

Reaction of some Promising Sugarcane Clones to Red Stripe Disease

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ABSTRACT

An experiment was conducted with 18 promising sugarcane clones to test against red stripe disease at BSRI farm during the crop year 1992-1993. Artificial inoculation was done with the bacterium *Pseudomonas rubrilineans* by brushing method and observation was made upto 6 weeks for disease development. In some clones, disease incidence occurred in the 1st week and the incidence percent remained unchanged upto 6th week while in some other clones, it increased gradually from 1st week to 6th weeks. Out of 18 clones, four were found resistant, five moderately resistant, five moderately susceptible, one susceptible and four highly susceptible.

INTRODUCTION

Red stripe caused by *Pseudomonas rubrilineans* is considered as one of the major bacterial diseases of sugarcane in Bangladesh. It is a widely distributed disease and has been reported from 50 sugarcane growing countries in the world (Agnihotri, 1983). The malady is generally considered of minor importance (Edgerton, 1959; Martin and Wismer, 1961) but the pathogen has the potential to cause epidemics (Chona and Rao, 1963; Fors, 1978). It occurred in an epidemic form in EL Salvador on Gloria 53 and in Guatemala on L-70-71 (Fors, 1978). In addition to leaf "stripe stage", the organism frequently produces "top rot" in cane (Agnihotri, 1983). Besides, in severe cases, red stripe leads to top rot development. Sugarcane genotypes respond differently to the red stripe pathogen (Edgerton, 1959; Rana and Shukla, 1968). In Central American countries, red stripe affected crops are known to harbour heavy sugarcane frog-hopper (*Aeneolamia* spp) population (Fors, 1978). This disease pest combination has been responsible for the deterioration of a number of commercial varieties. In Bangladesh, both the phases of the disease are frequently observed in the sugarcane fields (Nahar *et al.*, 1986). A high incidence of red stripe/top rot was observed in the promising strain, I-294/76 at BSRI, as a result it had to be dropped from the breeding programme (Anon., 1983). Considering the wide spread outbreaks of the disease in Bangladesh, it was felt necessary to study the reaction of promising clones to red stripe through artificial inoculation with the bacterium *Pseudomonas rubrilineans*.

MATERIALS AND METHODS

The newly red stripe infected leaves were sterilized by dipping in calcium hypochlorite, washed several times by sterilized distilled water and placed in PDA

medium and pure culture of the bacterium. *Pseudomonas rubrilineans* was made. From the culture made in PDA plates, a bacterial suspension having an approximate concentration of 5×10^7 bacteria was prepared in sterile distilled water (Király *et al.*, 1974). This suspension was then inoculated by brushing method. The commonly used tooth brush was dipped in the bacterial suspension and then spindle leaf of each plant was rubbed with this suspension soaked tooth brush.

Eighteen clones were inoculated in the middle of May, 1993 when the plant age was 14 weeks. Twenty plants were inoculated in each clone. Observations for the development of red stripe were started at an interval of 7 d since inoculation and continued upto 6 weeks. Number of red stripe infected plants was counted out of total plants inoculated and percentage of infected plants was calculated out. During the period of study, average temperature, relative humidity and rainfall were $28 \pm 2^\circ\text{C}$, 85% and 23 cm respectively.

RESULTS AND DISCUSSION

Table 1 shows that all the clones except 9-123/84 and 1-227/87 showed red stripe infection from 1st to 6th weeks. In some clones, red stripe infection remained constant from 1st to 6th weeks whereas in others this infection gradually increased. Variety Isd-2/54 showed 10% infection in the 1st week and increased upto 15% from 2nd to 6th weeks. Variety Isd-16 showed 80% infection in the 1st week and showed 85% infection from 2nd to 6th weeks. Variety L. Jaba-C showed 15% infection from 1st to 6th weeks. The infection was 10% in 1st and 2nd weeks and 15% from 3rd to 6th weeks, in the clone 1-144-86. The infection was 10% from 1st to 6th weeks in the clone 1-154/86. The clone BC-1 showed 35 and 40% infection in the 1st and 2nd weeks respectively and showed 45% infection from 3rd to 6th weeks. The clone 1-8/87 showed 60% red stripe infection upto 3rd week and 80% infection in the last 3 weeks. The clone 1-210/87 showed 5% infection in the 1st week and 15% infection from 2nd to 6th weeks. The clone 1-233/87 showed as low as 5% infection throughout the observations. The clone 1-290/87 showed 35% infection in the 1st week and 40% infection in the rest five weeks. Forty five percent infection was observed in the 1st week and 70% infection in the remaining five weeks in the clone 1-291/87. In case of 1-294/87, 10, 25 and 35% red stripe infections were observed in the 1st, 2nd, and 3rd weeks respectively and 40% infection from 4th to 6th weeks. The clone 1-31/88 showed as high as 80% infection in the 1st week and as high as 95% infection in the remaining weeks. Ten percent red stripe infection was observed in the 1st week and 15% infection was observed upto 6th week in the clone 1-56/88. The clone 1-78/88 showed 35% infection throughout the observations. The clone 1-413/88 showed 95% red stripe infection in the 1st week and the highest infection (100%) in all other observations. Varieties Isd-2/54, Isd-16 and L. Jaba-C and some other clones showed red stripe infection in the 1st week. Similar observation was previously reported (Malek *et al.*, 1983). Table 2 shows that out of 18 clones, 4 were found resistant, 5 moderately resistant, 4 moderately susceptible, 1 susceptible and the rest 4 highly susceptible in reaction to red stripe disease. Malek *et al.* (1983) reported that the varieties/strains varied in their degree of susceptibility to red stripe. It is also reported that sugarcane genotypes respond differently to the red stripe pathogen (Edgerton, 1959; Rana and Shukla, 1968). Wismer (1979) stated that the performance of sugarcane variety (s) by artificial inoculation with the red stripe pathogen varies from natural infection under field conditions. In this experiment also, different varieties/ clones

responded differently to red stripe disease which coincide with the above results cited by different workers.

Table 1. Varieties/clones showing red stripe infection.

Varieties/ Clones	% infection					
	1st week	2nd week	3rd week	4th week	5th week	6th week
Isd-2/54	10	15	15	15	15	15
Isd-16	80	85	85	85	85	85
L-Jaba-C	15	15	15	15	15	15
I-123/84	0	0	0	0	0	0
I-144/86	10	10	15	15	15	15
I-154/86	10	10	10	10	10	10
BC-1	35	40	45	45	45	45
I-8/87	60	60	60	80	80	80
I-210/87	5	15	15	15	15	15
I-227/87	0	0	0	0	0	0
I-233/87	5	5	5	5	5	5
I-290/87	35	40	40	40	40	40
I-291/87	45	70	70	70	70	70
I-294/87	10	25	35	40	40	40
I-31/88	80	95	95	95	95	95
I-56/88	10	15	15	15	15	15
I-78/88	35	35	35	35	35	35
I-413/88	95	100	100	100	100	100

Table 2. Reaction of varieties to red stripe disease.

Varieties/clones	% infection	Grade	No. of varieties/clones
I, 123/84, I- 154/86 I- 227/87, I- 223/87	0 - 10	Resistant	4
Isd- 2/54, L. Jaba-C I- 144/86, I- 210/87 I- 56/86	10.1-30	Moderately resistant	5
BC-1, I-290/87 I-294/87, I-78/88	30.1-50	Moderately susceptible	4
I-291/87	50.1-70	Susceptible	1
Is-16, I-8/87 I-31/86, I-413/88	70.1 & above	Highly susceptible	4

From this experiment, it can be concluded that preference should be given in selecting those clones which are resistant to red stripe disease.

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