a	1.90b	7.66a	0.00b	11.55 <sup>d</sup>
Untreated Check	12.53a	12.66a	-	13.00a	-	13.86a	-	14.13a	-	15.06a	-	-
LSD 0.05												34.41

**A:** mean number of larvae and adults / plant.

**R:** reduction percentage of infestation after insecticide application.

\* Means followed by the same letter(s) in each column are not significantly different at  $P \leq 0.05$  level.



**Fig. 2.** General mean reduction percentages against the larvae of *P. mixta* infesting (Lodata) cv. sugarbeet plants during the second season of 2019/2020.

### Economics and Profits of Insecticide as Compared with Control against *P. mixta* Infesting (Lodata) cv. Sugarbeet Plants During the Second Season of 2019/2020:

The control costs and benefits were determined for *P. mixta* in the sugarbeet plants (Lodata cultivar) during the second season of 2019/2020.

The economics and profits were calculated for some insecticides singly to give comparatively high yields compared to the control.

Assuming that all the plots that were sprayed with the insecticides singly from Spinetoram to Thiamethoxam and controls were similar in their production inputs (constant service costs) and differ only in the control costs. Therefore, the accountant particulars concerning their values were explained clearly as follows:

The insecticide of Spintoram, indoxacarb, Lambda-Cyhalothrin, and Azadirachtin gave high root yields of 40.00, 39, 39, and 38ton/fed, in respect, on average, especially the insecticide of Spintoram represented the highest production of sugarbeet yield.

Likewise, the averages of top yields were 7, 6, 5, and 6 kg/fed for the insecticide of Spintoram, indoxacarb, Lambda-Cyhalothrin, and Azadirachtin, respectively. It is worth mentioning that sugarbeet roots increased parallel to the increase in top yields. The insecticide spray increased the sugarbeet production (roots and tops) at varying levels rather than the controls. Spintoram gave the highest (L.E. 25390) net returns/fed. and subsequently indicated the utmost profit of one Egyptian pound of L.E 9.26. Azadirachtin recorded L.E. 23902 and L.E. 7.39 for the net returns/fed. and the profits of one Egyptian pound investment, in sequence, compared to the untreated check. On the other hand, Indoxacarb recorded L.E. 24136 and L.E. 6.42, followed by Lambda-Cyhalothrin L.E. 23515 and L.E. 6, for the same net returns and profits, successively. Emamectin benzoate recorded also L.E. 22350 and L.E. 2, for the same net returns and profits, consequently for each. Thiamethoxam, Profenofos and Diazinon showed the least net returns of 22220, 21910 ,and 21660 for net returns and 1.21, 0.56, and 0.30 for-profits, in respect, compared to the check.

Therefore, the applied singly insecticides could be arranged in descending order as follows: Spintoram > Azadirachtin > indoxacarb > Lambda-Cyhalothrin > Tuflobenzuron > Emamectin benzoate > Thiamethoxam > Profenofos > Diazinon that means Spintoram, Azadirachtin and indoxacarb gave the highest profits to the grower but Tuflobenzuron > Emamectin benzoate > Thiamethoxam > Profenofos > Diazinon gave the least profits for the producer.

It is of great importance to conclude that the check (treated with no chemicals) gave L.E 21757.5 as net returns/fed. and that was higher than that of Spintoram; this phenomenon was due to the least total costs/fed. as compared to the higher costs in the applied insecticide of Azadirachtin, indoxacarb, Lambda-Cyhalothrin, Tuflobenzuron, Emamectin benzoate, Thiamethoxam, Profenofos, and Diazinon (Table, 4).

**Table 4:** Economics and profits of certain singly insecticide as compared with control against *P. maxi* infesting (Blackman and Eastop) cv. sugarbeet plants during the second winter season of 2019/2020.

Insecticides Mixtures (Treatments)	No. of insecticide applications	Root yields (ton / feddan)	Top yields (ton / feddan)	% sucrose	Roots income (L.E)(a)	Top yields income (L.E)(b)	Biological returns (Gross income / feddan) (L.E) (c)	Input costs / feddan (L.E)			Net returns / feddan (L.E) (f)	Additional returns over untreated control (L.E) (g)	Profit of one Egyptian pound investment (L.E) (h)
								Treatments costs / feddan (L.E)	Labour wages / feddan (L.E) (d)	Total costs / feddan (L.E)(e)			
Spintoram	1.00	40.00	7.000	15.5	25200	560	25760	190	200	390	25370	3612.5	9.26
Profenofos	1.00	35.00	6.000	15	21700	480	22180	70	200	270	21910	152.5	0.56
Indoxacarb	1.00	39.00	6.000	14.7	23946	560	24506	170	200	370	24136	2378.5	6.42
Emamectin benzoate	1.00	37.00	5.500	14	22200	440	22640	90	200	290	22350	592.5	2.00
Lambda-Cyhalothrin	1.00	39.00	5.000	14	23400	400	23800	85	200	285	23515	1757.5	6.00
Diazinon	1.00	36.00	5.000	14	21600	400	22000	140	200	340	21660	97.5	0.30
Tuflobenzuron	1.00	37.00	5.000	14.4	22496	400	22896	140	200	370	22526	768.5	2.00
Azadirachtin	1.00	38	6.000	15.2	23712	480	24192	90	200	290	23902	2144.5	7.39
Thiamethoxam	1.00	37.00	5.000	14	22200	400	22600	180	200	380	22220	462.5	1.21
Untreated Check	0.00	35.00	4.000	14.62	21437.5	320	21757.5	0	0	0	21757.5	0	0

(a) Worked out at L.E 600 / ton including an increase of L.E 100 for the early roots delivery to the factory and L.E. 20 for every increase over 14% sucrose.

(b) Worked out at L.E 80 / ton.

(c) Worked out as summation (Σ) of roots income + top yields income.

(d) Worked out at L.E 200 / feddan × No. of sprays.

(e) Total costs of control / feddan = treatments costs + labour wages.

(f) Net returns / feddan = (Gross income / feddan) – (Total costs / feddan)

(g) Additional returns = Net returns of any mixture – control returns.

(h) Profit for one Egyptian pound = Additional returns ÷ Total costs.



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## ARABIC SUMMARY

تقييم بعض المعاملات ضد ذبابة أوراق البنجر التي تصيب محصول بنجر السكر في منطقة النوبارية

\* مجدي عبد الظاهر مسعود، أحمد محمد عبد الفتاح، راضي عبد المجيد شاور، احمد صبحي بركات، مدحت خميس  
عبد الفتاح، احمد محمد كردى

\* قسم وقاية النبات – كلية الزراعة (سابقا باشا) – جامعة الإسكندرية – مصر.

أجريت الدراسة الحالية خلال الموسمين 2019/2018 و2020/2019 في منطقة النوبارية بمحافظة البحيرة، مصر. وقد أظهرت النتائج أنه خلال الموسم الأول (2019/2018) أن المتوسط العام لنسب خفض الإصابة خلال فترة الفحص بأكملها أن البروفينوفوس والإسبينتورام كانا أكثر فاعلية ضد ذبابة أوراق البنجر حيث كان أعلى متوسط عام لنسبة خفض الإصابة تقدر بـ 92.43% و 83.22% على الترتيب يليه انخفاض بنسبة 66.76% ، 62.10% و 58.57% لأزاديراختين وتوفلوبنزورون وبنزوات إيمامكتين على التوالي بدون وجود فروق معنوية. بينما في الموسم الثاني (2020/2019) ، سجل أعلى متوسط عام لنسبة خفض الإصابة بنسبة 91.55% ، 68.36% لكل من البروفينوفوس والإسبينتورام على التوالي يليه متوسط خفض بنسبة 68.36% و 62.10% و 42.43% لإيمامكتين وبنزوات ، ديازينون وتوفلوبنزورون على التوالي بدون فروق معنوية.

كذلك تم حساب اقتصاديات وأرباح بعض المبيدات منفردة لإعطاء غلة عالية نسبياً مقارنة بالغير معاملة. أعطت المبيدات الحشرية سبينتورام ، إندوكسكارب ، وأزاديراختين محصول جذر مرتفع بلغ 40 ، 39 و 38 طن / فدان في المتوسط .بينما أعطى Spintoram أعلى عائد / فدان (25370 جنيهه) بنسبة عائد للجنية المصرى تقدر بـ 9.27 يلية الأزاديراختين بنسبة عائد/ فدان (23902 جنيهه) و نسبة عائد للجنية المصرى تقدر بـ 7.39 على التوالي مقارنة بالغير معاملة.