Egypt . J. Biol. P. Cont. 1(2),1991,79 - 85

INFLUENCE OF INSECTICIDAL APPLICATION ON APHID POPULATIONS AND THEIR NATURAL ENEMIES IN WHEAT FIELDS

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ABSTRACT

The present study was carried out to evaluate the effect of chemical treatments on aphids and their natural enemies in wheat fields during 1990-1991 planting season at Sohag Governorate (upper Egypt) . Two districts ; El - Maragha and Shandaweel were selected for this study . Rate of aphids infestation , numbers of predators and percentage of parasitism were estimated weekly allover the season in the two locations . El - Maragha field was treated three times with insecticides by late February, while Shandaweel fields was treated only once early in the season . Obtained data showed that in spite of the frequent spray at El-Maragha field,aphid infestation lasted longer than that of Shandaweel and continued relatively higher throughout the season . Sharp decline in the number of predators (40-48%) and in the percentage of parasitism (66%) was observed after the insecticidal application, while a gradual increase in the number of predators was occurred towards the end of the season Shandaweel field . Therefore , an integrated aphid control programme in wheat fields considering the positive role of parasitoids and predators rather than dependance on chemical control should be developed .

KEY WORDS : Wheat, Aphids, Parasitoids, Predators, Insecticides .

INTRODUCTION

Aphids are the major insect pest of wheat in Egypt . El- Hariry (1979) and Tantawi (1985 a,b) surveyed four species of aphids ; *Rhopalosiphum padi* L., *Rh. maidis* F., *Shizaphis graminum* R. and *Sitibion avenae* Fab. attacking wheat plants in Egypt . Attia and El-Kady (1988) added the Russian species , *Diuraphis noxia* Mord. to the aphid fauna in wheat fields of Egypt . Enayat *et. al.* (1984) , Tantawi (1985 b) and El - Heneidy *et. al.* (1990) estimated the wheat yield loss due to aphid infestation with 7.5 - 23 % in middle and upper Egypt where the highest infestation mostly occurs .

El- Heneidy and Attia (1989) and El-Heneidy (1991) studied the population dynamics of aphids and their natural enemies in middle and upper Egypt .

Current practice of aphids control in wheat fields is dependent on chimical insecticides, regardless its direct and indirect impact on the environment in general and on the natural enemies in particular . Therefore, the present study aimed to evaluate the effect of insecticide treatment on aphid populations and their natural enemies in wheat fields at Sohag Governorate .

MATERIALS AND METHODS

The study was carried out in wheat fields located at two districts, Shandaweel and El- Maragha (Sohag Governorate) throughout the growing season of 1990 - 1991. The study was undertaken in an area of about 5 feddans of wheat in each location . The surrounding crops were Egyptian clover , cabbage and faba bean . Weekly samples were collected allover the season from mid-January until mid-April in the two districts .

APHIDS INFESTATION

Infested samples of wheat plants were collected throughout the season for identification of aphid species . Rate of aphids infestation was estimated weekly by examining 100 randomized wheat plants/district according to the following relative categories (Hafez, 1964)

L = Light infestation N = No infestation

S = Severe infestation M = Moderate infestation

NATURAL ENEMIES

Direct count of predatory species on 100 wheat plants was undertaken weekly . Samples of infested wheat plants were collected weekly and transfered to the laboratory for:

a. Estimation of the percentage of parasitism by dissecting 100 randomized living aphids / district .

b. Identification of parasitoid species by confining infested samples in glass jars until emergence of parasitoid adults .

INSECTICIDE TREATMENT

a. At Shandaweel, only one treatment with malathion was applied on January 13th, in the infested spots .

b. At El-Maragha, three insecticidal treatments were applied . The first treatment was primor, applied on February 23rd followed by two treatments of malathion applied on February 27th and March 3rd , respectively in the whole field .

RESUTS AND DISCUSSION

I - THE TARGET PESTS

Four species of aphids ; i.e. *Rhopalosiphum padi* L., *Rh. maidis* F., *Shizaphis graminum* R. and *Sitibion avenae* Fab. were recorded attacking wheat plantations during 1990 / 1991 season in the two districts of the study . *Rh. padi* dominated the other species of aphids in wheat fields allover the season . This observation is in agreement with the findings of Tantawi (1985a), El - Heneidy and Attia (1989) and El-Heneidy (1991) .

Rates of aphids infestation : According to the four relative categories of aphid infestation , the highest infestation was recorded during the period lasted between late February and late March (Table 1) . Rate of aphid infestation was relatively higher at El-Maragha field in comparison to that of Shandaweel .

II - NATURAL ENEMIES

Predators and parasitoids were the only biological control agents taken into cosideration during the present study . No insect pathogen diagnosis was observed on aphids during the investigation .

PREDATORS

Data summarized in table 1 and fig. 1 represent the total number of common aphidophagous predators in wheat fields, i.e. coccinellids, chrysopids, anthocorids, syrphids, staphylinids and true spiders.

Among these predators, coccinellids and true spiders was the most abundant groups on wheat plants in the two investigated areas .

Number of predators at El-Maragha field was relatively higher than that of Shandaweel due to the high aphids infestation at El-Maragha field during the season. Sharp decline (40 -48 %) in the number of predators was recorded after insecticidal treatments at El - Maragha field, which received three applications, while a gradual increase in the number of predators at the end of the season was observed at Shandaweel field which received only one insecticidal treatment early in the season on the infested spots .

PARASITOIDS

As shown in table 1 and fig.2, the highest percentage of parasitism was recorded during late February (20 & 24 %) in El - Maragha and Shandaweel fields, respectively and continued during March at Shandaweel field . Sharp decline in the percentage of parasitism (66%) was recorded at El-Maragha field after the three treatments of insecticides, while a normal decline was observed at Shandaweel field, where only one insecticidal treatment was applied . *Diaeretiella rapae* M. and *Aphidius* spp. (Hym., Braconidae) were identified parasitizing aphids species in wheat fields .

It could be concluded from the obtained data and from field observations that :

1 - Although El- Maragha field was treated three times within 10 days, aphids infestation lasted longer and continued relatively higher throughout the season, comparing to that of Shandaweel field which was trated only once . This negative result which appeared after the treatment might be due to one or more of the following factors :

a - **B**ad application of insecticides .

b - **R**apid resurgence of aphids population .

c - **S**uppressing the population of natural enemies .

2 - The multible treatments of insecticides at El - Maragha fields, badly affected the number of natural enemies . Accordingly, sharp decline in the number of predators (40 - 48 %) and in the percentage of parasitism (66%) was recorded , while the result was quite different in Shandaweel field which was treated only once, early in the season .

3 - It is clear that the timing of insecticidal application plays a critical role in disturbing the natural balance between aphids and their natural enemies in wheat fields .

4 - Early infestation of aphids should be chemically treated only in the infested spots (as conducted at Shandaweel field) , so less influence on the natural enemies will be occurred .

Out of the present study, it could be concluded that an integrated pest management programme for aphids control depending on the positive role of predators and parasitoids is needed to reduce dependence on currently used programmes of chemical insecticides .

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Table 1

Weekly rates of aphids infestation , number of associated predators and parasitism % in wheat fields at El - Maragha and Shandaweel (Sohag Governorate) during 1990 / 91 season

Date	Shandaweel			El - Maragha		
	Aphids infestation	No. of predators/100 plant	Paresitism %	Aphids' infestation	No.of predators/100 plant	parasitism %
Jan. 27	L	26	0	L	30	0
Feb. 3	L	28	12	L	38	16
10	L	34	12	L	44	10
17	L	27	16	M	47	12
23	L	40	20	M	58	24
Mean	-	22.3	15.0	-	46.8	15.5
Mar. 3	M	46	16	M	30	8
10	M	36	16	M	18	14
17	L	40	12	M	33	18
24	L	34	10	M	39	10
31	L	28	16	L	38	10
Mean	-	36.8	17.5	-	31.6	15.0
Apr. 7	L	30	8	L	29	5
14	N	18	4	L	24	1
22	N	20	0	N	27	0
Mean	-	22.7	4.0	-	26.7	2.0

N = No infestation
M = Moderate infestation
L = Light infestation

Fig.1 : Weekly no. of predators /100 wheat plant at El-Mereghe and Shandaweel during 1990/91.

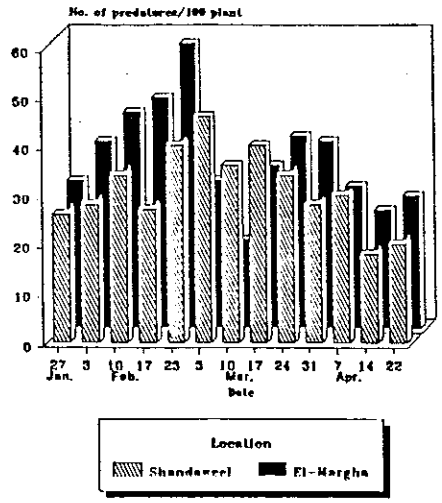

Fig.2 : Weekly rate of parasitism of wheat aphids at El-Mereghe and Shandaweel during 1990/91.