



**Biotica
Research
Today**
Vol 3:10 916
2021 919

Red Banded Mango Caterpillar: Evolving as a Destructive Pest in Major Mango Growing District of Bihar and West Bengal

Abhay Kumar Yadav^{1*}, Ritesh Singh¹, Prabhakar Yadav², Vikash Singh³ and Jaish Raj Yadav⁴

¹Dept. of Fruit Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh (224 229), India

²Dept. of Horticulture, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur, Uttar Pradesh (209 217), India

³Dept. of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh (224 229), India

⁴Dept. of Plant Pathology, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh (224 229), India



Open Access

Corresponding Author

Abhay Kumar Yadav
e-mail: bhy.abhay@gmail.com

Keywords

Caterpillar, Losses, Quarantine, Seed borer

Article History

Received in 11th October 2021

Received in revised form 26th October 2021

Accepted in final form 27th October 2021

E-mail: bioticapublications@gmail.com

How to cite this article?

Yadav *et al.*, 2021. Red Banded Mango Caterpillar: Evolving as a Destructive Pest in Major Mango Growing District of Bihar and West Bengal. *Biotica Research Today* 3(10): 916-919.

Abstract

At all the stages of bearing of mango, there is attack of several insect and non-insect pests. Red banded caterpillar or *Deanolis sublimbalis* was the minor pest of mango but very recently emerged as a serious pest all over the world and act as emerging pest in Bhagalpur and Darbhanga district of Bihar. It causes great loss in most of the district of Bihar. The most destructive stage of this pest was larval stage. The red and white alternate bands on the body were the characteristic feature of this pest. This pest attacked the mango fruit from the pea sized till the maturity of the fruit causing boring of the fruits through several tunnels by the larvae. The matured instar larvae reached the seed yet to harden and tunnelled them, excreted inside and exposed the fruits to the secondary infestation by micropathogens. Pupation occurred in the soil inside a brownish cocoon or in the dry twigs of the branches.

Introduction

Red banded mango caterpillar (RBMC) is a great threat to Australia's mango industry. It is a serious pest of mango fruit in all stages of fruit development, feeding on both the flesh and the seed. This pest has only four known hosts and all of which belong to the family Anacardiaceae. Mango (*Mangifera indica*) is the only host of economic importance, and the only host in Australia. RBMC is distributed throughout Southeast Asia and Papua New Guinea (PNG) and has been spreading through the Torres Strait islands since 1990. It was detected on mainland Australia, near the tip of Cape York Peninsula in October 2001. Since August 2001 Cape York Peninsula from just north of Coen has been a defined quarantine area for a number of targeted plant pests, including RBMC. Movement restrictions for mango fruits and plants within and from this quarantine area are in place.

Until relatively recently the scarcity of literature about RBMC suggested that it is generally a pest of little concern. However surveys in the Philippines and PNG have found severe infestation rates of 40-55%.

Even very low numbers of RBMC would be highly problematic for commercial mango producers in India. Chemical control would be difficult because the caterpillar feeds internally on the fruit, and the likelihood of finding effective biological control agents is unclear. Additionally, confirmation of the presence of RBMC in production areas is likely to lead to the imposition of national and international quarantine restrictions.

In India, founded a new fruit borer of mango, Tirathabamundella for the first time in the Andaman and Nicobar islands showed the record of red banded caterpillar (*Deanolis sublimbalis*, synonyms are *Dianolis albizonalis*, *Noorda albizonalis*, *Autocharis albizonalis*). Similarly, reported this pest from

Malda during a thorough and acute survey in the mango orchards of Malda and Murshidabad districts of West Bengal, India. This pest is thought to have been recorded as a new pest, causing alarming losses of mango in Andhra Pradesh and Bihar in India. Fruit borer, *Autocharis albizonalis* Hampson, is a predominant pest of mango has recently been emerged as a serious pest. The damage due to this pest showed 10-52% damage from pin head stage to full maturity in Malda, Murshidabad, Nadia and Hooghly districts of West Bengal, India.

Common Name: Red banded mango caterpillar (RBMC), mango seed borer.

Scientific Name: *Deanolis sublimbalis*; also known as *Noorda albizonalis*.

Distribution

Widespread in Asia, Southeast Asia, Oceania. It is reported from Australia (the islands in the Torres Strait, and from the tip of Cape York Peninsular), and Papua New Guinea.

Hosts

Anacardiaceae: mango (*Mangifera indica*); Kuini (*Mangifera odorata*) in PNG and Indonesia; *Mangifera minor* a wild fibrous mango found in PNG; and *Boueabur manica* in Thailand (Tenakanai et al., 2006). It is also reported on the purple nut sedge (*Cyperus rotundus*).

Part of Commodity Affected: Fruit and Seed

Biology of the Pest

In India, the fruit borer (*Noorda albizonalis*) infestation in Puri district of Orissa. The female moth laid milky white oval eggs in masses near the distal end of the fruit. The incubation period was to be 2-3 days and pre-ovipositor period was 1.5-2.5 days. Hatching occurred after 3 days and newly hatched larvae bored through the tender fruits at the early stage via distal end of the fruit. Fully matured larval instar pupated preferably inside the fruits or outside in the soil or cracks, crevices or sometimes in the branch.

Larvae

The larva is quite distinctive; its body is covered with alternating red and white bands, with a black "collar" on the first segment (Figure 1). The head is brown or black. The caterpillar commonly grows to 2 cm in length. The larva of red banded caterpillar completed 5th larval instars and underwent pupation thereafter either inside the fruits or in the soil or preferably in dry branches. The borer entered the fruit through one bore hole made typically on the lower half of the fruit. The two larval instars fed on the mango flesh, while the later instars fed on the seed. Mango seed weevil larvae can also be found in mango seed causing similar damage to RBMC however for field assessment these larvae have no red banding.



Figure 1: Larvae of RBD

The 1st Instar Larvae: Cylindrical, brownish, size 4-9 mm L × 1.08 mm W, Development period was 2 days. The full grown caterpillars were about 2.5 cm in length and dorsum being red with white intersegment streaks and dorsoventral regions were slightly hairy.

The 2nd Instar Larvae: Brownish-yellow, size 10 mm L × 2.0 mm W, Development period was 2-3 days.

The 3rd Instar Larvae: Brown head, white body and red intersegmental band (12.3 mm L × 2.2 mm W, Development period was 3 days.

The 4th Instar Larvae: Morphologically similar to 3rd instar period 2-3 days.

The 5th Instar Larvae: Head dark brown, mandibles heavily sclerotized and black with 3 pairs of thoracic legs and 5 pairs of abdominal legs. Size varied from 19.5 mm L × 3.5 mm W; Period of development was 2 days.

Pre-Pupae and Pupae

Pre-pupae turn a blue to green colour on the white. When pre-pupal stage is reached the larvae stop feeding and display minimal mobility (Tenakanai et al., 2006).

The pupa is encased in a spun cocoon which may incorporate soil particles or bark particles, and is 11-12 mm long. Pupae are pale brown and gradually turn dark brown as they age (Figure 2).



Figure 2: Pupae

Adults

The adult is a plain greyish coloured pyralid moth, with “beak like” mouthparts typical of this moth family (Figure 3). A more complete description of the adult moths is provided by Sahoo and Das (2004). The adult moths have wings of a shining bluish-fawn colour with a well-marked darker border and a narrow, dark streak across the end of the forewing cell. Forewing length is about 13 mm. Hind wing colouration is similar and the wings are held beside the body when the moth is resting, so that its shape is evenly triangular. The head and rather slender body are brown with creamy yellow markings and there are shining white scales on the tarsi and undersides of the thorax, head, and pulps. The sexes are alike in appearance, except that the mid-leg of the males has a dark brown tibial scale brush which is lacking in females. Males can be identified by an abdomen that extends beyond the hind wings.



Figure 3: Adult of RBD

Eggs

The oviposition occurred at the base of the peduncle covered with the dried leaves in 70% of the cases. They also said that eggs are usually laid in groups of two, though single egg lying and egg masses contained up to 14 eggs are recorded. Ovipositor occurred as early as 45 days after the setting of fruit and continued upto the fruit maturity. He also described that the eggs were oval, waxy white and were laid in masses on the fruit apex and hatched after 3-4 days. The insects passed through 5th larval instars with total development period of 14-20 days. The prepupal and pupal period lasted for 2 to 3 days and 9 to 14 days respectively. Longevity of the adult was described from 8 to 9 days and life cycle completed with 28 to 41 days.

Symptoms & Life Cycle

The caterpillars or larvae tunnel into the flesh and seed of the fruit (Figure 4). Young fruit are particularly susceptible. Bacteria, fungi and fruit flies invade and rot the fruit. Sticky liquid exudes from the larval entry hole, dribbles down the fruit as a dark stain and collects at the base (Figure 5). Cracks appear on the fruit at the entry hole and damaged fruits may fall.



Figure 4: Damaged mango fruit by larvae of red banded caterpillar



Figure 5: Sticky liquid from larval entry hole

In Papua New Guinea, the eggs are white to crimson, laid in groups of up to 15 on the fruit stalk, or more rarely on the base of the fruit or in crevices, such as spots caused by the anthracnose fungus, *Colletotrichum gloeosporioides*. After hatching in about 10 days, the first instars bore together into the side of the fruit, and they and the second instars, feed beneath the skin. Several larvae can occur in the same fruit, but usually they disperse and there is only one that tunnels into the seed. When mature, the larva is white with a brown or black head, up to 2 cm long, and has 11 bands along the back, pink at first and then red (Figure 1). The five larval stages occur over about 16 days, and then pupation occurs on the ground or in or under the bark. It lasts up to 14 days before the adults emerge; they are greyish/ pale brown, 12 mm long, and nocturnal.

Spread over short distances is by natural dispersal of adults, and over longer distances in infested fruit and, perhaps, by wind.

Impact

In Papua New Guinea, economic losses of 40-55% have been reported from Port Moresby, Central Province and East New Britain. Fruit are damaged at all stages of development, some as small as 10 mm. Similar yield losses have been reported from the Philippines and India although, overall in Asia, economical losses are said to be 10-15%.

Detection & Inspection

Look for black stains on the fruit. Cut the fruit open and look for caterpillars with 11 red bands along the back in the flesh or in the seed.

Management of Red Banded Mango Caterpillar

Natural Enemies

No parasitoids of *Deanolais sublimbalis* have been recorded in Papua New Guinea, but two egg parasitoids, *Trichogramma chilonis* and *Trichogramma chilotraeae* have been recorded in the Philippines. In Papua New Guinea, the weaver ant, *Oecophilas maragdina*, is a predator of the moth, although it is said that it does not feed on the eggs or larvae.

Cultural Control

The following have been recommended, but are all labour-intensive and are likely to be too expensive for commercial orchards, but might be of interest to smallholders to safeguard fruit from high losses.

During growth:

- Bagged individual fruits.
- Remove and destroy fruits with black stain that are likely to contain larvae in the flesh or seed.

After harvest:

- Collect and destroy dried branches and other dead wood in mango tree in the off-season. This is a recommendation from India, where pupae are also collected from cracks and crevices of trunks and branches during the off-season.

Chemical Control

Apheromone has been identified and trialled in Papua New Guinea, but has, as yet, not been used commercially.

- Use neem at 10 days intervals, starting when mango trees are in flower and continue for 2 months.
- In Papua New Guinea, thiacloprid was the most effective insecticide tested and, in the Philippines, the synthetic

pyrethroids, deltamethrin and cyfluthrin, gave acceptable control commencing at 60 days after fruit formation. Note that residue data are required for these chemicals before recommendations can be made.

Note: In Papua New Guinea, chloropyrifos-treated trees had increased levels of damage compared to the untreated control, perhaps due to removal of the weaver ant (*Oecophilas maragdina*), a possible biocontrol agent.

Conclusion

Mango fruit borer, preferably known as the red banded caterpillar, *Autocharis albizonalis* Hampson, though was a minor pest gradually gaining importance. Mango fruits were found to be attacked by this borer during the pea stage to the maturity stage of the fruit. Thereafter fruit rotting and necrosis of the fruit occurred due to secondary microbial infestation. Even very low numbers of this pest would be highly problematic for commercial mango producers. So a careful measure should be taken to control the pest before becoming a serious pest in India, specially Darbhanga district of Bihar.

References

- Krull, S.M.E., 2004. Studies on the mango-ecosystem in Papua New Guinea with special reference to the ecology of *Deanolis sublimbalis* Snellen (Lepidoptera, Pyralidae) and to the biological control of *Ceroplastes rubens* (Homoptera, Coccidae). PhD. Thesis, Institut fur Phytopathologie und Angewandte Zoologie der Justus-Liebig-Universitat Gießen, Versuchsstation, Alter Steinbacher Weg 44, Gießen.
- Sahoo, A.K., Das, B.K., 2004. Incidence and biological observations of mango fruit borer, *Deanolis albizonalis* Hampson (Pyralidae: Lepidoptera) in West Bengal. *Environmental and Ecology* 22(2), 180-183.
- Tenakanai, D., Dori, F., Kurika, K., 2006. Red-banded mango caterpillar, *Deanolis sublimbalis* Snellen (Lepidoptera: Pyralidae: Odontinae) in Papua New Guinea. In: *Pest and disease incursions: risks, threats and management in Papua New Guinea, ACIAR Technical Reports No. 62* (ed. TV Price), pp. 161-165. ACIAR, Canberra, Australia.