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Studies on relative composition of egg parasitoids of rice yellow stem borer, *Scirpophaga incertulas* (walker) in kharif 2017

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Abstract
The experiment was conducted at Research cum Instructional Farm of IGKV, Raipur (C.G.) during Kharif, 2017-18. Biological control may be defined as the use of natural enemies to suppress the pest species. The hymenopteran parasitoids, *Telenomus* sp., (*Scelionidae*), *Tetrastichus* sp. (Eulophidae) and *Trichogramma* sp. (*Trichogrammatidae*) were the three important YSB egg parasitoids recorded from this area which played an important role in population regulation of YSB. In stem borer egg parasitization maximum per cent of egg parasitization by *Telenomus* sp. was observed in the 41 SMW second week of October (50.07%). Parasitization by *Trichogramma* sp. was maximum with (17.31%) during 39 SMW of September and parasitization by *Tetrastichus* sp. was shown maximum during 44 SMW with (15.55%).

Keywords: Triclosan, TCS, determination, detection, sensor

Introduction
Rice (*Oryza sativa* L.) is one of the most important food crop, occupies the prominent place in Indian agriculture and it is regarded as an important food crop supporting food security for 5 percent of the global population (FAO, 2011) [3]. In Asia, about 3 billion people depends on rice as principal food source. Globally, about 90 percent of the rice cultivable land is in Asia. In India area (million/ha), production (million metric tons) and productivity (metric tons/ha) is 43.79, 112.91 and 3.87, respectively (world agricultural production-USDA). Chhattisgarh is popularly known as a "Rice bowl of India" and the area, and productivity is 3745.29 (thou. ha.), and 2212 (kg/ha) (Krishi Darshika, 2018) [4]. Among the various insect pests of rice inflicting yield loss, yellow stem borer, *Scirpophaga incertulas* (Walker) is considered one of the major insect pest of rice, having a potential to cause yield losses ranging from 3%-95% in India (Ghose *et al*., 1960) [1] while Prasad *et al*. (2007) [2] reported yield losses ranging from 38%-50%. The most commonly used method of control is insecticides, but less effective due to the concealed habit of the larvae. Biological control offers an eco-friendly option for management of yellow stem borer. The present study was conducted to record the extent of parasitism by egg parasitoids against rice yellow stem borer at Raipur, Chhattisgarh.

Material and methods
The observations were recorded in the Research farm of IGKV, Raipur Chhattisgarh during kharif, 2017. For the estimation of parasitism of yellow stem borer, 10 egg masses were randomly collected from the unsprayed field at weekly interval and brought to the laboratory for the emergence of larvae and parasitoids. Each of the egg mass was kept separately in glass vials, which was provided with sufficient moisture to prevent desiccation of larvae and leaf pieces. The vials were covered with cotton and numbered with date. Egg masses were observed every day and were recorded on number of larvae hatched. Based on the no. of emerged larvae and parasitoids the percent egg parasitism were calculated.

$$\text{Per cent parasitization (egg)} = \frac{\text{Number of parasitoids emerged}}{\text{No of parasitoids emerged + No of larvae hatched}} \times 100$$

Result and Discussion
Based on the number of emerged larvae and parasitoids percent egg mass parasitization was calculated. From the data presented (Table: 1) revealed that the maximum percent of egg

parasitization by *Telenomus* sp. was observed in the second week of October (50.07%). The 1st week (40 SMW) of October shows (36.78%) second position in percent egg parasitization. The minimum percent of egg parasitization by *Telenomus* sp. was observed in the 39 SMW of September (13.98%). Parasitization by *Trichogramma* sp. was maximum with (17.31%) during 39 SMW of September and parasitization by *Tetrastichus* sp. was shown maximum during 44 SMW with (15.55%). The total per cent egg mass parasitization was ranged from 23.70 to 58.84 per cent.

Similar findings were reported by Kumar *et al*., (2008) [8] who reported that the *Telenomus* sp. parasitizing up to 78.4 per cent on October, while the lowest egg parasitization was found in the 1st fort night of August (6.4%). Chakraborty (2008) also reported that the presence of three parasitoids species in a single egg mass is uncommon. Incidence of parasitization by only *Trichogramma* sp., *Telonomus* sp. and *Tetrastichus* sp. was 6.12 per cent, 9.53 per cent and 48.44 per cent, respectively. Parasitization by *Trichogramma* sp. + *Telonomus* sp., *Telonomus* sp. + *Tetrastichus* sp. and *Trichogramma* sp. + *Tetrastichus* sp. were 3.46 per cent, 21.06 per cent, and 2.35 per cent, respectively. Activity of *Telonomus rowani* was recorded from late August to middle of October. Varma *et al*., (2009) [5] reported that the *Trichogramma* was the predominant egg parasitoid during September, while *Tetrastichus schoenobii* and *Telenomus dignus* have become dominant during October. Baghel (2011) [11] observed *Telenomus* sp. most active during the fourth week of October and capable in parasitizing 0.00 to 71.02 per cent eggs at Raipur. Egg mass was mostly parasitized either by single or by two parasitoid species. Nirala (2014) [7] reported that the maximum percent of egg parasitization by *Telenomus* sp. was observed in the second week of October (53.95%) and parasitization by *Trichogramma* sp. was maximum with (17.31%) during 39 SMW of September. On the contrary Garg (2012) [9] reported that the maximum percent of egg parasitization by *Telenomus* sp. was observed in the first fortnight of November (38%). It may be stated that the *Telenomus* sp. is the most pre dominant egg parasitoid of rice stem borer egg found most active during second week of October at Raipur.

Table: 1 weekly per cent egg mass parasitization during kharif 2017

SMW	Week of egg collection (10 egg mass)	No. of larvae emerged	Per cent egg parasitization by *Telonomus* sp.	Per cent egg parasitization by *Trichogramma* sp.	Per cent egg parasitization by *Tetrastichus* sp.	Total per cent egg mass parasitization
38	Sep 17-23	993.00	14.99	13.77	0.00	28.76
39	Sep 24-30	889.00	13.98	17.31	0.00	31.29
40	Oct 1-7	557.00	36.78	6.14	0.00	42.93
41	Oct 8-14	263.00	50.07	5.00	3.75	58.84
42	Oct 15- 21	372.00	32.06	0.00	9.16	41.23
43	Oct 22-28	360.00	29.83	0.00	10.16	40.00
44	Oct 29 - Nov 04	446.00	22.50	0.00	15.55	38.05
45	Nov- 05-11	309.00	16.04	0.00	7.65	23.70

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