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The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
TPI 2024; 13(4): 109-111

www.thepharmajournal.com
Received: 10-01-2024
Accepted: 12-03-2024

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Screening of finger millet genotypes for tolerance to blast disease in Bastar plateau region of Chhattisgarh

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Abstract
The field experiment was conducted during Kharif 2022 at Saheed Gundadhur College of Agriculture and Research Station, Jagdalpur, IGKV, Raipur (CG), to identify the resistant genotypes for blast disease (*Magnaporthe grisea*). The experiment was conducted under field condition. The screening revealed that none of the genotype was immune or highly resistant. Genotype CFMV 1 (30.63%) and TNEc 1341(9.44%) was recorded highly susceptible and resistant for neck blast respectively. Genotype VR 1163 (43%) was found susceptible for finger blast. The mean of all location revealed that the one genotype TNEc 1342 (8.84%) and IIMR-FM-R21-8011 (9.36) was resistant for neck blast. The incidence ranged from 8.84 to 21.16 and 14.75 to 26.13 in neck blast and finger blast respectively.

Keywords: Screening, finger millet, genotype, resistant and disease

Introduction
Millets are one of the oldest foods known to human and possibly the cereal grain to be used for domestic purpose. Finger millet (*Eleusine coracana*) commonly known as ragi, bird foot in different part of India. (Patro *et al.* 2018) [6]. Small millets are the conventional crops, which are easily grown in less fertile soils. The most important small millet crops are finger millet, kodo millet, little millet, foxtail millet, barnyard millet and proso millets which are grown in India (Netam *et al.* 2014) [5]. Finger millet (*Eleusine coracana*) is one of the major staple foods in tribal region of the rural community of Bastar, Chhattisgarh. It is commonly known as bird foot, mandia, ragi in different place of India. Finger millet is also known as ragi, African millet and bird's foot millet and an important staple food crop in part of eastern and central Africa and India. (Sandhya *et al.* 2017) [8]. In India, finger millet ranks next to pearl millet and is cultivated on 2.6 m ha area with a production of about 3.0 mt and accounts for 81% of the minor millets produced. A number of constraints limit finger millet production and productivity. In India, blast is one of the major diseases causing recurring yield losses in all the state (Seetharam 1983) [9]. Blast is the most destructive disease of finger millet because of its aggressiveness. Finger millet blast is caused by the fungus *Magnaporthe grisea* (anamorph *Pyricularia grisea).* The pathogen attacks all stages of crop development (vegetative and productive stages) (Mgonja M. *et al.* 2013) [3].

Material and Methods
Twenty seven entries were evaluated with one susceptible check (KMR 301) and one resistant check (GE 4449) under an initial varietal trail at upland Research Station cum Instructional Farm, Lamker under SG College of Agriculture and Research Station, Jagdalpur (CG) during *Kharif* season 2022. These entries were sown in two rows of 3 meter length and 22.5 cm × 10 cm spacing with to find out resistant sources against blast disease of finger millet. The recommended agronomic practices were adopted at the time of crop growth. Infected plants were examined for lesion development and disease severity was assessed on the basis of lesion length by using 1 to 9 scale (Anon, 2020) [1] (Table 1). Neck blast (%) and finger blast (%) incidence was calculated by using the following formula:

$$\text{Neck blast (\%)} = \frac{\text{No. of infected panicles}}{\text{Total number of panicle}} \times 100$$

$$\text{Finger blast (\%)} = \frac{\text{No. of infected finger}}{\text{Average no. of finger} \times \text{total number of panicle}} \times 100$$

Results & Discussion

Symptoms of blast disease *viz*. leaf, neck and finger millet were observed and recorded the per cent disease incidence in different finger millet genotype. Where leaf blast grade ranged (G) from 1-3 in which minimum grade observed in CFMV 1, KIFMG 21 and WN 660 (1.13) and maximum observed in WN 660 and GPU 106 (2.13), similarly the neck blast and finger blast per cent incidence ranged from 10 to 30.63% and 10.00 to 43.00% respectively. Genotypes WN 660, WN 666, GPU 105, BUFM 19-E-1, GE 6541, IIMR-FM-R21-8001, WN 577 and GPU 106 were found resistant for finger blast. This experiment was conducted in nine different centre which fall under different ecological condition and the mean of all centers revealed that no any genotype was found to be resistant for leaf blast, the minimum percentage of neck blast and finger blast severity was recorded in TNEc 1342 (8.84% and 14.75%) and the maximum percentage of disease severity was observed in VR 1163 (21.16%) and KIFMG 211 (26.13%) respectively.

Nagaraja *et al.* (2016) [4] Screened 12 finger millets cultivars and reported that GE 4449 and GPU 28 found resistant for leaf blast and GE 4449 and GPU 28 was moderately resistant for neck and finger blast. Divya *et al.* (2017) [2] evaluate 10 genotypes were evaluated of finger millets for blast disease and found all genotypes were free from blast disease incidence and recorded minimum percentage of neck blast severity in VL 379 (14.82%) and minimum finger blast severity in GPU 45 (19.70%). Patro *et al.* (2013) [11] evaluated 16 pre released and released varieties of finger millets and reported that nine varieties were resistant to all three forks of blast diseases.

Table 1: Standard Evaluation System (SES) scale for leaf blast disease

Score	Description	Reaction
1	Small, brown, pinhead size specks without sporulating centre	Highly Resistant (HR)
2	Small (1-2mm) roundish to elongated, necrotic grey spots with a distinct brown margin covering up to 5% leaf area	Resistant (R)
3	Typical blast lesions (≥3mm) with sporulating center, covering 6-10% of the leaf area	Resistant (R)
4	Blast lesions covering 11-20% leaf area	Moderately Resistant (MR)
5	Blast lesions covering 21-30% leaf area	Moderately Resistant (MR)
6	Blast lesions covering 31-40% leaf area	Susceptible (S)
7	Blast lesions covering 41-50% leaf area	Susceptible (S)
8	Blast lesions covering 51-75% leaf area	Highly Susceptible (HS)
9	Blast lesions covering >75% leaf area & plant dead	Highly Susceptible (HS)

Table 2: Screening of finer millet genotype for tolerance to blast disease

Screening of finer millet genotype for tolerance to blast disease							
S.No.	Genotype	Jagdalpur(Bastar)			Mean of Nine centre		
		LB(G)	NB (%)	FB (%)	LB(G)	NB (%)	FB (%)
1	CFMV 2	1.33	10.81	24.88	3.89	15.86	16.21
2	VR 1163	1.27	14.71	43.04	3.88	21.16	23.56
3	VR 1171	1.33	15.56	28.97	3.59	17.31	19.65
4	CFMV 1	1.13	30.63	25.83	3.72	20.74	21.88
5	TNEc 1341	1.53	9.44	24.00	3.73	15.96	17.99
6	KIFMG 211	1.13	10.00	28.04	3.53	17.75	26.13
7	KMR 654	1.27	10.00	21.94	3.44	13.95	17.93
8	KMR 655	1.27	10.06	27.78	4.25	16.56	22.04
9	VL 409	1.27	10.25	28.16	3.21	13.64	16.19
10	WN 660	1.13	10.00	10	3.79	13.99	16.47
11	WN 666	2.13	10.00	10.00	3.98	14.20	21.02
12	GPU 105	1.93	10.00	10.00	4.7	17.16	15.67
13	GPU 67	1.67	10.00	32.64	4.26	16.77	18.72
14	PPR 1216	1.60	10.55	20.30	4.21	16.21	15.18
15	BUFM 19-E-1	1.27	10.00	10.00	4.29	11.74	15.88
16	PR 1734	1.67	10.00	27.78	4.63	12.94	16.5
17	TNEc 1342	1.67	10.00	28.33	3.81	8.84	14.75
18	GE 6541	1.73	10.00	10.00	4.12	10.17	16.63
19	IIMR-FM-R21-8011	1.93	10.00	26.11	4.36	9.36	15.52
20	IIMR-FM-R21-8006	1.47	10.00	21.67	3.72	10.67	17.44
21	IIMR-FM-R21-8001	1.53	10.00	10.00	4.58	15.11	17.91
22	IIMR-FM-R21-8012	1.53	10.00	25.00	3.91	12.16	17.97
23	VL 402	1.20	10.00	24.45	2.95	18.50	21.53
24	VL 376	1.40	21.67	25.26	3.82	16.83	19.19
25	WN 577	1.73	10.00	10.00	4.16	12.86	17.66
26	GPU 106	2.13	10.00	10.00	4.83	12.82	16.11
27	PPR 1272	1.07	10.00	23.24	3.23	13.72	15.79
28	GE 4449 (RC)	1.13	11.80	22.08	2.57	7.70	10.71
29	KMR 301 (SC)	1.87	40.04	40.56	5.65	33.39	35.43
	C.D. (5%)	0.76	2.55	6.50	0.9	8.94	7.14
	C.V. (%)	31.01	12.39	17.72	24.42	52.47	38.38

Acknowledgement
Authors acknowledge to All India Coordinated Research Project on Small Millets, ICAR. GKVK, campus, Bengaluru to provide the grant for experiment. The work was carried out at Saheed Gundadhur College of Agriculture and Research Station, Jagdalpur, Bastar, Centre of IGKV, Raipur, Chhattisgarh to provide all necessary facilities.

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