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Sucking pests incidence on green gram genotypes correlating with yield

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Abstract
The experiment was carried out during *Kharif* 2022, on the Mungbean at experimental research field was conducted research farm of Entomology, Department of Agricultural Entomology, College of Agriculture, Badnapur, VNMKV Parbhani, with objectives, to screen mungbean genotype against sucking pest complex. The experiment under RBD with the seven treatments and three replications. Investigating for major sucking insect pests *i.e*., aphids (*Aphis crassivora*), whitefly (*Bemisia tabaci*), thrips (*Thrips tabaci*) and leafhopper (*Empoasca kerri*). The overall sucking complex population was recorded lowest in cultivars PM 809-10,BM 2021-2 and ATM 2022-06 proved to be most effective and tolerant against sucking pest population of aphids, leaf hoppers, thrips and whiteflies and recording minimum pod damage and highest grain yield.

Keywords: Bio-pesticides, diamondback moth (DBM), *Bacillus thuringiensis*, neem oil, and *Beauveria bassiana*

1. Introduction
Greengram (*Vigna radiata* L.) is locally called as “Mungbean”. India is the world's largest producer of mungbean, contributing 54% of global production and occupying 65% of the global acreage. Mungbean has a significant impact on human nutrition in addition to enhancing soil fertility through atmospheric nitrogen fixation. India is major producer of green gram in the world but it grown in all states. It is cultived in about 40.38 lakh hectares with total production of 31.5 lakh tonnes with productivity of 783 kg/ha and contribute about 11% to total pulse production in the year 21-22. Among the many reasons for low green gram productivity in the country, damage caused by insect pests is one of the most significant. Nearly 64 insect pest species have been identified on green gram in India, however just a few are known to cause economic damage over a vast area. Among all insect pests attack on mungbean, sucking pests, *viz*., aphids, whiteflies, jassids, and thrips, and are the most notorious insect pests that attack mungbean (Khattak *et al*., 2004) [4]. Number of insect pests infest mungbean, causing significant losses to the leaves, stems, flowers, buds, and pods and harming the seedling stage. (Ujagir and Sehgal, 1988) [6]. And because mungbean is available throughout the year in a variety of seasons and circumstances, it turned into a persistent pest of pulses. In order to identify a resistance source with a better yield, screening based on host plant resistance responses—an economically viable genotyping measure against sucking insect pests— became necessary.

2. Methodology
The experiment was carried out during *kharif* 2022 at agriculture research farm, Badnapur, MH, India will assess the incidence of insect pests on 31 genotypes of green gram sown in a Randomized Block Design with three replications for evaluation in the first week of July 2022. Location of experiment has subtropical climate carrier under central Maharashtra platue zone with average rainfall of about 650 mm received mostly during June to September. The minimum and maximum temperature is during the last five year15.25 °C and 43.85 °C respectively and the mean relative humidity range from 30-91 per cent. Each genotypes was sown at 3 rows of 4m lengh at 30cm plant to plant spacing. Sucking pest population was recorded at weekly intervals from five randomly selected plants particularly

approached on top, middle and bottom trifoliate leaf of the plant. Data presented as total number of sucking pests per trifoliate leaf of each genotype. The data obtained was then after subjected to $\sqrt{x + 0.5}$ transformation before analysis. Each net plot's total grain yield was recorded. and calculated on hectare basis. The data statistically analyzed by standard analysis of variance method suggested by Panse and Sukhatme (1967) [5].

3. Results and Discussion

3.1 Aphid population

The result of aphid population ranged in between 5.44 to 10.06 aphids/trifoliate leaf (Table 1; fig 1). PM 809-12 with minimal aphids' population (5.44 aphid/trifoliate leaf) whereas TAM 141 and Phule chetak indicate highest population 9.67 and 10.06 aphid/trifoliate leaf respectively. Concurrently BARI Mung-6 showed highest aphid population as stated by Abdullah *et al*. (2018) [1].

While Bhople *et al.* (2017) [2] also found that Phule M-702-1 had the lowest aphid population and PKV AKM had the highest aphids. The genotype with average five to seven aphids/trifoliate leaf were BM 2021-2, ATM 2022-06, PM 811-4, BM 2011-4, AKM 16-08, PM 811-8,ATM 2022-07, ATM 2022-05.

3.2 Whitefly population

Tagger and Gill (2012) [12] found moderately resistant genotypes had the lowest whitefly population. This experimental result of whitefly population in range of 0.94 to 3.06 whiteflies/trifoliate leaf (Table 1; fig 1) PM 809-10 and ATM 2022-06 minimum infestation was found in with 0.94 whiteflies /trifoliate leaf whereas Phule chetak indicate highest population (3.06) whiteflies/ trifoliate leaf. Concurrently. This finding similarly with Yadav and Dahiya's (2000) [11] findings that PDM-91-249 was a reliable source of resistance. Some other genotypes showed one to two whiteflies/ trifoliate leaf.

3.3 Thrips population

Thrips population ranged in between of 0.61 to 2.44 thrips/trifoliate leaf (Table 1; fig 1) whereas ATM 2022-06, BM 2021-2, PM 809-10, AKM 16-08, ATM 2022-08 with 0.61, 0.72, 0.78, 0.89, 0.67 thrips/trifoliate leaf respectively showed minimal thrips population. Chauhan *et al.* (2018) found that the highest population of thrips was found in IGKM 06-26-5, followed by NKM 15-12, VGG 10-008, RMG 1092, and Pant M 4. The minimum population was recorded in NBPGR- 150, GAM 5, NVL 516, NVL 825, AKM 12-24, and Pusa 1672 Similarly Bhople *et al.* (2017) [2] found a minimum infestation in ML1628, followed by Pusa-1171, ML-1464, and BPMR-145.Phule-chetak (2.28) and TAM 127 (2.44) thrips/trifoliate leaf directs highest population of thrips Singh and Singh's 2014 work, where the maximum thrips population was recorded in genotype BPMR-145, followed by HUM12, and ML-1628 Other genotype with average one to two thrips/trifoliate leaf include ATM 2022-04, ATM 2022-05, ATM 2022-07, PM702-1, PM 811-4.

Table 1: Mean infestation population of sucking pests on Green gram

Table 1 Mean infestation population of sucking pests on Green gram						
Sr. No	**Genotypes**	**Aphids**	**Whitefly**	**Thrips**	**Leafhopper**	**Yield (Kg/ha)**
1	PKV Green Gold	7.11 (2.91)	2.00 (1.47)	1.61 (1.44)	2.28(1.62)	1018
2	PKV AKM 4	7.72 (2.74)	1.67 (1.31)	1.78 (1.50)	2.33(1.58)	878
3	BM 4(Ch)	7.89 (3.06)	1.89 (1.44)	1.67 (1.45)	2.67(1.68)	1059
4	Vaibhav (Ch)	7.06 (2.86)	1.72 (1.42)	1.28 (1.31)	2.61(1.58)	826
5	TAM 141	7.94 (2.92)	1.72 (1.41)	1.28 (1.31)	2.33(1.68)	1118
6	TAM 127	9.67 (3.27)	2.94 (1.70)	2.44 (1.70)	3.50(1.76)	897
7	BM 2021-4	6.28 (2.68)	1.72 (1.39)	1.39 (1.36)	1.72(1.44)	1282
8	PM 702-1	7.61 (2.97)	1.67 (1.38)	1.11 (1.26)	2.00(1.34)	931
9	PM 809-10	5.44 (2.51)	0.94 (1.06)	0.72 (1.06)	1.39(1.05)	1332
10	PM 809-12	7.83 (3.06)	1.67 (1.37)	1.44 (1.38)	2.06(1.46)	1250
11	PM 811-4	5.89 (2.62)	1.17 (1.18)	1.11 (1.26)	1.83(1.22)	1117
12	BM 2002-2	7.33 (2.89)	2.00 (1.43)	1.39 (1.36)	2.61(1.68)	1528
13	BM 2002-1	8.00 (3.01)	2.11 (1.46)	1.44 (1.35)	2.56(1.46)	1405
14	Phule Chetak	10.06(3.31)	3.06 (1.75)	2.28 (1.66)	3.11(1.74)	1201
15	TARMI	8.28 (3.08)	1.56 (1.24)	1.33 (1.32)	2.50(1.58)	937
16	AKM 12-14	7.83 (3.03)	1.67 (1.37)	1.22 (1.28)	2.00(1.44)	1133
17	AKM 16-08	6.39 (2.69)	1.28 (1.23)	0.78 (1.10)	2.06(1.34)	1176
18	BM2021-1	7.61 (2.90)	1.67 (1.39)	1.39 (1.35)	2.61(1.46)	1377
19	BM2021-2	5.67 (2.58)	1.00(1.13)	0.67 (1.04)	1.72(1.05)	1257
20	PM 504 -20-27	7.56 (2.94)	1.83(1.36)	1.28 (1.31)	2.50(1.58)	1289
21	PM 402-2-1	8.06 (2.97)	1.78(1.36)	1.50 (1.40)	2.78(1.68)	1050
22	PM 818-8	7.56 (2.91)	1.50 (1.26)	1.11 (1.26)	2.39(1.34)	1271
23	PM 811-17	6.33 (2.66)	1.50 (1.30)	1.28 (1.32)	2.06(1.44)	1343
24	ATM 2022-01	7.06 (2.82)	1.72 (1.36)	1.44 (1.38)	2.67(1.58)	727
25	ATM 2022-02	9.33 (3.23)	2.33 (1.61)	2.06 (1.58)	3.44(1.77)	1084
26	ATM 2022-03	7.39 (2.91)	1.72 (1.41)	1.22 (1.30)	2.39(1.44)	1022
27	ATM 2022-04	7.17 (2.92)	1.39 (1.30)	1.06 (1.21)	2.28(1.34)	857
28	ATM 2022-05	6.89 (2.83)	1.44 (1.32)	1.06 (1.23)	2.00(1.68)	708
29	ATM 2022-06	5.83 (2.61)	0.94 (1.09)	0.61 (1.02)	1.39(1.05)	854
30	ATM 2022-07	6.67 (2.71)	1.07 (1.26)	1.06 (1.23)	1.94(1.44)	856
31	ATM 2022-08	7.17 (2.83)	1.33 (1.30)	0.89 (1.14)	1.72(1.34)	756
SE (m)		0.1425	0.103	0.1023	0.1228	54.72
CD at 5%		0.4766	0.329	0.3271	0.3926	150.69
CV %		9.5266	12.333	13.4691	13.067	11.64
* Figures in parenthesis are √X +0.5 values						

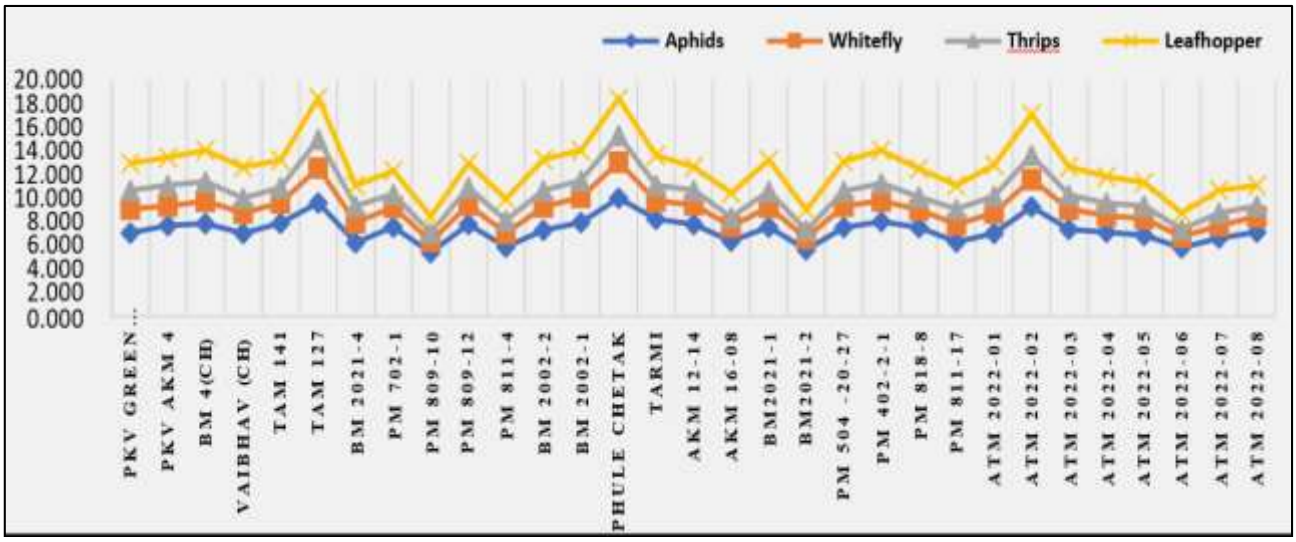

Fig 1: Sucking Pests Infestation on Green Gram Genotype

3.4 Leafhopper population

Result of leafhopper population ranged in between of 1.39-3.50 leafhoppers/trifoliate leaf. (Table 1; fig 1) ATM 2022-06 with minimal leafhopper population (1.39 leafhoppers/ trifoliate leaf). Singh and Singh (2014) [8] and Singh *et al.* (2019) [9] they found that the lowest leaf hopper population was observed in KM-2293 followed by TMB-36 and Pusa-1271 and the highest population was observed in BM-4. Whereas Phule-chetak, ATM 2022-02, TAM 127 indicate highest population with 3.11, 3.44, 3.50 leafhoppers/trifoliate leaf respectively. The genotypes with average one to two leafhopper/trifoliate leaf PM 809-10, BM 2021-4, BM 2021-2, ATM 2022-08, PM 811-4, ATM 2022-07 and others.

3.5 Grain Yield

The grain yields were were calculated according to results maximum grain yield was reported in BM 2002-2909 (1528 kg/ha) with mean 5.67 aphids, 1.00 whitefly, 0.67 thrips and 1.72 leafhopper infestation per trifoliate leaf and lowest yield of ATM 2022-05 (708 kg/ha) with mean 6.89 aphids, 1.44 whitefly, 1.06 thrips and 2.00 leafhopper. Results of Singh and Singh (2019) [9] coincide as PM-5 (7.72 q/ha) followed by IPM 3061 (6.96 q/ ha) and HUM-16 (6.58 q/ ha) and the least from IPM 306-6 (3.11 q/ ha) closely followed by IPM 05-3-22 (3.23 q/ ha), ML 5 (3.30 q/ ha) and SM 48 (3.13 q/ ha). The yield in local check cultivar, HUM-12 was 4.13 q/ ha affected by sucking pest infestation.

4. Conclusions

Screening of 31 genotypes against sucking pests. The least population of aphid was observed on PM 809-12 with 5.44 aphid/ trifoliate leaf and highest in Phule chetak with 10.06 aphid/trifoliate leaf. Similar same trend observed in case whitefly as the genotypes most prevalent entry was PM 809-10 with 0.94 whiteflies /trifoliate leaf and Phule chetak (3.06) whiteflies/ trifoliate leaf found most susceptible to infection. ATM 2022-06 (0.94), BM 2021-2 (1.00) whiteflies/ trifoliate leaf. In respect of thrips, the least infestation of thrips found in cultivars ATM 2022-06 with 0.61 thrips/trifoliate leaf exhibited tolerant entry among all and most susceptible genotypes to infection were found Phule chetak (2.28) and TAM 127 (2.44) thrips/trifoliate leaf. Similarly, the least population of leafhopper was found in ATM 2022-06 with 1.39 leafhoppers/ trifoliate leaf and genotype like Phule-chetak (3.11), ATM 2022-02 (3.44), TAM 127 (3.50) leafhopper/trifoliate leaf which shows highest population. From overall performance, mungbean genotypes PM 809-10 And ATM 2022-06 were recorded tolerant to whiteflies, aphids, Thrips and leaf hopper. Whereas genotypes Phule chetak and TAM 127 were found highly susceptible to whiteflies, aphids, Thrips and leaf hopper.

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