# EVALUATION OF TRICHOGRAMMA EVANESCENS PARASITOID AS COMPARED WITH RECOMMENDED FURADAN INSECTICIDE, AGAINST CHILO AGAMEMON BLES. IN RICE FIELD

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## *Abstract*

The egg-parasitoid, *Trichogramma evanescens* was evaluated as a biological control tool, at rates of 0, 10000, 18000 and 28000 wasp/fed., compared with Furadan-recommended insecticide in the recommended and half-dose 6 and 3 kg/fed., against rice stem borer, *Chilo agamemnon* Bles. In rice fields. The obtained results can be summarized as follows.

*Trichogramma evanescens* parasitoid, plays an effective role, as a biological control agent, against *Chilo agamemnon*, in rice field. It significantly decreased insect-total damage % in any of the tested rates, as compared with the check (untreated). The highest rate of parasitiod (28, 000 wasps/fed.) was as highly effective as Furadan - recommended dose (6 kg/fed.), and signficantly was better than Furadan-half dose (3 kg/fed.) in rice stem borer control.

The lowest rate of parasitiod or insecticide induced the lowest reduction in insect total damage % (28.6, 42.0% and 31.2, 42.0%). in both of 1993 and 1994 seasons, respectively. This reduction increased as rate of parasitoid and insecticide increased. It reached 54.5, 60.1% and 59.7, 62.2% as parasitoid and insecticide rate reached 28.000 parasitoids and 6 kg/fed., in the two years of investigation, respectively.

Therefore, *Trichogramma evanescens* at the rate of 28.000 parasitiods/fed. can be successfully used against *Chilo agamemnon* as an effective and safe method better than Furadan as the pest recommended insecticide.

## INTRODUCTION

Rice is considered one of the most important cereal crops for producer, consumer and Government in Egypt (Isa *et al*, 1971).

A large number of insects attack rice plants in Egypt during various stages of growth. Insect problems of rice are often serious in most of the world, and if not brought under control may severely affect rice production. Rice stem borer, *Chilo agamemnon* Bles., is a major insect pest in rice field causing high reduction yearly in grain yield (Isa *et al*, 1971).

The current use of insecticidal control has caused adverse effects on insect resistance as well as dangerous side effects on human, animal and environment. These effects increased interest in search for new measures of insect control. The use of integrated pest management (IPM) insect control is the new approach in this respect for reducing insect population or maintaining it under economic injury. Biological control is the best tool in IPM system. It is very effective and safe component in this respect. Trichogramma evanescens is the main parasitoid on Chilo agamemnon eggs in rice field.

This study was conducted mainly to evaluate the role of egg-parasitoid, *Trichogramma evanescens* as a biological control agent against *Chilo agamemnon* in rice field, compared with Furadan as a recommended insecticide and untreated checks.

## MATERIALS AND METHODS

Two experiments for the evaluation of the egg-parasitoid, *Trichogramma evanescens* for biological control against *Chilo agamemnon* Bles. were carried out at Sakha Agric. Res. St., Kafr El-Sheikh Governorate during two successive seasons 1993 and 1994. Thirty-day old seedling were transplanted on mid-May in a randomized complete block design with six treatments and four replications. The plot area was one faddan. Giza-180 rice variety was chosen as a susceptible variety for the rice stem borer. The paper cards that contained the parasitized eggs were put in carton-paper veils 8x2 cm., with the top and bottom covered with wire screen to allow the parasitoid to pass out and to prevent any predators getting in. The release of parasitized eggs was carried out on June 30 as the pest adult of the 3rd generation laid the eggs which is considered the most dangerous one. The veils were at-

tached to rice leaves using pieces of wire. Each veil contained three different ages of parasitized eggs so that adult parasitoids emerged in three waves 1, 4 and 7 days after being attached to the plant, (Three-wave release technique, Abbas *et al.*, 1989). These successive waves allow the emerging parasitoids to follow and attack the successive waves of the insect-laid eggs. Rates of release were 0,10000, 18000 and 28000 wasps/fed. compared with Furadan-recommended insectcide, 10% granules, at two rates; 6 and 3 kg/fed. as a recommended and half-recommended dose. One hundred of plant hills were taken at random from each treatment. Percentage of dead hearts (DH%) at 60 day after transplanting, as well as, white heads (WH%) at 10 days before harvest were recorded. The total damage percent (DH% + WH%) were then obtained. The data were statistically analyzed to reveal significant differences between the treatments .

## RESULTS AND DISCUSSION

The obtained results are recorded in Tables (1 and 2). Data of the two seasons, 1993 and 1994 showed that the untreated plots received the maximum total damage (7.7 and 6.9%) through the two years, respectively. Using *Trichogramma evanescens* or Furadan insecticide at any rate resulted in significant reduction in total damage as compared with the untreated plots. Furadan at the rate of 6 kg/fed. and T.evanescens at the rate of 28.000 parasitoids/fed. gave the highest control (3.1, 2.6% and 3.5, 2.7% total damage in 1993 and 1994 season, respectively). T.evanescens at the rate of 10.000 parasitoids/fed and Furadan at the rate of 3 kg/fed. were less effective (5.5, 4.0% and 5.3, 4.0% total damage in the two successive seasons, respectively),as compared with the check (untreated). It can be noticed that there were significant differences among any of the treatments and the check . From these results, it appears that the effectiveness of T.evanescens, as a biological control agent against rice stem borer, increased as the rate of parasitoid increased .

The reduction in total damage reached 28.6 and 42.0% by applying 10.000 parasitoids/fed., and 31.2 and 42.0% with Furadan 3 kg/fed in two seasons, respectively. This reduction increased as rate of parasitoid or insecticide increased. It reached 54.5, 60.1% by the release of 28.000 parasitoids/fed and 59.7, 62.6% when using Furadan 6 kg/fed in 1993 and 1994, respectively .

It can be concluded that *Trichogramma evanescens* released at the rate of

28.000 parasitoids/fed is as effective, for controlling rice stem borer, as the recommended insecticide Furadan without any significant difference. The other lower rates of the parasitoid achieved satisfactory results which did not significantly differ from the half-dose of Furadan (3 kg/fed.). So, it can be concluded that *T.evanescens* parasitoid can be used as effective, easy and safe method in decreasing rice stem borer damage in rice fields.

Table 1. Evaluation of the egg-parasitoid, *Trichogramma evanescens* against *Chilo agamemnon* compared with Furadan insecticide (1993).

| Treatments and Rate/fed. | Infestation % | | | Reduction in T.Damage % |
|---|---|---|---|---|
| | DH% | WH% | T.Damage % | |
| Untreated (check) | 3.2 | 4.5 | 7.7 a | --- |
| 10,000 parasitoids | 2.5 | 3.0 | 5.5 b | 28.6 |
| 18,000 parasitoids | 2.1 | 3.0 | 5.1 b | 33.8 |
| 28,000 parasitoids | 2.0 | 1.5 | 3.5 c | 45.5 |
| 3 kg Furadan | 2.1 | 3.2 | 5.3 b | 31.2 |
| 6 kg Furadan | 1.2 | 1.9 | 3.1 c | 59.7 |

These results agree with those of Hassan and Heil (1980) who found that releasing of *T.evanescens* at the rate of 135.000 / hectare resulted in 75% reduction in number of *Ostrinia nubilalis* larvae. Neuffer (1980) reported that the release of T.evanescens at the rates of 50 to 100,000/hectare at the time of stem borer oviposition led to high reduction in infestation, especially at the highest rates of release. El-Heneidy *et al.*, (1988) stated that release of *T.evanescens* in sugar can fields at a rate of 60.000 adults/fed. resulted in 47.2% and 48.8% reduction in rates of infestation in the stalks and joints, respectively. Also, Abbas *et al.*, (1989) mentioned that release of *T.evanescens* in sugar cane fields at a rate of 20.000 adults/fed. resulted in 54.5% and 64.6% reduction in rates of borer infesation in the stalks and joints, respectively.

Table 2. Evaluation of *T.evanescens* against *C.agamemnon* compared with Furadan insecticide (1994).

| Treatments and Rate/fed. | Infestation % | | | Reduction in T.Damage % |
|---|---|---|---|---|
| | DH% | WH% | T.Damage % | |
| Untreated (check) | 2.8 | 4.1 | 6.9 a | --- |
| 10,000 parasitoids | 1.6 | 2.4 | 4.0 b | 42.0 |
| 18,000 parasitoids | 1.1 | 2.4 | 3.5 b | 49.3 |
| 28,000 parasitoids | 1.0 | 1.7 | 2.7 c | 60.1 |
| 3 kg Furadan | 1.3 | 2.7 | 4.0 b | 42.0 |
| 6 kg Furadan | 1.1 | 1.5 | 2.6 c | 62.0 |

* DH : dead hearts. * WH: white heads. * T: total damage.

* The values of the different letters are significantly different at 5%.

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# تقييم طفيل التريكوجراما ايفانسنس - مقارنا بمبيد الفيورادان الموصى به ضد ثاقبة ساق الأرز فى حقول الأرز

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تم تقييم طفيل التريكوجراما - كأسلوب للمكافحة الحيوية - بمعدلات ( صفر ، ١٠٠٠٠ ، ١٨٠٠٠ ، ٢٨٠٠٠ طفيل / فدان) مقارنا بمبيد الفيورادان (الموصى به) وبمعدلى (٦,٣ كجم /ف) ضد ثاقبة الأرز ، فى حقول الأرز ، ويمكن تلخيص النتائج فى الآتى :-

- يلعب طفيل التريكوجراما دورا مؤثرا - كعامل مكافحة حيوية - ضد ثاقبة ساق الأرز .

- خفض الطفيل نسبة الاصابة وبدرجة معنوية عند استعماله بأى من المعدلات المختبرة بالمقارنة بالقطع غير المعاملة.

- باستعمال الجرعة المرتفعة من الطفيل (٢٨٠٠٠ طفيل /ف) تم تحقيق نفس الأنخفاض الشديد فى الأصابة التى تم الحصول عليها باستعمال المعدل الموصى به من مبيد الفيورادان الموصى به (٦ كجم /ف) ، كما كانت هذه النتيجة أفضل مما حققته نصف الجرعة من نفس المبيد.

- حقق الطفيل عند استعماله بالمعدل (١٠٠٠٠ طفيل /ف) خفضا فى الاصابة بمعدل ٢٨,٦، ٤٢٪، أما الفيورادان (٣كجم/ف) فقد حقق ٣١,٢، ٤٢٪ خلال موسمى ١٩٩٣ ، ١٩٩٤ على التوالى ، ثم زادت نسبة الانخفاض فى الاصابة بزيادة معدلات كل من الطفيل والمبيد حتى وصلت ٤٥,٥ ، ٦٠,١٪ للطفيل بمعدل ٢٨٠٠٠ طفيل /ف ، ٥٩,٧ ، ٦٢,٢٪ عندما استعمل المبيد بمعدل ٦ كجم /ف خلال الموسمين على التوالى .

لهذا يمكن أن يستعمل طفيل التريكوجراما (بمعدل ٢٨٠٠٠ طفيل /ف) - كعامل مكافحة حيوية ضد ثاقبة ساق الأرز - بنجاج وبكفاءة لا تقل عنها فى مبيد الفيورادان الموصى به وبالجرعة الموصى بها ، فضلا عن تجنب الآثار الخطيرة الناجمة عن استعمال المبيدات.