

A STUDY OF PARASITISM OF THE SOUTHERN GREEN STINK
BUG, *Nezara viridula* (L.) (HEMIPTERA: PENTATOMIDAE), BY
Trichopoda pennipes (F.) (DIPTERA: TACHINIDAE)¹

E.B. MENEZES²

D.C. HERZOG³

P.J. D'ALMADA⁴

RESUMO

Um estudo do parasitismo de *Trichopoda pennipes* (F.)
(Diptera: Tachinidae) em percevejo verde da soja,
Nezara viridula (L.) (Hemiptera: Pentatomidae).

Pelos métodos de rede de varredura e de batida de pano, adultos de *Nezara viridula* (L.) foram coletados nas variedades Cobb e Bragg durante a safra de 1978 em Quincy, Florida.

Neste estudo os seguintes dados foram anotados: número de indivíduos de cada sexo, número de indivíduos de cada sexo parasitados por *Trichopoda pennipes* e número de ovos do parasitóide ovipositado em cada hospedeiro. O método de varredura foi mais eficiente na coleta de machos e fêmeas de *Nezara viridula*. A percentagem de parasitismo e o número de ovos do parasitóide por indivíduos foi mais elevado em machos de *Nezara viridula*. A média de ovos do parasitóide por indivíduo decresce diretamente com o crescimento da população do hospedeiro.

Recebido em 25/04/84

¹ This investigation was conducted at the University of Florida, Arc - Quincy, 32351 Florida, USA.

² Associate Professor of Entomology, Universidade Federal Rural do Rio de Janeiro, km 47 Antiga Rodovia Rio-São Paulo, 23460 Seropédica, RJ.

³ Associate Professor of Entomology Department of Entomology and Nematology University of Florida.

⁴ Department of Statistics - IFAS, University of Florida Gainesville, Florida, 32611.

INTRODUCTION

Trichopoda pennipes (F.), the feather-legged fly, is an important natural parasitoid on the adult southern green stink bug, *Nezara viridula* (L.). *T. pennipes* is a large tachinid that deposits its eggs on the body surface of stink bug adults. After hatching, the larvae penetrate into the body of the bug, attach by the posterior end to the right tracheal trunk and feed on the internal organs and body fluids of the host (TODD & LEWIS, 1976).

Although a high oviposition rate is common, only one parasitoid larva develops within the body of a parasitized stink bug. At maturity, the larva forces its way out of the posterior end of the host, which is usually dead at this time. The pupation of the parasitoid occurs in the soil.

Numerous attempts in the biological control of *N. viridula* have been tried with the artificial propagation and release of *T. pennipes* adults. Results have generally been favourable but not important (DEBACH 1962, DAVIS, 1964). Although *T. pennipes* has been known to occur in the southeastern U.S. for many years, only fragmentary bits of information are available in the literature on the incidence and impact of this parasitoid as a natural control agent of *N. viridula* (TODD & LEWIS, 1976).

MITCHELL and MAU (1971), in Hawaii, reported a higher percentage of parasitism by *T. pennipes* on male *N. viridula* than of females in two field collections from Macadamia nut orchards. They postulated that male *N. viridula* produce a pheromone that is highly attractive to females of the species and also serves as kairomone to the females of *T. pennipes*.

Studies were conducted at the University of Florida, AREC-Quincy to determine the incidence and percentage of parasitism by *T. pennipes*.

MATERIAL AND METHODS

Sweep net and ground cloth methods were used to collect *N. viridula* adults during the summer and fall of 1978 on 'Cobb' and 'Bragg' soybean varieties. These adults were brought to the laboratory where the following data were recorded: number of adults *N. viridula* of each sex, number of individuals of each sex parasitized by *T. pennipes*, and the number of parasitoid eggs per individual. Eggs of *T. pennipes* are easily seen on the exoskeleton of parasitized bugs. Based on this information and following TODD & LEWIS (1976), the percentage of parasitism and the mean number of eggs per parasitized bug were calculated.

RESULTS AND DISCUSSION

Table 1 summarizes the percentage of parasitization of *N. viridula* and mean number of *T. pennipes* eggs on adult hosts. The percentage parasitization on male bugs was higher than on female bugs in both 'Cobb' and 'Bragg' soybean varieties.

TABLE 1 - Percentage of parasitism of *Nezara viridula* (L.) and average number of *Trichopoda pennipes* (F.) eggs on adult host.

	Males		Females	
	% Parasitized	\bar{X} of eggs	% Parasitized	\bar{X} of eggs
Method: Cloth	47.5	3.11	37.2	1.87
Net	57.8	3.38	46.3	2.19
Variety: Bragg	52.1	3.28	40.2	2.02
Cobb	52.6	3.22	43.3	2.04
MxV: Bragg-Cloth	44.2	3.08	34.1	1.81
Bragg-Net	59.6	3.47	46.3	0.22
Cobb-Cloth	50.8	3.14	40.3	1.93
Cobb-Net	56.1	3.30	46.2	2.15

Table 2 summarizes ANOVA for percentage parasitization of *N. viridula*, and the mean number of *T. pennipes* eggs on adult hosts. Males had a higher percentage of parasitism and a higher mean number of parasitoid eggs per bug than females.

Figure 1 gives the mean number of female bugs parasitized and non-parasitized, and the mean number of eggs per individual collected on different dates. Figure 2 gives the mean number of male bugs parasitized and non-parasitized, and the mean number of eggs per individual collected on different dates.

Significantly more parasitized individuals of both sexes were collected using the sweep net method.

TABLE 2 - ANOVA for percentage of parasitism of *Nezara viridula* (L.) and average number of *Trichopoda pennipes* (F.) eggs on adult host.

Source	Males			Females		
	df*	% Parasitized	\bar{X} of eggs	df*	% Parasitized	\bar{X} of eggs
Rep	3	*		3		*
Variety	1			1		
$E_A = R \times V$	3			3		
Method	1	**	**	1	**	**
Meth x Var	1			1		
$E_B = R \times M(V)$	6			6		
Date	14	**	**	14	**	**
Date x Var	14	**	**	14		
Date x Meth	14	**	**	14		**
Date x Meth x Var	12		**	13		**
$E_C = R \times D(M \times V)$	132			137		

df* degrees of freedom

Fixed: Method, Variety

Random: Date

Test (Meth x Var) + (Error C), with (Error B + DMV)

σ : % Parasitized 2,11 df, eggs 2,16 df

ρ : % Parasitized 2,10 df, eggs 5,16 df

Test Method + 2 (Error C) with (Error B + DMV + DM)

σ : % Parasitized 1,23 df, eggs 2,29 df

ρ : % Parasitized 1,24 df, eggs 1,18 df

Test Variety + 2 (error C) with (Error A + DMV + DV)

σ : % Parasitized 3,26 df, eggs 1,28 df

ρ : % Parasitized 236,16 df, eggs 4,8 df

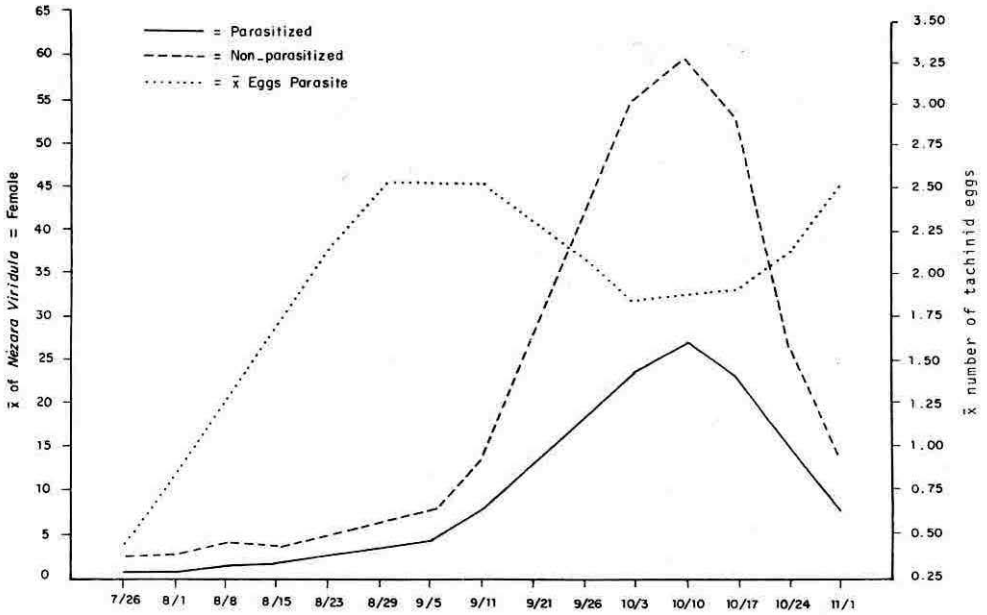


FIG. 1 - Mean number of female bugs parasitized and non-parasitized and mean number of tachinid eggs per individual collected on different dates.

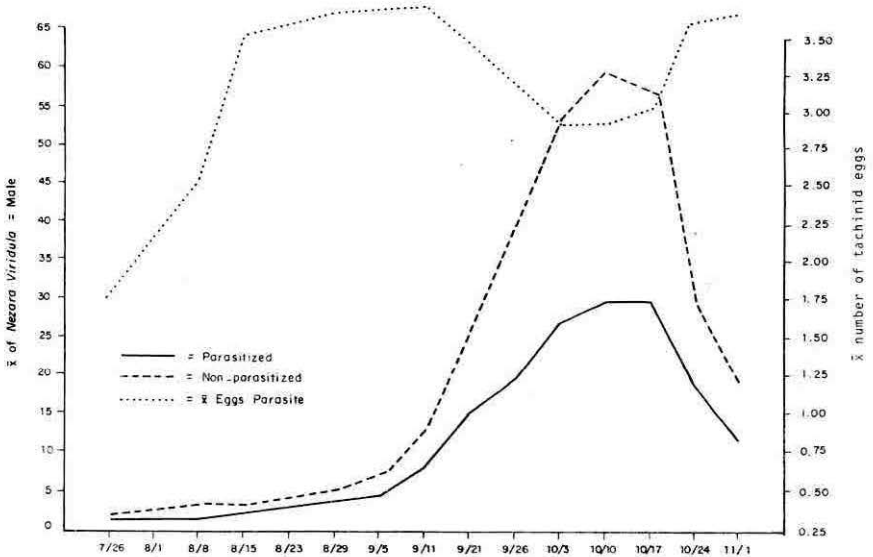


FIG. 2 - Mean number of male bugs parasitized and non-parasitized, and mean number of tachinid eggs per individual collected on different dates.

Supernumerary oviposition is common in this host parasitoid relationship, and this evidence is clearly shown in Figures 1 and 2.

TODD & LEWIS (1976) observed that more parasitized bugs were found than expected for a random (Poisson) distribution as calculated according to WADLEY (1967), and as compared by the χ^2 test. This tendency seems to be a definite disadvantage for the parasitoid since only one adult emerges from each parasitized bug; this tendency is clearly seen in Figures 1 and 2.

The mean number of parasitoid eggs per individual decreased directly with increases in the host population.

These data indicate that male *N. viridula* had a higher percentage of parasitism and a higher mean number of eggs per bug than did females and these trends were consistent on both 'Bragg' and 'Cobb' soybean varieties in this study. These results are in agreement with those of MITCHELL and MAU (1971) in Hawaii and TODD and LEWIS (1967) in Georgia.

ACKNOWLEDGEMENTS

The authors thank Dr. M.R. Honer for his suggestions and revision of this paper.

LITERATURE CITED

- DAVIS, C.J. The introduction, propagation, liberation, and establishment of parasites to control *Nezara viridula* var. *emargdula* (F.). *Proc. Hawaii. ent. Soc.* 18: 369-75. 1964.
- DE BACH, P. An analysis of success in biological control of insects in the Pacific area. *Proc. Hawaii. ent. Soc.* 18: 69-79. 1962.
- MITCHELL, W.C. & MAU, R.F.L. Response of the female southern green stink bug and its parasite, *Trichopoda pennipes* to male stink bug pheromones. *J. econ. Ent.* 64: 856-9, 1971.
- TODD, J.W. & LEWIS, W.J. Incidence and oviposition patterns of *Trichopoda pennipes* (F.) parasite of the Southern green stink bug, *Nezara viridula* (L.). *Jl Ga ent. Soc.* 11(1): 50-54, 1976.
- WADLEY, F.M. *Experimental statistics in entomology*. Washington, D.C. Graduate School Press, U.S.D.A., 1967. 133p.

ABSTRACT

Sweep net and ground cloth methods were used to collect *Nesara viridula* (L.) adults during the summer fall, 1978, on 'Cobb' and 'Bragg' soybean varieties. The following data were recorded: number of individuals of each sex, number of individuals of each sex parasitized by *Trichopoda pennipes* (F.), and number of parasitoid eggs per individual. Significantly more parasitized individuals of both sexes were collected using the sweep net method. Percent parasitism and mean number of eggs per individual were higher in males. Mean number of parasitoid eggs per individual decreased directly with increases in the host population.