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6. SUMMARY

Rice (*Oryza sativa*, L.) is one of the most staple foods for more than three billion people all over the world. It comes in the second rank, after wheat, as a main food for several countries in the world.

The experiment trials were conducted at two locations; at both laboratory and experimental field of Rice Research and Training Center, Sakha Agricultural Research Station, Kafr El- Shiekh governorate, Egypt and El- Sabein village, Seidy Salem District, Kafr El-Sheikh governorate. They were carried out during two successive summer seasons; 2014 and 2015 at rice nursery and permanent field for the following objectives:

I. Survey the main insect pests attacking the rice fields and their associated parasitoids in rice nursery and permanent field.

II. Study the population fluctuation of the main insect pests and their associated parasitoids.

III. Evaluation of sampling methods for rice insect pests and their associated parasitoids.

IV. Effect of *Trichogramma evaescens* release on rice infestation by *Chilo agamemnon*

The obtained results could be summarized as follow:

I. <u>The main insect pests attacking the rice fields and their associated parasitoids in rice nursery and permanent field:</u>

White backed planthopper *Sogatella* spp. recorded the highest number of individuals (327) with a percentage of 26.18% followed by rice leafminer *Hydrellia prosternalis* Deem. (265 individuals = 21.22%), in the first season. In the second season, the highest number recorded by rice leafminer *Hydrellia prosternalis* Deem. (1390 individuals = 42.72%) followed by white backed planthopper, *Sogatella* sp. (1072 individuals = 32.94%). The lowest number of individuals was recorded by rice stem borer, *Chilo agamemnon* Bles. and green stink bug, *Nezara viridula* L. (126 individuals = 10.09%), (122 individuals = 3.75%) and (108 individuals = 8.65%), (131 individuals = 4.03%) respectively.

The captured parasitoids were belonging to 15 families; 35 species were identified, but one was not identified. The most abundant species were belonging to Diapriidae (150 and 210 individuals) followed by *Gronotoma* sp. (78 and 84 individuals). The following species were the most abundant: *Opius hediqusti* Fisher., *Aphanogmus* sp., *Camptoptera* sp., *Callitula* sp.,

Trissolcus basalis (Wollaston), *Telenomus* sp., and *Oligosita* sp. Twenty- five species were less abundant in the first and the second seasons respectively.

II. The population fluctuation of the main insect pests:

1- Rice stem borer *Chilo agamemnon* Bles.:

The population numbers of the rice stem borer in the nursery kept low till transplanting in the first season. In the paddy field, the first peak was recorded in the last week of July with a value of 15 individuals, and reached the highest peak (19 individuals) by the last week of August. In the second season, the number of individuals was relatively high (7 individuals) in the nursery then reached a peak in the third week of July (15 individuals) in the paddy field.

2- Rice leafminer, *Hydrellia prosternalis* Deem:

In the first season, number of individuals in nursery was relatively high and recorded one peak (20 individuals) in the last week of May. In the paddy field, number of individuals reached a peak in the last week of July (32 individuals). In the second season, number of individuals reached the first peak (75 individuals) in the first week of June and recorded the second peak (94 individuals) in the third week of same month in nursery. In the paddy field, rice leaf miner recorded two peaks in the second and the last week of July (154 and 164 individuals respectively).

3- Rice skipper *Borbo borbonica* :

In the first season, rice skipper individuals increased gradually and reached a peak in the third week of May (11 individuals) in the nursery. In the paddy field, the individuals increased gradually and reached a peak in the first week of September (20 individuals). In the second season, number of individuals was relatively low in the nursery, and increased gradually to reach a peak by the last week of August in the paddy field (27 individuals).

4- Green leafhopper *Nephotettix* sp.:

Number of individuals in the nursery reached a peak in the second week of June (13 individuals) in the first season. In the paddy field, number of individuals recorded a peak by the last week of August (25 individuals). In the second season, number of individuals reached a peak by the first week of June (19 individuals) in nursery. Furthermore, in the paddy field number of individuals recorded two peaks, the first one was in the last week of June (26 individuals) and the second was in the first week of September (28 individuals).

5- White backed planthopper *Sogatella* spp.:

In the first season, the number of individuals increased gradually in the nursery and reached a peak (23 individuals) in the third week of June. In the paddy, the insect number recorded one peak (32 individuals) in the second week of August and decreased again till reached 12 individuals in the third week of September. In the second season, number of individuals was high throughout the season and reached a peak in the nursery (80 individuals) in the third week of June. Two peaks were recorded in the paddy field in the second and the last week of July (85 and 83 individuals, respectively).

6- Green Stink bug, *Nezara viridula* L.:

Number of green sting bug was low during the whole seasons and reached a peak in the paddy field in the first week of September (18 individuals) and in the last week of July (21 individuals) in the first and the second seasons respectively.

III. Population fluctuations of the most abundant parasitoids associated with some insect pests attacking rice plants:

1- Diapriidae species:

The population numbers of the diapriid parasitoids in the nursery was relatively low till transplanting. In the paddy field, the first peak was recorded in the third week of June (21 individuals) and decreased gradually till the end of the season. In the second season, the population numbers of the parasitoid in the nursery were relatively high. In the paddy field, parasitoid recorded a peak in the third week of June (27 individuals) and recorded another peak in the third week of July (26 individuals).

2- *Gronotoma* sp.:

The population numbers of the parasitoid, *Gronotoma* sp. kept low in the nursery in the first and second seasons. In the paddy field, the population number of the parasitoid recorded a peak in the third week of June (10 and 13 individuals) and reached the second peak in the second week of July (16 and 18 individuals) and the third peak by the last week of the same month (10 and 15 individuals) in 2014 and 2015 seasons.

3- *Telenomus* sp.:

The parasitoid was not detected in nursery. In the paddy field, number of individuals increased gradually and reached a peak (10 and 15 individuals) by the first week of August in both seasons.

4- *Aphenogmus* sp.:

In the first season, number of individuals was relatively low in the nursery. In the paddy field, number of individuals recorded a peak (6 individuals) in the third week of July and recorded another peak (6 individuals) in the third week of August. In the second season, number of individuals was high in the third week of May in the nursery. In the paddy field, number of individuals recorded a peak (5 individuals) in the last week of June and recorded another peak in the third week of September.

5- *Oligosita* sp.:

In the first season, the parasitoid was not recorded in nursery in the first and the second seasons. In the paddy field, the first appearance of the parasitoid was by the first week of August (one and 3 individuals) and the number of individuals recorded a peak (12 and 9 induv.) in the second and in the first week of September in the first and the second season respectively.

6- *Camptoptera* sp.:

The parasitoid was not detected in nursery in the first season. In the paddy field, the first appearance of the parasitoid was in the first week of August (5 individuals) and reached a peak in the second week of September (7 individuals). In the second season, the parasitoid was existed in the third week of May in the nursery and disappeared till transplanting. In the paddy field, the first appearance of the parasitoid was by the first week of August (6 individuals) and reached a peak by the second week of September.

7- *Opius hedigusti* Fisher:

The number of individuals was relatively high in the second week of June in nursery and increased in the third week of the same month (4 individuals). In the paddy field, number of individuals was high (4 individuals) in the last week of June and decreased gradually till disappeared in the last week of August. In the second season, number of individuals reached a peak (7 individuals) in the third week of June in the nursery. In the paddy field number of

individuals was relatively high in the third week of June (5 individuals) and decreased in the remainder of the season.

8- *Trissolcus basalis* (Wollaston):

In the first season, number of individuals was relatively low in the nursery in the first and the second seasons. In the paddy field, number of individuals was relatively low and increased at the end of the season (4 individuals) in the first season. In the second season, number of individuals was relatively high and recorded one peak in the second week of September (9 individuals).

9- *Callitula* sp.:

The parasitoid did not existed in nursery in the first and the second seasons. While in the paddy field, the first appearance of the parasitoid was in the second week of August (one and 4 individuals) reached a peak in the third and in the second week of September (8 and 9 individuals). in 2014 and 2015 seasons respectively.

IV. Evaluation of sampling methods for rice insect pests and their associated parasitoids:

Data indicated that water pan trap captured more number of rice insect pests and their associated parasitoids than did the other sampling methods during both seasons.

V. Effect of *Trichogramma evaescens* release on rice infestation by *Chilo agamemnon*:

The parasitoid was released at a rate of 30,000 wasps / feddan twice; 40 and 60 days after rice transplanting in the both seasons.

In 2014 season, dead hearts, caused by the borer infestation, were reduced by 36.67 % and 39.53% due to parasitoid release in the first and second examination, respectively. In 2015 rice season, the borer infestation accounted for 38.89% and 28.57% dead heart reduction in the first and the second examination, respectively.

The borer infestation was reduced by 45.00% as white heads. Reduction infestation calculated three weeks before harvest averaged 39.13%. In 2015 season, the borer infestation reductions averaged 42.31% and 33.33% in the first and second examination respectively, due to *Trichogramma* release.