



## BIOLOGY OF LEAF EATING CATERPILLAR *TRILOCHA VARIANS* (WALKER) ON *FICUS MICROCARPA*

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### ABSTRACT

The biology of *Trilocha varians* (Walker) was studied on *Ficus microcarpa* L.f. under laboratory conditions in Jodhpur, Rajasthan. The fecundity ranged from 140-200 and incubation period was 3-5 days. It has five larval instars, with total larval and pupal period being 16-22 and 10-15 days, respectively. The adult male and female longevity were 4-7 and 6-12 days, respectively.

**Key words:** *Trilocha varians*, Bombycidae, Lepidoptera, *Ficus microcarpa*, pest, leaf eating caterpillar, biology, measurements, life stages, fecundity

Leaf eating caterpillar *Trilocha varians* (Bombycidae: Lepidoptera) is one of the major pest of *Ficus* spp. (Naeem-Ullah et al., 2020) and well distributed in Nepal, India, Pakistan, Sri Lanka, Thailand, Taiwan, Java, Malaysia, Southern China, Japan, Philippines and Indonesia (Zolotuhin and Witt, 2009; Gurule, 2013; Chuenban et al., 2017). The major hosts of *T. varians* are *Ficus religiosa*, *F. infectoria*, *F. elastica* and *F. bengalensis* (Kedar et al., 2014). Other host plants are *Artocarpus heterophyllus*, *A. communis*, *A. kamansi*, *F. nitida*, *F. septica*, *F. mclelandi* and *F. caraica* (Navasero et al., 2013; Chu and Wang, 1993). The young larvae feed on leaves, twigs and tender shoots, due to their feeding the leaves appear transparent while the late instars cause complete defoliation of the plants. A review of literature revealed that this is the first severe incidence of *T. varians* feeding on *F. microcarpa* in Rajasthan. Earlier, *T. varians* infesting several species of *Ficus*, has been reported in Haryana, Punjab, parts of Maharashtra, Assam, Karnataka, Tamil Nadu (Kedar et al., 2014, Singh et al., 2017, Gurule and Nikam, 2013; Pathre et al., 2019; Subhasish and Tariang, 2018; Udayagiri, 1988; Rajavel and Shanthi, 2007). Various species of *Ficus* viz., *F. benjamina*, *F. neuda*, *F. panda* and *F. microcarpa*, etc. are planted to enhance the aesthetic value and for landscaping purpose, mainly planted alongside the roads, in many countries. However, maintaining healthy *Ficus* flora has great challenge to gardeners due to sudden outbreak of pests including defoliating insect pests. The present study has been conducted to evaluate the biological parameters of *T. varians* under laboratory conditions.

### MATERIALS AND METHODS

Study on biology of leaf eating caterpillar *T. varians* on *Ficus* was conducted during 2020 in the Laboratory of Department of Entomology, Agricultural Research Station, Mandor- Jodhpur, Rajasthan. The fourth and fifth instar larvae were collected from the infested *Ficus* trees planted in the University campus and brought to laboratory for culturing of the pest for further studies. The new and fresh *Ficus* leaves provided as feed and placed into containers containing *T. varians* larvae. On daily basis, left over leaves were changed and replenished with new leaves for larvae feeding. Final instars larvae transformed into pupae and emerged as adults. A pair of adults was placed into rearing cage for egg laying. The eggs were laid by female moth on jar wall and on *Ficus* leaves in the jar. Number of eggs was counted on daily basis and observations were recorded on their colour, size, shape and incubation period. Newly hatched larvae were released singly in petriplates for studying duration of each instar and pupal period. The pre-oviposition, oviposition and post-oviposition periods, fecundity and longevity were studied by keeping the paired moths in glass jars. Measurement of various stages viz., eggs, larval instars, pupae and adults were recorded with the help of digital caliper.

### RESULTS AND DISCUSSION

The maximum infestation (10-15%) of *T. varians* was observed from second fortnight of September to first fortnight of November. Early instar larvae feed in cluster on under surface of leaves resulting in white and

papery patches on upper surface of leaves. Later instar larvae got dispersed and fed irregular portions from the leaf margins towards the midribs consuming all the leaves of a branch. When most of the leaves were eaten up, twigs died back and in extreme cases, the plants succumbed to death. Otherwise, the plants recovered and produced new flush. The biological parameters of *T. varians* were studied under laboratory conditions. The results indicated that adult female laid  $163.00 \pm 22.63$  eggs in long rows touching each other and round flat in shape. The freshly laid eggs were pale yellow in colour while before hatching changed into black colour. These findings are in line with Rajavel and Shanthi (2007) and Daimon et al. (2012). The incubation period of eggs was  $4.30 \pm 0.67$  days (Table 1). Similarly, Singh and Brar (2016) also observed that eggs hatched within 3-8 days. Egg width and thickness were measured  $0.82 \pm 0.18$  and  $0.49 \pm 0.11$  mm, respectively.

There were five larval instars and newly hatched larvae were brown in colour. After 24 hr, the colour of larvae changed to greyish white and remained same in colour up to fourth instar. The fifth instar larvae

were dull brown with greyish bands. A caudal horn was present on 8<sup>th</sup> abdominal segment of each larva. Similar findings were recorded by Daimon et al. (2012) and Singh and Brar (2016). Total larval duration was  $18.30 \pm 2.00$  days. The body length of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> larval instars was  $2.45 \pm 0.60$ ,  $4.63 \pm 0.73$ ,  $13.30 \pm 2.36$ ,  $16.70 \pm 3.43$  and  $30.60 \pm 4.01$  mm, respectively (Table 2). The length and width of cocoon were  $9.82 \pm 1.66$  and  $4.96 \pm 0.56$ , respectively. The male pupa had an average length of  $7.99 \pm 0.91$  and width of  $2.86 \pm 0.27$  mm while the female pupa had length of  $9.10 \pm 1.29$  and width of  $3.83 \pm 0.45$  mm, respectively. Pupation took place in boat shaped silken cocoon. The colour of newly pupated larva was whitish yellow and changed into dark brown prior to adult emergence.

The present findings are in line with Rajavel and Shanthi (2007) and Daimon et al. (2012). Pupal stage lasted for  $11.70 \pm 1.57$  days (Table 1). The head, thorax and abdomen of adults were dark reddish brown. The forewings were pale reddish brown having curved waved line. The hind wings were greyish with reddish brown outer margins. Our findings are in line with the

Table 1. Duration and morphometrics of life stages of *T. varians* on *F. microcarpa*

Parameter	Mean*± SD	Parameter	Mean*± SD				
Egg		Pupa					
Incubation period (days)	$4.30 \pm 0.67$	Pupal period (days)	$11.70 \pm 1.57$				
		Adult					
Hatching (%)	$68.00 \pm 10.33$	Pre- oviposition period (days)	$2.30 \pm 4.80$				
Larva		Oviposition period (days)	$3.00 \pm 0.67$				
I instar (days)	$2.50 \pm 0.53$	Post-oviposition period (days)	$1.60 \pm 0.70$				
II instar (days)	$3.30 \pm 0.82$	Longevity					
III instar (days)	$3.20 \pm 0.79$	Male (days)	$5.50 \pm 0.85$				
IV instar (days)	$4.30 \pm 0.67$	Female (days)	$9.30 \pm 2.00$				
V instar (days)	$5.00 \pm 0.67$	Fecundity per female	$163.00 \pm 22.63$				
Total larval period (days)	$18.30 \pm 2.00$	Total life cycle					
		Male (days)	$35.50 \pm 2.95$				
		Female (days)	$39.30 \pm 3.97$				
Parameter (mm)	Larva					Adult	
	First	Second	Third	Fourth	Fifth	Male	Female
	Mean*± SD						
Body length	$2.45 \pm 0.60$	$4.63 \pm 0.73$	$13.30 \pm 2.36$	$16.70 \pm 3.43$	$30.60 \pm 4.01$	$7.22 \pm 0.54$	$8.88 \pm 0.65$
Head capsule length	$0.32 \pm 0.02$	$0.48 \pm 0.14$	$1.00 \pm 0.42$	$1.62 \pm 0.28$	$2.38 \pm 0.29$	-	-
Head capsule width	$0.34 \pm 0.06$	$0.42 \pm 0.06$	$1.00 \pm 0.17$	$1.51 \pm 0.06$	$2.12 \pm 0.13$	-	-
Caudal horn	$0.45 \pm 0.08$	$1.20 \pm 0.32$	$1.45 \pm 0.14$	$2.20 \pm 0.13$	$1.46 \pm 0.23$	-	-
Antennal length	-	-	-	-	-	$3.26 \pm 0.31$	$2.53 \pm 0.57$
Forewing length	-	-	-	-	-	$6.80 \pm 1.23$	$10.00 \pm 1.33$
Forewing width	-	-	-	-	-	$4.50 \pm 0.85$	$5.10 \pm 0.88$
Hindwing length	-	-	-	-	-	$7.00 \pm 1.05$	$7.40 \pm 0.52$
Hindwing width	-	-	-	-	-	$4.40 \pm 0.70$	$5.60 \pm 0.52$
Wing span	-	-	-	-	-	$15.00 \pm 1.76$	$23.00 \pm 1.94$

\* n=10

findings of Singh and Brar (2016). Body length and wing span of male were  $7.22 \pm 0.54$  and  $15.00 \pm 1.76$ , respectively while  $8.88 \pm 0.65$  mm and  $23.00 \pm 1.94$  mm, respectively in the female. The female was bigger in size than male. The female adult lived long as compared to male. Total life cycle of male and female was  $35.50 \pm 2.95$  and  $39.30 \pm 3.97$  days, respectively (Table 1). Jia and Jinxin, 1997 reported that the egg, larva, pupa and adult stages lasted for 4-8, 11-15, 3-17 and 5-16 days, respectively. The sex could be determined based on the presence and absence of a suture on the ninth abdominal segment in female and male, respectively.

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