Pest Management in Horticultural Ecosystems
Vol. 30, No.1 pp 219-222 (2024)
DOI Number : 10.5958/0974-4541.2024.00022.8

RESEARCH NOTE

Hibiscus arnottianus (Family: Malvacea) - A new host plant record for leaf roller *Haritalodes derogata* Fabricius (Lepidoptera: Crambidae)

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ABSTRACT: This study reports on the occurrence of the leaf roller moth, *Haritalodes derogata* (Fabricius, 1775) (Lepidoptera: Crambidae: Spilomelinae) on *Hibiscus arnottianus* (Family: Malvacea) in Palar Agriculture College, Melpatti, Pernambut Road, Kothamarikuppam, Tamil Nadu, India. The research delves into biological and morphometric data related to the developmental stages of the moth.

Keywords: *Hibiscus arnottianus, Haritalodes derogata,* Palar agricultural college, metamorphic data

Hibiscus arnottianus, commonly known as Koki'oke'oke'o or Koki'oke'oke'o'ula, is an ornamental plant of Malvaceae family. This is an evergreen, either a small tree or tall shrub, unique to Oahu and occasionally cultivated. Recognized for its sizable, aromatic, funnel-shaped flowers with five spreading elliptical white petals, the plant reaches a height of 10–30 ft (3–9 m), featuring multiple trunks and a dense, sometimes hairy, crown. Indigenous to Oahu and Wailau Valley, Molokai, the species flourishes in wet forests at elevations ranging from 1000 to 3000 ft (305–914 m). Previously abundant in mountainous areas near Honolulu, it serves as a prime example of localized endemism within the Hawaiian archipelago (Little, 1989). The study conducted by Manjula *et al.* (2020) in Karnataka sheds light on the complex insect interactions affecting *H. rosa-sinensis*. The plant contends with a total of 20 insect species across Hemiptera, Lepidoptera, and Coleoptera orders, featuring both defoliators and sap suckers. Notably, the sucking pests are dominated by coccids, with seven distinct species representing Pseudococcidae, Coccidae, Cerococcidae, and Monophlebidae families. Regarding the *Hibiscus* genus, the prevalence of sap-sucking pests, such as aphids, mealy bugs, and scales, surpasses that of defoliators. Notably, the current investigation serves as a novel contribution to this aspect of *Hibiscus* ecology. The study is founded on meticulous field collections and laboratory observations conducted by the primary author within the *H. arnottianus.*

In a recent survey conducted in November 2023 at Palar Agriculture College, Melpatti, Pernambut Road, Kothamarikuppam, Tamil Nadu an observation was made regarding the severe infestation of *H. arnottianus* (Fig. 1, 2, and 3), commonly known as *Vellaisembaruthi* in Tamil, within the Garden land area (GPS coordinates 12.8818° N, 78.7768° E, altitude). The affected plants exhibited visible leaf folding, indicative of infestation by lepidopteran larvae. Subsequently, these caterpillars were systematically collected and reared on their host plant within an insect rearing cage under controlled laboratory conditions, maintaining a temperature range of 25-31^{o}C and RH 60-75%. Larvae in various instars were gathered and provided with *H. arnottianus* leaves until the pupation stage. The emerged pupae were then allowed to develop into adults, and their identification was performed at the adult stage. Throughout this process, the duration and dimensions of each stage in the life cycle of the leaf folder were meticulously recorded, contributing to a comprehensive understanding of the species' developmental dynamics and impact on the host plant.

The findings indicate a notable infestation of *H. arnottianus* by the leaf folder known as *Haritalodes derogata* (Fabricius,1775) (Lepidoptera: Crambidae: Spilomelinae), with sporadic instances. This identification is consistent with the detailed description provided by Hosseini Tabesh *et al.* (2015). Regarding the genus *Haritalodes* Warren, 1890, which falls under the subfamily Spilomelinae and is one of the 322 known genera, it encompasses eleven identified species distributed in the Oriental, Palaearctic, Australian, and Afro-Tropical regions, as outlined in the work of Nuss *et al.* (2014). The pest occurs in India, Pakistan, Bangladesh, Burma, Australia, Africa, China, Japan, Sri Lanka and other parts of the world. The pest is active from the month of September to November (Mariselvi

and Manimegalai, 2016). Afrotropical (Africa, Sub-Saharan, Madagascar, Comoros, Seychelles, Reunion Island), Australian (Papua New Guinea, Australia, Samoa), Eastern Palaearctic (Japan, Philippines, Korea, Taiwan, China, Southeast Asia, Pakistan), Oriental (Nepal, Java, India, Burma, Bangladesh, Thailand, Malaysia, Indonesia, Guam, Singapore, Solomon Island, Andaman Island, Nicobar Island, Sri Lanka, Vietnam, Pakistan) (Leraut, 2005; Yamanaka, 2008; Robinson *et al.,* 2010).

Nature of infestation

The larva exhibits characteristic leaf-rolling behavior during its early stages, consuming green tissue initially and progressively devouring a substantial portion of the leaf as it matures (see Fig. 1 and 2). Remarkably, flowering is relatively unaffected by this pest, as illustrated in Fig. 3. Observable symptoms of larval infection include the formation of webs and leaf withering.The larval feeding process results in complete leaf consumption or the development of prominent holes. Subsequently, the affected leaves transition to a brown color before ultimately dropping from the plant. Severe infestations, denoted by a high number of leaf rolls, lead to stunted plant growth.Caterpillars employ silk spun by the spinnerets near their mouths to roll up leaves from the sides and secure the roll. Scrapping by larval instars is particularly intense during the first three stages (characterized by a transparent light green to yellow color). The presence of fecal pellets inside the leaf, which are subsequently dropped below the plant, indicates larval activity.In the fourth and fifth instars (displaying light pink to dark red coloration), feeding substantially diminishes. Larvae in these stages cease feeding altogether, constructing a new leaf folded completely with silken threads, in which they pupate without exposure to sunlight. This behavior signifies a crucial phase in the pest's life cycle.

Hosts

Several host plants of ten different families are known for *Haritalodes derogata* of which the most important ones belong to the family Malvaceae (*Abelmoschus esculentus, Abutilon sp., Alcea sp., Alcea rosea, Althaea sp., Althaea rosea, Gossypioideskirkii, Gossypium sp., G. barbadense, G. herbaceum, Hibiscus sp., H. cannabinus, H. mutabilis, H. parviformis, H. rosa-sinensis, H. sabdariffa, H. tiliaceus, Kydiacalycina, Sida sp., S. cordifolia, S. orientalis, Thespesia danis, T. lampas, T. populnea, Urena sp., U. lobata*) (Robinson *et al.,* 2010), *Hibiscus syriacus* L. and *Hibiscus mutabilis*L., (***Hosseini Tabesh et al., 2015).*** Our present report is a new addition of Host plant *H. arnottianus* for *H. derogata.*

Fig 1. Infestation of leaf roller

Fig.2. Larvae of leaf roller H. derogata

Fig. 3. Obtect pupa

Developmental stages

The antepenultimate larval stage ranges from 100-180 mm in length (mean ± SE: 12.3±0.68 mm) and 18-68 mg in weight (39±4.07 mg). Transitioning to the penultimate larval phase, lengths fluctuate between 20-24 mm (22.00±0.37 mm), and weights range from 90-124 mg (94.2±6.13 mg). In the ultimate larval stage, lengths extend to 25-30 mm (25.4±0.22 mm), with weights ranging from 130-220 mg (175.7±3.93 mg) (Fig. 4 and 5). The larva has been described detail by Atulukwu (2021). According to Anoike (1978) larvae of *Syleptaderogata* [*Sylleptederogata*], a pest of okra in Nigeria, underwent 5 or 6 instars when instars when reared singly in the laboratory; the life cycle was completed in 33.9+or-0.5 days.

Fig. 4. Female adult

The prepupal stage (Fig. 6) features lengths varying from 16-22 mm (18.5±0.69 mm) and weights spanning 60-90 mg (69.7±4.62 mg). The subsequent pupal stage presents lengths of 13-18 mm (14.40±0.60 mm) and weights ranging from 40-55 mg (46.1±1.27 mg). Pupae adopt an obtect form, exhibiting a distinctive chocolate brown hue and were found to exist 8-11 days. Mariselvi and Manimegalai (2016) reported that the period of pupation is about 6-12 days. Roychoudhury *et al.* (2017) have also reported of this species 7-10 days. Finally, the adult stage (Fig. 7) emerges with a length range of 25-32 mm (27.2±0.42 mm). These moths are light yellowish in color and have black and brown spots on their head, body, and abdomen. What makes them distinct is the presence of dark brown wavy lines on their wings, giving them a unique and eye-catching appearance. The diagnostic features of moth of this species have been described by Roychoudhury *et al.* (2017); Atulukwu (2021) and Mariselvi and Manimegalai (2016).

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to Dr. H. Sankararaman, Assistant Professor in the Department of Agricultural Entomology at Vanavarayar Institute of Agriculture, Pollachi, Coimbatore. His invaluable assistance and expertise in insect identification played a crucial role in the successful completion of this study. I am truly thankful for his guidance and support throughout the research process.

REFERENCES

Anioke, S. C. 1989. The biology of *Sylepta derogata* Fabricius (Pyralidae), a lepidopterous pest of okra in Eastern Nigeria. *International Journal of Pest Management,* **35**(1): 78-82.

Atuluku, S. I. 2021. Management of leaf roller *Sylepta derogata* Fab. (Lepidoptera: Pyralidae) on some

Table 1. Morphometrics of *H. derogate* developed on *H. arnottianus* in laboratory

Stage	Length(mm)		Weight (mg)	
	Range	Mean ± SE	Range	Mean ± SE
Larva				
Antepenultimate	10-18	12.3± 0.68	18-68	39± 4.07
Penultimate	20-24	22.00± 0.37	90-124	94.2± 6.13
Ultimate *	25-30	25.4± 0.22	130-220	175.7± 3.93
Prepupa	16-22	18.5±0.69	60-90	69.7±4.62
Pupa	13-18	14.40±0.60	40-55	46.1±1.27
Adult **	25-32	27.2±0.42	-	-

*Full grown ** Wing expanse of dry specimen. Data based on 10 observations

okra varieties in Samaru and Kadawa, Nigeria. *Postgraduate thesis, Ahmadu Bello University*, Zaria, Nigeria.

Hosseini Tabesh, B., Alipanah, H., &Sahragard, A. 2015. First record of *Haritalodes derogata* (Fabricius) (Lepidoptera: Crambidae: Spilomelinae) from Iran. *Journal of Crop Protection,* **4**(2): 167-171.

Leraut, P. 2005. Contribution à lettuce des generes *Pyralis* Linnaeus, *Pleuroptya* Meyrick *Haritalodes* Warren [Lepidoptera, Pyraloidea]. *Revue Française d'Entomologie (N. S.),* **27**(2): 77-94.

Little, E. L. 1989. *Common Forest Trees of Hawaii: Native and Introduced (Vol. 679)*. US Department of Agriculture, Forest Service.

Manjula, K. N., Renuka, S., Rishi, R. R. and Sundararaj, R. 2020. Insects infesting *Hibiscus rosa-sinensis* Linn. in Karnataka, India. *Entomon,* **45**(3): 231-236.

Mariselvi, S. and Manimegalai, K. 2016. Biochemical studies of cotton pest *Sylepta derogata* Fab. by Econeem, *Acorus calamus*, and *Piper longum* extracts. *International Journal of Scientific and Research Publications,* **6**(1): 388-402.

Nuss, M., Landry, B., Vegliante, F., Tränkner, A., Mally, R., Hayden, J., Bauer, F., Segerer, A., Li, H., Schouten, R., Solis, M. A., Trofimova, T., De Prins, J., and Speidel, W. 2014. Global Information System on Pyraloidea. Retrieved from www.pyraloidea.org

Robinson, G. S., Ackery, P. R., Kitching, I. J., Beccaloni G. W. and Hernandez, L. M. 2010. HOSTS-A Database of the World's Lepidopteran Hostplants. Natural History Museum, London. Retrieved from http://www.nhm.ac.uk/hosts

Roychoudhury, N., Meshram, P., Pandey, A. and Prajapati, N. 2017. *Hibiscus tiliaceus* Linn. (family Malvaceae)–a new host plant. *Indian Journal of Forest,* **40**: 151-154.

Yamanaka, H. 2008. Revisional study of some species of the genus *Haritalodes* Warren (Pyralidae, Pyraustinae) from Eastern Palaearctic and Oriental Regions. *Tinea,* **20**(4): 243-252.

MS Received: 01 March 2024
MS Accepted: 28 April 2024