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Short Communicaiton

Influence of meteorological parameters on the incidence of leaf hopper in okra at Pusa, Bihar

S.K.MANDAL, ABDUS SATTAR* and S.C.GUPTA
Department of Entomology and Agril. Zoology
*Agrometeorology Section, Department of Agronomy
Rajendra Agricultural University, Bihar, Pusa (Samastipur)-848 125

Leaf hopper (*Amrasca biguttula biguttula Ishida*) is one of the important insect pests of okra (*Abelmoschus esculentus* (L) Moench) in India (Singh and Agrawal, 1988). Heavy loss in okra yield (upto 40 to 56 percent) occurs due to leaf hopper attack (Krishnaiah, 1980). The population buildup of insect pests mainly depends on meteorological parameters. Temperature, relative humidity and rainfall are the key meteorological parameters that largely affect the activity of insects. Keeping the above in view, a field experiment was carried out with the objective to study the impact of weather parameters on the incidence of leaf hopper.

Field trials were conducted at the University Apiary, Rajendra Agricultural University, Pusa Farm, Samastipur during summer seasons of 2000 and 2001 to assess the impact of weather parameters on the incidence of leaf hopper. The experiment was laid out in a randomized block design with three replications having a plot size of 3m x 2m. The crop was sown on 16th February in both the years with a spacing of 30cm x 30cm. Observations on the pest activity were recorded starting from 30 days after sowing at weekly intervals till the crop attained maturity. Leaf hopper nymphs as well as adult population were observed from three leaves consisting of 2nd, 3rd and 4th each of the 10 randomly selected tagged plants in each of the replicates after Krishnaiah *et al.* (1979). Both the leaf hopper nymphs and adults were counted on lower surface of leaves in the early morning, the time during which the leaf hopper were found inactive. The population counts in all the replicates were taken together and average population per 30 leaves per 10 plants were worked out. The weekly meteorological data were collected from the agro-meteorological observatory situated near the experimental site within the campus. Correlation analysis was carried out to find out the degree of association between the population of leaf hopper and weather parameters. Multiple regression equations were developed using these weather parameters.

The two-year weekly weather parameters alongwith the leaf hopper population (nymph and adult) are presented in Table 1. The leaf hopper population of 34 and 27 per 30 leaves were recorded at an

Table 1: Weekly average weather parameters and leaf hopper population at Pusa, Bihar

Standard met. weeks		2000						2001					
		Leaf hopper population	Max temp (^{0}C)	Min temp. (^{0}C)	RH(%) 0700 hrs	RH (%) 1400 hrs	Rainfall (mm)	Leaf hopper population	Max temp (^{0}C)	Min temp. (^{0}C)	RH(%) 0700 hrs	RH (%) 1400 hrs	Rainfall (mm)
			(X_1)	(X_2)	(X_3)	(X_4)	(X_5)		(X_1)	(X_2)	(X_3)	(X_4)	(X_5)
10	5-11 Mar	34	29.4	15.1	79	43	5.0	27	31.4	13.5	83	28	0
11	12-18	50	31.5	14.2	78	36	0	45	33.4	16.3	73	28	0
12	19-25	68	34.6	15.9	81	30	0	62	33.8	17.4	83	33	0
13	26-01Apr.	135	38.0	17.5	54	21	0	115	35.9	16.8	77	20	0
14	2-8	198	36.6	20.0	70	37	0	149	37.2	21.0	75	32	0
15	9-15	186	35.0	22.4	83	49	21.0	170	34.5	19.8	73	31	6.0
16	16-22	229	35.2	22.7	86	51	18.0	216	37.0	27.5	67	38	0
17	23-29	197	34.9	23.9	81	53	0	194	32.9	23.1	77	59	80.0
18	30-06 May	174	33.7	25.6	77	45	0	159	31.5	23.8	84	57	11.0
19	07-13	156	38.8	25.5	85	59	58.0	147	33.2	24.8	80	57	27.0
20	14-20	137	31.5	24.5	86	69	74.6	176	35.0	24.7	85	53	50.0
21	21-27	108	32.5	24.7	87	69	41.0	125	32.4	25.5	86	65	38.5
22	28-03 June	95	34.1	26.3	87	71	116.0	97	33.1	25.6	85	67	12.5
23	04-10	91	34.8	25.8	90	69	94.0	94	34.1	27.1	82	59	11.0
24	11-17	87	32.4	26.1	91	77	112.0	95	32.0	26.0	92	75	213.5
25	18-24	85	34.3	22.0	84	69	13.7	80	33.8	23.1	86	68	24.0

Table 2 : Correlation coefficients between weather parameters and leaf hoper population

Weather parameters	Correlation coefficients
Maximum temperature (^{0}C)	0.607**
Minimum temperature (^{0}C)	0.359*
Relative humidity (%) at 700 hrs.	-0.196
Relative humidity (%) at 14 00hrs.	0.025
Rainfall (mm)	-0.107

: Significant at 5% level **: Significant at 1% level

early stage of crop growth in 10th standard meteorological week (smw) in 2000 and 2001 respectively, when the ambient temperatures were recorded between 15.1°C to 29.4°C in 2000 and 13.5°C to 31.4°C in 2001. The threshold level for occurrence of epidemic by the insect is two leaf hoppers per leaf. Relative humidity of 43 percent (1400hrs) to 79 percent (0700hrs) were recorded in 2000 and 28 percent (1400hrs) to 83 percent (0700hrs) in 2001. Rainfall of 5.0 mm was observed during the year. Initial population in 10th smw started to increase progressively during 13th to 16th smw and attained its peak (229 and 216 per 30 leaves) in 16th smw in 2000. Afterwards, gradual decline in population continued during 17th to 25th smw and reached a population level of 85 and 80 per 30 leaves in 25th smw

The population trends reversed later showing steep fall in 17th smw from 229 to 197 per 30 leaves in 2000 and 216 to 194 per 30 leaves in 2001. The findings in respect of early leaf hopper manifestation and its continuance with varied population level up to crop harvest are in conformity to the reports of Dhamdhere *et al.* (1984) and Chaudhary (1987).

Correlation coefficients were worked out between population build up of leaf hopper and mean weather parameters on the basis of pooled data of 2000-2001 (Table 2). The build up had highly significant positive correlation with maximum temperature (r=0.607**) while the correlation with minimum temperature was found significant (r=0.359*) and positively correlated. Mebbet *et al.* (1984) and Dhamdhere *et al.* (1984) also reported that the population build up of leaf hopper was positively correlated with temperature. The relationship with relative humidity at 700hrs and rainfall was insignificant and correlated (Table 2).

Multiple regression analysis indicated significant correlation with both maximum and minimum temperatures which revealed that with unit increase (1°C) in temperatures it will bring about 9 and 4 numbers of leaf hoppers for 30 leaves. Multiple regression analysis showed that weather parameters accounted for 51.82

per cent of total variation in the leaf hopper population. The equation is as follows

$$Y = -112.413 + 8.682 X_1 + 3.572 X_2 - 2.618 X_3 + 1.020 X_4 - 0.092 X_5$$

$(R^2 = 51.8\%)$

Where,

X_1 = Maximum temperature (°C)
X_2 = Minimum temperature (°C)
X_3 = Relative humidity (%) at 0700 hrs.
X_4 = Relative humidity (%) at 1400 hrs.
X_5 = Rainfall (mm)

REFERENCES

Chaudhary, R.S. 1987. Residues and residual effectiveness of some organophasphorus insecticides against pest complex in okra, *Abelmoschus esculentus* (2) Moench Ph.D. Thesis submitted to R.A.U., Pusa, Bihar, pp **52**:188-189.

Dhamdhere, S.V., Bahadur, J. and Misra, U.S. 1984. Studies on occurrence and succession of pests of okra at Gwalior. *Indian J. Pl. Prot*,**12**: 9-12.

Krishnaiah, K. 1980. Methodology for assessing crop losses due to pests of vegetables, In Assessment of crop losses due to pests and disease, UAS, Bangalore, India. Eds H.C Govinda G.K. Veeresh P.T. Walker and J.H. Junkun. Proceeding of the Workshop held from September 19-30 1977 at University of Agricultural Sciences, Hebbal, Bangalore, India, pp 259-267.

Krishnaiah, K. Ramchander, P.R., Jagon Mohan, N. and Wahi, S.D. 1979. Sampling technique for estimation of jassid population in okra. *Indian J. Ent*., **41**(2):200-202.

Mebbet, T. Nachaping, M. Monglakul, K. and Mekdaing, J. 1984. Distribution of cotton of *Amrasca divastons* and *A. chalophora* in relation pest scouting techniques for Thiland. Trop. *Pest Manag*., **30**:133-141.

Singh, R. and R.A.Agrawal 1998. Role of chemical components of resistant and susceptible genotypes of cotton and okra in ovipositional preference of cotton leaf hopper, In: Proc. *Indian Acad. Sci (Animal Sci.)*, **97**:545-50