



## Research note

# Field efficacy of the parasitoid, *Pediobius imbrues* (Hymenoptera: Eulophidae) on coconut slug caterpillar, *Macroleptra nararia* Moore (Lepidoptera: Limacodidae)

N. B. V. CHALAPATHI RAO\*, G. KRISHNA RAO and D. R. ROSHAN

Horticultural Research Station, Dr. Y. S. R. Horticultural University, Ambajipeta, East Godavari -533214, Andhra Pradesh, India

\*Corresponding author E-mail: chalapathirao73@gmail.com

**ABSTRACT:** The coconut slug caterpillar, *Macroleptra nararia* is one of the major pests of coconut plantations in Andhra Pradesh with periodic out breaks especially under favorable weather conditions. Though many parasitoids were identified against this sporadic out break pest, none were found amenable for laboratory rearing. A new larval parasitoid, *Pediobius imbrues* (Hymenoptera: Eulophidae) with a natural parasitism ranging from 2 -10 per cent under field conditions was identified in slug affected coconut gardens in March 2015. This parasitoid was also found amenable for lab rearing on *Bracon hebetor* probably being facultative hyper parasitoid. Field release studies of lab reared *P. imbrues* against slug caterpillar in the affected coconut gardens revealed that a maximum of 41.41 and 50.31 per cent parasitism of slug caterpillar, respectively, in 2017 and 2018 within 30 days after release and this promising parasitism provides scope for large scale field releases during slug caterpillar out breaks in view of major economic losses caused by the pest.

**KEY WORDS:** Coconut, *Pediobius imbrues*, slug caterpillar

(Article chronicle: Received: 16-06-2019; Revised: 20-11-2019; Accepted: 25-11-2019)

Coconut slug caterpillar, *Macroleptra nararia* Moore (Lepidoptera: Limacodidae) is one of the pre-dominant sporadic pest in Andhra Pradesh. Andhra Pradesh is one of the major coconut growing states in India and has an area of 1.42 lakh ha with the coastal districts comprising East and West Godavari commanding fifty per cent of this area. One of the major factor that contribute to the loss of production and productivity in coconut, in recent years in the state and in these districts in particular was the sporadic outbreak of the coconut slug caterpillar *M. nararia* and was earlier reported in the East Coast of India (Nirula, 1955; Menon and Pandalai, 1960; Kalidas, 2002; Sujatha *et al.*, 2008; Rajan *et al.*, 2011; Chalapathi Rao *et al.*, 2016). During the out breaks, the larvae of *M. nararia* feed on all the green vegetative matter including spathes and even nuts. A high yield loss will be observed in the affected gardens in subsequent years of out break because of drying of all functional leaves, buckling and drooping of bunches and shedding of nuts. The high temperature and relative humidity along with water bodies leads to favourable build up of the pest and 90 to 95 per cent damage was recorded in severely infested gardens (Rajan *et al.*, 2011). During outbreaks the pest was also observed to cause feeding damage to the intercrops banana and cocoa in coconut based cropping system in out breaks. Many parasitoids, i.e.,

*Eurytoma tatipakensis* Kur., *Euplectromorpha natadae* Kur. and *Secodes narariae* Kur (Nair, 1986) were reported on larvae of *M. nararia* and predator, *Cantheconidea furcellata* (Wolff) were found predaceous on larvae of *M. nararia* (Malik *et al.*, 1996) but none are amenable for laboratory rearing. Parasitic Hymenoptera is the most important and successful in the pest suppression (Clausen, 1978; Noyes, 1985) and widely conventional in classical biological control programmes (Greathead, 1986). Moreover, LaSalle (1993) divulged that Eulophidae are the most imperative groups in biological control programs in any crop system. Diverse insect orders such as Orthoptera, Neuroptera, Hemiptera, Thysanoptera, Neuroptera, Lepidoptera, Diptera and Hymenoptera recorded a wide range of parasitism by genus *Pediobius* Walker (Kerrich 1973; Boucek, 1988 and Hansson, 2013). Recently larval parasitoid *Pediobius imbrues* (Hymenoptera: Eulophidae) was reported with a natural occurrence ranging from 2-10 per cent in slug caterpillar infested coconut gardens in East Godavari district of Andhra Pradesh (Chalapathi Rao *et al.*, 2017).

Keeping in view of lab amenable culture maintenance of *P. imbrues*, its field efficacy was evaluated in the slug caterpillar, *M. nararia* out break villages in East and West

Godavari districts of Andhra Pradesh in the years 2017 and 2018 in an area of one hectare in three villages namely, Darbarevu, Patthagonda and Mintaepudi. Observations were made on the ten per cent of total palms present and from the sample palms, 10 leaflets from lower whorl were collected. *P. imbrues* parasitoids were released @ 60 per palm at fortnight intervals and the per cent parasitised slug caterpillar larvae were recorded from the sampled leaflets. In 2017 in Darbarevu village *P. imbrues* initial parasitism was 2.10 per cent while in 2018 no initial *P. imbrues* parasitised larvae were recovered in the samples collected. After systematic release of the parasitoid a higher per cent parasitism of slug caterpillar larvae was recorded and a maximum of 41.41, 50.31 and 50.23 per cent parasitised larvae were observed in the field collected samples of the three villages within 30 days after release (Table 1).

Fixed releases of parasitoids at fortnight intervals reduced the slug caterpillar infestation in short time, which proved the parasitoid efficacy in natural field conditions. Parasitoids represent excellent candidates for the control of outbreaks of any crop pest. Earlier, Kamarudin Norman *et al.*, (1996) reported that *P. imbrues* is a salient parasitoid on bagworm *Metisa plana* on oil palm, while Cheong *et al.* (2010) reported that *P. imbrues* is an imperative parasitoid on bagworm, *Pteroma pendula* as well as *M. plana*. Moreover, *P. imbrues* is the parasitoid which constitutes 64 per cent of total parasitoids (*P. imbrues*, *P. elasmii*, *Dolichodenidea metesae*, *Aulosaphes psychidivorus*,

*Aphanogmus thylax*, *Eupelmus catoxanthae*, *Eurytoma* sp., *Temelucha* sp., *Goryphus* sp. and *Friona* sp.) in oil palm ecosystem and plays a pre-dominant role in the bio-suppression of *P. pendula* and *M. plana* (Cheong *et al.*, 2010). Ghosh and Abdurahiman (2010) reiterated that *P. imbrues* is a hyperparasite of *B. brevicornis*, *B. hebetor*, which is the most common parasitoid in the coconut ecosystem and same was also reported by Chalapathi Rao *et al.* (2017). Hence, it can be inferred that *P. imbrues* is a promising parasitoid which can parasitize the slug caterpillar, *M. nararia* in coconut and thus can overcome the deleterious insecticide recommendations.

**REFERENCES**

Bousek Z. 1988. Australasian chalcidoidea (Hymenoptera). A Biosystematic Revision of Genera of Fourteen Families, with a reclassification of species. CAB International, Wallingford, Oxon, U.K. 701 pp.

Chalapathirao NBV, Padma E, Ramanandam G. 2017. *Pediobius imbrues* (Hymenoptera: Eulophidae), a promising parasitoid of coconut slug caterpillar, *Macroplectra nararia* Moore (Lepidoptera: Limacodidae) in Andhra Pradesh. *Pest Manage Hort Ecosyst.* **23**: 176-178.

Cheong YL, Sajap AS, Hafidzi MN, Omar D, Abood F. 2010. Outbreak of bag worm and their natural enemies in oil palm *Elaeis guineensis*, plantation at Hutan Melintang, Perak, Malaysia. *J Entomol.* **7**: 141-151. <https://doi.org/10.3923/je.2010.141.151>

Clausen CP. 1978. Introduced parasites and predators of arthropod pests and weeds: a review. : Agricultural Hand Book, U.S. Dept. of Agriculture, Washington, D.C., USA.

Ghosh SM, Abdurahiman UC. 2010. On the biology of *Pediobius imbreus* (Hymenoptera: Eulophidae), a hyperparasite of *Opisina arenosella*, the black-headed caterpillar of coconut. *Cocos* **6**: 27-30.

Greathead DJ. 1986. Insect Parasitoids. In: Waage JK, Greathead DJ (Eds.). *Parasitoids in classical biological control*. Academic Press, London, UK.

Kamarudin NH, Walker AK, Wahid MB, Lasalle J, Polaszek A. 1996. Hymenopterous parasitoids associated with bagworms *Metisa plana* and *Mahasena corbetti* (Lepidoptera: Psychidae) on oil palms in peninsular Malaysia. *Bull Entomol. Res.* **86**: 423-439. <https://doi.org/10.1017/S000748530003501X>

**Table 1. Field efficacy of *Pediobius imbrues* on *Macroplectra nararia* in 2017 and 2018**

Name of the village and Date of sampling	No. of Slug caterpillars /10 leaf lets (Mean +SE)	Per cent parasitisation by <i>P. imbrues</i>
2017 (Darbarevu, West Godavari)		
21.04.2017(Pre – release)	47.6 ± 2.23	2.10 ± 0.32
01.05.2017	21.1 ± 1.56	30.33 ± 2.28
11.05.2017	15.4 ± 1.08	41.41 ± 1.68
2018 (Patthagondi, East Godavari)		
01.03.18 (Pre – release)	38.8 + 1.85	-
15.03.18	32.1 + 2.03	43.24 + 1.71
30.03.18	-	50.31+ 1.95
2018 (Mintaepudi, West Godavari)		
31.05.2018 (Pre – release)	58.89 ± 2.53	-
15.06.2018	36.24 ± 1.98	49.19 ± 2.08
30.06.2018	12.33 ± 0.74	50.23 ± 1.87

- Kerrich GJ. 1973. A revision of tropical and subtropical species of the eulophid genus *Pediobius* Walker (Hymenoptera: Chalcidoidea). *Bull Br Mus Nat Hist.* **29**: 115–199.
- La Salle J. 1993. Parasitic Hymenoptera, biological control and biodiversity, pp. 197-215. In: La Salle J, Gauld ID (Eds.). *Hymenoptera and Biodiversity*. CAB International, Wallingford, UK.
- Mallik B, Viraktamath CA, Puttaswamy. 1996. Damage by the slug caterpillar *Macroleptura nararia* (Lepidoptera: Limacodidae) to coconut around Bangalore. *Indian Coconut J.* **27**: 2-4.
- Menon KPV, Pandalai KM. 1960. The Coconut palm- A monograph, Indian Central Coconut Committee, Ernakulam, Kerala, India, 384 pp.
- Nair MRGK. 1986. Insect and mite pests of crops in India. Indian Council of Agricultural Research, New Delhi, India, 408 pp.
- Nirula KK. 1955. Investigations on the pests of the coconut palm. Part I. The coconut palm and the pests of palm. *Indian Coconut J.* **8**: 118-130.
- Noyes JS. 1985. Chalcidoids and biological control, Chalcid Forum, Number **5**: 5-10.
- Rajan P, Josephraj Kumar A, Sujatha A. 2011. Gradient outbreak of coconut slug caterpillar *Macroleptura nararia* Moore in east coast of India. *Cord* **27**: 61-68.