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## Seasonal incidence of aphid, *Aphis gossypii* infesting okra and its relation with weather parameters

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#### Abstract

Studies were conducted on incidence of *Aphis gossypii* on okra under field conditions at faculty of agriculture Shere Kashmir University of Agriculture Sciences and Technology during 2018. The incidence of aphids commenced from 29<sup>th</sup> standard week and was lowest (3.30 aphids/3 leaves). The aphid count gradually increased and reached its peak in 32<sup>nd</sup> SW (47.28 aphids/3leaves) thereafter it declined and was again minimum during 40<sup>th</sup> SW (5.19 aphids/3 leaves). The study of relation of weather parameters on incidence of aphids revealed 47 per cent of variability of aphid counts is explained by weather factors. Further, a significant and positive correlation was found between the aphid count and maximum temperature ( $r= 0.331$ ), minimum temperature ( $r= 0.020$ ) and minimum relative humidity ( $r= 0.266$ ), however negative correlation was found between aphid count and maximum relative humidity ( $r=-0.323$ ) and rainfall ( $r=-0.249$ ). The contribution of weather factors on *A. gossypii* population was 47 per cent ( $R^2=0.47$ ).

**Keywords:** Aphids, okra, incidence, weather

#### Introduction

Vegetables are important food crops owing to their health benefits as well as their role in food trade. 1 Vegetables are a rich source of proteins, vitamins and minerals and help in detoxification of body and develop immunity. [2] India having diverse climatic conditions is a hub for production of various types of vegetables and thus ranks in second in the production of vegetables [3].

Among all vegetables, India is the largest producer of okra *Abelmoschus esculentus* (L.) Moench) amongst vegetables. Okra (is grown in tropical and sub- tropical regions mostly during summer and rainy season and is classified as warm season crop. The crop is grown primarily for its soft immature fruits or pods. However, all parts of plant are beneficial including its leaves and seeds. It is cultivated in an area of 528 thousand hectares with an annual production 6164 thousand MT with a productivity of 11.67Mt/ha. [4] However, the growth and quality of crop is affected by attack of numerous insect pests. One of the most important constraints in production of okra is insect pests. As high as 72 species of insects have been recorded on crop important ones being shoot and fruit borer, leafhopper, whitefly, red spider mite and aphids. [5] The sucking pest complex consisting of aphids (*Aphis gossypii* Glover), leafhopper (*Amrasca biguttula biguttula* Ishida), whitefly (*Bemisia tabaci*. Gennadius) and Thrips (*Thrips tabaci* Lindeman) are major pest and causes 17.46 per cent yield loss in okra. [6] Aphid, *Aphis gossypii* damaging okra is a polyphagous sucking pest which sucks the sap from tender parts of plant causing general weakness and wilting. It also acts as vector of virus transmitting mosaic and leaf curl. 7,8 In Jammu and Kashmir, the crop is cultivated on an area of 2.52 thousand hectares with a production of 42.99 thousand MT and *A. gossypii* is one of the important pests owing to its polyphagous nature. [8] The current study was carried out to study the incidence of *A. gossypii* and effect of abiotic factor on its incidence so as to develop appropriate management strategy for the pest.

#### Material and method

##### Cultivation of crop

In order to study the incidence of *A. gossypii* on okra (*A. esculentus* L.), a field trial of okra was conducted at Faculty of Agriculture, Sher e Kashmir University of Agricultural sciences

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and Technology, during the year 2018. The SKBS11 variety was grown during the month of April at a spacing of 45x 30 cm. Fertilizer was given as per the recommendation (i.e. 140 kg of urea, 60kg DAP and 40kg of MOP per hectare) to maintain proper growth of the crop.

### Recording observation on incidence

The observations on recording the incidence of aphids was determined by counting the number of aphids (irrespective of stage) at weekly intervals from May to October on ten randomly selected plants from the field using a magnifying lens (10X). From each plant, top, middle and bottom leaves were considered and the composite mean of aphids was recorded [9]. Three plants were considered as one replication. Mean population was expressed as number of aphids per 3 leaves (aphids/3 leaves). Aphid populations were estimated as per the score given [10].

Score 0 :	No aphids
Score 1 :	1-10 aphids
Score 2 :	11-20 aphids
Score 3 :	21-50 aphids
Score 4 :	51-100 aphids
Score 5 :	> 100

### Recording data on weather factors

Data of weather factors viz., temperature (maximum and minimum), relative humidity (maximum and minimum) and rainfall was also recorded during the experimental period on weekly intervals from meteorological observatory of the faculty. The data thus obtained was statistically analysed using R- software. Correlation analysis of weather parameters and weekly incidence of pest was also done.

### Result and discussion

Okra is an important vegetable crop as far as its nutritional value is concerned. It is a rich source of Calcium and vitamin C, thus needs to be extensively cultivated. However, the cultivation is seriously affected by sucking pests like aphids.

### Seasonal incidence of aphid, *Aphis gossypii*

Studies conducted to ascertain the incidence of *A. gossypii* on okra during year 2018 revealed that the initially no incidence

of aphids was recorded during 27<sup>th</sup> and 28<sup>th</sup> SW. Incidence commenced gradually from 29<sup>th</sup> SW (3.30 aphids/ 3 leaves) when the weather factors corresponded to 30.45 °C (maximum temperature), 17.51 °C (minimum temperature), 1.1mm rainfall and 81 and 57.85 (RH max and min). The number of aphids increased gradually afterwards and 4.71 aphids/3 leaves were recorded in 29<sup>th</sup> SW which further increased to 4.71 aphids/3 leaves and 5.46 aphids/3 leaves during 30<sup>th</sup> and 31<sup>st</sup> SW. During 32<sup>nd</sup> SW, the count abruptly increased to 16.8 aphids/3 leaves in 32<sup>nd</sup> SW then to 36.51 aphids/3 leaves in 34<sup>th</sup> SW. During 35<sup>th</sup> SW the count was 43.11 aphids/3 leaves after which it peaked to 47.28 aphids/ 3 leaves during 36<sup>th</sup> SW (September) corresponding to maximum and minimum temperature of 30.24 and 14.05 °C, maximum and minimum relative humidity of 84.14 and 51.57 per cent, respectively. The number of aphids declined thereafter upto 40<sup>th</sup> SW (5.19 aphids/ 3 leaves) (Table 1). The present investigation is in conformity with Prakash and Tomar, 2010 who found similar activity period of aphids on cotton [11]. Current findings are also in line with Khating *et al.* 2016 who also observed peak number of aphids on okra during September (43.3 aphids/3 leaves) [12].

### Influence of weather parameters on aphid, *A. gossypii*

The correlation analysis of aphid population recorded throughout the period of investigation with weather factors indicated that the population count is positively correlated with maximum temperature ( $r=0.331$ ), minimum temperature ( $r=0.020$ ) and maximum per cent relative humidity ( $r=0.266$ ) (Table 2). The results are in conformity with Prakash and Tomar, 2010 who also found similar correlation pattern of aphid population with weather parameters. During the present investigation, the population count of aphids was negatively correlated with minimum relative humidity ( $r=-0.249$ ) and rainfall ( $r=-0.323$ ). Regression analysis revealed 47 per cent of variability in population count of aphids is explained by weather parameters. The present findings are in conformity with Patel and Purohit, 2013 who also observed negative association of aphid, *Melanaphis sacchari* with rainfall and average humidity [13]. These findings are also supported by Khating *et al.* 2016 who also observed positive correlation of aphid count with maximum, minimum temperature [12].

**Table 1:** Seasonal incidence of aphid (*A. gossypii*) on okra, *Abelmoschus esculentus* (L.)

Month	Standard Week (SW)	Temperature (°C)			Relative humidity (%)			
		Average number of aphids/3 leaves	Aphid Score	Max	Min	Rainfall (mm)	Max	Min
July	27	0.0	0	27.2	14.05	4.9	83	60.2
	28	0.0	0	31.74	16.55	0.57	75.85	55
	29	3.30±0.31	1	30.45	17.51	1.1	81	57.85
	30	4.71±0.39	1	27.24	16.35	5.8	87.4	71
	31	5.46±0.36	1	31.8	14.4	0	84.57	54.57
August	32	16.8±0.58	2	30.6	17.6	4	82	65.28
	33	33.30±1.03	3	30.8	17.07	3.22	84	61
	34	36.51±1.25	3	31.6	16.67	0	81.57	56.14
	35	43.11±1.1	3	31.84	14.95	0	83.28	55
September	36	47.28±1.41	3	30.24	14.05	0	84.14	51.57
	37	38.40±1.3	3	28.68	10.65	1.95	86.14	59.71
	38	25.11±1.24	3	27.11	8.25	0	82.85	50.85
	39	11.31±0.50	2	26.44	7.54	1.54	83.4	57.14
October	40	5.19±0.42	1	24.81	6.47	0	83.7	52.57
C.D P=0.05		1.53						

**Table 2:** Correlation coefficient of weather factors with incidence of *A. gossypii* on Okra

Abiotic factors	Number of aphids/3 leaves	R <sup>2</sup>	Regression equation
Maximum Temperature ° C (X1)	0.331*	0.47*	Y= -3.88+ 5.94 X1- 1.97 X2+ 3.83X3-1.18X4+1.06 X5
Minimum Temperature ° C (X2)	0.020*		
Per cent maximum relative humidity (X3)	-0.323*		
Per cent minimum relative humidity (X4)	0.266*		
Rainfall (mm) (X5)	-0.249*		

\*Significant at 5%

### Conclusion

The present investigation carried out to study the seasonal incidence of aphid, *A. gossypii* on okra and impact of weather factors on it revealed that incidence started from 29<sup>th</sup> SW and peaked during 36<sup>th</sup> SW, thereafter the incidence gradually declined. Thus properly timed application of insecticide/ botanical prior to commencement of 36<sup>th</sup> SW can effectively manage the pest which still needs to be evaluated. Weather factors explained 47 percent of variability in the incidence of aphids as depicted from regression analysis. Maximum, minimum temperature and minimum relative humidity were significantly and positively correlated with incidence while as, rainfall and maximum relative humidity were negatively correlated.

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