International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(3): 2184-2186

Received: 17-03-2018
Accepted: 18-04-2018

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

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

Evaluation of finger millet early and medium duration varieties against major diseases

TSSK Patro, A Meena, M Divya and N Anuradha

Abstract
Nine finger millet (*Eleusine coracana*) genotypes were evaluated for resistance to blast (*Pyricularia grisea*) at ARS, Vizianagaram, Andhra Pradesh, India, during *kharif*, 2017 under natural disease pressure. None of the genotypes was found free from disease incidence. Minimum percentage of neck and finger blast severity was recorded in PR 202 (51.33 and 26.38) and the maximum percentage of disease severity was observed in BR 14-3 (81.70 and 80.80) whereas it was 90.00 and 90.54 in VR 708 (check) respectively. On the basis of pooled data of all centers, Minimum percentage of neck and finger blast severity was recorded in KOPN 942 (2.91) and PR 202 (12.05) and the maximum percentage of disease severity was observed in GPU 67 (20.63) and BR 14-3 (35.46) respectively.

Keywords: Finger millet, screening, blast, resistant, susceptible

1. Introduction
Millets are one of the oldest foods known to humans and possibly the cereal grain to be used for domestic purposes. Finger millet (*Eleusine coracana*) commonly known as ragi, birds foot in different parts of India. It is a major food crop as well as feed and fodder for livestock especially in tribal belts. It contains a large proportion of carbohydrates and thus provides bulk of energy in diets. It is also rich in proteins, sulphur containing amino acids and because of its low glycemic index with high fibre it is recommended for diabetic patients. Apart from the major nutrients, it also contains iron and calcium, which is deficient in most Indian women. High calcium, high soluble fibre, low fat, high diastatic power of malted grains renders finger millet unique. It has proved to be very effective in controlling blood glucose level of diabetics. Consumption of finger millet prevents constipation and cholesterol.

However, it is traditionally grown in marginal soil conditions with low inputs. The major constraints in the millet growing regions are blast (*Pyricularia grisea*) and banded blight (*Rhizoctonia solani*). Blast pathogen attacks all aerial parts of finger millet plant causing leaf, neck and finger blast and often resulting in >50% yield losses (Esele, 2002) [4]. The average loss due to finger millet blast has been reported to be around 28% (Viswanath, 1997) [11] and has been reported as high as 80-90% in endemic areas. Ramappa *et al*. (2002) [10] recorded upto 50 percent neck blast and 70 percent finger blast during *kharif*, 2000 in Mandya and Mysore districts. Disease appears on leaf lamina with typical spindle shaped spots. Banded blight of finger millet caused by *R. solani* is one of the emerging problems in successful cultivation of finger millet. The disease was observed in severe form at the university farms in Vizianagaram, Andhra Pradesh and Berhampur (Anilkumar *et al*., 2003) [2]. 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]. 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 percent or above favours the rapid disease development. Host resistance is the most efficient, feasible, ecofriendly and cheapest way to control the diseases in finger millet. Limited information is available on resistant genotypes/varieties of these diseases for this region. In the present study, 10 entries of finger millet were evaluated against finger millet diseases under natural epiphytotic conditions during *kharif*, 2014.

2. Materials and methods

In order to find out resistant sources against major diseases of finger millet, field experiment was conducted with 9 finger millet genotypes having both early and medium duration varieties were grown in a randomized block design with three replications at research farm of Agricultural Research Station, Vizianagaram, Andhra Pradesh during *kharif,* 2017. The recommended agronomical practices with 25 N: 40 P: 25 K in kg/ha were adopted for better crop growth. Each genotype was sown in two rows of 3.0 m length by adopting 22.5 × 30 cm spacing. Five randomly selected plants were selected from each genotype/replication for recording the observations. The genotypes of different maturity groups 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) (Table 1).

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

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

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

3. Results and Discussion

Symptoms of blast were observed and percentage of disease severity was recorded (Table 2). 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 (1.67) was found in VL 386 as resistant and maximum (4.33) is in VR 708 as highly susceptible. Minimum percentage of neck and finger blast severity was recorded in PR 202 (51.33 and 26.38) and the maximum percentage of disease severity was observed in BR 14-3 (81.70 and 80.80) where it was 90.00 and 90.54 in VR 708 (check) respectively.

This experiment was carried out in 5 centers which fall under different ecological conditions and the mean of all centers revealed that no variety was found to be resistant to leaf blast. Minimum percentage of neck and finger blast severity was recorded in KOPN 942 (2.91) and PR 202 (12.05) and the maximum percentage of disease severity was observed in GPU 67 (20.63) and BR 14-3 (35.46) respectively.

Patro and Madhuri (2014) [8] 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) [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) [9] and Nagaraja *et al* (2016) [5] 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) [6, 9] 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 2: Evaluation of finger millet early and medium duration varieties for resistance to major diseases

S. No	Entry	Vizianagaram			Mean of five centers		
		LB (G)	NB (%)	FB (%)	LB (G)	NB (%)	FB (%)
1	VL 386	1.67	72.02	72.92	4.78	15.54	31.7
2	BR 14-3	2.33	81.70	80.80	4.78	11.29	35.46
3	PR 10-35	3.00	53.11	55.78	5.67	5.75	22.68
4	KOPN 942	2.67	64.56	65.35	5.11	2.91	26.3
5	GPU 45	3.00	63.22	62.26	5.67	10.03	32.83
6	VL 352	2.00	75.76	75.31	4.89	12.10	34.19
7	GPU 67	3.67	52.33	53.38	5.67	20.63	32.93
8	PR 202	2.67	51.33	26.38	4.56	4.53	12.05
9	VR 708 (Check)	4.33	90.00	90.54			
	Mean	2.81	2.84	2.96	5.14	10.35	28.52
	CD (5%)	0.93	8.53	8.87	1.08	3.30	20.55
	CV	19.03	8.85	9.45	12.04	18.22	41.14

4. Acknowledgement

Necessary facilities provided by Agricultural Research Station, Vizianagaram are acknowledged.

The work was carried out by utilizing the grants received from All India Coordinated Research

Project on Small Millets, ICAR. GKVK campus, Bengaluru.

5. 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 *Thanetephorus cucumeris*. Indian Journal of Mycology and Plant Pathology. 1995; 25:315-316.
4. Esele JP. Diseases of finger millet. A global review. Sorghum and finger millet diseases edited by Leslie JF. 2002, 19-26.
5. 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.
6. 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 23-27, 2016, New Delhi, India, 2016, 269.
7. 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.
8. 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.
9. Patro TSSK, Neeraja B, Sandhya Rani Y, Jyothsna S, Keerthi S, Bansal A. Reaction of elite finger millet varieties against blast disease incited by *Magnaporthe grisea in vivo*. 2016; 11(2):209-212.
10. 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.
11. Vishwanath S, Mantur SG, Channamma KAL. Recent approaches in the management of finger millet diseases. In Proc. National seminar on small millets. ICAR and TNAU, Coimbatore, 1997, 27-30.