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Influence of Some Insecticides against *Spodoptera littoralis* and *Aphis gossypii* and their Associated Predators in Potato Fields

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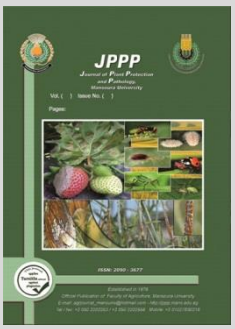

ABSTRACT

This study was conducted in potato fields at Banha city Qalyubia Governorate, during the 2022 and 2023 seasons where Senator (flonicamid), Chess (pymetrozine), and Closer (sulfoxaflor) insecticides were evaluated against *Spodoptera littoralis* and *Aphis gossypii*, and their associated predators. According to the results, pymetrozine was the most effective compound against the *S. littoralis*, followed by flonicamid, and sulfoxaflor was the least effective compound. The residual effect showed mortality percentage of cotton leafworm larvae ranging from 86.2 to 92.2% and 78 to 96.5% for the 2022 and 2023 seasons, respectively and the general mean reduction percentage for *A. gossypii* ranging from 86.5 to 86 % for season 2022 and 86.2 to 83.9 % for season 2023. The results clearly showed that the tested compounds caused a decrease of less than 50% in the numbers of the biological enemies associated with them (*Coccinella undecimpunctata* and *Chrysoperla carnea*) after treatment during the two seasons. Therefore, the tested insecticides were less harmful to predators and had an effective effect on the pests under study.

Keywords: *Spodoptera littoralis*, *Aphis gossypii*, predators

INTRODUCTION

Potatoes (*Solanum tuberosum* L.) is ranked the fourth worldwide after wheat, rice, and maize. It makes up roughly 22% of all vegetables and 40% of all root and tuber crops grown worldwide (FAO, 2001). The potato (*Solanum tuberosum* L.) is one of the most important food crops in Egypt. The crop is vulnerable to a number of insect pests and the most serious pests are the cotton leaf worms and cotton aphids (*S. littoralis* Boisd and *A. gossypii* Glover, respectively).

Typically, potatoes are propagated through seed tubers, which contain a variety of viruses including PVX, PVY, PLRV, and others that are spread by aphids (Verma and Chandla, 1999). Aphids' capacity to propagate viruses causes a rapid deterioration of seed supplies and a 40–85% decrease in potato output (Khurana, 1999 and Chandla and Verma, 2000). It has been revealed that over 40 aphid species are vectors of several potato viruses (Salazar, 1996). In Egypt, the cotton leafworm *S. littoralis* is regarded as one of the most dangerous and damaging pests to cotton, other agronomic crops, and vegetable crops (Magd El-Din and El-Gengaihi, 2000). It is a significant cotton pest in Southern Europe, the Middle East, and Africa. According to Abdul-Wahab (2002) and Kandil *et al*. (2003), larvae are widely recognized for their ability to consume leaves from practically every type of plant, resulting in significant damage to the crops. Up until 2000, children are mostly instructed to hand-pick egg masses early in the season as part of pest management programs, and insecticides are then applied with the intention of their larvicidal effects. It is illegal and limited to use children for egg-mass collection, nonetheless, as a result of the recent universal declaration of children's rights (Abd-Elsamed *et al*., 2011). In order to address the shortage of labourers gathering *S. littoralis* egg masses, it was thought vital to identify recently created compounds with some promise. The traditional insecticides are losing their effectiveness against these insect pests quickly, either because insects are developing tolerance to them or because of their residual toxicity issues, or both. According to studies by Morita *et al*., 2007 and Naik *et al*., 2018, flonicamid is a pyridinecarboxamide chemical has systemic and cross-plate activity and provides long-term control. It quickly suppresses aphid feeding behaviour and is thought to be quite harmless for natural enemies. Pymetrozine, a pyridine azomethine chemical, prevents aphids from penetrating their stylets, resulting in an instantaneous stop to feeding. According to Sephser *et al*. (2002), it is harmless for nontarget arthropods and has a high degree of selectivity as well as low mammalian toxicity. Sulfoxaflor is a novel class of sulfoximines, a type of insecticide intended for use against insects that feed on sap. It works differently from other insecticides acting at nicotinic acetylcholine receptors (nAChRs) (Zhu *et al*., 2010).

Thus, the aim of this study was to assess, the effects of three insecticides against *S. littoralis*, *A. gossypii*, and their associated predators under both laboratory and field conditions.

MATERIALS AND METHODS

Tested Insecticides:

The compounds are belonging to several chemical groups, and commercial formulations were used in its preparation as shown in Table (1).

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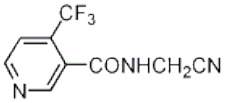
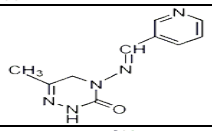
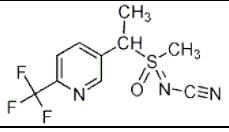
Table 1. The insecticides were tested against *Spodoptera littoralis* and *Aphis gossypii*.

Trade name	Common name	Recommended dose	Company name	Chemical structure
Senator 50% WG	Flonicamid	20 g/100 liter water	Spark chemicals	
Chess 50% WG	Pymetrozine	20 g/100 liter water	Syngenta agro egypt	
Closer 24% SC	Sulfoxaflor	50 cm^3 / Fed	Corteva Agriscience	

Rearing of *S. littoralis:*

A laboratory strain of the cotton leaf worm, *S. littoralis*, was raised on castor bean leaves in a controlled environment with temperature and relative humidity of 26 ± 2°C and 65 ± 5% (Eldefrawi *et al*., 1964). Freshly egg masses were obtained from the Cotton Leaf Worm Division of the Plant Protection Research Institute, Dokki, Egypt, to be used in beginning the insect culture.

Semi field studies on cotton leaf worm:

The current study was conducted on potato plants, *Solanum tuberosum* L. (cultivar: Spunta) in Banha city at Qalyubia Governorate during the 2022 and 2023 seasons. Plantation was done on March 29, 2022 and on March 20, 2023, respectively. A 100-square-meter area was split into 4 plots, 3 of which received pesticide treatments and 1 served as a control. To apply the tested insecticides at the recommended dose, a motor sprayer is utilized. Randomly leaf samples are collected from the center of the sprayed replicates (away from the edges). The leaves are taken from the middle level of the plants, placed in paper bags and transported to the laboratory to feed second and fourth instar larvae. Second and fourth larvae of *S. littoralis* were given the treated leaves that had been allowed to dry in a laboratory. Three replicates totaling 90 larvae were treated (30 larvae / replicate). Additionally, as a control, larvae were fed on leaves immersed in only water. The second and fourth instar larvae were fed on treated leaves with insecticide and kept in a glass container. *Spodoptera littoralis* counts were recorded immediately after 1 day from feeding, as well as after 7, and 10 days. The Abbott formula Abbott (1925) was used to calculate the corrected mortality of larvae.

Laboratory bioassay of cotton leafworm:

According to Abo-EL-Ghar *et al*. (1994), the leaf dipping technique was used, in which freshly cut potato leaves were dipped in one of the prepared concentrations for two seconds. Five replicates, each was 20 larvae were distributed. Insecticides were used at concentrations ranging between 4, 2, 1, 0.5 and 0.25 ppm. In control treatment, larvae were fed only on leaves dipped in only water. Second and fourth larval instars of *S. littoralis* were fed on the treated leaves for 24hrs. then fed on untreated leaves for 7 days, the mortality was calculated (Finny, 1971) for detection the sub lethal concentration of the three tested insecticides

Field study on the cotton aphid and its predator's populations:

The same location, areas and spraying method that used for cotton leafworm were also used to study the effectiveness of the three insecticides against potato plants infested with *A. gossypii* in field environments and their biological enemies (*Coccinella undecimpunctata* and *Chrysoperla carnea*). Thirty leaves were randomly selected from each plot. Numbers of *A. gossypii* and its associated predators were taken immediately before treatment, as well as after 1, 7 and 10 days from treatment. Henderson & Tilton (1955) was utilized to compute the percentage reduction in both A. gossypii and its predator's population.

Data analysis:

The Abbott formula Abbott (1925) was used to calculate the adjusted mortality of larvae. Using software LDP Line, the LC_{50}, LC_{90}, and slop values of the investigated substances were determined by applying Finney's equation (1971). Duncan, (1955) was determine to compare the differences between means of one-way variance analysis (ANOVA) at ($P<0.05$) using software Costat system for Windows, Version 6.311(Costat, 2006).

RESULTS AND DISCUSSION

Semi field studies on cotton leaf worm

Among the tested insecticides in 2022 growing season, pymetrozine was the most effective compound against the cotton leafworm followed by flonicamid while sulfoxaflor was the least effective one after 7, and 10 day from treatment. The mortality percentage of second instar larvae were 82.1, 92.6, 92.6%; 76.7, 88.9, 96.3% and 85.7, 85.2, 92.6% after 1, 7 and 10 days, whereas the residual effects were 92.6, 92.6 and 88.9% for pymetrozine, flonicamid and sulfoxaflor, respectively (Table 2). Meanwhile, the mortality percentages of fourth instar larvae were the same for flonicamid and sulfoxaflor were 76.7, 86.2. 89.7% and was 70.0, 82.8, 89.7% for pymetrozine after 1, 7 and 10 days respectively, whereas the residual effects were 87.9% for both flonicamid and sulfoxaflor and was 86.2% for pymetrozine. Data shows that general mean of flonicamid and sulfoxaflor was 84.2% and pymetrozine was 80.6% (Table 2).

In 2023 season the mortality percentages of second instar larvae were 83.3, 86.2, 92.9%; 83.3, 89.7, 92.9% and 90.0. 96.6, 96.4% after 1, 7 and 10 days for flonicamid, pymetrozine and sulfoxaflor respectively, the residual effects were 89.5, 91.3 and 96.5% (Table 3). While the mortality percentage of fourth instar larvae decrease to reach 70, 73.3, 89.7%; 76.6, 86.7, 93.1% and 73.3, 76.7, 79.3% after 1, 7 and 10days for flonicamid, pymetrozine and sulfoxaflor respectively, residual effects were 81.5, 89.9 and 78%. Generally, flonicamid, pymetrozine and sulfoxaflor induce high larval mortality. The mode of insecticide-

induced larval death was determined by Sudderuddin & Tan, (1973) and they revealed that the chemical mediator acetylcholine (Ach) has present in insect neuron synapses, mediating the transmission of nerve impulses from one nerve axon to another. Since acetylcholine buildup at nerve synapses causes interruption of nerve transmission and leads to in death, acetylcholine esterase hydrolyzes the neurotransmitter.

Table 2. Efficiency of some insecticides against second and fourth instar larvae of *S. littoralis* under semi field condition in 2022 growing season.

Insecticides	Instar larvae	Initial Effect	Mortality % of 2nd and 4th instar larvae			General Mean
		1 day	7 day	10 day	Residual effect	
Flonicamid	2nd instar	78.6	88.9	96.3	92.6	87.9
	4th instar	76.7	86.2	89.7	87.9	84.2
Pymetrozine	2nd instar	82.1	92.6	92.6	92.6	89.1
	4th instar	70.0	82.8	89.7	86.2	80.6
Sulfoxaflor	2nd instar	85.7	85.2	92.6	88.9	87.8
	4th instar	76.7	86.2	89.7	87.9	84.2

Table 3. Efficiency of some insecticides against second-and fourth-instar larvae of *S. littoralis* under semi field condition in 2023 growing season.

Insecticides	Instar larvae	Initial Effect	Mortality % of 2nd and 4th instar larvae			General Mean
		1 day	7 day	10 day	Residual effect	
Flonicamid	2nd instar	83.3	86.2	92.9	89.5	87.4
	4th instar	70.0	73.3	89.7	81.5	77.6
Pymetrozine	2nd instar	83.3	89.7	92.9	91.3	88.6
	4th instar	76.6	86.7	93.1	89.9	85.4
Sulfoxaflor	2nd instar	90.0	96.6	96.4	96.5	94.3
	4th instar	73.3	76.7	79.3	78.0	76.4

Toxicity test against larvae of *S. littoralis*:

The sub-lethal concentration of the three tested insecticides (flonicamid, pimetrozine and sulfoxaflor) against the second and fourth larval instars of *S. littoralis* under laboratory conditions is shown in Table (4). The data indicate that flonicamid had superior toxicological activity, followed by pymetrozine and then sulfoxafluor. The LC_{50} values for flonicamid were 0.378 and 0.852 ppm against second and fourth instar larvae, respectively, and increased compared to the other two insecticides to reach 0.634 and 1.154 ppm for pymetrozine and 1.061 and 2.474 ppm for sulfoxaflor against second and fourth instar larvae, respectively.

Table 4. Toxicity of flonicamid, pimetrozine and sulfoxaflor against the 2nd and 4th instar larvae of *S. littoralis*.

Treatments		LC_{50}	Lower limit	Upper limit	Slope	LC_{90}
Flonicamid	Second	0.378	0.161	0.571	1.824	1.905
	Fourth	0.852	0.372	1.328	1.79	4.43
Pymetrozine	Second	0.634	0.306	0.907	2.321	2.26
	Fourth	1.154	0.819	1.56	2.724	3.41
Sulfoxaflor	Second	1.061	0.774	1.395	3.095	2.753
	Fourth	2.474	1.795	4.077	2.484	8.116

Efficacy of the tested insecticides against *A. gossypii* in potato field

In 2022 season, flonicamid, pymetrozine, and sulfoxaflor reduced by 92.6, 92.0, and 94.7% as initial effect of *A. gossypii* population on potato plants for the tested insecticides, as shown in Table 5. The general mean of reduction percentages was 86.5, 86.3, and 86% for the previously tested insecticides, respectively. For the same tested insecticides, the mean percentages of the residual impact were found to be 83.5, 83.5, and 81.7%, respectively and the tested insecticides could be grouped in descending order as follows: flonicamid > pymetrozine > sulfoxaflor. In this regard, various researchers, such as (Barrania *et al.*, 2019; Hamed *et al.*, 2022; Afzal *et al.*, 2001 and Saleem *et al.*, 2001), examined the effectiveness of the tested insecticides on the aphid *A. gossypii* and evaluated the effectiveness of various insecticide sprays against sucking insect pests.

Table 5. Mean number and reduction percentage of *A. gossypii* infesting potato plants under field conditions during season 2022.

Tested Insecticide	Mean No. of *A. gossypii* ± SE				%reduction after spray at days				General Mean of %reduction
	Pre - spray	After Spray at days			Initial	Residual effect			
		1 day	7 days	10 days	1 day	7 days	10 days	Mean	
Flonicamid	32.25 ± 1.31 a	2.50 ± 0.29 b	3.50 ± 0.50 b	7.50 ± 0.50 b	92.6	89.5	77.5	83.5	86.5
Pymetrozine	33.00 ± 1.78 a	2.75 ± 1.11 b	2.75 ± 0.75 b	8.50 ± 1.04 b	92.0	91.9	75.0	83.5	86.3
Sulfoxaflor	31.75 ± 1.18 a	1.75 ± 0.25 b	5.00 ± 1.29 b	7.00 ± 1.58 b	94.7	84.7	78.6	81.7	86.0
Untreated	32.00 ± 3.39 a	33.50 ± 0.50 a	33.00 ± 4.06 a	33.00 ± 4.49 a	-	-	-	-	-

Means with the same letter are not significantly different, SE = Standard Error

The data in Table 5 showed that the mean number of *A. gossypii* decreased irregularly after treatment with each of the pesticides under consideration, In the cases of flonicamid, pymetrozine, and sulfoxaflor, this decline persisted until the conclusion of ten days. A statistical analysis showed that, examination days after application,

there was no significant difference between all treatments, although there were significant disparities between all treatments and the control. The current results are consistent with those of Varai *et al*. (2021), who found that the administration of several pesticides significantly increased aphid mortality.

In season 2023, after 24 hours of the second season from treated with of the tested insecticides (flonicamid, pymetrozine, and sulfoxaflor), the mean reduction percentages of *A. gossypii* population on potato plants were 95.4, 95.7, and 95.8% and reduction percentages of residual effect were 79.8, 81.4, and 77.9%, while the general mean of percentage reduction were 85.0, 86.2, and 83.4%, respectively according to data shown in Table (6). In accordance with their reduction percentages, the tested insecticides were grouped as follows in descending order: pymetrozine > flonicamid> sulfoxaflor.

The mean number of *A. gossypii* declined irregularly following the treatment with each of the insecticides under investigation as shown in Table (6). This decrease continued during the ten days after treatment in all tested insecticides. there was no significant difference between mean number of *A. gossypii* for all treatments, but there were significant disparities between all treatments and control. These results confirm the results of the previous season. The present findings are in line with those of Maurya *et al*. (2015), who discovered that the application of several insecticides markedly raised aphid mortality.

Table 6. Mean number and reduction percentage of *A. gossypii* infesting potato plants under field conditions during season 2023.

Tested Insecticide	Mean No. of A. gossypii ± SE				%reduction after Spray at days				General Mean of % reduction
	Pre - spray	After Spray at days			Initial	Residual effect			
		1 day	7 days	10 days	1 day	7 days	10 days	Mean	
Flonicamid	61.5 ± 1.71 a	3 ± 1.29 b	4 ± 0.91 b	9.25 ± 0.48 b	95.4	87.8	71.9	79.8	85.0
Pymetrozine	65.5 ± 3.10 a	3 ± 1.08 b	3.5 ± 0.29 b	9.5 ± 0.65 b	95.7	90.0	72.9	81.4	86.2
Sulfoxaflor	61.5 ± 4.35 a	2.75 ± 0.75 b	4.75 ± 0.48 b	9.75 ± 1.70 b	95.8	85.6	70.3	77.9	83.9
Untreated	61.75 ± 1.03 a	66 ± 1.47 a	33 ± 1.63 a	33 ± 2.38 a	-	-	-	-	-

Means with the same letter are not significantly different, SE = Standard Error

Effects of the tested insecticides against the predators in potato field:

Coccinells undecimpunctata

According to the results given in (Tables 7-8), the three tested compounds efficacy against *C. undecimpunctata* on potato plants varied somewhat from one another. Based on the overall results, it appeared that flonicamid and pymetrozine were more effect than sulfoxaflor, as evidenced by the maximum percentage of the *C. undecimpunctata* population that was reduced after the initial application, which was 67.3, 66.1, 56.2 % and 78.3, 74.4, 63.4 % in the two seasons that were studied, respectively. After that, for the next 10 days following application, the reduction percentages of all tested pesticides decreased. The overall effects of the sulfoxaflor were (40.1 and 40.4%) on average, but the flonicamid also greatly increased (48.4 and 49.5%) with pymetrozine (41.7 and 48.9%). The mean number of *C. undecimpunctata* there were no significant differences between all treatments and control at before spray directly and after ten days after application except flonicamid at 2023 season, although reduction percentage is not the highest for it. However, compared to a matching cotton field treated with conventional insecticides, (Al-Shannaf, 2002) reported that the predator *C. undecimpunctata* numbers were three times higher in pheromone-treated fields.

Table 7. Mean number of *C. undecimpunctata* and reduction % for the tested insecticides at different days after spray during seasons 2022.

Tested Insecticide	No. of *Coccinella undecimpunctata*± SE				Reduction %			Mean of reduction %
	Pre – spray	After Spray at days			After Spray at days			
		1 day	7 day	10 day	1 day	7 day	10 day	
Flonicamid	59 ± 3.29 a	20 ± 2.20 b	22 ± 1.78 b	30 ± 3.85 a	67.3	50.6	27.2	48.4
Pymetrozine	54 ± 3.19 a	19 ± 1.47 b	25 ± 2.68 b	30 ± 2.35 a	66.1	38.7	20.4	41.7
Sulfoxaflor	55 ± 1.08 a	25 ± 1.91 b	25 ± 2.94 b	29 ± 4.08 a	56.2	39.8	24.5	40.1
Untreated	53 ± 4.65 a	55 ± 4.34 a	40 ± 6.70 a	37 ± 5.07 a	-	-	-	-

Means with the same letter are not significantly different, SE = Standard Error

Table 8. Mean number of *C. undecimpunctata* and reduction % for the tested insecticides at different days after spray during seasons 2023.

Tested Insecticide	No. of Coccinella undecimpunctata± SE				Reduction %			Mean of reduction %
	Pre - spray	After Spray at days			After Spray at days			
		1 day	7 day	10 day	1 day	7 day	10 day	
Flonicamid	33 ± 3.34 b	7 ± 1.78 b	15 ± 2.80 c	20 ± 2.35 b	78.3	49.8	20.5	49.5
Pymetrozine	44 ± 2.61 a	11 ± 2.80 b	20 ± 2.12 bc	26 ± 3.29 ab	74.4	49.8	22.4	48.9
Sulfoxaflor	42 ± 2.27 ab	15 ± 3.37 b	22 ± 1.29 b	27 ± 2.04 ab	63.4	42.1	15.6	40.4
Untreated	42 ± 3.49 ab	41 ± 2.12 a	38 ± 1.15 a	32 ± 2.38 a	-	-	-	-

Means with the same letter are not significantly different, SE = Standard Error

Chrysoperla carnea

The findings displayed in Tables 9 and 10 demonstrated that none of the three tested compounds killed all *C. carnea* individuals discovered in potato fields, not even one day after spraying or during any of the other post-treatment periods. The findings unmistakably showed that flonicamid was the most potent chemical, resulting in the greatest percentage of *C. carnea* population reduction either one day after treatment or after the two evaluated post-treatment periods. Reduction percentages of 59.9 and 49.8%

for flonicamid were seen after one day of application; pymetrozine followed with 57.1, 43.8%, and 25.9, 16.7% for sulfoxaflors in 2022 and 2023 season respectively. The mean number of *C. carnea* there were no significant disparities between all treatments and the control immediately before spraying and after ten days after application in season 2022 Table 9, but there were significant disparities between all treatments and control before and after application in season 2023. These results agree with (Barrania *et al.*, 2019; Hamed *et al.*, 2022) reported that flonicmide recorded high percentages of general mean of effect 56.5 % and El-Sherbiny *et al*. (2018) reported that flonicamid, exhibited the highest degree of safety to the soil micro-arthropods and had the least harmful effect on predators causeing a mortality rate of less than 50%..According to Hegab (2002) evaluation, the incidence of flying adults of certain predaceous insects was negatively impacted by three spray programs (esfevaporate, es-fenvalerate + profenofos, and esfenvalerate + profnofos + thiodicarb). These three programs had a highly significant negative impact on the population density of these arthropod species, with figures for 1998 and 1999 of 37.67 and 49.18%, respectively. Seasonal declines in 2008 and 2009 were 62.29 and 58.14%, respectively, according to Al-Shannaf (2010). However, after two days of treatment, *C. carnea* and *C. undecimpunctata* showed a considerable reduction %, according to Abd-Elsamed *et al*. (2011).

Table 9. Mean number of *C. carnea* and reduction % for the tested insecticides at different days after spray during seasons 2022.

Tested Insecticide	No. of *C. carnea* ± SE				Reduction %			Mean of reduction %
	Pre - spray	After Spray at days			After Spray at days			
		1 day	7 day	10 day	1 day	7 day	10 day	
Flonicamid	19 ± 5.02a	8 ± 3.81b	9 ± 2.55b	11 ± 3.29a	59.9	47.4	39.1	48.8
Pymetrozine	20 ± 5.49a	9 ± 3.24b	11 ± 0.91b	13 ± 2.61a	57.1	38.9	31.6	42.5
Sulfoxaflor	18 ± 4.81a	14 ± 2.92ab	12 ± 1.58b	14 ± 1.78a	25.9	25.9	18.1	23.3
Untreated	20 ± 3.49a	21 ± 1.91a	18 ± 2.04a	19 ± 2.20a	-	-	-	-

Means with the same letter are not significantly different, SE = Standard Error

Table 10. Mean number of *C. carnea* and reduction % for the tested insecticides at different days after spray during seasons 2023.

Tested Insecticide	No. of *C. carnea* ± SE				Reduction %			Mean of reduction %
	Pre - spray	After Spray at days			After Spray at days			
		1 day	7 day	10 day	1 day	7 day	10 day	
Flonicamid	35 ± 5.69a	18 ± 5.60b	18 ± 5.05b	15 ± 2.35c	49.8	47.3	59.2	52.1
Pymetrozine	33 ± 4.14a	19 ± 4.95b	17 ± 2.48b	15 ± 1.78c	43.8	47.2	56.7	49.2
Sulfoxaflor	41 ± 2.27a	35 ± 3.94a	20 ± 0.41b	24 ± 1.78b	16.7	50.0	44.3	37.0
Untreated	40 ± 1.96a	41 ± 0.58a	39 ± 2.12a	42 ± 1.29a	-	-	-	-

Means with the same letter are not significantly different, SE = Standard Error

CONCLUSION

The current investigation came to the conclusion that the three insecticides (flonicamid, pymetrozine, and sulfoxaflor) were harmful to *A. gossypii* and *larval instars of S. littoralis* at various exposure times. After being treated with all of the insecticides, the mean numbers of *A. gossypii* decreased with residual effects. Pymetrozine was the most effective compound against *S. littoralis*, followed by flonicamid, whereas the sulfoxaflor was the least effective compound.

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تأثير بعض المبيدات الحشرية ضد حشرتي دوده ورق القطن والمن والمفترسات المرتبطة بهما في حقول البطاطس

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الملخص

أجريت هذه الدراسة في حقول البطاطس بمدينة بنها بمحافظة القليوبية خلال موسمي ٢٠٢٢ و٢٠٢٣ حيث تم تقييم المبيدات الحشرية سيناتور (فلونيكاميد) وتشيس (بايميتروزين) وكلوزر (سلفوكسافلور) كل من دوده ورق القطن والمن والمفترسات المرتبطة بهم. ووفقًا للنتائج كان البايميتروزين هو المركب الأكثر فعالية ضد حشرة دوده ورق القطن، يليه الفلونيكاميد، وكان السلفوكسافلور هو المركب الأقل فعالية. وقد أظهرت النتائج أن نسبة الموت ليرقات دودة ورق القطن تراوحت بين ٨٦,٢٪ إلى ٩٢,٢٪ و٧٨٪ إلى ٩٦,٥٪ لموسمي ٢٠٢٢ و٢٠٢٣ على التوالي وتراوحت نسبة الخفض لحشرة المن من ٨٦,٥ الي ٨٦٪ لموسم ٢٠٢٢ومن ٨٦,٢ الي ٨٣,٩ % لموسم ٢٠٢٣. وأظهرت النتائج بوضوح أن المركبات المختبرة تسببت في انخفاض أعداد الأعداء البيولوجية المرتبطة بها (أبو العيد ذو ١١ نقطة واسد المن) بنسبة أقل من ٥٠٪ بعد المعاملة خلال الموسمين. وبالتالي فإن المبيدات المختبرة كانت أقل ضرراً على الحشرات المفترسة ولها تأثير فعال على الآفات قيد الدراسة.