Egyptian Journal of Biological Pest Control, 18(1), 2008, 11-16
Proceeding of 2nd Arab Conference of Applied Biological Pest Control, Cairo, Egypt, 7-10 April 2008

Utilization of *Trichogramma evanescens* (Ashmead) for Controlling Rice Stem Borer, *Chilo agamemnon* Bles. in Rice Fields in Egypt

Sherif, M. R.; A. S. Hendawy and M. M. El-Habashy
Rice Research and Training Center, Sakha Agricultural Research Station, Agricultural Research Center, Egypt

ABSTRACT

The rice stem borer, *Chilo agamemnon* Bles. is the key insect pest of rice fields in Egypt. Since the growers tend to use insecticides to control this pest, a 3-year study was conducted at Rice Research and Training Center, Sakha Agricultural Research Station Kafr El-Sheikh Governorate, Egypt to test the efficacy of the egg-parasitoid, *Trichogramma evanescens* (Ashmead) in controlling the borer. In 2005, the natural parasitism of *Trichogramma* in rice fields was found to be quite low from May through late July, moderate during the first half of August, but high by late August and during September. Population fluctuation of rice stem borer was monitored using light traps that exhibited four peaks of moth activity, to find out the proper time for using egg-parasitoid. In 2006, *T. evanescens* was released in rice fields sown with Giza 178 rice cultivar (susceptible to stem borer) twice; 25th June and 15th July at the rates of 0, 25, 50, 75, 100 and 125 thousand wasps/ha. The rates of 75, 100 and 125 thousand wasps/ ha reduced dead hearts by 48.03, 50.70 and 79.11% and white heads by 69.71, 62.66 and 71.07%, respectively. In 2007, the parasitoid was released in 80 hectares at Sakha, and in 35 hectares at Sirw, and the reductions in dead hearts and white heads averaged 75-80% idicating that *Trichogramma* release could efficiently control the pest in rice fields. An experiment was carried out to estimate the efficacy of *Trichogramma* for rice stem borer control compared with carbofuran insecticide against the pest. It was found that both treatments similarly controlled the pest. Because of the hazardous effect of the insecticides, release of *Trichogramma* twice; by late June and during July at a rate of 75 thousand wasps/release was more preferred than insecticides to control *C. agamemnon* in rice fields.

Key Words: Utilization, *Trichogramma evanescens*, *Chilo Agamemnon*, Rice fields, Egypt.

INTRODUCTION

The rice stem borer, *Chilo agamemnon* Bles. is the key insect pest of rice plants in Egypt, resulting in considerable yield losses, particularly in the borer-susceptible varieties. The growers used to use insecticides to control the pest, especially broadcasting the granulated insecticide; carbofuran. Other than the known hazards of pesticides to the environment and human beings, the granules of carbofuran falling into flood water are highly toxic to fish possibly bred in flooded rice, and to aquatic predators. Hence, biological control against this borer becomes a sound tactic to conserve natural enemies.

The natural parasitism of egg masses of yellow rice stem borer, *Scirpophaga incertulas* (Walker) by *Trichogramma japonicum* was estimated as 7.11-14.03 %, by Marub (1993).

Release of *T. maidis* was carried out, in rice fields at a rate of 1 g / ha, the dead hearts and white heads were 72.00 and 28.63 % less than non-release fields, which reflected an increase in yield by 10.73% (Asaady and Navai 1995). Releases of *T. dendrolimi* Matsumura to control the Asian corn borer, *Ostrinia furnacalis* (Guenee) showed consistent levels of 66.85 % parasitism, with reductions in corn damage of 65.92 % (Piao and Yan 1996). Many releases of *Trichogramma* spp. were necessary to control the codling moth, *Cydia pomonella* (L.), regardless of release rate (McDougall and Mills 1997). In Egypt, Abbas *et al.*, (1989) found that releasing *T. evanescens* at a rate of 50,000 wasps/ha in sugar cane fields reduced *C. agamemnon* infestation by 54.4-64.6%. Also, Soliman and Ewaise (1997) reported that release of *T.* evanescens in rice fields at a rate of 28,000 parasitoids/fed (= 70,000 parasites/ha) successfully controlled *C. agamemnon.* In Iran, research on stem borer control was focused on biological control; it was found that 80 % control could be achieved in rice fields with the release of *Trichogramma* in flood water (Rani 1998). *T. japonicum* Ashmead combined with three *Telenomus* species parasitized 65 % of eggs of white rice stem borer, *Scirpophaga innotata* (Walker), and multiple parasitism occurred in 61 % of parasitized egg masses (Litsinger *et al.*, 2006).

The inundative release of *T. japonicum* during the rice panicle initiation increased parasitism from 12% before release to 32 % four days after release (Anonymous 2006). This release increased the yield by about 230 $/ha when the stem borer was biologically controlled.

The present study was carried out to estimate the appropriate rate of *T. evanescens* release, and parasitoid efficacy for rice stem borer, *C. agamemnon* control compared with the recommended insecticide carbofuran.

MATERIALS AND METHODS

1. Rearing of *T. evanescens*:

T. evanescens was mass-reared at Rice Research and Training Center (RRTC) laboratory (Kafr El-Sheikh Governorate) on eggs of grain moth, *Sitotroga cerealella* using the procedures described by Abbas (1998).

2. Monitoring of *T. evanescens* in rice fields:

In 2005 rice season, the natural parasitism of *T. evanescens* was weekly monitored in rice fields at Sakha Agricultural Research Station (SARS) from June till September. Every week, ten rice hills, free from any insect infestation, were pulled out and transferred to the laboratory. Each hill was fixed in wet soil harbored in plastic pot, and then the pots were individually placed into screen cages. *C. agamemnon* pupae were collected from the field sexed and introduced as two males and two females per cage. The caged rice hills were daily examined, and the hills having *C. agamemnon* eggs were transferred to the field, and placed among rice plants to allow *T. evanescens* parasitize *C. agamemnon* eggs. In the following day, the potted hills were transferred again from the field to the laboratory and new hills were placed instead, and so on. The host eggs, previously exposed to the field parasitism, were picked up by cutting the pieces of rice leaves containing the eggs, kept into petri dishes, and monitored till hatching of rice stem borer larvae or appearance of parasitism symptoms (black eggs). Percentage of parasitism was calculated based on number of parasitized eggs in relation to total field-exposed eggs.

3. Monitoring of flight activity of *C. agamemnon* moths by the light trap:

C. agamemnon moths were collected using the ultra-violet light trap, installed in rice fields, beginning from May up to September. The catch was collected every morning, and number of borer moths per trap was recorded.

4. Effect of *Trichogramma* release rates on rice stem borer infestation:

In 2006 rice season, the parasitoid was released in rice fields sown with Giza 178 rice cultivar (susceptible to stem bore) twice; 25th June and 15th July (20 and 40 days after rice transplanting, respectively). Six rice plots (about 0.4 ha each) were assigned for parasitoid release at rates of 0, 25, 50, 75, 100 and 125 thousand wasps/ha. To avoid the drift of the parasitoids among the experimental plots, the treated areas were apart from each other by about 100 m. Then, the about to emerge wasps, harboured in parasitized *S. cerealella* eggs, were distributed as paper cards among rice hills.

5. Large-scale release of *Trichogramma* for controlling rice stem borer:

In 2007 rice season, the parasitoid was released in large areas of rice fields; 80 ha at SARS and in 35 ha at Sirw Agricultural Research Station. The release was practiced twice; on 25th June and on 15th July (about 20 and 40 days after transplanting Giza 178 cultivar). Each release was at a rate of 75,000 wasps/ha, depending on the results of 2006 season.

6. Parasitoid efficacy against the pest compared to a recommended insecticide:

Both *Trichogramma* and carbofuran (Furadan 10G) were field compared as control agents for the rice stem borer in 2007 rice season. Three plots (1000 m^2 each) were assigned for this experiment, the first plot received the parasitoid at the rate of 75,000 wasps/ ha, the second was treated by carbofuran (15 kg/ha), while the third was untreated (check).

7. Assessment of rice stem borer infestation:

Damage of *C. agamemnon* appears as dead hearts during the vegetative stage, and as white head in the reproductive stage. To assess levels of dead hearts, four samples (each of 100 hills) were taken from each experimental plot, 20 days after the first release. Other samples, of the same size, were taken three weeks before harvest to assess levels of white heads. The reduction percentages of dead hearts and white heads were calculated in release plots compared to none release ones.

8. Statistical analysis:

Data were subjected to analysis of variance, and means of treatments were compared using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

1. Monitoring of *T. evanescens* in rice fields:

Natural parasitism status of *T. evanescens* on *C. agamemnon* eggs was investigated during 2005 rice season (Table 1). The parasitism rate was quite low throughout the period from 18th June (2.94 %) up to 16th

July (4.13 %). The rate gradually increased from 23th July (7.88 %) to 13 August (17.63%). A considerable level of parasitism was detected at the last week of August (26.98 %). During September, *T. evanescens* was more active, exhibiting parasitism of 32.87 % by early September, and reached the peak on 24th September (85.77%). These results show that the parasitism rate was relatively satisfactory by late August, and throughout September. This situation was considered accepted ten years ago, when most of rice varieties matured by late September and were harvested during October. During the last decade, early maturing rice varieties replaced the old conventional ones. Thus, high parasitism rates of *C. agamemnon* eggs do not coincide the active period of the pest, and the growers tend to use insecticides to get rid of the borer. These unwise applications of insecticides might affect the low levels of parasitism during June and July. Way and Heong (1994) recommended avoidance of insecticide applications against early season defoliating insects, because the rice plants can compensate the damage; this strategy preserves the early arriving natural enemies that are crucial for later biological control. Data in Table (1) disclose the importance of enhancing *Trichogramma* population during June and/or July to face the increase in rice stem borer population by progress in the development of rice plants. The population of the parasitoid could be increased by inundative releases.

2. Monitoring of flight activity of *C. agamemnon* moths by the light trap:

The moths of rice stem borer, monitored by the light trap, exhibited four peaks of flight activity; by mid-May, late June, late July, and mid-September. The first peak could be negligible because the rice plants in nurseries are not preferred to borer attack because their stems are thin. Both second and third peaks are important as they cause in the main losses in rice yield. The last borer peak is too late to induce losses, because most of rice areas are sown now with early maturing rice varieties. These results show that the optimum period for *C. agamemnon* control should be by late June and throughout July.

Table (1): Natural parasitism rate of *Chilo agamemnon* eggs by *Trichogramma evanescens* at Kafr El-Sheikh rice fields in 2005.

Sampling Date	Total host eggs (No.)	parasitized host eggs (No.)	Parasitism %
Jun 18	68	2	2.94
25	85	2	2.35
Jul 2	172	4	2.33
9	187	6	3.21
16	218	9	4.13
23	330	26	7.88
30	255	24	9.41
Aug 6	433	66	15.24
13	692	122	17.63
20	368	55	14.95
27	404	109	26.98
Sept 3	356	117	32.87
10	449	201	44.77
17	568	258	45.42
24	520	446	85.77

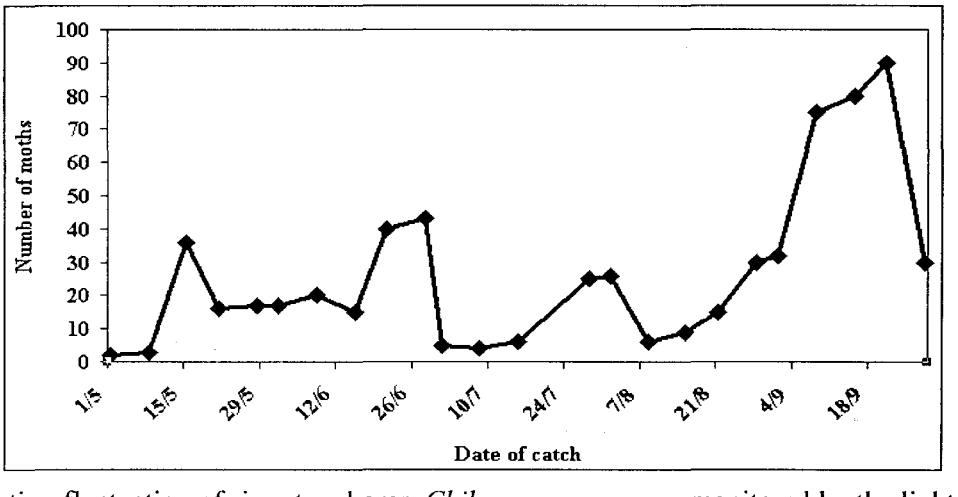

Fig (1): Population fluctuation of rice stem borer, *Chilo agamemnon* as monitored by the light trap at Sakha Agricultural Research Station.

Table (2): Percentages of dead hearts and white heads in rice fields receiving different rates of *Trichogramma evanescens* at Kafr El-Sheikh rice fields, during 2006 rice season.

Number of wasps/ha (x1000)	Dead heart		White head	
	%	Reduction %	%	Reduction %
0 (check)	4.26 c	-	11.06 d	-
25	4.13 c	3.05	8.20 c	25.86
50	2.26 b	46.95	4.91 b	55.61
75	2.18 b	48.83	3.35 a	69.71
100	2.10 b	50.70	4.13 ab	62.66
125	0.89 a	79.11	3.20 a	71.07

Means followed by a common letter are not significantly different at the 5 % level.

3. Effect of *Trichogramma* release rates on rice stems borer infestation:

Release of *Trichogramma* in two waves; 25th June and 15th July in 2006 rice season reduced both symptoms (dead hearts and white heads) of rice stem borer infestation (Table 2). Different release rates induced variable levels of dead hearts which differed significantly. The check plot (non-release) exhibited 4.26% dead hearts, that was slightly reduced to 4.13% (3.05% reduction) at the release rate of 25,000 wasps/ha. The rate of 50,000 wasps/ha eliminated 46.95% of dead hearts. However, higher release rates; 75, 100 and 125 thousand wasps/ha reduced dead hearts by 48.83, 50.70 and 79.11 %, respectively. Almost, the same trend was detected with white head symptom. The check plot significantly suffered from the highest stem borer infestation (11.06 % white heads). Release the parasitoid at a rate of 25,000 wasps/ha induced 25.86 % stem borer reduction. The rates of 50, 75, 100 and 125 thousand wasps/ha reduced 55.61, 69.71, 62.66 and 71.07% white heads, respectively.

Because rice plants are greatly capable of compensation for most of dead hearts, particularly those occurring before tillering stage (Sherif *et al.*, 1999). Levels of white heads were statistically the same at the rates of 75, 100 and 125 thousand wasps/ha.

This shows that the release at the rate of 75,000 wasps/ha was sufficient to control pest; at this level, 69.71 % of white heads were reduced (Table 2). Factors that can influence the effectiveness of biological control agents against the insect pests were listed as timing and number of release, methods of release, synchrony of natural enemy with the host, field conditions and release rate (Huffaker and Messenger 1976, Collier and van Steenwyk 2004, and Stiling and Cornelissen 2005). In the current investigation, the three release levels of 50, 75 and 125 thousand wasps/ha induced the same efficacy against the targeted stem borer. These results are in line with those of Crowder (2007) who stated that the impact of release rates of 35 augmentative biocontrol agents on the control of 42 arthropod pests. He concluded that in 64 % of the cases, the release rate did not impact the effectiveness of biological control, and emphasized the importance of synchrony of release of the biocontrol agent with the host insect to enhance chances of success. Mohanraj *et al.* (1995) released only 5,000 individuals of *Trichogramma* spp. twice; at active rice tillering stage, and at flowering stage to control the yellow rice stem borer, *Scirpophaga incertulas* and obtained 10.3 % reduction in borer infestation in release plots. By contrast, Bentur *et al.* (1994) used very high doses of *Trichogramma japonicum* Ash. to control the rice leaf folder, *Cnaphalococis medinalis* (Guen) (Lep., Pyralidae). They released the parasitoid 4-9 times, each at a rate of 100,000 wasps / ha to obtain 3.7-59.0 % decrease in leaf damage, and a 1.3-10.2 fold increase in egg parasitism.

4. Large-scale release of *Trichogramma* for rice stems borer control:

Efficacy of *T. evanescens* release to control *C. agamemnon* was evaluated on a large-scale release; 80 ha at Sakha (Kafr El-Sheikh Governorate), and 35 ha at Sirw; Damietta (Dumiat) Governorate (Table 3). Two releases (each of 75,000 wasps/ha), were carried out during July, reduced dead hearts at Sakha (71.31%) and (64.94%), at Sirw with an average of 68.13%. The white heads, essentially responsible for rice yield losses, attributed to the rice stem borer, were reduced by 83.04 and 77.37 % at Sakha and Sirw, respectively, with an average reduction of 80.21%. These results confirm those obtained in the previous season (2006). Results with the same trend were obtained at Assam (India), when the average of yellow rice stem borer, *S. incertulas* was reduced by 54.90 % fifty days after inundative release of *Trichogramma japonicum* (Borah 1994). In the Philippines, 10 % increase in income of rice growers was attained when the damage of *S. incertulas* was reduced by *T. japonicum* release (Anonymous 2002).

4. Efficacy of *Trichogramma* release against the rice stem borer compared to a recommended insecticide:

Both *Trichogramma* and carbofuran (Furadan 10G) (a recommended insecticide) were field compared as control agents of the rice stem borer in 2007 rice season (Table 4). In the check plots, 3.86% of rice

Table (3): Rice stem borer infestation in rice fields receiving two releases of *Trichogramma evanescens* each at 75,000 wasps/ha in a large-scale evaluation in 2007 rice season.

Location	Treated area (ha)	Dead heart %			White head %		
		Control	*Treatment*	Reduction	Control	Treatment	Reduction
Sakha	80	7.18	2.06	71.31	14.92	2.53	83.04
Sirw	35	5.99	2.10	64.94	12.15	2.75	77.37
Average				68.13			80.21

Table (4): Efficacy of *Trichogramma evanescens* for rice stem borer control compared with a recommended insecticide (Sakha Agric. Res. Station, 2007 rice season).

Treatment	Rate / ha	Dead heart %			White heads %		
		Untreated	Treated	Reduction	Untreated	Treated	Reduction
Check (untreated)	-	3.86	-	-	12.78	-	-
Carbofuran (Furadan 10G)	15 kg	-	1.02	73.58	-	2.96	76.84
Trichogramma evanescens	75,000 wasps	-	1.17	69.69	-	2.96	82.71

plants suffered from dead hearts, which were reduced by 73.58 % and 69.69 % in the plots treated with carbofuran and *Trichogramma*, respectively. The reductions of white heads were more evident than those of dead hearts. They were reduced by 76.84 and 82.71 %, respectively. Considering that white heads are more effective than dead hearts in reducing rice yield, it could be reported that the parasitoid release was relatively more efficient than carbofuran for the borer control. These results confirm those obtained by Soliman and Ewaise (1997) who indicated that *Trichogramma* was as equivalent as Furadan. In such concern, Collier and van Steenwyk (2004) suggested that the use of insecticides may be an important factor that can improve the effectiveness and economical use of augmentative biological control.

In conclusion, *T. evanescens* release gave profound results for *C. agamemnon* control. The cards containing the about to emerge parasitoid adults should be fixed among rice plants twice a season; the first by late June, and the second about 20 days later, each at a rate of 75,000 wasps / ha. This is an easy technique to be followed, and only one worker can achieve the parasitoid release in several hectares per day. However, the cost of labor may be a constraint for the parasitoid application in large area. To overcome this problem, Karadgov (1998), in Bulgaria, applied the release of *Trichogramma maidis* by plane to control the European corn borer, *Ostrinia nubilalis*. The author combined the parasitized eggs with wheat flour at a ratio of 1:1 to obtain a normal paraitoid distribution in field areas. The results were very good; 3-5 parasites / m^2 achieved 85 % egg parasitism, when the capacity of a plane for parasitoid distribution was 82 ha / hour.

ACKNOWLEDGEMENTS

The authors wish to express their gratitude to Dr. Mohamed A. Ewaise and Prof. Dr. Ahmed H. El-Heneidy for their advice during the parasitoid rearing and release procedures. Thanks, also, are due to Mr. Mohamed Aly for his technical assistance.

REFERENCES

Abbas, M. S. 1998. Mass production and utilization of *Trichogramma evanescens* as a biocontrol agent against tomato fruit worm, *Heliothis armigera* in Egypt. Egg parasitoids, Cali, Colombia, March. Mitt. Biol. Bundesanstalt. Land Forstwirtsch, Berlin Dahlem, H.356.

Abbas, M. S.; A. H. El-Heneidy; M. M. Embaby and M. A. Ewaise. 1989. Utilization of *Trichogramma evanescens* to control *Chilo agamemnon* in sugar-cane fields in Egypt. 3. Three wave release technique. Proc. 1st Int. Conf. Econ. Ent., Vol. 2.

Anonymous. 2002. Control rice stem borer-use *Trichogramma japonicum*. Report of Department of Agriculture, Regional Field Unit, No. 10- Northern Mindanao, Philippines.

Anonymous. 2006. Control of white stem borer using *Trichogramma japonicum* Ashmead. Organic Farming Information Network. Philippine Council for Agriculture, and Natural Resources Research and Development (PCARRD).

Asaady, H. B. and I. N. Navai. 1995. Effects of rearing conditions on the efficacy of *Trichogramma* against rice stem borer (*Chilo suppressalis*) and green rice semilooper (*Naranga aenescens*) in Mazandaran. *Trichogramma* News. 8(2): 33.

Bentur, J. S., M. B. Kalode, B. Rajendran and V. S. Patel 1994. Field evaluation of the egg parasitoid *Trichogramma japonicum* Ash. (Hym.; Trichogrammatidae) against the rice leaf folder, *Cnaphalocrocis medinalis* (Guen) (Lep.; Pyralidae) in India. Applied Entomology, 117 (3): 257-261.

Borah, R. K. 1994. Parasitization efficacy of *Trichogramma japonicum* on rice stem borer in Assam. Annals of Agricultural Research, 15 (1): 124-125.

Collier, T. and R. van Steenwyk. 2004. A critical evaluation of augmentative biological control. Biological Control, 31: 245-256.

Crowder, D. W. 2007. Impact of release rate on the effectiveness of augmentative biological control agents. Journal of Insect Science, 7 (15): 1-11.

Huffaker, C.B. and P.S. Messenger (1976). Theory and practice of biological control. Academic Press.

Karadgov, S. 1998. Air application of *Trichogramma*. Egg Parasitoid News, Volume 10.

Litsinger, J.; A. Alviola, C. Cruz, B.Canapi, E. Batay and A. Barrion. 2006. Rice white stem borer, *Scirpophaga innotata* (Walker) in southern Mindanao, Philippines. II. Synchrony of planting and natural enemies. International Journal of Pest management, 52 (1): 23-37.

Marub, E. 1993. YRSB eggs parasitoid potential on different rice varieties in an IPM. Ilum Pertania, 5 (3): 645-656.

McDougall, S. J. and N. J. Mills. 1997. Dispersal of *Trichogramma platneri* Nagarakatti (Hym.; Trichogrammatidae) from point-source releases in an apple orchard in California. Journal of Applied Entomology, 121: 205-209.

Mohanraj, P.; K. Veenakumari; A. B. Mandal. 1995. Biocontrol of the yellow stem borer using *Trichogramma* a parasitoid native to the Andamanas. Rice Biotechnology Quarterly, 23: 9-10.

Piao, Y. F. and S. Yan. 1996. Progress of mass production and field application of *Trichogramma dendrolimi*. In " Proceedings of the National Symposium on IPM in China" (Zhang, Z.L., Piao, Y.F. and Wu. J.Wu., Eds), pp 1135-1136. China Agricultural Scientech Press, Bejing.

Rani, N. S. 1998. The rice situation in Iran. International Rice Commission Newsletter (47), Food and Agricultural Organization of the United Nations.

Sherif, M. R.; F. E. Abdalla and A. M. Soliman. 1999. Major insects of rice plants in Egypt and their management. Advanced Agricultural Research in Egypt, 2 (3): 188-219.

Soliman, A. M. and M. A. Ewaise. 1997. Evaluation of *Trichogramma evanescens* parasitoid as compared with recommended Furadan insecticide against *Chilo agamemnon* Bles. in rice field. Egyptian Journal of Agricultural Research, 75(1):105-110.

Stiling, P. and T. Cornelissen. 2005. What makes a successful biological control agent? A meta-analysis of biological control agent performance. Biological Control, 34: 236-246.

Way, M. J. and K. L. Heong. 1994. The role of biodiversity in the-dynamics and management of insect pests of tropical irrigated rice-a review. Bulletin of Entomological Research, 84: 567-587.

الملخص العربى

استخدام طفيل *Trichogramma evanescens* لمكافحة ثاقبة ساق الأرز *Chilo agamemnon* فى حقول الارز بمصر

محمود رمزي شريف & أحمد سمير هنداوي & محمود محمد الحبشي

مركز بحوث الأرز بسخا، محطة البحوث الزراعية بسخا، مركز البحوث الزراعية، مصر

ثاقبة ساق الأرز *Chilo agamemnon* هي الآفة الرئيسية لنباتات الأرز في مصر. و نظرا لاستخدام المزارعين للمبيدات الحشرية في مكافحة الحشرة، أجريت دراسة مدتها ثلاث سنوات لتقييم كفاءة طفيل الترايكوجراما *Trichogramma evanescens* في مكافحة الآفة. أوضحت دراسة تقلبات تعداد الطفيل فى حقول الأرز (عام ٢٠٠٥) أن أعداد الطفيل كانت منخفضة خلال مايو ويونيو ويوليو ، ثم زادت نسبيا خلال النصف الأول من أغسطس ، وارتفعت بشكل ملحوظ مع أواخر أغسطس وطوال سبتمبر. كما أوضحت دراسة تقلبات تعداد ثاقبة ساق الأرز وجود أربع ذروات لطيران الفراشات. ونظرا لأن الحشرة تصيب الأرز أساسا خلال يوليو وأغسطس ، بات من الواضح أن الوقت المناسب لإطلاق الطفيل يبدأ من أواخر يونيو وخلال شهر يوليو ، وذلك لأن إطلاق الطفيل خلال أغسطس يعتبر متأخرا جدا لمكافحة الآفة نظرا لزراعة أصناف الأرز مبكرة النضج فى أغلب المساحات. وفى عام ٢٠٠٦ جرى تقييم المعدل المناسب لإطلاق الطفيل لمكافحة الآفة ، واتضح أن معدل ٧٥,٠٠٠ طفيل/ هكتار كان فعالا حيث قلل نسبة القلوب الميتة بمعدل ٤٨,٠٣% والسنابل البيضاء بمعدل ٦٩,٧١ %. كما جرى تقويم كفاءة إطلاق الطفيل على نطاق واسع (٨٠ هكتار فى سخا ، و ٣٥ هكتار فى السرو) وكانت النتائج مبشرة حيث انخفضت الإصابة بالآفة بمعدل ٧٥-٨٠ %. وفى تجربة لمقارنة كفاءة الطفيل بمبيد الفيورادان الموصى به لمكافحة الثاقبة حيث ظهر أن **الطفيل كان** أفضل نسبيا من المبيد فى مكافحة الآفة. وعلى هذا يمكن التوصية باستخدام الطفيل على نطاق واسع لمكافحة ثاقبة ساق الأرز عند إطلاقه مرتين (كل منهما بمعدل ٧٥,٠٠٠ طفيل/ هكتار) فى أواخر يونيو وخلال شهر يوليو.