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Research Article

IDENTIFICATION OF RESISTANT SOURCES FOR SHEATH BLIGHT IN FOX-TAIL MILLET INCITED BY *RHIZOCTONIA SOLANI.* KUHN

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ABSTRACT
The present investigation was undertaken to identify the resistant genotypes amongst sixteen genotypes of foxtail millet for evaluating sheath blight disease severity caused by *Rhizoctonia Solani* were studied during 2010-2011 at Agricultural Research Station, Vizianagaram, Andhra Pradesh, and this paper reports the result of this investigation. Sheath blight disease caused by *Rhizoctonia solani*. Kuhn is a serious disease of foxtail millet and inflicts considerable reduction in grain yield. The disease has characteristic lesions and in severe cases, completely drying up of lesions. Among the sixteen genotypes screened against sheath blight maximum percentage of disease severity was recorded in VFMC-391(88.16%) and the minimum percentage of disease severity was recorded in SiA 2863 (2.14%). Among the sixteen genotypes, SiA 3121, RAU 2, SiA 2723, SiA 2863, SiA 3132, SiA 3155 and SiA 3156 were evaluated as resistant genotypes and TNAU 248, SiA 2750, PS 4, RFM 14, TNAU 261, TNAU 264 and VFMC 391 were evaluated as highly susceptible genotypes. These genotypes could be considered a potential source for disease resistance against the sheath blight of foxtail millet and could be used in breeding program for development of sheath blight resistant foxtail millet variety.

Keywords: *Rhizoctonia Solani, Sheath Blight, Foxtail Millet, Genotypes, Disease Intensity*

INTRODUCTION

Small millets are staple foods that supply a major portion of calories and protein to large segments of populations in the semi-arid tropical regions of Asia. Foxtail millet is one of the important protein producing and food security small millet crop. Foxtail millet (*setaria italica*.L) Beauv.) also known as German, Italian, Siberian millet is one of the oldest crops cultivated for hay, pasture and grains. It is called by different colloquial names as kangni, navane, tenai, korra and rata. It has the longest history of cultivation among the millets, having been grown in china since sixth millennium BC. Its grains are used for human consumption and as feed for cage birds. It can grow in altitudes from sea level to 2000 m which was adapted to a wide range of elevations, soils and temperatures. At present, its cultivation is confined to semi arid regions in the states of Andhra Pradesh, Karnataka, Chhattisgarh and Tamil Nadu. Although no major diseases, a few diseases like blast, rust, smut, brown spot, downy mildew and udbatta have been reported on this crop. 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. The central portions of the lesions subsequently turn white to straw with narrow, reddish brown boarder. Such spots, at later stages, are distributed irregularly on leaf lamina. A temperature of around 28-30^0 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. The mycelial growth along with white to brown sclerotia can be observed on and around the lesions. Later on, the leaves dry up and plants appear blighted. On peduncles, ears and glumes irregular to oval, dark brown to purplish brown necrotic lesions are formed. Early infection on peduncle or near finger base is somewhat similar to neck rot resulting in poor grain filling. If the sheath is infected before peduncle emergence, then the fingers are disorganized and reduced in size.

Infected glumes produce smaller and shriveled grains. Sheath blight caused by *Rhizoctonia solani* has been reported from many states of the country. The disease inflicts economic loss in yield and yield attributes if infection occurs at tillering stage. Host resistance is the most efficient, feasible and cheapest way to control sheath blight disease in foxtail millet. In the present study, fifteen landraces of foxtail millet were evaluated against sheath blight under natural epiphytotic conditions during *Kharif* of 2011 and 2012.

MATERIALS AND METHODS

In order to find out resistant sources against sheath blight caused by *Rhizoctonia solani*, field experiment was conducted with sixteen foxtail millet genotypes having different maturity periods were grown in a randomized block design with three replications at research farm of Agricultural Research Station, Vizianagaram, Andhra Pradesh during *Kharif* of 2011 and 2012. The recommended agronomical practices with 40 N: 20 P : 20 K in kg/ha were adopted for better crop growth in both the years. The genotypes were sown in first fortnight of July. Each genotype was sown in two rows of 3.0 m length by adopting 30 cm between rows. After three to four weeks of sowing and 10 cm between plants with in rows. Five randomly selected plants were selected from each genotype/replication for recording the observations. Sixteen genotypes of different maturity groups of foxtail millet were screened for sheath blight susceptibility under natural epiphytotic conditions.

The severity of sheath blight was scored based on relative lesion height on the whole plant: immune = no infection, resistant = lesions limited to lower 20% of the plant height , moderately resistant = lesions limited to lower 20 to 30% of the plant height , moderately susceptible= lesions limited to lower 31 to 45% of the plant height, susceptible = lesions limited to lower 46 to 65% of the plant height, and highly susceptible = lesions more than 65% of the plant height. The percentages of infection were recorded and were subjected to analysis of variance technique on the basis of mean values (Cochran and Cox, 1950).

$$\text{Per cent disease severity} = \frac{\text{Area of plant tissue infected}}{\text{Total Area}} \times 100$$

Statistical Analysis

The data was analyzed by applying statistical tools of ANOVA (Analysis of variance) technique for drawing conclusions from the data. Critical difference (C.D) was calculated to see the significant and non-significant difference between the mean values of per cent sheath blight infection in the sixteen genotypes. This is great help in screening program and in selection of genotypes resistant to sheath blight disease.

Figure 1: Sheath blight infected leaf

RESULTS AND DISCUSSION

Symptoms of sheath blight disease were observed and percentage of disease severity was recorded. The data present in the table revealed that a total of sixteen foxtail millet genotypes were evaluated against sheath blight disease, out of which none of the genotype could exhibit immune reaction. The analysis of variance revealed that there is highly significant difference among sixteen genotypes for sheath blight disease. Among the sixteen genotypes screened maximum percentage of disease severity was recorded in VFMC-391 (88.16%) and the minimum percentage of disease severity was observed in SiA 2863 (2.14%). It was evident from the table that SiA 3121, RAU 2, SiA 2723, SiA 2863, SiA 3132, SiA 3155 and SiA 3156 were having very less infection and so they were considered as resistant genotypes. In low value crops like foxtail millet, breeding for horizontal or rate reducing resistance is very useful. These genotypes would be of immense value to the breeders involved in developing high yielding resistant genotypes of foxtail millet. SiA 2757 is considered as moderately susceptible genotype. The genotypes TNAU 248, SiA 2750, PS 4, RFM 14, TNAU 261, TNAU 264 and VFMC-391 are having very high infection and so they were considered as highly susceptible genotypes.

Table 1: Per cent Sheath blight disease severity on the sixteen genotypes

S.No.	Genotypes	Disease severity (%) mean values
1	SiA 3121	18.39 [c]
2	RAU 2	9.14 [b]
3	SiA 2723	2.95 [a]
4	SiA 2863	2.14 [a]
5	SiA 3132	2.15 [a]
6	SiA 2757	41.62
7	TNAU 248	83.06
8	SiA 2750	79.57
9	PS 4	70.56 [de]
10	SiA 3155	2.40 [a]
11	SiA 3156	6.65 [ab]
12	RFM 14	69.36 [d]
13	TNAU 261	72.60 [de]
14	TNAU 264	74.05 [e]
15	VFMC-391	88.16
16	SiA 326	19.86 [c]
S. Ed. (±)		1.83
C. D. (P = 0.05)		3.74

It was thus concluded that foxtail millet genotypes namely SiA 3121, RAU 2, SiA 2723, SiA 2863, SiA 3132, SiA 3155 and SiA 3156 were considered as resistant genotypes and TNAU 248, SiA 2750, PS 4, RFM 14, TNAU 261, TNAU 264 and VFMC-391 were considered as highly susceptible genotypes.

REFRENCES

Adhipathi P, Vineeta Singh and Suresh Chand Meena (2013). Virulence diversity of R*hizoctonia solani* causing sheath blight disease in rice and its host pathogen interaction. *The Bioscan* **8**(3) 949-952.

Belmar SB, Jones RK and Starr JL (1987). Influence of crop rotation on inoculum density of *Rhizoctonia solani* and sheath blight incidence in rice. *Phytopathology* **77**1138-1143.

Bhuvaneswari V and Krishnam Raju S (2012). Efficacy of new combination fungicide against Rice sheath blight caused by R*hizoctonia solani*. *Journal of Rice Research* **5** 57-60.

Damicone JP, Patel MV and Moore WF (1993). Density of sclerotia of *Rhizoctonia solani* and incidence of sheath blight in rice fields in Mississippi. *Plant Disease* **77** 257-260.

Dath AP (1990). *Sheath Blight Disease of Rice and Its Management* (Associated Publishing Company, New Delhi, India).

Fabrício Á Rodrigues, Francisco XR Vale, Lawrence E Datnoff, Anne S Prabhu and Gaspar H Korndörfer (2003). Effect of Rice Growth Stages and Silicon on Sheath Blight Development. *Phytopathology* **93** 256-261.

Fisher and Yates (1968). *Statistical Method for Research Worker* (Oliver and Boyd Ltd. Edinburg and London) 10.

Gangopadhyay S and Chakrabarti NK (1982). Sheath blight of rice. *Review of Plant Pathology* **61** 451-460.

Groth DE and Nowick EM (1992). Selection for resistance to rice sheath blight through number of infection cushions and lesion type. *Plant Disease* **76** 721-723.

Jain AK, Gyanendra Singh and Joshi RP (2014). Identification of Host Resistance against Banded leaf and Sheath Blight of Foxtail Millet. *35th Annual Conference and Symposium*.

Lakpale N, Kotasthane AS, Thrimurty VS and Agrawal KC (1996). Influence of host factors on sheath blight of rice. *Indian Journal of Mycology and Plant Pathology* **26** 193-195.

Lee FN and Rush MC (1983). Rice sheath blight: A major rice disease. *Plant Disease* **67** 829-832.

Mithrasena YJPK, Adhikari WP and Wickramasinghe DL (1989). Studies on sheath blight of rice in the low country wet zone. *Tropical Agriculture* 145 75-86.

Pinson Li Z, Marchetti SRM, Stansel JW and Park WD (1995). Characterization of quantitative trait loci (QTLs) in cultivated rice contributing to field resistance to sheath blight (*Rhizoctonia solani*). *Theoretical and Applied Genetics* **91** 382-388.

Prasad B and Eizenga GC (2008). Rice Sheath Blight Disease Resistance identified in Oryza spp. Accessions. *Plant Disease* **92** 1503-1509.

Suresh Chand Meena, Vineeta Singh, Adhipathi P and Ramesh Chand (2013). Screening for sheath blight resistant genotypes among mutated population of rice cv. pusa basmati-1. *The Bioscan* **8**(3) 919-924.