Indian J. Appl. Ent. **33**(2) : 105–109 (2019)

POPULATION DYNAMICS OF MAJOR SUCKING INSECT PESTS INFESTING BLACK GRAM (*VIGNA MUNGO* L.)

VIJAY KUMAR, HEMANT SWAMI, LEKHA, H.K. JAIN AND K.D. AMETA
Department of Entomology, Rajasthan College of Agriculture, Maharan Pratap University of Agriculture & Technology, Udaipur

ABSTRACT

A field experiment on "Population dynamics of major insect pests infesting black gram (*Vigna mungo* L.)" was carried out at Agronomy farm, Rajasthan College of Agriculture, MPUAT, Udaipur during *Kharif,* 2018. The major sucking insect pests observed on blackgram were aphid, *Aphis craccivora* (Koch); jassids, *Empoasca kerri* (Pruthi); whiteflies, *Bemisia tabaci* (Gennadius) and thrips, *Caliothrips indicus* (Bagnall). The peak population of aphid (36.67/ 5plant), jassid (30.67/5 plant) and whitefly (35.67/5plant) were recorded during first week (31 SMW) of August; while peak population of thrips (17.33/5plant) in the second week (32th SMW) of August. The population of aphid, jassid, whitefly and thrips exhibited a non-significant positive correlation with temperature, while thrips exhibited positive significant correlation. Aphid and jassid exhibited negative significant correlation with relative humidity.

Key words: Population dynamics, Blackgram, aphid, jassid, whitefly, thrips, correlation.

INTRODUCTION

In India, the total area under pulses cultivation is 25.23 million hectares with a production of 22.14 million tonnes and productivity of 764 kg per hectare (Anonymous, 2017). Black gram is one of the important pulse crops grown throughout the country. The area under black gram cultivation in our country was 44.93 lakh hectares with a production of 29.26 lakh tonnes and productivity of 651 kg/ ha during 2016-2017 (Anonymous, 2017). In Rajasthan, black gram was cultivated over 2.61 lakh hectares with a production of 1.35 lakh tonnes and productivity of 576 kg/ha (Anonymous, 2017). Though the crop is being cultivated over a large area, the production and productivity of the black gram are very low due to losses caused by various abiotic and biotic factors. Among biotic factors insect pests are a major factor responsible for causing heavy losses in the yield of black gram and thus limit its production in the region. As many as 200 insect pests have been reported to infest black gram from sowing to the harvest (Talekar, 1990). The major insect pests causing economic losses to the crop are whitefly (*Bemisia tabaci*), leaf hopper (*Empoasca kerri*), aphid (*Aphis craccivora*) and blister beetle, *Mylabris pustulata* (Soundararajan and Chitra, 2012). The whitefly, which is a potential vector of mung bean yellow mosaic virus (MYMV) alone, causes damage ranging from 30-70 per cent (Talekar, 1990). These insect pests have been reported to cause annual yield losses to the tune of about 2.0 to 2.4 million tonnes of pulses with an approximate monetary value of Rs. 6000 crores (Reddy, 2009). Knowledge of incidence pattern of major sucking insect pests of blackgram is important for development of suitable management strategies.

MATERIALS AND METHODS

The experiment to record the seasonal incidence and fluctuation in the population of jassids, aphids, thrips and white flies under the prevailing environmental conditions was conducted at agronomy farm during *kharif*, 2018. The variety PU-31 was sown in the last week of June in the plot size of4.5 x 5 m^2 with three replications. The row to row distance and plant to plants spacing were maintained at 15 and 45 cm^2, respectively. Hoeing, weeding and other cultural practices were followed

as per the recommendations. Recommended doses of fertilizers (20-25 kg N/ha and 40-50 kg P_2O_5/ha) were applied as basal application. The population of different insect pests was recorded at weekly interval on the selected and tagged five plants during morning hours between 6.30 AM to 8.00 AM. The observations on the incidence of major insect pests were recorded in each plot on randomly tagged plants at the weekly interval with a view to record the first appearance and peak population of pests. The observations on the population of sucking pests were recorded by visual counting method in the early morning hours when the insects were less active. The populations of jassids, aphids, thrips and whiteflies were recorded from upper, middle and lower portion of five randomly selected plants in each replication. A magnifying 10x hand lens with LED illumination was used to count the insects in the field. The population data of sucking pests were subjected to statistical analysis to find out the coefficient of correlation with mean atmospheric temperature, relative humidity and rainfall. A simple correlation was worked out between the population of insect pests and abiotic environmental factors by using Karl pearson formula of coefficient of correlation (Steel and Torry, 1980):

$$r_{xy} = \frac{\Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{n}}{\sqrt{\left[\Sigma X^2 - \frac{(\Sigma X)^2}{n}\right]\left[\Sigma y^2 - \frac{(\Sigma Y)^2}{n}\right]}}$$

Where,

r_{xy} = Simple correlation coefficient

X = Variable i.e. abiotic factors.

Y = Variable i.e. mean number of insect pests

n = Number of paired observations

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

$$t = \frac{r}{\sqrt{1 - r^2}} \times \sqrt{n - 2}$$

where,

r = correlation coefficient value

n = number of paired observations

t_{n-2} d.f = t table value for n-2 degrees of freedom

RESULT AND DISCUSSION

The incidence of aphid, *A. craccivora* commenced in the second week of July and the population attained its peak during first week of August with a mean of 36.67 aphids/5 plants (Table -1). In the present investigation aphid showed positive correlation but non-significant with temperature and negative significant correlation with humidity. It was found that increase in the temperature favors the multiplication of aphid, while relative humidity and rainfall had adverse effect on population buildup of aphid. Similarly, the result show that the incidence of jassids, *Amrasca kerri* Pruthi commenced in the second week of July and the population attained its peak during first week of August with a mean of 30.67 jassids/5 plants(Table -1). It was observed that the jassids exhibited negative correlation with humidity and rainfall indicating that increase in humidity and rainfall had adverse effect on population buildup jassids. The present findings are in close agreement with the findings of Sarode *et al.* (2003) who observed one peak period of jassids during 34 to 37 standard meteorological weeks *i.e.* 20 August to 15 September that supports the result of present investigation. Mohapatra *et al.* (2018) reported that the highest population of jassids (36.80 jassid/cage/plant) was during the 39th standard week. Temperature (maximum and minimum) and rainfall showed non-significant positive correlation, which also confirms the result of present investigation.

The incidence of whitefly *Bemisia tabaci* (Genn.) in black gram commenced in the second week of July and the population attained its peak during first week of August with a mean population of 35.67 whiteflies/5 plants (Table -1). during *Kharif* 2018. In the present investigation it was found that temperature favors the multiplication of whitefly, while rainfall and relative humidity had adverse effect on population buildup of whitefly. The present findings are in line with the findings of Jat *et al.,* (2017) who revealed that aphid population attained peak in the 1st week of September during 2013 and 2nd week of September during 2014; the jassids and whitefly remained active throughout the growing stage and attained

Table 1. Seasonal incidence of insect pests on black gram during *Kharif*, 2018

Standard Meteorological weeks (SMW)	Abiotic Factors			Insect Population /5Plant			
	Mean Temp. (°C)	Mean RH %	Total Rainfall (mm)	Aphids	Jassids	Whitefly	Thrips
28	27.67	80.79	130.20	7.33	11.67	14.67	-
29	26.56	85.93	130.20	8.33	9.33	20.33	-
30	25.56	78.36	2.40	22.00	13.00	23.00	6
31	26.59	67.07	0.00	**36.67**	**30.67**	**35.67**	13
32	26.59	78.04	27.20	21.33	26.33	25.67	**17.33**
33	26.86	77.43	67.60	15.00	27.67	22.33	12
34	26.64	77.93	33.60	13.33	26.33	20.00	8
35	25.55	78.93	17.40	10.00	15.00	19.67	3.67
36	24.66	75.43	11.00	6.67	14.33	11.00	0
Coefficient of correlation (r) for populationand atm. Temperature				0.11 NS	0.26 NS	0.27 NS	0.76*
Coefficient of correlation (r) for populationand relative humidity				-0.75*	-0.68*	-0.56 NS	-0.36 NS
Coefficient of correlation (r) for populationand total rainfall				-0.54 NS	-0.44 NS	-0.35 NS	-0.24 NS

*5% level of significance; NS: Non significant

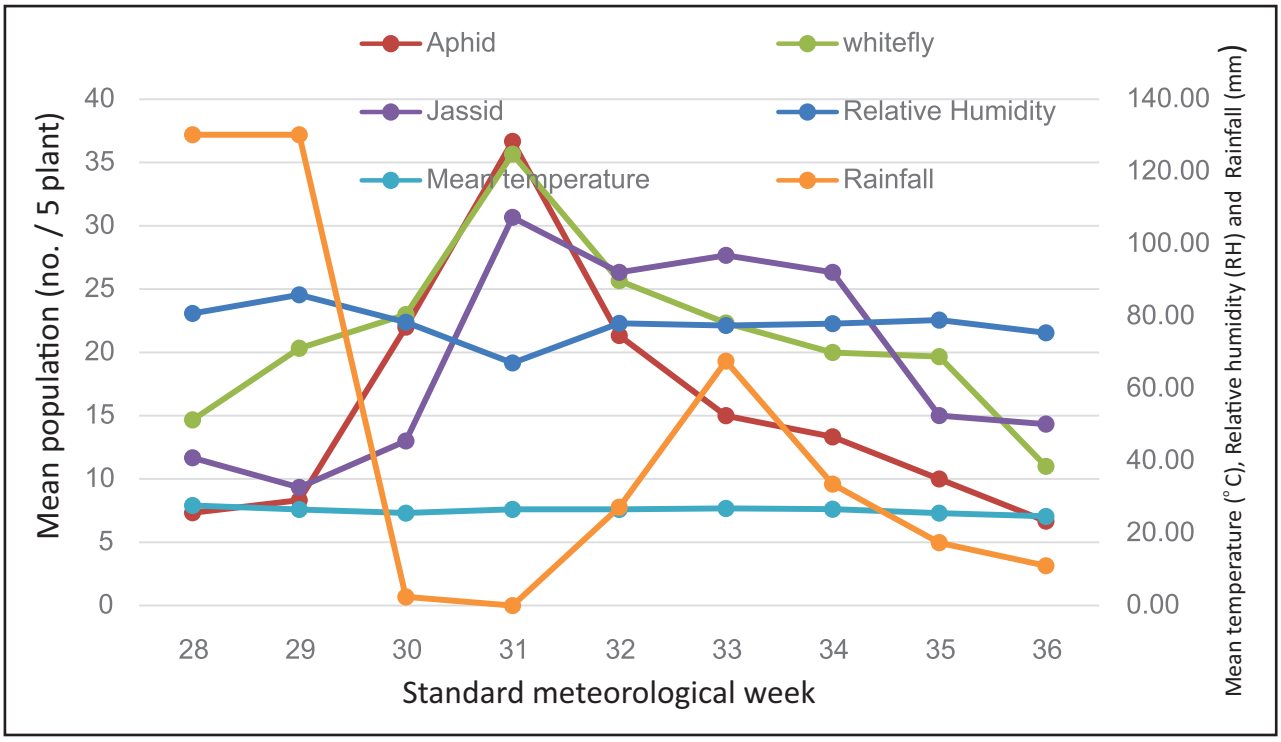

Fig 1: Seasonal incidence of Aphids, Whitefly and Jassids

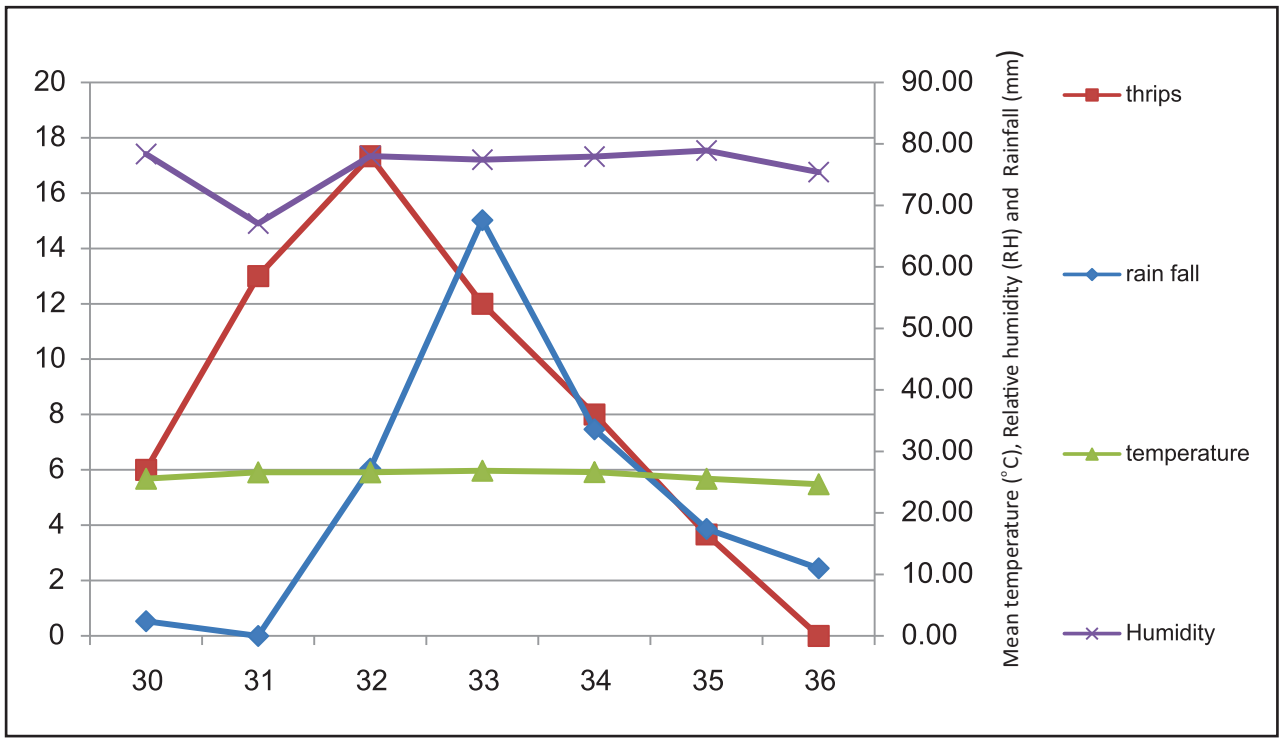

Fig 1: Seasonal incidence of thrips

the peak in the 4th week of August and last week of August during both years.

The incidence of thrips in black gram started in the last week of July and reached its peak with a mean of 17.33 thrips/5plants (Table -1). during second week of August (32nd SMW). The pest population then reduced gradually and declined being lowest in 3.67 whiteflies/5 plants in the first week of September (35th SMW) during *Kharif* 2018. The pest showed positive significant correlation with temperature. These results are in line with the findings of Nitharwal and Kumawat (2009) who recorded the peak period of sucking insect pests *viz.,* jassids, whitefly and thrips in green gram ecosystem during the first week of September. A significant negative correlation of jassids, whitefly and thrips with maximum temperature and a positive significant correlation of jassids, whitefly and thrips with relative humidity were reported. The present findings are also in agreement with Kumar and Singh (2014) who observed that the population of whitefly and jassids had a non-significant negatively correlation with maximum and minimum temperature and sunshine hours; while significant positive correlation with maximum humidity. Whereas, Umesh Chandra *et al*. (2010) recorded that the population of thrips had significant negative correlation with minimum temperature.

ACKNOWEDGEMENTS

The authors are thankful to Head of Department and Dean, RCA for providing necessary facilities.

REFERENCES

Anonymous, 2017. Area, production, productivity of black gram in India. *Directorate of Economics and Statistics, second advance estimates.* 2016-17.

Jat, S.K., Lekha, Rana, B.S. (2017). Effect of Abiotic Factors On The Incidence Of Major Insect Pests of Blackgram [*Vigna mungo* L.]. *International Journal of Agriculture Sciences*, **9**: 4159-4161.

Kachawa, D., Surakasula, A., Singh, R.B. and Dangi, N.L. 2017. Estimation of avoidable yield losses caused by *Helicoverpa armigera* (Hubner) on chick pea. *Journal of Entomology and Zoology Studies,* **5**: 1476-1478.

Kumar, M. and Singh., S.P. 2014. Population dynamics of major insect pest of blackgram [*Vigna Mungo* (L.) Hepper] in relation to weather parameters. *International Journal of Agriculture, Environment and Biotechnology,* **9**: 673-677.

Nitharwal, M. and Kumawat, K.C. 2009. Population dynamics of insect pest of green gram (*Vigna radiata* L.) in Semi-Arid region of Rajasthan. *Indian Journal of Applied Entomology*, **23**: 90-9.

Reddy, A.A. 2009. Pulses production technology: Statuse and way forward. Economic and Poltical weekly, **44**: 73-80.

Sarode, S.V., Dandle, H.G., and Kadam, Pradnya. 2003. Influence of weather parameter on the incidence of major pests of rainfed cotton. Proceedings of the national Symposium on Frontier Areas of Entomology Research, 5-7 Nov. 2003 held at IARI, New Delhi by Entomological Society of India.

Soundararajan, R.P., Chitra, N. 2012. Impact of intercrops on insect pests of blackgram, *Vigna mungo* L. *Journal of Entomology*, **9**: 208-219.

Steel, R.G.D. and Torry, J.H. 1980. Principles and procedures of statistics, second edition, New York; MC Graw-Hill.

Talekar, N.S. 1990. Insect pest of mungbean and their control.libnts. avrdc.org.tw/fulltext pdf/eam0121. pdf

Umbarkar, P.S., Parsana, G.J. and Jethva, D.M. 2010. Seasonal incidence of gram pod borer, *Helicoverpa armigera* (Hubner) on green gram. Legume Research, **33**: 148-149.

Received: 00.00.0000 Accepted: 00.00.0000