



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; 9(5): 1265-1267

Received: 19-06-2020

Accepted: 27-07-2020

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Identification of foxtail millet varieties against banded blight disease incited by *Rhizoctonia solani* Kuhn

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Abstract

Sixteen genotypes of foxtail millet were screened for sheath blight disease severity caused by *Rhizoctonia solani* were studied during *kharif*, 2019 at Agricultural Research Station, Vizianagaram, Andhra Pradesh. The screening revealed that none of the test lines or varieties was immune or highly resistant. However, TNSi 417 (50.0%) was recorded as susceptible. Percent disease severity ranged from 50.0% (TNSi 417) to 89.7% (TNSi 419) whereas it was 96.3% in susceptible check (SiA 3367).

Keywords: Foxtail millet, screening, resistant, susceptible, blast, banded blight

Introduction

Small millets grown in India mainly constitute Finger millet, Foxtail millet, Kodo millet, Little millet, Proso millet and Barnyard millet. Among the six small millets, Italian millet (*Setaria italica* (L.) P. Beauv) is an important crop next only to finger millet. Foxtail millet is fairly tolerant to drought; it cannot tolerate water logging. It is one of the world's oldest cultivated millet in the Poaceae family, distributed widely among the millets. Foxtail millet, is also known as Italian millet and its other colloquial names kangni, navane, tenai, korra and rala. China is regarded as the centre of origin of foxtail millet (Vavilov, 1926) [13]. In India it is cultivated in an area of 5 lakh hectares and the production of 2.9 million tons with productivity of 600 kg per hectare (Anon., 2016) [1]. At present, foxtail millet (*Setaria italica*) is cultivated on a limited area in Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, Rajasthan, Madhya Pradesh, Uttar Pradesh and north eastern states. Foxtail millet grains are rich in protein, fibre, β carotene, minerals *viz.*, calcium, iron, potassium, magnesium, zinc, antioxidants and vitamins (Rai, 2002) [11]. The grains with husk intact have long shelf life which is a preferable attribute (Ravi *et al.*, 2010) [12].

Foxtail millet has been affected with many diseases like blast, rust, smut, brown spot, downy mildew and udbatta have been reported on this crop, blast, rust and downy mildew diseases are the yield limiting biotic constraints (Nakayama *et al.*, 2005) [3] and banded blight has been emerged as a deadly disease in this crop which hinders the yield. Under water logging conditions, found infected with sheath blight disease caused by a soil borne necrotrophic fungi *Rhizoctonia solani* kuhn. Causing considerable loss in grain yield under favorable environmental conditions. The disease is characterized by oval to irregular light grey to dark brown lesions on the lower leaf sheath. A temperature of around 28-30 °C and a relative humidity of 70 per cent or above favors the rapid disease development where these lesions enlarge rapidly and coalesce to cover larger portions of the sheath and leaf lamina. At this stage, the disease symptom is characterized by a series of copper or brown color bands across the leaves giving a very characteristic banded appearance.

Materials and methods

A field experiment was conducted against sheath blight caused by *Rhizoctonia solani* during *kharif*, 2019 at Agricultural Research Station, Vizianagaram. The experiment was laid on a plot in Randomized Block Design, with 16 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 foxtail 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, 1996)^[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 upto 20% of the plant height	HR
2	Vertical spread of the lesions upto 21-30% of the plant height	R
3	Vertical spread of the lesions upto 31-45% of the plant height	MR/MS
4	Vertical spread of the lesions upto 46-65% of the plant height	S
5	Vertical spread of the lesions upto 66-100% of the 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

16 entries were evaluated during *kharif* 2019 in foxtail millet against banded blight disease. The screening revealed that none of the test lines or varieties was immune or highly resistant. However, TNSi 417 (50.0%) was recorded as susceptible. Percent disease severity ranged from 50.0% (TNSi 417) to 89.7% (TNSi 419) whereas it was 96.3% in susceptible check (SiA 3367) (Table 2).

Patro *et al.*, 2018^[5] screened 11 varieties and reported that 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%. Patro and Madhuri (2014)^[6] 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)^[8] and Nagaraja *et al.* (2016)^[2] 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^[4], Patro *et al.*, 2013^[6] and Patro *et al.*, 2016^[9]. These genotypes would be of immense value to the breeders involved in developing high yielding resistant genotypes of little millet. Patro *et al.*, 2019^[10] reported that SiA 3159 (35.5%) and SiA 3274 (38.2%) was recorded as moderately resistant when screened 18 foxtail millet entries against *R. solani*.

Table 2: Evaluation of foxtail millet genotypes against sheath blight

S. No.	Entry	Banded blight (%)	Reaction
1	SiA 2566	88.3	HS
2	SiA 2667	82.0	HS
3	SiA 1827	78.3	HS
4	TNSi 416	80.3	HS
5	TNSi 417	50.0	S
6	TNSi 418	39.7	MS
7	TNSi 419	89.7	HS
8	TNSi 421	86.7	HS
9	TNSi 422	82.7	HS
10	GS 702	83.7	HS
11	GS 1204	82.0	HS
12	GS 2137	79.7	HS
13	GS 02236	82.6	HS
14	SiA 2755	87.7	HS
15	R(Si A 3282)	22.0	MR
16	S (Si A 3367)	96.3	HS
	LOC. MEAN	75.7	
	C.D. (5%)	10.6	
	C.D. (1%)	14.5	
	C.V. (%)	8.5	

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