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Seasonal Incidence of Major Insect-Pests on Blackgram, *Vigna mungo* (Linn.) and Its Correlation with Weather Parameters

Mun Mun Mohapatra*, D.C. Singh, P.K. Gupta, U. Chandra, B. Patro and S.D. Mohapatra

Department of Entomology, College of Agriculture, Narendra Deva University of Agriculture and Technology, Faizabad 224229, Uttar Pradesh, India

**Corresponding author*

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A B S T R A C T

Insect-pests with biotic and abiotic factors play a major role in low production and productivity of black gram in India. The insect-pests like white fly, *Bemisia tabaci* (Genn.), jassid, *Empoasca kerri* Pruthi, bihar hairy caterpillar, *Spilosoma obliqua* Walker and tobacco caterpillar, *Spodoptera litura* (F.) were recorded as major pests. The high population of 18.50white flies/cage/plant, 36.80jassid/cage/plant, 12.60bihar hairy caterpillar/plant and 10.40tabacco caterpillar/plant were observed during 39th standard week. Temperature (maximum & minimum) and rainfall showed non-significant positive correlation and relative humidity showed non- significant negative with the population of white fly, jassids and bihar hairy caterpillar. The highest population of cocccinellids 2.00*Coccinella septempunctata* L. adult/plant and 1.20 *Cheilomenes sexmaculata* (F.) adult/plant were observed during 41th & 39th standard week respectively. The maximum temperature showed non-significant positive correlation where as minimum temperature and rainfall had non-significant negative correlation while relative humidity had significant negative correlation with the population of coccinellids.

Introduction

Black gram, *Vigna mungo* (Linn.), Family-Leguminosae popularly known as urd bean or *mash kalai* or black bean is native of India and the fourth important pulse crop with high nutritive value (Singh, 2004). Uttar Pradesh is the most agriculturally important state in India with respect to staple food production. Black gram is a prominent rainy and summer season pulse crop with area 88,000ha, production 55.2 thousand MT and productivity 523 kg/ha (Anonymous, 2016). In India the area, production and productivity of urdbean are 32.15 lac ha, 17.66 lac tonnes and 549 kg/ha, respectively (Khajuria *et al*, 2015). Black gram or Urdbean, *Vigna mungo* (Linn.) contributes 10% of national pulses production, is rich source of protein and carbohydrates (Ali and Gupta, 2012). On an average, 2.5 to 3.0 million tonnes of pulses are lost annually due to pest problems (Rabindra *et al.*, 2004).

The annual yield loss due to the insect pests has been estimated at about 30 per cent in Urd bean and Mung bean. The major insect pests which plays most important role in economic losses of black gram are white fly, *Bemisia tabaci* (Genn.), jassid, *Empoasca kerri* Pruthi, bihar hairy caterpillar, *Spilosoma obliqua* Walker and tobacco caterpillar, *Spodoptera litura* (F.).

The present investigation was carried out to know the seasonal incidence of insect pests on black gram *Vigna mungo* (Linn.) and their relationship with abiotic factors.

Materials and Methods

The black gram (NDU-1) crop was grown in plots having size 5x4m^2 with spacing of 30×10 cm at the Students' Instructional Farm, Narendra Dev University of Agriculture and Technology, Faizabad, Uttar Pradesh. The experimental site falls under sub-tropical climatic zone of Indo-Gangtic plains and situated at 26.47^0 N latitude and 82.12^0 E longitudes at an altitude of 113 meters from mean sea level. The weather conditions during the period of investigation is characterized by the temperature range of maximum 29.50-36.50ºC and minimum 11.07- 26.21ºC and RH 67.00- 84.57% and total rainfall 2.17 mm during crop growth period. The crop was grown during the *Kharif*, 2015 following the recommended agronomic practices in a Randomized Block Design (RBD) with three replications.

The observations on major insect pests were recorded on 5 randomly selected plants of the crop in a standard week from sowing to till the availability of insects or harvesting of the crop. The sap feeders were recorded by counting number of nymphs and adults per plant per cage during early morning hours 7.00 a.m- 8.00a.m. Larvae of defoliators and coccinellid larvae/adults were recorded by shaking the plants on polythene sheet of one square meter area in each plot (Yadav *et al.*, 2015). Meteorological data were collected from the Department of Meteorology of this University.

Results and Discussion

White fly, *Bemisia tabaci* (Genn.)

The first appearance of whitefly population 1.80/ plant / cage was noticed in the 35th standard week. The whitefly population was observed in the third week of August and continued up to last week of October. The population followed gradually increase and attain peak population 18.50/cage/plant during 39th standard week (Table 1) at 35.57-22.35^{0}C temperature and R.H 72.00%. The population of whitefly showed non-significant positive correlation with temperature (maximum and minimum) and rainfall and showed non-significant negative correlation with relative humidity (Table 2). These findings are in accordance with the findings of Singh and Kumar (2011), Yadav *et al.*, (2015) and Kumar and Singh (2016).

Jassid, *Empoasca kerri* Pruthi

Empoasca kerri is an important pest of the blackgram crop. The pest marked its first appearance during 35th standard week with initial mean population of6.00 jassids/cage/plant followed a gradual increase and attained peak population of36.80 jassids/cage during 39th standard week (Table 1) at 35.57-22.35^{0}C temperature and R.H 72.00%. The population of jassid showed non-significant positive correlation with temperature (maximum and minimum) and rainfall and showed non-significant negative correlation with relative humidity(Table 2). These findings are in accordance with the findings of Nayak *et al.*, (2004), Singh and Kumar (2011) and Yadav *et al.*, (2015).

Tobacco caterpillar, *Spodoptera litura* (F.)

S. litura larval population 3.20/plant was first noticed during 37th standard week. The larval population followed gradually increase and attain peak population 10.40 larvae/ plant during 39th standard week (Table 1) at 35.57-22.35^{0}C temperature and R.H 72.00%.The population of *S. litura* showed non-significant positive correlation with maximum temperature while non-significant negative correlation with minimum temperature and rainfall. The population showed significant negative correlation with relative humidity (Table 2). These findings are in accordance with the findings of Yadav *et al.,* (2015).

Bihar hairy caterpillar, *Spilosoma obliqua* Walker

The pest marked its first appearance during 35th standard week with initial mean population of 2.20larvae/plant followed a gradual increase and attained peak population of12.60 larvae/plant during 39th standard week (Table 1) at 35.57-22.35^{0}C temperature and R.H 72.00%. The population of *S. obliqua* showed non-significant positive correlation with temperature (maximum and minimum) and rainfall and non-significant negative correlation with relative humidity (Table 2). These findings are in accordance with the findings of Kumar *et al.,* (1998) and Yadav *et al.,* (2015).

Coccinellid, *Coccinella septempunctata* L.

The incidence of adult beetle/plant was first observed during 39th standard week and it remained present on the crop up to 43th standard week (one week before harvest).The maximum population 2.00 was found in the 41th standard week at temperature 33.92-20.35^{0}C and R.H 67.00%. The population of *C. septempunctata* showed non-significant positive correlation with maximum temperature where as non-significant negative correlation with minimum temperature and rainfall and significant negative correlation with relative humidity (Table 2). These findings are in accordance with the findings of Yadav *et al.,* (2015) and Patel *et al.,* (2010).

Table.1 Seasonal incidence of major insect pests on black gram *Vigna mungo* (Linn.) during *Kharif* 2015

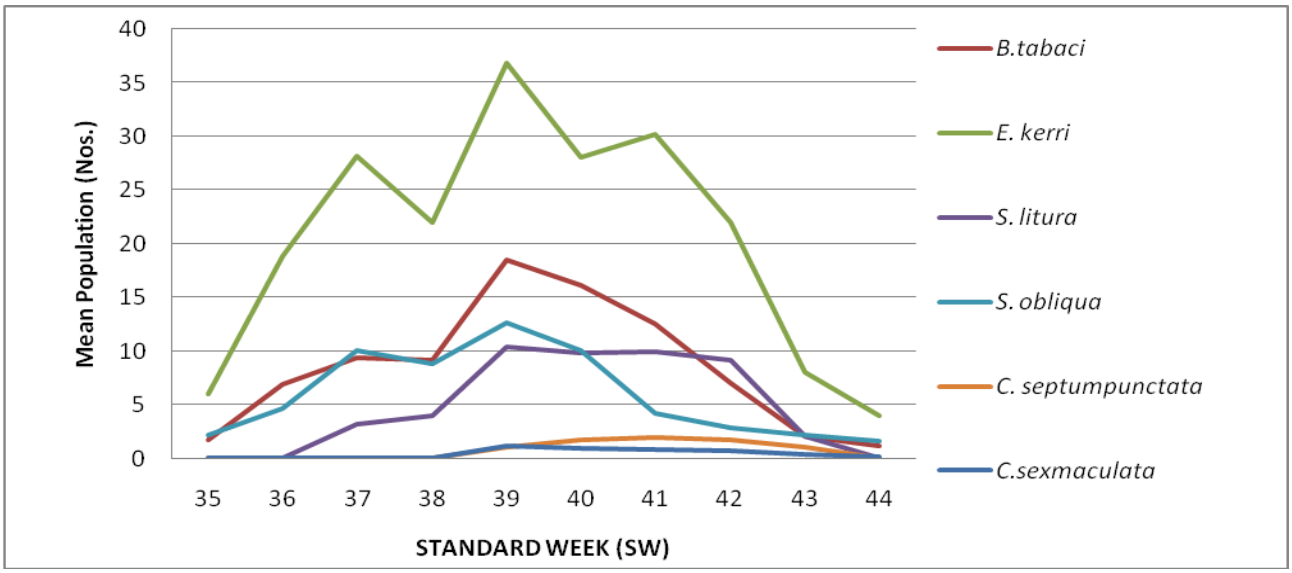
Dates of observation (Standard Week)	Average insect population/plant					
	B. tabaci **(/cage/plant)**	***E. kerri*** **(/cage/ plant)**	***S. litura*** **(per plant)**	***S. obliqua*** **(per plant)**	***C. septumpuctata*** **(per plant)**	***C. sexmaculata*** **(per plant)**
35 (27 Aug-02 Sep)	1.80	6.00	0.00	2.20	0.00	0.00
36 (03-09 Sep)	6.90	18.80	0.00	4.60	0.00	0.00
37 (10-16 Sep)	9.40	28.20	3.20	10.00	0.00	0.00
38 (17-23 Sep)	9.20	22.00	4.00	8.80	0.00	0.00
39 (24-30 Sep)	18.50	36.80	10.40	12.60	1.00	1.20
40 (01-07 Oct)	16.10	28.00	9.80	10.00	1.80	0.95
41 (08-14 Oct)	12.50	30.20	10.00	4.20	2.00	0.80
42 (15-21 Oct)	7.00	22.00	9.20	2.80	1.80	0.70
43 (22-28 Oct)	2.10	8.00	2.00	2.20	1.00	0.40
44 (29-04 Nov)	1.20	4.00	0.00	1.60	0.00	0.10

Table.2 Correlation coefficient (r) between weather parameters and population of major insect pests of black gram and coccinellids

Sl.No.	Insect	Max. Temp.	Min. Temp.	R.H. (%)	Rain fall
1	*B. tabaci*	0.506 NS	0.281 NS	- 0.470NS	0.043 NS
2	E. kerri	0.556 NS	0.360 NS	- 0.437NS	0.50NS
3	*S. litura*	0.282 NS	-0.056 NS	-0.733*	-0.067 NS
4	*S. obliqua*	0.573 NS	0.478 NS	-0.094 NS	0.252 NS
5	*C. septempunctata*	0.111 NS	-0.359 NS	-0.914*	-0.309 NS
6	*C. sexmaculata*	0.134 NS	-0.280 NS	-0.807*	-0.316 NS

*P<0.05 (significant)

Fig.1 Seasonal incidence of major insect-pests of black gram, during *kharif*, 2015 Tobacco caterpillar, *Spodoptera litura* (F.)



Coccinellid, *Cheilomenes sexmaculata* (F.)

The incidence of adult beetle/plant was first observed during 39th standard week and it remained present on the crop up to 44th standard week (till harvest). The maximum population 1.20 was found in the 39th standard week at temperature 33.92-20.35^{0}C and R.H is 72.00%. The population of *C. sexmaculata* showed non-significant positive correlation with maximum temperature where as non-significant negative correlation with minimum temperature and rainfall and significant negative correlation with relative humidity (Table 2). These findings are in accordance with the findings of Yadav *et al.*, (2015) and Patel *et al.*, (2010).

In conclusion, the study about seasonal incidence of insect pests is one of the most important objectives of pest management. This provides the data of seasonal fluctuation and peak activity of insect pests. Correlation study of insect-pests population with weather parameters also provides information about weather influence on insect pest population. The information collected in this study is very useful in insect pest management.

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