

SUCCESSION OF IMPORTANT INSECT PESTS OF OKRA UNDER SOUTH GUJARAT CONDITION

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ABSTARCT

Study was conducted on insect-pests succession in okra during *kharif* 2007 at Navsari Agricultural Univesity, Navsari. Observations on five important insect pests, aphid *Aphis gossypii*, jassid *Amrasca biguttula biguttula*, whitefly *Bemisia tabaci*, shoot and fruit borer *Earias vittella*, mite *Tetranychus macfarlanei* and predators like green lacewing *Chrysoperla scelestes* and lady bird beetle *Coccinella septempunctata* were recorded. The incidence of sucking pest like jassid, whitefly and borer like shoot and fruit borer started simultaneously in fourth weeks after sowing i.e. the last week of July. Out of these, two sucking pests occurred throughout the season. Among them, whitefly multiplied at comparatively faster rate reaching the peak level 8th weeks after sowing. It was followed by jassid which attained the peak level 11th weeks after sowing conforming positive correlation with whitefly. The third sucking pest i.e. aphid multiplied relatively slowly and as such reached to the peak level 13th weeks after sowing i.e. first week of October disclosing positive correlation with jassid. The population of these sucking pests declined at the end of crop season. Mite population started 9th weeks after sowing, which multiplied relatively at slower rate and as such reached to the peak level in 12th weeks after sowing i.e. last week of September, conforming significant positive correlation with aphid ($r= 0.966$). Shoot and fruit borer population started to see in 4th weeks after sowing, which also multiplied relatively slowly and reached to the peak level in 10th weeks after sowing i.e. second week of September, conforming significant positive correlation with jassid ($r= 0.940$) and whitefly ($r= 0.579$). The population of these pests gradually declined at the end of crop season. The chrysopid appeared in the early stage of crop suppressing jassid and whitefly population. The incidence of coccinellids predator started during later part of crop stage and prevailing throughout the remaining crop season.

KEY WORDS: aphid, fruit and shoot borer, jassid, mite, okra, succession, whitefly

INTRODUCTION

Okra, [*Abelmoschus esculentus* (L.) Moench], is an important vegetable crop grown in tropical and sub-tropical parts of the world. India is the second largest producer of vegetables

next to china. The total production of vegetable in India is about 6.2 million hectare (Netam *et al.*, 2007). Okra belongs to the family Malvaceae and it has multipurpose uses. Its fruits are consumed as green vegetable and mucilaginous extracts of green stem and roots are used for clarifying sugarcane juice in Gur manufacturing in India (Chauhan, 1972). Okra crop is usually heavily infested by various insect pests which affect the crop growth and considerable damage is caused by jassid, *Amrasca biguttula biguttula* resulting in discoloration curling and deformation of leaves and deterioration of yield, quality and quantity. Keeping in view these reasons, the present investing was undertaken to study the succession of important insect in okra, during *kharif* 2007.

MATERIALS AND METHODS

Studies on succession of insect pests of okra were undertaken during *kharif* 2007 at N. M. College of Agriculture, Navsari Agricultural Univesity, Navsari. The experiment was conducted with five varieties (Parbhani Kranti, Arka Anamika, Pusa Sawani, Go 2 and AOL 03-1 following RBD in four replication. Five lines of each variety per plot were sown and observations were recorded on the insect-pests incidence at weekly interval right from twenty days after sowing till to the harvesting of the crop on five randomly selected plants for the sucking pests and predators, while shoot and fruit borer incidence was recorded on ten randomly selected plants. The observation on sucking pest viz., aphid, jassid, whitefly and mite were recorded on three leaves per plant, i.e. one upper, one middle and one lower leaf, while for fruit and shoot borer, whole plants were observed for number of infested shoots in the early crop growth stage and in later crop growth stage infested buds/fruits were taken into account. The number of larvae and adults of predators were recorded from these randomly selected five plants.

RESULTS AND DISCUSSION

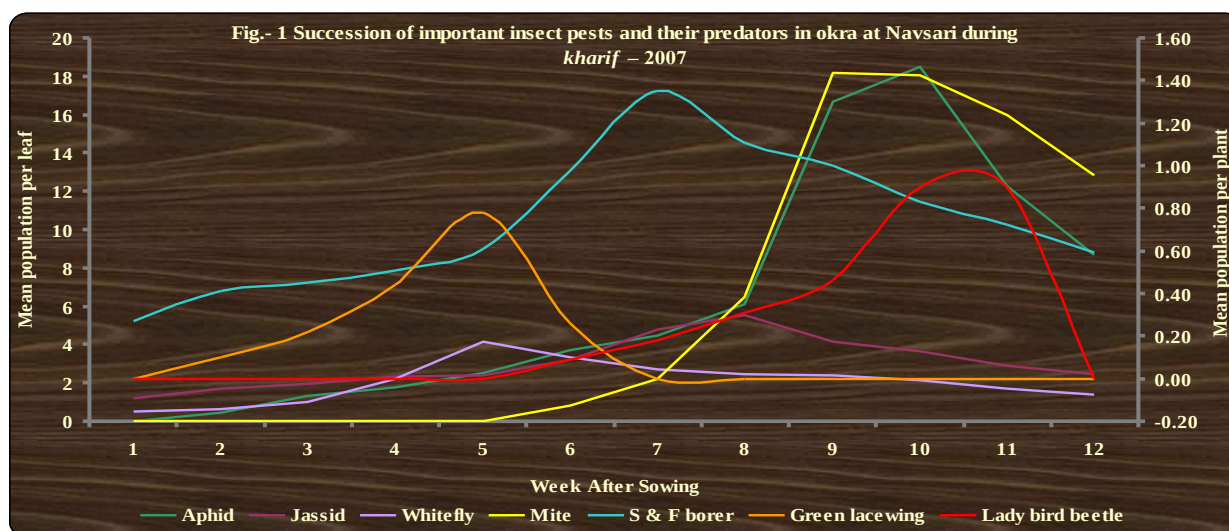
The incidence of sucking pest viz., jassid and whitefly commenced from fourth week after sowing i.e last week of July and fluctuated throughout the crop season (Table 1). Among different insect-pests, whitefly multiplied comparatively at a faster rate reaching to peak level (4.18 adults/leaf) during last week of August. Patel (1998) found the activity of whitefly reaching its peak level after seven to eight weeks of sowing. Population of jassid increased gradually and reached to its peak during third week of September (5.52 jassids/leaf). Similarly, aphid population initiated in first week of August and reached to peak level (18.50 aphids/leaf) at first week of October. Mite population build up started in the first week of September and reach to peak level (18.20 mites/leaf) during the last week of September. The shoot and fruit borer infestation initiated in fourth week after sowing (last week of July) and population reached to its maximum level (1.35 larvae/plant) during the second week of September (Table 1).

The two predators, green lacewing and lady bird beetle occurred in first week of August to third week of October. Out of the two predators, green lacewing (chrysopid) was first to appear in between fourth and nine week after sowing and reached to its maximum level at eight week after sowing (Table 2). The lady bird beetle (coccinellids) swung into action nine week after sowing and prevailed throughout the crop season, the coccinellids reached to peak level at

13th weeks after sowing (Table 2). The two predators viz; green lacewing and lady bird beetle appeared at different period exerting to some extent natural check on sucking pests.

Sequence of occurrence of important insects and mite pests on okra

From the results presented in Table 1 and graphically depicted in Figure 1, it can be evident that there was no incidence of insect pest in early stage until third weeks after sowing. The incidence of sucking pest like jassid, whitefly and borer like shoot and fruit borer started simultaneously in fourth weeks after sowing i.e. the last week of July. Out of these, two sucking pests occurred throughout the season. Among them, whitefly multiplied at comparatively faster rate reaching the peak level 8th weeks after sowing. It was followed by jassid which attained the peak level 11th weeks after sowing conforming positive correlation with whitefly (Table 2). The third sucking pest i.e. aphid multiplied relatively slowly and as such reached to the peak level 13th weeks after sowing i.e. first week of October disclosing positive correlation with jassid (Table 2). The population of these sucking pests declined at the end of crop season. The fourth sucking pest i.e. mite population started 9th weeks after sowing, which multiplied relatively at slower rate and as such reached to the peak level in 12th weeks after sowing i.e. last week of September, conforming significant positive correlation with aphid ($r = 0.966$) and negatively correlated with whitefly ($r = -0.018$) (Table 2). Shoot and fruit borer population started to see in 4th weeks after sowing, which also multiplied relatively slowly and reached to the peak level in 10th weeks after sowing i.e. second week of September, conforming significant positive correlation with jassid ($r = 0.940$) and whitefly ($r = 0.579$). The population of these pests gradually declined at the end of crop season.



The two predators, *C. scelestes* and *C. septempunctata* occurred at distinct periods of crop growth. The chrysopid appeared in the early stage of crop suppressing jassid and whitefly population. The incidence of coccinellids predator started during later part of crop stage and prevailing throughout the remaining crop season (Table 3). *C. scelestes* conforming significant positive correlation with aphid ($r = 0.862$), jassid ($r = 0.699$) and mite ($r = 0.763$).

CONCLUSION

From the above results, it can be concluded that jassid, whitefly and shoot and fruit borer population started in fourth week after sowing, whereas aphid and mite population started fifth and nine week after sowing, respectively. Incidence of sucking pest like jassids and whitefly started simultaneously during last week of July and it may be closely followed by aphid in first week of August. The incidence of aphid and mite initiated in first week of August and first week of September, respectively, whereas shoot and fruit borer started during last week of July.

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Table 1: Succession of important insect-pests of okra during kharif 2007

Standard week	WAS	Date of Observation	Mean Population per Leaf			Mean Population per Plant		Natural Predator per Plant	
			Aphid	Jassid	Whitefly	Mite	Shoot and Fruit Borer	Green Lacewing	Lady Bird Beetle
31	4	30/07/2007	0.71(0.00)*	1.26(1.18)*	0.96(0.52)*	0.71(0.00)*	0.87(0.27)*	0.71(0.00)*	0.71(0.00)*
32	5	06/08/2007	0.96(0.44)	1.44(1.68)	1.02(0.62)	0.71(0.00)	0.94(0.41)	0.76(0.10)	0.71(0.00)
33	6	13/08/2007	1.32(1.33)	1.55(1.96)	1.18(1.02)	0.71(0.00)	0.96(0.45)	0.83(0.22)	0.71(0.00)
34	7	20/08/2007	1.48(1.78)	1.65(2.30)	1.59(2.18)	0.71(0.00)	0.99(0.51)	0.94(0.44)	0.71(0.00)
35	8	27/08/2007	1.70(2.51)	1.69(2.41)	2.04(4.18)	0.71(0.00)	1.04(0.61)	1.11(0.78)	0.71(0.00)
36	9	03/09/2007	2.02(3.69)	1.89(3.22)	1.86(3.34)	0.99(0.80)	1.17(0.98)	0.85(0.26)	0.76(0.09)
37	10	10/09/2007	2.21(4.46)	2.23(4.76)	1.71(2.70)	1.40(2.20)	1.35(1.35)	0.71(0.00)	0.81(0.18)
38	11	17/09/2007	2.54(6.10)	2.41(5.52)	1.65(2.48)	2.58(6.48)	1.26(1.11)	0.71(0.00)	0.88(0.31)
39	12	24/09/2007	4.01(16.69)	2.14(4.16)	1.61(2.36)	4.21(18.20)	1.21(1.00)	0.71(0.00)	0.95(0.46)
40	13	01/10//2007	4.19(18.50)	2.02(3.65)	1.56(2.14)	4.29(18.02)	1.14(0.83)	0.71(0.00)	1.16(0.90)
41	14	08/10//2007	3.50(12.24)	1.83(2.90)	1.41(1.72)	4.04(15.98)	1.10(0.72)	0.71(0.00)	0.82(0.90)
42	15	15/10//2007	2.98(8.70)	1.70(2.46)	1.30(1.38)	3.64(12.86)	1.04(0.59)	0.71(0.00)	0.71(0.00)

* Data in the parentheses are original value, while those outside are square root ($\sqrt{X + 0.5}$) transformed values

WAS = Week After Sowing

Table 2: Correlation among important insect-pests of okra during *kharif* 2007

Insect-pests	Aphid	Jassid	Whitefly	Mite	Shoot & fruit borer
Aphid	-	0.481	0.140	0.966*	0.416
Jassid	0.481	-	0.498	0.393	0.940*
Whitefly	0.140	0.498	-	-0.018	0.579*
Mite	0.966*	0.393	-0.018	-	0.303
Shoot & fruit borer	0.416	0.940*	0.579*	0.303	-

**Significant at 5 % level ($r = \pm 0.574$)*

Table 3: Correlation between insect predator and their host insects during *kharif* 2007

Insect-pests	Green lacewing	Lady bird beetle
Aphid	0.862*	0.011
Jassid	0.699*	-0.181
Whitefly	0.308	-0.227
Mite	0.763*	0.090

** Significant at 5 % level ($r = \pm 0.574$)*

[MS received: August 7, 2012]

[MS accepted: September 10, 2012]