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SCREENING OF DIFFERENT GENOTYPES AGAINST BLAST DISEASES AND YIELD OF FINGER MILLET (*ELEUSINE CORACANA* L.)

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ABSTRACT

Forty finger millet genotypes were screened to identify the sources of resistance against blast disease at Research farm, Birsa Agricultural University, Ranchi during *Kharif* season, 2024 under epiphytotics. Among forty genotypes, none of the genotypes were found to be highly resistant for blast disease. In case of leaf blast disease, six genotypes namely IIMRFM-3796, VL-347, VL-410, PR-1734, BAU-22-3 and GE-4449 were recorded as resistance reaction against leaf blast disease, the disease incidence was ranged from 8.0 % (VL-410) to 63.7 % (GPU-107) whereas, finger millet was ranged from 6.1 % (GE-4449) to 43.9 % (VR-1192). Highest grain yield of 33.6q/ha were recorded in CFMV-2, showed resistant reaction against leaf blast and finger blast
***Keywords* :** Finger millet, Leaf blast, Finger blast, Resistant, Screening

Introduction

Finger millet [*Eleusine coracana* (L.)] is an important nutricereal crop grown extensively in various regions of India and Africa. Finger millet is the top-ranked small millet by area and production however; it falls to the sixth position among all cereals and millets, behind wheat, rice, maize, sorghum, and bajra (Devi *et al.,* 2011). In Jharkhand finger millet is grown over an area of 0.39 Lakh hectares with an annual production of 0.44 Lakh tones and average productivity of 1108 Kg/ha in 2024-25 (www.upag. gov.in, 2025). The high nutritional value of finger millet grains, which are composed of 65–75% carbohydrates, 5–8% protein, 15–20% dietary fiber, and 2.5–3.5% minerals (Chetan and Malleshi, 2007). It contains 5-8% good quality protein (eleusinin) which get readily absorbed by the body. Finger millet also contains important amino acid like tryptophan, methionine, threonine, valine, isoleucine and cystine which are essential for better health. It is lower in fat content (1.3%) and majority is unsaturated fat. It is the richest source of calcium (344 mg/100g), iron (3.9 mg/100g), phosphorus (283 mg/100g) and potassium (408 mg/100g). It is highly valued as a reserve food for the draught conditions (Patro *et al.,* 2023). In an era of climate change and malnutrition prevalence in diet, the finger millet is one of the emerging solutions among other millet crops enhanced due to their stress adaptability and high nutritive values (Ranganatha *et al.,* 2022). Finger millet is affected by several diseases *viz.*, blast, brown leaf spot, foot rot and viral diseases. Among them blast disease caused by *Pyricularia grisea* is a serious threat to the cultivation of finger millet as it causes severe yield losses under favorable environmental conditions for pathogen. Blast of finger millet is becoming serious problem in Jharkhand state. In view of changing climate, cropping pattern, cropping intensity and lack of suitable management practices, its frequency of occurrence and yield losses upto 36 % has been reported in India (Viswanath and Channmma, 1994). The leaf and finger blast severity varies within the season and also from one season to another (Barnwal, 2012). Moreover, fungicides are effective to control blast of finger millets but the chemical causes environment pollution, deteriorate soil health, health hazards and decreases beneficial microorganism population present in soil therefore, cultivation of varieties resistance to disease is a better option for its management hence, the present study was undertaken to identify the sources of resistance along with good yielder.

Materials and Method

A field trial of forty finger millet genotypes along with two checks was conducted at Research Farm, Birsa Agricultural University, Ranchi during *Kharif* seasons, 2024. The design was alpha lattice having three replications. The plot size was 3.0 m x 2.5 m with spacing of 25 cm row to row distance. Finger millet seed rate was applied @ 8kg/ha and were sown on 6th July, 2024. Fertilizers were applied @ 40:30:20: kg/ha N:P:K and the plot was fertilized with 5 ton/ha of FYM. Half dose of nitrogen and full dose of P_2O_5 and K_2O applied at the time of sowing while rest of nitrogen was applied in 30 days after sowing or just after weeding. All possible care was taken to prevent pest attack by spring insecticide as and when needed. The observation of blast was recorded by taking twenty plants randomly selected by using 0-5 scale (Anon, 1996) from each plot. Blast disease was screened at three phases of the crop *i.e.* at seedling stage (35-40 days old plant) for leaf blast and at dough stage (70-75 days old plant) for finger blast using 0-5 Standard Evaluation Systems (SES) scale for different diseases provided by AICRP (All India Coordinated Research Project) on small millets for leaf blast (0= highly resistant; 1= resistant; 2= moderately resistant; 3= moderately susceptible; 4= susceptible; 5= highly susceptible) and for finger blast (0= immune; 1= highly resistant; 2= resistant; 3= moderately resistant; 4= susceptible; 5= highly susceptible). The percentage diseases severity (PDI) for both leaf and finger blast calculated by Wheeler, 1969. Grain yields were recorded for each plot after threshing and sun drying for seven days.

$$Finger\ Blast\ (\%) = \frac{No. of\ blast\ infected\ fingers\ per\ plant}{Total\ no. of\ fingers\ per\ plant} \times 100$$

$$PDI\ for\ leaf\ blast\ (\%) = \frac{Sum\ of\ all\ numerical\ rating}{No. of\ observation\ X\ maximum\ scale} \times 100$$

Results and Discussion

Forty genotypes including resistant check (GE4449) and susceptible check (KMR301) were screened against leaf blast to analyze its effect on grain yield of finger millet. Out of forty genotypes, six genotypes *viz*., IIMRFM-3796, VL-347, VL-410, PR-1734, BAU-22-3, and GE-4449 were recorded as a resistant reaction against leaf blast diseases. Twelve genotypes such as PR-1938, KMR-716, WN-1585, TNEC-1345, CFMV-2, VL-352, BM-3, GPU-67, PRR-1216, A-404, BBM-13, and BWM-1 were recorded as a moderately resistant reaction against the diseases. Rest of the genotypes showed moderately susceptible to susceptible diseases reaction against leaf blast of finger millet. Whereas, none of the genotypes showed highly resistant and highly susceptible reaction against the diseases (Table 1).

It was depicted from the Table 2 that highest grain yield of 33.6 q/ha was recorded in genotype, CFMV-2 this treatment also recorded leaf blast intensity of 19.7% and finger blast disease severity of 9.0 per cent, this treatment was followed by IIMRFM-3796 which recorded grain yield of 32.4 q/ha. The genotype BM-3 gave also grain yield of 32.1q/ha, leaf blast diseases severity of 12.5%, finger blast severity of 6.6%. Whereas the susceptible check (KMR301) genotype recorded leaf blast diseases severity of 50.7% finger blast diseases severity of 35.7% and grain yield of 22.1q/ha. The percent disease severity of leaf blast ranged from 8.0 to 63.7 per cent, whereas, it was 50.7 per cent in susceptible check (KMR 301). In case of finger blast, it was ranged from 6.1 to 43.9, whereas the disease severity was 35.7 per cent in susceptible check (KMR 301).

Table 1 : Screening of finger millet genotypes against leaf blast disease

	Disease Score/ Disease Reaction					
	0 (HR)	**1 (R)**	**2 (MR)**	**3 (MS)**	**4 (S)**	**5 (HS)**
Genotypes	NIL	IIMRFM-3796, VL-347, VL-410, PR-1734, BAU-22-3, GE-4449	PR-1938, KMR-716, WN-1585, TNEC-1345, CFMV-2, VL-352, PRR-1216, BM-3, GPU-67, BWM-1, A-404, BBM-13	OEB-605, VR-1192, VR-1188, IIMRFM-3999, KMR-708, IIMRFMR-21-8011, , CFMV-1, BR-9, BR-14-5, VL-1163, PR-1731, IIMRFM-4715, VL-406, VL-376, VL-402, BAU-22-2	PR-202, GPU-107, KMR-301, IIMRFMR-21-8006, BFM-5-E, VL-39	NIL

Table 2 : Evaluation of genotypes against blast and yield of Finger millet during *Kharif*, 2024

SI No.	Genotypes	Leaf blast Disease Severity (%)	Finger blast Disease Severity (%)	Grain yield (q/ha)
1	OEB-605	36.3 (36.2)	12.5 (20.7)	23.4
2	VR-1192	40.3 (39.3)	43.9 (41.4)	19.7
3	VR-1188	40.7 (39.5)	14.2 (22.0)	21.2
4	PR-1938	34.7 (36.0)	17.1 (24.3)	23.8
5	IIMRFM-3999	48.0 (43.8)	8.5 (17.0)	25.8
6	BFM-5-E	51.0 (45.5)	15.5 (23.2)	17.8
7	KMR-708	45.7 (42.4)	20.3 (26.8)	30.7
8	KMR-716	33.0 (35.0)	13.5 (21.5)	21.5
9	WN-1585	32.0 (34.3)	30.7 (33.6)	20.3
10	IIMRFM-4715	47.7 (43.6)	17.7 (24.1)	27.5
11	IIMRFM-3796	9.0 (17.3)	8.5 (16.7)	32.4
12	IIMRFMR-21-8006	51.0 (45.5)	14.4 (22.3)	25.0
13	IIMRFMR-21-8011	46.0 (42.5)	17.5 (24.7)	20.4
14	VL-396	51.3 (45.7)	17.6 (24.7)	26.1
15	VL-406	40.3 (39.3)	8.7 (17.0)	23.6
16	VL-347	8.3 (16.4)	6.4 (14.4)	10.8
17	VL-352	34.3 (35.8)	32.3 (34.7)	16.6
18	VL-376	36.7 (37.2)	16.0 (23.5)	22.5
19	TNEC-1345	18.7 (25.4)	11.8 (20.0)	24.3
20	CFMV-1	39.7 (38.9)	16.8 (24.1)	29.5
21	CFMV-2	19.7 (26.0)	9.0 (17.3)	33.6
22	BR-9	47.7 (41.7)	13.2 (21.3)	26.1
23	BR-14-5	43.7 (41.1)	21.1 (27.3)	23.4
24	GPU-107	63.7 (52.9)	14.0 (21.8)	21.6
25	GPU-67	35.0 (36.2)	10.8 (19.1)	23.1
26	VL-410	8.0 (16.1)	9.2 (17.5)	15.1
27	VL-402	38.7 (38.1)	15.0 (22.7)	22.9
28	VL-1163	47.7 (43.6)	24.5 (29.5)	23.5
29	PRR-1216	33.0 (34.9)	17.8 (25.0)	19.9
30	PR-1734	8.8 (16.4)	6.8 (14.7)	26.7
31	BM-3	12.5 (20.8)	6.6 (14.8)	32.1
32	A-404	25.3 (30.2)	17.0 (24.3)	31.5
33	BBM-13	31.0 (33.8)	13.7 (21.7)	30.5
34	BWM-1	12.5 (20.8)	17.8 (25.0)	26.3
35	PR-202	59.0 (50.1)	11.0 (19.3)	17.3
36	PR-1731	46.8 (45.7)	32.7 (34.8)	29.0
37	BAU-22-3	9.7 (18.0)	8.2 (16.5)	28.8
38	BAU-22-2	47.5 (35.4)	13.3 (21.3)	29.9
39	GE-4449 (RC)	9.0 (17.4)	6.1 (14.2)	27.0
40	KMR-301 (SC)	50.7 (45.3)	35.7 (36.6)	22.1
S Em (±)		2.08	0.77	1.48
CD at 5%		5.50	2.73	4.19
CV (%)		10.10	7.10	10.60

Patro *et al.* (2018) also found that VL 352 and GPU 67 were resistant reaction against leaf blast of finger millet under artificial epiphytotics. Bal *et al.* (2020) screened 33 genotypes, only one genotype, VR 1101 showed moderately resistant reaction to leaf blast and two genotypes, VL 389 and GPU 96 were recorded as resistant to finger blast disease. Patro *et al.* (2023) reported that none of the genotypes were found free from disease. Minimum disease incidences of finger blast (21.67%) were recorded in VL 409 and maximum disease incidence of finger blast (76.67%) was recorded in IIMR-FM-R21-8001. Barnwal (2012) revealed that lowest neck blast of 2.5%, finger blast of 12.1% and highest grain yield of 27.4q/ha in OEB225 followed by GPU67, A-404, JWM-1, GPU45, GPU67, OEB225, IE7 and PR202 showed moderately resistance reaction against blast diseases.

Conclusion

Out of 40 genotypes; IIMRFM-3796, CFMV-2, BM-3 are resistant to moderately resistant against (leaf and finger blast) and high yielding genotypes. However, genotypes *viz.,* IIMRFM-3796, VL-347, VL-410, PR-1734, BAU-22-3, GE-4449 are blast resistant genotypes. VL-347 and VL-410 can serve as donor parents because of their ability of early maturity and resistance to blast disease.

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