



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; 12(8): 551-553  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 01-05-2023  
Accepted: 05-06-2023

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## Seasonal incidence of aphid, *Aphis craccivora* Koch on black gram and it's correlation with different abiotic factors

**Suneha Mishra, Archana Kerketta, AK Awasthi, RKS Tomar, Dinesh Pandey and NK Chaur**

### Abstract

The field experiment was conducted at Instructional farm of Barrister Thakur Chhedilal College of Agriculture and Research Station, Bilaspur, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during *kharif* 2022. The studies revealed that the first appearance (7.7 aphid per 10 cm. twig/plant) of Aphid on Black gram was observed during the 32<sup>nd</sup> standard week in vegetative stage, which continued to build up with intermediately up and downs and reached maximum (13.5 aphid per 10 cm. twig/plant) during second week of September in pod filling stage and observed up to maturity stage of crop. The correlation studies revealed that population of aphid was exhibited significant negative correlation with maximum temperature ( $r = -0.774$ ) and all other weather parameters were non-significantly correlated with population of aphid.

**Keywords:** Aphid, seasonal incidence, correlation, abiotic factors

### Introduction

In India pulses are second most important constituent diet after cereals and pulses are rich source of proteins. Among the pulses black gram is the rich source of protein; it contributes 10% of national pulse production. 30% yield loss is estimated annually due to the attack of insect pests in black gram (Justin *et al.*, 2015) [4]. Origin of black gram is India. Black gram botanically known as *Vigna mungo* (L.) belongs to the Leguminosae family, Black gram commonly known as Urdbean, mash, mashkalai, black mapte (Ali and Gupta, 2012) [1]. Remarkable progress in enhancing the pulses production seen in India from past 15 years. In India during 2005-06, the total production of pulses was 13.38 million tons, during 2020-21 it was increased to 25.58 million tons. (Gaur, 2021) [3]. In *Kharif* 2021-22, black gram production was 20.5 lakh tonnes (1<sup>st</sup> advance estimates) in an area of 39.43 lakh hectares. According to 2<sup>nd</sup> advance estimates during 2021-22, black gram was grown in 3.93 lakh hectares with a production of 3.65 lakh tonnes and productivity of 929 kg ha<sup>-1</sup> (Anonymous 2022) [2].

From sowing to harvesting black gram is attacked by number of insect pests in the field as well as in storage also (Lal and Sachan, 1987a) [7]. In blackgram 60 insect species are known to attack at different stages of crop growth in India (Lal and Sachan, 1987b) [6]. Among the insect pests of black gram Whitefly, Aphid, Jassid and Green leaf hopper are recognised as important sucking insect pests; while Grasshopper, Leaf webber, Grey weevil, Tobacco caterpillar, Bihar hairy caterpillar, Leaf and Epilachna beetle are recognized as foliage feeders (Rajawat *et al.*, 2021) [9].

Hence, the present investigation were undertaken to study the Seasonal incidence of Aphid, *Aphis craccivora* Koch on Black gram and it's correlation with different abiotic factors in the prevailing agro conditions of Chhattisgarh plain.

### Materials and Methods

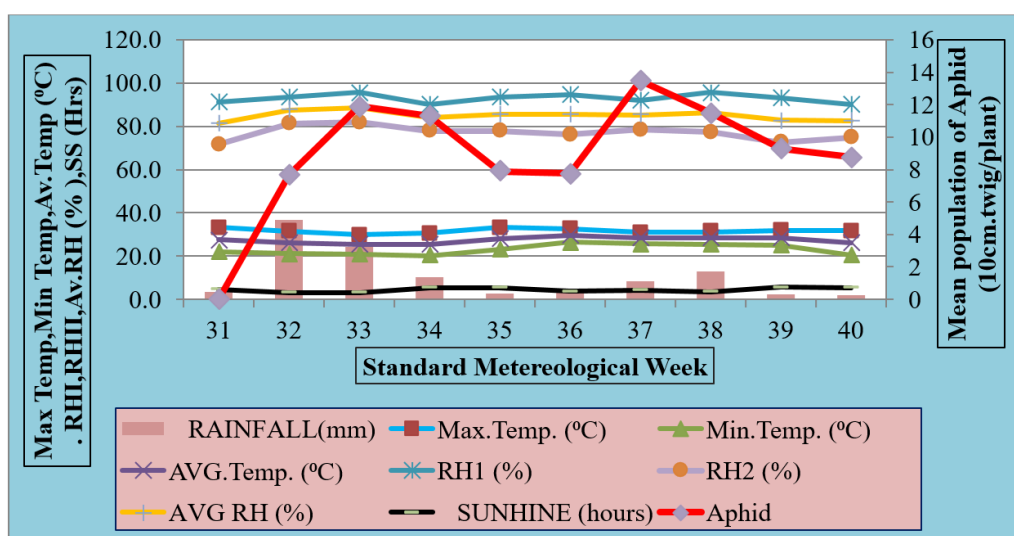
The experiment was conducted at Instructional Farm of BTC CARS, Bilaspur, a constituent college of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). To study the Seasonal incidence of Aphid, *Aphis craccivora* Koch On Black gram during *Kharif* 2022, Black gram sowing in the plot size of 10 m × 10 m with planting distance of 30 cm × 10 cm during third week of July with following all the improved recommended package of practices for raising the crop except plant protection measures. To record the observation on aphid population infesting Black gram crop, aphid was counted from nymph and adult/10 cm

twigs/plant (Kumar and Singh, 2016) [5]. The weekly meteorological data on temperature, relative humidity, rainfall and sunshine hours were also recorded for whole of the cropping season from the meteorological observatory located at BTC CARS, Bilaspur (C.G.). The obtained data were

correlated with various abiotic factors and correlation coefficients were worked out as suggested by Pungavi and Kandibane, (2021) [8]. The graphical representation was applied to depict the seasonal incidence of the aphid. (Fig. 1)

**Table 1:** Seasonal incidence of aphid, *Aphis craccivora* Koch on black gram at Bilaspur during *Kharif* 2022

SMW	Date of observation	Mean population (no.) of Aphid
		(per 10 cm twig/plant)
32	06/08/2022- 12/08/22	7.7
33	13/08/2022- 19/08/22	11.9
34	20/08/2022- 26/08/22	11.3
35	27/08/2022 - 02/09/22	7.9
36	03/09/2022 - 09/09/22	7.8
37	10/09/2022- 16/09/22	13.5
38	17/09/2022- 23/09/22	11.5
39	24/09/2022- 30/09/22	9.3
40	01/10/2022- 07/10/22	8.8



**Fig 1:** Seasonal incidence of aphid, *Aphis craccivora* Koch on Black gram

**Table 2:** Correlation (r) and regression (b<sub>yx</sub>) coefficient between meteorological parameters and population of aphid on black gram

Meteorological parameters	Aphid	
	r	b <sub>yx</sub>
Maximum Temperature(°C)	-0.774	-2.650**
Minimum Temperature (°C)	0.178	-
Average Temperature (°C)	-0.137	-
Morning RH (%)	0.245	-
Evening RH (%)	0.579	-
Average RH (%)	0.527	-
Rainfall (mm)	0.211	-
Sunshine (Hrs.)	-0.111	-

\*\*significant at 1%

**Results and Discussion**

The seasonal incidence of aphid was observed on black gram starting from first week of August 2022 to first week of October 2022 at weekly interval (Fig. 1). The first incidence of aphid was recorded on black gram crop in the first week of August (32<sup>nd</sup> SMW) with an overall population ranged from 7.7 to 13.5 (aphid/10 cm. twig/plant). The aphid population (13.5 aphid/10 cm. twig/plant) attained peak during the second week of September (37<sup>th</sup> SMW). The Weather condition prevailed during this period were maximum (30.9 °C), minimum (25.9 °C) and average (28.4 °C) temperatures,

morning (92.1%), evening (78.4%) and average (85.3%) relative humidity, Rainfall (8.3 mm) and sunshine hours (4.3 hrs.). From the third week of September (38<sup>th</sup> SMW), the Aphid population started declining and reached to lowest (8.8 aphid/10 cm. twig/plant) during the first week of October (40<sup>th</sup> SMW). Correlation co-efficient was worked out between the number of aphid and the weather factors viz., temperature (maximum and minimum), relative humidity (morning and evening), rainfall and sunshine hours (Table 1). The correlation studies of *Aphis craccivora*, showed a significant negative correlation with maximum temperature (r = -0.774) and all other weather parameters were non-significantly correlated with population of aphid. The regression equation between aphid and maximum temperature (y = -2.6503x + 92.854, R<sup>2</sup> = 0.5995) depicts that every unit increase in maximum temperature, the infestation level decreases by - 2.6503 units. The correlation studies showed that the incidence of aphid was affected only by temperature, which indicated that the increase in temperature decreasing the population of aphid. The present findings on aphid infestation on black gram are in line with those of Kumar and Singh (2016) [5], who reported a non-significant relationship between several weather factors and insect population in black gram crop, but not with maximum temperature.

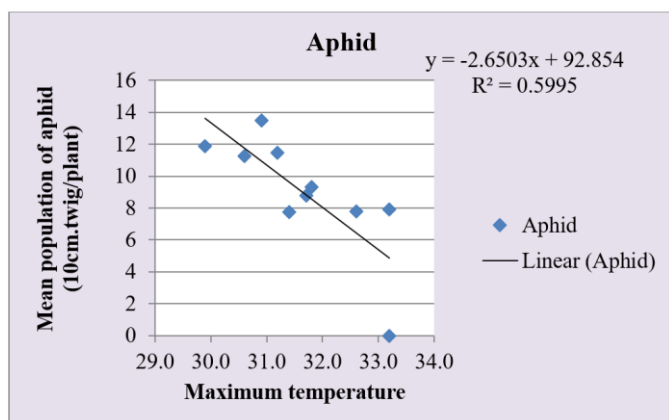


Fig 2: Regression of aphid infestation on maximum temperature ( $^{\circ}\text{C}$ )

### Conclusion

The seasonal incidence studies of the pest revealed that the first appearance (7.7 aphid 10 cm. twig/plant) of aphid on black gram was observed during the 32<sup>nd</sup> standard week in vegetative stage, which continued to build up with intermediately up and downs and reached maximum (13.5 aphid 10 cm. twig/plant) during second week of September in pod filling stage and observed up to maturity stage of crop.

The correlation studies between the population of aphid and various weather parameters showed significant negative correlation with maximum temperature ( $r = -0.774$ ) and all other weather parameters were non-significantly correlated with population of aphid.

### Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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