Research Article

First Record of *Trilocha varians* (Bombycidae: Lepidoptera) from Pakistan

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Abstract | The infestation of *Trilocha varians* was seen on weeping fig (*Ficus benjamina*) for the first time from Pakistan in 2018. The immature stages of pest were found on these ornamental bushes, collected from the infested plants grown in lawns of Muhammad Nawaz Shareef University of Agriculture, Multan, Pakistan, and were brought to the lab for rearing and identification. After emergence of moths, specimens were killed and identified using available taxonomic keys under stereomicroscope. After identification, it was revealed that the insect under study was identified as *T. varians*. After going through the relevant literature, it was found that this species had not been reported so far from Pakistan. Therefore, the detail description is being presented here for futuristic references.

Received | January 12, 2023; **Accepted** | February 20, 2023; **Published** | March 13, 2023
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Citation | Ramzan, M., U.N. Ullah, S. Saba, M.M. Khan, U. Faheem, A. Rehman, N.A. Maan and W. Hassan. 2023. First record of *Trilocha varians* (Bombycidae: Lepidoptera) from Pakistan. *Journal of Innovative Sciences,* 9(1): 61-64.
DOI | https://dx.doi.org/10.17582/journal.jis/2023/9.1.61.64
Keywords | *Ficus benjamina*, Weeping fig, Taxonomy, Multan, Punjab, Pakistan

1. Introduction

Ficus benjamina belongs to family Moraceae. It is medium to large perennial plant with 10-20 m height (Chuenban *et al.*, 2017). It has spread in several countries like Southeast Asia and India (Zolotuhin and Witt, 2009). It is distributed in Sri Lanka, Java, China, Borneo, Sumatra, Taiwan, Japan, Hong Kang, Philippines, Sulawesi (Kishida, 2002), including Pakistan. It is commonly cultivated as decorative ornamental plant in parks, lawns, houses and also alongside the road in throughout the world, including Pakistan. Besides its ornamental importance, its various parts like leaves are used for diseases treatment and numerous infections (Sirisha *et al.*, 2010) and known to be efficient for the removal of formaldehyde and Carbon Monoxide gases (Kim *et al.*, 2008; Mousa *et al.*, 1994; Lansky *et al.*, 2008).

Among many other pests of *Ficus*, the larvae of *T.*

varians, attack on various parts (Daimon *et al*., 2012) of fig. Severe attack of the pest leads up to 100% defoliation of the plant ultimately plant dies as shown in Figure 2. The larvae of *T. varians* attacked on the jackfruit and white irregular patches produce after feeding the early instar. The reproductive potential of jackfruit is reduced due to high infestation of *T. varians.* The pest reduced the medicinal value of *Ficus* spp. like jackfruit and fig Navasero *et al*. (2013).

This insect pest belongs to family Bombycidae and order Lepidoptera. The genus *Trilocha* belongs to subfamily Bombycinae (Lamaire and Minet, 1998), and is closely resembled with *Bombyx mori*. The pest had been reported the pest of economically important *Ficus* spp. like *F. annulata, F. microcarpa, F. altissima* and *F. benjamina*, belong to moraceae family from many foreign countries like South China, Thailand, Japan, Taiwan, India, Philippines, Sumatra, Nepal, Myanmar and Java (Zolotuhin and Witt, 2009; Kishida, 2002; Huang *et al*., 2002). The various studied had been proved that pest reduced the aesthetic value of ornamental plants.

T. varians had not been reported not only from Multan but also from Pakistan. Only one report was found on Internet (http://v3.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxid=192954) in which only genus name (*Trilocha*) was mentioned in relation of Pakistan but nothing was given about location, collected material, habitats, host plants and detail of morphology and other information. From the same, it was evidenced that the information given in the source was presented without scientific support and the species was never reported from Pakistan.

Based upon above mentioned facts, the current manuscript is being written so that authentic information can be presented about the notorious lepidopteran pest of ornamental plants for ready reference to be used in futuristic studies.

2. Materials and Methods

2.1 Collection and rearing

The all-immature stages (eggs, larvae and pupae) of *T. varians* were collected from the plants of *F. benjamina* at Muhammad Nawaz Shareef University of Agriculture, Multan (MNS-UAM) Pakistan from the months of November 2018 through February 2019. The coordinates of the samples sites are 30.1273° N, 71.4350° E. The specimens were carried to the Ecology Lab for rearing and identification. The collected specimens were reared on their natural diet *i.e.,* leaves of *F. benjamina.* The larvae were kept in plastic jars till the pupation occurs. After the adult emergence, adults were shifted into plastic containers.

2.2 Identification

After emergence of adults, the specimens were killed with the killing bottle containing ethyl acetate and pinned. The specimens were identified by using the morphological keys under the microscope (Hampson, 1894; Wange *et al*., 2015) as shown in Figure 1.

3. Results and Discussion

The adult moths emerged from rearing pupae in the lab, identified as *Trilocha varians* Walker 1855. Although, it was reported from Indian subcontinent in nineteenth century by Hampson (1894) but he did not mention exact location or habitat for its existence. Later, it was reported from many eastern and south-east Asian countries like the, Japan (Kishida, 2002), The Philippines (Navasero *et al*., 2013) and India (Kedar *et al*., 2014).

The taxonomical hierarchy of the insect is given below:

- Phylum: Arthropoda
- Class: Insecta
- Order: Lepidoptera
- Family: Bombycidae
- Subfamily: Bombycinae
- Genus: *Trilocha* (Walker 1855)
- Species: *varians* (Walker 1855)
- Scientific name: *Trilocha varians* (Walker, 1855)

3.1 Synonymy

Synonymy of genus *Trilocha* as given by Hampson (1894):

- *Ocinara*, Walker. Cat. vii, p. 1768 (1856).
- *Naprepa*, Walker. Cat. v, p. 1152 (1855), nom. praeocc.
- *Trilocha*, Moore, Cat. Lep. E. I. C. p. 382 (1857).
- *Ernolatia*, Walker. Journ. Linn. Soc. vi, p. 131 (1862).
- *Chazena*, Walker. Char, undescr. Het. p. 21 (1869).
- Synonymy of genus *Trilocha* as given by Hampson (1892):
- *Ocinara varians*, Walker, Cat. V, p. 1153; Moore, Lep. Ceyl. ii, pl. 133, figs. 1, 1a, lb (larva).

- *Naprepa albicollis*, Walker, Journ. Linn. Soc. vi, p. 171; C. 4"/S. no. 1091.
- *Naprepa cervina*, Walker, Cat. xxxii, p. 489; C. & S. no. 1092.
- *Chazena velata*, Walker, Char, undescr. Het. p. 21.

Figure 1: Different stages of *T. varians*.

3.2 External morphology

Morphological characters are summarized as below: Eggs: cake shape and flat. Larva: Body length of larval instar 1 – 5 is 2.07 ± 0.44, 4.02 ± 0.52, 8.63 ± 1.40, 13.18 ± 2.15, 22.27 ± 5.17mm, respectively. Average width of head capsule of 1-5 larval instars is 0.29 ±0.01, 0.45 ± 0.06, 0.92 ± 0.09, 1.50. ± 0.32, 2.07 ± 0.07 mm, respectively. 5 pairs of abdominal legs. A caudal present on dorsum of 8th abdominal segment which has two parts; the proximal and terminal. Proximal part is large and dark brown while terminal is short, retractable and white in color. Pupa: Width of male cocoon is 4.78 ± 0.54 mm and length are 9.93 ± 1.01mm while 5.58 ±0.64 mm wide and 11.62 ± 0.88 mm long in female. Adult: The body parts such as head, abdomen, and thorax of pest are pale/dark red-brown in colour. Forewings pale reddish brown/ greyish with pale hind wings. Outer margin of forewing with dark patch below the apex.

Figure 2: Damage of *T. varians* on *Ficus* spp.

Conclusions and Recommendations

It is new pest and first record in Pakistan. Further studies are required such as biology, morphology, host plants and management strategies using integrated pest management especially biological control.

Acknowledgement

Authors are extremely appreciative to IP^2, MNS-University of Agriculture, Multan for providing facilities for this study and suitable environment for writing this paper.

Novelty Statement

It is new pest of ornamental plants and first record from Pakistan. It is new emerging pest of various other ornamental plants especially Ficus species.

Author's Contribution

MR: Performed the experiment and wrote the article after analyzed the data. UNU: Supervised the study. SS, MMK, UF, AUR, NAM and WH critically reviewed the manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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