



EVALUATION OF SESAME GENOTYPES FOR FIELD RESISTANCE AGAINST STEM AND ROOT ROT CAUSED BY *Macrophomina phaseolina* (Tassi) Goid.

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ABSTRACT

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Stem and root rot caused by *Macrophomina phaseolina* is a devastating disease in sesame. Use of host plant resistance is the cheapest and effective disease management strategy. In the present study, 58 sesame genotypes were evaluated for their resistance against stem and root rot disease in 2025 in a sick field under artificial conditions. The results showed that there was significant difference in Percent Disease incidence (PDI %) of the genotypes tested. The mean disease incidence of genotypes ranged from 5.7 to 59.8 %. Eight genotypes VSP-16 (5.7 %), TPTS-40 (6.6 %), YLM-161 (8.6 %), Nirmala (8.9 %) and VS-16-009 (9.5 %), Madhavi (9.6 %), GT-10 (9.6) and VS-20-008 (10 %) were found to be resistant (R). These genotypes might be helpful in improving the breeding program of sesame crop. These sesame genotypes can be used for improvement of genetic resistance in already developed lines/varieties or development of new resistant varieties and cultivars through hybridization program.

KEYWORDS: Genotypes, percent disease incidence, resistance.

INTRODUCTION

The queen of oil seed, sesame is known for its high nutritional and therapeutic value (Biswas *et al.*, 2018). It has been consumed as traditional healthy food for its anti-inflammatory and antioxidative properties (Yadav *et al.*, 2022). The crop's susceptibility to disease is the main barrier to the sesame production causing 7 million tons of yield loss for every year (Ara *et al.*, 2017) and it creates significant impact on growers. Stem and root rot caused by *M. phaseolina* is a devastating disease in sesame and causes 5-100 per cent yield loss (Vyas, 1981). Murugesan (1978) estimated that increase in 1 per cent of disease infection may lead to yield loss of 1.8 kg ha⁻¹.

As stem and root rot is a seed, stubble and seed borne disease, it is difficult to control by conventional management practices. Using chemicals not only increase input cost but also harmful to environment. Various management studies have been carried out by several researchers *viz.*, using bio-agent (Abdul sattar *et al.*, 2006), plant extracts (Ahmed *et al.*, 2010) and cultivating resistant varieties (Thiyagu *et al.*, 2007). Among these, host plant resistance is one of the important effective strategies for the management of disease (Salari *et al.*, 2012). Different genotypes of sesame will differ in their genetic potential of disease resistance. The screening of genotypes for resistance against stem and root rot will help to identify genotypes for resistance.

Hence, the present research was planned out to evaluate the resistance of sesame genotypes against stem and root rot disease.

MATERIAL AND METHODS

Fifty eight sesame genotypes obtained from AICRP on sesame, Tirupati were evaluated for their resistance against stem and root rot disease under sick plot conditions during the year 2025. Each genotype was sown in a row of 3 m length with inter row spacing of 30 cm. A row of susceptible check was sown after every four genotypes. Two replications of each genotype were maintained. Two susceptible checks, YLM-66 and YLM-146 were used as infector rows. Disease incidence was recorded at 70 days and Percent Disease Incidence (PDI) was calculated.

$$PDI = \frac{\text{No of infected plants}}{\text{Total number of plants}} \times 100$$

Based on PDI, the genotypes were categorized as resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible (Table 1).

RESULTS AND DISCUSSION

Results from the field experiment on screening of sesame genotypes against stem and root rot revealed that mean disease incidence of genotypes ranged from

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Table 1. Disease scale used for evaluation of disease resistance in sesame genotypes (Dinakaran and Naina Mohamed, 2001)

Scale	PDI	Reaction
1	1-10	Resistant
3	11-20	Moderately resistant
5	21-30	Moderately susceptible
7	31-50	Susceptible
9	51-100	Highly susceptible

5.7 to 59.8 per cent (Table 2). The least disease incidence was observed in genotype VSP-16 with 5.7 per cent, followed by genotypes TPTS-40 (6.6 %), YLM-161 (8.6 %), Nirmala (8.9 %) and VS-16-009 (9.5 %). The highest disease incidence was observed in genotype RMT-130 with 59.8 % followed by RMT-175 (58.5), Gowri (51.3 %), TPTS-01 (50.4) and SKL-2 (44.2 %). Remaining genotypes (48) showed disease incidence ranging from 9.6 to 43.4 per cent.

Based on the per cent disease incidence, out of 58 genotypes screened, 8 genotypes (YLM-161, TPTS-40, Madhavi, VS-16-009, VS-20-008, VSP-16, Nirmala, GT-10) were found to be resistant (R) with >10 per cent disease incidence, 17 genotypes (YLM-11, YLM-17, TPTS-29, Hima, VS-19-045, RMT-204, VSP-5, IC-204159, IC-326984, IIOS-3101, PCU-39, AT-324, PT-10, SVT-451, TKG-22, VZM-2, CUMS-19-4) were found moderately resistant with 11-20 per cent disease incidence, 16 genotypes (YLM-171, TPTS-06, TPTS-21, VS-18-005, VS-20-001, RMT-176, VSP-6, JCS-1020, JCS-3593, IC-204830, IC-326984, RT-54, RT-204, SKL-3, PCU-35, MT-2019-11) were found moderately susceptible with 21-30 percent disease incidence, 12 genotypes (YLM-165, TPTS-18, TPTS-24, TPTS-45, TPTS-46, Swetha, Chandna, JCS-706, JCS-2454, RT-68, SKL-2, DS-56) showed susceptible reaction with 31-50 percent disease incidence and 5 genotypes (TPTS-01, Gowri, RMT-130, RMT-175, RMT-253) were found to be highly susceptible with disease incidence of more than 51 per cent (Table 3).

Similarly, the disease reaction of sesame genotypes to stem and root rot disease was studied by Thiyagu *et al.* (2007). In sick plot method, fifteen parents and their F1's were screened against the disease. Three genotypes

(ORM 7, ORM 14 and ORM 17) were found to be resistant with PDI of 7.69, 8.33 and 6.67 respectively in sick plot condition but the F1's screened against the disease showed that all crosses were susceptible to highly susceptible to root rot disease. Ramesh Nath Gupta *et al.* (2020) evaluated three hundred fifty germplasm lines for their relative resistance under natural sick plot conditions and majority of them showed moderately susceptible to susceptible reaction against stem and root rot. None of the germplasms showed resistant reaction. Similar studies by Deepthi *et al.* (2014) revealed that none of the cultivars showed complete resistance against *M. phaseolina*. Only one entry PKDS-91 was found as moderately resistant to charcoal rot. Ezhilarasi and Meena (2019) found most of the sesame lines were moderately susceptible to stem and root rot in their study.

Even though many lines have been identified as moderately resistant against the stem and root rot disease, complete resistant genotype are rarely available against this wide host range pathogen. In the study, eight genotypes showed resistant disease reaction against the stem and root rot. But further evaluation of these genotypes in different seasons under variable conditions will reveal the resistant potential. Hence resistant genotypes are recommended for further evaluation and potential cultivation. These lines might be helpful in improving the breeding program of sesame crop. These sesame lines can be used for improvement of genetic resistance in already developed lines/varieties or development of new resistant varieties and cultivars through hybridization program.

The identification of resistant genotypes in the study marks a significant step toward sustainable management of stem and root rot in sesame. Continued

Table 2. Screening of sesame genotypes against stem and root rot disease in sick plot

S. No	Sesame genotypes	Initial plant stand*	Final plant stand*	Percent disease incidence (%) *	Disease reaction
1.	YLM-11	45	41	12.7 (27.1)	MR
2.	YLM-17	36	36	20.0 (31.0)	MR
3.	YLM-161	41	40	8.6 (24.3)	R
4.	YLM-165	31	31	31.1 (35.5)	S
5.	YLM-171	45	42	29.5 (34.9)	MS
6.	TPTS-01	30	27	50.4 (42.2)	HS
7.	TPTS-06	45	38	22.9 (32.2)	MS
8.	TPTS-18	45	43	34.1 (36.7)	S
9.	TPTS-21	50	50	26.9 (34.0)	MS
10.	TPTS-24	46	45	41.5 (39.3)	S
11.	TPTS-29	30	30	11.7 (26.5)	MR
12.	TPTS-40	30	29	6.6 (22.4)	R
13.	TPTS-45	40	40	40.2 (38.8)	S
14.	TPTS-46	28	27	40.1 (38.8)	S
15.	Swetha	31	30	37.0 (37.7)	S
16.	Madhavi	30	24	9.6 (24.9)	R
17.	Gowri	35	31	51.3 (42.5)	HS
18.	Chandna	33	27	43.4 (39.9)	S
19.	Nirmala	32	31	8.9 (24.6)	R
20.	Hima	27	17	19.1 (30.5)	MR
21.	VS-16-009	24	21	9.5 (25.1)	R
22.	VS-18-005	33	30	22.5 (32.1)	MS
23.	VS-19-045	17	10	20.0 (31.0)	MR
24.	VS-20-001	34	29	20.6 (31.3)	MS
25.	VS-20-008	45	45	10.0 (25.5)	R
26.	RMT-130	32	27	59.8 (45.4)	HS
27.	RMT-175	26	23	58.5 (44.9)	HS
28.	RMT-176	17	15	30.0 (35.2)	MS
29.	RMT-204	33	31	11.3 (26.2)	MR
30.	RMT-253	35	33	39.1 (38.4)	S
31.	VSP-5	36	35	15.0 (28.2)	MR

Cont...

Table 2. Screening of sesame genotypes against stem and root rot disease in sick plot

S. No	Sesame genotypes	Initial plant stand*	Final plant stand*	Percent disease incidence (%) *	Disease reaction
32.	VSP-6	30	23	27.8 (34.3)	MS
33.	VSP-16	37	37	5.7 (21.1)	R
34.	JCS-706	24	23	42.7 (39.7)	S
35.	JCS-1020	20	18	27.0 (34.0)	MS
36.	JCS-2454	31	31	33.5 (36.4)	S
37.	JCS-3593	35	35	24.9 (32.9)	MS
38.	IC-204159	41	41	19.9 (30.6)	MR
39.	IC-204830	45	43	27.9 (34.4)	MS
40.	IC-326984	30	28	16.2 (28.7)	MR
41.	IC-326984	49	47	27.4 (33.3)	MS
42.	IIOS-3101	38	38	13.4 (27.4)	MR
43.	RT-54	34	33	29.5 (34.3)	MS
44.	RT-68	20	18	31.0 (35.1)	S
45.	RT-204	28	21	26.4 (32.8)	MS
46.	SKL-2	28	26	44.2 (40.0)	S
47.	SKL-3	32	31	25.4 (33.2)	MS
48.	PCU-35	25	24	25.5 (33.3)	MS
49.	PCU-39	29	23	15.7 (28.8)	MR
50.	GT-10	53	47	9.6 (24.9)	R
51.	MT-2019-11	28	28	21.0 (31.4)	MS
52.	AT-324	39	37	18.6 (30.3)	MR
53.	PT-10	23	22	16.6 (29.3)	MR
54.	SVT-451	29	29	19.5 (30.4)	MR
55.	TKG-22	27	24	14.2 (27.8)	MR
56.	VZM-2	47	41	15.9 (28.9)	MR
57.	CUMS-19-4	32	27	20.0 (31.1)	MR
58.	DS-56	34	26	41.3 (39.2)	S
59.	YLM-66 (Check)	35	47	44.8 (40.4)	S
60.	YLM-146 (Check)	49	44	40.3 (38.9)	S
	SE (m)±		2.43		
	C.D		6.90		
	C.V		10.48		

Note: R= Resistant, MR= Moderately Resistant, MS= Moderately susceptible, S= Susceptible, HS=Highly Susceptible;

* Mean of two replications. The values in parenthesis are arcsine transformed values

Table 2. Categorization of sesame genotypes based on their reaction to stem and root rot disease

S. No.	Disease score	Percent disease incidence (%)	Reaction	No. of genotypes	Genotypes
1.	1	1-10	Resistant	8	YLM-161, TPTS-40, Madhavi, VS-16-009, VS-20-008, VSP-16, Nirmala, GT-10
2.	3	11-20	Moderately resistant	17	YLM-11, YLM-17, TPTS-29, Hima, VS-19-045, RMT-204, VSP-5, IC-204159, IC-326984, IIOS-3101, PCU-39, AT-324, PT-10, SVT-451, TKG-22, VZM-2, CUMS-19-4
3.	5	21-30	Moderately susceptible	16	YLM-171, TPTS-06, TPTS-21, VS-18-005, VS-20-001, RMT-176, VSP-6, JCS-1020, JCS-3593, IC-204830, IC-326984, RT-54, RT-204, SKL-3, PCU-35, MT-2019-11
4.	7	31-50	Susceptible	12	YLM-165, TPTS-18, TPTS-24, TPTS-45, TPTS-46, Swetha, Chandna, JCS-706, JCS-2454, RT-68, SKL-2, DS-56
5.	9	51-100	Highly susceptible	5	TPTS-01, Gowri, RMT-130, RMT-175, RMT-253

efforts in screening, validation and breeding will contribute to securing sesame production and improving farmer livelihoods. The use of resistant varieties not only provides an eco-friendly and cost-effective management strategy but also reduces the dependency on chemical control measures.

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