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SHORT COMMUNICATION

Rearing Techniques of *Trichogramma chilonis* (Ishii) *Hymenoptera trichogrammatidae* on *Sitotroga cerealella* (Oliverer) *Lepidoptera gelechiidae* (EGGS)

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ABSTRACT
To study the rearing techniques of T. chilonis, reared on S. cerealella and percent parasitism, a study was conducted at the Biological Control Laboratory of Agriculture Research Institute, Quetta Balochistan during the month of July-Aug 2017. The results showed a significant effect of parasitism of T. chilonis on the S. cerealella eggs. Highest parasitism of Trichogramma (62%) was recorded on the eggs of S. cerealella having (32) cards among that (25) cards were parasitized by Trichogramma on the temperature (27℃) which were kept for (24) hours. The minimum percent parasitism of Trichigramma (52%) on the eggs of S.cerealella was noted. Total number of cards were (75), out of which (40) cards were parasitizes by Trichogramma at room temperature (27℃).
KEYWORDS: *Rearing Techniques, Trichogramma chilonis (ISHII), Hymenoptera trichogrammatidae, Sitotroga cerealela (OLIVERER), Lepidoptera gelechiidae (EGGS).*

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INTRODUCTION

Trichogramma chilonis (ishii)(Hymenoptera: *Trichogrammatidae)* is an egg parasitoid that is widely distributed in Pakistan. T. *australicum* Girault and T. *confusum* viggiani are synonyms of T. *chilonis*. In Pakistan it has been recorded from C*hilo infeuscatellus* C. *partellus, Helicoverpa armigera, Agrotis ipsilon, Autographa nitgrisigna, Spodoptera litura, Actigona steniellus and Emmaloceradepresella*[1].The genus *Trichogramma* is one of 80 genera in the family *Trichogramma atidae.* All members of this family are parasites of insect eggs.*Trichogramma atidae* includes the smallest insects, ranging in size from 0.2 to 1.5 mm. with the genus *Trichogramma*, there are 145 described species worldwide; 30 species have been identified from North America and estimated 20 to 30 species remain to be described. *Trichogramma* wasps' primarily parasitize eggs of moths and butterflies (Lepidoptera). However, certain species of *Trichogramma* also parasitize eggs of beetles (Coleoptera), and lacewings and their relatives (Neuroptera) [2]. *Trichogramma* wasps occur naturally in almost every terrestrial habitat and some aquatic habitats as well. They parasitize insect eggs. Especially eggs of moths and butterflies. Some of the most important caterpillar pests of field crops, forests, and fruit and nut trees are attacked by *Trichogramma* wasps. However, in most crop production systems, The number of caterpillar eggs destroyed by native populations of *Trichogramma* is not sufficient to prevent the pest from reaching damaging levels. Recognizing the potential of *Trichogramma* species as biological control agents,

entomologists in the early 1900's began to mass rear *Trichogramma* for insects' control. Today *Trichogramma* species are the most widely used insect naturally enemy in the world, partly because they are easy to mass rear and they attack many important crop insect pests [3]. *Trichogramma* wasps also kill host eggs by feeding on them. The host egg is stung and the adult feeds on the drop of liquid appearing at the site of the sting, but no eggs is laid. The host egg contributes significantly to pest control. The minute *Trichogramma* adults feed on water and sweet substances in the field and spend most of their time looking for suitable host eggs. Once a female *Trichogramma* find the eggs, host she drills a hole through the chorine (egg shell) and insects on or more eggs depending on size of host egg. The parasitoid larva kills the host egg and feeds on content of host egg. The larva goes through three developmental stages and pupates inside the host egg due to which parasitized host eggs turn back [1].It's an idea that has captured the imagination of entomologists, farmers, growers and entrepreneurs for more than 100 years that's rear the beneficial "mini-wasp'' *Trichogramma* and release them by the thousand in field, orchards, forests and stored grains go downs. Once liberated, the tiny parasites would seek out and destroy eggs of the most feared caterpillar pests, such as sugarcane borers, cotton bollworms, corn borers, spruce budworms, Angoumois grain moths and many others. While its uncommon for an insect's scientific name, especially one so long and unusual as *Trichogramma*, to also become its common name, the commercial development of this natural enemy and the fact that it attack so many important caterpillar pests has earned it a place in the popular terms of many pest management advisors and producers[4]. Angoumois grain moth *sitotroga cerealella* (Olivier) (Gelechidae: Lepidoptera) is one of the major insects pests of stored grain in the topics and sub-topic. Sorghum, maize, wheat, barley, and millets are the main crop infested by this pest. Infestation start in the field when crop are carried to storage facilities, immature stage from the field infestations complete their life cycles to pupate and emerge as adult in storage. Population of S. cerealella multiplies 112.27 times between two successive generations[5]. S. *cerealella* damage stored grain, such as wheat, maize, barley, sorghum, etc. its breeding takes place from April to October. Angoumois grain moth is a cosmopolitan pest of cereal grain. Female laid their eggs on the grain or in small development beyond the pericarp, forming a characteristics "window''. After emergence, straw colored moth mate within 24 hours and female start laying eggs singly or in batches. The eggs are small, white when freshly laid and turn reddish later on. A singly female lay on average 150 eggs. The full grown larvae is about 5 mm long, with a white body and feeds inside the grain and then pupate a silken cocoon in cavity made in rain during feeding. The color of pupae is reddish-brown. Adult do not feed and live only for few days. The female adults have a longer life span than males. Wheat, maize, sorghum, are the best food of sitotroga larva and one grain seed provide optimum media for sitotroga larva [1]. The main objective of the current research was rearing techniques of *Trichogramma chilonis* on *sitotroga cereallela* eggs. The bio control agents are rarely used to unawareness about its usefulness and rearing techniques among agricultural experts and farmers. Therefore, the study was performed to invent an easy way to produce and provide *Trichogramma* for field condition. To find out the percent parasitism of *Trichogramma* against pest.

MATERIAL AND METHODS

To study the rearing techniques of *T. chilonis*, need on S. *cerealella* and percent parasitism, a study was conducted at the Biological Control Laboratory of Agriculture Research Institute (ARI) Quetta Baluchistan during the month of July-Aug 2017.

Prior to the experiment, the laboratory has been sprayed with insecticide to become free from insects and mites (if any) present in the laboratory and all the equipment were sterilized. The experiment was conducted at controlled lab conditions with 27 ºC±2ºC and 65±5%R.H.

The following research aspects are carried out to achieve the main objectives:

Seed collection and preparation:

One kg seed of wheat was purchased from local grain market. Seed grain of wheat was put in separate trays. The seeds were washed with water to remove the dust and weak seeds, and left in the sun for drying. The sun dried grains was then put in plastic bag and kept in autoclave at 70ºC for 30 minutes for sterilization to kill the stored grain insects if any. After sterilization and cooling the grains were ready for rearing S. *cerealella* culture.

Rearing of S. *Cerealella*:

S. *cerealella* was reared on wheat grains. The seeds were kept in three glass jars of 2 liters size. Fresh eggs of S. *cerealella* were obtained from the Biological Control Laboratory, ARI, and Quetta. S. *cerealella* eggs were observed under microscope for the mite's infestation. Dark-red eggs were introduced into glass jars containing sterilized seeds. The jars were covered with mulish cloth and then kept at 27 ºC±2ºC and

65±5%R.H. in the control lab conditions for the S. *cerealella* development. S. *cerealella* eggs on a card were kept in each glass jar.

Collection of S. *cerelella* Adults:

When adults of S. *cerealella* emerge, then collected from the jars with the help of electric vacuum pump and were shifted to plastic oviposition jars having wire gauze at the bottom. Wheat flour was placed at the bottom of the jars allowing S. *cerealella* to lay eggs on wheat flour.

Collection of S. *cerealella* eggs.

S.*cerealella* adults laid eggs in wheat flour. On the next day, the wheat flour will be dusted away from the jar and sieved through meshes to get the eggs singly. Fresh eggs of S. *cerealella* were then put into jars where *Trichogramma* was available for parasitizaion.

Preparation of S. *Cerealella* cards:

S. *cerealella* fresh eggs were collected from the S. *cerealella* culture and placed in plastic bottles having muslin cloth at open end. On the glued hard paper card ($1\times\frac{1}{2}\times2\times\frac{1}{2}$ cm) eggs of S. *cerealella* were sprinkled, so as to get the uniform placement. These cards are left for some time to become dry and then the cards are introduced for 24 hrs in a glass jar having *Trichogramma* culture. For the parasitoid development the card exposed to *Trichogramma* was kept in a separate jar at 27°C $\pm$ 2°C *and* 65 $\pm$ 5% R.H.After two days the eggs on each card will turn black showing signs of parasitized eggs.

Percent Parasitism

The percent, parasitism was calculated by the following formula

$$\frac{No\ of\ eggs\ parasitized}{Total\ number\ of\ eggs\ parasitized}\times 100$$

Data Collection

The data was recorded on the day interval after the installation of cards and the cards were prepared on daily basis.

RESULT AND DISCUSSION

Table 1: Percent parasitism of *Trichogramma* against *Sitotroga cerealella.*

Date	Total Cards	Parasitoid Cards	Percent Parasitism
2-6/7/2017	38	22	57.8%
9-13/7/2017	41	23	56.01%
16-20/7/2017	38	25	56.79%
23-27/7/2017	59	36	61.02%
30-03/7-8/2017	32	20	62.5%
6-10/8/2017	69	39	56.52%
13-17/8/2017	75	40	53.33%
15-19/8/2017	78	47	60.26%
23-27/8/2017	88	53	60.23%

Each card has 300 eggs.

The *Tricogramma* is one of the most important parasites against the different insect pests like store again pests and other Lepidoptera. The percent parasitism of *Trichogramma* was recorded by S.*cerealella eggs* which is major pest of store grain products. The results showed a significant effect of parasitism on the S. *cerealella* eggs. Highest parasitism of *Trichogramma* (62%) was recorded on the eggs of S.*cerealella* having (32) cards among those (25) cards were parasitized by *Tricogramma* on the temperature (27℃) which was kept for 24 hours.The minimum percent parasitism of *Trichogramma* (52%) on the eggs of S. *cerealella* was noted. Total numbers of cards were (75) out of which (40) cards were parasitized by *Trichogamma* at room temperature (27℃).Similar results were noted by [6].Studies parasitism of *sitostroga cerealella*. (Lepidoptera: Gelechidate) eggs by *Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae) as influenced by host egg age and age of the female parasitoid under the laboratory conditions.The developmental period of *T. chilonis* inside the host eggs remains different. A second experiment on investigating the effect of parasitoid age on parasitism showed that T.*chilonis* laid significantly the highest average numbers of eggs at 80.6± 1.5 and 69.4 ± 6.3% during the first 8 and 24 h of its age respectively. Later, the parasitization decreased to 35% by the end of day 4, thus, for the highest yield of parasitoid production, it is important to use younger *Trichogramma* for parasitization.

CONCLUSION

The results showed a significant effect of parasitism on S. *cerealella* eggs. Highest parasitism of *Trichogramma* (62%) was recorded on the eggs of S. *cerealella* having (32) cards among that (25) cards were parasitized by *Trichogramma* on the temperature (27℃) which were kept for 24 hrs. The minimum percent parasitism of Trichogramma (52%) on the eggs of S. cerealella was noted. Total numbers of cards were (75) out of which (40) cards were parasitized by *Trichogramma* at room temperature (27℃).

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