J. Agric. Sci. Mansoura Univ., 32 (12): 10563 - 10581, 2007

SURVEY AND SEASONAL ABUNDANCE OF MAJOR INSECT PESTS ATTACKING RICE PLANTATION

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ABSTRACT

Survey and seasonal abundance of major pests attack and damaging rice plants (Giza 171 , variety) in nursery and fields by using light trap and sweep net were carried out during 2003 and 2004 seasons at Faqus district, Sharkia Governorate.

Results of survey in both seasons revealed that the collected insects were 26 species belonging to 26 genera as well as one undefined species belonging to genus *Chironomus* of these , 12 species from Homoptera, four species from Diptera; four species from Lepidoptera; three species from Hemiptera and four species from Orthoptera. These orders could be arranged descendingly according to their abundance during the whole period of study as follows Homoptera, Diptera, Lepidoptera, Hemiptera and Orthoptera which recorded 85.13; 8.38; 2.90; 2.76 and 0.83% , respectively.

Accordingly seasonal abundance of some major economic importance insects found in large numbers and / or approximate period of abundance were, homopterous species such as: *Nephotettix modulatus,* (late June up to late Oct.), *Sogatella furcifera* (late July up to late Oct.) and *Balclutha hortensis* (late June up to late Oct.). Yet dipterous species including *Chironomus* sp. (early June up to early Oct.) and *Hydrellia prosternalis* (late June up to early Oct.) then, the lepidopterous species including *Chilo agamemnon* (late June up to late Oct.).

All the surveyed dominant species were peaked in field except bloodworm *Chironomus* sp. which reached its peak in nursery.

A relationship between insect population of each species and climatic factors (Temperature and relative humidity) were noticed in most cases.

Key words: Rice–light trap and sweep net–major insect pests- population fluctuations.

INTRODUCTION

In Egypt, rice is subjected to several economic insects infestation it in both nurseries and fields. Some insect species considered as injurious pests which cause a great loss in rice yield. Of these leaf and plant hoppers , blood worms; leaf miner of rice and rice stem borer (El-Metwally, 1977; Tantawi, 1982 and Tantawi *et al.*, 1989). Yet, many investigators surveyed major rice insect pests in different ecological areas of the world by using different means such as sweep net and light traps or other means, reported that Homoptera (Cicadellidae and Delphacidae) and rice stem borer were the most dominant in nurseries and rice fields (Tantawi, 1982; Tantawi *et al.*, 1989 (Egypt); Lee *et al.*, 1997 (Korea); Gunathilagaraj and Kumar, 1998 (India); Tomeva and Anchev, 1998 (Yugoslavia); Naganagoud *et al.*, 1999 (India); Pai, 1999; Sherif *et al.* (1999) (Egypt); Manimaran and Manickavasagam, 2000 and Roshan Singh *et al.* 2000) (India).

Population level of the most principal insects was closely related to some factors such as stage of the rice growth (Iitomi *et al.*, 1997 and WangRongfu, *et al.* 1998) and weather factors (Fen Bincan, 1997; Rutter *et*

al., 1998; AnujbhatNagar and Saxena , 1999; Huangciwei *et al.* 1999; Mourad *et al.*, 2003 and Bhownik *et al.* 2005).

Accordingly, this study investigation was carried out to study the population density of the major economic insects attack rice plants in nurseries and fields located in faqus at Sharkia Governorate, Egypt by using some means such as Robinson light trap and sweep net collecting at the age of rice seedlings 15 days till harvest time. The seasonal fluctuation in population of the major considered insects in relation to the weather factors of such region (Temp. & R.H%) was also studied**.**

MATERIALS AND METHODS

Studies on surveying the flying insects which occur in rice nurseries and fields as well as the seasonal abundance of certain dominant species were carried out in faqus locality, Sharkia Governorate during two consecutive seasons 2003 and 2004 by means of a light trap and a sweep net.

A light trap of the Robinson type fitted with a 160 watt mercury vapour lamp, was located in an experimental rice (Giza 171 variety) field (one feddan) surrounded by on open cultivated area of rice at a height of 2 meters and was operated from sunset to sunrise and the light trap catches were weekly taken and recorded. The experimental area received the usual agricultural treatments using in rice (except the chemical control of pests).

Samples weekly were carried out in the same area by a sweep net. The survey was conducted when the rice seedlings were 15 days in the nursery and continued till harvest time in the field . Insect samples that were killed by potassium cyanide were dried in the air for 24- 48 hrs. in open Petri dishes and then separated into different species by the aid of a binocular Stereomicroscope. Insects were caught of by the two sampling methods were identified in the Plant Protection Department of the Faculty of Agriculture, Zagazig University and in the Institute of Plant Protection of the Egyptian Ministry of Agriculture.

Records of the Meteorological station at Zagazig were taken for 2003 and 2004 species concerning weekly average temperature and relative humidity to represent the conditions prevailing in the field for dominant species during the whole period of this study. The simple correlation and partial regression values were calculated according to Snedecor and Cochran method (1976).

RESULTS AND DISCUSSION

Survey of rice insects occurring in nurseries and fields by using light trap and sweep net in Faqus locality, Sharkia Governorate during the two successive seasons of 2003 and 2004 revealed that, the collected insects were 26 identified species belonging to 26 genera as well as one undefined species to one genus (Table, 1). This came true throughout each growing season. Of these 12 species from Homoptera, four species from Diptera, four species from Lepidoptera; three species from Hemiptera and four species from Orthoptera.

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The surveyed species, their site of occurrence, approximate period of occurrence and total number in both 2003 and 2004, seasons are listed in Table (1).

These orders could be arranged descendingly according to their abundance during the whole period of study as follows. Homoptera, Diptera, Lepidoptera, Hemiptera and Orthoptera, showing percentages of 85.13; 8.38; 2.90 ; 2.76 and 0.82% (Table, 1). In this concern Bishara (1966) made a survey in rice plantations in Egypt and he found nine species from Orthoptera; six species from Hemiptera; five species from lepidoptera; four species from Diptera; six species from Coleoptera and one species from Thysanoptera. In addition, Ali (1978) surveyed insects of rice nurseries and fields by using an insect net at Sakha and Serw experimental stations and he recorded 14 hemipterous species, 12 dipterous species, five coleopterous species, two Odonata species and one hympenopterous species. In this concern, Tantawi *et al.* (1989) and Sherif *et al.* (1999) surveyed three major insects in rice plantation belonging to order Diptera and Lepidoptera.

On other hand the obtained data also show that the total numbers of collected insects belonging to orders Homoptera, Lepidoptera Hemiptera and Orthoptera by light trap were markedly higher than those collecting by sweep net (Table, 1).

a. Order Homoptera:

Species homopterous insects were most abundant in rice nurseries and fields during the tested seasons and represented by 12 species. The collected species could be arranged descendingly according to their relative abundance as follows: *Nephotettix modulatus* M.; *Sogatella furcifera* (Horv.); *Balclutha hortensis* Lind.; *Nephotettix apicals* (Motsch); *Empoasca decipiens* Paoli; *Cicadulina* bipunctella zeae *China; Sogatella vibix* (Haupt.); *Cicadulina chinai* (Ghour) *Neolimnus aegyptiacus* Mats.; *Empoasca decedens paoli; Exitianus capicola stal.* and *Orosius albicinctus* (Dist.). Showing total numbers of : 4713; 4530; 3986; 3244; 2757; 2686; 1636; 1474; 1057; 766; 259 and 99 insects during the whole period of study and such surveyed insects more abundant in the field than nursery (Table, 1).

Population fluctuations of dominant homopterous species :

Fam. Cicadellidae :

***Nephotettix modulatus*:**

The first abundant homopterous species, representing 17.32% of the whole homopterous catch in rice nurseries and fields. The total number of collected insects in light trap catches were more higher than those collected by sweep net recording 1426; 1874 and 656; 757 individuals in both seasons respectively.

Data recorded in Tables (2 & 3) show that the species began to appear in light trap catches at the end of nursery period (26th June) with low numbers three and seven individuals for both seasons. After transplanting the insect population was increased gradually reach its maximum at beginning of October (263 adults at means 24.71°C and 60.42% R.H in the first season and 234 adults in 25th September at means 28.75°C and 64.14% R.H. in the second season.

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In sweep net collection, the same trend was noticed as shown in Tables (2, 3).

The present results are in accordance with those reported by Ali (1978); Ammar *et al.* (1979); Tantawi (1982) in Egypt and by Dae (1985) in Korea; Chakrabarty *et al.* (1985); Nath and Banerjerjee (1985) in West Bengal; Shrivastava *et al.* (1987); Shrivastava and Shukla (1988); Dehal and Neupane (1990); Raju *et al.* (1997); Mallick and Chowdhury (1999); Manimarum and Manickavasaga (2000); Nath and Bhagabati (2002) in India and Vijakumar and Patil (2004).

Fam. Delphacidae :

2. *Sogatella furcifera* (Horv.):

The second most abundant species in the whole period of study (4530 adults, representing (16.65%) of the total homopterous catch (Table, 1). The species was presented in both light trap and sweep net catches in both seasons, but it was more abundant in light trap catches than the later mean, being : 1508 & 1540 and 663 & 819 in both seasons, respectively. The insect was only found in rice fields from late July to late October in 2003 and 2004 seasons. After the first appearance and as shown in Tables (2 & 3) the species had one peaks in both light trap and sweep net collections in 2003 and 2004 seasons. In 2003 the peak in light trap and sweep net catches occurred at the beginning of October and late September recording 223 in light trap and 118 adults 200/ strokes; while in 2004 season, the insect population reached its highest level on 25th September in light trap catches with a total number of 384 individuals and on8th October in sweep net samples with total number of 196 individuals/200 strokes (Tables 2 & 3). After these peaks, the insect population decreased gradually till the end of each season.

Results reported by (Tantawi , 1982 ; Luo , 1985 ; Misra and Prased , 1985 ; Ram, 1986 ; Saha , 1986 ; Matsumura , 1997; Fen Bincen 1997; Iitomi *et al.* 1997; QingYuwen *et al.* 2000 and Vijakumar and Patil, 2002 & 2004) are in accordance with the obtained results. On the other hand, Ambikadevi *et al.* (1998) in India found that the *S. furcifera* population peaked during January.

3. *Balclutha hortensis* Lind.

The third most dominant homopterous species in rice plantations representing 14.65% of the whole homopterous catch in both seasons (Table, 1). In light trap catches, the species was only presented during field period, while in sweep net catches, it was found in nursery and field periods in 2003 and 2004 seasons. The period of insect activity started from late June to late October in both seasons of study.

So, in light trap catches, the insect began to appear in low numbers at the beginning of July in both seasons recording 11 individuals in 2003 and 5 individuals in 2004. Thereafter, the leafhopper population increased gradually and reach its maximum (220 insects) on 25th September in 2003 season and (214 insects) on 18th September in 2004 season (Tables, 2 & 3) (at means of 25.71; 27.32ºC and 59.42 ; 63.00 R.H.%). In sweep net samples, the cicadellid started to appear at the end of nursery period (26th

June) in low number (2 individuals/200 strokes) . After wards, the population were increased to attain its peak during the end of Sept. and third weeks of September in both seasons, showing 73 and 89 adults / 200 strokes. These results are in agreement with those reported by (Khodier, 1976; Ali, 1978; Ammar *et al.* 1979 ; Tantawi, 1982 and Mourad *et al.,* 2003).

Effect of climatic factors (temperature (ºC) and relative humidity (R.H.%) on the population fluctuation of the dominant hemipterous species:

a. *Nephotettix modulatus*:

The insect number was insignificantly correlated (negative correlation) with temperature in 2003, season (r = - 0.248), while in 2004 season, a highly significant negative correlation was noticed observed (r = - 0.831**). As such relative humidity had a positive significant effect on the insect population in studied seasons, where (r = +0.488* in 2003 and r= +0.514* in 2004 seasons). It was obvious that in 2003 and 2004 seasons, the two tested factors had a total E. V. of : 61.12 and 70.00%, respectively. Bhowmik *et al.* (2005) found that *N. virescens* population showed significantly positive correlation with maximum temperature and significantly negative correlation with the maximum relative humidity Table (4).

Table (4): Simple correlation (r.) partial regression (b.) and explained variance (E.V.) for the number of the dominant hemipterous species under weekly mean temperature and relative humidity during 2003 and 2004 seasons.

Season	Considered climatic factor	r.	b.	E.V.%
Nephotettix modulatus				
2003	Weekly mean Temp.	-0.248	-16.79	34.45
	Weekly mean R.H.	+0.488*	+11.55	21.60
	Interaction temp. x R.H.	+0.093		5.07
	Total E.V.			61.12
2004	Weekly mean Temp.	-0.831**	-45.28	38.07
	Weekly mean R.H.	+0.514*	+13.82	20.41
	Interaction temp. x R.H.	-0.207		11.52
	Total E.V.			70.00
Sogatella furcifera				
2003	Weekly mean Temp.	-0.477*	-30.86	19.40
	Weekly mean R.H.	+0.393	+7.29	12.10
	Interaction temp. x R.H.	+0.093		2.80
	Total E.V.			34.30
2004	Weekly mean Temp.	+0.315	+12.28	5.10
	Weekly mean R.H.	+0.472*	+9.62	17.90
	Interaction temp. x R.H.	-0.207		3.90
	Total E.V.			29.90
Balclutha hortensis				
2003	Weekly mean Temp.	-0.229	-11.45	3.50
	Weekly mean R.H.	+0.449*	+7.85	18.20
	Interaction temp. x R.H.	+0.093		1.50
	Total E.V.			23.20
2004	Weekly mean Temp.	-0.639*	-30.23	45.11
	Weekly mean R.H.	+0.453*	+10.07	28.80
	Interaction temp. x R.H.	-0.207		14.90
	Total E.V.			88.81

b. *Sogatella furcifera*:

From the recorded data shown in Table (4) it is clear that the insect number was negatively significant correlated with temperature in 2003 season and positively insignificant correlated in 2004 season. The correlation between insect population and relative humidity (R.H.%) was positive insignificant in 2003 season and positive significant in 2004, season where of calculated (r.) were : +0.393 and 0.472* , respectively.

In general, the total effect of the two mentioned climatic factors on the insect activity was higher in the first season than that in the second one, where the calculated values of total explained variance (E.V. %) were 34.30% and 29.90% , respectively.

c. Balclutha hortensis:

With respect to the effect of the two tested weather factors on *B. hortensis* activity, the data given in Table (4) indicate that temperature effect was negatively insignificant in 2003 season (r = -229) and negatively significant in 2004 season (r = -639*) concerning insect number. The insect abundance was correlated with relative humidity being positively significant in both seasons, where (r.) values were + 0.449* and +0.453* for both season respectively. The total effect of the two studied factors on the population density of *B. hortensis* adults in 2004 season was much higher than that in 2003 season .

The corresponding values of total explained variance (E.V.%) were 88.81% and 23.20% of successively season. Mourad *et al.,* (2003) found that significant positive relationship for the day maximum temperature and significant negative correlation for the day relative humidity with population density of *B. hortensis*.

Order : Diptera:

The total number of dipterous insects reached to 2680 individuals representing 8.38% of the total insects count during the whole period of study (Table, 1). The total number of insects caught during the second season (1448) which exceeded that catches in the first one (1232). Four species belonging to four genera and three families were surveyed .

The surveyed species could be arranged descendingly according to their relative abundance in both seasons as follows: *Chironomus* sp., *Hyderellia prosterualis* deeming, *Ephydra macellaria* Egger, and *Atylotus agrestis* wied representing 42.28 ; 36.49; 15.45 and 5.78% of the whole dipterous catch in both examined seasons, respectively.

Population fluctuations of surveyed dipterous species:

A. *Chironomus* sp.

This rice pest was the first abundant dipterous species in both seasons. The total number of collected adults was 1133 during the whole period of study being 42.28% of the whole catch (Table, 1) . The total number of collected adults during the second season (622 individuals) were much higher than the first one (511 individuals).

The total number of swept adults was greatly higher in rice fields than nurseries. Within 20 days of sowing date (at early June in both seasons) the chironomid began to appear in moderate numbers recording 28 and 34

adults /200 strokes throughout 2003 and 2004 seasons, respectively. The population increased to attain its highest peak at the end of nursery period (26th June) recording 112 and 149 adults /200 strokes in the first and second seasons , respectively (Tables, 2 & 3). The corresponding means of temperature and relative humidity were 28.76ºC & 52.14% R.H. in 2003 and 29.15ºC & 60.14%R. H. in 2004 seasons.

In rice fields, the species started to appear in numbers of 55 and 86 flies /200 strokes in the two seasons successively. The population decreased gradually till completely disappeared from late August to mid September in each season. After wards the species was re-appeared in low numbers at late September in 2003 and at around mid- September in 2004 to record a small peak of 9 and 15 adults/ 200 strokes on 9th October and at early October in the two seasons, respectively. The species was completely absent in sweep net catches taken after mid October in both seasons. These results agree with those reported by Ali (1978) ; Kikuchi *et al.* (1985) Tantawi *et al.* (1989); Chattopadyay *et al.* (1995) and Stevens *et al.* (2006).

b. *Hydrellia prosternealis* Deeming:

As noticed in Tables (2 & 3) the species was greatly abundant in rice fields than in nurseries showing total numbers of (460 & 518) and (3 & 6) adults in the first and second seasons, respectively. In nurseries , the adults were first collected at late June after 35 days of sowing. The corresponding averages of temperature and relative humidity were: 28.76; 29.15ºC and 52.14; 60.14% R.H. for the two seasons, successively.

After transplanting, it was noticed that the insect population was noticely increased till attained its peak recording : 79 adults/ 200 strokes in 2003 and 86 adults /200 strokes in 2004 seasons at late August in both seasons at means ranged between 26.42 & 29.50ºC and 59.35 & 67.57% R.H. After this peak , the population was decreased gradually till disappeared at early October in the first season and after mid October in the second one. In agreement with obtained results (Foda *et al.,* 1997 ; Sherif *et al.* 1997; Tomeva and Anchev, 1998 and Mourad *et al.* 2003) who reported that adults of this species occurred in rice nurseries and fields and attained its peak at mid Aug.

Results of El-Metwally (1977) and Ali (1978) disagree with the obtained herein results.

Effect of climatic factors (temperature °C and relative humidity R.H.%) on the population fluctuations of the dominant dipterous species:

A. *Chironomus sp.*

The sensitivity of *Chironomus* sp. to the changes in the two tested environmental climatic factors show that the correlation between insect population and temperature was positively significant in both seasons, where (r) values were + 0.573 in 2003 and + 0.504 in 2004 seasons (Table 5) . In both seasons of study the effect of relative humidity was negatively insignificant in 2003 and negatively significant in 2004 .

Table (5): Simple correlation (r.) partial regression (b.) and explained variance (E.V.) for the number of dominant dipterous species under periodic mean temperature and relative humidity during 2003 and 2004 seasons.

Season	Considered climatic factor	r.	b.	E.V.%
***Chironomus* sp.**				
2003	Periodic mean Temp.	+0.573*	+9.56	32.70
	Periodic mean R.H.	-0.278	-2.15	7.50
	Interaction temp. x R.H.	-0.007		0.22
	Total E.V.			40.42
2004	Periodic mean Temp.	+0.504*	+20.02	20.40
	Periodic mean R.H.	-0.674*	-8.55	26.85
	Interaction temp. x R.H.	-0.357		16.69
	Total E.V.			63.94
Hydrellia prosternalis				
2003	Periodic mean Temp.	+0.277	+3.36	7.90
	Periodic mean R.H.	+0.573*	+3.24	33.10
	Interaction temp. x R.H.	-0.007		0.23
	Total E.V.			41.23
2004	Periodic mean Temp.	-0.364	-1.01	0.50
	Periodic mean R.H.	+0.831**	+3.83	64.50
	Interaction temp. x R.H.	-0.357		4.41
	Total E.V.			69.41

It was obvious that the effect of the two mentioned climatic factors on the insect activity was much higher in the second season than that the first one, where the value of total explained variance was 63.94% and 40.42 % in both successively seasons.

b. *Hydrellia prosternalis*:

From the data shown in Table (5) it is clear that the *H. prosternalis* number was positively insignificant correlated with temperature in 2003 (r=+0.277) while it was negatively insignificant correlated in 2004 seasons (r = - 0.364). The insect abundance was markedly correlated with the change in relative humidity being positively significant and highly significant in 2003 and 2004 seasons, where (r) values were : +0.573* and 0.831**, respectively. It was clear that the two tested factors had a considerable total effect on the insect abundance in each season showing total E. V. 41.23 in the first season and 69.41% in the second one. These results disagreement with Mourad *et al.* (2003).

Order : Lepidoptera:

This order was the third most abundant of all order surveyed in rice nurseries and fields. It included four species belonging to three genera and three families (Table , 1).

Generally the total number of lepidopterous insects collected by using the light trap and sweep net was higher in the first season (467) than in the second one (428) representing 2.90% of the total insects count during the whole period of study. The descending order of abundance of the caught species during the whole period of study was as follows: *Chilo agamemnon*

Bles. *Spodoptera littoralis* (Boisd), *Spodoptera exigua* Hb. and *Pelopids borbonica* Boisd. Which were found in total numbers of 421; 331; 143 and 32 insects with percentages of occurrence of : 45.42 ; 35.71; 15.42 and 3.45 respectively (Table, 1). The all lepidopterous species occurred only in rice fields except *C. agamemnon* which occurred in both rice nurseries and fields. From another point of view, all species were only found in light trap catches except. *P. borbonica* which was only present in sweep net.

Population fluctuations of *Chilo agamemnon* Bles:

The population fluctuations of this species was only discussed owing to its economic importance and for its highest occurrence in rice nurseries and fields. As shown in Table (1), the insect was very common in rice fields, while in nurseries it was found in low numbers in both seasons. The total number of collected insects in the first seasons (218 moths) exceeded that collected in the second on (203 moths).

The insect population started to appear in very low numbers in rice nurseries at late June within about 30 days after sowing (at means ranged between 28.76 & 29.15ºC and 52.14-60.14% R.H.) recording 4 and 4 moths in both seasons.

On rice plants, it was noticed that this pest had three periods of activity in each season. The first period started from 26th June to 17th July in both seasons and the peaks of 12 & 8 adult took place at the beginning of July and during the first half of July at means ranged between 23.76; 29.67ºC & 54.28; 67.71% R.H.) in both seasons , respectively.

The second period was the longest and began from 7th August to 11th September in 2003 and from 14th August till 11th September in 2004 seasons with peaks of 38 and 30 adults occurring on 21st August and 28th August , respectively. The corresponding means of temperature were 27.57 ; 29.50ºC and those of relative humidity were 60.64; 67.57% in the two seasons, successively .

The third period of insect abundance was the shortest which lasted for about 14 days beginning from 18th September to 16th October in both seasons. Its peaks were recorded at the beginning of October in each season (at means ranged between 24.71; 27.08ºC and 60.42; 61.75% R.H.) showing a total number of 38 adults in 2003 and 35 adults in 2004 .

These results are nearly similar to those recorded obtained by El-*Tantawy (1973) in Egypt; Huang et al., (1985) in China ; Tantawi et al.,* (1989) in Egypt and Cheng Zhongfang *et al.* (1999) in China.

Effect of climatic factors (temperature °C and relative humidity R.H.%) on the population fluctuation of *C. agamemnon* Bles.

Regarding the effect of the two tested weather factors on the size of *C. agamemrnon* population , the results in Table (6) clearly show that insect population was affected by the two tested factors in both seasons. The insect number was correlated significantly positive with temperature in 2003 (r = + 0.590*) , while in 2004 an insignificant positive correlation was observed (r = + 0.209). Relative humidity had a positively insignificant effect 2003 (r= + 0.303) and a positively significant effect in 2004 where r = + 0.628*. The corresponding values of total explained variance E.V.% were 56.10% and 40.00%, successively.

Table (6): Simple correlation (r.) partial regression (b) and explained variance (E.V.) for the number of *C. agamemnon* under weekly mean temperature and relative humidity during 2003 and 2004 seasons.

Season	Considered climatic factor	r.	b.	E.V.%
2003	Weekly mean Temp.	+0.590*	+5.96	38.90
	Weekly mean R.H.	+0.303	+1.033	13.00
	Interaction temp. x R.H.	+0.093		4.20
	Total E.V.			56.10
2004	Weekly mean Temp.	+0.209	+0.44	0.60
	Weekly mean R.H.	+0.628*	+1.38	37.30
	Interaction temp. x R.H.	-0.207		2.10
	Total E.V.			40.00

Order Hemiptera:

Species of this order occurred in low number in rice nurseries and fields during the whole period of study. Three species belonging to three genera and two families were surveyed in both light trap and sweep net catches (Table , 1). Of these, two species belong to family Pentatomidae and one species belong to family Lygaeidae.

The descending order of the abundance of the Hemipterous species in rice nurseries and fields during the whole period of study could be arranged as follows: *Nysius cymoids* spin; *Nezara viridula* L. and *Eysacoris inconspicus* (H.Sc.), which were found in total number of 681; 177 and 23 insects, respectively.

All these species were found in sweep net catches except *Nysius cymoids* found only in light trap also.

Order Orthoptera:

Species of this order occurred in very low numbers in rice nurseries or fields during the whole period of study. Four species belonging to four genera and three families were surveyed in both light trap and sweep net catches (Table ,1) . Of these , two species belong to family Acrididae, one species belong to each of Gryllotalpidae and Tettigonidae.

Bishara (1966) surveyed nine Orthoptera species in rice fields at different localities in Egypt while Ali (1978) surveyed eight species at kafr El-Sheikh.

The descending order of the abundance of the orthopterous species in rice nurseries and fields during the whole period of study could be arranged as follows: *Gryllotalpa gryllotalpa* L.; *Euprepocnemis plorans* (Ramb.); *Aiolopus strepens* (Latr.) and *Homorocophus nitidulus* scop. Which were found in total number of 133 , 54, 32 and 45 insects, respectively. All these species were found in sweep net catches except *G. gryllotalpa.*

Generally, the total numbers of all orthopterous species were nearly similar in both seasons being 67 & 64 and 59 & 74 insects in light trap and sweep net catches, respectively.

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J. Agric. Sci. Mansoura Univ., 32 (12), December, 2007

حصر للآفات الحشرية الرئيسية ودراسة الوفرة الموسمية لبعض الأنواع التى تصيب زراعات الأرز

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أجريت عملية الحصر وتقدير الوفرة الموسمية للحشرات الرئيسية التى تصيب الأرز فى المشتل والحقل على صنف الأرز جيزة 171 باستخدام المصيدة الضوئية وشبكة الجمع فى موسمى 2003، 2004 بمركز فاقوس محافظة الشرقية ولقد أوضحت النتائج المتحصل عليها مايلى:

أوضحت عملية الحصر تعريف 26 نوعاً حشرياً تتبع 26 جنساً ونوع واحد غير محدد ينتمى إلى الجنس *Chironomus* وتتبع هذه الأنواع (5) رتب حشرية وهى كالتالى : 12 نوع من متشابهة الأجنحة ، 4 أنواع من ذات الجناحين ، 4 أنواع من حرشفية الأجنحة ، 3 أنواع من نصفية الأجنحة ، 4 أنواع من مستقيمة الأجنحة 0 ولقد أمكن ترتيب هذه الرتب على حسب وفرتها العديدية خلال موسمى الدراسة تنازلياً كالتالى : متشابهة الأجنحة Homoptera ، ذات الجناحين Diptera حرشفية الأجنحة Lepidoptera ، نصفية الأجنحة Hemiptera ، مستقيمة الأجنحة Orthoptera حيث سجلت 85.13، 8.38، 2.90 ، 2.76، 0.83 % على التوالى 0

وأوضحت النتائج الوفرة الموسمية لبعض هذه الآفات الرئيسية الحشرية و فترة تواجدها والتى تتواجد بأعداد كبيرة فى مشاتل وحقول الأرز وهى نطاط الأوراق *Nephotettix modulatus* يتواجد فى الفترة من (أخر يونيو إلى آخر أكتوبر) ونطاط النباتات *Sogatella furcifera* يتواجد فى الفترة من (آخر يوليو إلى آخر أكتوبر) ونطاط الأوراق *Balclutha hortensis* يتواجد فى الفترة من (آخر يونيو إلى آخر أكتوبر) من رتبة متشابهة الأجنحة0

والديدان الدموية (هاموش الأرز) *Chironomus* sp وتتواجد فى الفترة من (بداية يونيو إلى أول أكتوبر) وصائعة انفاق أوراق الأرز *Hydrellia prosternalis* تتواجد فى الفترة من (آخر يونيو إلى أول أكتوبر) من رتبة ذات الجناحين ، ومن رتبة حرشفية الأجنحة ثاقبة ساق الأرز *Chilo agamemnon* وتتواجد فى الفترة من (آخر يونيو إلى آخر أكتوبر)0

ووجد أيضاً أن أعلى تعداد لهذه الحشرات السابقة يتواجد فى الحقل فيما عدا الديدان الدموية (هاموش الأرز) التى يتواجد أعلى تعداد لها فى المشتل0

وأوضحت النتائج أيضاً وجود علاقة ارتباط بين تعداد هذه الحشرات وبعض العوامل المناخية مثل درجة الحرارة والرطوبة النسبية وذلك فى معظم الحالات0

Table (1): List of major insect pests surveyed in rice nurseries and fields by using light trap and sweep net in Faqus locality, Sharkia Governorate during 2003 & 2004, seasons.

Order	Family	Species	Studied stage	Site of occurrence	Approximate period of abundance		Total number				Grand total number (G.T.)	%
					From	To	Light trap		Sweep net			
							2003	2004	2003	2004		
Homoptera	Cicadellidae	*Nephotettix modulatus* M.	Adult	N&F	Late June	Late Oct.	1426	1874	656	757	4713	17.32
		*Balclutha hortensis*Lind.	Adult	N&F	Late June	Late Oct.	1643	1367	439	537	3986	14.65
		Nephotettix apicals (Motsch)	Adult	N&F	Late June	Late Oct.	993	1154	431	666	3244	11.92
		Empoasca decipiens Paoli	Adult	N &F	Mid July	Late Oct.	775	743	686	553	2757	10.13
		Cicadulina bipunctella zeae China	Adult	F.	Mid July	Late Oct.	962	869	423	432	2686	9.87
		Cicadulina chinai(Ghour)	Adult	F.	Mid July	Late Oct.	378	437	263	396	1474	5.42
		Neolimnus aegyptiacus Mats.	Adult	F.	Mid Aug.	Mid. Oct.	399	430	141	87	1057	3.88
		Empoasca decedens Paoli	Adult	N&F	Late June	Mid. Oct.	187	259	163	157	766	2.82
		Exitianus capicola Stal.	Adult	F.	Late Aug.	Mid. Oct.	82	101	43	33	259	0.95
		Orosius albicinctus (Dist.)	Adult	F.	Early Sept.	Mid. Oct.	21	35	16	27	99	0.36
	Delphacidae	*Sogatella furcifera* (Horv.)	Adult	F.	Late July	Late Oct.	1508	1540	663	819	4530	16.65
		Sogatella vibix (Haupt.)	Adult	F.	Late July	Late Oct.	747	839	21	29	1636	6.01
	Total		-	-	-	-	9121	9648	3945	4493	27207	85.13
Diptera	Chironomidae	*Chironomus* sp.	Adult	N&F	Early June	Early Oct.	0.0	0.0	511	622	1133	42.28
	Ephydridae	*Hydrellia prosternalis* Deeming	Adult	N&F	Late Jun	Mid. Oct.	0.0	0.0	460	518	978	36.49
		Ephydra macellaria Egger	Adult	N&F	Early June	Mid. Sept.	0.0	0.0	195	219	414	15.45
	Tabanidae	*Atylotus agrestis* Wied.	Adult	F.	Mid. July	Early Oct.	0.0	0.0	66	89	155	5.78
	Total		-	-	-	-	0.0	0.0	1232	1448	2680	8.38

N. Nursery F. field

Table (1): Count

Order	Family	Species	Studied stage	Site of occurrence	Approximate period of abundance		Total number				Grand total number (G.T.)	%
					From	To	Light trap		Sweep net			
							2003	2004	2003	2004		
Lepidoptera	Crambidae	*Chilo agamemnon* Bles.	Adult	N&F.	Late June	Late Oct.	218	203	0.0	0.0	421	45.42
	Noctuidae	*Spodoptera littoralis* Boisd	Adult	F.	Late July	Mid. Oct.	172	159	0.0	0.0	331	35.71
		Spodoptera exigua Hb.	Adult	F.	Late July	Early Oct.	77	66	0.0	0.0	143	15.42
	Hesperiidae	*Pelopidas borbonica* Boisd.	Adult	F.	Late July	Late Sept.	0.0	0.0	13	19	32	3.45
	Total		-	-	-	-	467	428	13	19	927	2.90
Hemiptera	Lygaeidae	*Nysius cymoids* Spin.	Adult	N&F	Mid. June	Mid. Oct.	299	258	52	72	681	77.29
	Pentatomidae	*Nezura viridula* L.	Adult	F	Late July	Late Oct.	0.0	0.0	73	104	177	20.09
		Eysacris inconspicus (H.Sc.)	Adult	F	Late July	Mid. Oct.	0.0	0.0	18	15	23	2.62
	Total		-	-	-	-	299	258	143	191	887	2.76
Orthoptera	Gryllotalpidae	*Gryllotalpa gryllotalpa* L.	Adult	N&F	Early June	Mid. Sept.	59	74	0.0	0.0	133	50.38
	Acrididae	*Euprepocnemis plorans* (Ramb.)	Adult	F.	Late June	Late Oct.	0.0	0.0	23	31	54	20.45
		Aiolopus strepens (Latr.)	Adult	F.	Late June	Mid. Oct.	0.0	0.0	19	13	32	12.12
	Tettigonidae	*Homorocoryphus nitidulus* Scap.	Adult	F.	Early July	Mid. Oct.	0.0	0.0	25	20	45	17.05
	Total		-	-			59	74	67	64	264	0.82
	Grand total										31959	

Table (2): Numbers of certain major insect pests collected from rice nurseries and fields by using light trap and sweep net in Faqus locality Sharkia Governorate during 2003 season.

Site of sampling	Sampling date	Total numbers of insects / week												Corresponding means	
		Nephotettix modulatus		*Sogatella furcifera*		*Balclutha hortensis*		*Chironomus sp.*		*Hydrellia prosternalis*		*Chilo agamemnon*			
		Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Temp. ºC	R.H.%
Nursery	5/6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.54	52.17
	12/6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	0.0	0.0	0.0	0.0	28.17	52.67
	19/6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.0	0.0	0.0	0.0	0.0	28.57	53.39
	26/6	3.0	3.0	0.0	0.0	0.0	2.0	0.0	112.0	0.0	3.0	4.0	0.0	28.76	52.14
Total		3.0	3.0	0.0	0.0	0.0	2.0	0.0	231	0.0	0.0	4.0	0.0		
Field	3/7	6	0.0	0.0	0.0	11	0.0	0.0	55	0.0	12.0	12.0	0.0	28.76	54.28
	10/7	6	2	0.0	0.0	26	2	0.0	48	0.0	15.0	7.0	0.0	29.26	58.64
	17/7	7	4	0.0	2	31	0.0	0.0	40	0.0	18.0	3.0	0.0	28.00	56.64
	24/7	9	9	0.0	7	52	2	0.0	31	0.0	33	0.0	0.0	29.75	61.03
	31/7	12	12	15	12	73	5	0.0	29	0.0	35	0.0	0.0	29.77	61.32
	7/8	12	22	14	24	81	10	0.0	26	0.0	38	11	0.0	29.00	61.85
	14/8	23	25	24	26	115	13	0.0	14	0.0	61	23	0.0	27.85	62.35
	21/8	53	27	127	48	146	19	0.0	10	0.0	71	38	0.0	27.57	60.46
	28/8	89	30	153	62	149	26	0.0	5	0.0	79	18	0.0	26.42	59.35
	4/9	110	45	193	76	158	39	0.0	0.0	0.0	36	12	0.0	27.85	60.00
	11/9	131	59	177	107	186	56	0.0	0.0	0.0	29	4	0.0	27.57	57.42
	18/9	217	83	207	48	213	61	0.0	0.0	0.0	21	13	0.0	26.42	58.57
	25/9	259	125	223	89	220	73	0.0	6.0	0.0	6.0	18	0.0	25.71	59.42
	2/10	263	138	190	41	92	50	0.0	7.0	0.0	3.0	38	0.0	24.71	60.42
	9/10	126	59	135	31	50	38	0.0	9.0	0.0	0.0	17	0.0	24.00	60.42
	16/10	70	10	40	13	30	20	0.0	0.0	0.0	0.0	0.0	0.0	26.00	61.71
	23/10	30	3.0	10	7	10	10	0.0	0.0	0.0	0.0	0.0	0.0	27.42	63.00
	30/10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.67	62.35
	Total	1423	653	1508	663	1643	437	0.0	280	0.0	457	214	0.0		
Grand total		1426	656	1508	663	1643	439	0.0	511	0.0	460	218	0.0		

Table (3): Numbers of certain major insect pests collected from rice nurseries and fields by using light trap and sweep net in Faqus locality Sharkia Governorate during 2004 season.

Site of sampling	Sampling date	Total numbers of insects / week												Corresponding means	
		Nephotettix modulatus		*Sogatella furcifera*		*Balclutha hortensis*		*Chironomus sp.*		*Hydrellia prosternalis*		*Chilo agamemnon*			
		Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Light trap	Sweep net	Temp. ºC	R.H.%
Nursery	5/6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.11	57.14
	12/6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.0	0.0	0.0	0.0	0.0	26.41	61.71
	19/6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.0	0.0	0.0	0.0	0.0	27.18	62.14
	26/6	7.0	2.0	0.0	0.0	0.0	2.0	0.0	149.0	0.0	6.0	4.0	0.0	29.15	60.14
Total		7.0	2.0	0.0	0.0	0.0	2.0	0.0	274	0.0	6.0	4.0	0.0		
Field	3/7	7	0.0	0.0	0.0	5.0	0.0	0.0	86	0.0	14	6	0.0	28.28	63.71
	10/7	10	1	0.0	0.0	9	2	0.0	70	0.0	19	8	0.0	29.67	67.71
	17/7	19	2	0.0	0.0	10	5	0.0	53	0.0	22	4	0.0	30.17	71.42
	24/7	32	6	6	2	11	6	0.0	34	0.0	27	0.0	0.0	28.61	67.28
	31/7	34	6	11	3	23	7	0.0	26	0.0	32	0.0	0.0	29.85	68.85
	7/8	49	8	24	7	34	12	0.0	19	0.0	36	0.0	0.0	29.25	68.42
	14/8	69	17	48	9	58	15	0.0	6	0.0	52	16	0.0	29.71	69.57
	21/8	75	26	67	11	92	36	0.0	3	0.0	69	25	0.0	29.88	65.57
	28/8	112	36	96	16	137	63	0.0	0.0	0.0	86	30	0.0	29.50	67.57
	4/9	171	42	102	32	166	66	0.0	0.0	0.0	46	21	0.0	30.04	69.28
	11/9	216	67	127	47	199	84	0.0	0.0	0.0	42	11	0.0	27.97	64.71
	18/9	289	102	289	127	214	89	0.0	5	0.0	38	0.0	0.0	27.32	63.00
	25/9	324	131	384	196	155	49	0.0	11	0.0	14	5	0.0	28.75	64.14
	2/10	205	179	212	162	103	34	0.0	15	0.0	10	31	0.0	27.31	58.14
	9/10	161	131	106	99	91	32	0.0	12	0.0	5	35	0.0	27.08	61.75
	16/10	82	71	26	69	43	29	0.0	8	0.0	0.0	7	0.0	26.42	56.42
	23/10	12	20	0.0	39	17	6	0.0	0.0	0.0	0.0	0.0	0.0	24.50	58.14
	30/10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.17	59.42
	Total	1867	755	1540	819	1367	535	0.0	348	0.0	512	199	0.0		
Grand total		1874	757	1540	819	1367	537	0.0	622	0.0	518	203	0.0		

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