



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; Sp 9(5): 101-105

Received: 08-06-2020

Accepted: 24-08-2020

Nandita Paul

Department of Entomology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Sonali Deole

Department of Entomology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

SS Shaw

Department of Entomology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Nandan Mehta

Department of Entomology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Corresponding Author:**Nandita Paul**

Department of Entomology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Seasonal incidence of sucking pests *viz.*, Aphid, *Rhopalosiphum maidis* (Fitch) and leaf hoppers, *Cicadulina* sp. infesting maize crop at Raipur (Chhattisgarh)

Nandita Paul, Sonali Deole, SS Shaw and Nandan Mehta

Abstract

The field experiment were conducted at Research Cum Instructional Farm at IGKV, Raipur (C.G.) during *kharif* 2018, to know the seasonal incidence of sucking pests *viz.*, aphid, *Rhopalosiphum maidis* and leaf hopper, *Cicadulina* sp. infesting maize crop. The aphids appeared during 35th SMW *i.e.* 4th week of August with a mean population of 0.74 aphids/cm² leaf area. The peak population were observed in the fourth week of September with a mean population of 9.4 aphids/cm² leaf area. Thereafter, the population declined gradually and reached to a minimum level of 0.75 aphids/cm² leaf area during 4th week of October (42nd SMW). The leaf hoppers, *Cicadulina* sp. appeared during 35th SMW *i.e.*, 4th week of August with a mean population of 0.48 adults/plant. The peak population were observed in the fourth week of September with a mean population of 36 adults/plant. Thereafter, the population declined and reached to its minimum levels of 1.56 adults/plant.

The correlation between leaf hopper, *Cicadulina* sp. and abiotic parameters during *kharif* 2018 results indicated that the population demonstrated a highly significant positive correlation with minimum temperature ($r=0.727$). While, leaf hoppers population showed significant but negative correlation with morning relative humidity ($r=-0.658$) and also showed significant but negative correlation with evening relative humidity ($r=-0.615$).

Keywords: Correlation, abiotic parameters, maize, incidence, aphid, leaf hopper

1. Introduction

Maize or corn (*Zea mays* L.) is a crop of global importance, which holds a unique position in world agriculture. Maize belongs to the family of Poaceae, originated from South America, from where it was taken to all parts of the world. In india, maize is emerging as third most important crop after rice and wheat. Its importance lies in the fact that it is not only used as human food and animal feed but at the same time it is also widely used in corn starch industry, corn oil production, and as baby corn in different recipes. The leafy stalk produces ears which contain the grain, which are seeds called kernels. Maize kernels are often used in cooking as a starch. The six major type of maize are dent, flint, pod, popcorn, flour and sweet corn. Insects attack maize throughout the cropping cycle and during storage, resulting in as little as 10 percent to complete loss.

The studies on seasonal incidence of insect pests of maize crop and their correlation with the weather parameters provide basic information about seasonal occurrence of insect pests and their natural enemies. This provides an opportunity for the development of management strategies significant for the control of these pests.

2. Materials and Methods

A field experiment was conducted at Research Cum Instructional Farm at IGKV, Raipur, (C.G.) during *kharif* 2018 under field condition to know the occurrence of insect pests on maize. The popular hybrid genotype was raised and maintained without insecticide application to study the occurrence of major insect pests on maize in relation to abiotic factors *viz.*, maximum temperature, minimum temperature, relative humidity (morning and evening), wind velocity and sunshine hours.

To determine the seasonal incidence of insect pests on maize crop, weekly populations were recorded on randomly selected twenty five plants from four corners and center starting from 15 days after germination to the late stage of the cropping season.

The number of corn leaf aphid, *Rhopalosiphum maidis* (Fitch) was counted from one sq cm leaf area on three leaves/plant using 25 plants for each observations and number of leaf hopper

was observed on 25 randomly selected plants in each quadrat and expressed as a per plant basis at five different locations at 15 days interval.

The data was statistically analyzed by subjecting to the correlation between weather parameters and the population of insect pests which were determined using the Karl Pearson's coefficient of correlation formula:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{(\sum X^2 - \frac{(\sum X)^2}{N})(\sum Y^2 - \frac{(\sum Y)^2}{N})}}$$

Where,

r_{xy} = Simple correlation coefficient

X = Variable *i.e.* abiotic component. (Average temperature, relative humidity and total rainfall)

Y = Variable *i.e.* mean number of insect pests per plant

N = Number of observations.

The correlation coefficient (r) values were subjected to the test of significance using t-test:

$$t = \frac{r_{xy} \sqrt{n-2}}{\sqrt{1-r_{xy}^2}}$$

Where,

r = Correlation Coefficient

n = No. of observations

The calculated t-value obtained was compared with correlation coefficient table value at 5 % and 1% level of significance.

3. Results and Discussion

Table 1: Seasonal incidence of fall army worm, *Spodoptera frugiperda* (Smith) infesting maize genotype KSCH-972 during, *kharif* 2018.

SMW No.	Aphids/ cm ² upper leaves of plants	Leaf hoppers/plant	Max. Temp. (°C)	Min. Temp. (°C)	Rain Fall (mm)	RH (%) Mor.	RH (%) Eve.	Wind Velocity (Km/h)	Sun Shine (hours)
33	0	0	30.3	25.3	101.2	94	79	4.1	2.9
34	0	0	29.0	24.6	60.4	93	79	5.5	0.6
35	0.74	0.48	28.3	24.1	275.0	96	86	6.8	0.2
36	0.92	0.92	29.2	23.9	30.2	93	57	0.5	1.1
37	7.2	7.2	32.6	25.1	0.0	90	55	2.2	6.4
38	8.64	23.4	31.0	24.1	32.8	92	68	3.5	3.6
39	9.4	36	32.9	25.0	11.0	93	59	1.2	7.8
40	7.2	35.16	34.0	23.8	0.0	91	44	0.7	8.0
41	4.3	29	32.4	22.8	0.0	87	51	2.8	7.1
42	0.75	16.76	33.4	21.3	0.0	89	40	1.0	8.5
43	0	12.36	32.9	18.9	0.0	86	48	1.1	8.3
44	0	1.56	31.0	19.6	0.0	86	49	2.6	9.3
45	0	0	32.3	20.1	0.0	86	49	1.8	8.7
Correlation of coefficient (r) for aphid population and abiotic factor			0.438	0.495	0.168	-0.139	-0.058	0.182	-0.264
Correlation of coefficient (r) for leaf hopper population and abiotic factor			-0.351	0.727**	0.315	-0.658*	-0.615*	0.047	-0.585

SMW: Standard Meteorological Week (*Significant at 5% level, ** Significant at 1% level)

3.1 Seasonal incidence of Aphid, *Rhopalosiphum maidis* (Fitch) in relation to abiotic parameters

The aphids appeared during 35th SMW *i.e.* 4th week of August with a mean population of 0.74 aphids / c.m.² leaf area. The population build up gradually and reached to its peak in the fourth week of September (39th SMW) with a mean population of 9.4 aphids / c.m.² leaf area, when the maximum atmospheric temperature, minimum atmospheric temperature, rainfall and relative humidity were 32.9°C, 25°C, 11 mm and 76 per cent, respectively. Then, the population declined and reached to its minimum level of 0.75 aphids / c.m.² leaf area during 4th week of October (42nd SMW). (Table.1)

The findings indicated that the population of aphids showed non significant negative correlation with morning relative humidity (r= -0.139), evening relative humidity (r= -0.058) and sunshine hours (r= -0.264). While, non significant

positive correlation with maximum temperature (r= 0.438), minimum temperature (r= 0.495), total rainfall (r= 0.168) and wind velocity (r=0.182). (Table.1)

Present findings are in confirmation with the findings of Ahad (2008) [1] who studied that the effect of agro meteorological factors on population fluctuation of black aphid recorded the highest among hemipteran insects, ranging from 4.30 to 53.23 plant with regular fluctuations of the population. Maximum infestation was recorded in the 4th week of August. Similarly Lutfallah *et al.*, (1993) [3] who recorded high infestation of *R. maidis* in the tasseling stage during the pollination period (70 days after sowing) on maize in Egypt. Atiyeh *et al.*, (1996) [2] also observed that the aphid population was significantly higher at the silking stage (8.29 aphids /leaf) on maize in Pakistan.

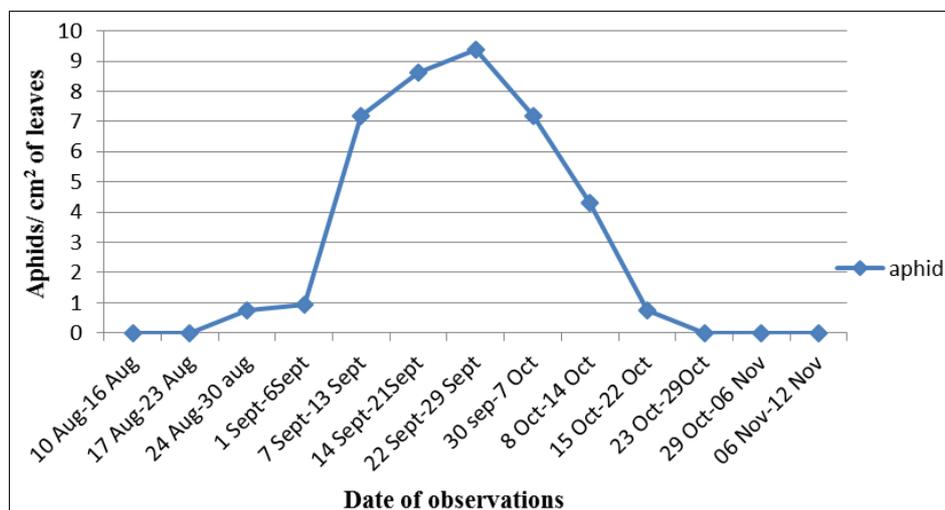


Fig 1: Mean population of aphids, *Rhopalosiphum maidis* (Fitch) during Kharif 2018.

3.2 Seasonal incidence of leaf hoppers, *Cicadulina* sp. in relation to abiotic parameters

The leaf hoppers appeared during 35th SMW i.e., 4th week of August with a mean population of 0.48 adults/plant. The population build up gradually and reached to its peak in the fourth week of September (39th SMW) with a mean population of 36 adults/plant. When, the maximum atmospheric temperature, minimum atmospheric temperature, total rainfall and relative humidity were 32.9°C, 25°C, 11 mm and 76 per cent, respectively. Then, the population declined and reached to its minimum levels of 1.56 adults/plant during 1st week of November (44th SMW).

The findings indicated that the population of hoppers showed non significant negative correlation with maximum temperature ($r = -0.351$) and sunshine hours ($r = -0.585$). While, non significant positive correlation with total rainfall ($r = 0.315$) and wind velocity ($r = 0.047$). The results indicated that hopper population showed highly significant positive correlation with minimum temperature ($r = 0.727$). The regression equation being ($Y = 0.954x - 9.389$) indicating that with a increase in 1°C minimum temperature there will be

increase in population of adult/plant by 0.954 per cent. While, leaf hoppers population showed significant but negative correlation with morning relative humidity ($r = -0.658$). The regression equation being ($Y = -0.280x + 37.86$) indicating that with a increase in 1 per cent of morning relative humidity there will be decrease the population of adult/plant by 0.280 per cent and also showed negative correlation with evening relative humidity ($r = -0.615$). The regression equation being ($Y = -0.384x + 35.10$) indicating that with a increase in 1 per cent of evening relative humidity there will be decrease the population of adult/plant by 0.384 per cent. (Table.1)

Present findings are in confirmation with the findings of sidar *et al.*, (2015) [4] who studied that the effect of agro meteorological factors on population fluctuation of the highest adult population (2.30 hopper/plant) was noticed during fourth week of September; during this period, maximum and minimum temperature, morning and evening relative humidity, wind velocity and bright sunshine hours were observed as 33.4°C, 24.0°C, 93%, 57%, 2.1 km/h and 8.3 h/day respectively.

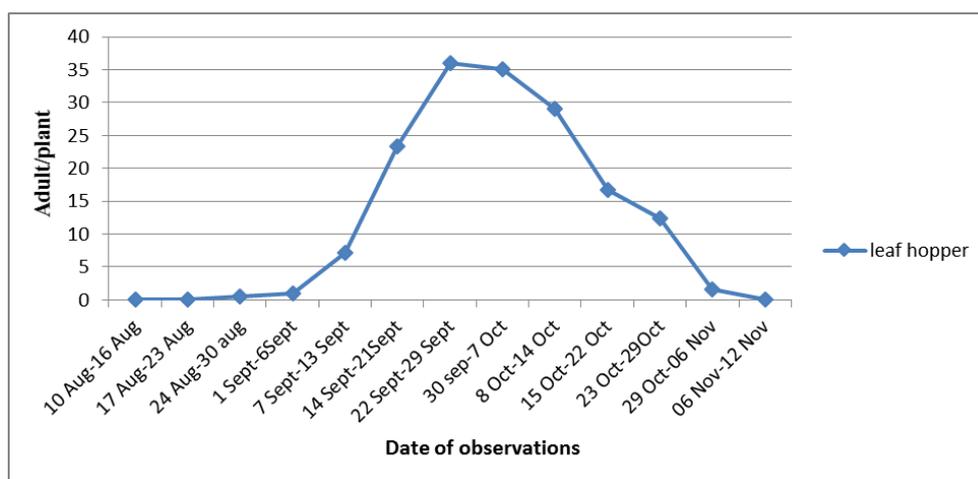


Fig 2: Mean population of leaf hoppers, *Cicadulina* sp. during Kharif 2018.

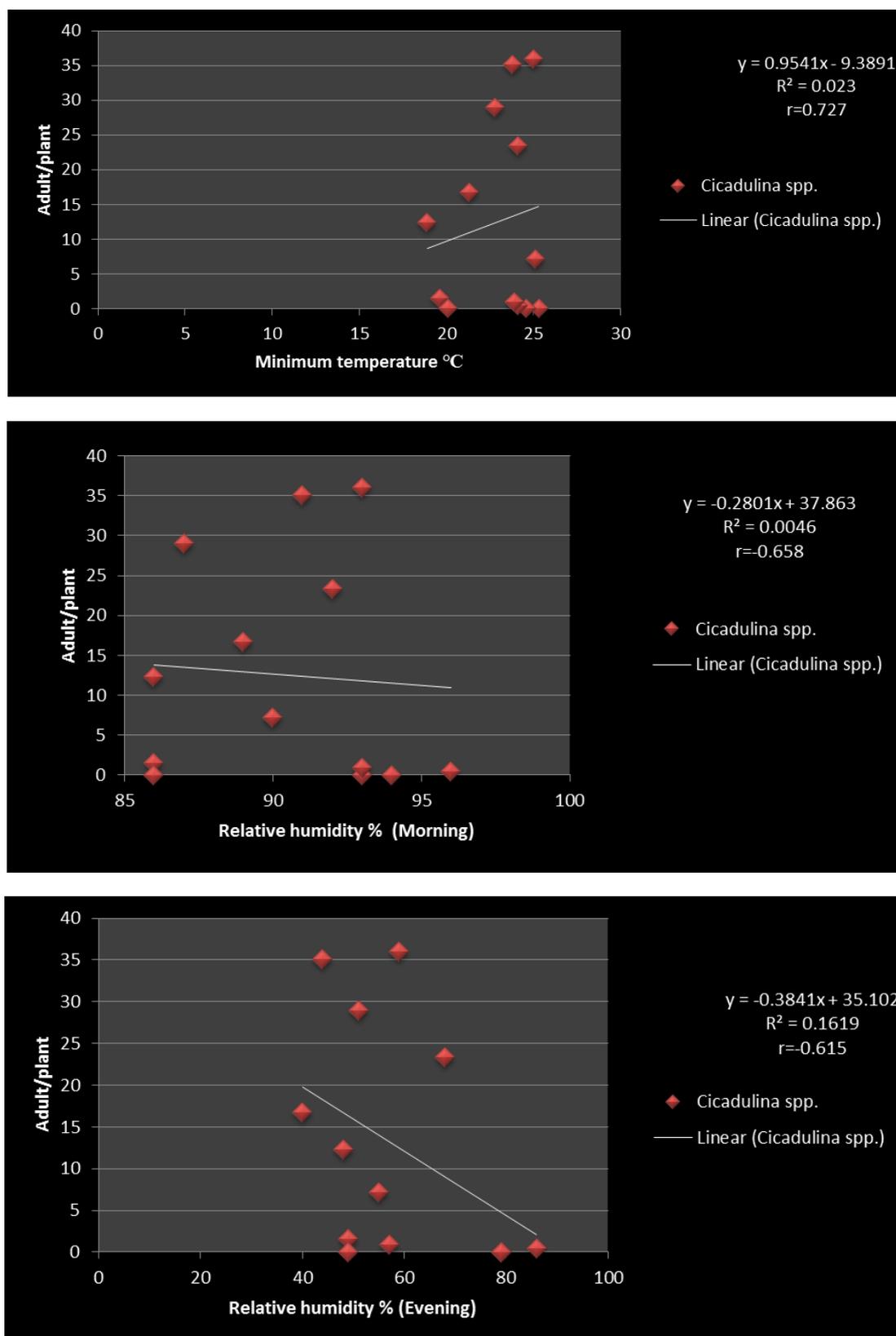


Fig 3: Regression of leaf hoppers adult population on abiotic parameters (2018-19)

4. Conclusion

The peak activity of aphid with a mean population of 9.4 aphids/c.m.² leaf area. The aphid population found non-significant negative correlation with RH in the morning ($r = -0.139$), RH in the evening ($r = -0.058$) and sunshine duration ($r = -0.264$). While, it was found that the minimum temperature ($r = 0.495$), maximum temperature ($r = 0.438$), total rainfall ($r = 0.168$) and wind speed ($r = 0.182$) were non-significant positive correlation.

The peak activity of leaf hopper with a mean population of 36 adult/plant. The findings indicated that there was non-significant negative correlation between the hopper population and the maximum temperature ($r = -0.351$) and bright sunshine hours ($r = -0.585$). While, showed non-significant positively correlated with total precipitation ($r = 0.315$) and wind speed ($r = 0.047$). The results indicated that hopper population showed highly significant positively correlated with minimum temperature ($r = 0.727$).

5. References

1. Ahad I, Bhagat RM, Ahmad H, Monobrullah M. Population dynamics of maize stem borer, *Chilo partellus* Swinhoe in upper Himalayas of Jammu Region. J Bio-Sci. 2008; 16:137-138.
2. Atiyeh R, Aslam M, Baalbaki R. Nitrogen fertilizer and planting date effects on insect pest populations of sweet corn. Pakistan. J Zoo. 1996; 28:163-167.
3. Lutfallah AF, Sherif MR, Duweini FK. Susceptibility of some commercial corn varieties to infestation with certain corn pests in Egypt. Egyptian Journal of Agriculture Research. 1993; 71:717-724.
4. Sidar YK, Deole S, Yadu YK, Ganguli RN. Seasonal incidence of major insect pests in maize crop (*zea mays* L.) under Chhattisgarh plains. Trends in Biosciences. 2015; 8(18):4848-4854.
5. Yadav S, Agnihotri M, Bisht RS. Seasonal incidence of insect-pests of blackgram, *Vigna mungo* (Linn.) and its correlation with abiotic factors. Agric. Sci. Digest. 2015; 35(2):146-148.