International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 02-06-2026, Accepted: 02-07-2026, Published: 17-07-2026
Volume 11, Issue 3, 2026, Page No. 99-102

Study of life table parameters of *Scirtothrips dorsalis* hood on tea

Dr. Chayanika Chetia
Assistant Professor, Department of Zoology, Tingkhong College, Tingkhong, Assam, India
DOI: https://doi.org/10.66856/ijer.2026.11.3.11239

Abstract
In this article, life table parameters of the yellow tea thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae), were studied on three selected tea cultivars *viz*., TV1, TV17 and TV23 in laboratory condition. The study revealed that the net reproductive rate (R_0) was maximum on TV17 and minimum on TV23. The intrinsic rate of increase (rm), finite rate of increase (λ) and weekly multiplication rate ($e^{rm.7}$) were maximum on TV1 and minimum on TV23. The doubling time was maximum for the population on TV23 and minimum on TV1. The results indicated that the adult reproductive parameters were affected by the three different cultivars of tea, which could be applied in tea thrips control management.

Keywords: Yellow tea thrips, life table, tea cultivars, fecundity, multiplication rate, generation time, developmental stages, net reproductive rate

Introduction
Tea is the most consumed inexpensive drink in the world. Tea plant, *Camellia sinensis* (L.) O. Kuntze, is cultivated in more than 34 countries with the annual production of 3.22 million metric tons of made tea (Hazarika *et al*., 2009; Muraleedharan and Roy, 2016; Varatharajan *et al*., 2019) [9, 13, 21]. Since the stable ecosystem of monoculture of tea provides relatively steady microclimate and food supply, it is infested by several divergent arthropod pests (Hazarika *et al*., 2009) [9]. Among the major insect pests, yellow tea thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) is a minute (less than 2 mm) pale yellow coloured pest which pierces and sucks the sap of tender leaves and buds, forming pale thin lines on the abaxial surface of the leaf parallel to the mid-vein and distorted buds. The damaged tissues turn brownish and the punctured corky lines are often called as 'sand paper' and 'silvered' lines (Varatharajan *et al*., 2019) [21]. *S. dorsalis* has established as a key pest, especially in the tea plantations of the north-eastern parts of India, including Assam (Mukhopadhyay and Roy, 2009; Roy *et al*., 2011 [12, 17]).
Life table studies are fundamental to population ecology and give a concise summary of certain key population statistics (Birch, 1948; Nanthagopal and Uthamasamy, 1989) [4, 15]. For the study of insect population dynamics, life tables are valuable as they present a suitable method for recording and accounting for population changes in an insect's life cycle (Nanthagopal and Uthamasamy, 1989) [15] and provide the most comprehensive account of the development, survival and fecundity of an insect population (Gaikwad and Patil, 2018; Price, 1997) [7, 16]. There exists a lack of knowledge on the life table studies of *S. dorsalis* on tea cultivars. Therefore, the objective of the present study was to collect proper information on the survival and fecundity of *S. dorsalis* on three selected tea cultivars *viz*., TV1, TV17 and TV23 under laboratory conditions and to construct life tables for them.

Materials and methods
This study was conducted on three cultivars of tea plant, *Camellia sinensis* (L.) O. Kuntze which were Tocklai vegetative *viz*., TV1 (Assam × China hybrid), TV17 (Assam × China hybrid) and TV23 (Cambod variety). A stock culture was maintained in the laboratory from field-collected *S. dorsalis*.
The life table of *S. dorsalis* on the tea cultivars was studied in the laboratory at 25°C±2°C, 70-80% RH and a 12L: 12D photoperiod by the leaf cup method (Mahendran, 2011 [11]). Adult gravid females were allowed to lay eggs on young leaves of the tea cultivars kept on a wet cotton wad within leaf cups (11×6 cm). Leaf discs with one hundred eggs were selected and kept in leaf cups covered with muslin cloth for hatching. Observations were made daily from hatching of eggs until the emergence of adults, and the age-specific survival rate (lx) was recorded (Nanthagopal and Uthamasamy, 1989) [15].
Age-specific fecundity rate (mx) is the mean number of female offspring produced in a unit of time by a female aged X (Birch, 1948 [4]). For this, adults emerging on the same day were paired and released in separate leaf discs (one pair/leaf) for mating and oviposition. On each day, the number of eggs laid by every pair was recorded. The mean number of eggs laid per day was calculated using the total number of eggs and the total number of females survived on the previous day (Mahendran, 2011) [11]. The number of female progenies (mx) was calculated based on the number of eggs laid per female and the sex ratio (Nanthagopal and Uthamasamy, 1989) [15]. Fecundity of females on subsequent days was recorded daily till their death.
Age-specific survival rates (lx) and age-specific fecundity rates (mx) for each age interval (X) were used to construct the life tables for each tested tea cultivar following (Atwal and Bains, 1974; Birch, 1948) [2, 4]. The net reproductive rate (R_0) is the rate of multiplication in one generation (Lotka, 1945 [10]), which incorporates lx and mx to provide a measure of net female progeny per female per generation. It must always be considered in relation to the length of generation (T) (Birch, 1948 [4]). For a population with a stable age distribution, both rm and λ refer to rates of increase; rm is the infinitesimal rate of increase and λ is the finite rate of increase (Birch, 1948 [4]).

Results and discussion

The duration of the pre-oviposition period ranged from one to two days with an average of 1.7±0.48 d, 1.8±0.42 d, and 1.9±0.32 d on TV1, TV17, and TV23, respectively. The oviposition period lasted from two to four days, with an average of 3.8±0.42 d, 3.6±0.70 d, 3.6±0.52 d on TV1, TV17, TV23, respectively. The post-oviposition period ranged from one to two days with an average of 1.1±0.32 d, 1.3±0.48 d, 1.2±0.42 d on TV1, TV17, TV23, respectively.

The data regarding the life table, age-specific survival rate (lx) and age-specific fecundity rate (mx) of *S. dorsalis* on three tea cultivars are presented in Table 1. The survival rate of immature stages on TV1, TV17 and TV23 was 0.89, 0.86 and 0.78, respectively. The length of time spent in the immature stage was greatest in TV23 (17 d) and least in TV1 (14 d). The first female mortality after emergence occurred on the second day in TV23 and the last mortality on the third day on both TV1 and TV17. Maximum egg production occurred on 19, 20 and 21 days in TV1, TV17 and TV23, respectively.

The net reproductive rate (R_0) of *S. dorsalis* was 4.438 on TV1, 4.523 on TV17 and 3.413 on TV23. The mean length of generation (T) was maximum (21.369 d) on TV23 and minimum (18.356 d) on TV1. As expected, the innate capacity for increase (rm) was maximum on TV1 (0.0813) and minimum on TV23 (0.0575). The estimate of rm for TV17 was intermediate at 0.0777. The finite rate of increase in number (λ) per female per day was maximum in TV1 (1.09) followed by TV17 (1.08) and TV23 (1.06). Similarly, weekly multiplication rate (WMR) was maximum on TV1 (1.83) and minimum on TV23 (1.50). The population of *S. dorsalis* multiplies in two-fold (Doubling Time: DT) in 8.04 days on TV1, 9.01 days on TV17 and 11.90 days on TV23 (Table 2).

Table 1: Age-specific survival (lx), fecundity (mx) and net reproductive rate (R0) of S. dorsalis Hood on TV1, TV17 and TV23

Tea cultivars	Age in days (X)	Age-specific survival (lx)	Age-specific fecundity (mx)	lxmx	lxmxX
TV1	0-14	0.89		Immature stages	
	15-16	0.82		Preoviposition period	
	17	0.82	1.15	0.943	16.031
	18	0.79	1.9	1.501	27.018
	19	0.65	2.25	1.463	27.797
	20	0.59	0.9	0.531	10.620
	21	0.51	0.0	0.0	0.0
				=4.438	=81.466
				$R_0=\sum$lxmx	$\sum$lxmxX
TV17	0-15	0.86		Immature stages	
	16-17	0.82		Preoviposition period	
	18	0.82	0.95	0.779	14.022
	19	0.80	1.85	1.480	28.120
	20	0.78	2.15	1.677	33.540
	21	0.69	0.85	0.587	12.317
	22	0.57	0.0	0.0	0.0
				=4.523	=87.999
				$R_0=\sum$lxmx	$\sum$lxmxX
TV23	0-17	0.78		Immature stages	
	18-19	0.75		Preoviposition period	
	20	0.71	0.95	0.675	13.490
	21	0.66	1.95	1.287	27.027
	22	0.58	1.65	0.957	21.054
	23	0.52	0.95	0.494	11.362
	24	0.40	0.0	0.0	0.0
				=3.413	=72.933
				$R_0=\sum$lxmx	$\sum$lxmxX

Table 2: Calculations of life table parameters for S. dorsalis Hood on TV1, TV17 and TV23

Tea cultivars	Mean length of generation $T_c = \frac{\sum Xlxmx}{R_o}$	Innate capacity for increase in Number $R_c = \frac{LogeR_o}{T}$	Corrected rm $\sum e^{7-rm}lxmx = 1097$	Corrected generation time $T = \frac{LogeR_o}{rm}$	Finite rate of increase in number λ = Antiloge(r_m)	Weekly multiplication rate $e^{rm.7}$	Doubling time
TV1	18.356	0.0812	0.0813	18.327	1.09	1.83	8.04
TV17	19.456	0.0776	0.0777	19.421	1.08	1.71	9.01
TV23	21.369	0.0575	0.0575	21.357	1.06	1.50	11.90

The demographic parameters R_0, rm, λ, WMR, T and DT are used to measure the effect of host plant on the development, survival and reproduction of insect arthropods (Silveira Neto *et al*., 1976 [19]). The values obtained for R_0, rm, λ and WMR are higher (Price, 1997 [16]), and T and DT are lower (van Lenteren and Noldus, 1990 [20]) in suitable hosts. Among the life table parameters, R_0 is essential for assessing food quality, as it represents an innate characteristic of the population (Bernardi *et al*., 2012 [3]). The thrips population tended to increase on all three tea cultivars as R_0 was greater than 1.0 in each case (Birch, 1948; de Souza *et al*., 2022 [4, 6]). However, the comparison of two or more populations by means of their reproductive rates may be misleading to a certain extent unless the mean length of generations is the same (Birch, 1948; Garad *et al*., 1984 [4, 8]). Indeed, based on the net reproductive rate (R_0), TV17 occupied first position, but it ranked second based on innate capacity for increase in numbers (rm). This positional shift of TV17 is due to a relatively higher value of generation time, which reduced the rm value. Life tables providing the statistics on the innate capacity for increase in numbers of a particular species give insight into the characteristic life patterns of different species (Garad *et al*., 1984 [8]). Innate capacity for increase in numbers (rm) is a relative measure of host quality and indicates the biotic potential of arthropods in a given environment (de Castro-Guedes *et al*., 2016; de Souza *et al*., 2022 [5, 6]). From the point of view of pest multiplication, TV1 with a high rm value would be the most suitable for the insect pest in the present study. Greater innate capacity for increase in numbers also measures the host's susceptibility to insect attacks and vice versa (Ahmed *et al*., 2022; Musa and Ren, 2005 [1, 14]). Unlike rm, which is the continuous form of rates of increase for a population, finite rate of increase in numbers (λ) is multiplication rate for a discrete unit of time (Birch, 1948; Nanthagopal and Uthamasamy, 1989 [4, 15]), i.e., it represents the number of individuals added to the population per individual per unit of time (de Souza *et al*., 2022 [6]). λ values of 1.09 (TV1), 1.08 (TV17), and 1.06 (TV23) indicate that the females reared more than one individual daily. The weekly multiplication rate of the thrips population was highest on TV1, and expectedly, the time interval between each generation (T) and population doubling time (DT) was lowest on TV1. The rm, λ and WMR were maximum on TV1. All these statistics were minimum on TV23. These results indicate that the tea thrips, *S. dorsalis* prefer TV1 cultivar for feeding and oviposition compared to the other two tea cultivars. The results of the present investigation were in close conformity with works on *Scirtothrips bispinosus* (Bagnall) on tea by (Mahendran, 2011) [11]. Similar observations have also been recorded by Seal *et al*., (2010) [18] on *S. dorsalis* feeding on Knockout rose and Jalapeno pepper. The life table parameters of insect pests differ with changes in biological factors (Ahmed *et al*., 2022 [1]). Among the biological factors, a host plant can have an important impact on development, fecundity and reproduction (Ahmed *et al*., 2022 [1]).

S. dorsalis presented a high biotic potential on tea cultivars. This information on survival and reproduction provides insight into the interaction between *S. dorsalis* and tea plants, which can help develop a management program for the pest species. Among the three cultivars, TV1 has the highest preference from *S. dorsalis*, as the multiplication rate was slightly higher on it than the other two cultivars. Therefore, TV1 is more prone to thrips attack than TV17 and TV23.

References

1. Ahmed MA, Cao HH, Jaleel W, Amir MB, Ali MY, Smagghe G, *et al*. Oviposition preference and two-sex life table of *Plutella xylostella* and its association with defensive enzymes in three Brassicaceae crops. Crop Protection,2022:151:105816.
2. Atwal AS, Bains SS. Applied animal ecology. Kalyani Publications, Ludhiana, 1974, 128–135.
3. Bernardi D, Garcia MS, Botton M, Nava DE. Biology and fertility life table of the green aphid *Chaetosiphon fragaefolli* on strawberry cultivars. Journal of Insect Science,2012:12:28.
4. Birch L. The intrinsic rate of natural increase of an insect population. The Journal of Animal Ecology,1948:17:15–26.
5. de Castro-Guedes CF, de Almeida LM, do Rocio Chiarello Penteado S, Moura MO. Effect of different diets on biology, reproductive variables and life and fertility tables of *Harmonia axyridis* (Pallas) (Coleoptera, Coccinellidae). Revista Brasileira de Entomologia,2016:60:260–266.
6. de Souza MT, de Souza MT, Zawadneak MAC. Biology and life table parameters of the *Heliothrips haemorrhoidalis* on strawberries. Phytoparasitica,2022:50:35–41.
7. Gaikwad SM, Patil SK. Life table parameters of papaya mealybug, *Paracoccus marginatus* Williams and Granara de Willink under laboratory conditions. Journal of Pharmacognosy and Phytochemistry,2018:7:2637–2640.
8. Garad GP, Shivpuje PR, Bilapate GG. Life fecundity tables of *Spodoptera litura* (Fabricius) on different hosts. Proceeding of Indian Academy of Science (Animal Science),1984:93:29–33.
9. Hazarika LK, Bhuyan M, Hazarika BN. Insect pests of tea and their management. Annual review of entomology,2009:54:267–284.
10. Lotka AJ. Population analysis as a chapter in the mathematical theory of evolution, in: LeGros Clark, W.E., Medawar, P.B. (Eds.), Essays on Growth and Form. Oxford, 1945, 355–385.
11. Mahendran P. Bio Ecology of the tea thrips *Scirtothrips bispinosus* (Bagnall)(Thysanoptera: Thripidae) and its natural enemies in south Indian tea plantations (Published doctoral thesis). Bharathiar University, Tamil Nadu, India, 2011.
12. Mukhopadhyay A, Roy S. Changing dimensions of IPM in the tea plantations of the north eastern sub-Himalayan region, in: Ramamurthy, V., Gupta, G., Puri, S. (Eds.), Proc. of National Symposium on IPM Strategies to Combat Emerging Pest in the Current Scenario of Climate Change. Collage of Horticulture and Forestry, Central Agricultural University, Pasighat, 2009, 290–302.
13. Muraleedharan N, Roy S. Arthropod pests and natural enemy communities in tea ecosystems of India, in: Chakravarthy, A.K., Sridhara, S. (Eds.), Economic and Ecological Significance of Arthropods in Diversified Ecosystems: Sustaining Regulatory Mechanisms. Springer, 2016, 361–392.
14. Musa P, Ren S. Development and reproduction of *Bemisia tabaci* (Homoptera: Aleyrodidae) on three bean species. Insect Science,2005:12:25–30.
15. Nanthagopal R, Uthamasamy S. Life tables for spotted bollworm, *Earias vitella* (Fabricius), on four species of cotton. Crop protection,1989:8:133–136.
16. Price PW. Insect ecology, 3rd ed., John Wiley & Sons, New York, 1997.
17. Roy S, Gurusubramanian G, Nachimuthu SK. Neem based integrated approaches for the management of tea thrips *Scirtothrips dorsalis* Hood (Thripidae: Thysanoptera) in tea, in: Proceedings of the Zoological Society. Springer, 2011, 72–77.
18. Seal DR, Klassen W, Kumar V. Biological parameters of *Scirtothrips dorsalis* (Thysanoptera: Thripidae) on

selected hosts. Environmental Entomology,2010:39:1389–1398.
19. Silveira Neto S, Nakano O, Barbin D, Villa Nova NA. Manual de ecologia dos insetos. Agronômica Ceres, 1976.
20. van Lenteren JC, Noldus LP. Whitefly plant relationships, behavioural and ecological aspects, in: Whiteflies: Their Bionomics, Pest Status and Management. Intercept Andover, UK, 1990, 47–49.
21. Varatharajan R, Roy S, Prasad AK, Mukhopadhyay A, Muraleedharan N. Bionomics and management of *Scirtothrips dorsalis* Hood (Insecta: Thysanoptera: Thripidae) on *Camellia sinensis* (L) O. Kuntze in tea plantations of north-eastern India. International Journal of Tropical Insect Science,2019:39:179–194.