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Pathogenicity of *Rhizoctonia bataticola* isolates Collected from Southern India and Screening of Groundnut genotypes for Resistance to dry Root Rot in Field conditions

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ABSTRACT: Groundnut is an economic important edible oilseed crop and suffers from seed, soil, and foliar diseases. *Rhizoctonia bataticola* is a soil-borne fungus causing dry root rot disease in groundnut and it survives in the soil for many years that resulting in disease mitigation difficulty. Managing dry root rot in groundnut through an integrated approach has been suggested, and the use of resistant varieties is one of the economical methods. The present study was conducted to know the virulent isolate of *R. bataticola* through pathogenicity test and screening of groundnut genotypes against dry root rot at Agricultural Research Station, Kadiri under sick soil conditions. The results revealed that the highest disease incidence (100%) was observed in isolate GRb 52 at 60 days after showing. Out of 61 genotypes, eight genotypes (ICGV 06146, ICGV 06424, ICGV 15070, ICGV 15080, ICGV 86325, K - 2307, KDG 123 and KDG 128) were showed resistant reaction (1-10%), 35 genotypes were found moderately resistant with 11-25% disease incidence, and 315 genotypes were found susceptible reaction (25-50%) and three genotypes were showed highly susceptible reaction with >50% disease incidence. In the current study, the virulent isolate used for mass multiplication of pathogen and the resistant genotypes would be useful in groundnut disease resistance breeding programs.

Keywords: Groundnut, *Rhizoctonia bataticola*, Pathogenicity, Screening, Genotypes, Disease incidence.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.), essential food and important oilseed crop is mostly cultivated by small and marginal farmers under low-input conditions in diverse agro-climatic environments of Asia and Africa. Globally, groundnut is grown in a 29.59 m ha area with average productivity of 1647 kg ha^{-1}, amounting to a total production of 48.75 MT. India is the second-largest producer of groundnut with 6.69 million tonnes, only next to China (17.33 million tonnes) in the world (FAOSTAT, 2020). In Andhra Pradesh, groundnut is one of the major oilseed crops grown in an area of 6.61 lakh ha with a production of 8.5 lakh tonnes and productivity of 1285 kg ha^{-1} (Indiastat, 2020).

The diseases caused by fungi, bacteria, viruses, and nematodes are a major threat to groundnut production in many parts of the world. Among these, dry root rot of groundnut caused by *Rhizoctonia bataticola* is an important disease-causing considerable economic loss to the crop grown under rainfed and irrigated conditions (Iwuala *et al*., 2020). The pathogen overwinters in soil or crop residues as microsclerotia for up to 3 years and act as the source of primary inoculum and disseminated through plant debris, soil, and infected pods (Acharya *et al*., 2021). The pathogen causes severe damage during any stage of crop growth and the incidence of dry root rot is increasing year by year due to climate change (Gururaj *et al*., 2016). The optimum temperature for seedling infection is 29 to 35°C and for pods, invasion is between 26 and 32°C (Sharma *et al*., 2016). Management of *R. bataticola* through soil application of fungicides is difficult because of its broad host range. Once established in the soil, it is difficult to eliminate the pathogen. Management through chemical methods leads to ill effects like residual toxicity, environmental pollution, and fungicide resistance. A single method of management may not be possible to control this disease effectively (Pandey *et al*., 2021).

Growing resistant cultivars one of the options against dry root rot disease is a cost-effective, sustainable strategy that fits into integrated disease management. Kumar, (2018) reported that none of the groundnut

genotypes showed a resistant reaction against dry root rot disease. Few reports like Moradia (2012); Rani (2014) observed the resistant reaction of groundnut genotypes against dry root rot disease. The existing resistant genotypes are still not sufficient to use against dry root rot due to the high pathogenic variability of *R. bataticola*. Hence, new resistant genotypes are a prerequisite for managing dry root rot disease, as the virulence of pathogens might be altered due to climate change (Kumari and Ghatak, 2018).

MATERIALS AND METHODS

Study site: The experiments were performed at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru (17°30′42.0"N 78°16′27.4″E), Telangana, India, and field screening of groundnut genotypes were performed at Agricultural Research Station, Kadiri (14°06′35.1″N 78°08′52.7″E), Andhra Pradesh.

Isolation and identification of dry root rot pathogen: For isolation of the dry root rot pathogen, groundnut plants showing the typical symptoms were collected from surveyed areas of Southern India (Table 1) , packed in labelled paper bags, and brought to the laboratory.

The dry root rot pathogen *Rhizoctonia bataticola* was isolated from the infected root region of groundnut plants by tissue segment method using Potato Dextrose Agar (PDA) medium (Rangaswami, 1972). The infected root portion was excised with a sterilized blade into tiny bits of one cm and surface sterilized by dipping in 0.1% $HgCl_2$ for 30 seconds followed by three washings in sterile distilled water before plating on PDA. The Petri dishes were incubated at 28±2°C for periodical observations.

Mass multiplication of *R. bataticola* isolates: The 60 *R. bataticola* isolates were individually multiplied in sorghum grains. The sorghum grains are soaked overnight and shade dried to remove excess moisture, filled the grains in 500 ml conical flasks, and sterilized twice in an autoclave at 121°C for 15 min at 15 lb psi. The actively growing mycelial discs of the *R. bataticola* isolates were inoculated into each flask separately under a laminar air chamber. The flasks were incubated at room temperature (28±2°C) for 15 days. The obtained inoculum was used for the pathogenicity test.

Pathogenicity test: Pathogenicity test for *R. bataticola* isolates was carried out using sick soil inoculation technique in the earthen pot under controlled environmental conditions using cultivar JL-24 with three replications for each isolate in a completely randomized block design. Sterilized soil filled in 6 inches diameter earthen pots (2.5 kg/ pot) and inoculum was thoroughly mixed in the upper 4-5 cm layer of soil with each isolate of *R. bataticola* in 1:10 proportions (inoculum: soil) and allowed to stabilize for ten days. After the colonization of soil, seeds (variety: JL-24) were sown in these pots. A check was also maintained without inoculum. Pots are placed in a glasshouse at 28 ± 2°C with regular, judicious, and uniform watering. Initial seedling emergence was recorded, dry root rot incidence was recorded at 75 days after sowing, and the per cent disease incidence was calculated. The pathogen was re-isolated from the infected plants showing rotting symptoms from artificially inoculated pots.

Screening of groundnut genotypes for their reaction to dry root rot disease: Screening of sixty-one groundnut genotypes was carried out at Agricultural Research Station, Kadiri under sick plot conditions against dry root rot disease (*R. bataticola*) during the 2019-2021 *rabi* season with a row length of 5 m row length in a randomized block design (RBD) with two replications with a spacing of 30 × 10 cm. The virulent *R. bataticola* isolate was multiplied on sorghum grains and applied to the field at 30 days before sowing to increase the disease incidence. Observation on disease incidence was recorded at harvest. The genotypes are categorized based on per cent disease incidence according to Moradia (2012) (Table 2). The disease incidence of root rot will be recorded for each variety by the following formula:

$$\text{Percent disease incidence} = \frac{\text{No. of infected plants}}{\text{Total no. of plants}} \times 100$$

RESULTS AND DISCUSSION

Isolation and identification of dry root rot pathogen: The groundnut dry root rot infected plants in the field were identified based on typical symptoms like withering and drying plants. The infected plants could be easily pulled out from soil due to lack of lateral and finer roots, showed blackening of the taproot, shredding of bark, and coming out in the form of flakes, and the presence of microsclerotia. When split open, the root portion has shown vertical blackish discolouration (Fig. 1).

The pathogen was isolated from diseased plants on PDA plates, and after 2-3 days of incubation, grey to black culture with aerial mycelium was observed, and isolates were purified by hyphal tip technique. Microscopic observation was also done for confirmation of the isolates as *R. bataticola* by using Olympus BX 53 microscope equipped with a digital camera DP 72 (Olympus) observed hyphal characters like hyphal branching at the right angle, formation of constriction near the point of branching, presence of microsclerotia for all the isolates (Fig. 2). The isolates were designated as GRb01 to GRb60 for further studies. Rani (2014); Kumar, (2018) observed similar hyphal characters of *R. bataticola* isolated from dry root rot infected groundnut plants.

Pathogenicity test: A pot culture experiment was conducted to test the pathogenicity of 60 *R. bataticola* isolates obtained from groundnut growing areas of southern India by soil inoculation method using susceptible groundnut cultivar (JL 24).

Table 1: Pathogenicity of *R. bataticola* isolates collected from Southern India.

State	Districts	Mandal/ Taluk	Village	Isolate	Germination* (%)	Disease Incidence* (%)
Andhra Pradesh	Ananthapuramu	Kadiri	ARS	GRb01	73.33 (59.21)	72.22 (63.25)
			Allugundu	GRb02	80.00 (63.43)	82.22 (69.39)
			Murthypalli	GRb03	86.67 (72.29)	83.33 (75.00)
			Kareddypalli	GRb04	93.33 (81.14)	71.67 (58.07)
		Kudair	Brahmanapalli	GRb05	80.00 (63.43)	75.00 (65.00)
			Jalli palli	GRb06	66.67 (54.99)	70.00 (61.92)
			Kommuru	GRb07	86.67 (72.29)	82.22 (69.39)
			Kuderu	GRb08	73.33 (59.21)	52.78 (46.75)
	Chittoor	S.R. Puram	Kannikapuram	GRb09	73.33 (59.21)	83.33 (75.00)
			Kothapallimitta	GRb10	100.00 (90.00)	53.33 (46.92)
			Marripalli	GRb11	66.67 (54.99)	83.33 (75.00)
			Muchalamarri	GRb12	66.67 (54.99)	66.67 (60.00)
		Yerpedu	Bandarupalli	GRb13	80.00 (63.43)	80.00 (68.07)
			Bokkasam palem	GRb14	86.67 (72.29)	61.67 (56.92)
			Manna samudram	GRb15	73.33 (59.21)	63.89 (53.25)
			Ramalingapalli	GRb16	66.67 (54.99)	76.67 (66.14)
Karnataka	Chitradurga	Challakare	Gowripura	GRb17	93.33 (81.14)	85.00 (71.14)
			Kydikunta	GRb18	60.00 (50.77)	63.89 (53.25)
			Mahadevapura	GRb19	73.33 (63.43)	83.33 (75.00)
			Pillahalli	GRb20	93.33 (81.14)	80.00 (68.07)
		Hiriyur	Halagaladdi	GRb21	86.67 (72.29)	71.67 (63.08)
			Karidasarahalli	GRb22	60.00 (50.77)	41.67 (35.00)
			Maddihalli	GRb23	73.33 (59.21)	63.33 (58.08)
	Tumakur	Pavagada	Avasikere	GRb24	80.00 (63.43)	73.89 (59.39)
			Kadirehalli	GRb25	66.67 (54.99)	66.67 (60.00)
			Madde	GRb26	86.67 (72.29)	83.33 (75.00)
			Thumakunte	GRb27	86.67 (72.29)	86.67 (72.29)
		Sira	Bejjihalli	GRb28	80.00 (63.43)	75.00 (65.00)
			Lakkanahalli	GRb29	86.67 (72.29)	85.00 (71.14)
			Thimmanahalli	GRb30	73.33 (59.21)	71.11 (57.64)
Tamil Nadu	Tiruvannamalai	Arni	Athimalaipattu	GRb31	73.33 (59.21)	80.56 (68.25)
			Kongarampattu	GRb32	66.67 (50.77)	58.89 (50.17)
			Kilnagar	GRb33	66.67 (50.77)	80.56 (68.25)
			Melnagar	GRb34	80.00 (63.43)	82.22 (69.39)
		Polur	Santhavasal	GRb35	86.67 (72.29)	80.00 (68.07)
			Sedarampattu	GRb36	93.33 (81.14)	78.33 (62.29)
	Villupuram	Gingee	Kanjanur	GRb37	53.33 (46.92)	47.22 (38.25)
			Ottampattu	GRb38	86.67 (72.29)	85.00 (71.14)
			Tokavadi	GRb39	80.00 (59.21)	73.89 (59.39)
			Venkatesapuram	GRb40	73.33 (59.21)	60.00 (51.14)
		Melmalaiyanur	Kannalam	GRb41	66.67 (50.77)	66.67 (55.00)
			Mannur	GRb42	80.00 (72.29)	82.22 (69.39)
			Sathaputhur	GRb43	86.67 (63.43)	76.67 (66.14)
			Valathy	GRb44	73.33 (59.21)	68.33 (56.14)
Telangana	Nagarkurnool	Balmoor	Gattuthummen	GRb45	80.00 (63.43)	66.67 (55.00)
			Godal	GRb46	86.67 (63.43)	75.56 (65.17)
			Jinkunta	GRb47	73.33 (59.21)	72.22 (58.25)
			Thummanpet	GRb48	86.67 (63.43)	76.67 (61.14)
		Talkapally	Boppally	GRb49	80.00 (63.43)	75.56 (65.17)
			Gattunallykuduru	GRb50	66.67 (50.77)	66.67 (60.00)
			Peddur	GRb51	93.33 (81.14)	71.67 (58.07)
			Kammareddy palli	GRb52	93.33 (63.43)	100.00 (90.00)
	Wanaparthy	Kothakota	Amadabakula	GRb53	80.00 (63.43)	75.00 (65.00)
			Apparaala	GRb54	100.00 (90.00)	60.00 (51.14)
			Kanimetta	GRb55	93.33 (81.14)	78.33 (62.29)
			Sankireddy palli	GRb56	93.33 (81.14)	50.00 (45.00)
		Pebbair	Chelimilla	GRb57	53.33 (50.77)	80.56 (68.25)
			Kambalapur	GRb58	80.00 (63.43)	67.22 (55.17)
			Kanchiravupalli	GRb59	93.33 (81.14)	80.00 (68.07)
			Pebbair	GRb60	86.67 (63.43)	75.56 (60.54)
Sem					3.37	2.77
CD (P=0.05)					9.45	7.76
CV%					7.42	6.58

* Mean of three replications; Valves in parenthesis are angular transformed valves

Fig. 1. Symptoms of dry root rot disease of groundnut (a) field symptoms (diseased plant and healthy plant), (b) dry root rot infected plant, (c) blackish discolouration inside root portion and (d) presence of minute sclerotia.

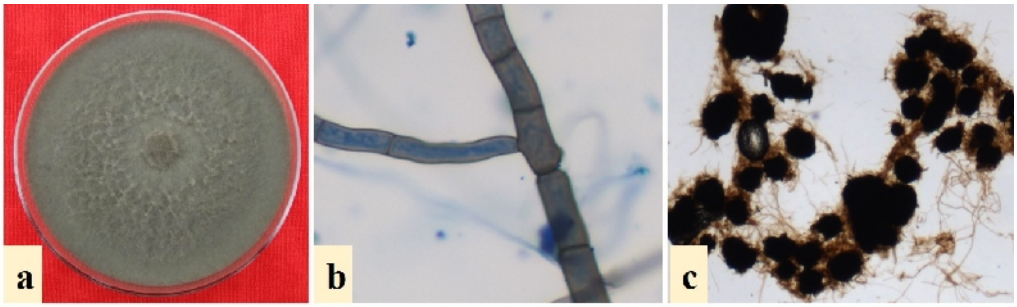

Fig. 2. Identification of *R. bataticola* (a) grey to black culture colour with aerial mycelium, (b) microscopic characters like, hyphal branching at right angle and formation of constriction near the point of branching and (c) presence of microsclerotia.

Table 2: Scoring scale for dry root rot disease.

Sr. No.	Disease incidence	Reaction
1.	1-10 % disease incidence	Resistant
2.	11-25 % disease incidence	Moderately Resistant
3.	26-50 % disease incidence	Susceptible
4.	51-100 % disease incidence	Highly Susceptible

The results revealed that all 60 isolates were pathogenic with different levels of disease incidence on groundnut cultivar (Table 1) showing symptoms of dry root rot, *i.e.*, infected plant become straw to brown coloured, plant wilt and dried (Fig. 3).

Infected plants are easily pulled out from the soil, and the root portion becomes black. The individual isolates were re-isolated from the infected portion of inoculated plants. The isolates were identical and similar characteristic features to pathogen isolated from the field, thus fulfilling Koch's postulates.

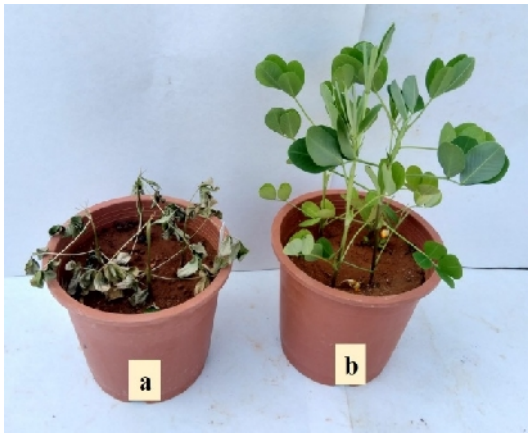

Fig. 3. Pathogenicity test (a) Isoate GRb52 and (b) control at 75 days after sowing.

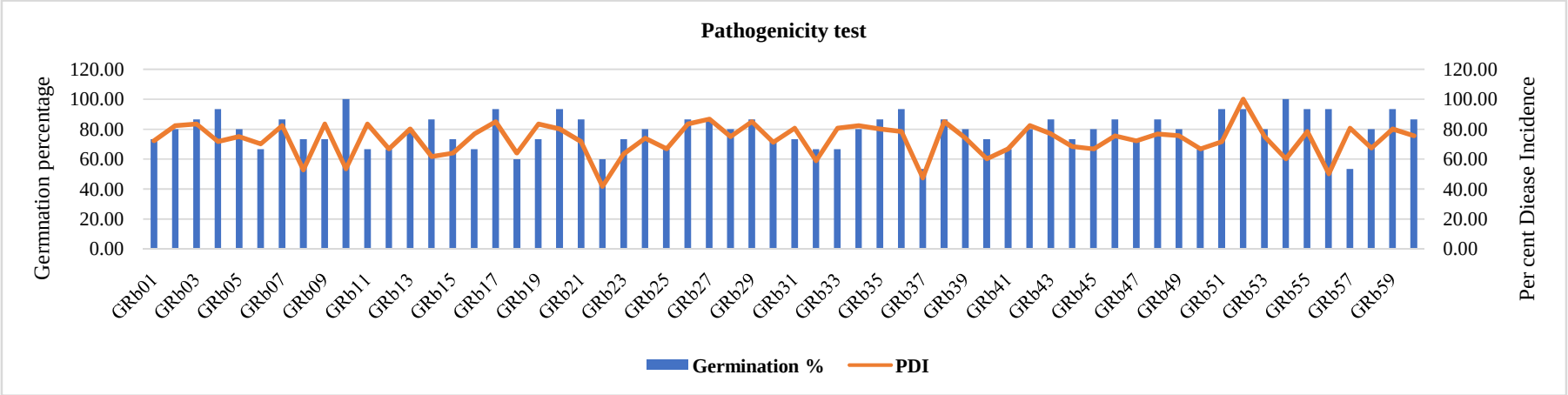

Fig. 4. Germination % and Per cent Disease Incidence (PDI) of *R. bataticola* isolates collected from Southern India.

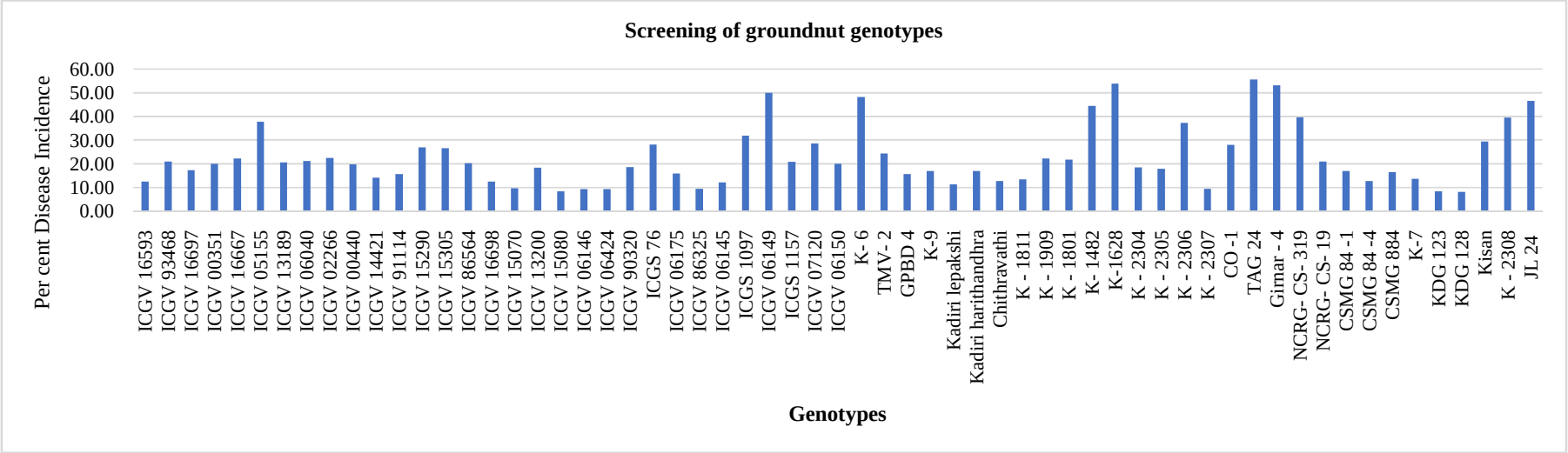

Fig. 5. Per cent Disease Incidence of groundut genotypes against *R. bataticola.*

The mean germination of the groundnut cultivar showed significant variations among the tested isolates ranging from 53.33 to 100 per cent, as shown in Table 1 and Fig. 4. The maximum germination (100%) was observed in two isolates (GRb10 and GRb54) followed by nine isolates with 93.33% germination (GRb04, GRb17, GRb20, GRb36, GRb51, GRb52, GRb55, GRb56 and GRb59). The germination of 86.67% in 13 isolates, 80.00% in 12 isolates, 73.33% in 11 isolates and 66.67% in 9 isolates were observed. Minimum germination (53.33%) was observed in two isolates (GRb37 and GRb57), followed by two isolates with 60.00% germination (GRb18 and GRb22).

The significant variations were observed in mean disease incidence among the 60 isolates varies from 41.67 to 100 per cent at 75 days after sowing (DAS) as shown in Table 1 and Fig. 4. The highest disease incidence (100%) was observed in isolate GRb 52 followed by isolates GRb16 and GRb27 showed 86.67% disease incidence. The isolates showed disease incidence viz., GRb17, GRb29 and GRb38 (85.00%), GRb03, GRb09, GRb11, GRb19 and GRb26 (83.33%), GRb02, GRb07, GRb34 and GRb42 (82.22%), GRb31, GRb33 and GRb57 (80.56%), GRb13, GRb20, GRb35 and GRb59 (80.00%). The lowest disease incidence (41.67 %) was observed in isolate GRb37 followed by isolates GRb22 and GRb56 showed 47.22 and 50.00 per cent disease incidence respectively. The rest of *R. bataticola* isolates showed mean disease incidence ranging from 52.78 to 78.33 per cent.

From the above results, GRb 52 isolate showed the highest disease incidence (100%) compared with all the remaining isolates. Hence, it was considered a highly virulent isolate and used in all experiments in the subsequent study.

The variability in the pathogenicity among the isolates of dry root rot disease was reported by several workers (Raja Mohan and Balabaskar, 2012; Muthukumar *et al*., 2014) in groundnut crop. Sobti and Sharma (1992) recorded 13 to 63 per cent root rot incidence of groundnut with different isolates of *R. bataticola.* Similarly, Mathukia (1982) also proved the pathogenicity of dry root rot isolates on groundnut by using the soil inoculation method. Sharma *et al.* (2012) also proved the pathogenicity of 50 isolates of *R. bataticola* using chickpea cultivar and reported variability among the isolates of the *R. bataticola*.

Screening advanced breeding lines for their reaction to dry root rot disease: The field screening results showed significant variations among the groundnut genotypes (Table 3 and Fig. 5). The mean disease incidence of genotypes ranged from 8.05 to 55.56 per cent. The least disease incidence was recorded in genotype KDG 128 (8.05%) followed by genotypes ICGV 15080 and KDG 123 (8.42%), ICGV 06424 (9.28%), ICGV 06146 (9.30%), ICGV 86325 and K – 2307 (9.38%) and ICGV 15070 (9.57%). The genotypes (41) showed disease incidence ranged from 11.25 to 29.41 per cent. The highest disease incidence was observed in TAG 24 genotype with 55.56 per cent, followed by K-1628, Girnar – 4, ICGV 06149, K- 6, JL 24 and K- 1482 genotypes recorded 53.85, 53.13, 50.00, 48.21, 46.46 and 44.44 per cent disease incidence, respectively.

Table 3: Percent Disease Incidence (PDI) and reaction of groundnut genotypes to dry root rot under sick plot conditions.

Sr. No.	Genotypes	PDI*	Reaction
1.	ICGV 16593	12.50 (20.71)	MR
2.	ICGV 93468	20.93 (27.20)	MR
3.	ICGV 16697	17.28 (23.88)	MR
4.	ICGV 00351	20.00 (26.79)	MR
5.	ICGV 16667	22.22 (27.81)	MR
6.	ICGV 05155	37.78 (37.10)	S
7.	ICGV 13189	20.51 (26.02)	MR
8.	ICGV 06040	21.05 (26.42)	MR
9.	ICGV 02266	22.47 (28.38)	MR
10.	ICGV 00440	19.74 (26.39)	MR
11.	ICGV 14421	14.14 (22.03)	MR
12.	ICGV 91114	15.58 (23.26)	MR
13.	ICGV 15290	26.92 (31.28)	S
14.	ICGV 15305	26.47 (32.89)	S
15.	ICGV 86564	20.24 (26.36)	MR
16.	ICGV 16698	12.50 (20.36)	MR
17.	ICGV 15070	9.57 (18.01)	R
18.	ICGV 13200	18.39 (25.38)	MR
19.	ICGV 15080	8.42 (16.22)	R
20.	ICGV 06146	9.30 (17.09)	R
21.	ICGV 06424	9.28 (17.70)	R
22.	ICGV 90320	18.60 (25.16)	MR
23.	ICGS 76	28.07 (31.29)	S
24.	ICGV 06175	15.94 (25.32)	MR
25.	ICGV 86325	9.38 (17.00)	R
26.	ICGV 06145	12.16 (20.64)	MR
27.	ICGS 1097	31.82 (33.38)	S
28.	ICGV 06149	50.00 (45.00)	S

29.	ICGS 1157	20.75 (26.79)	MR
30.	ICGV 07120	28.57 (30.91)	S
31.	ICGV 06150	20.00 (26.57)	MR
32.	K - 6	48.21 (43.90)	S
33.	TMV- 2	24.29 (29.51)	MR
34.	GPBD 4	15.56 (25.19)	MR
35.	K - 9	16.90 (25.06)	MR
36.	Kadiri lepakshi	11.25 (19.59)	MR
37.	Kadiri harithandhra	16.90 (24.81)	MR
38.	Chithravathi	12.68 (20.88)	MR
39.	K - 1811	13.33 (22.50)	MR
40.	K - 1909	22.22 (29.68)	MR
41.	K - 1801	21.74 (27.64)	MR
42.	K - 1482	44.44 (42.12)	S
43.	K - 1628	53.85 (45.74)	HS
44.	K - 2304	18.46 (25.45)	MR
45.	K - 2305	17.91 (24.56)	MR
46.	K - 2306	37.25 (37.69)	S
47.	K - 2307	9.38 (16.33)	R
48.	CO -1	28.00 (32.90)	S
49.	TAG 24	55.56 (49.62)	HS
50.	Girnar - 4	53.13 (47.17)	HS
51.	NCRG- CS- 319	39.58 (38.89)	S
52.	NCRG- CS- 19	20.83 (27.70)	MR
53.	CSMG 84 -1	16.90 (25.06)	MR
54.	CSMG 84 -4	12.68 (19.67)	MR
55.	CSMG 884	16.42 (23.02)	MR
56.	K - 7	13.64 (21.26)	MR
57.	KDG 123	8.42 (16.70)	R
58.	KDG 128	8.05 (16.49)	R
59.	Kisan	29.41 (34.62)	S
60.	K - 2308	39.39 (43.75)	S
61.	JL 24	46.46 (43.58)	S
	Sem	1.33	
	CD (0.05)	3.76	
	CV%	8.01	

* Mean of two replications; Valves in parenthesis are angular transformed valves

Based on diseases incidence, genotypes were categorised. Eight genotypes ICGV 06146, ICGV 06424, ICGV 15070, ICGV 15080, ICGV 86325, K - 2307, KDG 123 and KDG 128 were found resistant (1-10% disease incidence), 35 genotypes were showed moderately resistant reaction with 11-25 per cent disease incidence, fifteen genotypes (CO -1, ICGS 1097, ICGS 76, ICGV 05155, ICGV 06149, ICGV 07120, ICGV 15290, ICGV 15305, JL 24, K – 2306, K – 2308, K- 1482, K- 6, Kisan and NCRG- CS- 319) were found susceptible with 26-50% disease incidence, and three genotypes (Girnar – 4, K-1628, TAG 24) with >50% disease incidence were showed highly susceptible reaction (Table 4).

Table 4: Grouping of groundnut genotypes in response to dry root rot resistance under field conditions.

Sr. No.	Reaction	No. of Genotypes	List of genotypes
1.	Resistant	8	ICGV 06146, ICGV 06424, ICGV 15070, ICGV 15080, ICGV 86325, K - 2307, KDG 123, KDG 128
2.	Moderately Resistant	35	Chithravathi, CSMG 84 -1, CSMG 84 -4, CSMG 884, GPBD 4, ICGS 1157, ICGV 00351, ICGV 00440, ICGV 02266, ICGV 06040, ICGV 06145, ICGV 06150, ICGV 06175, ICGV 13189, ICGV 13200, ICGV 14421, ICGV 16593, ICGV 16667, ICGV 16697, ICGV 16698, ICGV 86564, ICGV 90320, ICGV 91114, ICGV 93468, K – 1801, K – 1811, K – 1909, K – 2304, K – 2305, K-7, K-9, Kadiri harithandhra, Kadiri lepakshi, NCRG- CS- 19, TMV- 2
3.	Susceptible	15	CO -1, ICGS 1097, ICGS 76, ICGV 05155, ICGV 06149, ICGV 07120, ICGV 15290, ICGV 15305, JL 24, K – 2306, K – 2308, K- 1482, K- 6, Kisan, NCRG- CS- 319
4.	Highly Susceptible	3	Girnar – 4, K-1628, TAG 24

During the present investigation, groundnut genotypes were categorised into resistant, moderately resistant, susceptible, and highly susceptible based on per cent disease incidence. Similarly, Moradia (2012) categorised 71 groundnut genotypes based on dry root rot incidence, out of 71 genotypes, 28 genotypes were found resistant (1-10%), six genotypes were moderately resistant (11-25%), and the remaining 37 genotypes were found susceptible with 25-50% root rot incidence. Further, Rani (2014) and Kumar (2018) also screened groundnut genotypes against dry root rot and categorised genotypes based on per cent root rot incidence. Further, several other workers *viz*., Om Gupta *et al*. (2012); Khan *et al*., (2013); Nagamma *et al*., (2015) reported the resistance reaction of genotypes for dry root rot under glasshouse and sick plot conditions.

CONCLUSION

In the present study, GRb 52 isolate showed the highest disease incidence and it is used for multiplication. In field screening eight genotypes ICGV 06146, ICGV 06424, ICGV 15070, ICGV 15080, ICGV 86325, K - 2307, KDG 123 and KDG 128 were showed resistant reaction with 1-10% disease incidence. The identified resistant genotypes may serve as potential donors in the groundnut resistance breeding programme for dry root rot.

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Conflict of Interest. Authors indicates agreement that this article contains all the information true and correct.

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