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SEASONAL INCIDENCE OF MAJOR INSECT PESTS OF GREENGRAM

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ABSTRACT

An experiment was conducted at Rajasthan College of Agriculture, Udaipur, to study the seasonal incidence of major insect pests of greengram. The aphid, *Aphis craccivora* (Koch), jassid, *Amrasca kerri* (Pruthi) and whitefly *Bemisia tabaci* (Genn.) infested the crop in the last week of July 2013; while the incidence of blister beetle *Mylabris pustulata* (Thunberg) and pod borer, *Helicoverpa armigera* (Hubner) initiated in the fourth week of August and third week of August 2013, respectively**.** The population of aphid, jassid, white fly, blister beetle and pod borer attained its peak during second week of August, first week of September, third week of August, first week of September and second week of September 2013, respectively. The infestation of pods by *H. armigera* were started in the third week of August. The pod damage increased gradually and reached to peak during second week of September 2013.

Key words: Insect–pest, Incidence, Greengram

INTRODUCTION

Greengram occupies third position among pulses grown in India after chickpea and pigeon pea. In India, the total production of greengram is 1.24 lakh tonnes from an area of 3.30 m.ha with productivity of 425 kg per ha (Anon., 2009). The production of greengram was reduced to 1.28 million tonnes during 2012–13 (Anon, 2013). Greengram is an important source of easily digestible high quality protein for vegetarians. It contains 24 per cent protein, 0.326 per cent phosphorus, 0.0073 percent iron, 0.00039 per cent carotene, 0.0021 per cent of niacin and energy 334 cal/100g of green gram (Gopalan *et al.*, 1977).

Various factors are attributed for low yield of greengram of which incidence of insect pests is important one. Greengram is attacked by number of insect–pests *viz.* aphids, jassids, pod borer, galerucid beetle, whitefly, thrips, blue butterfly, stem fly, pod bug and plant bugs which affect the plant growth, pod formation and productivity. The major insect pests of greengram are aphid, *Aphis craccivora* (Koch), jassid, *Empoasca kerri* (Pruthi), white fly, *Bemisia tabaci* (Gennadius), blister beetle, *Mylabris pustulata* (Thunberg) and pod borer *Helicoverpa armigera* (Hubner).

MATERIALS AND METHODS

The present investigations was carried out at the Instructional Farm, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur during *kharif* 2013. The variety SML–668 was sown in well prepared field on 4th July, 2013 with the seed rate of 15 kg/ha. The plot size was 5.0 m x 3.0 m (15 sq m.) maintaining row to row distance and plant to plant spacing of 30 and 10 cm and was replicated thrice.

Population of jassids *Empoasca kerri* (Pruthi), aphids *Aphis craccivora* (Koch), whiteflies *Bemisia tabaci* (Gennadius), blister beetle *Mylabris pustulata* (Thunberg) and pod borer *Helicoverpa armigera* (Hubner) was recorded at weekly interval on five plants selected randomly and tagged. The observations were recorded during morning hours between 6.30 a.m. to 8.30 a.m. of the day.

Jassids, aphids and whiteflies : Visual counting method was used to record the population of jassids, aphids and whiteflies on 5 randomly selected plants in each replication. The total number of adults and nymphs of jassids and whiteflies were counted on the entire tagged plants; whereas, the aphids were counted from 5 cm floral twigs. Aspirator was used to collect necessary sample insects for further identification. A hand–held magnifying lens (6x) with LED illumination was used to count the insects on the plants in the field.

Blister beetle : Population of blister beetle was observed by visual count for 2 minutes during 9–11 a.m. from 5 plants per replication, selected at random.

Pod borer : The incidence of *H. armigera* was determined by counting the population of larvae on five randomly selected tagged plants at weekly interval. The incidence was also studied in terms of mean pod damage by counting

the total number of pods and damaged pods on five randomly selected tagged plants and mean damage was calculated by using the following formula:

$$\text{Mean infestation (\%)} = \frac{\text{No. of infested pods}}{\text{No. of total pods}} \times 100$$

Observations on the prevailing abiotic conditions of the atmosphere were recorded weekly from the Meteorological Observatory at the Agronomy Farm to work out the correlation coefficient between the pest populations and the abiotic factors of the environment using standard statistical formulae (Fowler *et al*., 1998).

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

Where,

r_{xy} = Simple correlation coefficient

X = Variable i.e. abiotic component. (Average temperature and relative humidity)

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:

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

The calculated t–value obtained was compared with tabulated t–value at 5% level of significance.

RESULTS AND DISCUSSION

During the course of investigation aphid (*Aphis craccivora* Koch)*,* jassid *(Amrasca kerri* Pruthi), whitefly (*Bemisia tabaci* Genn.), blister beetle (*Mylabris pustulata* Thunberg) and pod borer (*Helicoverpa armigera* Hub.) were recorded as major insect pests of greengram.

The data presented in Table 1 indicates that the incidence of aphids initiated in the last week of July (30th SMW) with a mean population of 20.25 aphids/5 plants. The population increased gradually and touched its peak with a mean of 36.75 aphids/5 plants during second week of August (32nd SMW). Thereafter, pest population reduced gradually and reached to a level of 10.5 aphids/5 plants in the fourth week of September (38th SMW). The pest showed negative correlation with temperature (r = –0.195) and rainfall (r = –0.509) and positive correlation with humidity (r = 0.059); however, the correlation was non–significant. Patel and Rote (1995) reported that aphid population was peak in the second fortnight of October followed by first and second fortnight of November. Pandey and Ahmed (2008) reported that cowpea aphid appeared in the second week of May and reached its peak in last week of July and stared declining thereafter.

Similarly, the infestation of jassids initiated in the last week of July (30th SMW) with a mean population of 16.75 jassids/5 plants. The population increased gradually and touched its peak with a mean of 27.67 jassids/5 plants during first week of September (35th SMW). Thereafter, pest population reduced gradually and reached to a level of 14.33 jassids/5 plants in the fourth week of September (38th SMW). The pest showed positive non significant correlation with temperature (r = 0.055) and negative non significant correlation with humidity (r = –0.599) and negative significant correlation with rainfall (r = –0.899**). Nitharwal and Kumawat (2009) reported peak period of sucking insect pests of green gram during first week of September when the population of jassid and whitefly was 12.40 and 10.80; 13.2 and 11.20 during kharif 2006 and 2007, respectively. Meena *et. al.* (2010) reported that incidence of jassids (2.0 and 2.4 jassids/plant) started in first week of August and was active till harvesting in both the years, its population reached at maximum (15.2 and 16.4 jassids/ plant) in fourth and third week of September.

In case of whitefly (Table 1) the population incidence initiated in the last week of July (30th SMW) with a mean of 15.99 whiteflies/5 plants. The population increased gradually and touched its peak with a mean of 34.5 whiteflies/5 plants during third week of August (33rd SMW). Thereafter, pest population reduced gradually and reached to a level of 13.67 whiteflies/5 plants in the fourth week of September (38th SMW). The pest showed positive non significant correlation with temperature (r = 0.023) and negative non significant correlation with humidity (r = –0.410) and negative significant correlation with rainfall (r = –0.872**). These results are in line with Dar *et. al.* (2002) who found that mungbean and urdbean were mainly infested by *B. tabaci, E. kerri* and *A. craccivora*. Among these pests, *B. tabaci* was observed from the 16th to 26th standard meteorological weeks (from vegetative to pod formation stage) on mungbean and from 16th to 25th SMW on urdbean. Its population peaked at the 25th and 26th SMW on urdbean and mungbean, respectively. Kumar *et. al.* (2004) recorded the peak population of whitefly on mung bean and urdbean in first fortnight of May and second fortnight of September in *Zaid* and *Kharif* crops, respectively.

The data presented in Table 2 indicates that the infestation of beetle initiated in the fourth week of August (34th SMW) with a mean population of 4.67 beetle/5 plants. The population increased gradually and touched its peak

Table 1. Effect of abiotic factors on the incidence of sucking pest during *kharif*, 2013

S.M.W.	Date and month	Abiotic factors			Mean population per five plants		
		Mean Temp (°C)	Mean R.H.(%)	Mean Rainfall (mm)	Aphids	Jassids	Whiteflies
29	21–27 July	27.3	79	20.68	–	–	–
30	28–03 Aug.	26.9	82	9.34	20.25	16.75	15.99
31	04–10 Aug.	26	79.5	13.08	27.5	17.5	19.67
32	11–17 Aug.	26.45	80	3.65	36.75	19.33	24.5
33	18–24 Aug.	27	72.5	0.54	26.5	18.5	34.5
34	25–31 Aug.	26.6	72.5	1.85	21.2	24.5	27.67
35	01–07 Sep.	26.75	62.5	0.00	17.1	27.67	24.33
36	08–14 Sep.	28	61	0.00	15.8	24.67	21.5
37	15–21 Sep.	27.85	61.5	9.6	13.8	17.99	19.3
38	22–28 Sep.	24.97	85.92	9.57	10.5	14.33	13.67
Coefficient of correlation (r_1) for population and atm. Temperature					–0.195 (NS)	0.055 (NS)	0.023 (NS)
Coefficient of correlation (r_2) for population and relative humidity					0.059 (NS)	–0.599 (NS)	–0.410 (NS)
Coefficient of correlation (r_3) for population and total rainfall					–0.509 (NS)	–0.899**	–0.872**

*,** – Significant at 5% and 1% level of significance, respectively; NS – Non significant.

Table 2. Effect of abiotic factors on the incidence of blister beetel and pod borer and infestation of pod borer during *kharif*, 2013

S.M.W.	Date and month	Abiotic factors			Mean per five plants		
		Mean Temp. (°C)	Mean R.H. (%)	Mean Rainfall (mm)	*M. pustulata*	*H. armigera*	
					Mean population	Larval population	Pod damage (%)
29	21– 27 July	27.3	79	20.68	–	–	–
30	28–03 Aug.	26.9	82	9.34	–	–	–
31	04–10 Aug.	26	79.5	13.08	–	–	–
32	11–17 Aug.	26.45	80	3.65	–	–	–
33	18–24 Aug.	27	72.5	0.54	–	2.67	–
34	25–31 Aug.	26.6	72.5	1.85	4.67	4.67	11.33
35	01–07 Sep.	26.75	62.5	0.00	10.67	8.99	15.67
36	08–14 Sep.	28	61	0.00	8.33	11.33	19.67
37	15–21 Sep.	27.85	61.5	9.6	4.67	8.33	17.00
38	22–28 Sep.	24.97	85.92	9.57	2.33	5.67	13.67
Coefficient of correlation (r) for population and atm. Temperature					0.307 (NS)	0.359 (NS)	0.242 (NS)
Coefficient of correlation (r) for population and relative humidity					–0.828**	–0.777*	–0.646 (NS)
Coefficient of correlation (r) for population and total rainfall					–0.574 (NS)	–0.569 (NS)	–0.455 (NS)

*,** – Significant at 5% and 1% level of significance, respectively; NS – Non significant.

with a mean of 10.67 beetle/5 plants during first week of September (35th SMW). Thereafter, pest population reduced gradually and reached to a level of 2.33 beetle/5 plants in the fourth week of September (38th SMW). The pest showed positive non significant correlation with temperature (r = 0.307), negative significant correlation with humidity (r = –0.828**) and negative non significant correlation with rainfall (r = –0.574). Balikai (2000) observed severe infestations of *M. pustulata* during August to December. Pawer *et. al.* (2014) recorded temporal and intraday abundance variations of blister beetle (*Mylabris phalerata*) on greengram under regular and late sown condition. The abundance of blister beetle and crop phenology revealed population from bud initiation stage with a peak during flowering and early pod formation stage,

clearly indicating its preference for the buds and flowers. Higher abundance of blister beetle adults during pod formation stage can be attributed to second flush of greengram. The beetle population decreased when the crop reached physiological maturity.

Similarly, the infestation of pod borer, *H. armigera* initiated in the third week of August (33rd SMW) with a mean population of 2.67 larvae/5 plants. The population increased gradually and attained its peak with a mean of 11.33 larvae/5 plants during second week of September (36th SMW). Thereafter, pest population reduced gradually and reached to a level of 5.67 larvae/5 plants in the fourth week of September (38th SMW). The pest showed positive non significant correlation with temperature (r = 0.359), negative significant correlation with humidity (r = –0.777*) and negative non significant correlation with rainfall (r = –0.569). Umbarkar *et. al.* (2010) studied the seasonal incidence of *Helicoverpa armigera* (Hubner) on green gram during *kharif*. The pest appeared with population density of 0.34 larvae/plant during 4th week after sowing (31st standard week) and reached to peak 3.42 larvae/plant in 37th standard week (10th week after sowing). Shivaraju *et al.* (2011) reported that pod borer activity commenced from 35–40 days after sowing. The peak incidence of *Helicoverpa armigera* was recorded during 3rd week of October. pod borer showed significant positive correlation with maximum temperature and was negatively correlated with minimum temperature.

The data presented in Table 2 indicates that the infestation of pods by *H. armigera* began in the fourth week of August (34th SMW) with an average of 11.33 per cent damaged pods. The infestation of pods was maximum (19.67%) in the 2nd week of September (36th SMW). Later, infestation declined and was 13.67 per cent in the 4th week of September (38th SMW). The pod infestation showed positive and non significant correlation (r = 0.242) with temperature, negative and non significant correlation with humidity (r = –0.646) and rainfall (r = –0.455).

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