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Identification of Resistant Sources of Finger Millet against *Pyricularia grisea* Sacc

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The present investigation was undertaken to evaluate the resistant genotypes amongst seven varieties of finger millet against major diseases during *kharif*, 2014 at Agricultural Research Station, Vizianagaram, Andhra Pradesh. Among them none of the variety could exhibit the immune reaction, in which DHFMV 10-2-1 was found to be resistant whereas VR 708 recorded as highly susceptible. The percent disease intensity of neck blast ranged from 15.0 to 64.6 where it was 66.0 in susceptible check VR 708. In case of finger blast, it was ranged from 10.5 to 54.6, whereas it was 55.4 in check. In case of banded blight, intensity ranged from 13.7 to 33.1 and it was recorded as 32.1 in check. The mean of all locations revealed that DHFMV 10-2-1 and VR 1076 were promising with ≈10% of disease and three varieties DHFMV 10-2-1, WN 259 and VR 1076 were resistant to banded blight with <10% incidence.

Key words: Finger millet, screening, blast, banded blight, resistant, susceptible.

Introduction

In India, of the cropped area of a little over 4 million hectares planted to small millets finger millet occupies first place with 50 per cent of the area. Andhra Pradesh is one of the major growing areas in India. Though the crop is less vulnerable to diseases, blast caused by *Pyricularia grisea* Sacc is the only serious disease problem wherever the crop is cultivated. The disease occurs at all the stages of plant growth *viz.*, germlings to earhead and even on seed. Disease appears on leaf lamina with typical spindle shaped spots. Under highly congenial conditions spots enlarge, coalesce and leaf blades especially from the tip towards base give a blasted appearance (Anilkumar *et al*., 2003). Ramappa *et al*. (2002) recorded upto 50 per cent neck blast and 70 per cent finger blast during *kharif*, 2000 in Mandya and Mysore districts. Banded blight of finger millet caused by *Rhizoctonia solani* is one of the emerging problems in successful cultivation of finger millet. The disease was observed in severe form

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at the university farms in Vizianagaram, Andhra Pradesh and Berhampur (Anilkumar *et al.*, 2003). The disease is characterized by oval to irregular light grey to dark brown lesions on the lower leaf sheath. The central portion of the lesions subsequently turns white to straw with narrow reddish brown border. Symptoms produced on every part of the plant thus gives a characteristic banded appearance, due to which the disease has been named as banded blight (Dubey, 1995). Under water logging conditions, it was found that causing considerable loss in grain yield. A temperature of around 28-30^0 C and a relative humidity of 70 per cent or above favours the rapid disease development. A genotype with resistance to two or more diseases offered scope in breeding programme to evolve multiple disease resistant variety combined with good yield potential. Hence, the study was undertaken to identify the finger millet resistant genotypes to major diseases.

Materials and Methods

A set of selected seven elite genotypes *viz.*, DHFMV 10-2-1, GPU 67, VR 990, WN 259, PR 202, VR 1076 and VR 708 (check) were evaluated against leaf, neck and finger blast under field conditions at Agricultural Research Station, ANGRAU, Vizianagaram during *kharif*, 2014. And the same experiment was carried out at seven AICRP (Bengaluru, Ranchi, Athyandal, Jagdalpur, Mandya and Berhampur). Each variety was sown in two rows of 3 m length with 22.5 × 10 cm spacing. Disease severity was recorded through visual estimation using a disease scale. Leaf blast (LB) and banded blight was recorded by using 0 to 5 scale (Anon, 1995) (Table 1, 2). The highest grade expressed by each entry out of five plants scored was considered as its reaction against the disease.

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

Score	Description	Reaction
0	No lesions/symptoms on leaves	No disease/HR
1	Small brown specks of pinhead to slightly elongate, necrotic grey spots with a brown margin, less than 1% area affected	R
2	A typical blast lesion elliptical, 5-10 mm long, 1-5% of leaf area affected	MR
3	A typical blast region elliptical, 1-2 cm long, 6-25 % of leaf area affected	MS
4	26-50 % leaf area affected	S
5	More than 50 % of leaf area affected with coalescing lesions	HS

Table 2: Standard Evaluation System (SES) scale for banded blight disease

Score	Description	Reaction
0	No incidence	No disease/HR
1	Vertical spread of the lesions up to 20% of plant height	HR
2	Vertical spread of the lesions up to 21-30% of plant height	R
3	Vertical spread of the lesions up to 31-45% of plant height	MR/MS
4	Vertical spread of the lesions up to 46-65% of plant height	S
5	Vertical spread of the lesions up to 66-100% of plant height	HS

Percent Disease Index (PDI) was calculated by using the following formula

$$\text{PDI for severity} = \frac{\text{Sum of all disease ratings}}{\text{Total no. of ratings} \times \text{Maximum disease grade}} \times 100$$

Results and Discussion

Symptoms of blast and banded blight disease were observed and percentage of disease severity was recorded. The data present in the table 3 revealed that a total of 10 finger millet genotypes were evaluated against major diseases, out of which none of the genotype could exhibit immune reaction. Among the genotypes screened, leaf blast grade ranged from 1-5 in which minimum grade (1.0) was found in DHFMV 10-2-1 as resistant and maximum (5.0) is in PR 202 and VR 708 as highly susceptible. Minimum percentage of neck and finger blast severity was recorded in DHFMV 10-2-1 (15.0 and 10.5) and the maximum percentage of disease severity was observed in PR 202 (64.6 and 54.6) where it was 66.0 and 55.4 in VR 708 (check) respectively. In case of banded blight, low severity was found in VR 1076 (12.7) and high in VR 708 (32.1).

This experiment was carried out in seven centers which fall under different ecological conditions and the mean of all centers revealed that DHFMV 10-2-1 was found to be resistant to leaf blast. Minimum percentage of neck blast severity was recorded in VR 1076 (6.4) and finger blast severity in DHFMV 10-2-1 and VR 1076 (10.3) and the maximum percentage of disease severity was observed in PR 202 (20.9 and 18.2). Whereas, low disease severity of banded blight was recorded in VR 1076 (6.4) and high in PR 202 (16.6). Though none of the test varieties were resistant to head blast, DHFMV 10-2-1 and VR 1076 were promising with ≈10% of disease and three varieties DHFMV 10-2-1, WN 259 and VR 1076 were resistant to banded blight with <10% incidence. Patro and Madhuri (2014) evaluated 32 finger millet genotypes and among them, two were susceptible to neck blast and moderately resistant to finger blast, 14 were moderately resistant and 13 were susceptible to

both neck and finger blast. Patro *et al.* (2013) evaluated 16 pre-released and released varieties of finger millet and reported that GPU 28 as immune to blast pathogen and nine varieties were resistant to all three forms of blast disease. Patro *et al* (2016) and Nagaraja *et al* (2016) screened 12 elite finger millet cultivars among them, GE 4449 and GPU 28 were reported to be resistance to leaf blast and GE 4440, GE 4449 and GPU 28 were moderate resistance/susceptible to neck and finger blast. Neeraja *et al*. (2016) screened 25 finger millet varieties and reported that nine varieties were resistant to moderately resistant to leaf blast and three were moderately resistance to both neck and finger blast.

Table 3: Reaction of finger millet entries against blast and banded blight

S. No.	Entry	Vizianagaram				Mean of nine centers			
		LB (G)	NB (%)	FB (%)	BB (%)	LB (G)	NB (%)	FB (%)	BB (%)
1	DHFMV 10-2-1	1.0	15.0	10.5	13.7	1.8	8.2	10.3	7.0
2	GPU 67	4.0	56.5	49.8	24.6	2.3	13.3	14.4	13.0
3	VR 990	4.0	53.6	41.5	20.4	2.7	12.9	13.3	10.4
4	WN 259	4.0	35.2	24.2	14.2	3.3	12.0	14.4	7.4
5	PR 202	5.0	64.6	54.6	33.1	3.3	20.9	18.2	16.6
6	VR 1076	3.0	24.2	16.9	12.7	2.1	6.4	10.3	6.4
7	VR 708 (Local)	5.0	66.0	55.4	32.1				

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