Madras Agric. J. 76 [3] : 143—149 March, 1989 https://doi.org/10.29321/MAJ.10.A02040

SEASONAL INCIDENCE OF RICE THRIPS *Stenchaetothrips biformis* (BAGNALL)

V. V. MADHUSUDHAN, M. GOPALAN and G. BALASUBRAMANIAN
Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore-641 003.

ABSTRACT

Studies conducted at the Paddy Breeding Station, Coimbatore on the seasonal incidence of the rice thrips, *Stenchaetothrips biformis* in the rice nursery and the main field revealed a peak occurrence of the pest during the months of August and September. The pest population and its damage during the month of March were very low. The population of thrips was higher on the weed host, *Echinochloa colona* during the month of March. Significant positive association was known to exist between thrips population and their damage (r=0.82) and regression equation Y = 14.2 + 17.9X indicated that for an increase of one thrip, there would be an increase of 17.9% damage.

The regression analyses revealed that an increase of 1% RH would increase the thrips population and their damage by 0.06 and 1.867% respectively as well as increase in sunshine by one hour would reduce the thrips population by 0.017 and their damage by 0.565% in the nursery.

In the transplanted crop, increase in evening RH by 1% would increase the thrips population by 0.271 and their damage by 1.129% as well as increase in sunshine by one hour would reduce thrips damage by 0.29%. The population of thrips on *E. colona* would be increased by 0.531 for every 1°C increase in minimum temperature.

Keywords : Rice, Thrips, Seasonal incidencc, Weed host

The rice thrips, *Stenchaetothrips biformis* has attained the status of a major pest in Tamil Nadu and its outbreaks have been reported repeatedly (Velusamy *et al.*, 1975; Velusamy and Chelliah, 1980). Nymphs and adults of thrips infest the rice seedlings and then the transplanted crops within the first few weeks after transplanting especially under water stress (Chang, 1977; Thomas *et al.*, 1979).

MATERIALS AND METHODS

Studies on the seasonal incidence of thrips in the rice nursery was assessed on the rice variety IR 20. Sowings were taken at fortnightly intervals from August 1986 to July 1987. The observations on the population of thrips (both nymphs and adults) were recorded at five days inter-vals from tenth to thirteenth day after sowing. Fifteen seedlings were selected at random in three strips in each plot and the number of adults and nymphs in each seedling was counted. On each day of observation, the total number of leaves and the number of leaves damaged were recorded and

Part of M. Sc (Ag.) thesis of senior author approved by Tamil Nadu Agricultural University, Coimbatore.

Table 1. Seasonal incidence and damage by *S. biformis* in the nursery, transplanted crop and the weed *Echinochloa colona* L. (August 1986-July 1987)

Period		Population of thrips and damage				
		Nursery		Transplanted crop		Weed
		[a] Population	[b] Damage	[c] Population	[d] Damage	[e] Population
August	1st	3.5	84.8	19.8	90.2	8.7
	15th	3.7	82.8	18.3	88.2	5.9
September	1st	3.8	84.2	19.1	91.7	5.9
	15th	4.7	93.7	14.3	80.4	6.0
October	1st	2.5	88.3	10.4	50.3	4.0
	15th	2.3	40.7	9.5	40.4	3.3
November	1st	1.3	83.5	5.4	19.5	3.4
	15th	0.9	18.0	3.5	23.8	2.6
December	1st	1.5	38.2	4.8	58.9	1.4
	15th	1.9	49.3	5.9	69.9	1.6
January	1st	2.5	60.6	8.9	75.9	5.5
	15th	1.7	43.7	7.8	53.1	5.4
February	1st	1.4	23.3	3 5	19.2	1.6
	15th	0.6	12.5	2.5	10.9	2.2
March	1st	0.2	7.5	1.4	8.1	7.7
	15th	0.6	16.2	2.6	15.3	0.1
April	1st	1.4	40.0	4.1	39.9	8.6
	15th	2.0	61.9	6.1	50.3	7.2
May	1st	2.4	37.2	2.6	34.0	9.2
	15th	2.2	49.3	3.0	45.2	7.2
June	1st	1.9	65.6	3.1	37.1	5.4
	15th	3.6	65.6	4.2	40.5	4.2
July	1st	2.9	65.3	13.4	61.7	3.5
	15th	3.9	80.4	17.2	78.6	0.3

[a]Mean population of thrips in 45 seedlings

[b]Mean percentage of damaged leaves in 45 seedlings

[c]Mean population of thrips in 45 hills

[d]Mean percentage of damaged leaves in 45 hills

[e]Mean population of thlips in 25 plants

the extent of leaf damage was worked out as percentage. The data were subjected to statistical analysis for the various sowing treatments and

the different periods and their interaction was compared for existence of significant differences. Weekly observations on nymphal and adult population of thrips from August 1986 to July 1987 were also taken on 50 randomly selected hills in IR 20 in the main field by counting the total number of leaves and affected leaves and the extent of leaf damage was computed as percentage.

To study the seasonal incidence of thrips on weed host *Echinochloa colona* L., observations were made on the nymphal and adult population of thrips from August 1986 to July 1987 at fortnightly intervals from 20 leaves selected at random in each of 25 weed plants. Weather parameters comprising of tempreature, relative humidity (evening and morning humidity percentage), sunshine hours and total rainfall were recorded during the observational period. The data on the population of thrips and percentage of leaf damage in nursery and transplanted crop as well as on weed host were subjected to simple correlation and multiple regression analysis with the weather parameters. To find out the effect of weather parameters, *viz* mean temperatore (°C), morning and evening relative humidity (%), sunshine (hours) and the rainfall (mm) on the population of thrips in the weed host, correlations were determined. The simple correlation co-efficient was also worked out between the population of thrips and percentage of damage in the rice nursery.

RESULTS AND DISCUSSION

a) Nursery

The mean data on the population of thrips and their extent of damage in rice seedlings in the nursery are given in Table 1. High population of thrips ranging from 2.9-4.7 and high intensity of corresponding damage ranging from 65.3 to 93.7 per cent were observed during June, July, August and September with a peak during the second fortnight of September. The peak incidence of thrips in the months of August and September was earlier reported by Senapathy and Sathpathy (1982). Lower population of thrips was observed during November, December, February and first fortnight of March.

The analysis of the data on the various dates of sowings and corresponding damage and the damage in the different periods in each sowing revealed that the sowings done in the second fortnight of September showed maximum damage (92.1%) followed by August (89.1%) (Table 2).

In general, higher damage was noticed during sowings made in June July, August and September, exhibiting an increasing trend while minimum damage was noticed in sowings done during November, February and March. The damage was significantly lower in the sowings done during October, November, December, Februry and March except in the sowings made during second fortnight of December and January. Among the different periods in each sowing, thirps damage was significantly higher at 30 days after sowing compared to all other periods (Table2).

Table 2. Influence of date of sowing on the damage by thrips

Treatment (Date of sowing)		Damage during different periods after sowing*					
		10th day	15th day	20th day	25th day	30th day	Mean
August	1st	89.3	84.9	88.6	90.3	92.3	89.1
		(70.89)	(67.72)	(70.34)	(71.87)	(74.00)	(83.6)
	15th	84.8	82.2	80.3	87.1	83.6	83.6
		(67.05)	(65.08)	(63.69)	(69.00)	(66.29)	(66.29)
September	1st	85.1	84.1	89.4	91.9	90.8	88.3
		(67.32)	(66.57)	(71.11)	(73.65)	(72.35)	(70.20)
	15th	94.3	93.7	87.6	86.4	97.9	92.1
		(76.45)	(75.48)	(69.44)	(68.51)	(81.69)	(74.31)
October	1st	50.7	45.5	53.9	53.5	54.9	51.7
		(45.39)	(42.39)	(47.22)	(47.05)	(47.77)	(45.96)
	15th	44.3	40.7	39.9	37.7	38.2	40.1
		(41.70)	(39.62)	(39.18)	(37.87)	(38.14)	(39.30)
November	1st	28.3	27.8	26.9	21.8	23.0	25.6
		(32.12)	(31.80)	(31.13)	(27.82)	(28.67)	(30.31)
	15th	20.7	18.0	18.8	19.3	25.4	18.5
		(27.04)	(25.11)	(25.69)	(25.99)	(30.22)	(26.81)
December	1st	34.5	37.9	32.0	34.6	35.5	34.9
		(35.95)	(38.12)	(34.44)	(36.00)	(36.57)	(36.22)
	15th	40.1	49.3	47.4	43.9	39.5	44.1
		(39.28)	(44.61)	(43.50)	(41.51)	(38.93)	(41.56)
January	1st	54.9	60.6	58.2	52.7	60.7	57.5
		(47.80)	(51.12)	(49.74)	(46.55)	(51.16)	(49.27)
	15th	38.3	43.7	44.5	45.7	44.6	43.4
		(38.24)	(41.34)	(41.84)	(42.53)	(41.91)	(41.17)
February	1st	24.5	23.2	16.7	22.1	23.2	21.9
		(29.67)	(28.88)	(24.11)	(28.00)	(28.70)	(27.87)
	15th	13.8	12.5	11.7	7.1	7.9	10.6
		(21.77)	(20.67)	(19.97)	(15.37)	(16.30)	(18.81)
March	1st	6.2	7.5	7.5	9.6	10.6	8.3
		(14.43)	(15.81)	(15.84)	(18.07)	(90.00)	(16.63)
	15th	15.1	16.2	17.3	13.2	16.5	15.7
		(22.85)	(23.74)	(24.58)	(21.36)	(23.93)	(23.29)
April	1st	38.7	41.4	34.2	47.9	49.6	42.3
		(38.46)	(39.77)	(35.44)	(43.79)	(44.74)	(40.44)
	15th	59.6	61.9	54.8	55.7	56.6	57.7
		(50.53)	(51.90)	(47.48)	(48.29)	(48.80)	(49.46)

May	1st	39.9 (39.17)	37.2 (37.55)	37.1 (37.52)	39.7 (39.09)	36.8 (37.30)	38.1 (38.13)
	15th	50.6 (43.35)	49.3 (44.61)	56.9 (48.95)	52.8 (46.62)	53.9 (47.29)	52.7 (46.57)
June	1st	64.5 (51.84)	65.3 (53.95)	65.1 (53.85)	59.9 (50.75)	42.8 (52.52)	59.5 (52.58)
	15th	74.9 (59.55)	74.5 (59.73)	73.7 (59.20)	74.3 (59.32)	76.2 (60.82)	74.6 (59.76)
July	1st	84.3 (66.87)	80.4 (63.83)	85.6 (66.13)	80.9 (67.89)	83.6 (64.15)	82.9 (65.77)
	15th	85.1 (66.43)	87.4 (60 18)	87.2 (69.22)	89.5 (71.42)	82.9 (65.66)	86.5 (68.55)
Mear		50.9 (45.71)	51.7 (45.75)	50.6 (45.48)	50.4 (45.70)	51.0 (46.50)	

	Treatment	Period
CD (P = 0 05%)	1.69	0.77

* Figures in parentheses are transformed values)

Simple correlations worked out between weather factors and population of thrips revealed that the population of thrips showed a significant positive correlation with evening relative humidity ($r=0.502$) and negative correlation with sunshine hours ($r=-0.423$). The regression equation fitted with evening relative humidity showed that an increase of 1 per cent of evening relative humidity would result in an increase of 0.06 number of thrips in the nursery as well as increase in sunshine by hour would decrease 0.017 number of thrips in the nursery (Table 3).

The percentage of damage due to thrips in the nursery was positively correlated with evening relative humidity ($r=0.702$) and negatively with sunshine hours ($r=-0.605$). The regression equation fitted with the evening humidity revealed that for every 1 per cent increase in relative humidity there would be an increase of 1.87 per cent of damage by thrips and for every increase of one unit of sunshine hour, there would be a decrease of 0.57 per cent of thrips damage (Table 3). The multiple regression analysis revealed the partial regression coefficient for evening relative humidity was positively correlated with the per cent damage of thrips while the other factors did not show any significant correlation. The multiple regression equation fitted with weather parameters to predict the damage of thrips was $Y=0.0876 + 0.5033\ X_1 + 2.154\ X_2 + 0.3663\ X_3 - 0.8627\ X_4 + 0.8429\ X_5$ with $R^2 = 0.55$. From this equation it is exhibited that every increase of one per cent in relative humidity would cause an increase of 2.154% damage by thrips.

b) Transplanted crop :

The data on the population counts of damage and assessment in the transplanted crop from August 1986 to July 1987 have shown that higher population of thrips and their damage was noticed in the months of July August, September and October (13.4, 17.2, 19.8, 18.3, 19.1, 14.3, 10.4 and 9.5) while the maximum occurred during the first fortnight of August (19.8). The population was less during February, March, May and June (Table 1)

Effect of weather parameters on the population and damage of *S. biformis* in the transplanted crop indicated that the evening relative humidity was found to be positively correlated with the population of thrips (r= 0.492) and the regression equation fitted with evening relative humidity revealed that for an increase of one per cent relative humidity, there would be an increase of 0.27 number of thrips (Table 3). The thrips damage showed a significant positive correlation with evening relative humidity (r =0.4314*) and negative correlation with sunshine hours (r = -0.3198*). The regression equation revealed that for every increase of one per cent in the evening relative humidity, there would be an increase of 1.129% damage but increase in sunshine by every one hour, there would be a decrease of 0.29% damage by thrips (Table3). The multiple regression analysis made between thrips damage Vs. weather parameters did not exhibit any relationship.

c) Weed host :

The data on the seasonal incidence of rice thrips on the weed host revealed the existence of two peaks during August and March. The population was low during the months of December, February and an increasing trend was noticed until March when the population was low on the rice crop after which the population declined considerably, (Table 1). This is an indication that the thrips subsisted on this weed host during the off-season, though relatively in lower numbers. This is in concurrence with the findings of Ananthakrishnan and Kandasamy (1977). Correlation studies made with the weather parameters and population of thrips indicated that the mean temperature was found to be positively correlated with the population on the weed host (r =0.445). The regression equation obtained revealed that for every one degree centigrade increase in the mean temperature, there would be an increase of 0.53 in the numbers of thrips, The multiple regression analysis showed no significant correlation with the weather parmeters (Table 3).

Studies on the influence of date of sowing on thrips incidence has indicated that the sowings taken up in July recorded lowest damage. Within each sowing, the damage was invariably found to be the highest on the 30th day after each sowing (51.0%) and took considerable time for the damage to manifest itself on the seedlings which was directly dependent on population build up. (Table 2).

The correlation studies made between the population of thrips and

Table 3. Effect of weather factors on the population/damage of *S. biformis* in the nursery and in the transplanted crop as well as on the weed host *Echinochloa colona* L.

Thirps	Variable	Mean	S. D.	Correlation coefficients	Regression equation
Population in the nurserv	Evening relative humidity (X2)	41.33	9.94	0.502*	—0.2671+ 0.06X2
	Sunshine hours (X3)	117.31	28.28	—0.4234*	4.3—0.017X3
Damage in the Nursery	Evening relative humidity (X2)	41.33	9.94	0.702**	—23.35+1.867X2
	Sunshine hours (X3)	117.31	28.28	—0.605**	120.21—0.565X3
Population in the transplanted crop	Evening relative humidity (X2)	41.33	9.94	0.492*	3.41+ 0.2706X2
Damage in the transplanted crop	Evening relative humidity (X2)	41.33	9.94	0.4314*	2.583+ 1.129X2
	Sunshine hours (X3)	117.31	28.28	—0.3198*	83.83— 0.29X3
Population on the weed host, *Echinochola colona*	Mean temperature (X1)	26.72	2.27	0.445*	—9.188+ 0.5313 X1

* Significant at 5 per cent level
** Significant at 1 per cent level

percentage of damage in the nursery revealed the existence of a highly positive relationship (r=0.82) and he regression equation fitted was Y=14.2+17.9Xwhich indicated that for an increase of one thrip, there would be an increase of 17.9% damage.

REFERENCES

Ananthakrishnan, T. N. and Kandasamy,C. 1980. On the trends of infestation of two species of *Baliothrips* Uzel on paddy maize and their weed hosts. *Curr. Sci. 46* (10) : 344-345.

Chang, H. C. 1977. Pest management in the Peoples Republic of China. Monitoring and forecasting insect populations in rice-wheat, cotton and maize. *FAO Plant Protection Bulletin 25* : 1-8.

Senapathy, B. and Sathpathy J. M.1982. Seasonal behaviour and chemical control of rice leaf thrips, *Stenchaetothrips* biformis (Bagnall) and varietal susceptibility of rice to its infestation. *Oryza 19* : 109-113.

Thomas, M. J., Nair, S. S. and Nair N. R, 1979. Outbreak of rice thirps in Kuttanadu Kerala India. *International Rice Research Newsletter. 4* (1) : 7.

Velusamy, R., Janaki, I. P., Subramanian, A. and Chandramohan, J. 1975. Varietial resistence of rice to insect pests. *International Rice Entomolgy Newsletter 3* : 13-16.

Velusamy, R. and Chelliah, S. 1980. Rice Res. istence to thrips. *International Rice Reseasearch Newsletter 5* (1) : 7.