Pest Management in Horticultural Ecosystems,
Vol. 20, No. 1 pp 47-49 (2014)

Population dynamics of *Tetranychus urticae* Koch on brinjal crop under north Bihar conditions

V. L. MONICA, ANIL KUMAR, HARI CHAND, SUDHIR PASWAN* and KUMAR SANJEEV*

Department of Entomology, Sugarcane Research Institute, Rajendra Agricultural University,
Bihar, Pusa, Samastipur-848125, India
E-mail : agri_anil@rediffmail.com

ABSTRACT: Studies were conducted to determine the population dynamics of two spotted spider mite, *Tetranychus urticae* Koch on brinjal crop under north Bihar condition from March to August, 2012. The mite population appeared initially at lower level with an average of 0.57 mites per cm^2 leaf area. Population gradually increased from April to June and recorded maximum 6.91 mites per cm^2 leaf areain the first week of June and then sharply declined from 4^{th} week of June onward. The relationship between the population of *T. urticae* and the weather parameters showed significant positive correlation with maximum temperature and significant negative correlation with the relative humidity at 0700 hrs, when the temperature increased the mite population also increased and with increasing relative humidity at 0700 hrs, the mite population decreased

Keywords : Brinjal, *Tetranychus urticae*, weather parameters

INTRODUCTION

Brinjal is subjected to attack by a number of insect and non-insect pests from nursery stage to harvest. Among the non-insect pests, mites are probably the most notorious ones and gaining tremendous importance in the recent years due to their devastating nature. On vegetables alone, spider mites damage accounts from 10-15 per cent yield loss (Anon., 1991). Basu and Pramanik (1968) ranked red spider mite as a major pest next to fruit and shoot borer in brinjal. The use of improper pesticides has led to develop resistance to acaricides and resurgence of this pest very often. Present study reports the population fluctuations of mite in relation to weather factors.

MATERIALS AND METHODS

A fixed plot survey was conducted at Research Farm, Rajendra Agricultural University, Pusa (Bihar) during 2012 from March to August to assess the population dynamics of two spider mite on brinjal. For this purpose, brinjal local variety 'Plaster' was raised in plots with row to row and plant to plant spacing of 75 x 65 sq. cm. The crop was grown by adopting all the recommended agronomic practices uniformly, keeping them completely free from insecticidal contamination.

The observations were recorded at weekly intervals. For sampling, five plants were randomly selected and three leaves covering from the top, middle and bottom canopy of brinjal were sampled separately. Mites were counted by marking 1 cm^2 leaf area in different samples and recorded. The data obtained was finally used to work out the mean number of mites per 1 cm^2 leaf area. The mite population was correlated with average maximum, minimum temperature (^{0}C), relative humidity (%) at 0700 hrs and 1400 hrs and total rainfall (mm). The meteorological data during crop season was recorded from Department of Meteorology, R.A.U., Pusa. Correlation coefficient and multiple linear regression were also worked out to study the influence of abiotic factors on pest population.

RESULTS AND DISCUSSION

The study revealed that during summer the mite population appeared 45 days after transplanting of brinjal (Fig.1). In the third week of March, the initial population of mite was at lower level with an average of 0.57 mites per 1 cm^2 leaf area. The mite population became significant from the fourth week of April (2.03 mites per 1 cm^2 leaf area) and there was a gradual increase in the mite population in the months of May and June. It is evident from the Fig.1 that the pest activity was peak (6.91 mites per 1 cm^2 leaf area) in the first week of June. The sharp decline in pest population (2.83 mites per 1 cm2 leaf area) was noticed in the fourth week of June onwards, whereas the minimum population (0.67 mites per 1 cm^2 leaf area) was observed during the fourth week of July.

As far as the effect of weather parameters is concerned, the maximum population of mites (6.91 mites

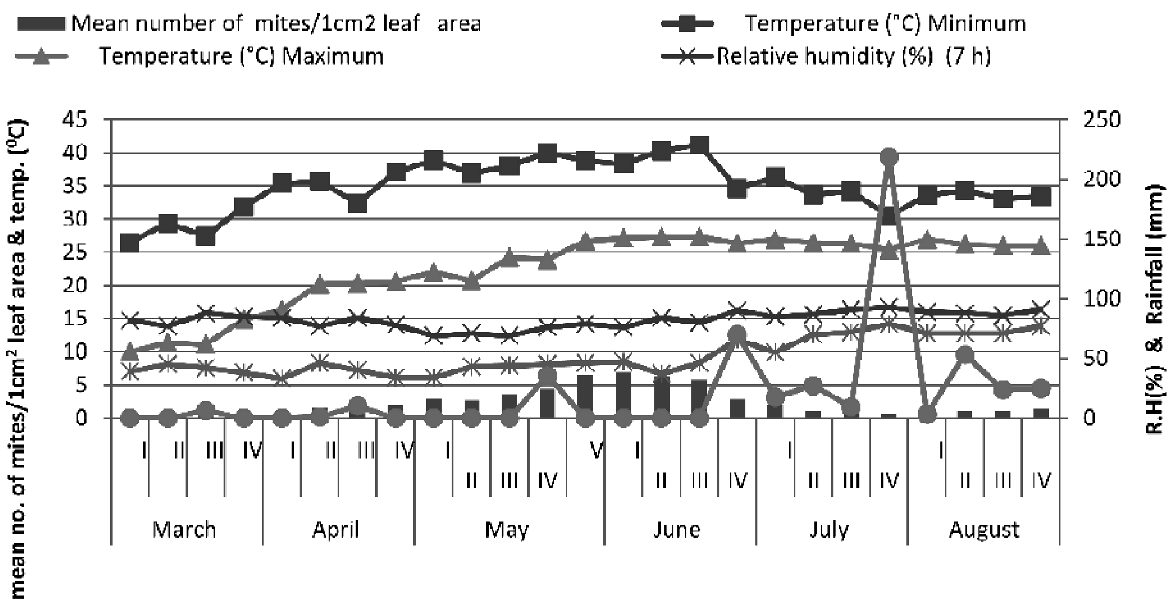

Fig. 1. Population dynamics of *Tetranychus urticae* on brinjal in relation to weather parameters.

per cm^2 leaf area) was recorded during the first week of June with corresponding weather parameters *i.e.*, maximum, minimum temperature (^{0}C), relative humidity (%) at 07 hrs and 14 hrs were 38.3, 27.1, 76, and 47, respectively. During this period of observation, there was no rainfall. The minimum mite population (0.67 mites per 1 cm^2 leaf area) was recorded during fourth week of July when the weather parameters *i.e.*, maximum, minimum temperature (^{0}C), relative humidity (%) at 07 hrs and 14 hrs and rainfall (mm) were 30.5, 25.4, 93, 79 and

Table 1. Correlation matrix: Effect of abiotic factors on red spider mite, *Tetranychus urticae* Koch population on brinjal

Population	No. of of observations	Temperature (^{0}C)		Relative humidity (%)		Rainfall (mm)
		Maximum (X_1)	Minimum (X_2)	07 00 hrs (X_3)	14 00 hrs (X_4)	(X_5)
T. urticae (Y)	25	0.814*	0.298 NS	-0.425*	-0.263 NS	-0.199 NS

* Significant at 5% probability level.
NS = Non-significant.

Table 2. Multiple linear regression models for abiotic factors on *Tetranychus urticae* Koch population

Population	No. of observations	Pure Constant	Temperature (^{0}C)		Relative humidity (%)		Rainfall (mm) (X_5)
			Maximum (X_1)	Minimum (X_2)	07 00 hrs (X_3)	14 00 hrs (X_4)	
T. urticae **(Y)**	25	0.866	0.025	0.337	-0.022	-0.100	-0.002

Multiple linear regression equation: $Y = 0.866 + 0.025 (X_1) + 0.337 (X_2) - 0.022 (X_3) - 0.100 (X_4) + 0.002 (X_5)$
Coefficient of determination (R^2) = 0.735*
*significant at 5% probability

218.4 respectively. The severe occurrence of two spider mite population in May to mid June is in close confirmity with results of Pande and Yadava (1975) and Gupta and Gupta (1985) who also reported that the occurrence of *T. cinnabarinus* was severe from May to middle of July in West Bengal.

Simple correlation was worked out between abiotic factors and mite population (Table 1). It was observed that, the maximum temperature and relative humidity recorded at 0700 hrs showed significant effect on the pest population. The maximum temperature maintained highly positive correlation, while the relative humidity recorded at 0700 hrs maintained negative correlation with the pest population, the correlation coefficient (r) being 0.814 and -0.425 respectively. The minimum temperature (r = 0.298) did not show any significant effect on the mite population. The relative humidity recorded at 1400 hrs (r = -0.263) and rainfall (r = -0.199) showed negative and a non significant effect on the mite population. Multiple linear regression was also worked by taking mite population as dependent variable and climatic factors (Tables 1 & 2) as independent variables. Data revealed that coefficient of determination (R^2) was significantly high 73.50 percent. Among the weather factors, maximum temperature was positively correlated while, relative humidity was negatively correlated and significant which was in conformity with Sanap *et al*. (1985), Borah (1987) and Lingeri *et al*. (1998) who reported that higher temperature and lower relative humidity played an important role in development and population build up of mite. Thus, it may be inferred that higher temperature and relative humidity at 0700 hrs are congenial weather parameters for increase in mite population.

REFERENCES

Anonymous, 1991. Mites of agricultural importance in India and their management. *Technology Bulletin No. 1*. All India Coordinated Research Project on Agricultural Acarology, UAS, Bangalore, p.18.

Basu, A. C. and Pramanik, L. M. 1968. Acaricidal tests of nine pesticides against two spotted spider mite, a serious pest of brinjal in West Bengal. *Journal of Economic Entomology*, **61** : 768 – 770.

Borah, D. C. 1987. Bio-ecology of *Polyphagotarsonemus latus* Banks (Acari : Tarsonemidae) an *Scirtothrips dorsalis* Hood (Thysanoptera : Thripidae) infesting chilli and their natural enemies. *Ph.D. Thesis,* University of Agricultural Sciences, Dharwad.

Gupta, V. N. and Gupta, S. K. 1985. Mites associated with vegetable crops in West Bengal. *Indian Journal of Acarology,* **10** : 61 – 64.

Lingeri, M. S., Awaknavar, J. S., Lingappa, S., and Kulkarni, K. A. 1998. Seasonal incidence of chilli, mites, *Polyphagotarsonemus latus* (Banks) and thrips, *Scirtothrips dorsalis* (Hood). *Karnataka Journal of Agricultural Sciences*, **11** : 380 – 385.

Pande, Y. D. and Yadava, S. R. S. 1975. Plant mites infesting brinjal and their predators in semi arid region of Rajasthan. *Indian Journal of Plant Protection*, **3** : 197 – 199.

Sanap, M. M., Nawale, R. N. and Ajri, D. S. 1985. Seasonal incidence of chilli thrips and mites *Journal of Maharashtra Agricultural Universities*. **10**: 345– 346.

MS Received : 17 January 2014
MS Accepted : 24 March 2014