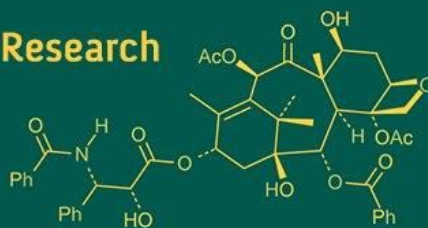


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(1): 1093-1095
www.biochemjournal.com
Received: 09-11-2025
Accepted: 11-12-2025

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Screening of sesame (*Sesamum indicum* L.) genotypes against Mirid Bug (*Nesidiocoris tenuis*) under field conditions

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i1Sm.7182>

Abstract

A study at the PC Unit's experimental farm, College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, was conducted during Kharif 2023 to evaluate fifty-eight sesame genotypes for resistance to the mirid bug, *Nesidiocoris tenuis* Reuter, under natural field conditions. The bug population was monitored weekly starting from the third week after sowing until crop maturity. Significant differences in bug populations among the genotypes were observed. The highest average bug count was on genotype AT-494 (6.7 bugs per plant), followed by RT-372, JTS-8, NIC-8202, ES-75, and IS-294 (6.3-6.5 bugs per plant per week). The lowest counts were on AT-467 (1.2 bugs per plant per week), then TKG-22 (1.3 bugs), and TKG-306 and SI-250 (1.4 bugs each). The bug population peaked during the sixth and seventh weeks after sowing, aligning with the crop's flowering stage.

Keywords: Screening of sesame genotypes, mirid bug, bug population, resistant and susceptible genotypes, *Nesidiocoris tenuis*

Introduction

Sesame (*Sesamum indicum* L.), often called the "queen of oil seeds," is among the oldest oilseed crops worldwide and is widely cultivated across India. It belongs to the Pedaliaceae family. Its native regions are believed to be East Africa and India [6, 1]. The popularity of the crop has risen because of its high-quality edible oil and its abundance of carbohydrates, protein, calcium, and phosphorus [7]. However, its productivity remains low primarily due to biotic stresses, with insect pests, which pose significant challenges. The mirid bug (*Nesidiocoris tenuis*), initially considered a minor pest, has emerged as a significant concern in sesame cultivation [5]. The nymphs and adults of *Nesidiocoris tenuis* are most active during sunny hours and primarily feed on tender plant parts, including flowers and pods, by sucking sap. This feeding behavior leads to multiple forms of damage that significantly affect plant health and productivity. As the insects pierce plant tissues with their needle-like mouthparts, they extract sap, disrupting nutrient flow, reducing photosynthetic efficiency, and impairing overall growth and development. This results in localized necrotic lesions and brown scars at feeding sites, weakening the plant and increasing its vulnerability to environmental stress.

Managing mirid bugs primarily involves chemical insecticides; however, their overuse can cause pest resistance, resurgence, and environmental issues. Host plant resistance offers a cost-effective and eco-friendly alternative for sustainable pest control. This study was conducted to evaluate various sesame genotypes for resistance or susceptibility to *N. tenuis*.

Materials and Methods

The experiment was conducted at the Experimental Farm, ICAR-Project Coordinating Unit for Sesame and Niger, at College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (Madhya Pradesh), during the 2023 Kharif season to assess 58 sesame genotypes against mirid bugs. Sesame seeds were sown in 3-meter rows, with three replicates, using a randomized block design. Row spacing was 30 cm, and plant spacing within rows was 10 cm, facilitating systematic evaluation.

Weekly inspections of each genotype were conducted from one week after germination through maturity to track mirid bug nymph and adult populations. Counts were taken from five randomly chosen plants per genotype. Data were

square-root transformed [$\sqrt{(x + 0.5)}$] prior to analysis to stabilize variances. ANOVA was used to test for differences among genotypes.

Table 1: Response of different genotypes of sesame against mirid bug (*Nesidiocoris tenuis*)

S. No.	Genotype	Average population of mirid bugs/plant/week Period of observations										
		WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	WK12	MEAN
1	AT-501	2.3 (1.7)	2.5 (1.7)	2.7 (1.8)	2.9 (1.9)	3.6 (2.0)	3.2 (1.9)	2.8 (1.8)	2.5 (1.7)	1.2 (1.3)	0.8 (1.1)	2.4 (1.7)
2	RT-399	2.4 (1.7)	2.6 (1.8)	2.8 (1.8)	3.6 (2.0)	3.4 (2.0)	3.1 (1.9)	2.7 (1.8)	2.5 (1.7)	1.4 (1.4)	0.7 (1.1)	2.5 (1.7)
3	AT-497	2.3 (1.7)	2.5 (1.7)	3.2 (1.9)	3.8 (2.1)	3.4 (2.0)	2.8 (1.8)	2.6 (1.8)	1.8 (1.5)	0.8 (1.1)	0.6 (1.1)	2.4 (1.7)
4	RT-400	2.4 (1.7)	2.8 (1.8)	3.4 (2.0)	3.6 (2.0)	3.3 (2.0)	2.9 (1.8)	2.7 (1.8)	1.7 (1.5)	1.3 (1.3)	0.9 (1.2)	2.5 (1.7)
5	AT-493	2.3 (1.7)	2.5 (1.7)	2.7 (1.8)	3.6 (2.0)	3.4 (2.0)	2.8 (1.8)	2.6 (1.8)	1.8 (1.5)	1.5 (1.4)	0.7 (1.1)	2.4 (1.7)
6	TKG-22	0.9 (1.2)	1.1 (1.3)	1.3 (1.4)	1.8 (1.5)	1.6 (1.4)	1.7 (1.5)	1.6 (1.4)	1.4 (1.4)	0.8 (1.1)	0.5 (1.0)	1.3 (1.3)
7	VS-20-054	2.3 (1.7)	2.6 (1.8)	3.1 (1.9)	3.8 (2.1)	3.6 (2.0)	2.9 (1.9)	2.7 (1.8)	1.6 (1.4)	1.2 (1.3)	0.6 (1.0)	2.4 (1.7)
8	TKG-22-55	2.7 (1.8)	2.9 (1.8)	4.2 (2.2)	5.8 (2.5)	4.6 (2.3)	4.1 (2.2)	3.8 (2.1)	1.7 (1.5)	0.7 (1.1)	0.9 (1.2)	3.2 (1.9)
9	TPTS-46	2.3 (1.7)	2.5 (1.7)	2.7 (1.8)	3.4 (2.0)	3.0 (1.9)	2.8 (1.8)	2.6 (1.8)	2.4 (1.7)	1.5 (1.4)	0.8 (1.1)	2.4 (1.7)
10	TKG-22-01	2.4 (1.7)	2.6 (1.8)	3.2 (1.9)	3.8 (2.1)	3.5 (2.0)	2.9 (1.8)	2.7 (1.8)	1.8 (1.5)	1.2 (1.3)	0.7 (1.1)	2.5 (1.7)
11	TPTS-29	2.3 (1.7)	2.5 (1.7)	2.7 (1.8)	3.4 (2.0)	2.9 (1.9)	2.8 (1.8)	2.6 (1.8)	2.4 (1.7)	1.6 (1.4)	0.7 (1.1)	2.4 (1.7)
12	TKG-22-04	2.3 (1.7)	2.6 (1.8)	2.7 (1.8)	3.8 (2.1)	3.3 (1.9)	3.2 (1.9)	2.7 (1.8)	1.8 (1.5)	1.4 (1.4)	0.8 (1.1)	2.5 (1.7)
13	TKG 306	1.0 (1.2)	1.2 (1.3)	1.4 (1.4)	1.6 (1.4)	1.7 (1.5)	1.8 (1.5)	1.7 (1.5)	1.5 (1.4)	1.2 (1.3)	0.7 (1.1)	1.4 (1.4)
14	OSM-19-06	2.3 (1.7)	2.5 (1.7)	2.7 (1.8)	3.4 (2.0)	2.9 (1.9)	2.8 (1.8)	2.6 (1.8)	2.4 (1.7)	1.6 (1.5)	0.7 (1.1)	2.4 (1.7)
15	RT-372	7.2 (2.8)	8.5 (3.0)	9.4 (3.1)	9.7 (3.2)	8.5 (3.0)	8.4 (3.0)	7.8 (2.9)	3.2 (1.9)	1.8 (1.5)	0.9 (1.2)	6.5 (2.6)
16	VS-21-042	4.2 (2.2)	5.8 (2.5)	6.3 (2.6)	7.2 (2.8)	5.5 (2.4)	4.9 (2.3)	4.7 (2.3)	2.4 (1.7)	1.4 (1.4)	0.8 (1.2)	4.3 (2.1)
17	RT-401	4.8 (2.3)	5.6 (2.5)	7.4 (2.8)	7.6 (2.8)	7.1 (2.8)	6.1 (2.6)	5.7 (2.5)	2.8 (1.8)	1.6 (1.4)	0.9 (1.2)	4.9 (2.3)
18	BRT-04	4.3 (2.2)	4.6 (2.3)	5.8 (2.5)	7.1 (2.8)	6.4 (2.6)	5.8 (2.5)	4.8 (2.3)	2.7 (1.8)	1.4 (1.4)	0.7 (1.1)	4.4 (2.1)
19	TKG 21	4.2 (2.2)	5.6 (2.5)	5.8 (2.5)	6.7 (2.7)	5.3 (2.4)	4.9 (2.3)	4.7 (2.3)	3.4 (2.0)	1.8 (1.5)	0.7 (1.1)	4.3 (2.1)
20	RT-392	4.3 (2.2)	4.6 (2.3)	6.1 (2.6)	6.4 (2.6)	6.2 (2.6)	5.9 (2.5)	4.8 (2.3)	3.7 (2.1)	1.9 (1.6)	0.7 (1.1)	4.5 (2.2)
21	AT-457	4.2 (2.2)	5.4 (2.4)	6.2 (2.6)	6.8 (2.7)	5.8 (2.5)	5.3 (2.4)	4.7 (2.3)	3.5 (2.0)	1.8 (1.5)	0.7 (1.1)	4.5 (2.2)
22	RT-395	5.6 (2.5)	5.7 (2.5)	6.3 (2.6)	6.9 (2.7)	6.7 (2.7)	6.5 (2.6)	5.8 (2.5)	3.8 (2.1)	1.9 (1.5)	0.9 (1.2)	5.0 (2.3)
23	AT-494	7.7 (2.9)	8.5 (3.0)	9.2 (3.1)	9.4 (3.1)	9.1 (3.1)	8.2 (2.9)	7.6 (2.8)	4.3 (2.2)	1.6 (1.5)	0.9 (1.2)	6.7 (2.6)
24	RT-396	4.3 (2.2)	4.5 (2.2)	5.8 (2.5)	6.8 (2.7)	6.4 (2.6)	5.4 (2.4)	4.8 (2.3)	2.8 (1.8)	1.7 (1.5)	0.6 (1.0)	4.3 (2.1)
25	PCU-21-1	4.2 (2.2)	4.5 (2.2)	6.2 (2.6)	6.6 (2.7)	5.8 (2.5)	4.9 (2.3)	4.7 (2.3)	3.8 (2.1)	1.8 (1.5)	0.5 (1.0)	4.3 (2.1)
26	AT-488	4.3 (2.2)	4.5 (2.2)	5.8 (2.5)	6.4 (2.6)	6.2 (2.6)	5.4 (2.4)	4.8 (2.3)	3.8 (2.1)	1.4 (1.4)	0.7 (1.1)	4.3 (2.1)
27	VS-20-001	4.2 (2.2)	4.4 (2.2)	6.2 (2.6)	6.8 (2.7)	6.1 (2.6)	4.9 (2.3)	4.7 (2.3)	3.8 (2.1)	1.6 (1.5)	0.8 (1.1)	4.3 (2.1)
28	S-0232-30	4.3 (2.2)	4.5 (2.2)	6.4 (2.6)	7.2 (2.8)	6.2 (2.6)	5.0 (2.3)	4.8 (2.3)	3.7 (2.0)	1.8 (1.5)	0.7 (1.1)	4.5 (2.2)
29	AT-467	0.8 (1.1)	1.0 (1.2)	1.2 (1.3)	1.4 (1.4)	1.5 (1.4)	1.6 (1.4)	1.5 (1.4)	1.3 (1.3)	1.0 (1.2)	0.6 (1.0)	1.2 (1.3)
30	MT-2019-7	4.4 (2.2)	4.6 (2.3)	5.8 (2.5)	6.3 (2.6)	5.8 (2.5)	5.2 (2.4)	4.9 (2.3)	3.8 (2.1)	1.4 (1.4)	0.8 (1.2)	4.3 (2.1)
31	GT-10	4.3 (2.2)	4.5 (2.2)	6.1 (2.6)	6.4 (2.6)	5.6 (2.5)	5.3 (2.4)	4.8 (2.3)	4.6 (2.3)	1.6 (1.4)	0.7 (1.1)	4.4 (2.2)
32	TKG-2022-3	4.4 (2.2)	4.6 (2.3)	6.2 (2.6)	6.7 (2.7)	6.8 (2.7)	5.1 (2.4)	4.9 (2.3)	3.9 (2.1)	1.2 (1.3)	0.7 (1.1)	4.5 (2.2)
33	RT-397	4.3 (2.2)	4.5 (2.2)	6.1 (2.6)	6.8 (2.7)	6.5 (2.6)	5.3 (2.4)	4.8 (2.3)	3.2 (1.9)	1.4 (1.4)	0.6 (1.0)	4.3 (2.1)
34	OSM-1907	4.2 (2.2)	4.4 (2.2)	6.3 (2.6)	7.2 (2.8)	6.4 (2.6)	5.5 (2.5)	4.7 (2.3)	3.3 (1.9)	1.6 (1.5)	0.5 (1.0)	4.4 (2.2)
35	GKVKs-1	4.4 (2.2)	4.6 (2.3)	6.3 (2.6)	6.4 (2.6)	6.2 (2.6)	5.8 (2.5)	4.9 (2.3)	3.7 (2.0)	1.5 (1.4)	0.6 (1.0)	4.4 (2.2)
36	PCU-21-2	4.3 (2.2)	4.5 (2.2)	6.4 (2.6)	6.8 (2.7)	5.6 (2.5)	5.2 (2.4)	4.8 (2.3)	3.8 (2.1)	1.7 (1.5)	0.7 (1.1)	4.4 (2.2)
37	SVT-464	2.7 (1.8)	2.9 (1.9)	3.3 (2.0)	4.5 (2.2)	4.3 (2.2)	3.9 (2.1)	3.8 (2.1)	3.4 (2.0)	1.8 (1.5)	0.8 (1.2)	3.2 (1.9)
38	RT-373 (NC)	4.4 (2.2)	4.6 (2.3)	5.8 (2.5)	6.9 (2.7)	5.8 (2.5)	5.4 (2.4)	4.9 (2.3)	4.7 (2.3)	1.3 (1.3)	0.7 (1.1)	4.4 (2.2)
39	OSM-79-19-3	6.2 (2.6)	7.4 (2.8)	8.4 (3.0)	9.4 (3.1)	8.8 (3.1)	8.2 (3.0)	5.8 (2.5)	3.7 (2.0)	1.8 (1.5)	0.8 (1.1)	6.1 (2.5)
40	PCU-22-1	6.3 (2.6)	7.8 (2.9)	9.1 (3.1)	9.2 (3.1)	8.4 (3.0)	7.2 (2.8)	7.4 (2.8)	3.6 (2.0)	1.6 (1.4)	0.7 (1.1)	6.1 (2.5)
41	SVT-460	2.8 (1.8)	3.0 (1.9)	3.6 (2.0)	4.7 (2.3)	4.1 (2.1)	4.2 (2.2)	3.9 (2.1)	3.5 (2.0)	1.7 (1.5)	0.8 (1.2)	3.2 (1.9)
42	JTS-8	6.4 (2.6)	7.8 (2.9)	8.6 (3.0)	8.8 (3.0)	8.6 (3.0)	8.4 (3.0)	7.8 (2.9)	4.2 (2.2)	1.8 (1.5)	0.7 (1.1)	6.3 (2.5)
43	IS-255-2-84-A	6.5 (2.6)	8.1 (2.9)	8.8 (3.0)	9.8 (3.2)	9.2 (3.1)	8.8 (3.0)	6.8 (2.7)	3.8 (2.1)	1.6 (1.4)	0.8 (1.1)	6.4 (2.5)
44	NIC-8202	6.8 (2.7)	8.4 (3.0)	8.8 (3.1)	9.4 (3.1)	9.2 (3.1)	8.1 (2.9)	6.5 (2.6)	3.4 (2.0)	1.7 (1.5)	0.7 (1.1)	6.3 (2.5)
45	ES-75	6.7 (2.7)	7.8 (2.9)	8.8 (3.1)	9.6 (3.2)	8.6 (3.0)	8.4 (3.0)	7.8 (2.9)	3.2 (1.9)	1.9 (1.5)	0.8 (1.1)	6.4 (2.5)
46	IS-294	6.5 (2.6)	8.4 (3.0)	9.2 (3.1)	9.8 (3.2)	9.3 (3.1)	8.8 (3.1)	6.3 (2.6)	3.2 (1.9)	1.7 (1.5)	0.7 (1.1)	6.4 (2.5)
47	KMR-74	6.7 (2.7)	7.8 (2.9)	8.4 (3.0)	9.7 (3.2)	8.6 (3.0)	7.6 (2.8)	7.4 (2.8)	4.8 (2.3)	1.2 (1.3)	0.8 (1.1)	6.3 (2.5)
48	ES-120-1-84-A	6.6 (2.7)	8.4 (3.0)	8.6 (3.0)	8.9 (3.1)	8.8 (3.0)	8.2 (2.9)	7.8 (2.9)	3.8 (2.1)	1.6 (1.5)	0.8 (1.1)	6.3 (2.5)
49	KMR-83-A	6.7 (2.7)	8.6 (3.0)	9.2 (3.1)	9.5 (3.2)	9.2 (3.1)	7.6 (2.8)	7.4 (2.8)	4.2 (2.2)	1.8 (1.5)	0.8 (1.1)	6.5 (2.6)
50	NIC-8473	6.6 (2.7)	7.8 (2.9)	8.6 (3.0)	9.2 (3.1)	8.6 (3.0)	8.2 (3.0)	7.8 (2.9)	4.1 (2.1)	1.7 (1.5)	0.7 (1.1)	6.3 (2.5)
51	NIC-8037	6.5 (2.6)	8.4 (3.0)	9.2 (3.1)	9.6 (3.2)	8.2 (3.0)	8.3 (3.0)	7.2 (2.8)	3.6 (2.0)	1.4 (1.4)	0.8 (1.1)	6.3 (2.5)
52	VRI-1	6.8 (2.7)	7.8 (2.9)	8.6 (3.0)	9.2 (3.1)	8.3 (3.0)	7.7 (2.9)	7.5 (2.8)	4.8 (2.3)	1.8 (1.5)	0.8 (1.1)	6.3 (2.5)
53	TKG 308	2.8 (1.8)	3.0 (1.9)	3.4 (2.0)	5.1 (2.4)	4.1 (2.2)	4.2 (2.2)	3.9 (2.1)	3.5 (2.0)	1.5 (1.4)	0.7 (1.1)	3.2 (1.9)
54	SI-3100-36	2.9 (1.8)	3.1 (1.9)	4.3 (2.2)	4.8 (2.3)	4.2 (2.2)	4.3 (2.2)	4.0 (2.1)	3.6 (2.0)	1.2 (1.3)	0.7 (1.1)	3.3 (1.9)
55	Prachi	5.2 (2.4)	6.4 (2.6)	7.6 (2.8)	9.4 (3.1)	8.4 (3.0)	7.1 (2.8)	6.7 (2.7)	3.2 (1.9)	1.4 (1.4)	0.9 (1.2)	5.6 (2.4)
56	TC-25	4.8 (2.3)	5.3 (2.4)	7.6 (2.8)	8.2 (2.9)	7.4 (2.8)	7.2 (2.8)	6.3 (2.6)	4.4 (2.2)	1.8 (1.5)	0.8 (1.1)	5.4 (2.4)
57	N-62-32-33	6.5 (2.6)	8.8 (3.0)	9.2 (3.1)	9.5 (3.2)	8.6 (3.0)	8.4 (3.0)	7.2 (2.8)	3.2 (1.9)	1.4 (1.4)	0.7 (1.1)	6.3 (2.5)
58	SI-250	1.1 (1.3)	1.3 (1.3)	1.5 (1.4)	1.7 (1.5)	1.8 (1.5)	1.9 (1.5)	1.8 (1.5)	1.5 (1.4)	1.1 (1.3)	0.6 (1.1)	1.4 (1.4)
	Sem ±	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	
	CD at 5%	0.04	0.05	0.04	0.04	0.04	0.04	0.06	0.06	0.09	0.09	

Results and Discussion

Fifty-eight sesame genotypes were tested for resistance to the mirid bug, *Nesidiocoris tenuis* Reuter, under natural field conditions by recording the number of bugs per plant. Significant differences in weekly bug populations among genotypes indicated high variability in susceptibility. The mirid bug first appeared in the third week after sowing (WK3), with populations being negligible, from zero to a few bugs per plant. As the crop grew, mirid bug numbers gradually increased, peaking during the sixth and seventh weeks after sowing. The highest population was aligned with the flowering stage, suggesting that this phase favors mirid bug reproduction. During peak infestation (WK6-WK7), susceptible genotypes carried more than nine bugs per plant, while resistant ones maintained significantly lower populations. Afterward, bug numbers steadily declined from the eighth week, reaching their lowest levels in weeks eleven and twelve. Similar population patterns, with peak mirid bug presence during sesame flowering, were observed by [8].

The overall average mirid bug population varied significantly across genotypes, ranging from 1.2 to 6.7 bugs per plant per week. The genotype AT-467 had the lowest average population at 1.2 bugs per plant per week, followed by TKG-22 at 1.3, and both TKG-306 and SI-250 at 1.4. These genotypes maintained lower bug populations throughout the cropping cycle, even during peak infestation periods, suggesting they possess a relatively higher resistance. Conversely, the highest average bug population was observed in AT-494, with 6.7 bugs per plant per week, followed by RT-372, JTS-8, NIC-8202, ES-75, and IS-294, with populations ranging from 6.3 to 6.5 bugs per plant per week. These genotypes suffered severe infestations, especially during flowering, classifying them as highly susceptible [2]. Also, they reported similar variability in mirid bug infestation among sesame genotypes under field conditions. Genotypes such as TKG-22-04, OSM-19-06, and AT-501, which recorded lower bug populations (2.4-2.5 bugs per plant per week), were identified as moderately resistant, supporting previous findings by [3] that sesame genotypes vary significantly in their response to sucking pests.

The current findings are supported by resistance screening reported in [4], which observed significant variation in *N. tenuis* populations across elite sesame lines. Some genotypes consistently had lower bug densities than the control variety. Both studies also identify the flowering stage as the period of highest mirid bug infestation, marking it as the most vulnerable growth phase. Genotypes such as AT-467, TKG-22, TKG-306, and SI-250 maintain lower mirid bug populations even at peak infestation, suggesting possible resistance mechanisms such as antixenosis or antibiosis. These genotypes are valuable genetic resources for sesame breeding programs focused on developing mirid bug-resistant cultivars, thereby reducing dependence on chemical insecticides and promoting sustainable production.

Conclusion

Screening of fifty-eight sesame genotypes for their resistance to the mirid bug, *Nesidiocoris tenuis* Reuter, revealed considerable differences in pest levels among them. The incidence of mirid bugs began in the third week after planting and increased with the crop's development, peaking during the sixth and seventh weeks at the flowering stage,

then gradually decreasing thereafter. The average bug population ranged from 1.2 to 6.7 bugs per plant per week. The lowest mean population was found on AT-467 (1.2 mirid bugs/plant), followed by TKG-22 (1.3 mirid bugs/plant), and TKG-306 and SI-250 (1.4 mirid bugs/plant). The highest was on AT-494 (6.7 mirid bugs/plant), with other high counts on RT-372, JTS-8, NIC-8202, ES-75, and IS-294 (6.3-6.5 mirid bugs/plant). The genotypes AT-467, TKG-22, TKG-306, and SI-250 are promising sources of resistance and may serve as donor parents in breeding programs to develop mirid bug-resistant sesame varieties.

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