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POPULATION ABUNDANCE OF SUCKING INSECT PESTS OF URD BEAN (*VIGNA MUNGO* L.) TO ABIOTIC FACTORS IN WESTERN U.P., INDIA

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ABSTRACT

The present investigation was conducted in the Department of Plant Protection experimental field at Chaudhary Charan Singh University, Meerut Campus, during the *Kharif* season of 2023-2024. The study focused on the population abundance of sucking insect pests (whiteflies and aphids) affecting urd bean and their correlation with weather parameters. In the experiment, the initial occurrence of the aphid population was recorded during the 28th SMW, while whiteflies were first noted during the 30th SMW. Both insect populations reached their peak levels during the 36th SMW. Correlation studies were performed using the Karl Pearson coefficient formula.
Keywords: *Vigna mungo*, population dynamics, correlation, multiple regression.

Introduction

Urd bean (*Vigna mungo* L.), which belongs to the Leguminosae family, is also known as black gram, urad, or mash in various regions of India. It is an important pulse crop that is grown throughout the year but is most abundant during the *Kharif* season (Mohapatra *et al*., 2018). It is a major source of dietary protein for many people. In India, the area, production, and productivity of urd beans are 32.15 lakh hectares, 17.66 lakh tonnes, and 549 kg/ha, respectively (Khajuria *et al*., 2015). Major states growing urd beans across India include Maharashtra, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, and Rajasthan. The nutritional value of urd bean lies in its high and easily digestible protein, containing approximately 25-28% protein, 1.0-1.5% oil, 3.5-4.5% fiber, 4.5-5.5% ash, and 62-65% carbohydrates on a dry weight basis (Ali and Gupta, 2012). Amino acid analysis indicates that the concentration of sulfur-containing amino acids, methionine and cystine, is lower compared to methionine, which is greater than that in mung bean. Numerous insect pests attack urd bean crops, potentially causing production losses of up to 70% depending on the severity of the attack. Various insect pests that target urd beans include whitefly (*Bemisia tabaci*), jassid (*Empoasca spp.*), aphids (*Aphis craccivora*), green leafhopper (*Nephotettix spp.*), grasshopper (*Atractomorpha spp.*), and blister beetle (*Mylabris pustulata*).

Materials and Methods

The present investigation was conducted for the research work at the Experimental farm of the Department of Plant Protection, Ch. Charan Singh University, Campus Meerut- 250004, U.P. The TU-40 variety of Urd bean was carried out for the experimental program which suitable for *Kharif* season. The variety was procured from the KVK-II, Sitapur farm, and sown at field plot which size is 4X3 m^2 with a spacing of 30X10 cm. The crop was grown in the *Kharif* season of 2023 in a Randomized Block Design with three replications.

Method of observations

The observation of aphids and whiteflies was recorded on randomly five selected plants of the crop

in a standard meteorological week from sowing to the availability of the pest population or harvesting time of the crop. The numbers of nymphs and adults both count per plant per cage during morning hours (Yadav *et al*., 2015). The meteorological data was collected from the weather station of the University.

Result and Discussion

Population abundance of aphids on Urd bean

The population of aphids was recorded from the 28th SMW to the 43rd SMW where the initial population occurrence was recorded from the 28th SMW with 1.52 aphids per five plants with a maximum temperature of 35.41℃, minimum temperature of 27.44℃, morning relative humidity 69.42% and evening relative humidity are 59.85% was found. The population of aphids gradually increased and attained the peak level of population with 38.52 aphids per five plants at 36th SMW where the maximum temperature (33.94℃), minimum temperature (26.20℃), morning relative humidity (72.57%), evening relative humidity (69.85%), and rainfall (0.1mm) was recorded. After that, the aphid population gradually decreased and reached 5.63 aphids per five plants.

The present investigation was found to be similar to Jakhar *et al.* (2017) reported that the aphid population appeared in the 28th SMW.

Correlation studies between aphid population and weather parameters showed that the maximum and minimum temperature, evening relative humidity, and rainfall (r= 0.25, 0.33, 0.36, and 0.07, respectively) was found positively non-significant while the morning relative humidity (r= -0.22) was found negatively non-significant.

Similar correlation studies were found with Kataria and Kumar (2016) and Jakhar *et al*., (2017) reported that the temperature was positively non-significant and relative humidity negatively non-significant.

Population abundance of whiteflies on Urd bean

The population of whitefly was recorded from the 28th SMW to the 43rd SMW where the initial population occurrence was recorded from the 30th SMW with 0.25 whiteflies per five plants with a maximum temperature of 30.95℃, minimum temperature of 25.88℃, morning relative humidity 84.71% and evening relative humidity are 79.14%, and rainfall 5.32 mm was found. The population of whitefly gradually increased and attained the peak level of population with 4.52 per five plants at 36th SMW where the maximum temperature (33.94℃), minimum temperature (26.20℃), morning relative humidity (72.57%), evening relative humidity (69.85%), and rainfall (0.1mm) was recorded. After that, the whitefly population gradually decreased and reached 0.98 whiteflies per five plants.

The present investigation is similar to Singh *et al*. (2019), who reported that the initial incidence of whitefly population started at the 30th SMW. Also, similar results were reported by Jakhar *et al*. (2017).

Correlation studies between whitefly population and weather parameters were showed that the maximum temperature (r= 0.02) was found positively non-significant while minimum temperature, morning relative humidity, evening relative humidity (r= -0.07, -0.03, -0.03, respectively) was found negatively non-significant. The rainfall (r= -0.55) was found negatively significant with whiteflies population.

The correlation studies were found to be similar to Jat *et al.* (2017). Vikrant *et al*. (2013), reported that the temperature and rainfall were found positively non-significant, and morning relative humidity was found negatively non-significant.

Table 1: Population abundance of sucking pests of Urd bean (*Vigna mungo* L.) during *Kharif* season 2023-2024.

Sr. No.	SMW	Temperature (℃)		Relative humidity (%)		Rainfall (mm)	Population of aphids	Population of whiteflies
		Max.	Min.	Mor.	Eve.			
1.	28	35.41	27.44	69.42	59.85	0.00	1.52	0.00
2.	29	34.01	26.8	80.71	71.14	4.28	5.62	0.00
3.	30	30.95	25.88	84.71	79.14	5.32	7.28	0.25
4.	31	33.32	26.28	84.00	73.42	5.62	25.32	0.36
5.	32	31.31	25.97	83.00	75.57	10.25	21.36	0.21
6.	33	34.61	26.68	73.42	63.57	6.52	27.86	0.48
7.	34	34.24	26.55	75.70	71.42	7.20	31.25	1.53
8.	35	34.24	26.61	77.00	71.57	1.20	33.98	2.96
9.	36	33.94	26.2	72.57	69.85	0.10	38.52	4.52

10.	37	32.38	25.22	78.42	71.42	0.90	36.25	4.24
11.	38	31.74	24.77	85.28	75.14	1.72	26.58	3.58
12.	39	34.68	23.44	85.14	42.85	0.00	25.34	3.21
13.	40	31.9	22.2	82.28	42.71	0.45	19.58	2.59
14.	41	31.9	17.65	85.42	35.42	0.00	11.23	1.58
15.	42	30.2	16.58	84.23	31.25	0.00	5.63	0.98
16.	43	35.41	27.44	69.42	59.85	0.00	1.52	0.00

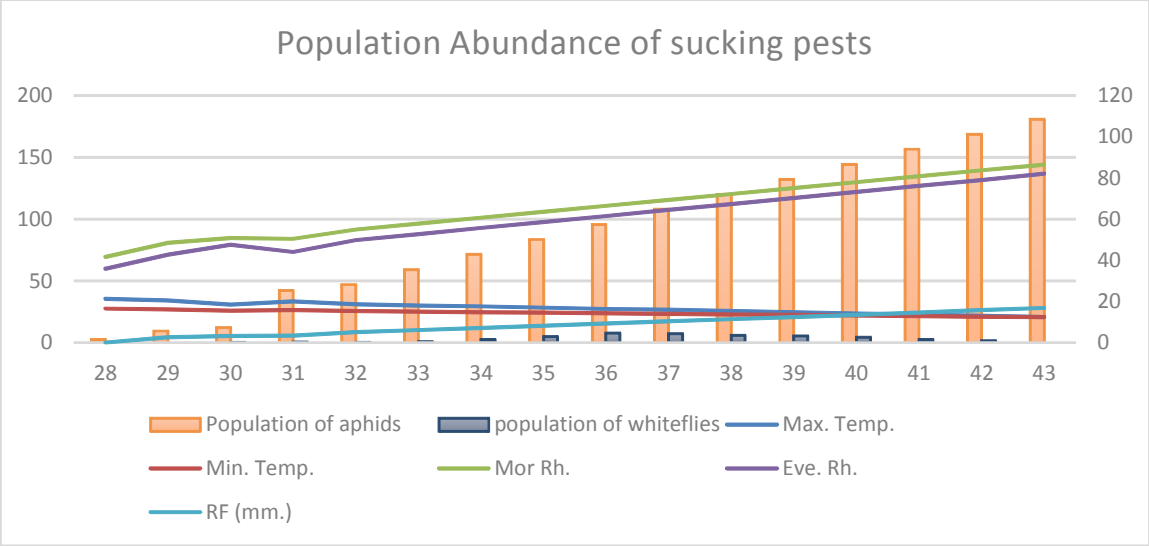

Fig. 1: Population abundance of sucking pests on Urd bean during *Kharif* season

Table 2: Correlation and Multiple regression analysis of sucking pests on urd bean about weather parameters. 20010712

Sucking Pests	Correlation		Multiple regression
Aphid	Max. Temp.	0.25	$Y= -78.46+4.20X_1-3.21X_2-0.11X_3+0.80X_4-0.34X_5$
	Min. Temp.	0.33	
	Mor. Rh.	-0.22	
	Eve. Rh.	0.36	
	RF.	0.07	
Whiteflies	Max. Temp.	0.02	$Y= -3.21+0.14X_1-0.21X_2+0.01X_3+0.07X_4-0.38X_5$
	Min. Temp.	-0.07	
	Mor. Rh.	-0.03	
	Eve. Rh.	-0.03	
	RF.	-0.55	

Note: Max.: Maximum; **Min.:** Minimum; **Mor.:** Morning; **Eve.:** Evening; **Temp.:** Temperature; **Rh.:** Relative humidity; **RF.:** Rainfall

X1= Maximum temperature; X2= Minimum temperature; X3= Morning relative humidity; X4= Evening relative humidity; X5= Rainfall

Conclusion

The present investigation demonstrated the population abundance of sucking insect pests of Urdbean about abiotic factors in Western U.P., which included aphids and whiteflies. The incidence of aphids was noted in the 28th SMW, peaking at the 9th SMW, while the occurrence of whiteflies was recorded in the 30th SMW, also reaching its peak at the 9th SMW. Correlation studies between aphids and temperature, evening relative humidity, and rainfall showed positive relationships, while morning relative humidity displayed a negative correlation. The relationship between whiteflies and maximum temperature was positively non-significant and

negatively non-significant with minimum temperature, morning relative humidity, evening relative humidity, and rainfall.

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