



Effect of tulsi (*Ocimum gratissimum*) leaf extract on oviposition action against uji fly (*Exorista bombycis* Louis.) and their hatchability on silkworm

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Abstract : The ovipositional deterrent and ovicidal activities of uji fly by spraying with tulasi (*Ocimum gratissimum*) leaf extract solution on oviposition against uji fly (*E. bombycis*) on silkworm was studied by spraying different concentrations, viz., 0.10, 0.50, 0.75, 1.00, 1.50 and 2.00 on second day fifth instar larvae on which eggs were laid. Significant differences were noticed and lowest number of eggs laid was at the concentration 2 per cent (3.00) as against the control (37.00). The percentage of eggs laid over the total eggs laid was also lowest at 2 per cent (2.22) as against the control (27.41). As the concentration increased, the number of eggs laid decreased. The rate of eggs hatchability was nil at 2 per cent concentration as against the control (89.19%). The egg hatchability reduction over control was maximum (-91.90%) at 2 per cent and it was minimum (-26.16%) at 0.10 per cent. Hence, the use of tulasi leaf extract could be an eco-friendly and low cost method for managing uji fly.

Key Words : Silkworm, Tulasi leaf extract, Uji fly

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INTRODUCTION

Mulberry silkworm, *Bombyx mori*.L are not exception to the attack of parasitoids, predators and pathogens. Since the silkworm is a domesticated species, it is particularly vulnerable to the attack of all the three groups of natural enemies. The tachinid flies that infest and breed on silkworms are called uji flies. The term uji appears to have originated after the name of a place in Japan where a tachinid parasitoid of the silkworm was first reported (Maxwell Lefroy, 1917). In India, earlier to 1980, it was confined to North-Eastern sericulture regions of the country, especially Bengal and Assam (Jameson, 1992). Since its accidental introduction to Karnataka could be traced back to the purchase and transportation of infested live Nistari cocoons from West-Bengal by the interested quarters of Karnataka obviously for preparation of cross breed layings. The fly was noticed for the first time in Bailanarasapur village of Hosakote taluk, Bangalore district during May 1980 and spread to the entire sericulture belt of Karnataka and today all the sericulture states of south India are affected with this pest

(Anonymous, 1980). Silkworms are attacked by uji fly, only when they have passed third moult (Anonymous, 1922). Young silkworms (first to third instar) practically escape from infestation. Ordinarily the uji fly prefers fourth and fifth instar silkworm. If the infestation takes place during fourth and early fifth instar silkworm die invariably before they reach spinning stage and farmers are in loss of 20-30 per cent cocoon production (Anonymous, 2008). Though recommended preventive and control measures are being followed by farmers, but the uji fly menace is still persisting. In this context, a new approach of uji fly management by employing effect of tulasi leaf extract on oviposition and ovicidal action against uji fly and their hatchability on silkworm have been tried in the present study. Because plant products are one of the most promising weapons available for insect control. Some plant compounds are highly effective and they disrupt metamorphosis, reproduction or cause death when it applied.

MATERIALS AND METHODS

The experiment was conducted at University Agricultural Sciences, Dharwad, College of Agriculture Bijapur during 2008-2009. The leaves of tulasi, *ocimum* sp. Were collected, crushed using pestle and mortar and soaked in distilled water for about 12 hours. Then the extract was filtered and prepared for different concentrations (viz., 0.10, 0.50, 0.75, 1.00, 1.50 and 2.00%) using distilled water. Population of uji fly, *Exorista bombycis* was maintained in the laboratory in fly proof netted cages of 60x60x60 cm cubic square with a circular sleeve for the passage. The emergence flies were fed with 10 per cent glucose solution soaked in cotton swab (Sriharan *et al.*, 1980). Further, a day old fifth instar silkworms were taken @ 100/ conc/treatments for three replications and sprayed with different concentration separately and then the gravid female uji flies was allowed for oviposition on silkworms for 30 minutes (Datta and Mukherjee, 1978). Afterwards, the number of infested silkworms were counted and fed with mulberry leaves for egg hatchability and it was recorded after 48 hours at each concentration by the following formula:

$$\text{Hatching (\%)} = \frac{\text{Number of eggs hatched}}{\text{Total number of eggs laid}} \times 100$$

RESULTS AND DISCUSSION

The number of eggs laid by the uji fly on silkworm after spraying with tulasi leaf extract in different concentrations is presented in Table 1. The significantly lowest at 2 per cent concentration (3.00) followed by 1.50 (9.00), 1.00 (14.00), 0.75 (19.66), 0.50 (25.00) and 0.01 per cent (27.33%) as against the control (37.00) where it was highest eggs laid by the uji fly on silkworm. According to Gajendran and Gopalan (1981) *Parthenium hysterophorus* showed repellent activity ranging from 19.53 to 62.20 per cent when sprayed on third instar larva of *Spodoptera litura*. Veeranna and Nirmala (2001) reported

significant repellent activity on the adult of uji fly, when 20 per cent *Pongamia glabra* leaf powder with kaolin was dusted on the silkworm body. These two reports are being corroborated with the present findings. This might be due to the chemical components present in the leaf, which could have prevented the uji fly from egg laying on silkworm larval body by acting as repellent or deterrent. Hence, the number of egg laid on the larva treated with tulasi leaf extract was less compared to the untreated batches. Similarly the percentages of egg laid over the total eggs laid was higher (20.24%) at 0.10 concentration followed by 0.50, 0.75, 1.00, 1.50 (18.52, 14.56, 10.37, 6.67%) and it was lower (2.22%) at 2.00 per cent concentration as against the control (27.41%). As the tulasi leaf extract concentration increases percentage of eggs laid was decreases. The tulasi leaf extract sprayed on silkworms before oviposition by uji fly had it effects on egg hatching percentage and it showed significant differences among different concentrations.

At 2 per cent concentrations, the percentage of hatching was zero followed by at 1.50 (14.78%), 1.00 (28.57%), 0.75 (38.96%), 0.50 (40.00%) and 0.10 per cent (47.57%) as against (89.19%) in control. According to Narayanaswamy and Dandin (1998) reported the uji fly eggs hatchability was reduced to 4.42 to 6.62 per cent when the eggs were exposed to volatile emanating from crushed bulb of *Allium sativum* for 72 and 64 hrs, respectively. Whereas, reduction of egg hatching percentage at 2 per cent concentration of tulasi leaf extract recorded maximum -91.90 per cent reduction over control as compared to -75.67, -62.16, -46.88, -32.43 and minimum -26.13 per cent in 1.50, 1.00, 0.75, 0.50 and 0.10 per cent, which is in close agreement with the observations of Kumar *et al.*, (1990) who observed that essential oils like lemon. Lime and orange at 0.1, 0.5 and 1.00 per cent concentration were highly effective as ovicides on all the stages of the uji fly eggs (1, 12 and 24 hrs old eggs). However, 1.00 per cent lemon oil was most effective in reducing hatchability (0 to 2.38%) compared to control. Murugesh *et al.* (2010) who observed ovipositional

Table 1 : Effect of tulasi (*Ocimum gratissimum*) leaf extract on oviposition and ovicidal action against uji fly and their hatchability on silkworm

Concentration of solution of tulasi leaf extract	No. of eggs laid by uji fly	Per cent eggs laid over the total eggs laid	Hatching (%)	Per cent reduction over the control
0.10	27.33	20.24	47.57 (43.61)	-26.16
0.50	25.00	18.52	40.00 (39.21)	-32.43
0.75	19.66	14.56	38.96 (38.62)	-46.88
1.00	14.00	10.37	28.57 (32.17)	-62.16
1.50	9.00	6.67	14.78 (22.94)	-75.67
2.00	3.00	2.22	0.00 (0.00)	-91.90
Control	37.00	27.41	89.19 (69.49)	-
F-test	*		*	
S.E.±	0.638	-	1.477	-
C.D. (P=0.05)	1.936		4.551	

Figures in the parenthesis are angular transformed values

deterrent and ovicidal activities of various plant products were studied against uji fly. Among all the plants, *Eucalyptus citriodora*, *Tridax procumbens*, *Parthenium hysterophorus* and *Tribulus terrestris* recorded lowest oviposition of 54.50, 55.00, 58.00 and 62.25 per cent as against control (100%) and egg hatchability of 63.85, 64.73, 65.63 and 67.00 per cent as against control (89.72%), where concentration at 0.80 per cent.

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