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Assessment of Losses due to Red Rot Disease in Sugarcane

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ABSTRACT

An experiment was conducted for two consecutive years with fourteen sugarcane clones such as Isd 2–54, Isd 16, Isd 17, L. Jaba–C, Isd 18, I 491–76, I 41–75, I 24–76, I 258–77, I 354–77, I 147–77, I 119–77, Nagarbari and Co 1158 to quantify losses due to red rot by artificial inoculation. All the fourteen clones showed reductions in germination (1.3–51.3%), millable cane production (0.7–95.7%) and yield of cane (2.4–95.6%). Mean reductions of these parameters were 26.5, 54.8 and 56.9% respectively. The clone I 491–76 showed the highest reduction in germination while the clone Co 1158 showed the highest reduction in millable cane and yield of cane.

INTRODUCTION

Red rot caused by *Colletotrichum falcatum* Went is one of the serious diseases of sugarcane in Bangladesh. The disease is a great threat to sugarcane in all sugarcane growing countries of the world. It is a problem of both commercial as well as seedcane (Edgerton, 1959; Agnihotri and Singh, 1977). Several high yielding high sugar popular varieties such as Isd 5-55, Co 419, Co 527, Co 975, Co 1158, B0 17, B0 70, Q 69 and BS 96 have been withdrawn from commercial cultivation due to red rot in Bangladesh. At present, the disease is widespread throughout the country but more severe in the non-mill zones (gur zones). It causes serious losses to sugarcane yield and alone responsible for 10-15% yield reduction in Bangladesh and damage of entire crop of a particular field is not uncommon. In case of nodal infections 8 to 15% losses in germination has been reported as compared to that of healthy ones (Agnihotri, 1983). It has been reported that the sucrose content in the red rot affected cane is always lower than in the healthy cane (Edgerton, 1959, Kirtikar and Verma, 1962; Sandhu *et al.*, 1969). Losses in cane yields have been estimated to be 44.1% in CoS 430 (Kirtikar and Verma, 1962) and 12.0 to 41.5% in varieties such as Co 312, Co 313, Co 453 and Col 29 (Sandhu *et al.*, 1969).

Considering the extent of damage caused by red rot disease this experiment was undertaken to estimate the losses due to red rot in some promising clones through artificial inoculation.

MATERIALS AND METHODS

Fourteen clones such as Isd 2–54, Isd 16, Isd 17, L. Jaba–C, Isd 18, I 491-76, I 41–75, I 24–76, I 258–77, I 354–77, I 147–77, I 119–77, Nagarbari and Co 1158 were tested in this investigation. The experiment was conducted for two consecutive years. In the first year, two-bud 30 setts and in the second year, 50 setts were used both for healthy and diseased cane for each clone. In both the years, to ensure diseased setts, 15 d old sporulated culture of *Colletotrichum falcatum* Went, the red rot organism was inoculated in the middle of two-bud setts by plug method before planting in the field. Healthy setts were also planted in the same day without inoculation. Healthy and diseased setts of each clone were planted in a separate single row of 15 and 25 m long in the first and second year respectively. Data were collected on germination, millable cane and weight of cane. Final germination count was recorded 60 d after planting. Harvesting was done on December 4, 1987 and January 18, 1989 for the 1st and 2nd year respectively. Average of two years results in respect of germination, millable cane and weight of cane etc have been shown in the Table 1.

RESULTS AND DISCUSSION

It is seen from the Table 1 that germination percentage, number of millable cane and yield of cane were found higher in healthy cane compared to diseased cane in each clone. The table shows that the clones such as Isd 2–54, Isd 16, Isd 17, L. Jaba–C, I 59-74, I 491-76, I 41-75, I 24-76, I 258-77, I 354-77, I 147-77, I 119-77, Nagarbari and Co 1158 showed 1.3, 39.7, 43.8, 2.5, 38.8, 51.3, 47.5, 30.0, 33.8, 12.5, 9.4, 17.5, 2.5 and 45.6% reduction in germination respectively due to red rot disease. These results conform reports that the presence of red rot in seed pieces impairs germination (Agnihotri *et al.*, 1979). He also reported that setts having nodal infections show 8 to 15% losses in germination as compared to that of healthy canes. In this experiment the lowest percentage reduction in germination was found in Isd 2–54 (1.3%) and the highest reduction in the strain I 491-76 (51.3%). Reduction in number of millable cane was found 12.0, 84.8, 79.7, 19.9, 66.3, 71.0, 92.8, 79.3, 76.9, 0.7, 72.4, 45.7, 23.3 and 95.7 in the clones such as Isd 2–54, Isd 16, Isd 17, L. Jaba-C, I 59-74, I 491-76, I 41-75, I 24-76, I 258-77, I 354-77, I 147-77, I 119-77, Nagarbari and Co 1158 respectively. Reduction in number of millable cane ranges from 0.7 to 95.7%, the lowest reduction in millable cane was found in the clone I 354-77 and the highest in Co 1158. The corresponding reduction in yield of cane was 2.4, 80.7, 84.6, 12.4, 65.0, 64.2, 93.9, 75.5, 80.2, 2.8, 79.4, 56.4, 40.7, and 95.6% i.e., ranging from 2.4 to 95.6% in above clones respectively. This result coincides with the findings of Sandhu *et. al.* (1969). They reported 12 to 41.5% losses in cane yield in the varieties like Co 412, Co 313, Co 453 and Co 129. The mean reduction of 14 clones on germination, millable cane and yield was recorded are 26.5%, 54.8% and 56.9% respectively. From the results it can be concluded that

red rot affects germination, millable cane production and yield of cane. However, severity of losses greatly varies from variety to variety and season to season.

Table 1. Effects of red rot disease on germination, millable cane and yield by artificial inoculation (av. of 1987 and 1988).

Clones	Treatment H=Heal-thy D=Diseased	Average germination of 2 seasons		Average millable cane of 2 seasons		Average weight of cane of 2 seasons	
		Germination (%)	Reduction due to red rot (%)	No. of Millable cane per 20 M row	Reduction due to red rot (%)	Yield of millable cane (Kg) per 20 M row	Reduction due to red rod (%)
Isd 2–54	H	41.3		192		102.8	
	D	40.0	1.3	169	12.0	100.3	2.4
Isd 16	H	41.3		111.5		76.9	
	D	5.6	35.7	17.0	84.8	14.8	80.7
Isd 17	H	61.3		194.5		125	
	D	17.5	43.8	39.5	79.7	19.3	84.6
L Jaba-c	H	44.4		186		109.2	
	D	41.9	2.5	149	19.9	95.6	12.4
I 59-74	H	51.9		160		120.3	
	D	13.1	38.8	54	66.3	42.1	65.0
I 491-76	H	64.4		186		128.5	
	D	13.1	51.3	54	71.0	45.9	64.2
I 41-75	H	50.0		166.5		119.7	
	D	2.5	47.5	12	92.8	7.3	93.9
I 24-76	H	40.0		113.5		83.7	
	D	10.0	30.0	23.5	79.3	20.5	75.5
I 258.77	H	39.4		156		120.1	
	D	5.6	33.8	36	76.9	23.8	80.2
I 354-77	H	43.1		212.0		151.5	
	D	30.6	12.5	210.5	0.7	147.5	2.8
I 147-77	H	13.8		49.0		29.9	
	D	4.4	9.4	13.5	72.4	6.1	79.4
I 119-77	H	40.6		146.5		90.7	
	D	23.1	17.5	79.5	45.7	39.5	56.4
Nagarbari	H	38.1		178		145.1	
	D	35.6	2.5	136.5	23.3	86.1	40.7
Co 1158	H	46.9		162.5		113.5	
	D	1.3	45.6	7.0	95.7	5.0	95.6
Mean (14 Clones)	H	44.0		158.1		108.3	
	D	17.5	26.5	71.5	54.8	46.7	56.9

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