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Influence of abiotic factors on population dynamics of okra aphid in okra ecosystem

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Abstract

The field experiment was conducted to study the influence of abiotic factors on population dynamics of okra aphid in okra ecosystem during *summer* 2016 and 2017 at RARS, Karjat. The results indicated that the aphids population ranged from 5.28 aphids /3 leaves in last week of May to 22.10 aphids /3 leaves in fourth week of April in year 2016 while, in year 2017 ranged from 3.62 aphids /3 leaves in last week of May to 24.22 aphids/3 leaves fourth week of April. The incidence was noticed till the end of the crop period (last week of May) in both of the year. The aphids population gradually increased and reached its peak of 26.10 aphids in fourth week of April during 2016 and 24.2 in third week of April during 2017. Thereafter gradual decrease in population was observed.

In summer 2016 the data on correlation coefficient study between pest population and weather parameters indicated that RHE (-0.749), showed highly significant negative correlation, while MinT (-0.078) and RHM (-0.078) showed negative correlation with pest activity whereas, MaxT (0.619) and BSS (0.433) showed significant positive correlation, with aphid population. While, in 2017, correlation coefficient study between pest population and weather parameters indicated that BSS (-0.316) and RHE (-0.195) showed negative correlation with pest activity whereas, MaxT (0.362), RHM (0.493) showed significant positive correlation, while MaxT (0.362) and MinT (0.161) showed positive correlation with aphid population.

Keywords: Seasonal activity, weather parameter, population dynamics, *Aphis gossypii*

Introduction

Okra, *Abelmoschus esculentus* (L) Moench, is one of the major vegetable crops in the tropical and subtropical regions of the world and is cultivated commercially in West Africa, South East Asia, Southern United States, Brazil, Turkey, and Northern Australia. In India, it is widely cultivated in West Bengal, Bihar, Orissa, Gujarat, Andhra Pradesh, Jharkhand, Chhattisgarh, Haryana and Maharashtra; occupying an area of about 532.6 thousand hectares, with a production of nearly 6346.3 million tones and productivity of 11.9 MT/hectare. In Maharashtra okra occupies an area of 23 thousand hectares, with productivity of 441.5 metric tons and productivity of 10.5 MT/ ha (Anon., 2014)^[1].

Okra is attacked by a number of insect pests, in this shoot and fruit borer, whitefly, jassids and yellow vein mosaic diseases are the major constraints. There are about 13 major insect and non-insect pests species, which attack this crop at various stages of growth (Dhamdhare *et al.* 1984)^[3]. The major insect pests being jassids (*Amrasca biguttula biguttula* Ishida), white flies (*Bemisia tabaci*), flea beetle (*Podagrica bowringi* Baly), shoot and fruit borer (*Earias vittella* Fabricius and *Earias insulana* Boisduval), aphids (*Aphis gossypii* Glover) and mite (*Tetranychus cinnabarinus* Boisduval).

Aphid is a polyphagous pest it occurs on many hosts plants and play vital role in transmitting diseases in cultivated crops. Due to mono culture of okra over a period of time, the pest buildup of *A. gossypii* has increased enormously. Therefore the keeping all view in mind, the present work carried out to study seasonal activity and relationship between weather factors of aphid infesting in okra ecosystem.

Materials and Methods

To study the Population dynamics of aphid a field study was undertaken at Regional Agriculture Research Station, Karjat (M.S).

Experimental details

Okra crop variety Varsha Upahar was sown on 26th of January, 2016 and 26th of January, 2017 for the Population dynamics of the aphid.

Experimental details

Crop : Okra
Variety : Varsha Upahar
Season : Summer season crop
Spacing : 45 cm X 30 cm
Plot size : 2.5 m X 3.0 m

Method of recording observations

To study the Population dynamics of the aphid under field conditions the following methodology was used for recording observations.

Observations on population aphid, *Aphis gossypii* (Glover) was recorded by counting the number of nymph and adults of aphid at weekly interval from randomly selected three leaves (one each from top, middle and lower canopy of the plant) of five randomly selected plants in each net plot. The counts were continued from one week after germination to harvest of the crop for each plot. The data thus obtained were converted to average population per leaf and subjected to statistical analysis.

Result and Discussion

Seasonal incidence of aphid on okra

The data on seasonal incidence of okra aphid during 2016 and 2017 presented in Table 1. In the Summer season 2016, okra crop was sown during first week of February. The population of aphids ranged from 5.28 aphids/3 leaves in last week of May to 22.10 aphids/3 leaves in fourth week of April. The incidence was noticed till the end of the crop period (last week of May). The aphids population gradually increased and reached its peak of 26.10 aphids in fourth week of April. Thereafter gradual decrease in population was observed.

During summer season 2017, okra crop was sown during first week of February. The population of aphids ranged from 3.62 aphids /3 leaves in last week of May to 24.22 aphids/3 leaves fourth week of April. The incidence was noticed till the end of the crop period (last week of May). The aphids population gradually increased and reached its peak of 24.22 in third week of April. Thereafter gradual decrease in population was observed.

The present findings more or less accordance with the results of Sumathi (1998) [6] conducted studies on seasonal incidence of sucking pests during April 1998 to January 1999 in Coimbatore, Tamil Nadu. Among the different dates of sowing of *bhendi* sowings taken on 28th May 1998, 23rd July 1998 and 14th January 1999 recorded minimum (2.81, per plant) population of the aphids, *Aphis gossypii*.

Boopati *et al.* (2011) [2] revealed that the incidence of *A. gossypii* commenced from first week of June *i.e.*, seventh week after sowing of okra. The aphid population reached at its peak in the third week of June *i.e.*, ninth week after sowing (8.90) followed by last week of June *i.e.*, eleventh week after sowing (6.68).

Correlation coefficient study between aphid population and weather parameters

In summer 2016 the data (Table 2) on correlation coefficient study between pest population and weather parameters indicated that RHE (-0.749), showed highly significant negative correlation, while MinT (-0.078) and RHM (-0.078)

showed negative correlation with pest activity whereas, MaxT (0.619) and BSS (0.433) showed significant positive correlation, with aphid population.

During 2017, the data (Table 2) on correlation coefficient study between pest population and weather parameters indicated that BSS (-0.316) and RHE (-0.195) showed negative correlation with pest activity whereas, MaxT (0.362), RHM (0.493) showed significant positive correlation, while MaxT (0.362) and MinT (0.161) showed positive correlation with aphid population.

The present finding more or less supported by Konar *et al.* (2013) [4]. They reported that aphid population was non significant negatively correlated with maximum and minimum temperature, minimum relative humidity, rainfall and total sunshine hours. Whereas, maximum relative humidity was positively correlated with the aphid population on okra.

The aphid population had negative correlation with minimum and mean temperature, rainfall and maximum and minimum relative humidity whereas, positive correlation with maximum temperature Singh *et al.* (2013) [5].

Table 1: Weekly population of okra aphid during summer season 2016 and 2017

2016		2017	
Date of observation	Mean population/plant	Date of observation	Mean population/plant
4/3/16	8.89	1/3/17	7.30
11/3/16	9.65	8/3/17	10.96
18/3/16	12.07	15/3/17	11.60
25/3/16	15.29	22/3/17	14.26
1/4/16	18.44	29/3/17	16.20
8/4/16	20.93	5/4/17	20.93
15/4/16	24.59	12/4/17	22.36
22/4/16	26.10	19/4/17	24.22
29/4/16	23.83	26/4/17	20.93
5/5/16	18.12	3/5/17	16.20
12/5/16	10.24	10/5/17	12.44
19/5/16	7.21	17/5/17	8.43
26/5/16	5.28	24/5/17	3.62
Average	15.43	Average	14.57

Table 2: Correlation between weather parameter and okra aphid during 2016 and 2017

Weather parameters	2016	2017
Maximum(I)	0.619214	0.362745
Minimum(I)	-0.07838	0.161429
R.H. (I)	-0.07841	0.493429
R.H. (II)	-0.74993	-0.19522
Sunshine	0.433194	-0.31652

Conclusion

From the present study, it can be concluded that the season and weather parameter play vital role in increasing and decreasing population of okra aphid. The results indicated that the incidence of aphid was noticed till the end of the crop period (last week of May) in both of the year. The aphids population gradually increased and reached its peak of 26.10 aphids in fourth week of April during 2016 and 24.2 in third week of April during 2017. Thereafter gradual decrease in population was observed.

In summer 2016 the data on correlation coefficient study between pest population and weather parameters indicated that RHE (-0.749), showed highly significant negative correlation, while MinT (-0.078) and RHM (-0.078) showed negative correlation with pest activity whereas, MaxT (0.619)

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