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Research Article

IDENTIFICATION OF RESISTANT VARIETIES OF FINGER MILLET FOR LEAF, NECK AND FINGER BLAST

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ABSTRACT
Pyricularia grisea causes blast disease in rice, finger millet and more than 50 members of gramineae family. Blast is characteristically a leaf disease, but can also infect neck and fingers also. Thirty two finger millet genotypes were evaluated against leaf, neck and finger blast at research farm of Agricultural Research Station, Acharya N. G. Ranga Agricultural University, Vizianagaram, Andhra Pradesh. The genotypes i.e. KRI 013-11, WN 259 and DHFMV78-3-1 were moderately resistant or moderately susceptible to neck blast and susceptible to finger blast. The genotypes i.e. TNEC 1256 and PPR 1040 were susceptible to neck blast and moderately resistant or moderately susceptible to finger blast. The genotypes i.e. VR 990, GPU 91, IGRFM 08-4, VL352, KMR 344, PPR 1044, OEB 265, GPU 89, VL 384, GPU 90, GK 2, VR 708 and KOPN 939 were susceptible to both neck blast and finger blast. The genotypes i.e. BR 45, KRI 013-18, GPU 88, BR 90, TNEC 1234, DHFMV10-2-1, GK 1, VL 376, GPU 92, GPU 67, KMR 316, GPU 45, KMR 228 and GPU 93 were moderately resistant or moderately susceptible to both neck blast and finger blast.

Keywords: *Finger Millet, Blast, Pyricularia Grisea, Genotypes*

INTRODUCTION
Six millets are cultivated in India as grain and feed crops. These are finger millet *[Eleusine coracana* (L.) Gaertn.], foxtail millet *[Setaria italica* (L.) Beauv.], kodo millet *(Paspalum scrobiculatum* L.), little millet *(Panicum sumatrense* Roth ex Roem. & Schuh.), proso millet *(Panicum miliaceum* L.) and barnyard millet *[Echinochloa Jrumentacea* (Roxb.) Link]. Evolutionally their cultivation stretches from sea-level to almost 1828 m mean sea-level and grown in most adverse soil and climatic situations. Nutritionally the grains are rich in proteins, minerals and vitamins and comparable or even superior to major cereals in certain nutritional parameters. Finger millet (*Eleusine coracana* (L.) Gaertn.) is the most important small millet of the tropics (12% of global millet area) cultivated in over 25 countries of Asia and Africa predominantly as a staple food grain. In India it accounts for 81% of the minor millets produced (Shastri 1989). The ability of finger millet to tolerate drought and survive in infertile soils coupled with its high nutritional value has made this crop an integral part of farmers risk avoidance strategies as well as various health foods (Shastri 1989, Taylor and Emmambux 2008). The crop is an important part of hill agriculture where it is traditionally grown in marginal soil conditions with low inputs. The major constraint in the profitable production of finger millet in all the millet-growing regions of the world is blast disease caused by the fungus *Pyricularia grisea* Sacc. (perfect stage *Magnaporthe grisea* [Hebert]). Barr. The pathogen attacks all aerial parts of finger millet plant causing leaf, neck and finger blast and often resulting in >50% yield losses (Esele 2002). Leaf blast appears on leaf lamina with typical spindle shaped spots. Under congenial conditions, such spots enlarge, coalesce and leaf blades, especially from the tip to base, give a blasted appearance. Well-developed lesions may measure 0.5 cm X 2 cm. Neck blast is the most damaging stage of the disease. Five to ten cm of the peduncle almost immediately below the ear turns brown and later black due to fungal infection. An olive grey growth of the fungus may appear in this area. Infection at seed setting stage may result into sterility while delayed infection may result in underdeveloped seeds. The ears hand down from the stalk at the point of infection and sometimes may break away. Finger blast infection usually begins from the apical portion and runs towards the base. The extent of damage depends on the stage of infection and the weather conditions. At times, the entire finger

length of the ear is affected. The initial inoculum of the fungus generally comes from infected seeds. Intensity of the disease depends on the weather conditions. A temperature of 25-30^{0}C, humidity of 90 per cent and above, cloudy days with intermittent rainfall conditions are very favourable for the development and rapid spread of disease. If there are continuous rains at the time of heading heavy losses to the crop occur. An attempt was made to which can be employed in breeding programme for development of blast resistant material.

MATERIALS AND METHODS

A field experiment was conducted with thirty two finger millet genotypes were grown in a randomized block design with three replications at research farm of Agricultural Research Station, Vizianagaram, Andhra Pradesh during *Kharif* of 2013 with recommended agronomical practices with 50 N : 40 P : 25 K in kg/ha. Each genotype was sown in ten rows of 3.0 m length by adopting 22.5 cm between rows and 10 cm between the plants. Ten randomly selected plants were selected from each genotype/replication for recording the observations. All the genotypes were evaluated against leaf, neck and finger blast diseases under natural epiphytotic conditions.

Leaf blast: For assessing leaf blast incidence, following scale is adopted:

Grade	**Percentage leaf area affected**
0	No symptoms on the leaves
1	Small brown specks of pinhead size to slightly elongate, necrotic grey spots with a brown margin, less than 1% leaf area affected.
2	A typical blast lesion elliptical, 5-10 mm long, 1-5% of leaf area affected.
3	A typical blast lesion elliptical, 1-2 cm long, 5-25% of leaf area affected.
4	25-50% of leaf area affected.
5	More than 50% of leaf area affected.

In case of leaf blast, the assessment of different grades depends on the perception of symptoms by human eye. This perception depends on the capability to distinguish and read infection from the uninfected tissue. In addition based on previous experience the material perceived is rated in a way that is easily communicable. Such rating should be consistent, in which case they can be numerically analyzed and interpreted.

Neck blast and finger blast are recorded at dough stage of the crop. Neck blast is recorded as the percentage of ears showing infection on the peduncle and finger blast as the percentage of fingers affected is recorded.

$$\text{Per cent neck blast} = \frac{\text{Number of ears showing infection on peduncle/neck}}{\text{Total number of ears in a unit area}} \times 100$$

$$\text{Per cent finger blast} = \frac{\text{Number of infected fingers per unit area}}{\text{Total number of ears in a unit area}} \times 100$$

The resistance or susceptibility of the genotypes or the test entries to blast can be assessed using the following rating

Rank	**PDI**	**Reaction**	**Grade**
0	0	Immune	I/HR
1	0.1-2.00	Highly resistant	HR
2	2.01-10.00	Resistant	R
3	10.01-25.00	Moderately resistant/susceptible	MR/MS
4	25.01-50.00	Susceptible	S
5	>50.00	Highly susceptible	HS

Symptoms showing leaf, neck and finger blast

Statistical Analysis

In the present experiment, randomized block design (RBD) was applied. The analysis of variance technique was applied for drawing conclusions from the data. The calculated value of 'F' was compared with tabulated value at 5% level of probability for the appropriate degree of freedom (Fisher and Yates, 1968).

RESULTS AND DISCUSSION

It is evident from the table that all the 32 genotypes were affected with leaf, neck and finger blast disease. The genotypes i.e. KRI 013-11, WN 259 and DHFMV78-3-1 were moderately resistant or moderately susceptible to neck blast and susceptible to finger blast. The genotypes i.e. TNEC 1256 and PPR 1040 were susceptible to neck blast and moderately resistant or moderately susceptible to finger blast. The genotypes i.e. VR 990, GPU 91, IGRFM 08-4, VL352, KMR 344, PPR 1044, OEB 265, GPU 89, VL 384, GPU 90, GK 2, VR 708 and KOPN 939 were susceptible to both neck blast and finger blast. The genotypes i.e. BR 45, KRI 013-18, GPU 88, BR 90, TNEC 1234, DHFMV10-2-1, GK 1, VL 376, GPU 92, GPU 67, KMR 316, GPU 45, KMR 228 and GPU 93 were moderately resistant or moderately susceptible to both neck blast and finger blast. However, the genotypes GK 1 and KMR 229 have recorded lowest neck blast incidence of 16.0 and GPU 88 have recorded lowest finger blast incidence of 14.4 per cent, and the susceptible genotype VR 708 have recorded highest incidence of neck and finger blast of 46.3 per cent and 45.8 per cent respectively.

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Reaction of finger millet genotypes against leaf, neck and finger blast during *kharif* 2013 (mean of three replications)

S.No	Entry	Leaf Blast (Grade)	Neck Blast%	Disease Reaction	Finger Blast%	Disease Reaction
1	KRI 013-11	4	24.1	MR/MS	33.9	S
2	VR 990	5	28.6	S	31.0	S
3	GPU 91	4	33.6	S	33.0	S
4	BR 45	3	23.6	MR/MS	23.4	MR/MS
5	IGRFM 08-4	5	30.6	S	32.9	S
6	VL352	4	44.5	S	45.9	S
7	KRI 013-18	3	22.9	MR/MS	24.5	MR/MS
8	GPU 88	3	18.3	MR/MS	14.4	MR/MS
9	BR 90	4	21.2	MR/MS	21.6	MR/MS
10	TNEC 1234	5	23.6	MR/MS	24.6	MR/MS
11	KMR 344	4	35.5	S	33.6	S
12	DHFMV10-2-1	4	17.0	MR/MS	17.1	MR/MS
13	GK 1	4	16.0	MR/MS	13.7	MR/MS
14	VL 376	3	16.8	MR/MS	16.9	MR/MS
15	GPU 92	3	16.8	MR/MS	18.1	MR/MS
16	GPU 67	3	21.1	MR/MS	24.1	MR/MS
17	TNEC 1256	4	25.3	S	23.9	MR/MS
18	PPR 1044	5	40.1	S	41.8	S
19	OEB 265	4	25.3	S	30.7	S
20	KMR 316	4	21.5	MR/MS	22.1	MR/MS
21	GPU 89	4	25.7	S	27.1	S
22	VL 384	3	26.0	S	26.3	S
23	GPU 45	3	17.7	MR/MS	17.6	MR/MS
24	PPR 1040	4	25.3	S	24.9	MR/MS
25	GPU 90	4	35.5	S	32.7	S
26	GK 2	4	26.3	S	26.4	S
27	WN 259	4	24.8	MR/MS	26.2	S
28	KMR 228	3	16.0	MR/MS	18.8	MR/MS
29	VR 708	5	46.3	S	45.8	S
30	DHFMV78-3-1	3	22.4	MR/MS	26.5	S
31	GPU 93	3	16.4	MR/MS	17.0	MR/MS
32	KOPN 939	5	27.0	S	27.2	S
	SEM		1.58		1.39	
	CD (5%)		4.47		3.92	

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