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Screening of rice genotypes to sheath rot caused by *Sarocladium oryzae* (Sawada) Gams and Hawksworth

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Abstract
Sheath rot of rice caused by *Sarocladium oryzae* (Sawada) Gams and Hawksworth has become potentially destructive disease. The screening for disease resistance is essential to identify the resistant variety/source. Forty four genotypes were screened in the field at Agriculture Research Station, Mugad with a susceptible check IET-19396 and out of forty four genotypes, two genotypes *viz*., Rere Seed, Bilidadi Goratiga showed highly resistant reaction. Sixteen genotypes showed resistant reaction; fourteen genotypes showed moderately resistant reaction, seven genotypes showed moderately susceptible reaction and about five genotypes showed susceptible reaction.

Keywords: disease resistance, rice, screening and sheath rot

Introduction
Rice (*Oryza sativa* L.) commonly known as Asian rice is an important cereal crop grown throughout the world. It is a staple food of 60 per cent of world's population and was first domesticated in the region of the Yangtze River valley in China. Rice suffers from many of the diseases caused by fungi, among them sheath rot caused by *Sarocladium oryzae* (Sawada) Gams and Hawksworth has become more prevalent in recent decades.

Sheath rot of rice is present in all rice growing countries worldwide. Sheath rot has become more prevalent in recent decades. Densely planted fields and those infested by stem borer are susceptible to *Sarocladium oryzae* infection. The fungus tends to attack the leaf sheaths enclosing young panicles, which retards or aborts the emergence of panicles. Seeds from infected panicles become discolored and sterile, thereby reducing grain yield and quality significantly.

Sheath rot of rice caused by *S. oryzae* is a seed borne pathogen mostly observed on the entire seed (about 46%) and on the lemma and/or palea (about 31%) (Mew and Gozales, 2002) [4]. Since, the pathogen attacks the crop at maturity during panicle initiation stages, its impact is direct to minimize the crop yields. The yield losses from 20 to 85 per cent in Taiwan and 30 to 80 per cent in Vietnam, the Philippines and India (Anon., 2012) [2].

The screening for disease resistance is essential to identify the resistant variety/source. Resistant variety is one of the best ways in reducing loss due to disease. However, there is a need to screen the genotypes against sheath rot of rice. Hence, screening of genotypes was done.

Material and Methods
Experiment conducted at ARS, Mugad. Forty four rice cultivars were selected and sown during *Kharif*. Each entry was planted in one line of two meter length with spacing of 20 cm X 10 cm and two replications were made. The cultivars were used for screening under artificial inoculation by single grain insertion method (Hazarika and Phookan, 1998) [3]. Susceptible check IET-19396 was sown after every five test rows and in border areas. The varieties were grouped according to their reaction as per Standard Evaluation System. Disease scoring was recorded by following 0-9 scale (Anon., 1996) [1].

Disease scoring was recorded by following 0-9 scale

Grade	Reaction
0	No infection
1	Small lesions
3	5% area of boot leaf sheath with lesions
5	6-25% area of boot leaf sheath with lesions
7	26-50% area of boot leaf sheath with lesions
9	>50% area of boot leaf sheath with lesions

Results and Discussion

Forty four genotypes were screened in the field at Agriculture Research Station, Mugad as described in materials and methods. Reactions of these genotypes along with severity grade as per international standards are tabulated in Tables 1 and 2. Disease scoring by 0-9 scale represented in Plate 1.

Plate 1: Disease scoring using 0-9 scale in the field

The genotypes were further classified into immune (grade 0), highly resistant (grade 1), resistant (grade 3), moderately resistant (grade 5), moderately susceptible (grade 7), susceptible (grade 9) based on their reaction to sheath rot. From Tables 1 and 2 it is revealed that, none of the variety was found immune. Out of forty four genotypes, two genotypes *viz*., Rere Seed, Bilidadi Goratiga showed highly resistant reaction. Sixteen genotypes showed resistant reaction; fourteen genotypes showed moderately resistant reaction, seven genotypes showed moderately susceptible reaction and about five genotypes showed susceptible reaction.

Table 1: Evaluation of rice varieties against sheath rot caused by *S. oryzae*

Variety	Sheathrot grade	Reaction*
Bili Kalavi	3	R
Tirlu huegge	3	R
Dodda bangar kaddi	3	R
M-181	3	R
Alur sanna	3	R
Bilidadi moratiga	3	R
Holesalu Chipiga	3	R
Y-4 (bangarkaddi)	7	MS
Rare seed	1	HR
Bilidadi goratiga	1	HR
Bili nellu	3	R
HY-26-1	3	R
Kari kalavi	3	R
Dodda valya	5	MR
Hakkala batta	5	MR
HY-449-1	7	MS
Maisali	3	R
HY-246-13	5	MR
Madras sanna	5	MR
Salivahana	7	MS
Valya	9	S
MTU-1001	5	MR
Rajamandri	3	R

Abhilash	5	MR
PR-106	5	MR
Sona Mahasuri	7	MS
Lunishree	3	R
Aditya	9	S
Pusa-682	7	MS
IR-9716-R	9	S
Rasi	3	R
ADT-36	5	MR
IR-39357-71-1-1-2-2	5	MR
Tellahamsa	7	MS
Pusa-677	9	S
IR-19743-46-2-33-2-2	5	MR
IR-64	3	R
Prasanna	3	R
BPT-5204	5	MR
Vajran	7	MS
Kagisali	5	MR
Ware Sanna	5	MR
Mote Bangar Kaddi	5	MR
IET 19396 (check)	9	S

* HR- Highly Resistant, R- Resistant, MR- Moderately Resistant, MS- Moderately Susceptible, S – Susceptible

Table 2: Evaluation of rice genotypes against sheath rot caused by *S. oryzae*

Reaction	Genotypes	Total no. of genotypes
Highly resistant	Rare seed, Bilidadi goratiga	2
Resistant	Bili kalavi, Tirlu hegge, Dodda bangar kaddi, M-181, Alur sanna, Bilidadi moratiga, Holesalu chipiga, Bili nellu, HY-26-1, Kari kalavi, Maisali, Rajamandi, Lunishree, Rasi, IR-64, Prasanna	16
Moderatly resistant	Dodda valya, Hakkala batta, HY-246-13, Madras sanna, MTU-1001, Abhilash, PR-106, ADT-36, IR-39357-71-1-1-2-2, IR-19743-46-2-33-2-2, BPT-5204, Kagisali, Ware sanna, Mote bangar kaddi	14
Moderatly susceptible	Y-4(Bangarkaddi), HY-449-1, Salivahana, Sona Mahasuri, Pusa-682, Tellahamsa, Vajran	7
Susceptible	Valya, Aditya, IR-9716-R, Pusa-677, IET 19396	5

The present results were in agreement with findings of Singh and Raju (1981) [6] who reported that among different varieties screened, five varieties *viz.*, Basumati-370, Chinsurah, Boro-II, homthong, sigadis and TKM-6 were resistant to sheath rot disease on artificial inoculation. Sahu and Parida (1997) [5] studied the response of 60 rice breeding lines against sheath rot. Out of 60 lines tested, three lines were highly resistant, 18 were resistant and 33 were moderately resistant to the disease.

Conclusion

Out of forty four genotypes used for screening two genotypes Rere seed, Bilidadi goratiga showed highly resistant reaction. Sixteen genotypes showed resistant reaction; fourteen genotypes showed moderately resistant reaction, seven genotypes showed moderately susceptible reaction, about five genotypes showed susceptible reaction and none of them were immune.

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