

HOST PREFERENCE OF TRILOCHA VARIANS (LEPIDOPTERA: BOMBYCIDAE)

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ABSTRACT

Leaf eating caterpillar *Trilocha varians* (Lepidoptera: Bombycidae) is a serious pest of *Ficus* spp. (*Ficus benghalensis, F. infectoria, F. benjamina, F. religiosa, F. elastica*). Larvae of *T. varians* feed on all parts of plants (leaves, twigs, branches) which ultimately caused 80-90% defoliation and even death of plant. Current study was conducted to check the most preferable host plant for this pest. Results showed that *F. benjamina* and *F. virens* hosts while *Morus alba* and *Ficus elastica* were not fed by larvae. Total development period from egg to male on *F. benjamina* took ($25.99\pm 1.12d$) days followed by *F. virens* ($27.33\pm 1.21d$) *and F. religiosa* ($19.91\pm 1.11d$). While developmental period from egg to female adult was on *F. benjamina* ($29.78\pm 1.99d$) followed by *F. virens* ($30.88\pm 1.67d$) *and F. religiosa* ($21.78\pm 1.60d$).

Key words: Bomycid moth, Lepidoptera, *Trilocha varians*, *Ficus virens*, *Ficus benjamina*, *Ficus religiosa*, *Ficus elastic*, weeping fig, ornamental plants, Pakistan

Figs belong to order Rosales and family Moraceae is commonly known as weeping fig. These fig plants are planted alongside the road to increase the beauty of the country. These 60 ft tall trees not only planted as decorative ornamental plants but also used to removed toxic gases from the environment such as formaldehyde (Kumar et al., 2012). These evergreen broadleaves plants are used to treat ulcer and cancer. The fig tree has a profound cultural impact through several religious traditions, including Islam, Buddhism, Jainism, and Hinduism (Udayagiri, 1988). Many insect pests such as whitefly, mealy bug (Ramzan et al., 2021a), thrips and leaf eating caterpillar, Trilocha varians are attacking the plants, but among them, T. varians (Lepidoptera: Bombycidae) is most damaging pest of Ficus spp. such as F. benjamina, F. elastica, F. religiosa and F. bengalensis etc. (Kedar et al., 2014; Naeem-Ullah et al., 2020). This lepidopteran pest has spread to many regions of the world especially India, Philipines, China, Pakistan, Malaysia (Navasero et al., 2014; Kedar et al., 2014; Singh and Brar, 2016; Basari et al., 2019; Ramzan et al., 2019). It has reported that early and later larval instars of T. varians attacked on whole parts of plant which caused 100% defoliation. This emerging pest is invading other *Ficus* spp. and many other ornamental plants. It is very important to get information about its host preference and hence this study.

MATERIALS AND METHODS

The present study was carried out in 2018-2020 at the MNS-University of Agriculture Multan. The insect collection was carried out from infested plants (F. benjamina) from different parks of Southern Punjab. The larvae were collected from infested plants (F. benjamina) for rearing and culture was maintained $(27\pm 3^{\circ}C)$ and relative humidity (RH) (65± 5%). For rearing purpose, 15 larvae were placed in single plastic container with camel hair brush and fresh leaves of F. benjamina were placed on containers for larval feeding on daily basis. The muslin cloth was placed on the mouth of each container and held tightly with rubber band. Fully grown larvae were kept separate in the glass bottle (15 cm height, 7 cm dia) for pupation. After emergence of adults, a pair of adults was kept in separate rearing cages to build up the culture and folded paper sheet placed for oviposition. After oviposition, paper strips containing eggs were cut with scissors and placed in petri dishes. After hatching, individual larva was placed individually in single petri dish. The culture was maintained for seven generations using the same procedure. Biological parameters such as hatching

period, size, shape and colour of egg; size, shape and colour of larva, pupa, cocoon and longevity, wing, length and width of adult were studied on host plants following Chuenban et al. (2017).

RESULTS AND DISCUSSION

Trilocha varians is economically important pest of various *Ficus* spp. and jackfruit (Ramzan et al., 2023) including Pakistan (Ramzan et al., 2021b). There is only a single study on the occurrence and host plants of *T. varians* (Navasero et al., 2013; Ramzan et al., 2020a); *F. nitida* and *F. benjamina* were recorded as the most infested (Navasero et al., 2013; Ramzan et al., 2023). Larvae caused about 90-100% defoliation (Ramzan et al., 2020b). *Broussonetia luzonica* and *B. papyfera* have also been tested as host plant but due to

rough and hard leaves not found suitable (Navasero et al., 2013). Ficus virens and F. benjamina were found as the most suitable host plants; F. religiosa was the preferable one. No feeding was observed on M. alba, F. carica and F. elastica. T. varians only feed on the Ficus such as fig (Daimon et al., 2012; Arya, 2020; Ramzan et al., 2023); (Zolotuhin and Witt, 2009). Significant variation was observed in hatching when reared on host plants maximum was recorded on F. benjamina (100%) followed by F. virens (91.00%) and minimum on F. religiosa (65.00%). The pupation was maximum on F. benjamina and lowest on F. religiosa. Forewings hind wings were pale reddish brown and gravish brown. During the study, it was observed that male was fast flayer while female short flayer. The fore wing length of male and female was 8.56 ± 0.77 and 9.9 ± 0.8 mm

Table 1. Bionomies and morphonetics of Trilocha varians on different hosts

Traits of male and female adults on hosts (in mm)				
_	F. benjamina		Ficus virens	
Parameters*	Male	Female	Male	Female
	Mean± SD		Mean± SD	
FWL	8.56 ± 0.77	9.9 ± 0.8	3.67 ± 1.07	2.33 ± 1.82
FWW	8.00 ± 1.81	5.7 ± 0.8	3.01 ± 0.99	2.56 ± 1.45
HWL	7.04 ± 0.98	8.00 ± 0.2	2.04 ± 1.88	2.89 ± 1.02
HWW	5.00 ± 0.97	5.70 ± 0.78	2.90 ± 1.73	3.78 ± 1.06
BL	7.90 ± 0.77	9.99 ± 0.99	2.90 ± 1.77	2.09 ± 1.01
AL	5.99 ± 0.70	4.98 ± 0.30	1.99 ± 0.01	2.00 ± 0.99
HL	2.80 ± 0.35	2.99±1.39	1.40 ± 0.89	1.00 ± 2.00
HW	3.80 ± 0.99	3.89 ± 1.00	1.00 ± 0.88	2.08 ± 1.90
Parameters	Ficus	Ficus virens	Ficus religiosa	
_	benjamina			
	Mean± SD	Mean± SD	Mean± SD	
Developmental period				
Egg	5.9 ± 1.98	5.6 ± 1.59	5.6 ± 1.59	
First instar	3.6 ± 1.01	2.63 ± 0.24	3.56 ± 0.12	
Second instar	3.4 ± 0.01	3.44 ± 0.70	4.03 ± 0.81	
Third instar	3.3 ± 0.22	3.22 ± 0.71	3.99 ± 0.11	
Fourth instar	3.5 ± 1.00	4.51 ± 0.24	5.10 ± 0.33	
Fifth instar	6.1 ± 1.89	7.10 ± 0.78	8.99 ± 0.65	
Pupa	12.9 ± 2.998	11.00 ± 2.13	13.01 ± 4.22	
Fecundity	168.00 ± 30.63	178.01 ± 26.33	111.23 ± 12.99	
Caudal horn length of larval instars (in mm)				
1 st instar	0.7 ± 0.1	0.4 ± 0.1	0.2 ± 0.1	
2 nd instar	1.2 ± 0.1	0.8 ± 0.1	0.3 ± 0.1	
3 rd instar	1.6 ± 0.1	1.7 ± 0.1	1.8 ± 0.1	
4 th instar	2.3 ± 0.1	2.1 ± 0.1	2.5 ± 0.1	
5 th instar	1.4 ± 0.0	1.8 ± 0.1	1.9 ± 0.1	

*Note: FWL: Fore wing length; FWW; Fore wing width; HWL: Hind wing length; HWW: Hind wing width; BL: Body length; AL: Antennal length; HL: Head length; HW: Head width

on *F. benjamina*, while 3.67 ± 1.07 and 2.33 ± 1.82 mm on F. virens, respectively. The hind wing length of male and female was 7.04 ± 0.98 and 8.00 ± 0.2 mm on F. *benjamina*, while 2.04 ± 1.88 and 2.89 ± 1.02 mm on F. virens. respectively. During the study, it was observed that male adult longevity was longer on F. benjamina (4-7 days) followed by F. virens (4-6 days) and F. religiosa (3-5 days) (Fig. 1) while female longevity on F. benjamina (9-12 days) followed by F. virens (7-10 days) and F. religiosa (4-10 days). Total development period from egg to male adult on *F. benjamina* (25.99 ± 1.12) followed by F. virens (27.33± 1.21) and F. religiosa (19.91 ± 1.11) while developmental period from egg to female adult was on F. benjamina (29.78 \pm 1.99) followed by F. virens (30.88± 1.67) and F. religiosa (21.78 ± 1.60) . The length of caudal horn which present on eighth abdominal segment on each larva was found longer on early instars while reduced on older larvae. The mating started within 3-4 hr after emerging and continued for 5-6 hr. It was observed that unmated female was long lived as compared to mated female (Fig. 2).

Ramzan et al. (2020a, b), Mansoor et al. (2022) and Sajid et al. (2023) reported similar findings. The weight of dead moth and pupa was 0.008 g and 0.006 g. The weight of eleven 1st instar larvae was 0.080g. The



Fig. 2. Survival (%) and post-developmental periods of *T. varians* reared on hosts

fecundity of T. varians on hosts varied. The fecundity was 168.00 ± 30.63 , 178.01 ± 26.33 and $111.23 \pm$ 12.99/ female reared on F. benjamina, F, virens and F. religiosa, respectively. The model species, Bombyx mori is known to feed solely on mulberry leaves (Morus alba). The main reason for the rejection of Morus alba leaves is due to the presence of toxins. The presence of high concentrated toxin such as sugar-mimic alkaloids 1, 1- deoxy-nojirimycin (DNJ), 4-dideoxy-1 and 4-imino-D-arabinitol (D-AB1) in mulberry latex. Many other such compounds may be also present on the plant leaves (da Cruz et al., 2012) that proved to be deterrent. Bombyx mori has adopted a unique enzymatic mechanism to minimize these toxins and made suitable for feeding (El-Shewy and Elgizawy, 2017). There is no such mechanism adopted by T. varians in the latex of mulberry. There is need to check or examine either the latex or leaves of tested host plants such as F. benjamina and Ficus virens having some semiochemicals that attract T. varians.

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AUTHOR CONTRIBUTION STATEMENT

All authors contribute equally.

CONFLICT OF INTEREST

No conflict of interest.

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