



PHYTOPHAGOUS MITES ASSOCIATED WITH VEGETABLE NURSERIES UNDER SOUTH GUJARAT

ABHISHEK SHUKLA* AND G.G. RADADIA

All India Network Project on Agricultural Acarology, Department of Entomology, N.M. College of Agriculture
Navsari Agricultural University, Navsari 396450, Gujarat

*Corresponding author; Email: abhishekshukla@nau.in

ABSTRACT

The two spotted spider mite, *Tetranychus urticae* Koch (Tetranychidae: Acari) remains active during nursery stage of brinjal and tomato, while the yellow mite, *Polyphagotarsonemus latus* (Banks) (Tarsonemidae: Acari) remains active in chilli nursery. Higher mite pest activities were recorded in summer nurseries followed by kharif and rabi nurseries of brinjal, tomato and chilli.

Keywords: Phytphagous mites, nursery, vegetables

INTRODUCTION

Horticultural nurseries are exceedingly complex agricultural systems, making pest and pathogen management very challenging. Compared to crop monocultures, nurseries are characterized by extreme heterogeneity in plant material. The typical agricultural row crop contains a single cultivar of a single species, grown over hundreds or even thousands of acres. The seedlings grown in these nurseries are very much vulnerable to the attack of insect pests and mites. The congenial environment of these nurseries provides a favorable micro-climate to phytophagous mites to multiply rapidly. The carryover of these nurseries serve as a source of mite infestation in field conditions.. Considering the importance of mite pests in vegetable and the severe losses caused by the mites in some of the commonly grown vegetables like brinjal, tomato and chilli, there is a need to document the mites infesting vegetable nurseries so that appropriate management strategies of these mite pests were initiated. Thus, the present studies were carried out to identify the common mites of these vegetable seedlings in nurseries and their activities in various period of time under south Gujarat.

MATERIAL AND METHODS

The present study was carried out at Regional Horticultural Research Station, Navsari Agricultural university, Navsari where the seedlings of most commonly grown vegetables viz., brinjal, tomato and chilli are grown round the year. For the sampling five seedlings of each vegetable were selected randomly from the nurseries and the three leaves (top, middle and bottom) were plucked and brought to Acarology

laboratory in separate plastic bags. These leaves were observed under stereo-zoom binocular microscope. All the mobile stages of mite found on these leaves were recorded. The number of mobile stages present on leaves were recorded from the 2 cm² leaf area. The observations were recorded during three season *i.e.* summer (15 February to 15 May), kharif (15 June to 15 September) and rabi (15 November to 15 January) on the three vegetable seedlings *viz.*, brinjal, tomato and chilli.

RESULTS AND DISCUSSION

The results on plant mite presence on various vegetable seedlings were presented and discussed. During the present study the most dominant mite species recorded were two spotted red spider mite, *Tetranychus urticae* Koch (Family: Tetranychidae) on brinjal and tomato and yellow mite, *Polyphagotarsonemus latus* (Banks) (Family: Tarsonomidae) on chilli throughout the period of study. Hence, the crop wise details are presented herewith.

Brinjal: During the year 2012-13, in summer nursery the incidence of *T. urticae* ranged between 1.20 to 4.53 mites per leaf with the seasonal mean of 2.10 mites per leaf. In kharif nurseries the mite population ranged between 1.21 to 2.93 mites per leaf with a seasonal mean of 1.97 mites per leaf, however, during rabi season the *T. urticae* incidence ranged between 1.80 to 3.70 mites per leaf with the seasonal mean of 2.47 per leaf. During 2013-14 the mite population was also recorded in three seasons and the data are presented in Table 2. In summer, the population of *T. urticae* ranged between 2.00 to 5.20 mites per leaf with the seasonal mean of 3.20 mites per leaf, whereas during kharif nurseries of brinjal the mite

population ranged between 0.80 to 2.40 per leaf with an average of 1.34 per leaf. Similarly in rabi nursery, the mite population varied between 1.50 to 2.60 mites per leaf with an average of 1.93 mites per leaf. The spider mite population in brinjal nurseries was also recorded during the year 2014-15 and the data are presented in the Table 1. It is evident from the data that in summer the mite population varied between 1.80 to 2.83 per leaf with seasonal mean of 2.39 mites per leaf, while in kharif nurseries the spider mite population ranged between 1.31 to 2.90 per leaf with seasonal mean of 2.09 mites per leaf. However, in rabi, it ranged between 0.87 to 2.10 mites per leaf with the mean of 1.61 mites per leaf. In year 2015-16, the spider mite population in brinjal nurseries varied between 1.00 to 2.80 per leaf with the seasonal mean of 2.11 mites per leaf. In kharif nurseries the infestation ranged between 1.20 to 4.20 mites per leaf with seasonal mean of 2.03 mites per leaf. During the rabi season the spider mite population varied between 1.23 to 2.27 mites per leaf with the average of 1.71 mites per leaf. The pooled over data of all the periods are presented in Table 1. The data indicated that during summer season the spider mite population varied between 1.75 to 3.17 mites per leaf with the mean of 2.48 mites per leaf, while in kharif brinjal nurseries the spider mite population ranged between 1.60 to 2.41 mites per leaf with an average of 1.92 mites per leaf. In rabi nurseries the spider mite population ranged between 1.64 to 2.22 mites per leaf with seasonal mean of 1.94 per leaf. So, on the basis of the present study carried out during 2012-13 to 2015-16, it can be concluded that the two spotted red spider mite, *Tetranychus urticae* Koch remained active on brinjal seedlings in nursery stage with maximum activities during summer nurseries followed by kharif and rabi nurseries of brinjal. Likewise, spider mite was also reported a common pest of brinjal from other parts of India by Rai *et al.* (1995) and Veeravel *et al.* (1995) thus closely support the present findings. Further, Roopa (2005) reported that spider mites appeared on brinjal much earlier on summer crop as compared to kharif and rabi in brinjal.

Tomato: In tomato nurseries the presence of spider mite, *T. urticae* was noticed. During 2012-13, in summer season the spider mite population ranged between 0.70 to 1.90 mites per leaf with an average of 1.34 mites per leaf, while in kharif nurseries this ranged between 1.21 to 2.93 mites per leaf with seasonal average of 0.87 mite per leaflet. During 2013-14, the spider mite population during summer nurseries ranged between 0.60 to 2.40 mites per leaflet with the seasonal mean of 1.04 mites per leaf, however in kharif nurseries the population of spider mites ranged between 0.20 to 2.60 mites per leaf with an average of 0.90 mites per leaf. In rabi nurseries this varied between 0.10 to 1.60 mites per leaf with seasonal mean of 0.81 mite per leaf. In year 2014-15, the

spider mite population on tomato during summer ranged between 0.27 to 2.73 mites per leaf with the seasonal mean of 1.38 mites per leaf whereas during kharif it varied between 0.43 to 1.76 mites per leaf with seasonal mean of 1.10 mites per leaf. In case of rabi nurseries the spider mite population on tomato seedlings was ranged between 0.63 to 1.20 mites per leaf with seasonal mean of 0.90 mites per leaf. In the year 2015 -16 during summer, the spider mite population ranged between 1.00 to 2.67 mites per leaf with seasonal mean of 2.25 per leaf, in kharif nurseries the spider mite population varied between 1.00 to 3.40 mites per leaf with an average of 1.30 mites per leaf and during rabi season the spider mite population varied between 1.00 to 2.20 mites per leaf with seasonal mean of 1.47 mites per leaf. The pooled data of all the years are presented in Table 2 showed that the spider mite population varied between 0.93 to 1.94 mites per leaf during summer with seasonal mean of 1.50 mites per leaflet, however during kharif season the spider mite population varied between 1.00 to 1.65 mites per leaf with seasonal mean of 1.32 mites per leaf. During rabi the spider mite population in tomato nurseries varied between 0.68 to 1.27 mites per leaf with seasonal mean of 1.01 mites per leaf. From the present study, it can be concluded that two spotted red spider mite, *T. urticae* was active in tomato nurseries throughout the year and its higher activities were noticed during summer season, followed by kharif and rabi season nurseries of tomato. Pokle and Shukla (2015) from Navsari in a study recorded *T. urticae* as a common mite pest inhibiting tomato both in nurseries and greenhouses.

Chilli: In chilli nurseries the yellow mite (*P. latus*) was recorded throughout the experimental period. During 2012-13, in summer season the yellow mite population on chilli was ranged between 0.63 to 1.47 mites per leaf with the seasonal mean of 1.20 mites per leaf. In kharif nurseries, the population of yellow mite varied between 0.46 to 1.80 per leaf with an average of 1.09 mites per leaf. However, during rabi nurseries the population varied between 0.30 to 1.42 mites per leaf with seasonal mean of 1.03 mites per leaf. During the year 2013-14, in summer nurseries, the yellow mite population varied between 1.00 to 2.40 mites per leaf with an average of 1.34 mites per leaf, whereas in kharif, it ranged between 0.20 to 1.21 mites per leaf with an average of 0.64 mites per leaf. In rabi season the yellow mite population varied between 0.53 to 1.40 mites per leaf with seasonal mean of 0.94 mites per leaf. In 2014-15, in summer nurseries the yellow mite population ranged between 0.23 to 1.80 mites per leaf with an average of 1.12 mites per leaf, while in kharif nurseries the population of yellow mite ranged between 0.60 to 1.80 mites per leaf with an average of 1.06 mites per leaf. In rabi nurseries the population ranged between 0.50 to

Table 1. Activity of spider mite *T. urticae* in Brinjal nurseries

SMW	Year-2012					Year-2013					Year-2014					Year-2015					Pooled								
	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW
7	1.47	24	2.00	46	2.00	7	3.70	24	2.40	46	2.60	24	2.40	46	1.93	7	2.00	24	2.26	46	1.66	7	2.44	24	2.27	46	2.05		
8	1.40	25	2.46	47	2.10	8	3.60	25	1.80	47	2.10	8	2.57	25	2.90	47	1.90	8	2.80	25	2.48	47	1.80	8	2.59	25	2.41	47	1.98
9	1.31	26	2.93	48	2.17	9	3.10	26	1.40	48	2.00	9	2.43	26	2.17	48	2.00	9	3.00	26	2.61	48	1.44	9	2.46	26	2.28	48	1.90
10	1.53	27	1.27	49	2.60	10	3.50	27	1.60	49	1.74	10	2.51	27	1.83	49	2.10	10	2.60	27	2.40	49	1.46	10	2.54	27	1.78	49	1.98
11	1.57	28	1.41	50	2.00	11	3.70	28	1.00	50	1.58	11	2.40	28	1.31	50	2.00	11	2.00	28	4.20	50	1.23	11	2.42	28	1.98	50	1.70
12	2.00	29	1.37	51	2.00	12	3.50	29	1.40	51	2.00	12	2.80	29	1.93	51	1.57	12	2.20	29	3.40	51	1.48	12	2.63	29	2.03	51	1.76
13	2.10	30	1.21	52	1.80	13	3.60	30	1.00	52	1.70	13	2.83	30	1.71	52	1.43	13	1.81	30	2.80	52	1.63	13	2.59	30	1.68	52	1.64
14	3.70	21	1.97	01	2.90	14	3.70	21	1.60	01	2.10	14	2.67	21	1.43	01	1.27	14	2.61	21	2.20	01	2.21	14	3.17	21	1.80	01	2.12
15	4.20	32	1.50	02	3.50	15	2.20	32	1.60	02	2.00	15	2.40	32	2.00	02	1.10	15	2.20	32	1.30	02	2.27	15	2.75	32	1.60	02	2.22
16	4.53	33	2.40	03	3.70	16	2.10	33	0.80	03	1.50	16	2.00	33	2.38	03	0.87	16	2.00	33	1.80	03	2.00	16	2.66	33	1.85	03	2.02
17	2.20	34	2.10	Mean	2.47	17	5.20	34	1.40	Mean	1.93	17	2.40	34	2.63	Mean	1.61	17	1.00	34	1.20	Mean	1.71	17	2.70	34	1.83	Mean	1.94
18	1.40	35	2.40			18	2.00	35	1.20			18	1.80	35	2.10			18	1.80	35	2.00			18	1.75	35	1.93		
19	1.20	36	2.10			19	2.80	36	0.80			19	2.10	36	2.87			19	2.20	36	1.40			19	2.08	36	1.79		
20	1.20	37	2.50			20	2.20	37	0.80			20	2.00	37	1.73			20	2.40	37	1.46			20	1.95	37	1.62		
Mean	2.12	Mean	1.97			Mean	3.20	Mean	1.34			Mean	2.39	Mean	2.09			Mean	2.18	Mean	2.03			Mean	2.48	Mean	1.92		

*S- Summer, K- Kharif, R- Rabi

Table 2. Population of spider mite *T. urticae* in Tomato nurseries

SMW	Year-2012					Year-2013					Year-2014					Year-2015					Pooled								
	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW	R	S	SMW	K	SMW	R				
7	1.57	24	1.40	46	1.00	7	0.80	24	0.80	46	0.80	7	2.73	24	0.61	46	1.00	7	2.60	24	1.80	46	1.68	7	1.94	24	1.15	46	1.12
8	1.50	25	1.57	47	1.00	8	0.60	25	0.47	47	0.86	8	2.10	25	0.43	47	1.00	8	2.60	25	1.60	47	1.60	8	1.70	25	1.00	47	1.12
9	1.46	26	0.71	48	1.00	9	0.70	26	0.80	48	1.10	9	2.10	26	0.67	48	1.00	9	2.67	26	2.00	48	1.66	9	1.73	26	1.05	48	1.19
10	1.86	27	0.80	49	1.00	10	0.90	27	1.20	49	1.20	10	2.00	27	0.93	49	1.20	10	2.20	27	2.60	49	1.69	10	1.74	27	1.38	49	1.27
11	1.90	28	0.93	50	0.60	11	0.60	28	0.80	50	1.60	11	2.33	28	0.66	50	0.60	11	2.40	28	3.40	50	2.20	11	1.81	28	1.44	50	1.25
12	1.70	29	1.37	51	0.87	12	0.80	29	0.40	51	0.90	12	1.67	29	0.98	51	0.63	12	2.20	29	2.60	51	1.41	12	1.59	29	1.34	51	0.95
13	1.50	30	1.21	52	0.50	13	0.80	30	0.60	52	0.70	13	1.23	30	0.90	52	0.77	13	2.27	30	2.40	52	1.27	13	1.45	30	1.28	52	0.81
14	1.30	21	1.50	01	0.20	14	1.00	21	2.60	01	0.30	14	0.87	21	1.10	01	1.00	14	2.60	21	1.40	01	1.20	14	1.44	21	1.65	01	0.93
15	1.10	32	1.71	02	0.60	15	1.20	32	1.40	02	0.10	15	0.27	32	1.38	02	1.00	15	2.20	32	1.00	02	1.00	15	1.19	32	1.37	02	0.68
16	0.70	33	1.40	03	0.97	16	1.00	33	0.80	03	0.60	16	1.00	33	1.76	03	0.69	16	1.00	33	1.46	03	1.00	16	0.93	33	1.36	03	0.82
17	1.00	34	1.95	Mean	0.87	17	0.60	34	1.40	Mean	0.81	17	1.00	34	1.60	Mean	0.88	17	2.60	34	1.60	Mean	1.47	17	1.30	34	1.64	Mean	1.01
18	1.10	35	2.00			18	2.40	35	0.20			18	1.00	35	1.40			18	1.80	35	1.40			18	1.58	35	1.25		
19	1.10	36	1.20			19	2.00	36	0.40			19	0.40	36	1.53			19	2.40	36	1.47			19	1.48	36	1.15		
20	1.00	37	1.50			20	1.20	37	0.87			20	0.70	37	1.47			20	2.00	37	2.00			20	1.23	37	1.44		
Mean	1.34	Mean	1.37			Mean	1.04	Mean	0.94			Mean	1.38	Mean	1.10			Mean	2.25	Mean	1.90			Mean	1.51	Mean	1.32		

*S- Summer, K- Kharif, R- Rabi

Table 3. Population of yellow mite *P. latius* in Chilli nurseries

SMW	Year-2012				Year-2013				Year-2014				Year-2015				Pooled						
	S	SMW	K	R	S	SMW	K	R	S	SMW	K	R	S	SMW	K	R	S	SMW	K	R			
7	1.20	24	0.60	46	1.21	7	1.40	24	0.20	24	1.60	24	1.80	46	1.00	46	0.80	7	1.35	24	0.90	46	1.05
8	1.23	25	0.60	47	1.37	8	1.47	25	1.00	47	1.41	25	1.27	47	1.00	47	1.00	8	1.40	25	0.97	47	1.19
9	1.20	26	0.46	48	1.42	9	1.63	26	1.20	48	1.27	26	1.00	48	0.93	48	1.20	9	1.45	26	1.22	48	1.19
10	1.37	27	0.58	49	1.00	10	1.40	27	0.80	49	1.00	27	0.73	49	0.87	49	1.20	10	1.37	27	0.98	49	1.02
11	1.40	28	0.93	50	1.00	11	1.37	28	0.67	50	1.00	28	0.91	50	0.63	50	1.00	11	1.34	28	1.36	50	0.91
12	1.47	29	0.57	51	1.00	12	1.32	29	0.42	51	0.80	29	1.00	51	0.57	51	1.67	12	1.30	29	1.09	51	1.01
13	1.28	30	1.00	52	1.00	13	1.10	30	0.45	52	0.86	30	1.46	52	0.50	52	1.46	13	1.05	30	1.15	52	0.96
14	1.30	21	1.63	01	0.30	14	2.40	21	0.80	01	0.74	21	1.63	01	0.80	01	1.21	14	1.24	21	1.27	01	0.76
15	1.30	32	1.57	02	0.60	15	1.30	32	0.80	02	0.71	32	1.77	02	0.91	02	1.40	15	0.91	32	1.34	02	0.91
16	1.30	33	1.67	03	1.40	16	1.00	33	0.60	03	0.53	33	1.10	03	1.00	03	1.46	16	1.03	33	1.19	03	1.10
17	1.46	34	1.00	Mean	1.03	17	1.40	34	0.60	Mean	0.94	34	0.87	Mean	0.82	34	1.24	17	1.22	34	0.93	Mean	1.01
18	0.90	35	1.40			18	1.00	35	0.60		0.87	35	0.74		0.82	35	2.21	18	0.84	35	1.24		
19	0.63	36	1.57			19	1.00	36	1.00		0.60	36	0.67		0.82	36	1.00	19	0.81	36	1.06		
20	0.80	37	1.80			20	1.00	37	0.20		0.73	37	0.60		0.82	37	0.67	20	0.91	37	0.82		
Mean	1.20	Mean	1.09			Mean	1.34	Mean	0.64		1.12	Mean	1.06		1.12	Mean	1.56	Mean	1.16	Mean	1.11		

*S- Summer, K- Kharif, R- Rabi

1.00 mites per leaf with the seasonal mean of 0.82 mite per leaf. In year 2015-16, the yellow mite population during summer nurseries ranged between 0.60 to 1.21 per leaf with seasonal mean of 0.95 mites per leaf. In kharif nurseries the yellow mite population ranged between 0.67 to 3.00 per leaf with an average of 1.56 mites per leaf. During rabi the mite population ranged between 0.80 to 1.67 mites per leaf with an average of 1.24 mites per leaf. The pooled data of the study period are presented in the Table 5 revealed that during summer nurseries of chilli the yellow mite, *P. latus* population varied between 0.87 to 1.45 mites per leaf with seasonal mean of 1.16 mites per leaf, while during kharif the yellow mite population ranged between 0.82 to 1.36 mites per leaf with seasonal mean of 0.82 to 1.36 mites per leaf. In case of rabi nurseries the pooled data indicated that the yellow mite population varied between 0.76 to 1.19 mites per leaf with seasonal mean of 1.01 mites per leaf. It can be concluded from the above study that, the yellow mite, *Polyphagotarsonemus latus* (Banks) remains active throughout the year in chilli nurseries. The higher number of yellow mite population was observed during summer nurseries of chilli followed by kharif and rabi nurseries of chilli. The present study gets support from earlier work of Reddy and Puttaswamy (1984) by reporting *P. latus* as a common mite species in chilli nurseries at Bangalore. Further, Patil and Nandihalli (2009) and Asma and Hanumantharaya (2015) also reported the *P. latus* as a major mite species infesting the chilli in nurseries as well as field.

ACKNOWLEDGEMENT

The authors are thankful to the Principal, N.M. College of agriculture, Navsari and to the Director of Research and Dean P.G. Studies, Navsari Agricultural University, Navsari for providing all the necessary facilities during the course of study. Further, we are thankful to Network coordinator, AINP on Agricultural Acarology for providing financial support in the project.

REFERENCES

- Asma, A. and Hanumantharaya, L. (2015). Population dynamics of major insect and mite pests of chilli. *Journal of Experimental Zoology*. **18**(1):173-176.
- Patil, R. S. and Nandihalli, B. S. (2009). Seasonal incidence of mite pests on brinjal and chilli. *Karnataka Journal of Agricultural Sciences*. **22**(3):729-731.
- Pokle, P.P. and Shukla, A. (2015). Biodiversity of phytophagous mites on commonly grown vegetables at Navsari, Gujarat. *J. Exp. Zool., India*, **18** (2):651-656.
- Rai, A. B., Vora, V. T. and Patel, C. V. (1995). Investigations on the integrated control of *Tetranychus urticae* (Acari : Tetranychidae) infesting brinjal in South Gujarat. Abstract Presented in 5th National Symposium on Acarology, Bangalore, 20-22 September 1995, pp. 76-77.
- Reddy, D.N.R. and Puttaswamy, S. (1984). Pests infesting chilli *Capsicum annum* L. in nursery. *Mysore Journal of Agricultural Sciences*. **18**:122-125.
- Roopa, S. P. (2005) Investigations on mite pests of Solanoceous vegetables with special references to brinjal. Ph. D. Thesis, Uni. Agric. Sci., Dharwad (India).
- Veeravel, R. Narayanswamy, P. and Baskaran, V. (1995). Relative toxicity levels of certain plant products against red spider mite, *Tetranychus telarius* in brinjal. Abstract Presented in 5th National Symposium on Acarology, Bangalore, 20-22, September, 1995, p. 83.

Received: 04.07.2017

Accepted: 10.12.2017