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SCREENING OF GREENGRAM (*Vigna radiata* L.) GENOTYPES FOR RESISTANCE TO MAJOR SUCKING INSECT PESTS UNDER NATURAL FIELD CONDITIONS

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ABSTRACT

A field experiment was conducted during *rabi* 2025–26 at the Regional Agricultural Research Station (RARS), Lam, Guntur, Andhra Pradesh, to evaluate the resistance of greengram genotypes against major sucking insect pests under natural field conditions. Eighty-three greengram genotypes were screened against whitefly (*Bemisia tabaci* Gennadius) and thrips (*Thrips palmi* Karny and *Scirtothrips dorsalis* Hood) in a Randomized Block Design with two replications. Significant variation was observed among the genotypes in their reaction to both insect pests, indicating substantial genetic variability for resistance. Whitefly population ranged from 0.89 to 5.38 adults per trifoliate leaf, whereas thrips population varied from 0.71 to 4.89 individuals per three leaves. Genotypes ML 818, CGG 23-022, IPM 512-1 and VGG 21-128 exhibited resistance or moderate resistance to both sucking pests and were identified as promising sources of broad-spectrum resistance. These genotypes may serve as valuable donor parents for resistance breeding programmes and contribute to the development of insect-resistant greengram cultivars for sustainable pest management.

***Keywords* :** Greengram, host plant resistance, whitefly, thrips, sucking insect pests, resistant genotypes

Introduction

Greengram (*Vigna radiata* (L.) Wilczek) is an important pulse crop cultivated in tropical and subtropical regions because of its short duration, wide adaptability and high nutritional value. It is a rich source of dietary protein and contributes to sustainable agriculture through biological nitrogen fixation and soil fertility improvement. In India, mungbean is cultivated on over 5.5 million hectares, producing 4.24 million tonnes during 2024–25, and its cultivation has expanded across *kharif*, summer and *rabi* seasons owing to the development of improved short-duration varieties and production technologies. (AICRP on *kharif* Pulses, 2025-26).

Among the major biotic constraints affecting greengram production, sucking insect pests are the most important. Whitefly (*Bemisia tabaci* Gennadius) and thrips (*Thrips palmi* Karny and *Scirtothrips dorsalis* Hood) cause significant economic losses by feeding on plant sap, reducing plant vigour and impairing growth. Whitefly also transmits mungbean yellow mosaic virus (MYMV), whereas thrips infest tender leaves, flower buds and flowers, resulting in leaf curling, flower shedding and poor pod set. Thrips activity is particularly severe during the flowering stage and has also been reported to transmit Groundnut Bud Necrosis Virus (GBNV) in urdbean, highlighting the importance of effective management of these pests in pulse crops. (Khattak *et al*., 2004; Satyapriya *et al*., 2017; Mounika *et al*., 2023; AICRP on *kharif* Pulses, 2025-26).

Management of sucking insect pests in greengram largely relies on repeated applications of chemical insecticides. However, indiscriminate use of insecticides has resulted in the development of insecticide resistance, pest resurgence, environmental contamination, pesticide residues and adverse effects on natural enemies. Therefore, the development and deployment of host plant resistance has emerged as an economical, eco-friendly and sustainable approach for managing sucking insect pests. Resistant cultivars are compatible with integrated pest management (IPM) programmes and help reduce dependence on chemical insecticides while ensuring stable crop productivity (Painter, 1951; Smith, 2005).

Several studies have reported considerable variability among greengram genotypes in their response to whitefly and thrips, indicating the availability of useful sources of resistance for crop improvement. However, information on resistant genotypes adapted to the agro-climatic conditions of Andhra Pradesh remains limited. Identification of stable and resistant genotypes is therefore essential for developing insect-resistant cultivars and strengthening integrated pest management programmes. Hence, the present investigation was undertaken to evaluate eighty-three greengram genotypes for their reaction to whitefly (*Bemisia tabaci*) and thrips (*Thrips palmi* and *Scirtothrips dorsalis*) under natural field conditions and to identify promising resistant genotypes for their utilization in resistance breeding programmes (Abdullah-Al-Rahad *et al*., 2018; Chauhan *et al*., 2018; Mounika *et al*., 2023).

Materials and Methods

The field experiment was conducted during rabi 2025–26 at the Regional Agricultural Research Station (RARS), Lam, Guntur, Andhra Pradesh, India, to evaluate the resistance of greengram genotypes against major sucking insect pests under natural field conditions. A total of 83 greengram genotypes obtained from ICAR–Indian Institute of Pulses Research (IIPR), Kanpur, and RARS, Lam were evaluated in a Randomized Block Design (RBD) with two replications. Each genotype was sown in two rows of 4 m length at a spacing of 30 × 10 cm on 19 November 2025. The crop was raised by following the recommended agronomic practices without the application of insecticides to facilitate natural pest infestation. Observations on whitefly (*Bemisia tabaci* Gennadius) and thrips (*Thrips palmi* Karny and *Scirtothrips dorsalis* Hood) were recorded from five randomly selected plants in each replication at 20 and 30 DAS. Whitefly population was recorded from one fully expanded upper trifoliate leaf, whereas thrips population was recorded from three leaves (upper, middle and lower canopy) during the morning hours following the method of Rathore and Tiwari (1999). The data were subjected to square-root transformation [$\sqrt{(x + 0.5)}$] and analysed by ANOVA for RBD. The significance of differences among genotypes was tested at the 5% probability level, and SEm (±), CD and CV were computed. Based on the mean pest population, genotypes were classified as Resistant (R), Moderately Resistant (MR) and Susceptible (S) using the mean ± standard deviation criterion.

Results and Discussion

Whitefly

Significant variation in whitefly incidence was observed among the 83 greengram genotypes, indicating substantial genetic variability for resistance (Table 1). The mean whitefly population ranged from 0.89 to 5.38 adults per trifoliate leaf. PUSA M 2471 recorded the lowest whitefly population and was classified as resistant, whereas VBN 5 exhibited the highest infestation and was categorized as susceptible. Genotypes ML 818, CGG 23-022, IPM 512-1 and VGG 21-128 also exhibited resistant or moderately resistant reactions and may serve as valuable donor parents for breeding whitefly-resistant greengram cultivars. Similar variability in whitefly resistance has been reported earlier, with Abdullah-Al-Rahad et al. (2018) identifying BARI Mung 6, Chauhan et al. (2018) reporting MDGVV 16, Mounika et al. (2023) identifying COGG 912, Narasimhudu et al. (2024) reporting MH 732, and Kishore et al. (2025) identifying GG 1 and GG 7 as resistant sources. However, the present study identified PUSA M 2471, ML 818, CGG 23-022, IPM 512-1 and VGG 21-128 as the most promising resistant genotypes under the prevailing field conditions.

Thrips

Significant variation in thrips incidence was observed among the 83 greengram genotypes, indicating substantial genetic variability for resistance (Table 1). The mean thrips population ranged from 0.71 to 4.89 thrips per three leaves. PUSA M 2471 recorded the lowest thrips population and was classified as resistant, whereas VBN 5 exhibited the highest infestation and was categorized as susceptible. Genotypes ML 818, CGG 23-022, IPM 512-1 and VGG 21-128 also exhibited resistant or moderately resistant reactions, indicating their potential as valuable sources of thrips resistance in greengram breeding programmes. The present findings are supported by Mounika *et al*. (2023), who reported lower thrips incidence in COGG 912 and higher infestation in MH 18-181, and by Kishore et al. (2025), who identified IPM-2-14 as a promising thrips-tolerant genotype. Similar genetic variability for thrips resistance was also reported by Chauhan *et al.* (2018).

Table 1 : Screening of greengram genotypes against whitefly and thrips incidence during rabi 2025-26.

S. No.	Genotype	Whitefly (No./trifoliate leaf/plant) Mean	Thrips (No./3 leaves /plant) Mean
1	64M25427	1.34 (1.34)	3.00 (1.85)
2	64M25532	0.50 (0.99)	1.67 (1.46)
3	AKM 8802	0.50 (0.99)	1.67 (1.46)
4	BCM 20-54	1.67 (1.47)	2.00 (1.57)
5	BGG 23-1	1.00 (1.22)	1.84 (1.50)
6	CGG 23-022	0.50 (0.99)	0.50 (1.00)
7	COGG 912	0.83 (1.15)	1.17 (1.29)
8	DGG 214	1.67 (1.47)	0.67 (1.06)
9	DGG 24-100	0.75 (1.11)	1.17 (1.28)
10	DGG 24-123	0.50 (0.99)	2.00 (1.58)
11	DGG 24-20	0.50 (0.99)	1.34 (1.34)
12	DGG 24-215	0.50 (0.99)	0.83 (1.15)
13	GM 6	0.33 (0.91)	2.17 (1.62)
14	IGKM 06-4-2	0.50 (0.99)	2.50 (1.72)
15	IGKM 2021-2	0.67 (1.08)	1.33 (1.35)
16	IPM 02-3	0.17 (0.80)	2.17 (1.63)
17	IPM 14-9	0.25 (0.86)	1.50 (1.41)
18	IPM 1603-7	0.67 (1.08)	2.67 (1.78)
19	IPM 2–14	0.50 (0.99)	0.67 (1.08)
20	IPM 2024 SS 11	0.33 (0.91)	1.34 (1.34)
21	IPM 2024 SS 14	0.67 (1.08)	1.17 (1.28)
22	IPM 2024 SS 17	0.33 (0.91)	4.34 (2.19)
23	IPM 410-3	0.50 (0.99)	3.34 (1.95)
24	IPM 512-1	0.50 (0.99)	0.33 (0.91)
25	JLPM 920-39	0.34 (0.89)	1.67 (1.47)
26	Keonjhar Mung 3	1.00 (1.19)	0.67 (1.06)
27	LGG 450	0.75 (1.11)	2.84 (1.81)
28	LGG 460	1.67 (1.47)	3.17 (1.92)
29	LGG 574	0.67 (1.07)	1.33 (1.35)
30	LGG 600	1.67 (1.47)	1.67 (1.47)
31	LGG 607	1.67 (1.47)	3.34 (1.95)
32	LGG 610	0.83 (1.15)	1.34 (1.34)
33	LGG 628	1.67 (1.47)	3.50 (1.98)
34	LGG 630	1.34 (1.36)	1.84 (1.52)
35	LGG 717	0.17 (0.80)	3.50 (1.98)
36	LGG 755	0.17 (0.80)	2.17 (1.63)
37	MH 1142	0.50 (0.99)	2.50 (1.72)
38	MH 1762	0.33 (0.91)	1.84 (1.50)
39	MH 1772	0.50 (0.99)	1.17 (1.29)
40	MH 18-181	0.60 (1.04)	4.83 (2.30)
41	MH 2-15	0.17 (0.82)	1.50 (1.41)
42	MH 2110	0.50 (1.00)	1.75 (1.47)
43	MGG 527	0.33 (0.91)	1.42 (1.38)
44	MGG 556	0.85 (1.16)	1.33 (1.35)
45	MGG 570	1.34 (1.36)	1.34 (1.34)
46	MI 13-47	0.67 (1.08)	2.34 (1.67)
47	ML 1808	0.17 (0.80)	1.50 (1.34)
48	ML 1839	0.33 (0.91)	1.42 (1.38)
49	ML 2748	1.17 (1.27)	1.60 (1.45)
50	ML 3044	0.70 (1.10)	2.67 (1.75)
51	ML 3262	0.17 (0.82)	1.84 (1.52)
52	ML 3264	0.67 (1.08)	1.67 (1.46)
53	ML 818	0.17 (0.80)	0.83 (1.15)
54	NMR 16-20	1.67 (1.47)	4.34 (2.19)
55	OBGG 123	0.33 (0.91)	1.67 (1.46)
56	OBGG 124	0.33 (0.91)	2.50 (1.67)
57	OKGG 6	0.50 (0.99)	2.84 (1.81)
58	PKV AKM 4	0.17 (0.80)	1.17 (1.28)
59	PM 2205	0.50 (0.99)	2.17 (1.62)
60	PM 2213	0.50 (0.99)	2.17 (1.62)
61	PM 707-5	0.50 (0.99)	3.17 (1.91)
62	PMD 20	0.50 (0.99)	1.17 (1.29)
63	PMS 17	0.50 (0.99)	2.17 (1.62)
64	PUSA 9072	0.33 (0.91)	2.50 (1.67)
65	PUSA M 1221	0.50 (0.99)	2.17 (1.62)
66	PUSA M 2471	0.17 (0.80)	0.50 (0.99)
67	PUSA M 2571	0.67 (1.08)	0.33 (0.91)
68	RMB 18-06	0.83 (1.15)	2.00 (1.56)
69	RMG 1249	0.50 (0.99)	2.33 (1.68)
70	RMG 1251-1	0.83 (1.15)	3.85 (2.07)
71	RMG 1252	0.17 (0.80)	3.17 (1.91)
72	RM 03-79	0.17 (0.80)	1.50 (1.41)
73	SGC 26	0.17 (0.80)	2.17 (1.62)
74	SKNM 2302	0.67 (1.07)	3.00 (1.86)
75	SKNM 2306	0.67 (1.08)	1.84 (1.52)
76	SML 1115	0.50 (1.00)	1.42 (1.38)
77	TARM 141	0.33 (0.91)	1.50 (1.41)
78	TRCM 16-22	1.34 (1.34)	1.34 (1.34)
79	VBN 4	1.67 (1.47)	2.67 (1.75)
80	VBN 5	1.67 (1.47)	3.85 (2.07)
81	VBN 7	1.17 (1.27)	1.50 (1.41)
82	VGG 20-235	0.33 (0.91)	0.67 (1.06)
83	VGG 21-128	1.34 (1.34)	1.17 (1.29)
	SEm ±	0.09	0.07
	CD (P = 0.05)	0.10	0.28
	CV (%)	14.53	15.01

DAS: Days After Sowing; *Values in parentheses are square root transformed values $\sqrt{(x + 0.5)}$

Table 2 : Grouping of genotypes according to their susceptibility to whiteflies

Reaction	Genotypes
Resistant <(Mean – SD)	IPM 02-3, LGG 717, LGG 755, MH 2-15, ML 1808, ML 3262, ML 818, PKV AKM 4, PUSA M 2471, RMG 1252, RM 03-79 and SGC 26
Moderately Resistant <(Mean-sd) to >(mean + SD)	64M25532, AKM 8802, BGG 23-1, CGG 23-022, COGG 912, DGG 24-100, DGG 24-123, DGG 24-20, DGG 24-215, GM 6, IGKM 06-4-2, IGKM 2021-2, IPM 14-9, IPM 1603-7, IPM 2–14, IPM 2024-SS-11, IPM 2024-SS-14, IPM 2024-SS-17, IPM 410-3, IPM 512-1, JLPM 920-39, Keonjhar Mung 3, LGG 574, LGG 610, MH 1142, MH 1762, MH 1772, MH 18-181, MH 2110, MGG 527, MGG 556, MGG 570, MI

	13-47, ML 1839, ML 3044, ML 3264, OBGG 123, OBGG 124, OKGG 6, PM 2205, PM 2213, PM 707-5, PMD 20, PMS 17, PUSA 9072, PUSA M 1221, PUSA M 2571, RMB 18-06, RMG 1249, RMG 1251-1, SKNM 2302, SKNM 2306, SML 1115, TARM 141, TRCM 16-22, VGG 20-235 and VGG 21-128
Susceptible >(Mean + SD)	64M25427, BCM 20-54, DGG 214, LGG 450, LGG 460, LGG 600, LGG 607, LGG 628, LGG 630, ML 2748, NMR 16-20, VBN 4, VBN 5 and VBN 7

Table 3 : Grouping of genotypes according to their susceptibility to thrips

Reaction	Genotypes
Resistant <(Mean – SD)	CGG 23-022, COGG 912, DGG 24-215, IPM 512-1, Keonjhar Mung 3, LGG 610, ML 818, PUSA M 2471, PUSA M 2571, VGG 20-235 and VGG 21-128
Moderately Resistant <(Mean-sd) to >(mean + SD)	64M25532, AKM 8802, BCM 20-54, BGG 23-1, DGG 24-100, DGG 24-123, DGG 24-20, GM 6, IGKM 06-4-2, IGKM 2021-2, IPM 02-3, IPM 14-9, IPM 1603-7, IPM 2–14, IPM 2024-SS-11, IPM 2024-SS-14, JLPM 920-39, LGG 450, LGG 574, LGG 600, LGG 755, MGG 527, MGG 556, MGG 570, MH 1142, MH 1762, MH 1772, MH 2-15, MH 2110, MI 13-47, ML 1808, ML 1839, ML 2748, ML 3044, ML 3262, ML 3264, OBGG 123, OBGG 124, OKGG 6, PKV AKM 4, PM 2205, PM 2213, PMD 20, PMS 17, PUSA 9072, PUSA M 1221, RMB 18-06, RMG 1249, RM 03-79, SGC 26, SKNM 2306, SML 1115, TARM 141, TRCM 16-22, VBN 4, VBN 5 and VBN
Susceptible >(Mean + SD)	64M25427, IPM 2024-SS-17, IPM 410-3, LGG 460, LGG 607, LGG 628, LGG 630, LGG 717, MH 18-181, NMR 16-20, PM 707-5, RMG 1251-1, RMG 1252 and SKNM 2302

Identification of Genotypes Resistant to Major Sucking Insect Pests

Comparison of the reaction of greengram genotypes to whitefly and thrips revealed considerable variation in their resistance to the two major sucking insect pests (Table 2). Genotypes ML 818, CGG 23-022, IPM 512-1 and VGG 21-128 exhibited resistance or moderate resistance to both pests, indicating their potential as valuable sources of broad-spectrum resistance. Such genotypes are useful donor parents for resistance breeding programmes aimed at developing greengram cultivars with durable resistance to sucking insect pests. However, their stability should be validated across seasons and locations before their utilization in crop improvement programmes.

Conclusion

The present investigation revealed substantial genetic variability among greengram genotypes in their reaction to the major sucking insect pests, whitefly and thrips, under natural field conditions. PUSA M 2471 was among the most resistant genotypes, while ML 818, CGG 23-022, IPM 512-1 and VGG 21-128 were identified as promising sources of resistance to one or both sucking pests. These resistant genotypes constitute valuable genetic resources for resistance breeding programmes aimed at developing insect-resistant greengram cultivars. Their utilization could reduce dependence on chemical insecticides and contribute to sustainable integrated pest management in greengram.

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