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Resistance in finger millet (*Eleusine coracana* L. Gaertn.) cultivars against major diseases

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Abstract
Reaction of thirty two finger millet cultivars against leaf blast (*Pyricularia grisea*), banded blight (*Rhizoctonia solani*) and leaf blight (*Drechslera nodulosa*) was studied at two locations during *Kharif* 2019 under natural epiphytotic conditions. Average leaf blast severity, banded blight incidence and leaf blight incidence ranging from 2.2 to 7.0 Grade 15.8 to 37.1% and 22.0 to 75.0%, respectively were recorded. Finger millet cultivar GPU 100 was found resistant to leaf blast. Whereas, 19 were moderately resistant and 12 were susceptible. None of the screened cultivars were resistant to banded blight. However, 21 were moderately resistant and 11 were susceptible. Similarly, none of the cultivar was resistant to leaf blight. Finger millet cultivar VR 1125 was moderately resistant, 22 were susceptible and 9 were highly susceptible to leaf blight. In the present study, finger millet cultivar VR 1125 has shown multiple moderately resistant reaction against leaf blast, banded blight and leaf blight. Eleven cultivars namely PR 1643, PR 1506, PRS 38, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, VR 1125, VL 376, PPR 1091 were shown moderately resistant reaction against leaf blast and banded blight. These finger millet cultivars may be utilized in crop improvement programme.

Keywords: finger millet, resistance, leaf blast, leaf blight, banded blight

Introduction
Finger millet (*Eleusine coracana* L. Gaertn.) locally known as *Ragi* and *Madua* is one of the important coarse cereal crop belonging to family Poaceae and extensively grown in different states of India being maximum in Karnataka. It is predominantly a rainfed crop and can be cultivated under irrigation. The crop is a versatile millet rich in calcium (0.34%), dietary fiber (18%), phytates (0.48%), protein (6 - 13%), minerals (2.5 - 3.5%) and phenolics (0.3 - 3.0%). The crop is vulnerable to the huge diversity of opportunistic microbes leads to various diseases during plant growth. Among them, blast caused by *Pyricularia grisea*, leaf blight caused by *Drechslera nodulosa* are major one and occurs at all the stages of plant growth. In India, blast was first time reported by McRae (1920) [11] and leaf blight by Coleman (1920) [4]. These are seed borne in nature (Ranganathaiah and Mathur, 1978 [17] and Jain, 2020) [9] and causes significant yield loss under favourable environmental conditions. Bisht *et al.* (1985) [3] reported 4.44% loss in grain yield due to leaf blast, whereas leaf, neck and finger blast in combination accounted 20.11 % loss under natural field conditions. The yield loss can be as high as up to 87.5% in disease endemic areas under favourable climatic conditions (Rao, 1990) [18]. Reduction in grain per spikelet ranging from 5 to 70% was reported by Ramappa *et al.* (2004) [16] in finger millet due to blight caused by *Helminthosporium nodulosum*. Banded blight caused by *Rhizoctonia solani* is an emerging disease of finger millet and was first reported from Kerala (India) in a severe form by Das and Girija (1989) [5]. Now, the disease is prevalent in all the finger millet growing areas of the country (Nagaraja *et al.*, 2016) [12]. As the crop is grown by resource poor farmers in low fertile lands, management of the diseases by biocontrol agents and chemicals are not feasible. Use of resistant cultivars possessing multiple disease resistance is the best and economical alternative to combat with these devastating diseases. Jain and Yadava (2004) [8] identified GE 3022, GE 3024, GE 3058, GE 3060 and MR 6 finger millet genotypes showing consistent resistance against the blast and suggested few morphological, anatomical and biochemical parameters that can be used effectively in formulation of selection indices in the selection of resistant genotypes. Rigorous screening of finger millet cultivars has been carried out against the blast disease, but reports are meager against leaf blight (Jain *et al.*, 1987, Kiran Kumar, 2011, Bal *et al.*, 2020) [7, 10, 1] and banded blight disease (Prajapati, 2019, Patro *et al.*, 2020) [15, 14].

Hence, in the present study attempts were made to screen diverse finger millet cultivars for their reaction to major diseases under natural epiphytotic conditions.

Materials and Methods

Thirty two cultivars of finger millet including one resistant check (GE 4449) and one susceptible check (Uduru Mallige) were screened at two centers namely College of Agriculture, Rewa (M.P.) and Regional Agricultural Research Station, Dindori (M.P.) during Kharif 2019 in randomized block design in three replications. The seeds of the test cultivars were sown in two rows of 3.0 m length with row to row 25.0 cm and plant to plant 10.0 cm spacing. Infector rows of susceptible cultivar were planted after two test entries to create artificial epiphytotic. Recommended agronomical package of practices were followed for optimum plant growth. Ten plants of each cultivar from each replication were tagged and artificially inoculated with fresh sclerotia of *Rhizoctonia solani* at 40 days after sowing at Rewa centre. Sclerotia were inserted between the stem of the middle tiller of each plant and leaf sheath of basal node. Vertical spread of the disease in terms of relative lesion height (RLH) was recorded at 70 days after sowing using following formula.

$$\text{RLH (\%)} = \frac{\text{Total lesion length}}{\text{Total length of sheath}} \times 100$$

Leaf blast and leaf blight incidence was recorded in 10 plants from each replication at seedling stage (Bhatt and Mohan, 1988) [2] and maximum tillering stage, respectively by adopting 1-9 grade scale (Palanna and Das, 2019) [13].

Disease rating scale for leaf blast (1 - 9 scale)

Score	Description	Disease reaction
1	Small brown pinhead size specks without sporulating centre	Highly Resistant (HR)
2	Small roundish to elongated necrotic grey spots with a distinct brown margin covering up to 5% leaf area	Resistant (R)
3	Typical blast lesions with sporulating centre 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)

Disease rating scale for leaf blight (1 - 9 scale)

Score	Description	Disease reaction
1	< 1% leaf area affected	Highly Resistant (HR)
2	1 - 5% leaf area affected	Resistant (R)
3	6 -10% leaf area affected	Resistant (R)
4	11 - 20% leaf area affected	Moderately resistant (MR)
5	21 - 30% leaf area affected	Moderately resistant (MR)
6	31 - 40% leaf area affected	Susceptible (S)
7	41 - 50% leaf area affected	Susceptible (S)
8	51 - 75% leaf area affected	Highly Susceptible (HS)
9	>75% leaf area affected	Highly Susceptible (HS)

Disease rating scale for banded blight (1 - 9 scale)

Score	Description	Disease reaction
1	< 1% of plant area covered by lesion	Highly Resistant (HR)
2	1 - 5% of plant area covered by lesion	Resistant (R)
3	6 -10% of plant area covered by lesion	Resistant (R)
4	11 - 20% of plant area covered by lesion	Moderately resistant (MR)
5	21 - 30% of plant area covered by lesion	Moderately resistant (MR)
6	31 - 40% of plant area covered by lesion	Susceptible (S)
7	41 - 50% of plant area covered by lesion	Susceptible (S)
8	51 - 75% of plant area covered by lesion	Highly Susceptible (HS)
9	>75% of plant area covered by lesion & plant dead	Highly Susceptible (HS)

The collected data were transformed and analysed in randomized block design for their significance.

Results and Discussion

Incidence of leaf blast recorded in 32 cultivars of finger millet at Rewa and Dindori centre is presented in table 1. Average leaf blast incidence ranging from 2.0 to 7.3 grade with a mean of 5.6 grade was minimum in GPU 100 followed by IIMR-R18-5538 (3.0 grade) at Rewa. Whereas maximum incidence was in Uduru mallige, PR 202, TNEc 1311 and PPR 1082 followed by KOPN 1112, BR 14-2 and KMR 703 (7.0 grade). At Dindori, leaf blast incidence ranged 2.3 grade (GPU 100) to 7.0 grade (PRS 38) with a mean of 5.3 grade. On average of both the centres, leaf blast incidence ranged 2.2 to 7.0 grade with a mean of 5.5 grade. Finger millet cultivar GPU 100 was found resistant to leaf blast. On the basis of mean incidence, nineteen cultivars namely GPU 101, TNEc 1302, PR 1643, PR 1506, PRS 38, PRSW 43, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, DHFM 9-5, OEB 608, VR 1125, VL

376, GPU 67, GPU 45, GE 4449, PPR 1091 were moderately resistant and 12 namely KWFM 47, KOPN 1112, VL 399, VL 400, TNEc 1311, BR 14-2, PPR 1082, KMR 703, KMR 704, VR 1112, PR 202, Uduru Mallige were shown susceptible reaction. Blast being a polycyclic compound interest disease, components of partial resistance may play an important role in arresting the disease development (Gupta *et al.*, 2016) [6]. Earleir, finger millet cultivars GPU 45 and PR 202 were reported moderately resistant and susceptible, respectively to leaf blast by Bal *et al.* (2020) [1].

Vertical spread of banded blight in terms of relative lesion height (RLH) was recorded in 32 finger millet cultivars at Rewa and data are presented in Table-2. Significant variation in RLH ranging from 15.8 to 37.4% with an average of 27.7% was minimum in VL 399 followed by PR 1506 (16.0%), PPR 1091 (16.1%) and DPLN-2 (18.0%). Maximum RLH was recorded in GPU 101 followed by Uduru Mallige (37.1%), GPU 45 (36.8%), GPU 67 (35.9%) and KOPN 1112 (35.7%). None of the screened entry was highly resistant or resistant to banded blight. However, 21 cultivars i.e. KWFM 47, GPU 100, VL 399, VL 400, TNEc 1311, PR 1643, PR 1506, BR 14-2, PRS 38, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, PPR 1082, PPR 1091, KMR 703, KMR 704, VR 1125, VL 376, PR 202 were shown moderately resistant reaction and 11 i.e. KOPN 1112, GPU 101, TNEc 1302, PRSW 43, DHFM 9-5, OEB 608, VR 1112, GPU 67, GPU 45, GE 4449, Uduru Mallige were susceptible to banded blight. In earlier reports GPU 45, GPU 67, PR 202, VL 376 and Uduru Mallige were found susceptible to highly susceptible against banded blight (Prajapati, 2019 and Patro *et al.*, 2020) [15, 14]. In the present study, these cultivars except VL 376 were also found susceptible to banded blight.

Higher incidence of leaf blight ranging from 22.0 to 75.0% with a mean of 49% was recorded in 32 cultivars of finger millet at RARS, Dindori (M.P.) and data are presented in Tabe-2. Significant variation was recorded in leaf blight incidence among the finger millet cultivars. None of the tested cultivars was completely free or resistant to leaf blight. However, one cultivar VR 115 was found moderately resistant showing 22.0% disease incidence (5 Grade). Twenty two cultivars namely GPU 101, VL 399, TNEc 1302, TNEc 1311, PR 1643, PR 1506, BR 14-2, PRS 38, PRSW 3, IIMR-R 18-5538, IIMR-R 18-5725, OEB 608, PPR 1091, KMR 703, KMR 704, VR 1112, VL 376, GPU 45, GPU 67, PR 202, GE 4449, Uduru Mallige were susceptible and nine i.e. KWFN 47,KOPN 1112, GPU 100, VL 400, RAUF 21, DPLN-2, DHFM 4-9, DHFM 9-5, PPR 1082 were highly susceptible to leaf blight. Bal *et al.* (2020) [1] screened 33 finger millet genotypes and none was found resistant to brown spot. In the present study, three cultivars namely GPU 45, GPU 67 and PR 202 were shown susceptible reaction against leaf blight. Whereas Bal *et al.* (2020) [1] reported them as highly susceptible.

Thirty two cultivars of finger millet were grouped into different categories of reaction against leaf blast, banded blight and leaf blight and data are presented in table 3. All the screened cultivars of finger millet were shown differential reaction against the diseases. None of the screened cultivars were highly resistant to the above diseases. One cultivar GPU 100 was resistant to leaf blast. Seven cultivars namely VL 399, TNEc 1311, BR 14-2, KMR 703, KMR 704, VR 1112, Uduru Mallige were susceptible to leaf blast and leaf blight. Eleven cultivars PR 1643, PR 1506, PRS 38, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, VR 1125, VL 376, PPR 1091 were moderately resistant to leaf blast and banded blight. Whereas three i.e. KOPN 1112, VR 1112, Uduru Mallige were susceptible to both the diseases. Nine cultivars GPU 101, TNEc 1302, PRSW 43, OEB 608, VR 1112, GPU 45, GPU 67, GE 4449, Uduru Mallige were susceptible to leaf blight and banded blight. One finger millet cultivar VR 1125 was found moderately resistant to leaf blast, leaf blight and banded blight.

Table 1: Performance of finger millet cultivars against leaf blast

S. No.	Entry	Leaf blast (G)			
		Rewa	Dindori	Mean	Reaction
1	KWFM 47	6.7	5.3	6.0	S
2	KOPN 1112	7.0	5.3	6.2	S
3	GPU 100	2.0	2.3	2.2	R
4	GPU 101	5.7	2.7	4.2	MR
5	VL 399	6.7	5.3	6.0	S
6	VL 400	6.7	5.7	6.2	S
7	TNEC 1302	5.3	5.7	5.5	MR
8	TNEC 1311	7.3	5.3	6.3	S
9	PR 1643	5.7	5.7	5.7	MR
10	PR 1506	6.0	5.3	5.7	MR
11	BR 14-2	7.0	5.7	6.4	S
12	PRS 38	4.3	7.0	5.7	MR
13	PRSW 43	5.0	5.0	5.0	MR
14	IIMR-R18-5538	3.0	5.0	4.0	MR
15	IIMR-R18-5725	5.0	5.3	5.2	MR
16	RAUF 21	5.0	5.7	5.4	MR
17	DPLN-2	4.0	6.0	5.0	MR
18	DHFM-4-9	4.3	5.3	4.8	MR
19	DHFM-9-5	6.3	5.3	5.8	MR
20	OEB 608	4.3	6.0	5.2	MR
21	PPR-1082	7.3	6.0	6.7	S
22	PPR-1091	4.3	6.0	5.2	MR
23	KMR 703	7.0	5.0	6.0	S

24	KMR 704	6.7	5.7	6.2	S
25	VR 1112	6.7	5.3	6.0	S
26	VR 1125	6.7	5.0	5.9	MR
27	VL 376	4.7	5.7	5.2	MR
28	GPU 67	4.7	4.7	4.7	MR
29	GPU 45	5.7	5.3	5.5	MR
30	PR 202	7.3	5.0	6.2	S
31	GE 4449	4.0	4.7	4.4	MR
32	Uduru Malige	7.3	6.7	7.0	S
	Location mean	5.6	5.3	5.5	

(R = Resistant, MR = moderately resistant, S = Susceptible)

Table 2: Performance of finger millet cultivars against banded blight and leaf blight

S. No.	Entry	Rewa		Reaction	Dindori		Reaction
		Banded Blight			Leaf blight		
		RLH (%)	Grade		Incidence (%)	Grade	
1	KWFM 47	24.0(28.96)	5	MR	55.3(48.05)	8	HS
2	KOPN 1112	35.7(36.62)	6	S	75.0(60.05)	8	HS
3	GPU 100	27.9(31.75)	5	MR	65.3(53.94)	8	HS
4	GPU 101	37.4(37.63)	6	S	48.3(44.02)	7	S
5	VL 399	15.8(23.40)	4	MR	45.3(42.30)	7	S
6	VL 400	27.8(31.62)	5	MR	63.3(52.75)	8	HS
7	TNEC 1302	32.0(34.30)	6	S	46.0(42.68)	7	S
8	TNEC 1311	20.6(26.55)	5	MR	45.7(42.49)	7	S
9	PR 1643	26.9(31.06)	5	MR	36.3(37.02)	6	S
10	PR 1506	16.0(23.47)	4	MR	36.0(36.83)	6	S
11	BR 14-2	29.5(32.84)	5	MR	45.0(42.11)	7	S
12	PRS 38	27.9(31.82)	5	MR	51.7(45.95)	7	S
13	PRSW 43	33.5(35.23)	6	S	46.7(43.07)	7	S
14	IIMR-R18-5538	25.2(30.12)	5	MR	52.3(46.34)	7	S
15	IIMR-R18-5725	27.3(31.36)	5	MR	48.3(44.02)	7	S
16	RAUF 21	28.7(32.16)	5	MR	58.3(49.81)	8	HS
17	DPLN-2	18.0(25.06)	4	MR	73.3(58.98)	8	HS
18	DHFM-4-9	25.4(30.22)	5	MR	75.0(60.05)	8	HS
19	DHFM-9-5	30.8(33.53)	6	S	71.7(57.96)	8	HS
20	OEB 608	30.1(33.07)	6	S	32.7(34.84)	6	S
21	PPR-1082	25.0(29.87)	5	MR	63.3(52.75)	8	HS
22	PPR-1091	16.1(23.55)	4	MR	44.0(41.54)	7	S
23	KMR 703	22.0(27.60)	5	MR	34.0(35.58)	6	S
24	KMR 704	27.8(31.81)	5	MR	43.3(41.15)	7	S
25	VR 1112	32.1(34.23)	6	S	46.3(42.87)	7	S
26	VR 1125	23.8(29.08)	5	MR	22.0(27.55)	5	MR
27	VL 376	27.9(31.71)	5	MR	43.3(41.15)	7	S
28	GPU 67	35.9(36.79)	6	S	46.7(43.07)	7	S
29	GPU 45	36.8(37.30)	6	S	33.0(35.04)	6	S
30	PR 202	28.7(32.34)	5	MR	35.0(36.24)	6	S
31	GE 4449	32.8(34.91)	6	S	44.7(41.91)	7	S
32	Uduru Malige	37.1(37.51)	6	S	41.0(39.78)	7	S
	Location. Mean	27.70	5		49.0	7	
	SEm±	2.465			1.622		
	C.D. (5%)	6.986			4.598		

Figures in parentheses are angular transformed values
(MR = moderately resistant, S = Susceptible, HS = highly susceptible))

Table 3: Grouping of finger millet cultivars against major diseases

Reaction	Leaf blast	Leaf blight	Banded blight	Leaf blast & Leaf blight	Leaf blast & banded blight	Leaf blight & Banded blight
Highly resistant	Nil	Nil	Nil	Nil	Nil	Nil
Resistant	GPU 100	Nil	Nil	Nil	Nil	Nil
Moderately resistant	GPU 101, TNEc 1302, PR 1643, PR 1506, PRS 38, PRSW 43, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, DHFM 9-5, OEB 608, VR 1125, VL 376, GPU 67, GPU	VR 1125	KWFM 47, GPU 100, VL 399, VL 400, TNEc 1311, PR 1643, PR 1506, BR 14-2, PRS 38, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, PPR 1082, PPR 1091, KMR 703,	VR 1125	PR 1643, PR 1506, PRS 38, IIMR-R 18-5538, IIMR-R 18-5725, RAUF 21, DPLN-2, DHFM 4-9, VR 1125, VL 376, PPR 1091	VR 1125

	45, GE 4449, PPR 1091		KMR 704, VR 1125, VL 376, PR 202			
Susceptible	KWFM 47, KOPN 1112, VL 399, VL 400, TNEc 1311, BR 14-2, PPR 1082, KMR 703, KMR 704, VR 1112, PR 202, Uduru Mallige	GPU 101, VL 399, TNEc 1302, TNEc 1311, PR 1643, PR 1506, BR 14-2, PRS 38, PRSW 3, IIMR-R 18-5538, IIMR-R 18-5725, OEB 608, PPR 1091, KMR 703, KMR 704, VR 1112, VL 376, GPU 45, GPU 67, PR 202, GE 4449, Uduru Mallige	KOPN 1112, GPU 101, TNEc 1302, PRSW 43, DHFM 9-5, OEB 608, VR 1112, GPU 67, GPU 45, GE 4449, Uduru Mallige	VL 399, TNEc 1311, BR 14-2, KMR 703, KMR 704, VR 1112, Uduru Mallige	KOPN 1112, VR 1112, Uduru Mallige	GPU 101, TNEc 1302,PRSW 43,OEB 608, VR 1112, GPU 45, GPU 67, GE 4449, Uduru Mallige
Highly susceptible	Nil	KWFN 47,KOPN 1112, GPU 100, VL 400, RAUF 21, DPLN-2, DHFM 4-9, DHFM 9-5, PPR 1082				

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References

1. Bal SS, Kumar S, Mishra IOP, Mahapatra PM, Panigrahi RK, Panda PK. Evaluation of finger millet genotypes against three major diseases in east and south eastern coastal plain zone of Odisha. J Pharmacogn. Phytochem 2020;9(3):635-639.
2. Bhatt J, Mohan D. Vulnerable growth stage for leaf blast occurrence in finger millet (*Eleusine coracana* (L.) Gaertn.). Millets Newsl 1988;7:44.
3. Bisht IS, Bhatt JC, Joshi HC. Assessment of losses in ragi due to blast disease in Kumaon hills. Indian Phytopath 1985;38:745-746.
4. Coleman LC. The cultivation of ragi in Mysore. Bull. Dep. Agric. Mysore. Gen. Ser. 11, 1920.
5. Das L, Girija VL. Sheath blight of Ragi. Curr. Sci 1989;58:681-682.
6. Gupta DK, Jain AK, Kumar A. Evaluation of finger millet genotypes for partial resistance to leaf blast caused *Pyricularia grisea*. Electron. J Plant Breed 2016;7(4):939-946.
7. Jain AK, Tripathi SK, Verma SNP. Note on field reaction of ragi to *Helminthosporium* disease. Millets Newsl 1987;6:45.
8. Jain AK, Yadava HS. Mechanism of blast resistance in finger millet (*Eleusine coracana* L. Gaertn.). Tropical Agriculture 2004;81(2):73-79.
9. Jain AK. Seed borne mycoflora of finger millet and their management: A review. The Pharma Innovation 2020;9(8):219-225.
10. Kiran Kumar AC. Studies on brown leaf spot disease (*Helminthosporium* spp.) of finger millet and foxtail millet. Bengaluru, India. M. Sc. (Agri.) Thesis, Dept. of Plant Pathology, University of Agricultural Science, Bengaluru, India 2011.
11. Mc Rae W. Detailed Administration Report of the Government Mycologist for the year 1919-20, 1920.
12. Nagaraja A, Kumar B, Jain AK, Sabalpara AN. Emerging diseases: Need for focused research in small millets. J Mycopathol. Res 2016;54(1):1-9.
13. Palanna KB, Das IK. Small Millets Pathology (Standard Operating Principles) 2019, 8-9.
14. Patro TSSK, Georgia KE, Raj Kumar S, Anuradha N, Sandhya Rani Y, Triveni U *et al*. Evaluation of finger millet early and medium duration varieties against blast and banded blight. Int. J Chem. Stud 2020;SP-8(5):148-150.
15. Prajapati S. Studies on banded leaf and sheath blight of finger millet caused by *Rhizoctonia solani* Kuhn. M.Sc. (Ag) Thesis (Plant Pathology), JNKVV, College of Agriculture, Rewa, M.P., India 2019, 1-83.
16. Ramappa HK, Ravishankar CR, Prakash P. Effect of blight disease on grain yield in finger millet varieties (*Eleusine coracana*) and its fungicidal management. Proceedings of 3rd National seminar on Millets Research and Development-Future policy options in India. Vol. III: Small Millets 2004, 68-70.
17. Ranganathaiah KG, Mathur SB. Seed borne infection of *Drechslera nodulosa* and *Pyricularia grisea* on finger millet in Karnataka state. Indian Psychopath 1978;31(4):480-481.
18. Rao ANS. Estimation of losses in finger millet (*Eleusine coracana*) due to blast disease (*Pyricularia grisea*). Mysore J Agric. Sci 1990;24:57-60.