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Incidence, survival, and biology of *Thylacoptila paurosema* (Meyrick) (*Pyralidae: Lepidoptera*) on *Senna occidentalis* in Northern India

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Abstract
Thylacoptila paurosema (Meyrick) (*Pyralidae: Lepidoptera*), commonly known as the cashew apple and nut borer, is a widely distributed pest known to infest *Anacardium occidentale* and, occasionally, *Senna occidentalis* in southern India. However, its presence and biology have not been reported from Northern India until now. This study documents the first confirmed incidence, survival, and developmental biology of *T. paurosema* on *S. occidentalis* in the National Capital Region (NCR), Delhi. Surveys conducted from May to December 2024 in South West Delhi and Gurugram revealed notable larval activity, including leaf webbing and pod boring, with estimated 4 to 5 overlapping generations. Larvae initially feed on leaflets during the vegetative phase and later on infest developing pods, resulting in up to 20% pod damage. Biological observations under controlled conditions showed that the larval stage lasted 10 to12 days, the pupal stage 5 to 6 days, and adult moths lived for 3 to 4 days. These findings highlight the pest's adaptability to alternative hosts and environmental conditions beyond its traditional range, raising potential concerns for its future spread and impact on leguminous plants in northern regions.

Keywords: *Thylacoptila paurosema, Senna occidentalis,* Cashew apple and nut borer, pod damage, biology, infestation

Introduction

Thylacoptila paurosema (Meyrick) (*Lepidoptera: Pyralidae*), commonly referred to as the cashew apple and nut borer, is distributed across India (notably South India, Odisha, Gujarat, Goa, and Tamil Nadu), Pakistan, Sri Lanka, Indonesia, Myanmar, Malaysia, Ethiopia, Ghana, Sudan, Namibia, South Africa, Madagascar, Saudi Arabia, and Yemen (Patel, H.M., *et al.,* 1991; Vanitha, K., 2015; Shetty, G.R., *et al*., 2023) [1, 5, 4]. The larvae primarily infest *Anacardium occidentale* (cashew), boring into tender apples and nuts typically at their junction and plugging entry holes with excreta. Larvae are cylindrical and green with yellow bands in early instars, turning dark pinkish and very active in later stages. They also web together young leaves and inflorescences, scraping surface tissues. Affected fruits shrivel, dry up, or fall prematurely (Reddy, B.N, *et al*., 2024; Girish, R., *et al*., 2024) [3, 1]. In South India, the pest is managed using chemical and biological control measures (Vanitha, K., 2015; Shetty, G.R., *et al*., 2023) [5, 4].

Although *T. paurosema* has been reported on *Senna occidentalis* (syn. *Cassia occidentalis* or *Cassia fistula*) in southern regions (Vanitha, K., 2015) [5], its presence and infestation patterns in Northern India remain undocumented. During entomological surveys across rural areas of Southwest Delhi and Gurugram particularly along roadsides, fallow fields, and drain catchments (Najafgarh, Dharampur, and Badshahpur), a significant prevalence of *S. occidentalis* was observed from June to November.

Senna occidentalis is a leguminous weed or medicinal shrub, occurring widely in humid tropical and subtropical regions on roadsides, arable lands, degraded pastures, open fields, and plantations. In temperate climates, it behaves as an annual and dies at the onset of winter. Its germination begins with pre-monsoon rains and plant matures by November in the National Capital Region (NCR), Delhi. Given no prior records from the region, this study presents the first report on the biology, incidence, and survival of *T. paurosema* on *S. occidentalis* in Northern India.

Materials and methods

Study Area and Observations

The investigation was carried out in the southwestern part of the NCR, covering 16 villages—eight each in South West Delhi (Raghopur, Nanak Heri, Badu Sarai, Kangan Heri, Jhatikara, Shikarpur, Rawta, and Daurala) and Gurugram (Dharampur, Daulatabad, Kharki Majra, Mankrola, Mohammad Heri, Babupur, Badhera, and Harsaru), located at 28.4972°N, 76.9867°E. Weekly surveys were conducted from May to December 2024 across two sites per village. Incidence of larval activity was assessed via leaf folds (webbing) and pod damage on *S. occidentalis* in scrub vegetation near roadsides, fallow lands, and drainage areas.

Larvae found in leaf folds and pods were recorded and used to study biological parameters, including developmental durations and dimensions. Rearing was conducted indoors under ambient conditions, with maximum temperature limited to 32°C.

Weather Data

Weather data for the study area was obtained via Apple Weather (iPhone 12 Pro) from May to December 2024, and correlated with plant phenology and pest incidence (Fig. 1).

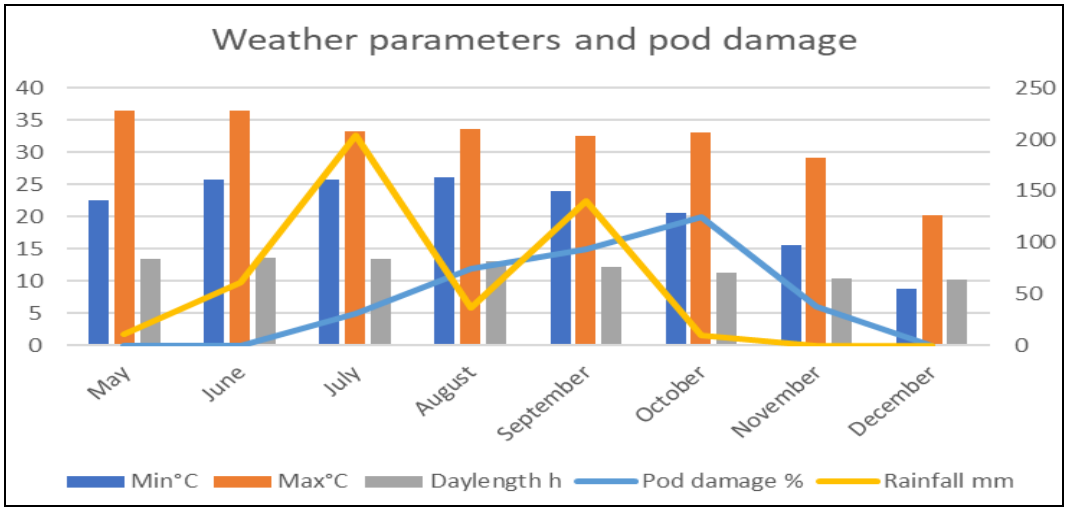
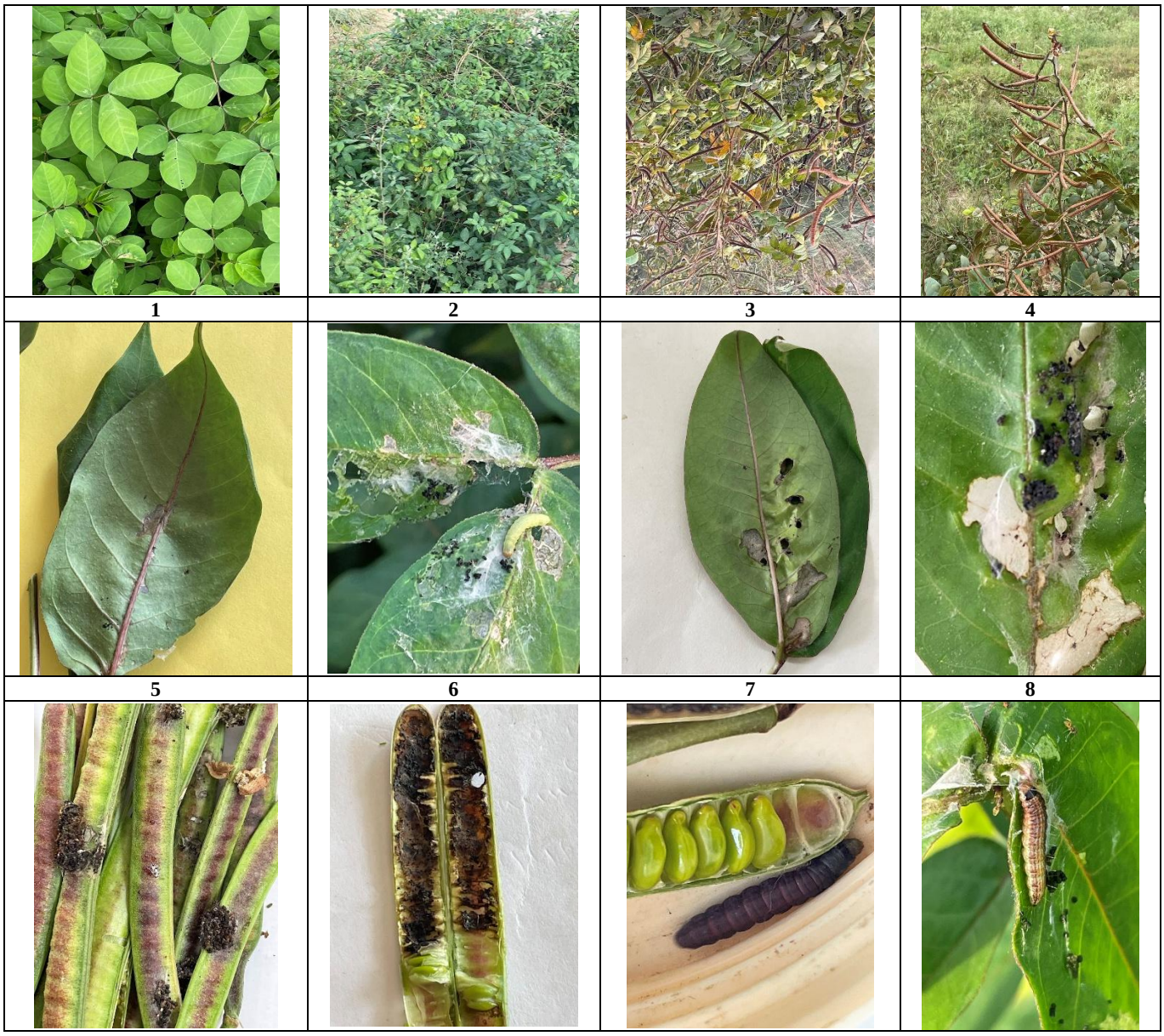


Fig 1: Weather parameters of NCR, Delhi and pod damage (%) from May to December 2024

Results and Discussion

Plant Phenology

Seedling emergence in clusters (Fig. 2, pic 1) between May 20 and June 1, 2024, from previous year's mature pods containing seeds was triggered by 10 mm of pre-monsoon rainfall. Regrowth from older plants was observed on May 31 (Fig. 2, pic 2). Flowering and pod formation occurred from mid-July to late October or early November. With the onset of winter, foliage production ceased and pods matured fully (Fig. 2, pic 3 & 4).



9	10	11	12
			
13	**14**	**15**	**16**

Fig 2: Pics 1 to 16 depict phenology of *Senna occidentalis* plant, feeding pattern and life stages of *Thylacoptila paurosema* Meyrick, leaf webber and pod borer in NCR, Delhi.

1.Young seedlings (31 May); 2. Old plants regrowth; 3. Mature plants; 4. Pod maturation; 5. Leaf folds; 6. Open folds; 7. Leaf folds; 8. Open folds; 9. Pod damage; 10. Inside pod damage; 11. Pinkish larva outside pod; 12. Light pink larva in leaf fold; 13. Pupation in excreta; 14. Pupae; 15. Female moth; 16. Male moth.

Field Incidence

From July to August, larval webbing of one or two leaf folds per five plants was recorded. No webbing was observed in June or from September to November. Each fold harboured one larva. Pod damage ranged from 5–20% from July through November, peaking in October (Fig. 1). Typically, one to two larvae were found per pod. Based on larval presence and pod damage, an estimated 4–5 overlapping generations occurred during the study period.

Biology

Before flowering, young larvae folded or webbed paired leaflets to feed on epidermal tissues, scraping the surface and leaving the papery membrane intact (Fig. 2, pic 5-8). Frass and live larvae were found inside the folds. With pod development, larvae shifted to boring into pods and feeding on seeds (Fig. 2, pic 9&10), often plugging the entry holes with frass. Multiple larvae could be found within a single pod.

Mature larvae were reddish brown with yellow and pink lines (Fig. 2, pic 11&12). Fifteen larvae collected from leaf folds in mid-June were reared on pod halves under ambient room conditions (25–33°C; 35–60% RH). Pupation occurred inside silken cocoons formed using faecal matter near exit holes (Fig. 2, pic 13). Thirteen larvae successfully pupated and emerged as moths.

Final instar larvae measured 11.5 mm in length and 4.5 mm in width. Female pupae were 10 mm long and 4.5 mm wide; males were 8.25 mm long and 4 mm wide (Fig. 2, pic 14). Adult moths measured 11.5 mm in body length with a wingspan of 20–21 mm. Forewings (9 mm) were dark brown in females, with dull black margins and brown speckles (Fig. 2, pic 15), whereas males had white to brown forewings (Fig. 2, pic 16). Hindwings (7.5 mm) were cream-colored. The larval period lasted 10–12 days, the pupal stage 5–6 days, and adult lifespan was 3–4 days.

Conclusion

The present study establishes the first verified report of *Thylacoptila paurosema* infestation on *Senna occidentalis* in Northern India, particularly in the National Capital Region. The pest exhibited clear signs of adaptation to this leguminous host, completing multiple generations and causing significant pod damage. Observations on its developmental biology under ambient conditions further confirm its ability to thrive outside its traditionally reported range. Given its expanding host range and potential to affect other legume crops, *T. paurosema* poses an emerging threat in the region. Continued monitoring and research into its ecological behavior, host preferences, and management strategies are essential to prevent further spread and to develop integrated pest management (IPM) approaches for its control in non-cashew ecosystems.

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