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New approaches for suppressing the population density of certain cotton pests.

By

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M. Sc. Agric. (Economic Entomology) fac. Agric. Kafr-El-Sheikh University 2014.

Thesis

Submitted in Partial Fulfillment of the

Requirements for the

Degree of

Doctor of philosophy sciences

in

Agricultural Sciences

(Economic Entomology)

((Economic Entomology Department))

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CONTENTS

	Title	Page
1.	Introduction.....	1
2.	Review of literature.....	3
2.1	Population fluctuation and generations of <i>S. littoralis</i> (boisd.) In relation to pheromone catches.	3
2.2.	Prediction of <i>S.littoralis</i> generations and in relation to accumulated heat units.	5
2.3	Efficacy of plant growth regulators (PGRs) on some insect pests.	8
2.4.	Efficiency of insect growth regulators (IGRs) and conventional insecticides against cotton leafworm, <i>S.littolaris</i> and certain sucking insects <i>A.gossypii</i> , <i>B.taboci</i> and <i>Empoasca</i> spp	13
2.5.	Effect of silica nanoparticles on <i>S. littoralis</i> .	16
2.6	Population fluctuations of certain sucking insects <i>A.gossypii</i> , <i>B.tabaci</i> and <i>Empoasca</i> spp.	18
2.7.	Efficacy of Ethephon on infestation of pink bollworm, <i>P. gossypiella</i> (Saund.), spiny bollworm, <i>Earias insulama</i> (Boisd.) and boll opening	20
3.	MATERIAIS AND METHODS..	22
3.1.	The Seasonal fluctuations and prediction possibility of adult cotton leafworm <i>S.littoralis</i> and in relation to accumulated heat units.	22
3.1.1	Monitoring of moths cotton leafworm <i>S.littoralis</i> by sex pheromore traps	22
3.1.2	Heat unit accumulations	24
3.2	Plant growth regulators(PGRs) a. Sunephon b.Gibberellic acetic acid	25
3.2.2.	Insect growth regulators (IGRs) a. Lufenurom b. Indoxaacarb.	25
3.2.3	Silica nanoparticals (Silica hydrophilic).	26
3.2.4.	Chlorpyrifos (Durspon)	26
3.3.	Field and semi-field experiments:	27
3.3.1.	Experimental design	27

- B -

3.3.2.	Treatment against cotton leafworm, <i>S. littoralis</i> (semi-field).	27
3.3.3	Sampling of some sucking insects, <i>A. gossypii</i> , <i>B.tabaci</i> and <i>Empoasca</i> spp.	28
3.3.4	Efficacy of Ethephon ® on infestation of pink bollworm, <i>P. gossypiella</i> , spiny bollworm, <i>E. insulana</i> and boll opening.	29
4	RESULTS AND DISCUSSION	30
4.1	seasonal fluctuations of <i>S. littoralis</i> moths and in relation cotton planting	30
4.2	Prediction of <i>S.littoralis</i> generations and in relation to accumulated heat unit	38
4.3	Toxicity of tested insecticides and insect growth regulates (IGRs) against the 4 th larval instar of <i>S.littoralis</i> .	42
4.4	Efficacy of two plant growth regulators, Ethephon ® and Gibberellic acetic acid and one silica nanoparticles (SiNPs) against certain sucking insects	44
4.5	Efficacy of two plant growth regulators, Ethephon ® and Gibberellic acetic acid and one silica nanoparticles (SiNPs) against certain sucking insects	49
4.5.1	Whitefly, <i>B. tabaci</i>	49
4.5.2	Cotton aphid, <i>A.gossypii</i>	50
4.5.3	Jassid, <i>Empoasca</i> spp.	51
4.6	Population fluctuations of certain suking insects	61
4.6.1	The cotton aphid, <i>A.gossypii</i> .	61
4.6.2	The cotton and twomato whitefly, <i>B.taboci</i>	63
4.6.3	Jassid, <i>Empoasca</i> spp	64
4.7.	Efficacy of Ethephon ® treatment on boll opening and bollworms infestation	66
4.8	Efficacy of Ethephon ® on percentage of boll opening	72
5	CONCLUSION	75
6	SUMMARY	77
7	REFERENCS	83
	ARABIC SUMMRY	

LIST OF TABLES:

Contents	Page
1. Average number of <i>S.littoralis</i> male moths / trap /3-nights caught during 2016 cotton growing season	32
2. Average number of <i>S.littoralis</i> male moths / trap /3-nights caught during 2017 cotton growing season	33
3. Average number of <i>S.littoralis</i> male moths / trap / month caught during 2016 and 2017 cotton growing season	36
4. Comparison of the observed and predicted <i>S.littoralis</i> generation monitored with sex pheromone related to accumulated degree days (DD's) in kafr El-Sheikh region during 2016 and 2017 seasons	41
5. Mortality percentages of <i>S.littoralis</i> 4 th larval instar after cholopyrifos, lufenuron and indoxacarb treatment	43
6. Toxicity of three compounds against the 4 th larval instar of <i>S.littoralis</i> recoded three days after treatment	45
7. Toxicity of three compounds against the 4 th larval instar of <i>S.littoralis</i> recoded five days after treatment	46
8. Toxicity of three compounds against the 4 th larval instar of <i>S.littoralis</i> recoded seven days after treatment.	47
9. Toxicity of three compounds against the 4 th larval instar of <i>S.littoralis</i> recoded ten days after treatment.	48
10. Efficiency of three compounds against <i>B.tabaci</i> (immature stage) recoded three days after treatment	49
11. Efficiency of three compounds against <i>B.tabaci</i> (immature stage) recoded five days after treatment	50
12. Efficiency of three compounds against <i>B.tabaci</i> (immature stage) recoded seven days after treatment.	50
13. Efficiency of three compounds against <i>A.gossypii</i> recorded one day after treatment.	51
14. Efficiency of three compounds against <i>A.gossypii</i> recorded three days after treatment	53
15. Efficiency of three compounds against <i>A.gossypii</i> recorded five days after treatment.	53
16. Efficiency of three compounds against <i>A.gossypii</i> recorded seven days after treatment	54

- D -

17	Efficiency of three compounds against <i>A.gossypii</i> recorded ten days after treatment	55
18	Efficiency of three compounds against <i>Empoasca</i> spp. recorded on day after treatment.	56
19	Efficiency of three compounds against <i>Empoasca</i> spp. recorded three days after treatment	57
20	Efficiency of three compounds against <i>Empoasca</i> spp. recorded five days after treatment.	58
21	Efficiency of three compounds against <i>Empoasca</i> spp. recorded seven days after treatment.	59
22	Efficiency of three compounds against <i>Empoasca</i> spp. recorded seven days after treatment.	59
23	Mean number of certain sucking insects per cotton leaf from control during 2016 cotton growing season.	62
24	Mean number of certain sucking insects per cotton leaf from control during 2017 cotton growing season.	65
25	Effects of late season Ethephon ® treatments on mean number of boll opening during 2016 season.	68
26	Effects of late season Ethephon ® treatments on mean number of boll opening during 2017 season .	56
27	Effects of late season Ethephon treatments on infestation of <i>P.gossypiella</i> during 2016 season	70
28	Effects of late season Ethephon ® treatments on infestation of <i>P.gossypiella</i> during 2017 season	70
29	Effects of late season Ethephon ® treatments on infestation of <i>E.insulana</i> during 2016 season	71
30	Effects of late season Ethephon® treatments on infestation of <i>E.insulana</i> during 2017 season.	72
31	Effects of late season Ethephon ® treatment on percentage of boll opening and each PBW and SBW infestation in 2016 season	73
32	Effects of late season Ethephon ® treatment on percentage of boll opening and each PBW and SBW infestation in 2017 season.	74

LIST OF FIGURES

Title		Page
1.	Sex pheromone trap (watery plastic trap)	23
2	Average number of <i>S.littoralis</i> male moths / trap /3-nights caught during 2016 cotton growing season	34
3	Average number of <i>S.littoralis</i> male moths / trap /3-nights caught during 2017 cotton growing season	34
4	Total average number of male moths of <i>S.littoralis</i> during 2016 cotton growing season	35
5	Total average number of male moths of <i>S.littoralis</i> during 2017 cotton growing season	36
6.	Population fluctuations of mean number of certain sucking insects from control per cotton leaf during 2016 cotton growing season	63
7.	Population fluctuations of mean number of certain sucking insects from control per cotton leaf during 2017 cotton growing season	66

VI- SUMMARY

The present study was conducted at the experimental farm, Sakha Research Stations Kafr El-Sheikh region under field and semi-field conditions during the seasons of 2016 and 2017. Therefore, the objectives of the current study were to:

- 1- Study the seasonal fluctuations of *S. littoralis* moths by using sex pheromone trap :
 - 2- Predicting of *S. littoralis* generations in cotton fields in relation to accumulated heat units.
 - 3- Toxicity of tested insecticide and insect growth regulators (GRS) against the 4th larval instar of *S. littoralis*.
 - 4- Effect of two plant growth regulators, Ethephon ® and Gibberellic acetic acid and one Silica nanoparticles (SiNP_s) on the 4th larval instar of *s. littoralis*.
 - 5- Efficiency of two insect growth regulators, Ethephon ® and Gibberellic ecetic acid and one Silica nanoparticles (SiNP_s) against certain sucking insects, *A. Jossypii*, *B. tabaci* and *Empoasca* spp.
 - 6- Population fluctuations of certain sucking insects, *A. Jossypii*, *B. tabaci* and *Empoasca* spp. during 2016 and 2017 seasons.
 - 7- Effect of Late season Ethephon ® treatment on percentage of bollworms infestation *F. gossypiella* and *E. insulana* during 2016 and 2017 seasons.
 - 8- Effect of Late season Etherhon ® treatment on percentage of boll opening and each of *P. gassepiella* and *E. insulana* infestation in 2016 and 2017 seasons.
-
1. Study the seasonal fluctuations of *S. littoralis* moths by using sex pheromone trap.

Results indicated that *S. littoralis* moths had six peaks during the studied seasons. These peaks occurred from the 3rd week of May until the 1st

Week of September. The first peak was occurred on 19th and 22nd May. The corresponding moths were 775 and 229 moth / trap / three days during 2016 and 2017 cotton season, respectively. The second peak secured on 28th June where the captured moths were recorded 655.3 and 255.3 moth / trap / three days during the first and second season; respectively. The third peak was occurred on 18th and 21st June, where the trapped moths equal 1161.8 and 336.3 moth/ trap / three days in the two tested seasons, respectively. The fourth peak was recorded on 21st and 18th July where the trapped moths equal 243 and 63 moth / trap three days in the two tested seasons, respectively. The fifth peak was occurred on 14th August, where the trapped moths were 221.5 and 355.5 moth / trap / three days in both seasons, respectively. The sixth peak recorded on 1st September, where the captured moths reached to 181.3 and 345.5 moth / trap / three days during the two seasons of 2016 and 2017, respectively.

2. Prediction of *S. littoralis* generations in cotton fields and in relation to accumulated heat unit:

Results showed that the observed peak of overwintering generation was occurred on 19th and 18th May in 2016 and 2017 seasons, respectively. On the other hand, the expected peak for the same generation was observed on 18th and 22nd May at 529.02 and 517.45 DD's during the two seasons of 2016 and 2017; respectively with deviation interval +1 and +2 than the real peak for both 2016 and 2017 season. The real peak of the first generation was occurred on the 18th and 21st June in the first and second season while the expected dates of this generation were observed on the 17th and 18th June with an average of 535.34 and 519.27 DD's during 2016 and 2017 season, respectively. The deviations between the observed and expected peaks were +1 and +2 days earlier for two season, respectively. The observed and expected peaks at the second generation were occurred on 21st and 18th July

during the two seasons of 2016 and 2017, respectively when the accumulated heat requirements completed 520.36 and 530.90 DD's during both seasons respectively. The deviation between the observed expected peaks were +8 and +5 days earlier for 2016 and 2017, respectively. The actual observed peak of the third generation appeared on 14th August for both seasons. The accumulation degree days of this generation were 534.07 and 526.95 DD's in 2016 and 2017, respectively.

3. Toxicity of tested insecticide and insect growth regulators (IGRs) against the 4th larval instar of *S. littoralis*.

Results indicated that the insecticide chlorpyrifos (Dursban) toxicity had a strong effect on the 4th larval instar of *S. littoralis* which the mortality percentage was 93.6% recorded one day after treatment followed by IGRs lufenuron (Match) and indoxacarb (Flaxe) giving 34.5 and 40.0 %, respectively. The highest mortality percentages were recorded five days after treatments, 98.49, 96.49 and 91.81% for *Chlorpyrifos*, *lufenuron* and *Indoxacarb*, respectively.

4. Efficiency of two plant growth regulators, Ethephon and Gibberellic acetic acid and one silica nanoparticles (SiNPs) against the 4th larval instar of *S. Littoralis*

Results exhibited that SiNPs gave the highest efficiency against the 4th larval instar with LC₅₀ values of 258.8843 ppm followed by Gibberellic acetic acid (287.4862 ppm) and Ethephon (320.4196 ppm), recorded three days after treatment. In addition, SiNPs was the most potent treatment until seven days after treatment against the 4th larval instar with LC₅₀ values of 14.4177 ppm compared with Gibberellic acetic acid (86.6704ppm) and Ethephon (163.0176 ppm), respectively.

5. Efficiency of two plant growth regulators, Ethephon and Gibberellic acetic acid and one silica nanoparticles (SiNPs) against certain sucking insects.

5.1. White fly, *Bemisia tabaci* (immature stage):

Results indicated that Gibberellic acetic acid was the most effective treatment with LC₅₀ values of 207.6859 ppm against *B. tabaci* (immature stage) followed by Ethephon (285.3632 ppm) and SiNPs (347.0463 ppm), recorded three days after treatment. Also, Gibberellic acetic acid was the most efficiency until seven days after treatment against *B. tabaci* (immature stages) with LC₅₀ values of 54.4262 ppm followed by Ethephon ® (122.88 ppm) and SiNPs (181.2311 ppm), respectively.

5.2 Cotton aphid, *Aphis gossypii* Glover:

Results exhibited Ethephon was the most efficiency against *A. gossypii* which LC₅₀ values was 285.3636 ppm in comparison with Gibberellic acetic acid (299.232 ppm) while SiNPs was 328.8570 ppm, recorded one day after treatment. However, Gibberellic acetic acid was the most effective treatment until five days after treatment against *A. gossypii* with LC₅₀ values of 224.2301 ppm while SiNPs was 250.4571 ppm followed by Ethephon was 295.872 ppm. SiNPs was the most potent material, recorded ten days after treatment with LC₅₀ values of 40.4686 ppm. Comparison with Gibberellic acetic acid was 89.3962 and Ethephon was the least (166.416 ppm), respectively.

5.3. Jassid, *Empoasca* spp:

Results revealed that Gibberellic acetic acid was the most efficiency until five days after treatment against *Empoasca* spp. with LC₅₀ values of 177.2563 ppm followed by SiNPs (189.6238 ppm) and Ethephon ® (358.558 ppm) respectively. However, SiNPs was the highest effective until ten days

after treatment with LC₅₀ values of 179.7592 ppm followed by Gibberellic acetic acid 138.428 ppm) and Ethephon (271.793 ppm), respectively.

6. Populations fluctuations of certain sucking insects.

6.1. The cotton aphid, *Aphis gossypii* Glover.

Results showed that two peaks of *A. gossypii* during the two studied seasons. The first peak recorded 11.00 and 13.0 insect / leaf occurred on 17 August and 13 October in the first season while they were 17.00 insect / leaf occurred on 3rd August and 22nd September in the second one-Then, the population started to decrease of gradually towered the end of the season.

6.2 The cotton and tomato white fly, *Bemisia tabaci* Genn.

Results confirmed that two peaks of *B. tabaci* during the two tested seasons. The first peak was 10.33 insect/ leaf occurred on 10th and 25th August in the season while they were 9.33 and 11.93 Insect/ leaf. Occurred on 10th august and 1st September during the second one the population declined gradually toward the end of the season.

6.3 Jassed, *Empoasca* ssp.

Results revealed that two peaks of *Empoasca* ssp during the two studied seasons. The first peak recorded 19.33 and 20.33 insect/ leaf occurred on 17th August and 8th September in first season while they were 20.00 and 17.00 insect/ leaf occurred on the same date in the second one, the population decreased gradually to wared the end of the season.

7. Effects of late season Ethephon ® treatment on percentage of bollworms infestation *Pectinophora gossypiella* and *Earias insulana* during 2016 and 2017 seasons.

Results indicated that the Ethephon ® treatments significantly reduced percentages of mean *P. Jossypiella* and *E. insulana* infestation relative to check. The lowest significantly percentage of mean *P. gossypiella* infestation recorded 15.64 and 15.60 in Ethephon ® with 3 cm³ while they were 6.73% of mean *E. insulana* infestation with 1.5 and 3cm³ /L in 2016

and 2017 late cotton seasons, respectively. Ethephon ® treatment gave the highest reduction percentages, 56.68 and 37.60% of *P. gossypiella* infestation with 3cm³ /L in the first and second seasons; respectively.

8-Effects of late season Ethephon ® treatment on percentage of boll opening and each of *P. gossypiella* and *E. Insulana* infestation in 2016 and 2017 seasons.

Results showed that the highest significantly mean number of boll opening / 100 plant was 1276.15 and 1744.40 with 2.5 cm³/L of Ethephon ® in the first and second season, respectively. At the same trends, concentration of Ethephon ® 25 cm³/ L gave the highest increasing of percentages of boll opening recording 36.68 and 22.58 % in the two tested seasons, respectively.