Himachal Journal of Agricultural Research 45(1&2) : 57-61 (2019)

Seasonal abundance of sucking insect and mite pests infesting okra under mid-hill conditions of Himachal Pradesh

Shruti Kaushal*, Pawan K. Sharma and P.C. Sharma
Department of Entomology
CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062, India.
*Corresponding author: shrutikaushal32@gmail.com

Manuscript Received: 28.06.2019; Accepted: 25.07.2019

Abstract

The studies on seasonal abundance of sucking insect and mite pests infesting okra were undertaken at CSKHPKV, Palampur and farmers' field at Samloti during *kharif* 2018. The activity of two sucking pests *i.e.*, aphid, *Aphis gossypii* and jassid, *Amrasca biguttula biguttula* on okra at Palampur initiated during second and third week of July, respectively and the pests remained associated with the crop till harvest *i.e.* third week of October. The peak population of *A.gossypii* (101.3aphids/plant) and *A. biguttula biguttula* (7.2 jassids/plant) was observed during second week of October and fourth week of August, respectively. Whereas, at Samloti the population of *A. gossypii*, *A. biguttula biguttula* and *Tetranychus urticae* started appearing during first week of June and the peak population of 64.4 aphids per plant was recorded during third week of September. The maximum number of jassids per plant (18.6) was observed during last week of August and *T. urticae* remained on okra crop for a short period having peak population of 11.2 mites per plant during second week of June. Analysis of correlation between weather factors and population of sucking pests on okra at Palampur showed that population of *A. gossypii* had a significant negative correlation with minimum temperature (r= -0.6545) and relative humidity (r= -0.7646). At Samloti, maximum temperature had significant negative effect on *A. gossypii* (r= -0.6040) and *A. biguttula biguttula* (r= -0.5144).

Key words: Okra, *Aphis gossypii*, *Amrasca biguttula biguttula*, *Tetranychus urticae,* weather parameters and seasonal abundance.

Okra, *Abelmoschus esculentus* L. (Moench) also known as lady's finger is an economically important malvaceous vegetable crop grown in tropical, sub-tropical and the warmer parts of temperate regions of the world. In India, the crop is grown on an area of 509 thousand hectares with the production of 6095 thousand metric tonnes contributing 73.25 per cent share of the world production (Anonymous 2018). In Himachal Pradesh this crop is grown on an area of 2.95 thousand hectares with the production of 39.36 thousand metric tonnes (Anonymous 2017). One of the important limiting factors in the cultivation of okra is insect pests. As many as 72 insect species have been recorded on okra (Srinivasa and Rajendran, 2003), of which, the sucking pests comprising of aphid, *Aphis gossypii* (Glover), jassid, *Amrasca biguttula biguttula* (Ishida), whitefly, *Bemisia tabaci* Gennadius and mite, *Tetranychus cinnabarinus* (Boisduval) cause significant damage to the crop. Krishnaiah (1980) reported about 40-56 per cent losses in okra due to leafhoppers. Aphids and leafhoppers are important pests in the early stage of the crop which suck the sap from the plants, make them weak and reduce the yield. Failure to control them in the initial stages was reported to cause yield losses to the tune of 54.04 per cent (Chaudhary and Dadheech, 1989). In order to reap maximum yields, it is imperative that the crop should be free from the infestation of pests. Studies on seasonal abundance and population fluctuations will help in formulating effective management strategies against the pest in okra ecosystem. This will not only be useful in framing an integrated pest management schedule but will also help in getting information about the low incidence and pest free periods.

Materials and Methods

Seasonal abundance of insect and mite pests was carried out on okra grown at the Experimental Research Farm, CSK Himachal Pradesh Krishi Vishvavidyalaya, Department of Entomology,

Palampur and the farmer's field at Samloti (Kangra) during 2018. At both the locations, the observations were recorded on 100 randomly selected plants throughout the crop season. The population count was made on 6 randomly selected leaves from upper, middle and lower plant canopy at weekly intervals. Agro-meteorological data on different weather parameters were obtained from the Agro-meteorological observatory of Department of Agronomy, CSK HPKV, Palampur and Rice and Wheat Research Centre, Malan to work out the correlation between population build-up and weather parameters.

Results and Discussion

The results obtained during the course of study on seasonal abundance of insect-pests are as follows:

Seasonal abundance of *A. gossypii* and *A. biguttula biguttula* at Palampur

Aphid, *A. gossypii*

The results (Table 1) reveal that the activity of aphids commenced during the second week of July with a population of 0.7 aphids per plant and the population showed a variable trend all through the crop season. Thereafter, the population increased gradually to 79.6 aphids per plant during the last week of September. After this week, the aphid population was observed to be fluctuating and the second peak (101.3 aphids/ plant) was observed in the second week of October. Subsequently, the population decreased to 30.7 aphids per plant during the third week of October signifying that the pest remained on the crop in considerable numbers until final harvesting. The results are similar to the findings of Singh et al. (2013) who observed the peak incidence of *A. gossypii* during second week of October. However, Badiyala (2007) reported the peak population of *A. gossypii* during August at Palampur. The difference in the peak population duration may be due to early sowing (last week of May) of the crop by the earlier workers as compared to second week of June in the present study and the variations could also be due to difference in crop varieties grown in different studies. The aphid population had significant negative correlation with minimum temperature (r= -0.6545) and relative humidity (r= -0.7646), but, non significant negative correlation with maximum temperature (r= -0.4034) and rainfall (r= -0.4699) (Table 2). Negative correlation of aphid population with minimum temperature, relative humidity and rainfall was earlier reported by Singh *et al*. (2013).

Jassid, *A. biguttula biguttula*

The jassid infestation appeared on okra nearly a month after sowing *i.e.* third week of July with an initial population of 2.6 jassids per plant. The mean maximum temperature, mean minimum temperature, mean relative humidity were 27.6 °C, 20.2 °C, 91.4 per cent, respectively, with a total rainfall of 198.2 mm recorded during this period. The population varied between 1.3 and 7.2 jassids per plant during the season with highest during the fourth week of August (Table 1). The results of present study are in agreement with those of Nath *et al.* (2011) who reported the activity of *A. biguttula biguttula* from July to October with peak from mid August to mid September. No significant correlation was observed between jasid population and maximum temperature (r= 0.0125), minimum temperature (r= 0.1721), relative humidity (r=0.1669) or rainfall (r= -0.0841) (Table 2). The present results are in line with those of Badiyala (2007) who observed positive non significant correlation of minimum temperature and relative humidity with jassid population on okra.

Seasonal abundance of *Aphis gossypii, Amrasca biguttula biguttula* and *Tetranychus urticae* at Samloti

Aphid, *A. gossypii*

The incidence of *A. gossypii* on rainy season okra at Samloti appeared during the first week of June with the population of 6.0 aphids per plant (Table 3). The highest infestation of the pests (64.4 aphids/plant) was recorded during the third week of September. The mean maximum temperature, mean minimum temperature and mean relative humidity during the peak pest activity period were 30.8 °C, 18.8 °C, 75.9 per cent and 56.6 mm, respectively. The activity of pest did not come to an arrest even during the last phase of crop maturity and a population of 8.6 aphids per plant was recorded during the last sampling date *i.e.* October 1st, 2018. The present results agree with the findings of Khating *et al.* (2016) and Aarwe *et al.* (2016) who also reported the peak pest activity during the month of September. Correlation analysis revealed that the aphid population had significant negative correlation with maximum temperature (r= -0.6040), though it was positive and non significant with minimum temperature, relative humidity and rainfall (r= 0.2976, 0.2034 and 0.0917, respectively) (Table 4). Earlier Badiyala (2007) and Faleiro *et al.* (1990) also reported a negative correlation between the population density of *A. gossypii* and maximum temperature.

Jassid, *A. biguttula biguttula*

At Samloti, *A. biguttula biguttula* infestation appeared on okra during first week of June (2.7 jassids/plant) and persisted throughout the cropping

Table 1. Seasonal abundance of *Aphis gossypii* and *A. biguttula biguttula* on okra at Palampur

Sampling date	Population count per plant*	
	Aphis gossypii	*Amrasca biguttula biguttula*
12-07-2018	0. 7	0.0
19-07-2018	7.2	2.6
26-07-2018	14.6	2.8
02-08-2018	21.3	3.3
09-08-2018	18.6	3.2
16-08-2018	16.2	4.5
22-08-2018	28.1	7.2
30-08-2018	19. 0	5.5
06-09-2018	30. 8	3.5
13-09-2018	48. 8	6.3
20-09-2018	68. 3	6.2
27-09-2018	79. 6	3.2
04-10-2018	49. 6	4.8
11-10-2018	101.3	3.7
17-10-2018	30. 7	1.3

*Nymphs+ adults recorded per plant (6 leaves/plant)
Data on number of nymphs+adults were recorded on 3 leaves/plant during first 2 sampling dates

Table 2. Correlation coefficient (r) between weather parameters and population of *Aphis gossypii* and *Amrasca biguttula biguttula* at Palampur

Abiotic factors	*Aphis gossypii*	*Amrasca biguttula biguttula*
Maximum temperature (° C)	-0.4034	0.0125
Minimum temperature (° C)	-0.6545*	0.1721
Relative Humidity (%)	-0.7646*	0.1669
Rainfall (mm)	-0.4699	-0.0841

*Significant at P= 0.05

season *i.e.* first week of October (3.1 jassids/plant) with peak during the last week of August (18.6 jassids/plant) (Table 3). The peak activity of jassids during the last week of August as reported in the present study is in accordance with the findings of Mohanasundaram and Sharma (2011). Correlation studies (Table 4) revealed that the jassid population was not influenced significantly by the weather parameters like minimum temperature (r= 0.3012), relative humidity (r= 0.0474) and rainfall (r= 0.4282). However, maximum temperature had significant negative impact (r= -0.5144) on the population density of the jassid. The results of the present study confirm the findings of Patel et al. (1997) who reported the significant negative correlation between jassid counts and the maximum temperature.

Mite, *Tetranychus urticae*

At Samloti, the phytophagous mites started appearing during the first week of June with 4.2 mites per plant, which increased to 11.2 mites per plant during the second week of June (Table 3). After that, the mite population declined abruptly due to the increase in rainfall and relative humidity which were not suitable for their build-up. Again mite population was observed during first and second week of August but the population was very low (0.7 mites/plant) and then mites disappeared completely.

Table 3. Seasonal abundance of *Aphis gossypii, Amrasca biguttula biguttula* and *Tetranychus urticae* on okra at Samloti

Sampling Date	Population count per plant*		
	Aphis gossypii	*Amrasca biguttula biguttula*	*Tetranychus urticae*
04-06-2018	6.0	2.7	4.2
11-06-2018	6.9	5.2	11.2
18-06-2018	8.1	7.8	9.3
25-06-2018	21.1	9.2	1.3
02-07-2018	11.9	8.5	0
09-07-2018	11.3	10.2	0
16-07-2018	13.9	11.3	0
23-07-2018	14.1	11.6	0
30-07-2018	14.8	9.3	0
06-08-2018	30.3	14.6	0.7
13-08-2018	27.7	11.5	0.7
20-08-2018	35.4	16.2	0
27-08-2018	20.8	18.6	0
03-09-2018	35.6	11.8	0
10-09-2018	37.7	13.2	0
17-09-2018	64.4	9.6	0
24-09-2018	30.2	8.3	0
01-10-2018	8.6	3.1	0

*Nymphs+ adults recorded per plant (6 leaves/plant)
Data on number of nymphs+adults were recorded on 3 leaves/plant during first 2 sampling dates

Table 4. Correlation coefficient (r) between weather parameters and population of *A.gossypii* and *A. biguttula biguttula* at Samloti

Abiotic factors	*Aphis gossypii*	*Amrasca biguttula biguttula*
Maximum temperature (^{0}C)	-0.6040*	-0.5144*
Minimum temperature (^{0}C)	0.2976	0.3012
Relative Humidity (%)	0.2034	0.0474
Rainfall (mm)	0.0917	0.4282

*Significant at P= 0.05

Conclusion

It is evident from the present study that two sucking pests *i.e. Aphis gossypii* and *Amrasca biguttula biguttula* were found infesting okra at both the locations. However, *Tetranychus urticae* was found infesting okra at Samloti only. At Palampur, *A. gossypii* was more abundant whereas, *A. biguttula biguttula* was more abundant at Samloti. The management practices against these pests can be undertaken based on the appearance and peak period of their abundance to encourage the need based application of pesticides which will help in reducing the ill-effects of pesticides on the environment and human health

References

Aarwe R, Pachori R, Sharma AK, Thakur AS and Mandloi R. 2016. Impact of weather factors on the incidence of major pests of okra. International Journal of Agricultural Sciences **8:** 981-83.

Anonymous. 2017. Horticultural Statistics at a Glance 2017. Oxford University Press, New Delhi, pp 207.

Anonymous. 2018. Indian Horticulture Database. National Horticulture Board, Ministry of Agriculture, Government of India, Gurgaon, India.

Badiyala A. 2007. Integrated pest management in okra, *Abelmoschus esculentus* (L.) Moench. Ph. D. Thesis. CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur. 267p.

Chaudhary HR and Dadheech. 1989. Incidence of insects attacking okra and the avoidable losses caused by them. Annals of Arid Zone **28:** 305-07.

Faleiro JR, Singh KM and Singh RN. 1990. Influence of abiotic factors on the population build up of important insect-pests of cowpea, *Vigna unguiculata* (L.) Walp. and their biotic agents recorded at Delhi. Indian Journal of Entomology **52:** 675-680

Khating SS, Kabre GB and Dhainje AA. 2016. Seasonal incidence of sucking pests of okra along with natural enemies in Khandesh region of Maharashtra. Asian Journal of Biological Sciences **11:** 269-72.

Krishnaiah K. 1980. Methodology for assessing crop losses due to pests of vegetable. Assessment of crop losses due to pests and diseases. *Proceedings of Workshop* held from Sept, 19-30, 1977 at UAS Bangalore, pp 259-67.

Mohanasundaram A and Sharma RK. 2011. Abundance of pest complex of Okra in relation to abiotic and biotic factors. Annals of Plant Protection Science **19:** 286-90.

Nath L, Prasad CS, Tiwari GN and Kumar A. 2011. Impact of weather parameters on major insect pests of okra prevailing in western Uttar Pradesh. Vegetos **24:** 152-56.

Patel KI, Patel JR, Jayani DB, Shekh AM and Patel NC. 1997. Effect of seasonal weather on incidence and development of major pests of okra (*Abelmoschus esculentus*). Indian Journal of Agricultural Sciences **67:** 181-183

Singh Y, Aastik J, Verma S, Mishra VK and Singh SS. 2013. Population dynamics of sucking insect-pests and its natural enemies on okra agro ecosystem in Chitrakoot region. African Journal of Agricultural Research **8:** 3814-819.

Srinivasa R and Rajendran R. 2003. Joint action potential of neem with other plant extracts against the leaf hopper *Amrasca devastans* (Distant) on Okra. Pest Management and Economic Zoology **10:** 131-36.