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Seasonal incidence of natural enemies of insect pests on okra

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Abstract

An experiment has been conducted at College of Agriculture Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani, Maharashtra, India to assess the population of coccinellids (grub and adult). The population of coccinellids (grub and adult) peak was observed in 40th MW (01-07 Oct.), The larvae of green lacewing the peak activity was observed during 40th MW (01-07 Oct.) in 2017-18 and 37th MW (10-16 Sept) in 2018-19 and the peak population of spider was noticed in 40th MW (01-07 Oct.) in 2017-18 and 2018-19, respectively.

Keywords: Coccinellids, green lacewing, spider and MW

Introduction

Okra (*Abelmoschus esculentus* L.) is one of the most common and widely grown vegetable in India. It considered as African sub-tropical vegetable, many countries are cultivating okra crop in the world. Okra crop is known by various names as okra, okro, bhindee, ladyfinger and quin bambo. Okra seeds are good source of protein, vegetable oil and rich in vitamin A and B, phosphorus and iodine, which play viral role in human diet. Okra is a powerhouse of valuable nutrients, soluble and insoluble fiber, which helps to lower serum cholesterol, risk of heart disease, keeps the intestinal tract healthy and decrease colorectal cancer. In India, vegetables have occupied the prime position in human diet, as these are the cheaper source of carbohydrate, minerals, vitamins, proteins, dietary fibers besides having medicinal value and provide nutritional security to a predominately vegetarian population.

Among different vegetables, okra, *Abelmoschus esculentus* (L.) Moench belonging to the family Malvaceae is an important annual vegetable, grown for its immature green non-fibrous edible fruits in the tropical and sub-tropical regions of the world. It is commonly known as "Gumbo" as well as "Okra" in USA, lady's finger in England and "Bhindi" or "Bhinda" in India. It is probably originated in Ethiopian region of Africa, but is now widely grown in Sudan and Nigeria regions of the Africa besides being grown in other countries. Because of its high nutritive value and prolonged shelf life as compared to others, okra has captured a prominent position among export-oriented vegetable crops. It has a vast potential as one of the foreign exchange earner crop and accounts for about 60 per cent of the total export of fresh vegetables [1b, 2b, 3b, 4b].

Okra has its own importance, taste, flavor and nutritional values as human food. It has good nutritional value particularly high content of calcium and vitamin C [5b, 6b]. It is grown extensively in the tropical, subtropical and warm temperature regions of the world especially in India, U.S.A., Africa, Asia, Nigeria, Sudan, Iraq, Pakistan, Turkey, Australia, U.K. and other neighboring countries. India ranks first in area and production in the world. It is a major commercial vegetable cultivated all over India particularly in the states of Andhra Pradesh, West Bengal, Jharkhand, Orissa, Uttar Pradesh, Madhya Pradesh, Karnataka, Gujarat and Maharashtra. India occupies an area of 532.66 thousand hectares with a production of 6346.37 thousand tones and productivity of 11.9 MT/ha. [7b, 32, 33, 34, 35].

The *Earias vittella* (Lepidoptera: Noctuidae) is a widely distributed insect pest. The attack of shoot and fruit borer (*E. vittella*) on okra starts 4 to 5 weeks after germination both in Kharif and summer seasons. The infested top tender shoots dries-up while flower, buds and developing fruits drop down pre-maturely and damaged fruits become unfit for human consumption. It is estimated that about 69 per cent loss in marketable yield due to attack of this insect on okra [8, 29, 30, 31].

In general, the overall damage due to the insect pests attack, Results in 48.97 per cent loss in pod yield^[9]. Part of approved Ph. D. (Agri.) Dissertation submitted by B.B. Gaikwad to Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani.

Material and Methods

The study was carried out on the seasonal abundance of major sucking pests of okra at the farm of Department of Agril. Entomology, VNMKV, Parbhani during kharif season of 2017-18 and 2018-19. The okra (Parbhani OK) was sown in a block size of 10 m x 10 m keeping the spacing of 60 X 30 cm. All the recommended agronomic practices *viz.* weeding, harrowing, application of fertilizer doses and irrigation were carried out timely and properly to raise good crop. This area was divided into four quadrates (5 m X 5m). No insecticidal treatments were applied at any stage of the crop growth. To know the population density of natural enemies, *viz.*, coccinellids (grubs and adults), green lace wing (grubs) and spiders, the counts were made on whole plant basis on five randomly selected plants from each quadrate at weekly intervals, commencing from 10 days after germination.

Result ND Discussion

Coccinellids

The observations on coccinellids are presented in Table 1 and It ranged from 0.70 to 2.90/plant during 2017-18 and 0.20 to 3.56/plant during 2018-19.

During 2017-18, the population of coccinellids (grub and adult) were first noticed during 31st MW (30 July-05 Aug) with gradual increase in following weeks. The peak numbers (2.90/plant) was noted during 40th MW (01-07 Oct.) when the prevailing rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, evaporation, bright sunshine and wind velocity were 57.6 mm, 33.20C, 21.60C, 82%, 65%, 5.4 mm, 7.0 hrs and 3.4 Kmph, respectively. After that, the number gradually declined but sustained till harvest of the crop (44th MW). During 2018-19, the coccinellids (grub and adult) were first recorded during 31st MW (30 July-05 Aug) and found till the end of crop season upto (44th MW) (29 Oct-04 Nov.). It increased gradually and reached its peak (3.56/plant) during 40th MW (01-07 Oct.) when the prevailing rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, evaporation, bright sunshine and wind velocity were 0.0 mm, 33.10C, 20.00C, 77.6%, 39.7%, 6.2 mm, 9.0 hrs and 3.4 Kmph, respectively. Thereafter, it declined gradually upto 44th MW^[15, 16, 18, 19, 22].

Green lacewing

The data on number of green lacewing on okra presented in Table 1 indicated that the population ranged from 0.10 to 1.02/plant and 0.20 to 1.02/plant during 2017-18 and 2018-19, respectively.

During 2017-18, green lacewing was recorded first time during 31st MW (30 July-05 Aug). The population increased gradually and attained its peak (1.02/plant) during 40th MW (01-07 Oct.) when the prevailing rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, evaporation, bright sunshine and wind velocity were 57.6 mm, 33.20C, 21.60C, 82%, 65%, 5.4 mm, 7.0 hrs and 3.4 Kmph, respectively.

Thereafter, the population declined gradually and found till end of the crop season. During 2018-19, larvae of green lacewing appeared from 31st MW with intensity of 0.30/plant and reached to its peak in 37th MW when the prevailing rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, evaporation, bright sunshine and wind velocity were 0.0 mm, 36.40C, 20.70C, 82.7%, 48.6%, 5.9 mm, 7.9 hrs and 2.9 Kmph, respectively. After that, the population decreased upto 40th MW (01-07 Oct.) (0.72/plant). Again the population decreased in next week and observed till end of the season^[24, 27, 23b].

Spider

The observations of spider on okra are presented in Table 1 It was found that the population ranged from 0.20 to 1.20/plant during 2017-18 and 0.10 to 0.98/plant during 2018-19.

During 2017-18, the population of spider was noticed first in 31st MW (0.20/plant) and occurred till harvesting of crop (44th MW). The peak activity (1.20/plant) was observed during 40th MW when the prevailing rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, evaporation, bright sunshine and wind velocity were 57.6 mm, 33.20C, 21.60C, 82%, 65%, 5.4 mm, 7.0 hrs and 3.4 Kmph, respectively.

During 2018-19, spider appeared with intensity of 0.10/plant and increased gradually attaining peak (0.98/plant) in 40th MW when the prevailing rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, evaporation, bright sunshine and wind velocity were 0.0 mm, 33.10C, 20.00C, 77.6%, 39.7%, 6.2 mm, 9.0 hrs and 3.4 Kmph, respectively. After that, the population declined and sustained upto 40th MW (01-07 Oct.). The present studies are in the line of following workers.^[22, 23] Anitha^[12] who recorded the coccinellids occurrence at peak during second week of October, 2006 and last week of December. Thereafter declined up to January, 2007. Highest coccinellid population was noticed during October month. Meena and Kanwat (2010)^[5] reported the appearance of the beetles reached its maximum in the first week of October. Purohit *et al.*, (2006)^[6] reported that population fluctuation of predators, *Coccinella* sp. and *Scymnus* sp. was occurred during late June and during July of both seasons. The maximum population of lady bird beetle (*Coccinella* spp.) was recorded during 3rd week of August and in the 2nd week of December during 2003 and during 1st week of September and December during 2004. Singh *et al.* (2013)^[8] revealed that coccinellids appeared more or less after the fifth week of the occurrence of aphid that is, fourth week of September (39th standard week) with 0.33 coccinellid/leaf. The population gradually increased and peaked with 2.51 coccinellids/leaf at the second week of October (41st standard week) which was found coincided with peak density of the aphid. The population then decreased but continued till third week of November (47th standard week).

The present findings are comparable with the results of Anitha, who observed a great fluctuation in chrysoperla population throughout the year and highest population noticed in the months of October, 2006 and November, 2006 and from January, 2007 to March, 2007. ^[11, 18b, 13, 17, 19].

Table1: Seasonal incidence of natural enemies on okra during years 2017 and 2018

Duration	Std. Met. Week	Coccinellids(Grub & adults)/plant		Number of green Lacewing/plant		No. of spiders/plant		
		2017	2018	2017	2018	2018	2017	2018
30-05 Aug	31	0.70	0.60	0.28	0.30	0.20	0.10	
6-12 Aug	32	1.60	1.82	0.56	0.50	0.64	0.50	
13-19 Aug	33	1.84	1.96	0.88	0.84	0.90	0.72	
20-26 Aug	34	2.20	2.06	1.02	0.88	1.10	0.86	
27-02 Sept	35	1.60	1.71	0.56	0.70	0.60	0.70	
03-09 Sept	36	1.74	2.46	0.96	0.84	0.86	0.72	
10-16 Sept	37	2.20	2.70	0.98	1.02	0.98	0.94	
17-23 Sept	38	1.90	2.78	0.70	0.68	0.98	0.68	
24-30 Sept	39	2.82	3.40	0.86	0.80	1.12	0.82	
01-07 Oct	40	2.90	3.56	1.02	0.72	1.20	0.98	
08-14 Oct	41	1.80	2.20	0.30	0.40	0.80	0.90	
15-21 Oct	42	1.50	1.00	0.20	0.30	0.70	0.70	
22-28 Oct	43	0.80	0.30	0.20	0.20	0.60	0.50	
29-04 Nov	44	0.40	0.20	0.10	0.20	0.40	0.30	

Conclusion

Okra is an important crop grown throughout India during Kharif as well as in Zayad cropping seasons. The crop is subjected to attacked by many insect-pests including okra fruit and shoot borer, aphids and whiteflies. The use of pesticides is been more popular to manage these pests without knowing these pesticides effect on our friend insects like natural enemies of aphids and whiteflies. An experiment has been conducted at College of Agriculture Vasant Rao Naik Marathwada Krishi Vidyapeeth Parbhani, Maharashtra, India to assess the population of coccinellids (grub and adult). The population of coccinellids (grub and adult) peak was observed in 40th MW (01-07 Oct.), The larvae of green lacewing the peak activity was observed during 40th MW (01-07 Oct.) in 2017-18 and 37th MW (10-16 Sept) in 2018-19 and the peak population of spider was noticed in 40th MW (01-07 Oct.) in 2017-18 and 2018-19, respectively. Maximum coccinellid were recorded at 38th standard week.

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