

BIOLOGIC POTENTIAL OF THE GREEN BUG, S. GRAMINUM AS AFFECTED
BY CERTAIN INSECT GROWTH INHIBITORS (IGIS) UNDER
LABORATORY CONDITIONS.

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ABSTRACT

The effect of certain insect growth inhibitors on the biotic potential of the aphid, S. graminum, was carried out after treatment of the adult stage with different concentrations. It was noticed that the durations of the 4th instar nymph was prolonged as a result of triflumuron application. The same compound has affected the adult span insignificantly.

As for diflubenzuron, nymphal duration showed, in general, no significant differences between the treated and untreated check. The two tested concentrations of diflubenzuron were significantly prolonged the duration of adult life. Also, a significant reduction was obtained in concern of the mean number of produced progeny per adult.

Cyfluthrin caused significant reduction in the duration of the third nymphal stage, while decreased significantly the adult span. Also, this compound decreased significantly the mean number of the produced progeny.

INTRODUCTION

Owing to the aphid minute size, the high productive potentials and their management to withstand the adverse environmental conditions they become one of the most serious pests infesting agronomic, horticultural and ornamental plants. These criteria have enabled aphids to survive for long history

which dates back about 300 million years to the Mesozoic period.

Aphids, are capable to face the agricultural practices made by man such as mass breeding of resistant crop varieties and pesticides by developing new tolerant or resistant biological races identified as 'biotypes'.

Plant breeders and agronomists have, however, managed in developing new cultivars or varieties of cereal crops which have the property of high yield of grains as well as fodder for animals. It was noticed that during the course of breeding a new juicy broad leaved plants appeared. At the same time aphid outbreaks on the produced new wheat and maize hybrids were encountered. Accordingly, chemical control was followed to overcome this problem, where several insecticide types were sprayed in cereals. Bhalla and Robinson (1966) found that apholate inhibited the reproduction of pea aphid Acyrtosiphon pisum at dosage from 0.1 to 0.0025 %, while Metepa could had no sterilitant action. Also, White and Lamb (1968) reported that the synthetic juvenile hormone (SJH) at 0.7-2 ug/adult aphid reduced fecundity and increased the percentage of apterae developing among the young.

The present investigation aimed to evaluate the role of certain insect growth inhibitors on the biotic potential of the green bug, S. graminum (Rond.) in laboratory.

MATERIAL AND METHODS

1. Maintenance of aphids

Cultures of the green bug, S. graminum (Rond.) were brought from Shandwill Agriculture Research Station, Sohag Governorate as alate females and maintained on barley plants. Another culture was collected from Giza Experimental Research Centre, as apterous viviparous females on barley. Both cultures were separately maintained in laboratory on barley seedlings, cultivar Giza 21 and considered as different geographical strains.

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2. Insect growth inhibitors :

- 2.1. Diflubenzuron, Dimilin 25 % WP :
1-(4-chlorophenyl)-3-(2,6-difluorobenzoyl) urea
- 2.2. Triflumuron (DAY AIR 8514) 6.5 % EC :
1-(4-trifluoromethoxy phenyl)-3-(2-chlorobenzoyl) urea.
- 2.3. IKI 7899, PP 145, 5 % EC :
N- 3,5-dichloro-4-(3-chloro-5-trifluoromethyl-2-pyridyloxy) phenyl carbamoyl -2,6-difluorobenzamide.

3. Assessments of biotic potential :

This experiment was carried out after treating the adult stage of S. graminum with concentrations of 62.5, 125 & 150 ppm of triflumuron; 625, 2500 ppm of diflubenzuron and 359.7 ppm for cyfluthrin by means of direct spraying method using the hand atomizer. Treated mothers were left to dry for 1 hr. before being placed on barley leaves. The differences in the biotic potential due to these sublethal concentrations were recorded; i.e. durations of 1st, 2nd, 3rd and 4th nymphal instars. Also, pre- and post-parturition periods, parturition period, number of offspring and durations of generations were considered. The obtained results were statistically analyzed by using the analysis of variance at 5 % level probability.

RESULTS AND DISCUSSION

Data concerning the role of the tested three insect growth inhibitors when used at different concentrations on the biotic potential of S. graminum are tabulated in Table (1). The obtained results indicate the important role of the studied factors as shown from the following discussion.

1. Triflumuron :

Data in Table (1) indicate the unimportant influence of triflumuron on the nymphal duration, concentration factor proved insignificant in this respect. This was pronounced with the 1st and 2nd nymphal instars. A different trend of results was recorded with 3rd and 4th instars. Triflumuron caused a significant increase in nymphs duration by + 0.45 days at 62.5 ppm and a significant decrease of - 0.1 at

Table (1) : Effect of certain insect growth inhibitors on the development and biotic potential of S. graminum aphid.

Developmental stages	Triflumuron (ppm)				Diflubenzuron		Cyfluthrin
	Untreated	62.5	125.0	150.0	625	2500	
and progeny	check						359.7
1st nymphal instar (days)	2.56±0.12	2.5±0.1	2.5±0.1	2.3±0.1	2.5±0.1	2.3±0.1	2.57±0.0
2nd nymphal instar (days)	1.3±0.1	1.0±0.0	1.3±0.1	1.2±0.2	1.1±0.0	1.4±0.1	1.30±0.3
3rd nymphal instar (days)	1.3±0.1	1.75±0.18	1.2±0.10	1.5±0.13	1.3±0.1	1.0±0.1	1.00±0.2
4th nymphal instar (days)	1.17±0.0	1.25±0.1	1.28±0.1	1.40±0.1	1.25±0.4	1.4±0.1	1.27±0.1
Pre-parturition period(days)	1.36±0.0	1.0±0.07	1.17±0.2	1.0±0.0	1.54±0.1	2.1±0.1	2.50±0.14
Parturition period (days)	5.18±0.2	6.25±0.38	6.73±0.3	5.25±1.4	5.22±1.4	4.0±0.3	3.25±0.4
Post-parturition (days)	1.5±0.1	1.25±0.1	1.4±0.1	1.8±0.5	1.3±0.14	2.1±0.14	0.80±0.1
Adult span (days)	7.99±1.26	8.5±1.71	9.45±1.61	8.0±1.31	8.06±1.1	8.2±0.5	6.50±1.1
% Mortality of nymphs	3.2	0.0	0.0	0.0	2.4	4.15	8.5
Mean no.of borne dead nymph	0.0	0.0	0.0	2.01±0.2	3.45±0.15	4.3±1.45	5.01±0.55
Mean no. of progeny	21.0±2.27	17.0±1.31	30.0±3.37	22.0±1.46	20.0±1.67	13.0±1.37	6.40±1.92

125 ppm. The durations of the 4th instar nymph was prolonged as a result of triflumuron application.

With adults, data in the same table indicate that the three tested concentrations of triflumuron caused significant reduction in pre-parturition period. Statistical analysis prove the insignificant increase of parturition, post-parturition and adult span periods as a result of triflumuron treatment.

As for produced progeny per adult, data show that the mean number of progeny was varied drastically according to the triflumuron concentration. Accordingly, they gave 17.0, 30.0 and 22.0 individuals with 62.5, 125 and 150 ppm, respectively. The untreated check revealed 21.00 individuals. The difference between the first two concentrations and the check was statistically significant.

2. Diflubenzuron :

Data in Table (1) indicate fluctuated influences according to the used concentration of diflubenzuron. At 625 and 2500 ppm, no significant influences on both 1st 2nd and 4th nymphal instars durations were recorded. On the contrary, the concentration 2500 ppm caused significant increase in 3rd nymphal instar duration. Percentage mortality among nymphs were 2.4 and 4.15 at 625 and 2500 ppm diflubenzuron, respectively. However, borne dead nymphs were encountered being 3.45 and 4.3 nymphs per adult at the same concentrations.

As for adult longevity, statistical analysis of the obtained data indicate the significant effect of diflubenzuron treatment on pre- and parturition periods. Diflubenzuron significantly prolonged the pre-parturition period by + 0.18 and + 0.74 % at 625 and 2500 ppm, respectively. The lower rate prolonged parturition period, while the higher one (2500 ppm) shortened this period. Moreover, the two tested concentrations of diflubenzuron, significantly, prolonged the adult longevity. Data in Table (1) indicate the significant influence of this growth inhibitor on the mean number of produced progeny per adult. A considerable reduction in diflubenzuron treated adults was recorded as compared with the untreated check.

3. Cyfluthrin :

Examination of the data show the insignificant influence of cyfluthrin (359.7 ppm) on the durations of 1st, 2nd and 4th nymphal instars, showing 2.57, 1.3 and 1.27 days, respectively. The untreated check revealed 2.56, 1.3 and 1.17 days, respectively. A significant influence of cyfluthrin was recorded for the 3rd nymphal instar (1.0 day) as compared with the normal (1.3 days).

As for adult longevity, a significant increase in preparturition period (2.5 days) when cyfluthrin was applied at 359.7 ppm as compared to the check (1.36 days). On the contrary, a significant decrease was recorded for the parturition periods (3.25 and 0.8 days), as compared with the check (5.18 and 1.5 days), respectively. Cyfluthrin was significantly decreased the adult span (6.5 days) as compared to the check. Cyfluthrin at 359.7 ppm considerably decreased the mean number of progeny per adult, being 8.4 nymphs as compared with 21.0 with the normal. In this respect, Bhalla and Robinson (1966) found that apholate inhibited the reproduction of pea aphid Acyrtosiphon pisum at dosage from 0.1 to 0.002%, while Metepa could had no sterilitant action. Also, White and Lamb (1968) reported that the synthetic juvenile hormone (SJH) at 0.7-2 ug/adult aphid reduced fecundity and increased the percentage of apterae developing among the young. The effects of insecticides on the biotic potential of aphids were studied by Combes (1983), Nabauer et al. (1983) and others.

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