

Population Dynamics of White Fly, *Bemisia tabaci* (Gennadius) and Aphid, *Aphis craccivora* (Koch) in Black Gram

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Abstract Field experiment were carried out during *kharif*, 2016-17 indicated the beginning of white fly infestation was recorded in the 5th week of July and reached a peak level 10.93 N and A/plant in the 4th week of August when the temperature ranged between 25.4-34°C and RH 45.4-79.42%. Correlation coefficient values for white fly incidence and weather parameters showed that maximum and minimum temperature had positive influence on white fly population. While, aphid infestation was recorded in the 2nd week of August and reached a peak level 12.40 N and A/plant in the 2nd week of September when the temperature ranged between 24.3-32.9°C and RH 63.4-79.9%. Correlation coefficient values for aphid incidence and weather parameters showed that maximum and minimum relative humidity besides rainfall had negative influence on aphid population.

Keywords *Vigna mungo* L., *Bemisia tabaci*, *Aphis craccivora*, Population, Weather parameters.

Introduction

Pulses are recognized as the rich source of proteins and constitute an important human diet after cereals. Undoubtedly, they have been considered as poor man's meat for the underprivileged people who cannot afford animal protein. Among the different pulses black gram is a rich source of protein (20.8 to 30.5%) and carbohydrates (56.5 to 63.7%). It is scientifically known as *Vigna mungo* L and commonly known as urdbean in India. Its primary origin is India Ali and Gupta [1]. Black gram contributes about 10% in national pulse production. The area, production and productivity of black gram at national level are 32.15 lac ha, 17.66 lac tonnes and 549 kg/ha, respectively Khajuria et al. [2]. While in Madhya Pradesh these are consequently 8.62 lac ha, 3.53 lac tonnes and 410 kg/ha. In Rewa district the area is about 13.1 thousand ha and the productivity is 272 kg/ha Anonymous [3]. The annual yield loss due to the insect pests has been estimated at about 30% in black gram and mung bean Gailce Leo Justin et al. [4].

Materials and Methods

A field experiment was carried out at Entomology Instructional Farm, JNKVV, College of Agriculture Rewa (MP), during *kharif* 2016-17. Popular black gram variety T-9, was sown in 200 sq. meter area followed the standard package and practices of the crop. The observations on the population of white fly and aphid was recorded at a weekly interval, starting from germination till harvesting of the crop. The number of

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Table 1. Population of white fly and prevailing temperature, relative humidity and rainfall in various standard weeks during *kharif* 2016-17.

Standard weeks /name week of month	Population (N and A/ plant)	Max temp (°C)	Min temp (°C)	Max RH (%)	Min RH (%)	Rainfall (mm)
29 (Jul 3 rd week)	0.00	31.4	24.2	83.1	58.2	17.4
30 (Jul 4 th week)	0.00	32.7	25	82.1	63.2	48.8
31 (Jul 5 th week)	2.13	32.5	24.6	84.7	59.9	27
Average	0.71	32.2	24.6	83.3	60.43	Total 93.2
32 (Aug 1 st week)	6.26	31.2	24.5	89.7	52.1	96
33 (Aug 2 nd week)	4.20	27.2	23.3	98.1	89.2	470
34 (Aug 3 rd week)	8.40	31	22.9	80.4	77.4	52.4
35 (Aug 4 th week)	10.93	34	25.4	79.42	45.4	14.4
Average	7.44	30.85	24.02	86.90	66.02	Total 632.8
36 (Sep 1 st week)	8.13	32.5	24.7	81.4	53.6	10.4
37 (Sep 2 nd week)	5.20	32.9	24.3	79.9	63.4	89.4
38 (Sep 3 rd week)	2.73	32.6	24.1	91.1	71.1	70.2
39 (Sep 4 th week)	1.20	29.5	23.7	93.9	69.4	196
Average	4.31	31.87	24.2	86.57	64.37	Total 366
40 (Oct 1 st week)	0.00	33	24.1	85	59.1	0.00
41 (Oct 2 nd week)	0.00	32.5	20.5	86.7	60.4	20.2
Average	0.00	32.75	22.3	85.85	59.75	Total 20.2
Total						1112.2
Correlation coefficient (<i>r</i> value)	1	0.101	0.314	-0.322	-0.183	-0.001

pests was counted at three locations. At each location five plants were selected at randomly and tagged for observation. Population of each insect were recorded on top, middle and lower leaves of tagged plants. The meteorological observation on temperature, humidity and rainfall were recorded at weekly interval during the entire period of experiment from the meteorological observatory, College of Agriculture, Rewa (MP). Correlation of insects population with the above mentioned parameters were worked out to find out if any relationship exist between them.

Results and Discussion

The data related to the population dynamics of white fly *Bemisia tabaci*, (Gennadius) and aphid, *Aphis craccivora* (Koch) in black gram under the climate change condition of Rewa district were studied during *kharif* 2016-17. The beginning of white fly infestation was recorded in the 5th week of July with an average population of 2.13 N and A/plant. However, during the month of July the average weekly population of the pest varied from 0 to 2.13 N and A/plant. The higher numbers of white fly population was ob-

served in the month of August, with a record of peak population of 10.93 N and A/plant in the 4th week of August. Of course, during the entire month of August the average weekly population of the pest was found changing between 4.20 to 10.93 N and A/plant. The white fly population the present climatic condition of Rewa district had indicated a decline in pest number from 1st week of September and completely disappeared in the 1st week of October (Table 1 and Fig. 1). The findings of Nitharwal et al. [5] has indicated it's appearance from first week of August and reported peak population 11.20 N and A/plant of the pest in the month of September of *kharif* 2006 and 2007. The correlation study of white fly population with the meteorological parameter viz., temperature, relative humidity and rainfall had indicated a negative correlation ($r = -0.322, -0.183, -0.001$) with the maximum and minimum relative humidity and rainfall while a weak positive correlation ($r = 0.101, 0.314$) with maximum and minimum temperature. Nayak et al. [6] has also reported that the effect of abiotic parameters on black gram pest incidence revealed that high mean ambient temperature and relative humidity favored the pest population build-up of white fly. While,

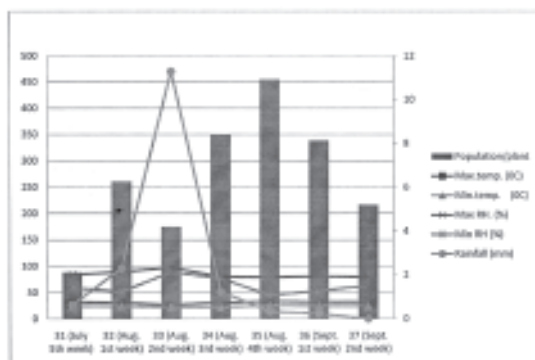


Fig. 1. Population of/white fly and prevailing temperature, RH and rainfall in various standard weeks during *kharif* 2016-17.

the minimum temperature showed positively correlation. Similarly Kumar et al. [7] also reported the peak population of white fly on mungbean and urdbean in the second fortnight of September during *kharif* season. The temperature and sunshine hours also favorable for white fly population with positive correlation. In the present investigation peak of white fly

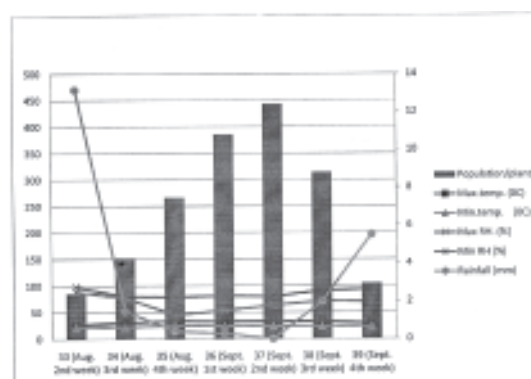


Fig. 2. Population of aphid and prevailing temperature, RH and rainfall in various standard weeks during *kharif* 2016-17.

population occurred in the 4th week of August which indicate a changing pattern in it's appearance and peaks, which in presently show the effect of climate change. While, the beginning of aphid infestation was recorded in the 2nd week of August with an average population of 2.40 N and A/plant. However, during the month of August the average weekly population

Table 2. Population of aphid and prevailing temperature, relative humidity and rainfall in various standard weeks during *kharif* 2016-17.

Standard weeks /name week of month	Population (N and A/ plant)	Max temp (°C)	Min temp (°C)	Max RH (%)	Min RH (%)	Rainfall (mm)
29 (Jul 3 rd week)	0.00	31.4	24.2	83.1	58.2	17.4
30 (Jul 4 th week)	0.00	32.7	25	82.1	63.2	48.8
31 (Jul 5 th week)	0.00	32.5	24.6	84.7	59.9	27
Average	0.00	32.2	24.6	83.3	60.43	Total 93.2
32 (Aug 1 st week)	0.00	31.2	24.5	89.7	52.1	96
33 (Aug 2 nd week)	2.40	27.2	23.3	98.1	89.2	470
34 (Aug 3 rd week)	4.26	31	22.9	80.4	77.4	52.4
35 (Aug 4 th week)	7.46	34	25.4	79.42	45.4	14.4
Average	3.53	30.85	24.02	86.90	66.02	Total 632.8
36 (Sep 1 st week)	10.80	32.5	24.7	81.4	53.6	10.4
37 (Sep 2 nd week)	12.40	32.9	24.3	79.9	63.4	89.4
38 (Sep 3 rd week)	8.80	32.6	24.1	91.1	71.1	70.2
39 (Sep 4 th week)	2.93	29.5	23.7	93.9	69.4	196
Average	8.73	31.87	24.2	86.57	64.37	Total 366
40 (Oct 1 st week)	0.00	33	24.1	85	59.1	0.00
41 (Oct 2 nd week)	0.00	32.5	20.5	86.7	60.4	20.2
Average	0.00	32.75	22.3	85.85	59.75	Total 20.2
Total						1112.2
Correlation coefficient (<i>r</i> value)	1	0.256	0.266	-0.287	-0.042	-0.063

of the pest varied from 0 to 7.46 N and A/plant. The higher numbers of aphid population was observed in the month of September with a record of peak population of 12.40 N and A/plant in the 2nd week of September. Of course, during the entire month of September the average weekly population of the insect was found changing between 2.93 to 12.40 N and A/plant. The aphid population in present climatic condition of Rewa district had indicated a decline in pest number from 3rd week of September and completely disappeared in the 1st week of October (Table 2 and Fig. 2). Similarly Jat et al. [8] also reported that the aphid infestation began in the 3rd week of August (33rd SMW) during the years 2013 and 2014 with peak population in the 1st week of September (36th SMW) during 2013 and 2nd week of September (37th SMW) during 2014 in Udaipur district of Rajasthan state. The correlation study of aphid population with the above mentioned meteorological parameter had indicated a negative correlation ($r = -0.287, -0.042, -0.062$) between the maximum and minimum relative humidity and rainfall while a weak positive correlation ($r = 0.256, 0.266$) with maximum and minimum temperature. Jat et al. [8] also reported that the aphid population decreased due to excessive rainfall (94.80 mm/week) and relative humidity (87.60%). The present finding also show a excessive rain (94.80 mm/week) during the 2nd week of

September which get the support from the study of Jat et al. [8].

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