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Red-Banded Mango Caterpillar (*Deanolis sublimbalis Snellen*): An Emerging Threat to the GI-Tagged Zardalu Mango of Bhagalpur District, Bihar

Kunal Sarkar, *Vikash Kumar and Saurav Vats
Department of Horticulture (Fruit Science), Bihar Agricultural University, Sabour, Bhagalpur – 813210, Bihar, India
***Corresponding Author's email: kdr4903@gmail.com**

The red-banded mango caterpillar, *Deanolis sublimbalis Snellen* (Lepidoptera: Crambidae), has grown from an occasional pest into one of the most damaging insects affecting mango, Mangifera indica L., across the eastern Indian mango belt. Newly hatched larvae bore into fruit within days of fruit-set, feed internally on the pulp and later on the developing kernel, and finally cut an exit hole before pupation, leaving behind blackened, oozing and often unmarketable fruit. Because the insect completes its most damaging phase inside the fruit, chemical intervention after boring is largely ineffective, making early-season, orchard-level management essential. In Bihar, the pest has intensified over the last decade in the Nathnagar, Kharik, Sultanganj, Sabour and Bausi blocks of Bhagalpur district, an area that produces the Geographical Indication (GI)-tagged Zardalu mango, prized for its aroma and sent every year as an official gift from the state. This review compiles the taxonomic status, biology, damage symptoms, host preference and ecological drivers of *D. sublimbalis* reported from Papua New Guinea, West Bengal and Bihar, situates the pest within the specific agro-ecological setting of Bhagalpur, and outlines integrated management options relevant to protecting the Zardalu mango economy.

Keywords: *Deanolis sublimbalis*; red-banded mango caterpillar; Zardalu mango; Geographical Indication; Bhagalpur; Bihar; integrated pest management

Introduction

Mango is one of the most economically important fruit crops of the Indian subcontinent, and Bihar's Bhagalpur district is known nationally for the Zardalu mango, a light-yellow, strongly aromatic variety that received the Geographical Indication tag in 2018 under the name Bhagalpuri Zardalu and is despatched every summer to the President and Prime Minister of India as a symbol of the state's agricultural heritage. Mango cultivation, however, is chronically constrained by a large and diverse pest complex, of which fruit borers cause some of the most conspicuous economic loss because the damage is internal, largely invisible until the fruit is cut open or already blackened, and impossible to reverse once boring has occurred. Among these borers, the red-banded mango caterpillar, *Deanolis sublimbalis Snellen* (synonyms *Noorda albizonalis Hampson* and *Deanolis albizonalis* (Hampson), has risen sharply in status over the past two decades, moving from a minor, sporadically reported insect to one of the principal threats to mango orchards of eastern India, including West Bengal, Odisha, Andhra Pradesh and Bihar. Field and laboratory studies from Papua New Guinea first documented its life history in detail, while subsequent Indian work, much of it carried out at Bidhan Chandra Krishi Viswavidyalaya (West Bengal) and Bihar Agricultural University, Sabour, has traced its build-up, varietal preference and seasonal pattern in the

Gangetic mango belt. This review draws together that body of work with a specific focus on Bhagalpur district, where the pest now threatens the GI-protected Zardalu crop.

Taxonomic Status and Geographic Distribution

D. sublimbalis belongs to the family Crambidae (subfamily Odontinae) and was originally described by Snellen in 1899; the name Noorda albizonalis Hampson, assigned shortly afterward, was subsequently synonymised with it, so the pest continues to appear in Indian literature under either name. It is essentially monophagous, developing almost exclusively on species of the genus Mangifera, with occasional records on wild relatives such as Mangifera minor and Mangifera odorata and, in Thailand, on *Bouea burmanica*. Geographically the pest is known from South and Southeast Asia (India, Myanmar, Thailand, Indonesia, China, Brunei, the Philippines) and Papua New Guinea, and it invaded northern Australia via the Torres Strait in 1990, reaching the Australian mainland at Cape York Peninsula by 2001, from where it remains under active biosecurity surveillance because of the scale of Australia's commercial mango industry. Within India its range has historically been confined to the eastern coastal and Gangetic belt like West Bengal, Odisha, Andhra Pradesh and Bihar and it has so far not established in the major mango-growing tracts of southern, northern or western India, a pattern attributed in part to the moth's comparatively weak flight capability.

Biology and Life Cycle

Detailed rearing studies conducted at the Laloki Agricultural Research Station in Papua New Guinea remain the most complete account of the insect's biology. Eggs are laid singly, in twos, or in small clusters of up to about fifteen on the peduncle or at the base of developing fruit, tucked under sepals or into crevices of dried bark; they are ovoid, milky white at laying and turn crimson within two to three days. The incubation period ranges from 8 to 12 days. On hatching, larvae from the same cluster move together toward the fruit and collectively bore into the rind, a behaviour thought to help them overcome the copious sticky exudate that green mango produces when wounded; first-instar larvae, only about 1 mm long, survive this exudate by protruding their posterior spiracles through it until the flow subsides. Early instars feed on the flesh while later instars move into the developing seed. The larval period from hatching to the pre-pupal stage lasts 11 to 21 days, the pre-pupal to pupal stage 4 to 14 days, and the pupal stage 5 to 20 days, giving a mean egg-to-adult period of around 48 days; the insect overwinters as a pre-pupa inside a silk-and-sawdust cocoon spun on a hard surface after the larva has left the fruit. Adults are small, nocturnal moths that mate and oviposit only in darkness and, notably, are not attracted to light traps, which limits the usefulness of conventional light-trap monitoring for this species. In West Bengal, comparable studies on the closely related population (there reported as *Autocharis albizonalis)* found the first pest brood appearing in the first fortnight of March and the population persisting through to June, with infestation beginning as soon as fruit reach the pea stage and continuing until near maturity, broadly corroborating the developmental pattern recorded in Papua New Guinea.

Nature and Symptoms of Damage

Larvae attack fruit from a very early stage, in some reports as small as 10 mm in diameter, and bore in through the surface, typically from the sides or the apex of the fruit. Internally the flesh and later the kernel are tunnelled and fouled with frass, while externally sap oozes from the entry point, accumulates at the drip point of the fruit, and darkens into a conspicuous black stain that is the most reliable field symptom of attack. As feeding progresses the larvae eventually cut an exit hole to leave the fruit before pupating outside it. The wounds created by entry and exit provide ready access for secondary invaders such as fruit flies and fermentation flies, which accelerate rot, and severely infested fruit either drop prematurely or ripen with an unmarketable blackened patch. Because the larvae feed internally for almost their entire developmental period, damage is frequently undetected until the fruit is opened or has already discoloured, and no curative treatment exists once boring has taken place a feature that makes this pest disproportionately damaging relative to the modest size of the insect itself.

Host Range and Varietal Susceptibility

Cultivar-preference trials conducted in the eastern Indian mango belt consistently show wide variation in susceptibility among commercial varieties, governed largely by biophysical fruit traits. A study of twenty-three cultivars at Sabour, Bihar, found infestation ranging from 0 to about 32%, with Amrapali and Kalapady remaining free of attack while Langra suffered over 30% damage; the distance from the tip of the stone to the distal end of the fruit and the thickness of the peel emerged as the most important traits governing preference. Independent varietal trials on the related mango red-banded caterpillar in West Bengal similarly identified Himsagar, Kesar, Suvarnarekha, Amrapali and Langra as consistently more susceptible, while Neeluddin and Arka Anmol were comparatively free of damage across seasons, and a broader multi-state survey recorded damage on varieties including Banganpalli, Totapuri, Himsagar, Langra, Chausa, Amrapali, Mallika, Dashehari, Alphonso and Kesar, with infestation levels reaching as high as 42% in the worst-affected orchards. This variation underlines that varietal choice and orchard composition are themselves a lever for pest management, and that region-specific screening including of Zardalu is needed before recommending resistant cultivars for Bhagalpur.

Ecological Factors Governing Incidence

Incidence of the pest tracks closely with fruit phenology and weather. Studies on mango red-banded caterpillar in West Bengal recorded peak infestation during the pea-to-marble stage of fruit development in the last week of March through April, coinciding with maximum temperatures around 36–42 °C, wide swings in relative humidity, and negligible rainfall, after which populations declined sharply toward mid-May as temperatures rose further and humidity increased with pre-monsoon showers. Directional analysis of the same orchards found the western aspect of the canopy consistently more heavily infested than the eastern or southern sides, attributed to comparatively poorer light interception and aeration on the west, which favours egg survival and larval establishment; a similar climate-sensitivity has since been modelled at a wider scale, with temperature seasonality identified as the dominant bioclimatic variable governing the pest's potential geographic range, suggesting that its distribution in eastern India could expand further under future climate scenarios. Together these findings imply that timing of protective sprays to the pea-stage window in March–April, and closer monitoring of the western canopy, should be priorities in any local surveillance programme.

Zardalu Mango of Bhagalpur: An Economically Vulnerable GI Crop

The Zardalu (also spelt Jardalu) mango is traditionally traced to a tree planted in Bhagalpur's Tagepur village in the early nineteenth century and is grown today mainly in Bhagalpur, Banka and Munger districts of Bihar. It was granted the Geographical Indication tag in 2018 as Bhagalpuri Zardalu, a recognition that ties the variety's identity and marketability to its place of origin and that has since supported its export beyond the state, including consignments sent annually to Rashtrapati Bhavan. Because GI status depends on maintaining a consistent, high-quality, blemish-free fruit associated with the region, any pest that causes visible external damage such as the blackened, oozing entry wounds typical of red-banded mango caterpillar attack poses a disproportionate threat to the crop's premium value, not merely to its yield.

Current Status of Infestation in Bhagalpur District

Field reports collated by Bihar Agricultural University and reported in the agricultural press indicate that red-banded mango caterpillar first affected mango orchards of Bhagalpur in isolated pockets around 2014–2015 and has since intensified almost every season, spreading from a few blocks Kahalgaon and Jagdishpur were among the earliest affected to become a district-wide concern across Bhagalpur, Banka, Munger, Jamui and Shekhpura. The problem is reported to be most acute in the Nathnagar, Kharik, Sultanganj, Sabour and Bausi blocks of Bhagalpur, where it has attacked essentially all locally grown varieties, including Maldah,

Bombay, Zardalu, Gulabkhas, Phajli, Ranipasand, Shankarbhog and the desi (seedling) types collectively known as Beeju. University entomologists have estimated that up to a tenth of the seasonal mango output in the district can be lost to this pest in a bad year, and horticulture scientists at the university have noted that a defined control protocol exists but requires sustained, area-wide adoption to be effective, since the moth readily re-infests from surrounding untreated orchards.

Integrated Management Strategies

Because larvae are protected inside the fruit for almost their entire feeding period, management has to rely on measures that intercept the insect before or immediately after boring rather than after damage is visible. Cultural practices recommended in the regional and international literature include collecting and destroying fallen and black-stained fruit likely to harbour larvae, removing dead wood and loose bark in the off-season where pupae and pre-pupae shelter, and individually bagging fruit once they cross the pea stage a labour-intensive but highly effective barrier method for smaller or premium blocks such as those growing Zardalu. Chemical control, where used, needs to begin at or before fruit-set and be timed to the pea-to-marble window identified in phenological studies, since sprays applied after larvae have entered the fruit have little effect; synthetic pyrethroids such as deltamethrin and cyfluthrin and, in trials from Papua New Guinea, thiacloprid have shown acceptable efficacy, while neem-based sprays applied at ten-day intervals from flowering through about two months of fruit development have also been used to reduce pesticide load. Monitoring is complicated by the fact that adults do not respond to light traps; sex-pheromone components have been identified for the species and pheromone traps are used experimentally for detection and to time interventions, though their large-scale commercial deployment in India remains limited. Biological control options recorded elsewhere include egg parasitoids such as Trichogramma chilonis and T. chilotraeae, and integrating such natural enemies with cultural sanitation and judicious, well-timed sprays offers the most sustainable route to protecting a premium, GI-tagged crop like Zardalu, where both yield and cosmetic fruit quality determine market value.

Conclusion

Deanolis sublimbalis has progressed from a locally reported curiosity to a serious, internally feeding pest across the eastern Indian mango belt, and its recent build-up in the Nathnagar, Kharik, Sultanganj, Sabour and Bausi blocks of Bhagalpur places Bihar's GI-tagged Zardalu mango directly at risk, both in terms of yield and of the blemish-free quality on which the variety's brand and export value depend. The insect's biology internal feeding from a very young larval stage, non-response to light traps, and a fairly narrow but critical infestation window at the pea-to-marble stage of fruit development means that surveillance and intervention must be concentrated in the weeks immediately following fruit-set rather than later in the season. Coordinated, area-wide adoption of cultural sanitation, timely and correctly targeted chemical or neem-based sprays, pheromone-based monitoring, and conservation of natural egg parasitoids together offer the most realistic path to containing this pest and safeguarding the Zardalu mango economy of Bhagalpur.

References

1. Bhattacharyya, M. (2014). Impact of ecological factors on the infestation of mango red banded caterpillar. Journal of Entomology and Zoology Studies, 2(4), 68–71.
2. CABI (2021). *Deanolis albizonalis* (mango seed borer). Invasive Species Compendium. Wallingford, UK: CAB International.
3. Down To Earth (2019). Threat for Bhagalpur's mango growers: Red banded mango caterpillar. Down To Earth, 6 June 2019.
4. FreshPlaza (2019). Red banded mango caterpillar threatens Indian mango growers. FreshPlaza, 10 June 2019.

5. Nirala, K.G., & Goswami, T.N. (2019). Host preference by red banded mango caterpillar Deanolis albizonalis (Hampson). Indian Journal of Entomology, 81(4), 682–684.
6. Pacific Pests, Pathogens and Weeds (2021). Mango red-banded caterpillar (281), Fact Sheet. Lucid Central, University of Queensland, in collaboration with the Australian Centre for International Agricultural Research (ACIAR).
7. Sahoo, S.K., & Jha, S. (2009). Bio-ecology of mango fruit borer, Autocharis (=Noorda) albizonalis Hampson (Pyralidae: Lepidoptera) — a recent threat to mango growers in West Bengal, India. Acta Horticulturae, 820, 1345–1425.
8. Tenakanai, D., Dori, F., & Kurika, K. (2006). Red-banded mango caterpillar, *Deanolis sublimbalis* Snellen (Lepidoptera: Pyralidae: Odontinae), in Papua New Guinea. In T.V. Price (Ed.), Pest and Disease Incursions: Risks, Threats and Management in Papua New Guinea (pp. 161–165). Canberra: ACIAR Technical Reports No. 62.
9. The Better India (2026). Why Bihar's GI-tagged Zardalu mango is sent to the President of India every year.
10. 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.