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Seasonal incidence and management of red spider mite, *Tetranychus urticae* Koch on Okra, *Abelmoschus esculentus* (L.) Moench

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Abstract
The studies were conducted for the two seasons i.e., Zaid and Kharif to determine the seasonal incidence and management of *Tetranychus urticae* Koch on Okra, *Abelmoschus esculentus* (L.) Moench during 2015 at SKUAST-Jammu, Chatha, Jammu. The two season data of mites' population on okra showed that *T. urticae* was found damaging and remain active on the okra crop and attained two peaks i.e., in 18th standard week and in in 25th SW, respectively. The increase in temperature coupled with decrease in relative humidity from March 2015 to June 2015 favoured the increase of *T. urticae* Koch. The pooled data on bio-efficacy of certain acaricides and botanicals against okra mite was recorded after two spray (1st and 2nd spray revealed that Abamectin was found to be the best treatment in reducing the mites population (74.64 per cent) on okra followed by Diafenthiuron (68.02 per cent) and Fenazaquin (60.43. per cent). Among the biopesticides, pongamia oil gave 46.32 per cent reduction followed by neem oil application.

Keywords: seasonal incidence, okra mite, *Tetranychus urticae*, bioefficacy, acaricides, botanicals

1. Introduction

India is bestowed with the diverse climatic conditions with varied habitats which favours the cultivation of a number of commercial vegetable crops. Vegetables cultivation in our country has assumed greater importance during the last decade which not only constitutes the major supplements of balanced diet such as dietary fibres, proteins, carbohydrates, rich source of iodine, calcium, sodium and vitamin A, C, thiamine, riboflavin but also become the source of developing agripreneurship and skill development to enhance the income and provide employment opportunities among rural youth, farm women and farmers [1]. The income per hectare from vegetable crops is almost four times more remunerative than the cereals crops and thereby, fetches higher income in short span and generates employment to the rural masses [2].

Okra, *Abelmoschus esculentus* (L.) Moench, also known as Lady's finger, is one of the important vegetable crops commercially cultivated in many parts of the world and in almost all the states in our country. During the past three decades, our country has made commendable progress in the field of vegetable research and development, enabling it to secure second position in vegetable production and occupies 8.51 million hectare area with a total annual production of 126.58 million tonnes during 2014 [3]. It is the single largest green vegetable exported to many parts of the world accounting for 60% of vegetable exports, excluding onion. It is mainly used for its tender green fruits as vegetable which is a rich source of minerals like iodine, calcium, sulfur and sodium and also contains vitamin A, C, thiamine and riboflavin. Jammu region of the J&K state is known for the production of quality vegetable crops in several pockets. However, the productivity of vegetable crops is far below the productivity in other states of the country. In Jammu region of the J&K state, okra is grown in an area of 2.52 million ha from sub tropical to high altitude intermediate zone with an annual production of 42.99 metric tonnes and productivity of 17.08 qt/ha [4]. The major problem in limiting the productivity of okra crop is its susceptibility to a large number of insect pests including vectors. Over 37 insect pest species have been recorded causing damage to okra crop [5]. Among the various insect pests such as whitefly, *Bemisia tabaci* Genn.; the leafhopper, *Amrasca biguttula biguttula* Ishida; the red spider mite, *Tetranychus urticae* (Koch); the shoot and fruit borer, *Earias vittella* Fabricius and *Earias insulana* Boisd etc. are the major pests causing considerable damage or loss to the yield of okra crop. Among them, phytophagous mites, *Tetranychus urticae* Koch causes various types of direct damage to crops like loss of chlorophyll, stunting of growth, plant deformities resulting in reduction of yield etc. *T. urticae* is known to attack about 1200 species of plants [6], of which more than 150 are economically important [7]. Defoliation, loss of chlorophyll, leaf bronzing, and even plant death occur due to direct feeding in severe infestation [8, 9]. In severe infestation, tetranychid mites web profusely and may form a thick sheath of webbing that covers the entire plant [10, 11]. In vegetable crops, spider mite damage alone causes 10 to 15 per cent loss in yield.

With the advent of intensive and extensive agriculture cultivation, mite pest have got the momentum and become emerging problems which requires more input in mite research, especially studies on diversity, damage potential and exploration of bio control agents for integrated mite control. For better management of mite pest, knowledge on seasonal population fluctuations, natural enemy complex and management of mite pest by effective chemicals is a prerequisite to mitigate the losses.

2. Materials and Methods

Field experiments were conducted at Chatha farm, SKUAST-J for two different seasons during 2015. The seasonal incidence of okra mites were recorded at weekly interval during the experimentation at Chatha farm. For sampling and monitoring, five plants were randomly selected in each plot. Three leaves covering top, middle and bottom canopy of okra plants were sampled in polythene bags. These leaves were brought to the laboratory, cut into 2.5 cm^2 size and were observed under Stereo-Binocular Microscope for enumeration of mite population. Further, sampling was carried out weekly interval until the end of the harvesting of crops. Weekly data on different weather parameters viz. maximum and minimum temperature, morning and evening relative humidity and rainfall were collected from Section of Agro-Meteorology, SKUAST of Jammu and subjected to simple correlation studies and linear regression analysis.

The okra variety Nemo hybrid was used for evaluation of bio-efficacy of some acaricides and botanicals against phytophagous okra mite on okra crop. The experiment was laid out in RBD (Randomized Block Design) with three replications and ten treatments. The okra seeds were sown directly in 2nd SW of February 2015. The plot size was 3×2 m^2 and plant geometry was 60×60 cm^2. The details of experiment were presented in table 1. A total of two pesticidal applications were done during 2015 after the commencement of incidence of mites at a month interval with knapsack sprayer. Pre treatment count population of the mites on okra was recorded one day before the spray of the respective pesticide. Details of the different acaricides and botanicals tested in the present study along with and trade name and doses/concentrations are presented in table 1.

Table 1: List of chemicals selected for bio-efficacy with trade name and dosage

Treatments	Name of Acaricides/Insecticides	Trade name	Concentrations (%)/ Doses
T1	Diafenthiuron 50WP	Pegasus 50 WP	0.075 (1.0 g /l)
T2	Dicofol 18.5EC	Kelthane 18.5 EC	0.046 (2.5 ml/l)
T3	Dimethoate30EC	Rogor 30 EC	0.05 (2ml/l)
T4	Fenazaquin10EC	Magister 10 EC	0.02 (2.0 ml/l)
T5	Propargite 57EC	Omite 57 EC	0.142 (3.0 ml/l)
T6	*Ocimum* oil	-	(3 ml/l)
T7	Neem oil	4%	4 ml/lit
T8	Pongamia oil 2 EC	Derrisom	2 ml/lit
T9	Abamectin 18 CE	Vertimac 10 EC	0.4 ml/lit
T10	Control (water spray)		

The observation on the mites was recorded from five randomly selected plants from each treatment replication wise. Three leaves of a plant were plucked and kept in polythene bags, with proper labeling pertaining to the particular treatment and replication were brought to the laboratory for proper counting of mite population under the binocular microscope. Post treatment observations were recorded after 1, 3, 7 and 14 days of spraying after each of two foliar spray to the crop. The mite population was counted on the basis of number of mites/2.5 cm^2 of the leaf area and finally mean number of mites/2.5 cm^2 of three leaves were calculated. The percent reduction of mite population caused by the respective pesticide was calculated for each date of observation in order to express the efficacy of respective treatment against mite infesting the crop. The percent bio-efficacy of various treatments against mites in comparison to control treatment was calculated using the formula as suggested by Henderson and Tilton [12] given below:

$$\text{Per cent efficacy} = 1- (Ta/Tb \times Ca/Cb) \times 100$$

Where, Cb = Number of larvae on untreated check before treatment, Ta = Number of larvae on treated plot after treatment, Tb = Number of larvae on treated plot before treatment, and Ca = Number of larvae on untreated check after treatment.

The data on the percent reduction of mite population were transferred in to the Arc sine percentage. The Data thus obtained were subjected to the statistically analysis of variance following RBD and the efficacy of the insecticides was evaluated at 5 per cent level of significance.

3. Results

Seasonal population fluctuations of red spider mite, *Tetranychus urticae* Koch

The observations on natural infestation of okra mite, *Tetranychus urticae* Koch in the main field of okra crop were recorded at weekly intervals starting from 11th SW to 30th SW during the year 2015. Infestation was first observed nearly a month after seed sowing *i.e.*, from 11th standard week with an initial population of 0.47 mites per 2.5 cm^2. The mean weekly temperature and relative humidity during the period were recorded to be 16.35°C and 76 per cent, respectively. From there, the population was observed to be increasing gradually till 18th standard week of May 2015 recording a maximum of 44.13 mean number of mites per 2.5 cm^2 on okra. During this period, the mean temperature and relative humidity in 18th standard week was observed to be 25.55°C and 51 per cent, respectively. After 18th SW, the mites population was observed to be fluctuated due to fluctuation in environmental conditions and again in 25th SW (55.53 mean number of mites population/2.5 cm^2) was observed as the second peak (Table 2, Fig. 1). Thus, there were two peaks of okra mite population build-up observed on okra during first season. During the second season in Kharif okra crop, the seasonal incidence of okra mite was recorded from 24th to 45 standard weeks, which showed that the incidence was varied from 1.33 to 14.25 mites per 2.5 cm^2 (Table 3, Fig. 2) and the maximum mites populations were observed in 42nd standard week with 14.25 mites per 2.5 cm^2.

The effect of key weather parameters on the incidence of okra mite was studied using correlation matrix. The correlation studies in zaid crop showed that the okra mite was highly significant and positively correlated with maximum temperature whereas, negatively correlated with relative humidity (highly significant with morning R.H and significant with evening R.H) and negatively correlated and significant with rainfall (Table 4). Whereas, in kharif crop, mites population fluctuation was highly significant and negatively correlated with minimum temperature and significant negative correlation was existed with maximum temperature and rainfall. The value of multiple linear regression equations for okra mite was calculated to be $Y=160.434–1.545X_1+1.607X_2–1.635X_3 + 0.062 X_4 – 0.038X_5$ for zaid crop and $Y=118.106–3.090X_1+1.082X_2–0.168X_3–0.365X_4–0.017X_5$ for kharif crop, respectively. The corresponding correlation co-efficient of multiple determination (R^2) values worked out to be 0.697 for zaid and 0.738 for kharif crop, respectively and was found statistically significant at 5% level of significance. The overall impact of weather factors on population build-up of mite was 69.70 per cent and 73.80 per cent which reflects that there were some other factors such as solar radiation, sunshine, rainy days and wind velocity who was responsible to govern the 30.30 and 26.20 per cent role in population build-up of okra mites on okra (table 5).

Bio-efficacy of certain acaricides and botanicals on okra mite population

First Spray

The pre-treatment population of okra mite ranged from 54.00 to 55.33 per 5 leaves in different plots during 1st spray. However, one day after application of various treatments, Diafenthiuron was the most effective causing 43.64 per cent population reduction which was followed by Fenazaquin (37.64) sprayed plots. Whereas, the plots treated with Propargite and Dicofol, the reduction was 36.64 and 36.45 per cent, respectively. Abamectin applied in plots reduces the mite population by 33.60 per cent whereas, dimethoate caused a population reduction of 28.61 per cent. *Ocimum* oil was the least effective, resulting in only 24.53 per cent reduction (Table 6). After three days of first spray, the best effect was observed in abamectin which reduced the mite population by 53.12 per cent. This was followed by the treatment of Diafenthiuron in different plots, causing a reduction of 51.73 per cent. Application of Pongamia oil resulted in 49.39 per cent reduction while in case of fenazaquin (49.00 per cent reduction); application of propargite resulted in 48.04 per cent reduction whereas, neem oil caused a suppression of 45.93 per cent over control. *Ocimum* oil was the least effective, giving a reduction of 36.24 per cent. After seventh days after 1st spray, the maximum reduction of mite population was observed in the application of Abamectin (61.34 %). This was followed by application of Diafenthiuron in various plots (60.67 %), Fenazaquin (55.54 %), Propargite (54.12 %) and dicofol (53.32 %). In case of ocimum oil, the reduction was recorded to be 33.16 per cent (Table 6). After 14th days of 1st spray, Abamectin was found to be the best treatment in reducing the mites population on okra followed by Diafenthiuron (68.02 per cent) and Fenazaquin (60.43. per cent). In these results, Abamectin is the most effective up to 14th days and significantly different from Diafenthiuron and Fenazaquin at 5 per cent level of significance.

Second Spray

One day after the second spray the highest population reduction was observed in dicofol treated plots, which caused a reduction of 66.17 per cent, followed by Diafenthiuron which resulted in 45.36 per cent reduction over control. The application of abamectin in various plots caused 41.14 per cent reduction in mites population. Neem oil was the least effective causing a reduction of 27.41 per cent (Table 6). Third day after second spray, abamectin was the most effective insecticide, causing 56.36 per cent reduction, followed by Diafenthiuron with 50.94 per cent, propargite with 49.39 per cent, neem oil (49.78 %); Fenazaquin and pongamia oil causing 48.04 per cent reduction. While, Ocimum oil was the least effective, giving a reduction of only 38.02 per cent. At 7 days after second spray, the maximum population reduction of mites was achieved due to abamectin treatment (66.47%), followed by Diafenthiuron (59.56 %). Propargite caused a reduction of 55.55 per cent, while application of dicofol and Fenazaquin resulted in 54.32 and 53.72 per cent reduction, respectively. Ocimum oil was against the least effective, giving a reduction of only 34.40 per cent. Among the biopesticides pongamia oil gave 46.32 per cent reduction followed by neem oil application resulted in only 42.68 per cent reduction in mites population. At 14 days after second spray, Abamectin (74.64) was again found to be the best treatment in reducing the mites population on okra followed by Diafenthiuron (68.59 per cent) and Fenazaquin (64.17 per cent). Overall, Abamectin is the most effective treatment after two sprays up to 14th days in reducing the mites population and found to be significantly different from Diafenthiuron and Fenazaquin at 5 per cent level of significance (table 6).

Table 2: Seasonal incidence of okra mite during Zaid season in relation to abiotic factors during 2015

Standard Meteorological Weeks	Date & month	Mean Mites Population/ 2.5 cm^2	Max. temp. (^{0}C)	Min. temp. (^{0}C)	RH Morn (%)	RH Even (%)	Rainfall (in mm)
11	12-18 March	0.47	22.6	10.1	89	63	107.4
12	19-25	0.93	29.1	13.5	83	47	0.0
13	26-1 Apr	2.2	26.1	15.5	85	67	99.6
14	2-8	5.27	25	15.1	83	58	112
15	9-15	14.47	31.4	16.8	74	46	0.0
16	16-22	25.07	32.1	17.8	77	48	30.0
17	23-29	33.67	35.1	19.2	63	63	0.0

18	30-6 May	44.13	34.3	16.8	67	35	0.0
19	7-13	27.6	37.3	21.5	63	44	9.1
20	14-20	20.53	36.4	21.4	76	34	8.4
21	21-27	17.33	39.7	20.8	59	20	0.0
22	28-3 Jun	34.53	37.2	21.5	59	29	1.8
23	4-10	40.13	37.6	21.6	60	34	0.0
24	11-17	48.47	37.4	22.7	61	37	4.4
25	18-24	55.53	37.7	24.5	65	45	16.3
26	25-1 July	44.4	36.7	23.6	67	48	89.8
27	2-8	26.13	36.5	26	75	55	31.8
28	9-15	11.53	33.5	24	85	64	146.9
29	16-22	6.47	33.5	26.4	83	71	102.6
30	23-29	0.87	34.5	24.9	84	62	126.2

Table 3: Seasonal incidence of okra mite during Kharif season in relation to abiotic factors during 2015

Standard Meteorological Weeks	Date & month	Mean Mites Population/2.5 cm^2	Max. temp. (^{0}C)	Min. temp. (^{0}C)	RH Morn (%)	RH Even (%)	Rainfall (in mm)
24	11-17 June	0.64	37.4	22.7	61	37	004.4
25	18-24	0.52	37.7	24.5	65	45	016.3
26	25-1 July	0.44	36.7	23.6	67	48	089.8
27	2-8	0.78	36.5	26.0	75	55	031.8
28	9-15	0.65	33.5	24.0	85	64	146.9
29	16-22	0.40	33.5	26.4	83	71	102.6
30	23-29	0.16	34.5	24.9	84	62	126.2
31	30-5 Aug	2.14	33.4	25.5	82	67	015.8
32	6-12	0.72	32.5	25.0	91	73	101.6
33	13-19	3.10	34.5	25.9	78	63	019.0
34	20-26	2.84	34.0	24.7	84	69	038.4
35	27-2 Sep	4.34	35.2	24.9	75	55	000.0
36	3-9	2.92	34.6	22.6	78	53	028.8
37	10-16	5.53	35.1	23.6	80	53	000.0
38	17-23	1.82	32.0	21.2	86	61	107.6
39	24-30	0.63	32.0	19.7	87	56	000.0
40	1-7 Oct	4.45	33.0	18.4	84	48	000.0
41	8-14	8.33	31.9	20.6	85	51	000.0
42	15-21	14.25	30.2	16.7	85	44	019.0
43	22-28	11.33	27.6	14.2	83	68	014.4
44	29-4 Nov	07.25	27.0	13.8	90	81	003.0
45	5-11	01.33	25.2	11.6	93	91	000.8

Table 4: Correlation between Seasonal population incidence of okra mite, *Tetranychus urticae* and abiotic factors

Okra mite, *Tetranychus urticae*	Temperature (^{0} C)		Relative humidity (%)		Rainfall (mm)
	Maximum	Minimum	Morning	Evening	
Zaid Season	0.682**	0.393	-0.815**	-0.527*	-0.556*
Kharif season	-0.493*	-0.555**	0.248	-0.099	-0.437*

**. Significant at the 0.01 level
*. Significant at the 0.05 level

Table 5: Regression equations and co-efficient of multiple determination (R^2) of okra mite in relation to abiotic factors

Okra mites	Regression linear equations of Okra mite	Corelation co-efficient (r)	Co-efficient of determination (R^2)	Co-efficient of Variation (%)
Zaid Season	$Y=160.434–1.545X_1+1.607X_2–1.635X_3 + 0.062 X_4 – 0.038X_5$	0.835	0.697	69.70
Kharif season	$Y=118.106–3.090X_1+1.082X_2–0.168X_3–0.365X_4–0.017X_5$	0.859	0.738	73.80

Where,
Y=Mean No. of Mites Populn./2.5 cm2 X3=RH Morning
X1= Max Temp. X4=RH Evening
X2= Min Temp. X5=Rainfall

Table 6: Pooled data of two seasons on bio-efficacy of acaricides and botanicals against okra mite during 2015

S. No.	Pesticide(s)	1DBS	Percent reduction of mite population				1DBS	Percent reduction of mite population			
			1 DAS	3 DAS	7 DAS	14 DAS		1 DAS	3 DAS	7 DAS	14 DAS
1.	Diafenthiuron 50WP	54.00	47.67 (43.64)	61.67 (51.73)	76.00 (60.67)	86.00 (68.02)	15.00	50.67 (45.36)	60.33 (50.94)	74.33 (59.56)	86.67 (68.59)
2.	Dicofol 18.5EC	55.33	35.33 (36.45)	50.33 (45.17)	64.33 (53.32)	71.00 (57.40)	14.33	83.67 (66.17)	53.00 (46.70)	66.00 (54.32)	74.67 (59.79)
3.	Dimethoate30EC	54.33	23.00 (28.61)	46.33 (42.87)	60.67 (51.15)	69.00 (56.15)	14.33	24.67 (29.74)	46.33 (42.87)	62.33 (52.12)	69.00 (56.15)
4.	Fenazaquin10EC	54.67	37.33 (37.64)	57.00 (49.00)	68.00 (55.54)	75.67 (60.43)	14.33	41.00 (39.79)	55.33 (48.04)	65.00 (53.72)	81.00 (64.17)
5.	Propargite 57EC	54.33	35.67 (36.64)	55.33 (48.04)	65.67 (54.12)	72.00 (58.04)	15.00	34.33 (35.83)	57.67 (49.39)	68.00 (55.55)	77.00 (61.33)
6.	Ocimum oil	54.67	17.33 (24.53)	35.00 (36.24)	30.00 (33.16)	20.00 (26.54)	14.33	21.67 (27.68)	38.00 (38.02)	32.00 (34.40)	25.33 (30.17)
7.	Neem oil	55.00	19.67 (26.28)	51.67 (45.93)	41.33 (39.98)	33.00 (35.04)	15.33	21.33 (27.41)	58.33 (49.78)	46.00 (42.68)	38.33 (38.21)
8.	Pongamia oil 2 EC	55.00	21.33 (27.48)	57.67 (49.39)	50.33 (45.17)	37.67 (37.84)	18.67	24.67 (29.70)	55.33 (48.04)	52.33 (46.32)	38.00 (38.02)
9.	Abamectin 1.8 EC	54.33	30.67 (33.60)	64.00 (53.12)	77.00 (61.34)	86.67 (68.59)	17.67	43.33 (41.14)	69.33 (56.36)	84.00 (66.47)	92.67 (74.64)
10.	Control (water spray)	55.33	0.00	0.00	0.00	0.00	15.67	0.00	0.00	0.00	0.00
SeM ±		0.035	0.323	0.197	0.796	0.233	0.165	0.423	0.239	0.280	0.575
CD at 5 %		N.S.	0.977	0.596	2.406	0.703	N. S	1.281	0.722	0.848	1.739

Figures in parenthesis angular transformed values
N. S.= Non-Significant; DBS=Days before Spray, DAS=Days after spray

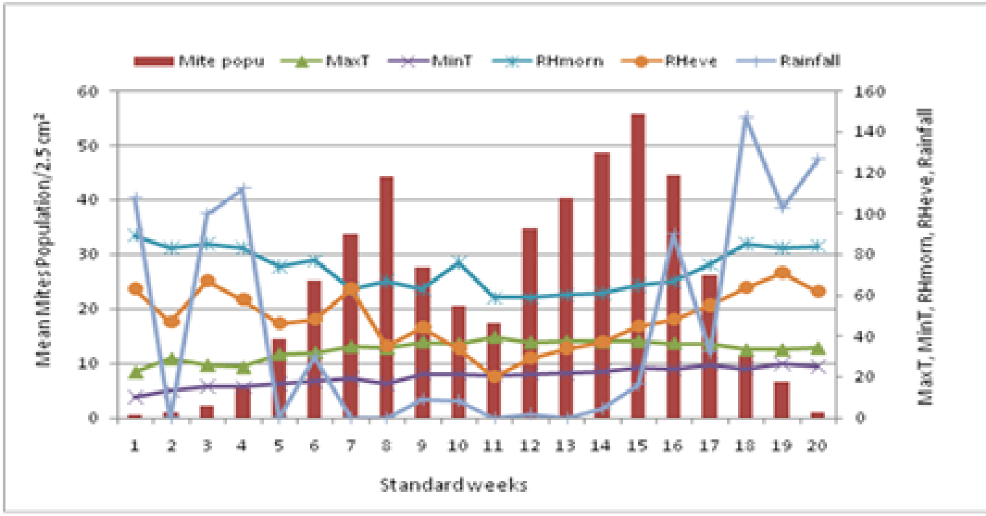

Fig 1: Seasonal incidence of okra mite in relation to abiotic factors during zaid season crop

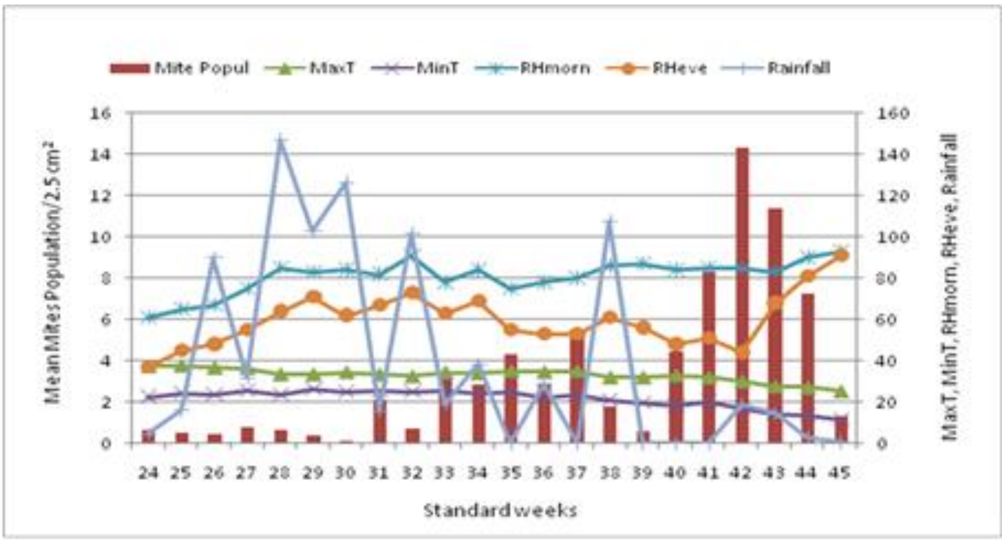

Fig 2: Seasonal incidence of okra mite in relation to abiotic factors during kharif season crop

4. Discussion

The seasonal incidence of tetranychid mites varies with the species, weather and the host plant. It is evident from the data recorded that mites were affected by maximum temperature and relative humidity. The increase in temperature coupled with decrease in relative humidity from March 2015 to June 2015 favoured the increase of *T. urticae* Koch. During the kharif season crops, the record of initial low level of mite populations from 24th to 30th standard weeks may be due to continuous rainfall and as new crop in new plot wherein, mite populations have had not been established. The Peak population of spider mites in May-June was in accordance with results of Puttaswamy, Gupta and Gupta, Pande and Sharma, Mishra *et al*., Kapoor *et al*. [13, 7, 14, 15, 16]. Spider mite incidence was very less probably due to heavy splash of rainfall. The severe occurrence of two spider mite populations in May to mid June is in close conformity with results of Pande and Yadava, Gupta and Gupta [17, 7] who also reported that the occurrence of *T. cinnabarinus* was severe from May to middle of July in West Bengal. It may be due to variations in temperature, relative humidity and rainfall during the congenial period of crop growth. The present findings are in close conformity with that of Prasad and Singh [18] who reported that the mite population started building up on the crop from the second fortnight of March and continued until the first fortnight of July.

Dicofol 0.05 per cent proved to be the most effective in causing 70 per cent maximum reduction of mites in okra and brinjal both under field and pot culture conditions in the finding of Ramaraju [19]. However, Singh and Choudhary [20] showed that abamectin 1.9 EC was most effective on okra in mite population reduction and propargite 0.05 per cent stood next to this treatment. In other findings, diafenthiuron at different formulations recorded the highest reduction of *T. urticae* population [21, 22]. The present finding are in conformity with Sreenivas *et al*. [23] who observed significantly lower number of *Tetranychus* mite per leaf in okra at seven and ten days after treatment observation. Singh and Choudhary [20] registered 84.67 per cent reduction of red spider mite population in okra with the application propargite 57EC at the rate of 1500ml per ha whereas, Tomar and Singh [24] who reported that propargite 57EC was most effective in reducing the mite incidence in Brinjal. The present study was comparable with Tomar and Singh [24] who observed that application of propargite 57% EC @ 1000ml/ha and fenpyroximate 5%EC @500ml/ha was significantly more effective in reducing *T. urticae* population to 1.6 to 1.8 mites/4cm^2 leaf area compared to 8.8 mites/4cm^2 leaf area in untreated control 15 days after application on brinjal, which could increase the fruit yield significantly (>80q/acre *vs* 64q in control). Chinniah [25] also reported that spiromesifen 240SC @0.7ml/lit., abamectin 1.8%EC @ 0.5ml/lit., propargite 57% EC @3ml/lit and fenpyroximate 5%EC @ 0.8ml/ lit were equally effective in suppressing spider mite population. The effectiveness of abamectin and difenthiuron in reducing tetranychid mite population on different crop ecosystem was reported by Karmate and Chandele, Anand kumar, Mani *et al*., Walunj *et al*. and Roopa [26, 27, 28, 29, 30]. Other acaricides *viz*., fenazaquin and propargite also found effective and present findings are in agreement with Kumar, Singh *et al*. and Roopa [27, 31, 30].

5. Conclusion

The mite pests are the emerging problems and causes significant losses in successful vegetable cultivation. Therefore, the present investigation shall be useful in monitoring the mite pest population throughout the zaid and kharif crop season to get the population fluctuation trend for devising the safer and eco-friendly Integrated Pest Management strategies in okra vegetable crops.

6. References

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