



## ESTIMATION OF PARASITIZATION OF EGGS OF MAIZE STEM BORER, *CHILO PARTELLUS* (SWINHOE) BY *TRICHOGRAMMA CHILONIS* (ISHII) ON MAIZE IN SOUTH EAST RAJASTHAN

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### ABSTRACT

An investigation was conducted on the estimation of natural parasitization of maize stem borer in specialty corn viz. Madhuri (Sweet corn), HQPM-1 (QMP) and Pratap hybrid maize-1 (Normal corn) by *T. chilonis* in maize crop during 2009. The data recorded on parasitization showed that egg parasitization ranged from 10.94 to 34.45 per cent in Madhuri, 12.85 to 31.87 per cent in HQPM-1 and 9.0 to 29.89 per cent in Pratap hybrid maize-1 respectively. The parasitization was found in maximum in 2<sup>nd</sup> to 3<sup>rd</sup> week of August 2009 while minimum during 2<sup>nd</sup> to 3<sup>rd</sup> week of October 2009. It is also visible that all test corns were almost significantly at par and no definite trend of difference was recorded.

**Keywords:** Maize, maize stem borer, *Chilo partellus*, egg parasitoid, *Trichogramma chilonis*

Maize crop is attacked by number of insect pests since germination to harvesting and maize stem borer, *Chilo partellus* (Swinhoe) is important of them, usually appears 10–15 days after sowing and cause serious loss, which some time leads to complete failure of the crop. The losses in maize yield due to this pest have been estimated to the tune of 5.14 to 91.22 per cent (Singh and Sajjan, 1982). Fast adoption of specialty corn and increasing acreage under them are changing the scenario of insect pests and their bio agents. The role of bio agents in the management of noxious insect pest is well established in India. Several *Trichogrammatids* have been utilized as successful bio control agents against many insect-pests on several field crops. *Trichogramma chilonis* (Ishii) is an effective egg parasitoid against maize stem borer in normal corn but their potential in specialty corn is not well investigated. Therefore, the present study was planned to estimate the natural parasitization of eggs of maize stem borer by *T. chilonis*.

### MATERIALS AND METHODS

The proposed investigation was conducted during Kharif 2009. The specialty corn viz. sweet corn (Madhuri-1), high quality protein maize (HQPM-1) and normal corn (Pratap hybrid maize-1) was planted on 10<sup>th</sup> July 2009 in the Instructional Farm of Rajasthan College Agriculture,

Udaipur, Rajasthan. The sowing was done in 60 × 60 and 25 × 25 cm row to row and plant to plant distance. There were 12 plants in each row. Five plants per plot were selected randomly and tagged for release of eggs of *C. partellus*. The experiment was replicated seven times, hence, 35 plants was used at a time for the release of eggs of *C. partellus*. Counted numbers of eggs were placed in the 5 tagged plants at weekly interval from 4 days after germination till grain filling for natural parasitization through *T. chilonis*. These eggs were collected back after 24 hours and kept in test tubes at 27±1<sup>o</sup>C temperature and 75±5% relative humidity for hatching. All neonate larvae hatched from eggs were separated daily and counted. Remaining eggs were kept for emergence of *Trichogramma* adults. The emerged *Trichogramma* adults were also counted and separated. Per cent parasitization of *Chilo* eggs was calculated after deduction of total number of larvae emerged and unhatched eggs from total number of eggs exposed for parasitization. The data were analyzed in CRD and correlation coefficient with weather was worked out by using following formula.

$$r_{xy} = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left[ \sum x^2 - \frac{(\sum x)^2}{n} \right] \left[ \sum y^2 - \frac{(\sum y)^2}{n} \right]}}$$

Where,

- $r_{xy}$  = Simple correlation coefficient  
 x = Variable i.e. abiotic components (Temperature and relative humidity)  
 y = Variable i.e. mean per cent parasitization by *T. chilonis*  
 n = Number of observations

## RESULTS AND DISCUSSION

The data on estimation of parasitization of eggs of maize stem borer in specialty corn during 22<sup>nd</sup> July to 21<sup>st</sup> October 2009 at weekly intervals are presented in Table 1. Data recorded on parasitization in third week of July ranged from 19.86 per cent in Pratap hybrid maize-1 to 27.18 per cent in Madhuri while in HQPM-1 it was only 24.45 per cent and all tested corn were found statistically at par. The data observed after one week i.e. on 29<sup>th</sup> July 2009 showed maximum parasitization, 28.64 per cent in Pratap hybrid maize-1 followed by 27.34 and 27.19 per cent in Madhuri and HQPM-1, respectively and no statistical difference was observed among tested corn.

The observations recorded on 05<sup>th</sup> August 2009 on parasitization reveals no significant difference among specialty corn with maximum parasitization, 26.91 per cent in Madhuri followed by 25.55 and 23.97 per cent in Pratap hybrid maize-1 and HQPM-1, respectively. The observations on egg parasitization on 12<sup>th</sup> August 2009 showed that Madhuri received maximum egg parasitization, 34.45 per cent, which was significantly superior to HQPM-1 and Pratap hybrid maize-1 with 29.41 and 26.44 per cent, respectively. It is also evident that HQPM-1 and Pratap hybrid maize-1 was statistically at par. During 19<sup>th</sup> August 2009 maximum parasitization, 29.89 per cent, was observed in Pratap hybrid maize-1 followed by 28.86 and 25.84 per cent in Madhuri and HQPM-1, respectively and no significant difference was observed among tested corn. The data observed on egg parasitization of maize stem borer on 26<sup>th</sup> August 2009 showed that significant maximum parasitization, 31.87 per cent was found in HQPM-1 followed by 28.45 and 23.06 per cent was in Pratap hybrid maize-1 and Madhuri, respectively. All test corn were found significantly different to each other.

The observations recorded on 2<sup>nd</sup> September 2009 showed that all test corn were statistically at par with maximum parasitization, 24.12 per cent in Pratap hybrid maize-1 followed by 23.85 and 22.69 per cent in Madhuri and HQPM-1, respectively. The observations recorded on 9<sup>th</sup> September 2009 on parasitization reveal no significant difference among specialty corn and the parasitization

were 22.57, 21.31 and 19.87 per cent in HQPM-1, Pratap hybrid maize-1 and Madhuri, respectively. It is evident from the table that egg parasitization recorded on 16<sup>th</sup> September 2009 on HQPM-1 was significantly higher, 22.30 per cent while Madhuri and Pratap hybrid maize-1 were statistically at par being 17.64 and 15.75 per cent parasitization. The data collected on 23<sup>rd</sup> September 2009 on egg parasitism showed that maximum parasitization, 21.05 per cent, was found in HQPM-1 followed by 20.91 and 16.25 per cent in Madhuri and Pratap hybrid maize-1, respectively and no significant difference was observed among tested corn. The observations recorded on 30<sup>th</sup> September 2009 revealed that maximum parasitization, 19.21 per cent, was found in Pratap hybrid maize-1 and minimum, 17.06 per cent, in Madhuri while HQPM-1 could received 17.68 per cent parasitization only and no statistical difference was found among specialty corn.

The data on egg parasitization during 1<sup>st</sup> week of October reveal that maximum parasitization, 14.58 per cent was observed in HQPM-1 followed by 14.01 and 11.75 per cent in Pratap hybrid maize-1 and Madhuri, respectively with no significant difference among specialty corn. The observations recorded on 14<sup>th</sup> October 2009 showed that Pratap hybrid maize-1 received minimum parasitization, 9.00 per cent only, which was significantly lower to Madhuri and HQPM-1 being 12.89 and 12.85 per cent, respectively. It is also clear that Madhuri and HQPM-1 were statistically at par. The data of last week, 21<sup>st</sup> October 2009, on egg parasitization showed that maximum parasitization, 14.41 per cent, was observed in HQPM-1 followed by 12.42 and 10.94 per cent in Pratap hybrid maize-1 and Madhuri, respectively. It is also evident from the data all test corns were significant different to each other and HQPM-1 was superior to Madhuri and Pratap hybrid maize-1. It is also evident from the Table that positive correlation ( $r = 0.04$ ,  $r = 0.20$  and  $r = 0.05$ ) with temperature and significant positive with relative humidity ( $r = 0.79$ ,  $r = 0.74$  and  $r = 0.73$ ) was found however correlation was non significant for temperature. It indicates that relative humidity enhance the activity of parasites.

Several workers have estimated the parasitization of maize stem borer and other lepidopterans by *Trichogrammatids* in different crop ecosystem and reported effective parasitization after inundative release of *T. chilonis*. The release of *T. chilonis* has varied parasitization rate from 1.6 to 85.3 per cent against changed insect pest and different crop ecosystem (Verma *et al.* 1991, Rana *et al.* 1997, Jalali and Singh 2003, Dev Narayan 2004, Manisegaran 2004, Jalali and Singh 2006). Our results also supported by Famoso and Alba (1988) who observed upto 41.84 per cent natural parasitization of *H. armigera* by *Trichogramma* sp. It was also observed that *T. chilonis*

**Table 1 Effect of specialty corn and abiotic factors on the parasitization of eggs of maize stem borer by *Trichogramma chilonis* Ishii during *kharif* 2009**

Specialty corn types	Mean Egg Parasitization (%)													
	Date of observation													
	22/07	29/07	05/08	12/08	19/08	26/08	02/09	09/09	16/09	23/09	30/09	07/10	14/10	21/10
Madhuri	31.33 (27.18)	31.52 (27.34)	31.20 (26.91)	35.93 (34.45)	32.45 (28.86)	28.64 (23.06)	29.14 (23.85)	26.40 (19.87)	24.70 (17.64)	27.20 (20.91)	24.36 (17.06)	20.03 (11.77)	20.98 (12.89)	19.31 (10.94)
HQPM-I	24.33 (24.45)	31.39 (27.19)	29.27 (23.97)	32.80 (29.41)	30.51 (25.84)	34.32 (31.87)	28.34 (22.69)	28.33 (22.57)	28.03 (22.30)	27.07 (21.05)	24.82 (17.68)	22.38 (14.58)	20.97 (12.85)	22.29 (14.41)
Pratap hybrid maize-I	26.31 (19.86)	32.34 (28.62)	30.36 (25.55)	30.86 (26.44)	33.07 (29.89)	32.22 (28.45)	29.36 (24.12)	27.46 (21.31)	23.35 (15.75)	23.75 (16.25)	25.98 (19.21)	21.93 (14.01)	17.38 (9.00)	20.64 (12.42)
S.Em±	1.41	0.41	0.82	0.88	0.78	1.03	0.89	0.75	1.09	1.12	0.73	0.68	0.66	0.32
CD (5%)	NS	NS	NS	2.71	NS	3.17	NS	NS	3.35	NS	NS	NS	2.03	0.97
CV (%)	-	-	-	5.91	-	7.24	-	-	9.59	-	-	-	9.13	4.17

**Correlation co-efficient (r values) for mean parasitization(%) and abiotic factors**

Temperature (C°)	0.04	0.20	0.05
Relative humidity (%)	0.79*	0.74*	0.73*

Figure in parentheses represent retransformed per cent values, \* = Significant at 5% level of significance

was dominant egg parasitoids among *T. chilostraceae* and *T. bactreae*.

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