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POPULATION DYNAMICS OF MAJOR INSECT-PESTS OF COWPEA [*VIGNA UNGUICULATA* (L.) WALP.] AND THEIR CORRELATION WITH METROLOGICAL PARAMETERS

Sandeep Kumar, Ram Singh Umrao[1] and A. K. Singh

Department of Entomology, N. D. U. A. & T., Kumarganj, Faizabad (Uttar Pradesh), India.
[1]Department of Entomology, C. S. A. U. A. & T., Kanpur (Uttar Pradesh), India.

Abstract

A total of five insects namely aphids, jassid, thrips, legume pod borer and *Coccinellids* predators appeared on cowpea. On the basis of population and damage only two insects *viz*. jassids and pod borers were found as major pests of cowpea. Jassid population showed highly positive correlation with relative humidity and significant positive correlation with maximum temperature, minimum temperature and rainfall. Pod borer population showed significant negative correlation with minimum temperature, relative humidity and rainfall and significant positive correlation with maximum temperature.

Key words : Cowpea, natural enemies, occurrence, incidence, weather variables.

Introduction

Pulse crop plays an important role in Indian agriculture because it is rich in proteins and sustains the productivity of a cropping system. Cowpea [*Vigna unguiculata* (L.) Walp.] is one of the important pulse crop also known as black eyed bean or Southern pea in English while *chola* or *choli*, *chavli, lobia* in various vernacular languages in India. As many as 21 insect pests of different groups have been recorded damaging the cowpea crop from germination to maturity. The avoidable losses in yield due to insect pests have been recorded in the range of 66 to 100 per cent in cowpea (Pandey *et al*., 1991). Area under cowpea in India is 3.9 million hectares with a production of 2.21 million tonnes with the national productivity of 683 kg/ha (Mandal *et al*., 2009). The incidence of insect pests and diseases cause lower production and productivity of cowpea due to direct or indirect damage. The important insect species attacking cowpea crop include aphid (*Aphis craccivora*), thrips (*Megaleurothrips* spp.), jassid (*Amrasca biguttula biguttcula*) and pod borer (*Helicoverpa armigera*). Information on population dynamics of cowpea pest complex in relation to weather parameters especially in mid U. P. conditions is lacking. Hence, the present study was under taken to develop suitable management strategies for suppressing the pest population.

Materials and Methods

A field trail was conducted out at Students' research Farm, C. S. A. U. A. & T., Kanpur during 2012, in RBD with six treatments including control and replicated thrice with plot size of 12m^2 on cowpea cv. Type-2. Seeds of cowpea were dibbled at a spacing of 45×15 cm distance during second week of July. All other post–sowing recommended agronomical practices except plant protection were followed to raise the crop. Incidence of all the major insect-pests was recorded at weekly interval starting from 15 days after germination and continued till the harvest of the crop. Aphid (*A. craccivora*) population was recorded on five randomly selected twigs (10-15cm length) from each tagged plant and mean number of aphids per cm shoot tip was worked out. Thrips, (*Megaleurothrips* spp.) population was assessed by randomly selecting five flowers on each selected plant and numbers of thrips per flower was worked out. Total number of jassids was counted on three compound leaves (upper, middle and lower) from each tagged plant at weekly interval and average population of jassids per compound leaf was worked out. For recording the infestation of pod borer the number of damaged pods and total number of pods in five tagged plants in each plot were counted at every picking and their cumulative total was worked out. The intensity of pod borer population

in flowers and pods was estimated by counting number of larvae on 10 flower buds and pods separately from tagged plants at weekly interval and the average value was worked out for its infestation. The number of Coccinellid predators was also observed on cowpea aphids at 15 cm shoot of five tagged plants separately per plot at weekly interval and counted. Further mean Coccinellid population per 15 cm of shoot tip was worked out.

In order to assess the influence of various weather parameters on abundance of insect pests of cowpea, data on various weather parameters recorded at the meteorological observatory were collected and correlated with the population of insect-pests.

Results and Discussion

Data given in (Table 1) revaled that among the various sucking pests recorded on cowpea, the aphid (*A. craccivora*) population commenced during early growth stage of cowpea crop. Sardana and Verma (1986) also reported that the aphid population was found to be high during early growth stage of the crop which corroborated with the present finding. Further, they registered peak activity of the pest during 13th meteorological week while in present study peak activity of aphid (*A. craccivora*) was noticed during 38th standard meteorological week. The aphid (*A. craccivora*) first appeared during second week of August slowly increased in subsequent weeks and reached to its maximum level of 49.95 aphids/15 cm twig during third week of September. There after a decline in the aphid population was noticed throughout the crop period.

Correlation of aphid population with meteorological parameters (Table 2) showed that significant positive correlation existed between aphids (*A. craccivora*) incidence on cowpea and maximum, minimum temperature, relative humidity and rainfall. This is in contrary with findings of Sardana and Verma (1986). Falerio *et al.* (1986) and Patel *et al.* (2010) also stated that temperature had negative influence an population of aphids (*A. craccivora*) on cowpea. Correlation of jassids population with meteorological parameters showed that

Table 1 : Weekly population of insect-pests on cowpea during *Kharif* 2012.

Standard week	Sap feeder population/leaf			Pod borer population/10 pods	Coccinellid population/15 cm shoot tip
	Aphids	Jassids	Thrips		
32 (6Aug. - 12 Aug.)	19.92	1.46	00	00	1.48
33 (13-19 August)	15.95	2.19	00	00	1.62
34 (20-26 August)	21.60	3.22	0.63	00	1.18
35 (27 Aug. 2 Sept.)	15.75	3.75	1.03	0.29	1.10
36 (3-9 September)	16.95	4.04	2.30	1.12	1.45
37 (10-16 September)	20.00	5.19	3.35	1.40	1.90
38 (17-23 September)	49.95	5.70	6.60	1.80	1.45
39 (24-30 September)	38.50	3.79	8.06	2.77	1.50
40 (01-07 October)	25.42	3.34	7.61	2.50	1.32
41 (08-14 October)	15.12	2.27	5.48	1.97	1.27
42 (15-21 October)	13.25	1.79	2.96	1.42	1.00
43 (21-28 October)	5.50	1.15	1.69	0.17	0.82

Table 2 : Correlation coefficient between meteorological parameters and different insect-pests of cowpea during *kharif* - 2012.

S. no.	Insect-pests	Correlation with Abiotic factors			
		Temperature ^{0}C		Relative humidity in (%)	Rainfall (mm)
		Max. (^{0}C)	Min. (^{0}C)		
1.	Aphids	0.464**	0.446**	0.149**	0.140**
2.	Jassids	0.334**	0.532**	0.518***	0.445**
3.	Thrips	0.405**	-0.289**	-0.383**	-0.275**
4.	Pod Borer	0.257**	-0.177*	-0.228**	-0.111*
5.	Coccinellid Predators	0.401**	0.649***	0.612***	0.779***

* Significant at 5%; ** Significant at 5%, 1%; ***Significant at 5%, 1%, 0.10%

maximum temperature, minimum temperature and rainfall had significant positive correlation while relative humidity had highly significant positive correlation with population build up of jassids. This is in contrary with findings of Faleiro *et al*. (1986), who reported that there was no significant correlation between leaf hopper population and maximum and minimum temperature, whereas the relative humidity influenced negatively with population build up. Population of thrips (*Megaleurothrips* spp.) was first time noticed during 34th standard week in month of August and maximum population of 8.06/five leafs was recorded in the 39th standard week. The population of thrips was seen having significant negative correlation with minimum temperature, relative humidity and rainfall but significant positive correlation was found with maximum temperature. This is in contrary with findings Singh *et al*. (2012), who found non significant positive correlation with minimum temperature and relative humidity to population build up of thrips. This is in partial agreement with the report of Singh *et al*. (2012), who found significant positive correlation between maximum temperature and jassid population build up. This is partial agreement with the findings of Faleiro *et al*. (1986), who found relative humidity influencing negatively on the population build up of thirps. The present findings are also in accordance with the findings of Singh *et al*. (1995) who had reported that minimum temperature and relative humidity had significant negative correlation with the build up of thrips population. Pod borer on cowpea was initially recorded during 35th standard week at pod setting stage and reached to its maximum level of 2.77 larvae/ plant during 39th standard week (last week of September). Significant negative correlation was found between pod borer population build up and minimum temperature, relative humidity and rain fall while significant positive correlation with maximum temperature. This is in partial agreement with findings of Singh *et al*. (2012), who found that temperature favoured the multiplication of gram pod borer. This is in agreement with the findings of Patel *et al*. (2010), who found significant negative correlation with population build up of pod borer and relative humidity, whereas temperature exhibited positive influence. The activity of predatory coccinellids began in 32th standard week and continued until the crop was harvested. The maximum population of 1.90 coccinellids/5 plants was recorded during 37th standard week. Significant positive correlation was found between coccinellid population and the maximum temperature while highly significant positive correlation was found between minimum temperature, relative humidity and rainfall. This is in agreement with the findings of Singh *et al*. (2012), who found maximum and minimum temperature showing positive correlation with the beetle population build up.

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