

Screening of some Sugarcane Genotypes to Wilt

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ABSTRACT

A field trial was conducted on screening sugarcane genotypes against wilt disease at two locations viz. Bangladesh Sugarcane Research Institute (BSRI) farm, Ishurdi and Regional Sugarcane Research Station (RSRS) farm, Thakurgaon during the cropping season 2010-11 and 2011-12. Twenty six sugarcane genotypes were inoculated by the mixed inocula of 8 different isolates of wilt pathogen following hypodermic syringe method. Among them, 10 were found as resistant, 14 were moderately resistant, 1 (Isd 16) was moderately susceptible and only 1 (Isd 18) was found as susceptible to wilt disease.

Key words: Screening, sugarcane genotype, wilt

INTRODUCTION

Sugarcane (*Saccharum officinarum*) is an important cash cum food cum industrial crop in Bangladesh. The crop is subjected to many pests and diseases. Sugarcane disease cause heavy losses in yield and quality of sugarcane. An overall 20.22% loss of cane is caused by different disease which worked out to Tk. 250 corers annually (Talukder *et al.*, 2005). Fungal diseases are one of the major concerns to agricultural production. Out of 40 sugarcane diseases in Bangladesh, wilt is considered as one of the most damaging (Talukder *et al.*, 2010). There is hardly an area in Bangladesh which is free from wilt disease (Malek *et al.*, 1982). Wilt associated with *Cephalosporium sacchari* and *Fusarium moniliforme* is found to be of considerable importance particularly late in the season in Bangladesh (Rahman, 1988). Singh *et al.* (1975) reported that *Fusarium moniliformae*, *Aceremonium furcatum* and *Aceremonium terricola* are also associated with the wilt of sugarcane even if *Cephalosporium sacchari* is an additional cause of the disease. Wilt occurs either alone or frequently in association with red rot pathogen (*Physalospora tucumanensis* Speg) and hastens the deterioration of the affected cane (Ganguly, 1964). Losses due to wilt, which are usually computed on the basis of the quantity of canes, dried or dead, found in the field after harvest, may vary from 2 to 10 t/ha (Parthasarthy, 1972). Depending on incidence of wilt, the yield reduction may go as high as 65% (Sharma, 1976). Ratoon cane generally record higher damage than the plant cane. The wilt disease not only reduces yield but also impairs juice quality (Anon., 1959). Wilt is mainly seed piece transmissible but the fungus can survive in the soil for 27-31 months (Ganguly and Chand, 1963). In view of the sett and soilborne nature of wilt pathogen, various types of control measures have been recommended to manage sugarcane wilt. So far, no single method has been known to control the wilt disease syndrome in sugarcane. Therefore, screening of sugarcane genotypes against wilt pathogen is a pre-requisite in the varietal development programme. Aiming to this, a field

trial was conducted to find out the level of resistance of sugarcane genotypes against different isolates of wilt pathogen.

MATERIALS AND METHODS

A field experiment was conducted in two locations viz. BSRI Ishurdi farm and RSRS, Thakurgaon farm during the cropping season 2010-11 and 2011-12 with 26 sugarcane genotypes comprising commercial varieties, clones under zonal yield trial (ZYT) III, II, I and advanced yield trial (AYT). Apparently healthy two budded setts of each genotype were planted in single rows of 20 m length. Row to row distance was 1 m. A mixture of spore suspension (10^6 /ml) of 8 isolates of wilt pathogen collected from different cane growing areas of the country used as inocula. The collected isolates were cultured on potato dextrose agar (PDA) medium for 10-12 days to sporulate and mixed inoculum was prepared from the fresh culture. Inoculation was done at the age of 8 months of plant in the month of August. Fifteen canes of each clone were inoculated in the middle of the third internode above the ground level following hypodermic syringe method. The punctured point (done by special inoculating needle, 2 cm long and 2 mm dia.) was covered and wrapped by insulating tape in order to keep away from oxidation and contamination. The inoculated canes were examined by splitting longitudinally after three months of inoculation and graded according to symptomatic method for calculating disease index (Table 1).

Table 1. Criteria for determination of disease index for screening sugarcane genotypes to wilt

Sl. No.	Criteria/Characters	Numerical rating/ Score
1.	<i>Lesions width above the inoculated internode (0-3)</i>	
	a) Very rare lesion or no lesion developed	0
	b) Rare lesion (1/3rd or less spread of full width)	1
	c) Medium lesion (1/3rd to 2/3rd spread of full width)	2
	d) High lesion (coved the full width)	3
2.	<i>Nodal transgression (0-3)</i>	
	a) Lesion restricted in the inoculated internode	0
	b) One node crossed	1
	c) Two nodes crossed	2
	d) Three or more nodes crossed	3
3.	<i>Presence of pith (0-2)</i>	
	a) Pith/holo absent	0
	b) Pith/holo restricted	1
	c) Pith/holo progressive	2
4.	<i>Condition of top (0-1)</i>	
	a) Green	0
	b) Yellow/dry	1

The mean of the total numerical ratings/scores of 12 canes was taken for assessing the disease index and disease reaction of each genotype against wilt pathogen was done based on following scale:

Disease index (Score)	Disease reaction (Grade)
0.00 – 2.00	Resistant (R)
2.10 – 4.00	Moderately Resistant (MR)
4.10 – 6.00	Moderately Susceptible (MS)
6.10 – 8.00	Susceptible (S)
Above 8.00	Highly Susceptible (HS)

RESULTS AND DISCUSSION

The results of different sugarcane genotypes in respect of their resistance/susceptibility against wilt pathogen during the cropping season 2010-11 and 2011-12 are presented in the Table 2. Out of 26 sugarcane genotypes, 10 were found as resistant (R), 14 were moderately resistant (MR), 1 (Isd 16) was moderately susceptible (MS) and only 1 (Isd 18) was found as susceptible (S) to wilt. During release of varieties for commercial cultivation all the varieties like Isd 2/54, Isd 19, Isd 20, Isd 25, Isd 32, Isd 33, Isd 34, Isd 35, Isd 36, Isd 37, Isd 38, Isd 39 and Isd 40 showed as resistant (R) to moderately resistant (MR) reaction. But now, they are showing resistant (R) to moderately susceptible (MS) reaction. This happened because of changing of the pathotypes (races) of the wilt pathogen and environmental factors. Some varieties like Isd 18 and Isd 28 have been withdrawn from commercial cultivation due their susceptibility to the disease. That is why; continuous breeding for resistant is inevitable to avoid epiphytotics to wilt. Among the 14 varieties prevailing under commercial cultivation, 4 varieties viz. Isd 2/54, Isd 32, Isd 33 and Isd 39 showed resistant and 8 varieties viz. Isd 19, Isd 20, Isd 28, Isd 34, Isd 36, Isd 37, Isd 38 and Isd 40 showed moderately resistant reaction. Similar results were also reported by Begum *et al.* (2007), Anon. (2004) and Rahman (2001). Sugarcane genotypes viz. 2/54, Isd 32, Isd 33, Isd 39, Isd 18T₂, I 91-05, I 94-05, I 94-06, I 223-06 and I 347-06 showed as resistant (R) reaction to wilt pathogen at two places (BSRI farm, Ishurdi & RSRS farm, Thakurgaon) for consecutive two cropping seasons of 2010-11 & 2011-12, respectively. These 10 genotypes seem to be resistant against all isoletes of wilt pathogen. Most of the genotypes showed different reactions at two places in two consecutive years. This may be because of environmental variation and change of pathotypes in two years. Similar results were also found by Begum *et al.* (2007), Rahman *et al.* (1985), Rahman *et al.* (1984) and Malek *et al.* (1982) in some genotypes of sugarcane. Therefore to cope up this problem it is prime importance of breeding and selection of wilt resistant genotypes having good agronomic characters. In this context, the genotypes showing resistant and moderately resistant reaction may either be released for commercial cultivation provided having good agronomic character or to be used as a source of resistant in breeding programme for developing wilt resistant varieties.

Table 2. Reaction of different sugarcane genotypes against mixed isolates of wilt pathogen causing wilt disease at BSRI farm, Ishurdi and RSRS farm, Thakurgaon during the cropping season 2010-11 and 2011-12

Sl. No.	Sugarcane genotypes	Disease reaction against wilt pathogen in 2011		Disease reaction against wilt pathogen in 2012		Remarks
		BSRI farm, Ishurdi	RSRS farm, Thakurgaon	BSRI farm, Ishurdi	RSRS farm, Thakurgaon	
1.	I sd 2-54	R	R	R	R	R
2.	I sd 16	MS	MR	MR	R	MS
3.	I sd 18	S	R	MS	R	S
4.	I sd 19	R	R	MR	R	MR
5.	I sd 20	R	R	MR	R	MR
6.	I sd 28	R	R	R	MR	MR
7.	I sd 32	R	R	R	R	R
8.	I sd 33	R	R	R	R	R
9.	I sd 34	R	R	R	MR	MR
10.	I sd 36	R	R	R	MR	MR
11.	I sd 37	R	R	MR	R	MR
12.	I sd 38	R	R	R	MR	MR
13.	I sd 39	R	R	R	R	R
14.	I sd 40	MR	R	R	MR	MR
15.	I 112-01	R	R	R	MR	MR
16.	I sd 18 T ₂	R	R	R	R	R
17.	I 25-04	R	R	R	MR	MR
18.	I 39-04	R	MR	R	R	MR
19.	I 91-05	R	R	R	R	R
20.	I 94-05	R	R	R	R	R
21.	I 150-05	R	MR	R	R	MR
22.	I 85-06	R	R	MR	R	MR
23.	I 94-06	R	R	R	R	R
24.	I 223-06	R	R	R	R	R
25.	I 310-06	R	R	MR	MR	MR
26.	I 347-06	R	R	R	R	R

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