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Effect of Different Cotton Genotypes on Parasitism Rate of *Trichogramma chilonis* Ishii

Ghulam Mustafa Cheema, Abida Nasreen and Muhammad Iqbal
University College of Agriculture, Bahauddin Zakariya University, Multan, Pakistan

Abstract: Parasitization rate by egg parasitoid, *Trichogramma chilonis,* was observed on artificially released eggs of Angoumois grain moth, *Sitotroga cerealella*, under field conditions on different cotton varieties viz., CIM-473, CIM-497, CIM-446, CIM-499, S-12, MNH-552, NIAB-78, NIAB-Krishma, BH-118, FH-900 and FH-901. Highest rate of parasitism (28%) was found on BH-118. It was followed by NIAB-Krishma (26.33%), FH-901 (25.00%), FH-900 (23.67%) and CIM-473 (22.00%). On CIM-497 and NIAB-78, 18 and 12% parasitization was observed. Lowest rate of parasitism (4.67%) was observed on CIM-499 followed by S-12 (5.33%), CIM-446 (6.67%) and MNH-552 (7.67%).

Key words: *Trichogramma chilonis*, parasitisim, cotton genotypes

INTRODUCTION

Trichogramma wasps are the most commonly used parasitoids worldwide. They are released extensively in Europe and Asia for the control of many species of caterpillar pests in various crops (Henn *et al*., 1995). *Trichogramma* is a pale yellow wasp smaller than a pinhead and dwarf size by pest egg, little larger than sand grains, which deposit their eggs by drilling through moth eggs. It has much shorter generation time approximately 10 to 40 days (Mills *et al*., 2000). The caterpillar pests are killed in the egg stage and no feeding damage occurs. This makes *Trichogramma* an especially important natural enemy for control of pests such as codling moth larvae, European corn borers and corn earworms, all of which bore into plant tissues and cause economic damage soon after hatching. Adult wasps emerge within 1 to 3 days of release and are active for about 9 days (Henn *et al*., 1995).

At the moment 70 spp. of *Trichogramma* have been used in Corn, Sugarcane, Tomato, Rice, Cotton, Sugerbeet, Apple, Plum, Vineyard, Pasture, Cabbage, Chestnut, Sweet pepper, Pomegranate, Paddy and forest in 23 countries (Hassan, 1998). Different spp. of *Trichogramma* has mass reared to destroy on average of 40 to 50% *Helicoverpa* spp. eggs in cotton (Luckman and Metcalf, 1994). It also reduced the damage from codling moth by 60% in orchard (Mills *et al*., 2000). It has potential to destroy the eggs of about 2000 mass spp. cutworms, leaf worms, leaf rollers, loopers, army worms, borers, tobacco, budworm, tomato fruit worms (Lindgren, 1969).

In Pakistan production of cotton relies heavily on the use of insecticides sprays. Most of 10 to 12 sprays applied to cotton are to control *Helicoverpa armigera* (Fill, 1994). Some of these sprays contain additional insecticides for the control of the other pest for example whitefly, jassid, thrips and aphids or mites. Associated with this high insecticides are problems with development of insecticides resistance and because of broad spectrum of insect activity, resulting in secondary pest out breaks and pest resurgence. So there is a desire within cotton industry to integrate the biological control. Inundative releases of *Trichogramma chilonis* have been recommended as an important component of an IPM programme for sugarcane in Punjab. Mohyuddin *et al*. (1997) successfully accomplished the integration of *Trichogramma chilonis* in biological control with chemical control. The aim of our study was to evaluate the efficiency of *Trichogramma chilonis* on different cotton varieties.

MATERIALS AND METHODS

The study was conducted on research area of agriculture farm of University College of Agriculture, Bahauddin Zakariya University, Multan during September, 2002. Eleven varieties of cotton viz., MNH-552, FH-901, FH-900, Krishma-NIAB, CIM-473, CIM-497, NIAB-78, BH-118, CIM-446, S-12 and CIM-499 were sown on bed having bed to bed distance 2.5 feet and plant to plant distance 6-9 inches during May, 2002. All the cultural practices were carried out according to the recommendations of Agricultural Extension Department. No insecticide spray was applied throughout the season. The experiment was laid out in RCBD with 11 treatments (varieties) and three replications.

Four plants in each variety were selected randomly at one spot. Three parasitized cards of *Trichogramma* containing 50 parasitized eggs were stapled on leaves of three plants whereas 150 fresh eggs of *Sitotroga*

cerealella were sprinkled on wet leaves of fourth plant. Finally, the plants were tagged. This procedure was repeated thrice on each variety. After 72 h, leaves with host (*S. cerealella*) eggs were detached and kept in the laboratory at 27±2°C and 60±5 RH for the period of five days. Thereafter, these were examined for parasitization. The parasitization (black eggs) were counted and analyzed statistically.

RESULTS AND DISCUSSION

Results (Table 1) show the rate of parasitism by *Trichogramma chilonis on* different cotton varieties. Result revealed that highest rate of parasitism (28%) was found in variety BH-118. It was followed by NIAB-Krishma, FH-901, FH-900 and CIM-473 where parasitization was 26.33, 25, 23.67 and 22.33%, respectively. Difference between the parasitism rates among these varieties was not significant. Percent parasitization on CIM-497 and NIAB-78 was 18 and 12%, respectively. Lowest parasitism rate (4.67%) was recorded on variety CIM-499 followed by S-12 (5.33%), CIM-446 (6.67%) and MNH-552 (7.67%).

The rate of parasitism of parasitoids is influenced by number of factors such as temperature, relative humidity, plant species, quality of cards and searching ability of parasitoids. For many parasitoids species, the final step of host location occurs on plants whose structure varies in time and space, altering the capacity of parasitoids to exploit hosts (Gingras *et al*., 2002). Reddy and Manjunatha (1999) studied the rate of parasitism of *T. chilonis* and *T. achea* on *Helicoverpa armigera* on different plants i.e., Cotton, Soybean, Maize, Sunflower, Sorghum, Safflower, Pigeon pea and Chickpea. Parasitism was low on Chickpea (0-1.5%) and on Safflower (4-13%). Moderate to high levels (16-63%) of parasitism was observed on Sorghum, Pigeon pea, Sunflower, Maize, Soybean and Cotton. Ulrichs *et al.* (2001) exposed eggs of bean pod borer (*Marcua vitrata*) for 48 h in fields to augment *Trichogramma evanescens* to measure field efficacy of parasitoid, which was highest 13.3%, thus generally low. Hoffmann *et al.* (2001) tested the performance of *Trichogramma ostriniae* reared on different hosts. *Sitotroga cerealella* eggs were found most effective for good performance.

Parasitism of sugarcane borer eggs by naturally occurring *Trichogramma* spp. ranged from 4.49 to 34.88%; however augmentation of the indigenous parasitoid *T. chilonis* increased this rate to 60-87.5% (Alba, 1990). Release rate and evenness of distribution influence the effectiveness of wasp releases (Mills *et al*., 2000). Varma and Shenhmar (1998) also determined parasitism of

Table 1: Rate of Parasitism of *Trichogramma chilonis* Ishii on *Sitotroga cerealella* eggs in the cotton field

Variety	% parasitization
MNH-552	7.67a
CIM-446	6.67a
S-12	5.33a
CIM-499	4.67a
NIAB-78	12.00ab
CIM-497	18.00bc
FH-901	25.00cd
FH-900	23.67cd
NIAB-Krishma	26.33cd
CIM-473	22.33cd
BH-118	20.00cd

Pectinophora gossypiella and *Earias* spp. *Trichogramma chilonis* was most common parasitoids of *Earias* spp., which were 30 and 30-35% during Sept.-Oct. and Oct.-Nov., respectively.

Effectiveness of egg parasitoid, *Trichgramma chilonis*, varied significantly among the cotton varieties. Highest activity of the wasp was observed in cotton cultivar BH-118 and the lowest was in case of CIM-449. The *T. chilonis* destroyed eggs of lepidopteron moths biologically in cotton crop. It can be added as cotton insect pest management tool. The inference derived from the results is that the use of parasitoid must be based on sound experimental data regarding its effectiveness for the relevant cultivar of cotton.

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