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Field Evaluation of Rice Cultures for Resistance against Gall Midge, *Orseolia oryzae*

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ABSTRACT

The experiment was conducted during *kharif,* 2021 (June–November) at Regional Agricultural Research Station, Warangal, Telangana, India to evaluate rice cultures for resistance against gall midge (biotype 4M). Screening of 200 rice cultures developed in different research stations of PJTSAU, Hyderabad was done against gall midge along with susceptible check under natural field conditions at RARS, Warangal. Susceptible check TN-1 was grown for every 9 entries and also as border rows. Observations on gall midge incidence were recorded twice at 31–34 and 58–62 days after transplanting and then percentage of silver shoots was worked out. Observations were recorded by counting the total number of plants, damaged plants, total number of tillers and total number of silver shoots. At 58–62 DAT, 90–100% hill (plant) damage and 9.72 to 21.79% tiller damage was recorded in TN-1. Gall midge incidence among test entries was ranged from 0–100% hill (plant) damage and 0–16.67% silver shoots. Among the 200 test entries evaluated against gall midge, three entries viz., RDR-2751, IBT-GM-7 and IBT-GM-36 had shown highly resistant reaction (Nil damage), eight entries viz., JGL-36147, JMS24B, KNM 12392, KNM 11596, IBT WGL-2, IBT WGL-21, IBT WGL-31 and MLT-E-K21-66 had shown resistant reaction (<1% silver shoots). Seventy-four entries had shown moderately resistant reaction (1–5% silver shoots) against local gall midge population. All the moderately resistant entries recorded >10% hill (plant) damage.

KEYWORDS: Rice cultures, gall midge, silver shoots, resistance

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Data Availability Statement: Legal restrictions are imposed on the public sharing of raw data. However, authors have full right to transfer or share the data in raw form upon request subject to either meeting the conditions of the original consents and the original research study. Further, access of data needs to meet whether the user complies with the ethical and legal obligations as data controllers to allow for secondary use of the data outside of the original study.

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1. INTRODUCTION

In India, rice is the most important cereal food crop and more than 65% of population dependent on rice. Worldwide, rice is cultivated in 165 mha with an annual production of 500.82 mt (Anonymous, 2017). Rice production in Asia is the key for global food security, as about 90% of the world rice is produced and consumed in Asia (Bandumula, 2017). India is the second largest producer of rice (118.87 mt), from an area of 43.66 mha, with a productivity of 2.72 t ha^{-1} (Anonymous, 2021). India has the largest area among the rice growing countries covering about one-fourth of the total cropped area of India. Telangana, in South India, rice is known as the rice bowl, and rice cultivation area increased from 1.3 mha to 3.2 mha from 1990 to 2020 (Akula et al., 2022). In 2022, Telangana produced 20.22 mmt of rice (Anonymous, 2023). Rice productivity needs to be increased keeping in view of the over exploding population (Rosegrant and Cline, 2003). In India, nearly one hundred different insect species feed on rice, and about 18 of these are considered to be the main pests that significantly reduce rice yield (Jena et al., 2018; Katti, 2021). As per Pasalu and Katti (2006), nearly 300 species of insect pests were identified as pests that attack rice crop at different stages and among them only 23 species cause notable damage. Prasad and Prasad (2010) also opined that the transplanted rice crop was infested with three major pests viz., yellow stem borer, gall midge and leaf folder. Among the major insect pest species, gall midge (*Orseolia oryzae* WM) is one of the most important pest which is capable of causing considerable loss in Telangana in general and gall midge endemic areas of the state in particular. The pest could be able to cause loss in yield ranging from 10–25% (Prasad and Prasad, 2006, Hari et al., 2022).

The maggot enters inside the young rice plant and starts feeding on growing point of rice plants. As a result, the meristematic tissue grows and encloses the feeding insect inside. The meristematic tissue as it grows, turns into a pale green tubular structure called "silver shoot". The damaged tiller does not bear panicle. The crop under severe infestation is stunted with more numerous tillers [Bentur et al. (1992)]. These new tillers are also eventually attacked resulting in almost 80 to 90% loss under severe infestation if the weather conditions are congenial for the pest species (Soren 2013). The gall midge and rice share such an intimate relationship that there is a constant battle for survival by either partner (Bentur et al., 2016). Host Plant Resistance (HPR) is an important tool of Integrated Pest Management (IPM), because pest can be easily managed by raising pest resistant or tolerant variety for sustainable crop production. HPR is not only environment friendly but also it is cost effective. Breeding resistant varieties has been a viable, ecologically acceptable approach for managing the pest (Krishnaiah, 2004). The superior strategy to manage the damage by gall midge in rice is to develop new varieties with high resistance to rice gall midge (Thippeswamy et al., 2014, Hari et al., 2022). In this back ground this experiment was conducted in *kharif* 2021 (June to November) under the field conditions of gall midge endemic area i.e., Warangal, Telangana to identify promising resistant rice entries against gall midge.

2. MATERIALS AND METHODS

This study was conducted at the Rice Research Farm, Regional Agricultural Research Station (RARS), Warangal, Telangana, India during *kharif* (June–November) 2021. The site is located at 18^0 01.077 N latitude 79^0 36.197 E longitude and an altitude of 259 m above mean sea level. 200 rice cultures/genotypes developed at different research stations of PJTSAU, Hyderabad, Telangana were evaluated for gall midge resistance along with susceptible check (TN-1) under natural field conditions at RARS, Warangal during *kharif*, 2021. Sowing of test entries was done on 25th July 2024. Both in nursery and main field, no insecticides were applied. Transplanting was done on 27th August 2024. Delayed transplanting was followed to enhance gall midge incidence in the experiment. Fertilizers of Nitrogen, Phosphorus and Potassium were applied at the rate of 100 kg ha^{-1}, 60 kg ha^{-1} and 40 kg ha^{-1} respectively. Susceptible check TN-1 was grown for every 9 entries and also as border rows. Spacing of 20 cm between rows and 15 cm with in the row was followed in the experiment. For each test entry 20 plants $hill^{-1}$ were maintained and observations were recorded from these 20 hills. Regular recommended agronomic practices were adopted in the experiment. Gall midge incidence as silver shoots were recorded on 31–34 and 58–62 days after transplanting and then percentage of silver shoots was worked out. Observations were recorded by counting the total number of plants, damaged plants, total number of tillers and total number of silver shoots. % silver shoot were calculated by the given formula:

Percent silver shoot (%)=(Number of silver shoots Total number of $tillers^{-1}$)×100

The percent infestation was checked on a 0–9 scale using the standard evaluation score (SES) for rice gall midge by IRRI (Table 1).

3. RESULTS AND DISCUSSION

At 31–34 DAT, susceptible check TN-1 had recorded hill (plant) damage in the range of 21.05 to 90.00% and tiller damage in the range of 3.14–8.89%. At 58–62 DAT, 90–100% hill (plant) damage and 9.72 to 21.79% tiller damage was recorded in TN-1. Mean damage of 98% plant damage and 15.29% silvershoots was recorded

Table 1: Standard evaluation system for rice gall midge

Per cent damage	Score	Reaction
Based on Per cent silver shoots		
0	0	Highly Resistant
<1	1	Resistant
1–5	3	Moderately Resistant
6–10	5	Moderately Susceptible
11–25	7	Susceptible
>25	9	Highly Susceptible
Based on Per cent plant damage		
0–10		Resistant
>10		Susceptible

(Anonymous, 2013)

in susceptible check TN-1 at second observation. During peak infestation of gall midge in TN-1, gall midge incidence among test entries ranged from 0–100% hill (plant) damage and 0–16.67% silver shoots. Among the 200 test entries evaluated against gall midge, three entries viz., RDR-2751, IBT-GM-7 and IBT-GM-36 had shown highly resistant reaction (Nil damage), eight entries viz., JGL-36147, JMS24B, KNM 12392, KNM 11596, IBT WGL-2, IBT WGL-21, IBT WGL-31 and MLT-E-K21-66 had shown resistant reaction (<1% silver shoots). Seventy four entries had shown moderately resistant reaction (1–5% silver shoots) against local gall midge population at RARS, Warangal during *Kharif* 2021. However, all the moderately resistant entries recorded >10% plant damage (Table 2). Among these promising rice cultures, a total of eleven entries viz., RDR-2751, IBT-GM-7, IBT-GM-36, JGL-36147, JMS24B, KNM 12392, KNM 11596, IBT WGL-2, IBT

Table 2: Screening of rice cultures against gall midge at RARS, Warangal during *kharif*, 2021

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
1.	RDR 1926	25.00	3.36	50.00	4.56	3	MR
2.	RDR 2720	50.00	4.45	55.00	4.72	3	MR
3.	RDR 2751	0.00	0.00	0.00	0.00	0	HR
4.	RDR 2747	50.00	3.76	55.00	4.00	3	MR
5.	RDR 1200	20.00	2.27	40.00	4.80	3	MR
6.	RDR 1162	10.00	1.26	15.00	1.38	3	MR
7.	RDR 1210	11.11	1.49	16.67	3.08	3	MR
8.	RDR 1221	30.00	2.15	40.00	3.59	3	MR
9.	JGL 33138	15.00	1.35	40.00	4.37	3	MR
10.	JGL 34564	25.00	2.73	35.00	3.35	3	MR
11.	JGL 34985	55.00	5.22	55.00	6.69	5	MS
12.	JGL 35158	0.00	0.00	0.00	0.00	Only One plant	
13.	JGL 35161	20.00	3.66	25.00	3.20	3	MR
14.	JGL 36147	5.00	0.45	5.00	0.45	1	R
15.	JGL 36175	15.00	1.21	20.00	2.55	3	MR
16.	JGL 36182	0.00	0.00	15.00	3.88	3	MR
17.	JGL 37216	35.00	2.87	45.00	3.79	3	MR
18.	JGL 38009	40.00	5.09	40.00	5.12	3	MR
19.	JGL 38039	35.00	5.48	50.00	6.96	5	MS
20.	JGL 38053	20.00	3.16	25.00	3.53	3	MR
21.	JGL 38067	30.00	3.06	45.00	5.68	5	MS
22.	JGL 38071	45.00	4.56	65.00	6.25	5	MS
23.	JGL 38085	35.00	4.23	50.00	8.29	5	MS
24.	JGL 38105	25.00	4.12	45.00	6.19	5	MS

Table 2: Continue...

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
25.	JGL 38125	15.00	1.26	30.00	3.05	3	MR
26.	JGL 38156	10.00	1.13	20.00	1.92	3	MR
27.	JGL 38159	45.00	5.38	50.00	5.40	3	MR
28.	JGL 38168	55.00	5.58	60.00	7.06	5	MS
29.	JGL 38180	50.00	4.60	60.00	6.02	5	MS
30.	JGL 38190	33.33	5.56	33.33	6.10	5	MS
31.	JGL 38206	20.00	5.49	25.00	4.88	3	MR
32.	JGL 38237	65.00	5.32	65.00	5.32	3	MR
33.	JMS23B	36.84	4.37	52.63	5.88	5	MS
34.	JMS24B	10.00	0.68	10.00	0.61	1	R
35.	KNM 12367	15.00	1.82	30.00	3.04	3	MR
36.	KNM 12368	15.00	1.44	30.00	2.59	3	MR
37.	KNM 12392	0.00	0.00	10.00	0.71	1	R
38.	KNM 12424	10.00	0.93	15.00	1.30	3	MR
39.	KNM 11496	35.00	5.56	65.00	8.74	5	MS
40.	KNM 11532	35.00	3.52	45.00	4.17	3	MR
41.	KNM 12505	30.00	2.88	60.00	4.55	3	MR
42.	KNM 11520	45.00	3.17	50.00	5.32	3	MR
43.	KNM 11551	45.00	4.33	50.00	5.34	3	MR
44.	KNM 11544	10.00	0.92	15.00	1.89	3	MR
45.	KNM 11545	40.00	7.01	55.00	8.64	5	MS
46.	KNM 11505	40.00	3.11	55.00	5.67	5	MS
47.	KNM 11612	35.00	2.56	35.00	3.13	3	MR
48.	KNM 11601	30.00	1.98	35.00	3.44	3	MR
49.	KNM 11596	5.00	0.39	10.00	0.70	1	R
50.	KNM 12452	20.00	2.48	25.00	2.94	3	MR
51.	KNM 12466	70.00	5.33	85.00	8.13	5	MS
52.	KNM 12472	55.00	5.20	70.00	7.54	5	MS
53.	KNM 6965	65.00	6.55	70.00	7.74	5	MS
54.	KNM 7048	65.00	6.73	65.00	8.81	5	MS
55.	KNM 7715	75.00	10.76	80.00	12.31	7	S
56.	KNM 10207	60.00	7.97	70.00	10.75	7	S
57.	TN-1	55.00	6.70	70.00	7.69	5	MS
58.	ISM	60.00	7.17	65.00	8.90	5	MS
59.	WGL 1083	45.00	3.69	50.00	7.09	5	MS
60.	WGL 1289	30.00	7.37	60.00	11.76	7	S
61.	WGL 1283	45.00	5.16	65.00	7.09	5	MS
62.	WGL 1246	35.00	5.04	55.00	7.69	5	MS
63.	WGL 1380	75.00	8.51	80.00	11.02	7	S

Table 2: Continue...

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
64.	WGL 1413	20.00	1.64	35.00	3.52	3	MR
65.	WGL 1511	10.00	1.73	15.00	2.23	3	MR
66.	WGL 1512	35.00	3.38	55.00	4.73	3	MR
67.	WGL 1513	55.00	6.63	65.00	7.17	5	MS
68.	WGL 1525	30.00	3.60	40.00	3.33	3	MR
69.	WGL 1533	75.00	5.26	80.00	7.10	5	MS
70.	WGL 1537	45.00	6.32	60.00	9.66	5	MS
71.	WGL 1543	65.00	10.00	80.00	12.64	7	S
72.	WGL 1551	35.00	6.67	40.00	7.69	5	MS
73.	WGL 1559	35.00	5.85	55.00	8.33	5	MS
74.	WGL 1560	25.00	6.43	40.00	8.70	5	MS
75.	WGL 1562	30.00	5.19	45.00	7.59	5	MS
76.	WGL 1571	35.00	5.73	45.00	6.51	5	MS
77.	WGL 1573	35.00	3.18	40.00	4.32	3	MR
78.	WGL 1590	45.00	3.88	45.00	4.12	3	MR
79.	WGL 1591	30.00	5.34	35.00	5.24	3	MR
80.	WGL 1592	40.00	6.82	60.00	7.74	5	MS
81.	WGL 1465	75.00	10.00	80.00	10.95	7	S
82.	WGL 1472	55.00	6.80	75.00	8.97	5	MS
83.	WGL 1482	35.00	4.37	55.00	8.78	5	MS
84.	WGL 1485	50.00	5.75	70.00	10.09	5	MS
85.	WGL 1492	65.00	10.99	70.00	13.20	7	S
86.	WGL 1495	55.00	5.90	80.00	9.09	5	MS
87.	MTU 1001	60.00	5.99	80.00	7.42	5	MS
88.	RNR 15048	60.00	6.49	65.00	7.25	5	MS
89.	KPS-6100	55.00	4.71	60.00	5.70	5	MS
90.	KPS-6002	40.00	2.82	65.00	5.47	3	MR
91.	KPS-6003	45.00	4.58	55.00	6.03	5	MS
92.	KPS-6097	35.00	7.10	50.00	8.81	5	MS
93.	KPS-6228	25.00	2.61	35.00	3.60	3	MR
94.	KPS-6251	30.00	1.99	40.00	3.39	3	MR
95.	KPS-6315	55.00	8.07	80.00	9.95	5	MS
96.	KPS-8558	40.00	3.85	55.00	5.02	3	MR
97.	KPS-8504	35.00	2.96	50.00	5.22	3	MR
98.	IBTWGL-1	30.00	1.74	35.00	2.73	3	MR
99.	IBTWGL-2	10.00	0.79	10.00	0.84	1	R
100.	IBTWGL-3	5.00	0.37	15.00	1.09	3	MR
101.	IBTWGL-9	65.00	6.50	70.00	8.86	5	MS

Table 2: Continue...

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
102.	IBTWGL-21	0.00	0.00	5.00	0.28	1	R
103.	IBTWGL-31	5.00	0.33	5.00	0.32	1	R
104.	IBTR 61 (TPL-60-3)	45.00	3.41	50.00	5.30	3	MR
105.	IBTR 67 (TPL62-3)	25.00	2.36	50.00	3.39	3	MR
106.	IBT-GM-7	0.00	0.00	0.00	0.00	0	HR
107.	Tellahamsa	70.00	4.80	90.00	5.87	5	MS
108.	MTU 1010	50.00	4.22	70.00	6.89	5	MS
109.	IBTR 203	15.00	1.61	25.00	2.61	3	MR
110.	IBTR 202	20.00	1.19	20.00	2.51	3	MR
111.	IBTR 212	20.00	1.93	50.00	6.39	5	MS
112.	MLT-M-K21-38	65.00	6.05	80.00	9.19	5	MS
113.	MLT-M-K21-40	40.00	3.06	65.00	5.01	3	MR
114.	MLT-M-K21-41	55.00	8.06	70.00	10.87	7	S
115.	MLT-M-K21-42	50.00	3.48	50.00	4.12	3	MR
116.	MLT-M-K21-44	10.00	0.60	40.00	2.39	3	MR
117.	MLT-M-K21-47	25.00	4.35	41.67	6.56	5	MS
118.	MLT-M-K21-48	70.00	6.75	85.00	8.54	5	MS
119.	MLT-M-K21-49	50.00	5.95	60.00	8.00	5	MS
120.	MLT-M-K21-50	40.00	5.58	45.00	6.42	5	MS
121.	MLT-E-K21-45	75.00	11.24	80.00	12.89	7	S
122.	MLT-E-K21-46	30.00	4.05	45.00	5.75	5	MS
123.	MLT-E-K21-47	50.00	8.05	65.00	11.07	7	S
124.	MLT-E-K21-48	75.00	11.31	85.00	13.08	7	S
125.	MLT-E-K21-49	60.00	6.12	80.00	9.70	5	MS
126.	MLT-E-K21-50	60.00	7.41	60.00	8.75	5	MS

Table 2: Continue...

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
127.	MLT-E-K21-51	70.00	10.04	80.00	13.36	7	S
128.	MLT-E-K21-52	70.00	9.02	80.00	10.46	5	MS
129.	MLT-E-K21-53	55.00	7.11	70.00	9.57	5	MS
130.	MLT-E-K21-54	55.00	5.41	65.00	8.10	5	MS
131.	MLT-E-K21-55	45.00	5.91	45.00	6.28	5	MS
132.	MLT-E-K21-56	35.00	5.67	40.00	5.91	5	MS
133.	MLT-E-K21-57	35.00	5.14	35.00	6.35	5	MS
134.	MLT-E-K21-58	60.00	8.70	65.00	8.84	5	MS
135.	MLT-E-K21-59	45.00	5.86	80.00	8.15	5	MS
136.	MLT-E-K21-60	35.00	4.97	80.00	4.95	3	MR
137.	MLT-E-K21-61	10.00	0.81	25.00	1.70	3	MR
138.	MLT-E-K21-62	25.00	2.78	35.00	3.83	3	MR
139.	MLT-E-K21-63	25.00	3.48	40.00	5.91	5	MS
140.	MLT-E-K21-64	25.00	2.93	35.00	3.56	3	MR
141.	MLT-E-K21-66	5.00	0.68	5.00	0.53	1	R
142.	RNRH 12	55.00	5.82	70.00	7.54	5	MS
143.	RNRH 39	60.00	5.68	70.00	7.08	5	MS
144.	RNRH 66	50.00	3.75	80.00	7.02	5	MS
145.	RNRH 68	75.00	7.13	85.00	10.12	5	MS
146.	RNRH 96	70.00	6.97	75.00	8.70	5	MS
147.	RNRH 97	55.00	4.90	60.00	5.76	5	MS
148.	RNRH 99	75.00	7.92	80.00	10.27	5	MS
149.	RNRH 166	70.00	9.50	95.00	11.37	7	S
150.	RNRH 168	50.00	6.40	50.00	7.14	5	MS
151.	RNRH 170	80.00	7.56	80.00	10.54	7	S
152.	RNRH 179	70.00	6.97	80.00	9.77	5	MS
153.	RNRH 186	90.00	8.05	100.00	11.43	7	S

Table 2: Continue...

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
154.	RNRH 188	80.00	12.23	95.00	14.58	7	S
155.	SN 232	75.00	8.04	80.00	9.44	5	MS
156.	SN 233	50.00	6.64	55.00	8.56	5	MS
157.	SN 923	20.00	3.57	35.00	4.71	3	MR
158.	SN 596	45.00	3.82	65.00	4.25	3	MR
159.	RMS1B	50.00	4.65	60.00	5.61	5	MS
160.	RMS2B	55.00	6.08	65.00	6.73	5	MS
161.	iRUE - 30	50.00	11.27	50.00	11.35	7	S
162.	RNR 28359	25.00	3.30	30.00	3.59	3	MR
163.	RNR 28373-1	50.00	6.52	75.00	8.66	5	MS
164.	RNR 29176	70.00	6.96	75.00	7.91	5	MS
165.	RNR 29177	55.00	5.90	60.00	6.46	5	MS
166.	RNR 31451	40.00	4.31	55.00	3.74	3	MR
167.	RNR 31461	20.00	2.53	20.00	1.63	3	MR
168.	RNR 31503	15.00	2.86	20.00	2.33	3	MR
169.	RNR 31535	10.00	1.67	25.00	2.51	3	MR
170.	RNR 31672	75.00	16.67	100.00	16.67	Only 4 plants	
171.	RNR 31713	25.00	3.23	40.00	2.47	3	MR
172.	RNR 31729	100.00	6.06	100.00	4.76	Only 1 plant	
173.	RNR 31749	16.67	2.44	33.33	3.45	Only 6 plants	
174.	RNR31753	23.08	5.88	61.54	10.32	7	S
175.	RNR 31755	30.00	2.40	35.00	2.70	3	MR
176.	RNR 34979	40.00	5.42	55.00	7.44	5	MS
177.	RNR 35012	45.00	3.63	50.00	4.85	3	MR
178.	RNR 35095	55.00	9.59	60.00	11.42	7	S
179.	RNR 35105	75.00	10.48	78.95	10.55	7	S
180.	RNR 35112	65.00	6.99	80.00	9.49	5	MS
181.	RNR 35118	75.00	7.67	85.00	9.09	5	MS
182.	RNR 35121	35.00	6.49	40.00	6.51	5	MS
183.	RNR 35123	45.00	5.62	50.00	6.02	5	MS
184.	RNR 35125	22.22	3.52	33.33	5.59	5	MS
185.	RNR 35131	80.00	9.20	95.00	11.26	7	S
186.	RNR 35146	75.00	11.30	85.00	13.19	7	S
187.	RNR 35172	50.00	4.14	65.00	6.02	5	MS
188.	RNR 35178	25.00	3.35	30.00	3.54	3	MR
189.	RNR 35197	55.00	3.95	70.00	5.17	3	MR
190.	RNR 36034	31.58	5.16	31.58	5.26	3	MR
191.	WGL 1062	45.00	4.08	60.00	4.29	3	MR
192.	RNR 28343	37.50	5.76	62.50	11.11	7	S

Table 2: Continue...

Sl. No.	Designation	First observation (31–34 DAT)		Second observation (58–62 DAT)		Damage score	Reaction
		% Damage on hill basis	% galls on tiller basis (% silver shoots)	% damage on hill basis	% galls on tiller basis (% silver shoots)		
193.	DSN23/K18/ CB12132	50.00	5.99	55.00	7.14	5	MS
194.	KNM 7787	40.00	3.94	52.63	6.01	5	MS
195.	KNM 7786	20.00	1.75	40.00	3.79	3	MR
196.	RNR 25988	60.00	6.56	75.00	7.85	5	MS
197.	IET 23737	50.00	5.97	65.00	7.98	5	MS
198.	RNR 26121	30.00	2.73	35.00	3.59	3	MR
199.	IBT-GM-36	0.00	0.00	0.00	0.00	0	HR
200.	RNR 11450	50.00	6.37	50.00	6.58	5	MS
TN-1 (Mean score)		53.71	5.33	98.00	15.29	7	S

HR: Highly resistant, R: Resistant, MR: Moderately resistant, MS: Moderately susceptible, S: Susceptible, HS: Highly susceptible

WGL-21, IBT WGL-31 and MLT-E-K21-66 were found to be promising and these cultures can be used as resistant donors in crossing programme or can be released as resistant varieties if they are found good in case of yield. These eleven rice cultures were found to be resistant both as per %silvershoots and % plant damage. Among rice gallmidge biotypes prevalent in Telangana, gall midge biotype 4M is very crucial and causing much damage to rice crop. Infact, number of available resistant donors against rice gall midge biotype 4M is very scanty. Hence, the promising rice cultures viz., RDR-2751, IBT-GM-7, IBT-GM-36, JGL-36147, JMS24B, KNM 12392, KNM 11596, IBT WGL-2, IBT WGL-21, IBT WGL-31 and MLT-E-K21-66 identified in the present study shall be exploited for managing the damage due to rice gall midge. In addition to these eleven promising rice cultures, seventy-four moderately resistant rice cultures shall also utilized if they are found to be promising for other phenotypic characters.

Previous researchers, Setty et al. (1994) screened 50 promising genotypes and identified the varieties IET 9691, IET 11475, IET 12351, IET 12797, IET 12811, IR 36, Abhaya, Surekha and Shakthi as resistant. Similarly, Mehar et al. (2009) reported that few genotypes from early group viz., Ananga, Annada, Kharavela and Shaktiman showed highly resistance reaction at both the levels of nitrogen with 0% silver shoot. Cultivars Jajati and Suraksha showed moderately resistant reaction of mid group and Chaitanya in late group. Prasad and Prasad (2010) reported that 6 entries remained free from the attack of gall midge. These entries were: ARC6605, MR 1523, RP 2068-18-5, Jhitpiti, INRC3021 and Aganni in the agro climatic conditions of Ranchi region of Jharkhand state. Hari et al. (2022) reported that, among the 19 rice varieties screened, Sheetal had showed highly resistance reaction to gall midge at field level and also at genotypic level by possessing three gall midge genes like gm^3 (Gm3del3), Gm4 (Gm4 LRR) and Gm8 (PRP), the varieties like Orugallu, Bhadrakali, Shiva, Kesava and Ramappa were showed moderate level of resistance reaction to gall midge in the field, and also possessing only Gm3 gene, while one rice variety like WGL-915 had showed moderate level of resistance to gall midge in the field by possessing only Gm4 gene. Among 83 rice genotypes screened, WGL-1789, WGL-1790, WGL-1798 and WGL-1800 were found highly resistant and WGL-1767, WGL-1778, WGL-1782 and WGL- 1792 were found to be resistant to gall midge (Shravan et al. (2021). Sreedhar et al. (2022) reported that, high yielding rice genotype, KNM 1638 is a medium slender, early duration (120–125 days) and photo insensitive culture with high yield potential (7356 kg ha^{-1}) having resistance to gall midge and leaf blast, and moderately resistant to neck blast with better adaptability. Srinivas et al, (2016) reported that, rice genotypes JGL 19607, JGL 21820, JGL 3844 (cluster II) and JGL 23745 (cluster III) exhibited least gall midge incidence which could be utilized as parents in developing gall midge resistance genotypes.

4. CONCLUSION

Three entries viz., RDR-2751, IBT-GM-7 and IBT-GM-36 had shown highly resistant reaction, eight entries viz., JGL-36147, JMS24B, KNM 12392, KNM 11596, IBT WGL-2, IBT WGL-21, IBT WGL-31 and MLT-E-K21-66 had shown resistant reaction.

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