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Identification of resistant sources in Donor Screening Nursery (DSN) of Barnyard millet against *Rhizoctonia solani,* the cause of sheath blight

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Abstract
A field experiment was conducted during *kharif*, 2017 at the Agricultural Research Station, Vizianagaram, Acharya N.G. Ranga Agricultural University, to identify the resistant sources for *Rhizoctonia solani* which causes banded blight disease in barnyard millet. Results revealed that none of the genotypes was found free from sheath blight incidence. However, varieties VB-16-7 (40.00), VB-16-8 (46.67), VB-16-20 (49.33), LRB-9 (44.00) and LRB-19 (49.30) were found to be resistant. Varieties VB-15-3 (56.00), VB-15-6 (57.33), VB-16-31 (52.00), PRB 903 (54.67), LRB-1 (52.00) and LRB-26 (56.00) as moderately resistant to moderately susceptible. Whereas, VB-15-1 (80.00) and LRB-21 (81.33) were found to be as susceptible. Whereas, VMBC-331 (local check) was recorded 86.67%. These genotypes may be directly utilized for cultivation or for breeding varieties with inbuilt resistance against banded blight.

Keywords: barnyard millet, banded blight, screening, *Rhizoctonia solani*, resistant, susceptible

Introduction
Barnyard millet (*Echinochloa frumentacaea*) is one of the hardiest millets, which is called by several names *viz.*, Japanese barnyard millet, ooda, oadalu, sawan, sanwa, and sanwank. Nutritionally, Barnyard millet is an important crop. It is a fair source of protein, which is highly digestible and is an excellent source of dietary fibre with good amounts of soluble and insoluble fractions (Hadimani and Malleshi 1993; Veena *et al.* 2005) [4, 12]. The carbohydrate content is low and slowly digestible (Veena *et al.* 2005) [12], which makes the Barnyard millet a natural designer food.

In India, barnyard millet is the second important small millet after finger millet having production and productivity 87 thousand tonnes and 857 kg/ha, respectively (Padulosi *et al.* 2009) [7]. In India, it is mainly cultivated in two different agro-ecologies, one in mid hills of Himalayan region of Uttarakhand in the North and another in Deccan plateau region of Tamil Nadu in the south. Wild barnyard millet (*Echinochloa colona*) is commonly found in rice fields as weed and consumed as food during drought years in many states of India (Padulosi *et al.* 2009) [7].

By any nutritional parameter millets are miles ahead of rice and wheat in terms of their mineral content compared to rice and wheat (Gopalan *et al* 2007) [3]. Staggered use of chemicals for the management of crop disease is often associated with problems such as pollution hazards and residual toxicity. Of course the diseases can effectively be controlled by application of fungicides. However, the poor farmers required only varieties with resistance to the diseases. A genotype with resistance to banded blight offered scope in breeding programme to evolve multiple disease resistant variety combined with good yield potential. Hence, the study was undertaken to identify the millet genotypes resistant to banded blight disease.

Material and Methods
Thirteen varieties of little millet collected from GKVK, Bangalore were screened against *R. solani*, the cause of banded blight at Agricultural Research Station, Vizianagaram. The genotypes were screened under field conditions during *kharif*, 2017 for selection of resistant genotypes with recommended agronomic practices. And the trial was also carried out at only one center *i.e.*, Vizianagaram. 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, 1996) [1] (Table 1).

Table 1: Standard Evaluation System (SES) scale for sheath blight disease

Score	Description	Reaction
0	No incidence	Immune
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 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

Twenty three barnyard millet varieties were screened for banded blight reaction. Among those, no variety was found to be immune to *R. solani* also none found to be resistant. However, varieties VB-16-7 (40.00), VB-16-8 (46.67), VB-16-20 (49.33), LRB-9 (44.00) and LRB-19 (49.30) were found to be resistant. Varieties VB-15-3 (56.00), VB-15-6 (57.33), VB-16-31 (52.00), PRB 903 (54.67), LRB-1 (52.00) and LRB-26 (56.00) as moderately resistant to moderately susceptible. Whereas, VB-15-1 (80.00) and LRB-21 (81.33) were found to be as susceptible. Whereas, VMBC-331 (local check) was recorded 86.67% (Table 2).

Patro *et al.*, (2017) [9] evaluated ten varieties where the disease intensity ranges from 85.33% (VL 207) to 97.33% (DHBM 18-6, VL 249 and DHBM 99-6) while it was 98.67% in the local check. Divya *et al.*, (2016) [2] evaluated thirteen varieties the percentage disease intensity ranged from 27.9% (ACM 10-082) to 92.5% (RBM 7-2) whereas it was 93.7% in susceptible check. Mean of all five locations revealed that ACM 10-082 as highly resistant, VL 172 and DHB 23-3 as resistant and remaining varieties as moderately resistant. Patro *et al* (2014) [10] and Nagaraja *et al* (2016) [5] reported that all the small millet crops were found infected with *R. solani*, whereas in the screening of little millet LAVT 19 and LAVT 14 were found as resistant genotypes. Similar research was also done in other small millet crops by Neeraja *et al*., 2016, Patro *et al*., 2013 and Patro *et al*., 2016 [6, 11, 12]. These genotypes would be of immense value to the breeders involved in developing high yielding resistant genotypes of little millet.

Table 2: Evaluation of barnyard millet donor screening nursery (DSN)

S. No.	Entry	Vizianagaram
1	VB-15-1	80.00
2	VB-15-2	70.67
3	VB-15-3	56.00
4	VB-15-4	62.67
5	VB-15-6	57.33
6	VB-16-7	40.00
7	VB-16-8	46.67
8	VB-16-20	49.33
9	VB-16-24	72.00
10	VB-16-31	52.00
11	UURB-2015-1	62.67
12	PRB 903	54.67
13	LRB-4	52.00
14	LRB-5	72.00
15	LRB-7	70.67
16	LRB-9	44.00
17	LRB-11	66.67
18	LRB-19	49.33
19	LRB-21	81.33
20	LRB-25	65.33
21	LRB-26	56.00
22	LRB-27	61.33
23	VMBC 331	86.67
	Mean	61.28
	CD (5%)	7.10
	CV	8.32

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