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SEASONAL ACTIVITY OF PREDATORY MITE, *NEOSEIULUS LONGISPINOSUS* EVANS (ACARI: PHYTOSEIIDAE) ON FRENCH BEAN

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ABSTRACT

The seasonal activity of predatory mite, *N. longispinosus* was recorded during the 2nd SMW where the predatory mite population was 0.13 mites per leaf. The population of *N. longispinosus* then gradually increased and the maximum population was recorded during 22nd SMW (Last week of May) with 5.40 predatory mites per leaf. The relationship between predatory mite, *N. longispinosus* and its prey *T. urticae* was found significantly positive. Furthermore, the relationship between *N. longispinosus* and various abiotic factors was significantly positive with maximum, minimum and average temperature, whereas non-significant correlation existed between morning relative humidity and predatory mite. The predatory mite had also significantly positive correlation with evening relative humidity. It is clearly evident that throughout the crop season distribution of the predatory mite, *N. longispinosus* was higher in middle strata followed by top strata and bottom strata.

Key words: Predatory mite, seasonal activity, french bean

INTRODUCTION

Phytoseiid mites (Acari: Phytoseiidae) play an important role in the biological control of phytophagous mites in several agro-ecosystems (Helle and Sabelis, 1985). They play a very important role in suppressing mite pest population occupying different habitats. Predatory mites of family Phytoseiidae have been successfully used in the biological control of numerous agricultural pests worldwide (Gupta, 1991). Among them *Neoseiulus longispinosus Evans* is very common species in south Gujarat. The present work was aimed to study the seasonal activities predatory mite on French bean. The seasonal incidence of predatory mite, *N. longispinosus* on crop like french bean is very scanty, therefore the present study was undertaken.

MATERIALS AND METHODS

The observations on the incidence of predatory mite, *N. longispinosus* were recorded at weekly interval on french bean cv Gujarat Rajmah, beginning from January 2015 and continued up to June 2015. For sampling, three random leaves representing top, middle and bottom canopy were plucked from each of twenty five randomly selected plants. These leaves were held in separate properly labelled polyethylene bags and brought to the Acarology laboratory for numerical count from 2 cm^2 leaf bit under stereo binocular microscope. The data were recorded separately considering canopy for different standing french bean plants. The observations were recorded till harvest. The data so obtained were summed up and converted to total population per leaf (irrespective of plant canopy and leaf surface). Correlation studies between predatory mite, *N. longispinosus* population and prevailing biotic and abiotic factors *viz*., spider mite population as well as maximum, minimum, average, morning, evening and average relative humidity were made by calculating the simple correlation coefficient (r).

RESULTS AND DISCUSSION

It is evident from Table 1 that the predatory mite, *N. longispinosus* was recorded from the french bean which were infested with *T. urticae*. The activity of predatory mite, *N. longispinosus* was first recorded during the 2nd Standard meteorological week (SMW) where the predatory mite population was 0.13 mite per leaf. The spider mite population during this period was 4.33 mites per leaf. The maximum, minimum and average temperature during this period was 32.40, 13.80 and 23.10 °C, respectively whereas the morning, evening and average relative humidity were 86.20, 40.50 and 63.40 per cent, respectively. The population of predatory mite, *N. longispinosus* then gradually increased and the

Table 1. Seasonal activity of *Neoseiulus longispinosus* on french bean (Gujarat Rajmah)

SMW	Distribution of mite on leaf canopy (cm^2)			Mean predatory mite population per plant	Mean preymite population per plant (2 cm^2)	Max. T. (ºC)	Min. T. (ºC)	Average Temperature (ºC)	Morning R. H (%)	Evening R. H (%)	Average R. H (%)
	Top	Middle	Bottom	(2 cm^2)							
01	0.00	0.00	0.00	0.00	4.73	28.10	13.90	21.00	85.60	38.40	62.00
02	0.00	040	0.00	0.13	4.33	30.10	9.80	19.90	72.10	32.40	52.20
03	0.00	0.40	0.00	0.13	4.47	29.60	12.70	21.20	82.40	33.20	57.80
04	0.60	1.80	0.40	0.93	6.87	28.00	14.50	21.30	83.00	45.90	64.40
05	1.20	2.20	1.20	1.53	6.00	29.80	14.00	21.90	78.40	36.60	57.50
06	1.60	3.20	1.60	2.13	6.07	32.00	14.90	23.50	85.10	37.10	61.10
07	1.80	3.60	0.80	2.07	6.40	32.40	13.80	23.10	86.20	40.50	63.40
08	1.00	2.40	0.80	1.40	6.73	34.40	16.10	25.20	90.50	37.90	64.20
09	1.60	3.40	0.80	1.93	7.40	23.70	12.90	18.30	75.00	44.60	59.80
10	2.00	4.00	1.66	2.53	7.93	32.70	15.20	24.00	81.50	41.60	61.50
11	2.00	4.20	1.40	2.53	8.80	32.50	18.50	25.50	84.90	48.90	66.90
12	3.60	6.00	2.20	3.93	9.13	33.10	19.00	26.10	82.80	39.50	61.10
13	4.60	7.80	3.00	5.13	11.53	35.30	21.50	28.40	90.10	44.30	67.20
14	4.40	7.20	2.20	4.60	13.07	32.20	21.20	26.70	87.20	55.20	71.20
15	3.00	5.20	2.00	3.40	12.80	30.50	22.20	26.40	89.10	54.00	71.60
16	1.80	4.00	1.60	2.47	12.40	36.70	23.80	30.20	87.40	46.00	66.70
17	2.80	4.60	1.66	3.00	12.47	33.50	24.40	29.00	87.50	59.10	73.30
18	2.20	4.40	1.80	2.80	13.27	34.70	24.20	29.50	85.60	61.00	73.30
19	3.00	6.00	2.60	3.87	13.33	36.40	25.30	30.80	84.70	47.10	65.90
20	3.00	5.80	2.00	3.60	13.47	35.50	26.60	31.00	82.70	56.80	69.80
21	3.60	6.20	3.80	4.53	14.27	33.90	28.40	31.10	78.80	63.70	71.30
22	4.80	7.60	3.80	5.40	12.93	33.50	28.00	30.80	80.50	63.10	71.80
23	2.40	5.40	1.40	3.07	11.80	34.50	25.70	30.10	84.50	62.20	73.30
Mean ± S. D.	2.20±1.42	4.17±2.14	1.59±1.07	2.66 ±1.55	220.20±0.34	32.30±3.07	19.41±5.67	25.86±4.06	83.72±4.56	47.35±10.07	65.53±5.85

Table 2. Correlation coefficient of *Neoseiulus longispinosus* with biotic and abiotic parameters

Parameters	*N. longispinosus*
T. urticae	0.842**
Maximum Temperature (°C)	0.567**
Minimum Temperature (°C)	0.800**
Average Temperature (°C)	0.773**
Morning relative humidity	0.254
Evening relative humidity	0.680**
Average Relative Humidity (%)	0.684**

(*Significant at 5% level of significance; ** Highly significant at 1% level of significance)

Table 3. Distribution of *Neoseiulus longispinosuson* french bean

Population	Top	Middle	Bottom	Mean
N. longispinosus	2.22	4.17	1.59	2.66

maximum predatory mite population was recorded during 22nd SMW (Last week of May) with 5.40 predatory mites per leaf. The prey mite (*T. urticae*) population were 12.93 mites per leaf.The maximum, minimum and average temperature during this period were 33.50, 28.00 and 30.80 °C, respectively, while the morning, evening and average relative humidity were 80.50, 63.00 and 71.80 per cent, respectively. So in the present investigation, it was found that the predatory mite *N. longispinosus* remain active on french bean from 2nd to 23rd SMW with the population ranging between 0.13 to 5.40 mites per leaf. The population of prey mite (*T. urticae*) also ranging between 4.33 to 13.47 per leaf during the crop season. The average temperature and relative humidity were ranging between 18.30 to 31.10 °C and 52.20 to 87.40 per cent, respectively.

The data presented in Table 2 shows the correlation between the population of predatory mite, *N. longispinosus* with biotic factor *viz.*, spider mite population and various abiotic factors *viz*. maximum, minimum and average temperature as well as morning, evening and average relative humidity during January 2015 to June 2015 and its effect on the population build-up.

In field condition, the relationship between predatory mite, *N. longispinosus* and its prey mite, *T. urticae* was found significantly positive (r = 0.842). Furthermore, the relationship between predatory mite, *N. longispinosus* and various abiotic factors were also worked out and it was found that *N. longispinosus* had a significant positive correlation with maximum temperature (r = 0.567), minimum temperature (r = 0.800) and average temperature (r = 0.733), while a non-significant correlation exist between morning relative humidity (r = 0.254), the predatory mite *N. longispinosus* had also significantly positive correlation with evening relative humidity (r = 0.680).

In past, Shah (2014) reported that the predatory mite, *A. longispinosus* had significant positive correlation with the eggs and mobile stages of its prey, *T. urticae* on gerbera. Thus closely support the relationship between predatory mite, *A. longispinosus* and *T. urticae*. Further, he also reported a significant positive correlation between predatory mite, *A. longispinosus* and mean temperature while significant negative correlation exists between mean relative humidity. Thus, partially support the present findings, the difference may be due to the crop and growing conditions. Further, Jasmine *et al.* (2008) also reported that the predatory mite, had positive correlation with the eggs and mobile stages of its prey *i.e. T. macferlini* and *Oligonychus indicus* as well as with average temperature and average RH under laboratory condition, thus more or less supported the findings. Further, Geroh *et al.* (2010) observed that population of acari significantly correlated with temperature.

The data presented in Table 3 shows the distribution of predatory mite, *N. longispinosus* on french bean plants. In field condition, it is clearly evident that throughout the crop season, the distribution of the predatory mite, *N. longispinosus* was higher in middle strata (4.17 mites/2 cm^2 leaf) followed by top strata (2.22 mites/2 cm^2 leaf) and bottom strata (1.59 mites/2 cm^2 leaf). The present findings are in the line of earlier work carried out by Shah (2014) on gerbera as well as by Pokle and Shukla (2015) on tomato.

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