Short Communication

© 2025, Centre for Advanced Research in Agricultural Sciences
Research Journal of Agricultural Sciences
Volume 16; Issue 01 (Jan–Feb 2025); pp 72–74

ISSN: 0976-1675 (P)
ISSN: 2249-4538 (E)

# Management of Skeletonization of *Eutectona machaeralis* Through the Release of the Indigenous Egg Parasitoid Trichogramma

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Received: 06 Nov 2024; Revised accepted: 25 Jan 2025

## Abstract

The biological control method provides an environmentally friendly alternative to conventional chemical pesticides, reducing the reliance on harmful chemicals and fostering the development of more integrated and sustainable pest management approaches. This study presents strong evidence that releasing the native egg parasitoid *Trichogramma chilonis* at a rate of 1.25 lakh/ha effectively controlled the populations of major insect pest, the teak defoliator, in both natural forest ecosystems and teak plantations. The release of *Trichogramma chilonis* significantly diminished the extent of defoliation caused by the pest and lowered larval infestation rates, which are known to affect the health and productivity of teak trees negatively.

***Key words*:** Biological control, Indigenous, Egg parasitoid, Teak defoliator, Defoliation

Effective management of insect pests, particularly teak skeletonizers is essential for the sustainable management of teak forests and for enhancing the economic value of teak timber. Traditional pest control methods, such as chemical pesticides, have often proven ineffective or unsustainable due to their negative environmental impacts and the development of pest resistance over time. As a result, there is a need for more ecologically balanced and sustainable pest management strategies.

Biological control, which uses natural predators, parasitoids, and pathogens to regulate pest populations, is a promising chemical control alternative. It has been explored as an environmentally friendly approach to managing pests in teak forests [1-13]. Among the various natural enemies of teak pests, egg parasitoids like *Trichogramma* species have shown great promise in controlling pest populations. These parasitoids lay their eggs in the eggs of target pests, preventing them from hatching and further developing.

One of the most effective egg parasitoids for controlling teak pests is *Trichogramma chilonis*, a native species that targets the eggs of various insect pests, including those damaging teak trees. Research has shown that releasing *T. chilonis* in teak forests can significantly reduce the populations of key pests such as skeletonizer, effectively mitigating damage caused by these insects. By parasitizing the eggs of these pests, *T. chilonis* plays a critical role in reducing pest populations in an environmentally safe and effective manner. However, despite promising results, the knowledge regarding the mass production and field application of *T. chilonis* remains limited. Most research has focused on laboratory rearing and the potential use of *T. chilonis* in biological control programs, with large-scale field applications not yet fully explored. Therefore, more systematic research is needed to develop methods for mass-producing *T. chilonis* in laboratories and releasing it on a large scale in teak plantations. This would facilitate the widespread adoption of *T. chilonis* in Integrated Pest Management (IPM) strategies for teak forests.

The use of *Trichogramma* species in an Integrated Insect Pest Management (IIPM) strategy offers a promising approach to controlling insect pests in teak forests. IIPM combines multiple pest control methods—biological control, cultural practices, and minimal chemical interventions—to manage pests in a sustainable and environmentally friendly manner. By incorporating biological control agents like *T. chilonis* into teak management programs, forest managers can reduce their reliance on chemical pesticides, promoting more sustainable pest control practices and healthier forest ecosystems.

## MATERIALS AND METHODS

An indigenous Trichogramma species, *Trichogramma chilonis* Nagaraja (Hymenoptera: Trichogrammatidae), was mass-reared on the stored grain pest *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae) as a laboratory host to produce IFB Tricho cards for field release. Approximately 30 million parasitoids were produced in the insectary of this institute, of which about 25 million *T. chilonis* parasitoids were used for field release, while 5 million were reserved for culture rotation and as the base population for mass multiplication.

At both the release and control sites in natural forests and teak plantations, observations were made on defoliation and skeletonization caused by skeletonizers. The damage caused by

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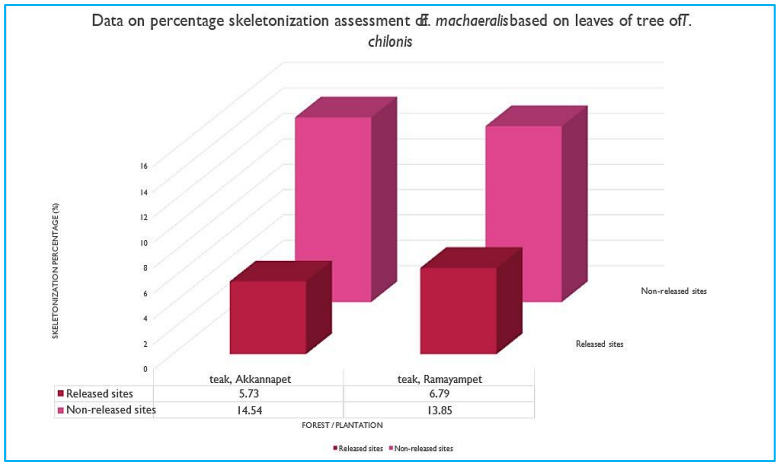
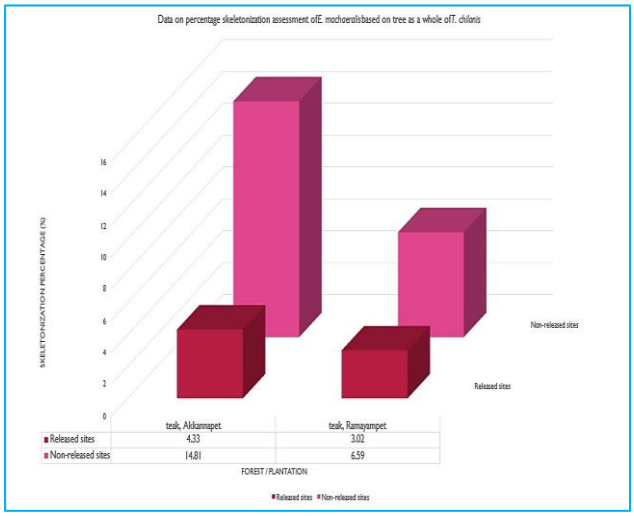
**Citation:** Deepa M, Rahul K, Shivakumar, Praveen Y. 2025. Management of skeletonization of *Eutectona machaeralis* through the release of the indigenous egg parasitoid Trichogramma. *Res. Jr. Agril. Sci.* 16(1): 72-74.

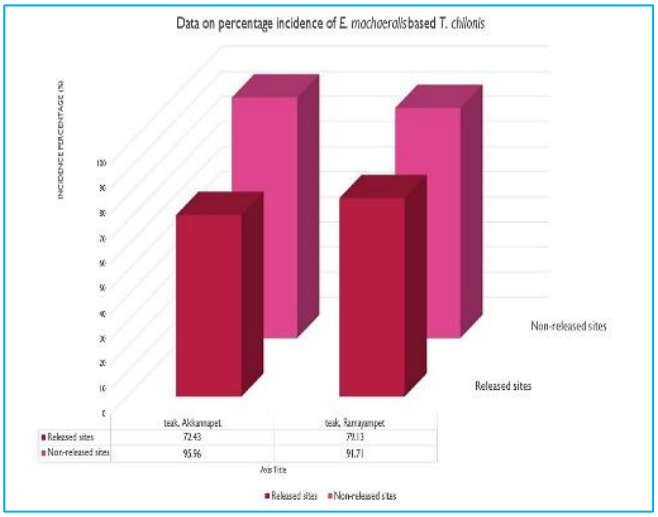
the teak skeletonizer was measured in 20 released plots and 20 non-released plots in natural teak forests, as well as in 20 released plots and 20 non-released plots in teak plantations, randomly after the outbreak period of the pests. Data on skeletonization and incidence were collected from 20 trees per plot and 20 leaves from each tree in both released and non-released plots of teak forests and plantations. The data collected on various infestation parameters were analysed using Student's 't'-test [5] as referenced by Kumar and Verri [9] to assess the impact of biological control using *Trichogramma* against major insect pests of teak in both natural forests and plantations.

## RESULTS AND DISCUSSION

The release of the indigenous egg parasitoid *Trichogramma chilonis* at a rate of 1.25 lakh per hectare in both natural teak forests and plantations led to significant reductions in defoliation and skeletonization caused by the pest *E. machaeralis*, compared to areas where no parasitoids were released. The data from both released and non-released sites show notable differences. For *E. machaeralis*, skeletonization assessments based on the entire tree showed considerable reductions at the sites where *T. chilonis* was released. These reductions were observed in both natural forests and plantations, with the release sites showing lower damage compared to non-released sites. The reduction in skeletonization was evident in areas where the parasitoid was introduced. In case of *E. machaeralis*, percentage skeletonization assessment based on tree as a whole and the number of leaves of a tree and its percentage incidence exhibited significant reduction in *T. chilonis* introduced sites when compared to non-released sites, both in natural forests and plantations. The difference of percentage skeletonization based on the tree as a whole and number of leaves of a tree and percentage incidence was noticed at 10.48% out of 14.81%, 8.81% out of 14.54%, and 23.53% out of 95.96% for natural forests of teak respectively and 3.57% out of 6.59%, 7.06% out of 13.85% and 12.58% out of 91.71% for plantations of teak respectively [14-16].




## CONCLUSION

Research on *Trichogramma* has played a crucial role in advancing sustainable pest management strategies, particularly in integrated pest management (IPM) for pests such as teak defoliators. By reducing the reliance on chemical pesticides, fostering biodiversity, improving pest control efficiency, and providing a cost-effective solution, *Trichogramma* has become an indispensable tool in modern agriculture. Findings from studies demonstrate its effectiveness in protecting crops, enhancing yields, and promoting environmentally sustainable farming practices, making it a valuable asset for global sustainable pest management systems.

***Acknowledgments***

*The Principal Investigator expresses gratitude to the Director General of the Indian Council of Forestry Research and Education for their financial support. The PI also extends thanks to the Director of the Institute of Forest Biodiversity, Hyderabad, for their ongoing encouragement, as well as to staff members like Soundarya, John and Sailaja for their assistance with culture maintenance.*

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