Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 2681-2683
Received: 13-03-2018
Accepted: 17-04-2018

TSSK Patro
Acharya NG Ranga Agricultural University, Agricultural Research Station, Vizianagaram, Andhra Pradesh, India

A Meena
Acharya NG Ranga Agricultural University, Agricultural Research Station, Vizianagaram, Andhra Pradesh, India

M Divya
Acharya N.G. Ranga Agricultural University, Agricultural Research Station, Vizianagaram, Andhra Pradesh, India

N Anuradha
Acharya N.G. Ranga Agricultural University, Agricultural Research Station, Vizianagaram, Andhra Pradesh, India

Correspondence
TSSK Patro
Acharya NG Ranga Agricultural University, Agricultural Research Station, Vizianagaram, Andhra Pradesh, India

Screening of Finger millet for major diseases and identification of resistant varieties

TSSK Patro, A Meena, M Divya and N Anuradha

Abstract
The present investigation was undertaken to evaluate the resistant genotypes amongst 30 varieties of finger millet against major diseases during *kharif*, 2017 at Agricultural Research Station, Vizianagaram, Andhra Pradesh. Among them none of the variety could exhibit the immune reaction, in which five varieties are found to be highly resistant and nineteen varieties are resistant whereas VR 708 recorded as highly susceptible to leaf blast. The percent disease incidence of neck blast ranged from 13.67 to 84.13 where it was 91.11 in susceptible check VR 708. In case of finger blast, it was ranged from 11.58 to 82.56, whereas the incidence was 92.26 in check. The mean of all locations revealed that seven varieties are found to be resistant to leaf blast. The incidence ranged from 19.98 to 69.04 and 18.20 to 50.77 in neck blast and finger blast respectively.

Keywords: finger millet, screening, resistant, susceptible

Introduction
Finger millet (*Eleusine coracana*) is one of the important cereal crop, originated in East Africa, belonging to the family Poaceae. Finger millet contributes to about 10 per cent of the total area (34.6 m ha) planted to millets. 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 m t and accounts for 81% of the minor millets produced (Shastri, 1989) [12]. It is commonly referred to as ragi, chodi, birds foot, nagli, mandua in different regions of the country. It is nutritionally rich in proteins, minerals, dietary fiber and phytochemicals and having more calcium than rice and wheat and is recommended for diabetes and other cardiovascular diseases. They are grown in soils which are typically poor to support any other crop. It is a food security crop and also demands high market prices. Further, it can be stored safely for many years without insect damage.
Although it is found to be a hardy crop, it is also affected by many diseases. The major constraint in the profitable production of finger millet in all the millet growing areas of the world is blast (*Pyricularia grisea*) and banded blight (*Rhizoctonia solani*) has been increasing problem and reported to cause considerable loss in grain yield. Blast disease appears on leaf lamina with typical spindle shaped spots and pathogen attacks all aerial parts of finger millet plant causing leaf, neck and finger blast and often resulting in >50% yield losses (Esele, 2002) [5]. Ramappa *et al*. (2002) [11] recorded upto 50 per cent neck blast and 70 per cent finger blast during *kharif*, 2000 in Mandya and Mysore districts. Banded blight disease was observed in severe form at the university farms in Vizianagaram, Andhra Pradesh and Berhampur (Anilkumar *et al*., 2003) [3]. 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) [3]. *Rhizoctonia solani* is a very common soil borne pathogen with a great diversity of host plants. Hence the diseases caused by this fungus are more serious and is of major importance throughout the world.

Material and Methods
An Initial Varietal Trial was conducted against finger millet blast cause by *Pyricularia grisea* during *kharif*, 2017 at Agricultural Research Station, Vizianagaram. The experiment was laid on a plot in Randomized Block Design, with 30 varieties, replicated three times which was sown in two rows of 3 m length with a spacing of 22.5 x 10 m. The recommended agronomic practices and other standard packages of practices were adopted at the time of crop growth period. Five randomly selected plants were selected from each genotype/replication for recording the observations. The genotypes of finger millet were screened under natural epiphytotic conditions and no artificial inoculation was made.

Infected plants were examined for lesion development and disease severity was assessed on the basis of lesion length by using 0 to 5 scale (Anon, 1995) [1] (Table 1). Neck blast (%) and finger blast (%) was calculated by using the following formula:

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

$$\text{Finger blast (\%)} = \frac{\text{No. of infected fingers}}{\text{Average no. of fingers} \times \text{Total number of panicles}} \times 100$$

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

Results and Discussion

The data on evaluation of 29 varieties against *Pyricularia grisea* revealed that none of the variety could exhibit the immune reaction, in which leaf blast grade ranged from 1 to 5 among those five varieties *viz*., PR1507, WN 585, OEB 602, IIMR FM 6655 and GMB are found to be highly resistant and nineteen varieties *viz*., WN 550, VR 1101, PR1511, WN 559, RAuF 15, ML 181, VL 390, KMR 633, KWDM 49, ML 322, VL 389, PRS 38, KMR 632, KOPN 1059, TNEC 1292, GPU 97, GPU 45, VL 352 and GPU 67 are resistant whereas VR 708 recorded as highly susceptible to leaf blast. The percent disease incidence of neck blast ranged from 13.67 (WN 550) to 84.13 (VL 352) where it was 91.11 in susceptible check VR 708. In case of finger blast, it was ranged from 11.58 to 82.56, in which lowest incidence was found in WN 550 (11.58) followed by PR 1507 (15.53) and highest was found in VR 352 (82.56) followed by VL 389 (80.67) whereas the incidence was 92.26 in check.

The same initial varietal trial was conducted under eight different locations including Vizianagaram which fall under different ecological conditions. The mean of all locations revealed that no varieties were found to be highly resistant and seven varieties are found to be resistant to leaf blast. In case of neck blast, the incidence ranged from 19.98 to 69.04 in which lowest incidence was found in WN 550 (19.98) followed by PR 1507 (28.66) and highest was recorded in PRS 38 (69.04) followed by IIMR FM 6655 (67.45). Lowest mean of finger blast incidence was found in PR 1507 (18.2) followed by GPU 97 (18.82) and highest in RAuF 15 (50.77) followed by PRS 38 (50.07). (Table 2).

Patro and Madhuri (2014) [9] evaluated 32 finger millet genotypes 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) [7] 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) [8] 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) [7] 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. Divya *et al.* (2017) [4] screened 10 genotypes were evaluated for resistance to blast none genotypes were found free from disease incidence. Minimum percentage of neck blast severity was recorded in VL 379 (14.82%), while the minimum finger blast severity (13.70%), was recorded in GPU 45.

Table 2: Reaction of finger millet entries in Initial Varietal Trial against blast

S. No	Entry	Vizianagaram			Mean of eight centers		
		LB (G)	NB (%)	FB (%)	LB (G)	NB (%)	FB (%)
1	PR 1507	2.33	16.15	15.53	4.17	28.66	18.2
2	WN 550	3.33	13.67	11.58	4.17	19.98	24.21
3	WN 585	2.33	71.35	73.3	2.89	55.23	42.18
4	OEB 601	4.00	70.29	70.11	4.44	46.43	42.27
5	VR 1101	3.00	62.07	59.55	4.11	49.64	34.62
6	PR 1511	2.67	52.22	60.33	4.61	35.03	31.41
7	WN 559	3.33	55.06	55.56	4.22	38.41	28.68
8	OEB 602	2.00	67.24	63.89	3.69	44.80	38.09
9	RAuF 15	3.33	72.38	70.78	4.83	64.24	50.77
10	ML 181	2.67	70.62	72.33	3.67	54.06	39.53
11	VL 390	2.67	43.91	44.44	3.33	46.52	29.11
12	IIMR FM 6655	2.33	73.63	70.11	3.89	67.45	42.24
13	KMR 633	3.00	51.46	48.22	3.72	42.11	23.82
14	KWFM 49	2.67	39.10	41.45	4.22	40.55	38.97
15	RAuF 13	3.67	55.66	61.67	4.06	50.48	34.68
16	ML 322	2.67	64.89	66.22	4.00	62.26	34.07
17	VL 389	2.67	79.83	80.67	3.50	50.53	41.86
18	PRS 38	2.67	72.08	66.56	5.00	69.04	50.07
19	KMR 632	3.00	66.57	68.22	4.00	46.67	38.46
20	KOPN 1059	2.67	39.88	45.33	4.39	39.06	30.87
21	TNEC 1292	2.67	69.78	73.89	4.11	67.32	54.36

22	GPU 97	2.67	32.97	33.89	4.11	31.74	18.82
23	TNEC 1294	3.67	49.37	50.11	5.39	54.30	42.88
24	GPU 96	3.67	60.46	59.78	3.56	39.53	26.99
25	GMB	2.33	62.03	60.65	3.33	45.85	29.32
26	GPU 45 (Check)	2.67	71.24	70.95	3.39	61.30	35.63
27	VL 352 (Check)	2.67	84.13	82.56	3.03	56.02	44.91
28	GPU 67 (Check)	3.00	34.09	30.44	5.17	43.79	20.85
29	PR 202 (Check)	3.67	43.60	49.33	4.39	49.68	35.18
30	VR 708	4.00	91.11	92.26			
	Mean	2.93	1737	1749.7		48.30	35.28
	CD (5%)	1.08	6.32	6.00		44.99	28.37
	CV	22.62	7.74	7.37		33.71	36.94

LB-Leaf blast, NB-Neck blast, FB-Finger blast

References

1. Anonymous. Package of practices for high yielding varieties, UAS, Bangalore, India, 1995.
2. Anilkumar TB, Mantur SG, Madhukeshwara SS. Diseases of finger millet. Project coordination cell. All India Coordinated Small Millets Improvement Project. ICAR, GKVK, Bangalore. 2003, 89.
3. Dubey SC. Banded blight of finger millet caused by *Thanatephorus cucumeris*. Indian Journal of Mycology and Plant Pathology. 1995; 25:315-316.
4. Divya M, Patro TSSK. Sandhya Rani Y, Triveni U, Anuradha, N. Reaction of *Eleusine coracana* (L) Gaertn early and medium duration varietiesnagainst major maladies. Progressive Research - An International Journal. 1995; 12(1):30-32.
5. Esele JP. Diseases of finger millet. A global review. Sorghum and finger millet diseases edited by Leslie JF, 2002, 19-26.
6. Nagaraja A, Bijendra Kumar, Jain AK, Patro TSSK, Nageswar Rao TG. Diseases of small millets. Diseases of field crops and their management. Indian Phytopathological Society. New Delhi. 2016, 295-371.
7. Neeraja B, Patro TSSK, Rani YS, Triveni U, Geethanjali K. Studies on three forms of blast (leaf, neck and finger) in finger millet (*Eleusine coracana* Gaertn.) incited by *Magnaporthe grisea* [Hebert]. Barr. *In vivo*. 6th International Conference "Plant, Pathogens and People". February, New Delhi, India. 2016; 269:23-27
8. Patro TSSK, Anuradha N, Madhuri J, Suma Y, Soujanya A. Identification of resistant sources for blast disease in finger millet (*Eleusine coracana* Gaertn.). Varietal Improvement of Small Millets. National seminar on "Recent Advances of Varietal Improvement in Small Millets. 2013, 5-6.
9. Patro TSSK, Madhuri J. Identification of resistant varieties of finger millet for leaf, neck and finger blast. International Journal of Food, Agriculture and Veterinary Sciences. 2014; 4(2):7-11.
10. Patro TSSK, Neeraja B, Sandhya Rani Y, Jyothsna S, Keerthi S, ansal A. Reaction of elite finger millet varieties against blast disease incited by Magnaporthe grisea in vivo. 2016; 11(2):209-212.
11. Ramappa HK, Ravishankar CR, Prakash P. Estimation of yield loss and management of blast disease in finger millet (ragi). Proc. Asian Cong. Mycol. Pl. Path. Oct 1-4, 2002. University of Mysore. 2002, 195.
12. Shastri BN. The wealth of India: A dictionary of Indian raw materials and industrial products. Publication and Information Directorate, CSIR, New Delhi. 1989; 160:6.