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To study the natural occurrence of *Trichogramma* species in organic and chemically treated rice field

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Abstract
Studies were conducted to compare the naturally occurrence of *Trichogramma* spp. under field conditions in organic and chemically treated rice crops by using sentinel cards and also to find colour preference for egg laying of *Trichogramma* spp. in organic and chemically treated field areas. The highest population was found in September in organic fields and October in chemically treated fields, *i.e.*, 10.81 and 6.44, respectively, and the lowest mean population was found in August in both organic and chemically treated fields, *i.e.*, 3.78 and 2.33, respectively. Pink was the most preferred colour card in both fields, with pink being seen at 21.25 in the organic field and 10.08 in the chemically treated field. Due to heat absorption, the colour card that was least preferred was black in both rice fields, where parasitization was measured at 0.42 and 0.33, respectively, causing the drying of eggs.

Keywords: *Trichogramma* spp., organic and chemically treated field, colour cards, *Corcyra cephalonica*

Introduction
Over 200 insect species are parasitized by various Trichogrammatid strains, with 26 in India, including *T. chilonis*, *T. japonicum*, and *T. achaeae*, crucial for biological control programmes. The egg parasitoids, *Trichogramma* species (Order: Hymenoptera, Family: Trichogrammatidae), (Smith, 1996) [8] *Trichogramma* are egg parasitic wasps that attack lepidopteran pests like sugarcane internode borer, rice stem borer, cotton soot, and pink bollworms. They consume and kill the host egg, making them the most widely used biocontrol agent in India (Gupta and Dikshit, 2010) [4]. *Trichogramma* are small wasps, they complete their life cycle and kill host larvae before hatching. Males are yellowish and smaller than females, with a tapered abdomen and long antennal hairs. Females have a black dorsum abdomen with triangular genitalia and short antennae (Albo, 1986) [1]. Adult parasitoids chew and hole eggs after the pupal stage, using smell cues to locate host eggs. They mate quickly after emerging; using chemical and visual cues like egg shape and colour to select the best environment for their progeny (Brodeur and Boivin, 2004) [2]. A female wasp uses the ovipositor and antennal drumming to determine if the egg is young, healthy, and robust, the female can also determine the number of eggs she will implant. A single female can parasitize up to ten host eggs in a day, and during her adult life, up to 50 eggs can be parasitized. The parasitoid larva consumes the egg, pupates, and emerges as an adult wasp, effectively stopping the pest's spread (Mukherjee, 2021) [6].

Materials and Methods
Experimental site
The experiment on the natural occurrence of *Trichogramma* species in rice fields was carried out at the Indira Gandhi Krishi Vishwavidyalaya research and instructional farm in Raipur, Chhattisgarh, during *kharif* 2022 on the Trombay CG Dubraj Mutant-1scented rice variety in the organic seed production unit and the CG Devbhog foundation seed production unit.

Mass production and maintenance of *Corcyra cephalonica* (Stainton) culture
The nucleus culture of *C. cephalonica* in the form of eggs was obtained from NBAIR, Bangalore, which were mass reared and kept in a separate room. Sorghum grains with bold pieces were feed to the larvae. The sorghum bold grains were milling in a home mill, creating pieces of each grain that were then heat sterilized for 30 minutes at 100 °C to remove any potential secondary infestations. Additionally, the material was added with yeast (10g) to promote growth and streptomycin sulphate (0.25 g/kg) to prevent bacterial infection. 10 kilograms of sorghum were mixed with 400 g of raw, crushed groundnuts and stored in pre-

sterilized wooden rearing box. A metal shelf held box in a set. The wooden box was covered with lid and labeled the date of inoculations were marked. These boxes were kept at favourable temperature (28±2) degree centigrade and relative humidity, (75±5%).

To ensure that eggs were distributed evenly throughout the food material, each tray was inoculated with 0.5 cc of *Corcyra* (0–1 hr old) eggs. To prevent larvae or moths from escaping, muslin cloth was used to cover these trays. For 30 days, the trays remained undisturbed. After 30 days, the moths were mechanically collected using test tubes and transferred from each tray at 9:00 am to the specially made oviposition cages. The moths were separated into egg-laying cages made of plastic buckets where they were allowed to mate and lay eggs (20 lit capacities). Every morning, the eggs were collected and cleaned by rolling them on blotting paper to get rid of scales and other moth body parts. Additional uses for cleaned eggs included preserving the *Corcyra* culture and carrying out various research tasks.

Methodology

An organic paddy field with variety (Trombay Dubraj mutant-1) and a chemically treated field with variety (CG- Devbhog) were used in this study.

Sentinal cards of nine colors *i.e*. parrot green, blue, white, pink, red, yellow, dark green, black, and orange containing *Corcyra* eggs were prepared in the laboratory and were uniformly spread and pasted on a card measuring 16 × 5 cm. To kill the host embryo, the eggs were placed under a UV lamp for 20 minutes.

Cards were first fixed in plastic cups to protect them from adverse environmental conditions, and then the plastic cups were hung on wooden stick, in inverted position in rice fields. In the experimental place, different coloured cards were placed in different areas during the evening hours. They were left in the field for 48 hours. Then they were removed and brought back to the laboratory in the morning hours. These cards were individually placed in polythene bags at a room temperature of 28±2 °C and a RH of 75±5%.

Parasitism by *Trichogramma* was assessed. The parasitoids that emerged were counted in the laboratory after their death s to determine their emergence rate. Parts of these adults were sent to NBAIR, preserved in 70% alcohol for identification.

Fig 1: Material required for making sentinel cards

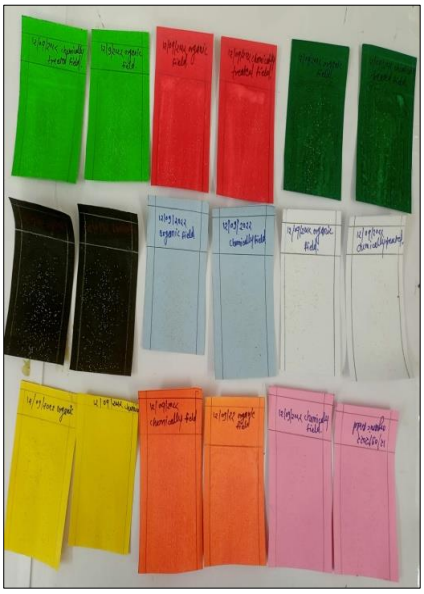

Fig 2: Colour cards

Fig 3: Application of sentinel cards in field

Fig 4: Parasitized card taken back in laboratory

Fig 5: Parasitized cards kept in individually in polythene bags

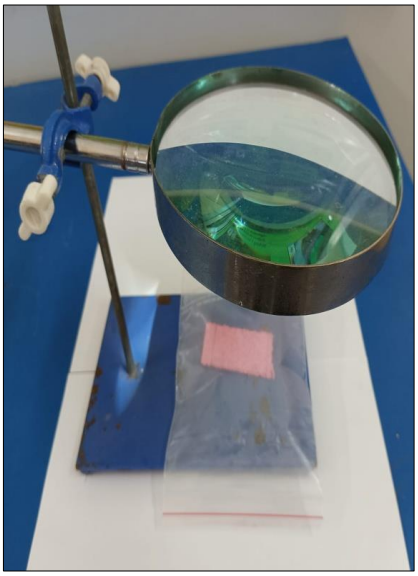

Fig 6: Counting adult emergence Number

Results and Discussion

The naturally occurring *Trichogramma* collected from both organic rice fields and chemically treated fields were sent to NBAIR Bengaluru for identification. It was identified as *T. chilonis* Ishii, whereas the sample oleander crop was identified as non-Trichogrammatid.

The result from the experiment showed that maximum mean population of *Trichogramma* spp. was seen in the months of September in organic fields and October in chemically treated fields, *i.e.*, 10.81 and 6.44, respectively, and the lowest mean population was seen in the month of August in both organic and chemically treated fields, *i.e*., 3.78 and 2.33.

The most common colour card preferred by *Trichogramma* spp. was pink in both fields which were observed at 21.25 in the organic field and 10.08 in the chemically treated field. The colour cards that were less preferred were black, in both rice fields where parasitization was recorded as 0.42 and 0.33, respectively, as due to absorption of heat, resulted in the drying of eggs.

Similar findings were reported by Ganeshwari and Sada Kumar (2019) [3], who reported that the parasitization by *Trichogramma* spp. was at its maximum (17.31%) during the month of September. Lakshmi *et al*. (2010) [5] and Ram Gopal Varma *et al.* (2013) [7] reported that *Trichogramma* was prevalent from September to October, and the total parasitization increased gradually from September 1st week to October 4th week, ranging from 39.34% to 97.56%.

Table 1: Observation of naturally occurring *Trichogramma* spp. egg parasitoid over the season of rice crops in two different field 2022-23

Organic field					Chemically treated field			
Colour cards	**August**	**September**	**October**	**Over all mean**	**August**	**September**	**October**	**Over all mean**
T_1-Blue	5	16.00	8.00	9.67	3	12.00	5.00	6.67
T_2-Yellow	3	14.50	12.00	9.83	3	6.25	7.50	5.58
T_3-Pink	8	38.25	17.50	21.25	5	13.25	12.00	10.08
T_4-Dark green	8	9.75	15.50	11.08	4	6.75	11.00	7.25
T_5-Parrot green	7	11.00	14.50	10.83	4	11.25	11.50	8.92
T_6-Red	0	1.25	5.50	2.25	0	2.50	3.50	2.00
T_7-Orange	3	4.00	3.50	3.50	1	3.00	4.00	2.67
T_8-Black	0	0.25	1.00	0.42	0	0.50	0.50	0.33
T_9-White	0	2.25	6.00	2.75	1	2.25	3.00	2.08
Monthly mean	3.78	10.81	9.28		2.33	6.42	6.44	

Table 2: *Trichogramma* spp. Identified from the Rice field

S. No.	Name of *Trichogramma* species	Host plant	Identifier
1.	*Trichogramma chilonis* Ishii	Organic rice field	Omprakash Navik ICAR-NBAIR, Bengaluru
2.	*Trichogramma chilonis* Ishii	Chemically treated field	Omprakash Navik ICAR-NBAIR, Bengaluru
3.	Non-Trichogrammatids	Oleander crop	Omprakash Navik ICAR-NBAIR, Bengaluru

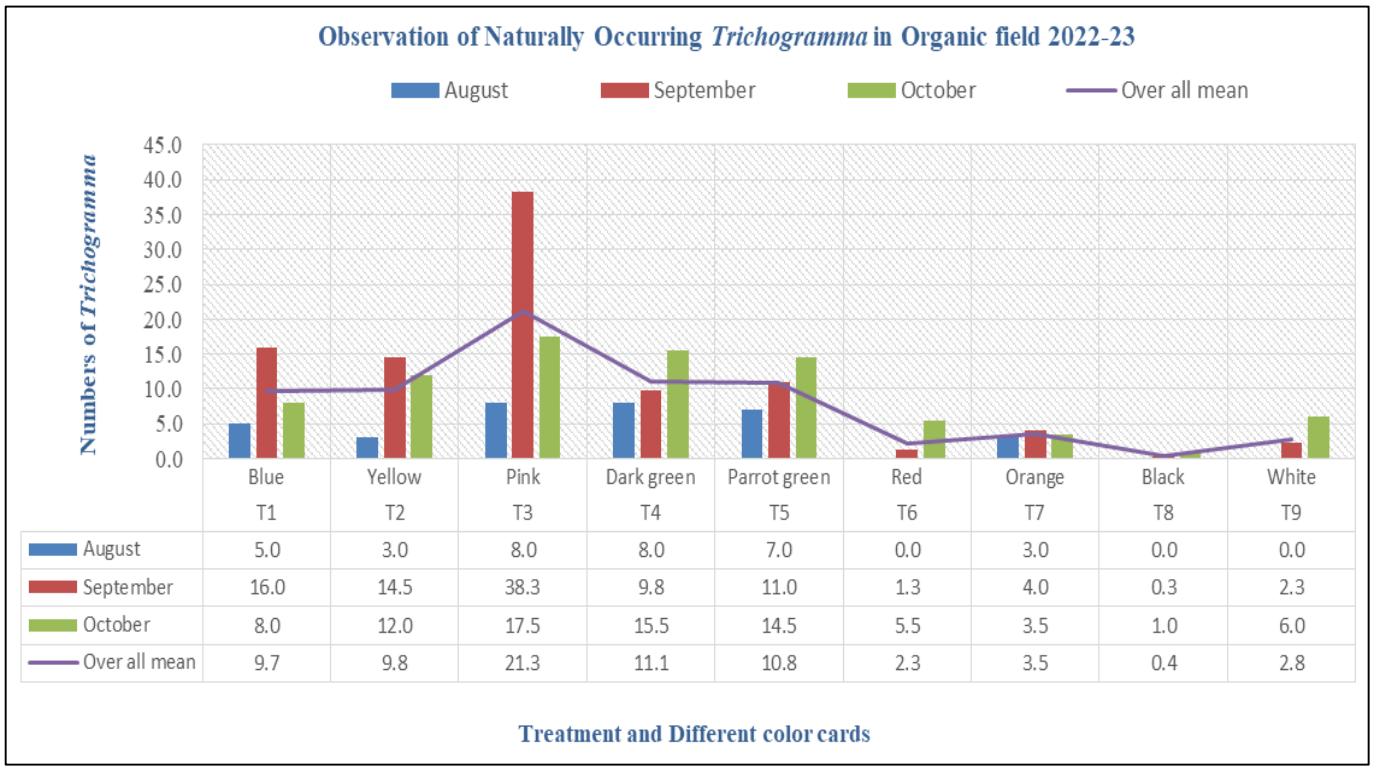

Fig 1: Naturally occurring *Trichogramma* in Organic rice field 2022-23

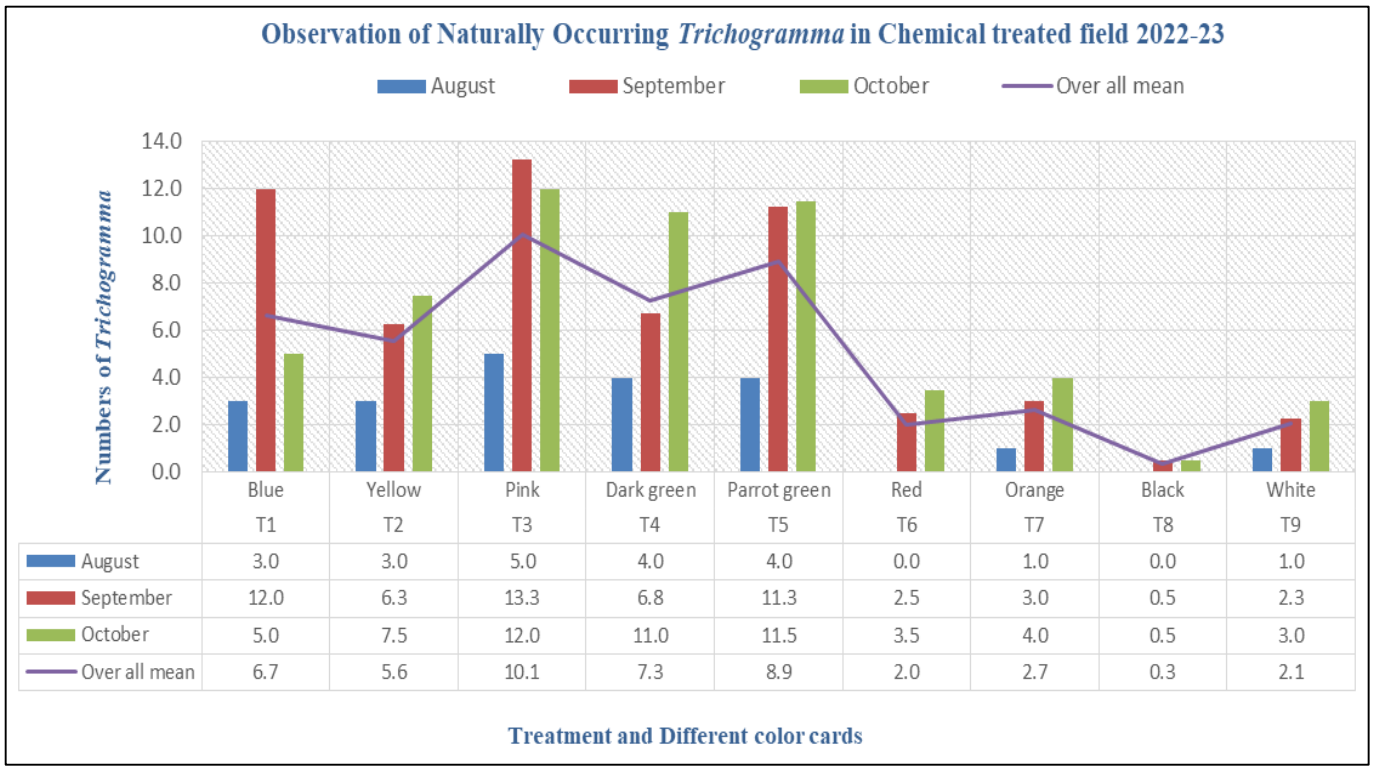

Fig 2: Naturally Occurring *Trichogramma* in Chemical treated rice field

Conclusion

In the most favourable month, *Trichogramma* population was high in September in the case of organic rice fields, and *Trichogramma* population was high in October in the case of chemically treated fields. The lowest was recorded in August in both fields; early vegetative stage yellow stem borer egg mass was not present in the paddy field. *Trichogramma* spp. preferred pink colour cards for parasitization in natural conditions, with mean values of 21.25 and 10.08 in organic and chemically treated fields, respectively.

References

1. Albo MC. Biology of *Trichogramma* species and their effectiveness as biological control for sugarcane stem borer M.S. thesis. UPLB, College Laguna; c1986.
2. Brodeur J, Boivin G. Functional ecological of immature parasitoids Annu. Rev. Entomol. 2004;49:27-49.
3. Ganeshwari, Kumar S. Studies on relative composition of egg parasitoids of rice yellow stem borer, *Scirpophaga incertulas* (walker) in *kharif* 2017. Journal of Pharmacognosy and Phytochemistry. 2019;8(3):4821-

4822.
4. Gupta S, Dikshit AK. Biopesticides: An ecofriendly approach for pest control Journal of Biopesticides. 2010;3(1 Special Issue):186-188.
5. Lakshmi VJ, Surekha K, Pasalu IC. Parasitization of rice yellow stem borer, *Scirpophaga incertulas* (Walker) egg masses. Annals of Plant Protection Sciences. 2010;18(2):366-369.
6. Mukherjee M. Studies on the host range and ovipositional preference of *Trichogramma* spp. under laboratory conditions, at Raipur, Chhattisgarh. M.Sc. Thesis, IGKV, Raipur, (C.G.); c2021.
7. Varma RGM, Jagadeeshwar R, Chitra S. Relative Composition of Egg Parasitoids of Rice Yellow Stem Borer, *S. incertulas* (Walker). Journal of Rice Research. 2013;6(2):53-58.
8. Smith SM. Biological control with *Trichogramma*: advances, successes and potential of their use. Annals of Review of Entomology. 1996;41:375-406.