



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(3): 2189-2191

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Received: 19-03-2018

Accepted: 20-04-2018

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Evaluation of donor screening nursery (DSN) of foxtail 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 foxtail millet. Results revealed that none of the genotypes was found free from sheath blight incidence. However, two varieties SiA 2863 (24.00) and ISC 74A (32.00) were found to be resistant. Four varieties were moderately resistant to moderately susceptible. Whereas, SiA 3208 (local check) was recorded 70.67%. The mean of two centers revealed that SiA 2863 (19.22) were found to be highly resistant. However, SiA 2697 (28.67), ISc 1199 (21.25), ISC 74A (35.72), ISc 789 (34.83) and GS 889 (35.44) were recorded resistant. However, SiA 2689 (42.67) was moderately resistant to moderately susceptible. These genotypes may be directly utilized for cultivation or for breeding varieties with inbuilt resistance against banded blight.

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

1. Introduction

Foxtail millet (*Setaria italica* L.) a crop rich in nutrients, originated in China. Millets have been in food use since time immemorial and an array of traditional healthy foods are prepared across rural India. Foxtail millet (*Setaria italica* L.), a crop rich in nutrients, originated in China. Presently, foxtail millet is extensively cultivated as a food and fodder crop throughout Eurasia and the Far East (Ning, 2015) [7]. Millets have been in food use since time immemorial and an array of traditional healthy foods are prepared across rural India. However, food use of millets is fast decreasing due to several reasons. Apart from health benefits, millets are also good source of energy, protein, vitamins and minerals (Ravindran, 1991) [12]. Millet foods are also known for their low glycemic index (Itagi, 2003 and Singh *et al.*, 2010) [4, 13]. There is therefore a need to revive these important groups of health promoting foods to enhance nutritional quality of diets of consumers. Among the millets foxtail millet (*Setaria italica*) is an important underutilized grain, grown in various parts of India. It grows well even under adverse agro climatic conditions. It is also called as navane. Among the millets, foxtail millet is a good source of protein (12.3 g/100g) and dietary fiber (14 g/100g). The carbohydrate content is low (60.9 g/100g). Besides, it is rich in minerals (3 g/100g) and phytochemicals. Foxtail millet is a good source of β carotene (126-191 μ g/100g, Goudar *et al.*, 2011) [3]. This millet has been proved to be suitable for people suffering from metabolic disorders (Itagi, 2003) [4]. Hence, in the present study foxtail millet was chosen for development of nutritious bread.

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) [2]. 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.

2. Material and Methods

Eleven varieties of foxtail 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 *khari*, 2017 for selection of resistant genotypes with

recommended agronomic practices. And the same trial was also carried out at two centers *viz.*, Ranchi and 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

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

3. Results and Discussion

Eleven varieties foxtail 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, two varieties SiA 2863 (24.00) and ISC 74A (32.00) were found to be resistant. Varieties SiA 2697 (47.00), SiA 2689 (42.67), ISc 789 (41.33) and IS 1199 (40.00) were moderately resistant to moderately susceptible. GS 1329 (69.33) was found to be as susceptible. Whereas, SiA 3208 (local check) was recorded 70.67% (Table 2).

The mean of two centers revealed that SiA 2863 (19.22) were found to be highly resistant. However, SiA 2697 (28.67), ISc

1199 (21.25), ISC 74A (35.72), ISc 789 (34.83) and GS 889 (35.44) were recorded resistant. However, SiA 2689 (42.67) was moderately resistant to moderately susceptible. Whereas GS 1329 was recorded 69.33% and local check as 55.89%. Patro and Madhuri (2014)^[9] screened 16 foxtail millet genotypes and reported that minimum percentage of disease severity was recorded in VFMC-391. However, eight genotypes were evaluated as resistant. Patro *et al.* (2014)^[9, 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^[6, 11], Patro *et al.*, 2013^[8] and Patro *et al.*, 2016^[11]. These genotypes would be of immense value to the breeders involved in developing high yielding resistant genotypes of little millet.

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

S. No.	Entry	Vizianagaram	Entry	Mean over two centers
1	SiA 2863	24.00	SiA 2863	19.22
2	SiA 2697	47.33	SiA 2697	28.67
3	SiA 2657	52.00	SiA 2657	52.00
4	SiA 2689	42.67	SiA 2689	42.67
5	SiA 2844	61.33	SiA 2844	61.33
6	ISC 74A	32.00	ISC 74A	35.72
7	ISc 789	41.33	ISc 789	34.83
8	GS 889	62.00	GS 889	35.44
9	GS 1329	69.33	GS 1329	69.33
10	ISc 1199	40.00	ISc 1199	21.25
11	SiA 3208	70.67	Local check	55.89
	Mean	49.33	Mean	35.00
	CD (5%)	9.67	CD (5%)	9.67
	CV	11.51	CV	11.51

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