

Bombycid Species, *Trilocho Varians* (Lepidoptera: Bombycidae) an Emerging Insect Pest of Ornamental Plants in Pakistan

Muhammad Mansoor

*Plant Sciences Division, Pakistan Agricultural Research Council, Islamabad-44000 Pakistan.,
joyadkpk@googlemail.com*

Waheed Ahmad

Department of Entomology, University of Swabi Khyber Pakhtunkhwa, Pakistan.

Roshan Zada

Landrange resource Institute, National Agricultural Research Centre, Islamabad, Pakistan.

Hafiz Muhammad Faisal Ayub

Research Officer (Entomology), Agricultural Research Station Swabi, Khyber Pakhtunkhwa, Pakistan.

Imtiaz Khan

PARC Adaptive Research Cum Demonstration Institute Miranshah- 28190-Pakistan

See next page for additional authors

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Recommended Citation

Mansoor, M., Ahmad, W., Zada, R., Faisal Ayub, H., Khan, I., Israr, M., Rasool, A., & Khan, M. (2022). Bombycid Species, *Trilocho Varians* (Lepidoptera: Bombycidae) an Emerging Insect Pest of Ornamental Plants in Pakistan, *Journal of Bioresource Management*, 9 (1).

ISSN: 2309-3854 online

(Received: Jun 9, 2021; Accepted: Jun 23, 2021; Published: Mar 24, 2022)

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Cover Page Footnote

Thanks to Concern Institutes.

Authors

Muhammad Mansoor, Waheed Ahmad, Roshan Zada, Hafiz Muhammad Faisal Ayub, Imtiaz Khan, Musaddiq Israr, Awais Rasool, and Muhammad Shehzad Khan

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BOMBYCID SPECIES, *TRILOCHA VARIANS* (LEPIDOPTERA: BOMBYCIDAE) AN EMERGING INSECT PEST OF ORNAMENTAL PLANTS IN PAKISTAN

MUHAMMAD MANSOOR^{1*}, WAHEED AHMAD², ROSHAN ZADA³, HAFIZ MUHAMMAD FAISAL AYUB⁴, IMTIAZ KHAN⁵, MUSADDIQ ISRAR⁶, AWAIS RASOOL⁷, AND MUHAMMAD SHEHZAD KHAN⁸

¹Plant Sciences Division, Pakistan Agricultural Research Council, Islamabad-44000 Pakistan.

²Department of Entomology, University of Swabi Khyber Pakhtunkhwa, Pakistan.

³Landrange resource Institute, National Agricultural Research Centre, Islamabad, Pakistan.

⁴Research Officer (Entomology), Agricultural Research Station Swabi, Khyber Pakhtunkhwa, Pakistan.

⁵PARC Adaptive Research Cum Demonstration Institute Miranshah- 28190-Pakistan.

⁶Department of Entomology, Abdul Wali Khan University, Mardan, Pakistan.

⁷Integrated Pest Management Program, National Agricultural Research Centre, Islamabad, Pakistan.

⁸Department of Plant Protection, The University of Agriculture, Peshawar-25130-Pakistan

Corresponding author's email: joyadkpk@googlemail.com

ABSTRACT

Weeping fig, *Ficus benjamina*, belongs to Moraceae family is planted alongside the roads as decorative plant and landscape purposes. Fig plants were seen infested with *Trilocha varians* for three years ago in University of Agriculture Faisalabad, Punjab Pakistan. The complete defoliation, even death of whole plant was observed caused by larvae. The complete metamorphosis was recorded with five larval instars. The fecundity of female was recorded very high (180-300) during its whole life period. The results showed that male was long lived than female. Further studies on current pest biology, host range, biological fauna and management associated with it are necessary to avoid future outbreak in Pakistan.

Keywords: Bombycid moth, emerging pest, weeping fig, defoliation, Pakistan.

INTRODUCTION

Weeping fig (*Ficus benjamina*) planted alongside the roads and inside the offices or homes to increase their beauty level, especially grown in tropical and subtropical environmental conditions. These are about 60 feet evergreen ornamental plants with broadleaves and show tolerance at harsh climatic conditions (temperature). The vegetative as well as reproductive parts of *F. benjamina* are not only used as medicine in the treatment of cancer and ulcer but also act as antioxidant (Sirisha et al., 2010) having fungal and antifungal characters (Mousa et al., 1994; Lansky et al., 2008). *F. benjamina* is used to improve the air quality by removing the toxic substances such as benzene,

trichloroethylene and formaldehyde (Kim et al., 2008).

Various insect pests are attacking on this plant which stop the photosynthetic system of plants (Walton and Pringle, 2004; Avery et al., 2011). Plants grow poorly or even death occurs due to disturbance in process of photosynthesis. Among insect pests a lepidopteran caterpillar, closely resembled to silkworm (*Bombyx mori*) had observed two years ago on *Ficus* species (*F. religiosa*, *F. benghalensis*, *F. infectoria* and *F. elastica*) especially *F. benjamina* in and around the University of Agriculture, Faisalabad, Punjab Pakistan but no importance had given to this pest. The later instars of pest cause complete (100 %) defoliation (Kedar et al., 2014). It has been widely distributed and reported by various researchers from many countries like India (Kedar et al.,

2014; Udayagiri, 1988; Rajavel & Shanthi, 2007; Singh and Brar 2016), Nepal, Thailand, China, Taiwan, Java (Zolotuhin and Witt, 2009) and Philipines (Navasero et al., 2013).

Now it is widely spreading to other ornamental plants such as fig in many areas of Pakistan. The pest can well survive and adopt various plants as host due to quick dispersal, high fertility, fecundity and flight (Aziz et al., 2013). By keeping in mind, the above-mentioned parameters, current pest can become the primary pest of various crops as well as fruits in Pakistan. The status of this pest as primary pest can judge by observing its feeding behaviour and larval instars. There is need to apply different management strategies such as biological, chemical and botanicals against this pest in the country. Before adopting any best strategy to control this pest, the proper information about its biology is very important. The purpose of the current study was to identify, highlight the economic importance of this emerging pest, discuss its biology and give the suggestions for proper pest control.

MATERIALS AND METHODS

Surrounding of study site has rich flora of various ornamental plants such as Shahtoot (*Morus alba*), roses, amla (*Phyllanthus emblica*), figs (*F. benjamina*), marigold (*Calendula officinalis*) etc. *F. benjamina* were planted for landscape and decoration purposes. Different larval instars of *T. varians* were collected from infested leaves of *F. benjamina* planted in and around the University and mass cultured under laboratory conditions ($26 \pm 2^\circ\text{C}$, $65 \pm 5\%$ temperature, relative humidity (RH) and 14:10 photoperiod) to determine the biology on *F. benjamina*. All hygienic conditions were followed such as alteration of foods/leaves and keeping all stages separate to each other in different rearing tools like plastic containers during the whole study period (August 2019-

January 2020). The stages of insect pest (egg, larva, pupa and adult) were identified by use of keys (Wange et al., 2015). The biological parameters of moth were also recorded on *F. benjamina* by using 15 replications. The cannibalism process was also observed by keeping five larvae in one plastic container with sufficient food (leaves) and data was recorded at 48 hours. The recorded data were statistically analyzed.

RESULTS AND DISCUSSION

T. varians has more than one host such as *F. annulata*, *F. carica*, *F. altissima*, *F. benjamina* and *F. microcarpa* belonging to family Moraceae. Weeping fig, *F. benjamina* was recorded the most preferable host for growth and development of pest larvae (Arya, 2020).

The current pest has been observed and reported on *Ficus* species from many countries including India, Nepal, China, Java, Thailand, Taiwan, Myanmar, Japan, the Philippines and Sumatra (Zolotuhin and Witt, 2009; Kishida, 2002; Huang et al. 2002). Jackfruit (*Artocarpus heterophyllus*), commonly known as jack tree belong to moraceae family and has reported the suitable host for pest growth and development (Kedar et al., 2014). Jackfruit, *Artocarpus heterophyllus*, *A. communis* and *A. kamansi* had also reported the most suitable host plants of pest in India (Arya, 2020). The beauty of ornamental plants can destroy due to attack of this pest which ultimately reduces the aesthetic value.

Many researchers had reported 100 % defoliation cause by later instars (Basari et al., 2019), is line with current study visual observations. Five larval instars were recorded and later instars (4th and 5th) were found more destructive. They feed vigorously on many leaves due to their high capacity of feeding and size. The later instars can require high food as compared to early instars (1st-3rd) (Zhang et al., 2015; Ramzan et al., 2019).

Early laid eggs were whitish in colour and change into blackish whitish before hatching. Eggs are laid in layers on the dorsal side of leaves. The embryonic period was 3-9 days depending upon environmental condition. It has been reported that incubation period reduced during high temperature while enhance at low temperature or during winter seasons (Navasero and Navasero, 2014). The time duration of 1st, 2nd, 3rd, 4th and 5th larval instar were 2.01 ± 1.01 , 2.32 ± 0.32 , 3.45 ± 0.33 , 3.99 ± 1.53 and 6.89 ± 1.85 days,

respectively. The current study findings are similar with early researchers, they had reported the almost similar durations of each larval instar (Daimon et al., 2012; Singh and Brar, 2016). During the study, a long caudal horn was observed in the eighth abdominal segment of larvae. The body length of first, second, third, fourth and fifth larval instar was 2.11 ± 0.23 , 3.91 ± 0.43 , 5.75 ± 1.12 , 12.54 ± 2.78 and 21.13 ± 4.85 mm, respectively (Table 2).

Table 1: Parameters of Bombycid moth, *Trilochoa varians* an emerging insect pest on leaves of *Ficus benjamina* under laboratory conditions.

Parameters	Mean \pm SE*	Range (days)
Incubation/embryonic period	4.91 ± 1.11	3-9
First larval instar	2.01 ± 1.01	2-3
Second larval instar	2.32 ± 0.32	1-4
Third larval instar	3.45 ± 0.33	2-4
Fourth larval instar	3.99 ± 1.53	3-6
Fifth larval instar	6.89 ± 1.85	4-9
Total larval period	16.67 ± 4.71	16-23
Total pupal period	9.03 ± 5.02	10-19
Male longevity	12.0 ± 3.45	5-14
Female longevity	8.57 ± 1.96	6-9
Fecundity	220.23 ± 41.00	180-300
Total life cycle	29.24 ± 2.34	28-31

*Value of mean of 15 replicates \pm SE

Table 2: Body and caudal horn length of larval instars (1st-5th) of *T. varians*.

Instars	Body length (mm)	Caudal length (mm)
	Mean \pm SE* (Range)	Mean \pm SE* (Range)
First	2.11 ± 0.23 (1.01-2.19)	0.40 ± 0.3 (0.39-0.34)
Second	3.91 ± 0.43 (2.10-3.11)	1.10 ± 0.2 (0.19-1.33)
Third	5.75 ± 1.12 (4.06-8.99)	2.30 ± 0.1 (2.16-2.01)
Fourth	12.54 ± 2.78 (9.21-14.34)	2.91 ± 0.1 (1.67-2.03)
Fifth	21.13 ± 4.85 (11.00-25.26)	3.93 ± 0.0 (2.00-1.44)

*Value of mean of 40 replicates \pm SE

The pupation occurs in whitish silken cocoon and size of cocoon can varies with feeding capacity and host plants. The size of cocoon can remain small if pest cannot feed properly due to non-suitability of host plants in specific area or lack of sufficient nutrients in

available hosts that need for pest growth and development. Males were long lived than females. The short life span of female than male may be due to the utilization of energy by female during reproduction. It was observed that mated female was died early than unmated. The lack of sufficient energy or protein utilized during egg

production can become the cause of female death. The significance difference was recorded between male and female cocoon and wing span. Ramzan et al., (2020a, b), Basari et al., (2019) Singh and Brar (2016); Kedar et al., (2014); Navasero et al., (2013) and Rajavel and Shanthi (2007) had concluded the similar results about cocoon and wing span. The proper management practices to control this pest should be adopted such as cultural and chemicals etc. (Ramzan et al., 2021).

CONCLUSION

The current pest can become risk for other ornamental plants and horticultural crops. It can cause 100 % plant defoliation and even death of complete plant. Further studies such as biological and toxicological are needed to control this emerging pest. The control measures should be adopted at small as well as large scale against this pest throughout the country especially in study area or hot spot.

AUTHOR'S CONTRIBUTION

MM has conceived the idea. MM and RZ conducted the research. WA and H M F collected data of different parameters. IK and MI have formatted the article. Statistical data interpretation was performed by AR and MSK. MM has reviewed the whole article and submitted.

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