

## SCREENING OF FINAL SUGARCANE GENOTYPES (*Saccharum officinarum* L.) FOR RED ROT *Colletotricum falcatum* Went DISEASE RESISTANCE

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### ABSTRACT

Thirty sugarcane (*Saccharum officinarum*) genotypes were screened two consecutive years 2007-2008 against red rot (*Colletotricum falcatum*) disease by artificial inoculation using “syringe method”. The genotypes were graded as various levels of susceptibility and resistance using standard disease index. Two genotypes S98CSSG-668 and S98CSSG676 appeared resistance, one moderately resistance, two moderately susceptible and twenty five were susceptible. These genotypes (S98CSSG-668 and S98CSSG676) may be utilized as one of the sources of resistance on the breeding programme of sugarcane to red rot disease.

**Key words:** Sugarcane genotypes, red rot, *Saccharum officinarum*, disease resistance

### INTRODUCTION

Sugarcane is a renewable, natural agricultural resource because it provides sugar, besides biofuel, fiber, fertilizer and myriad of by products/co-products with ecological sustainability. Sugarcane provides over 50% of the worlds sugar requirements as it can grow in any country where it is not exposed to frost. Worldwide sugarcane occupies an area of 20.42 million ha with a total production of 1333 million metric tons. Sugarcane area and productivity differ widely from country to country. Sugarcane growing countries of the world are lying between the latitude 36.7° north and 31.0° south of the equator extending from tropical to subtropical zones.

Sugarcane is also the second most important cash crop in Pakistan after cotton. Pakistan grows about 1 million hectares of sugarcane, more than all other cane producing countries contributing around 3.6% of Gross Domestic Production (GDP) (Anon. 2005). Pakistan's sugarcane yield averages about 46 tonnes per hectare, well below the world average of above 60 tonnes, and below neighboring India's yield of 65 to 70 tonnes. Sugarcane currently accounts 4.8% of cropped area and 11% value added of the total crops (Anon.2005).

Red rot is one of the oldest known diseases of sugarcane. It occurs in most cane-growing countries. Red rot disease of sugarcane is one the main limiting factors in cane yield and quality. (Chona, 1980 and Martin, 1961). It is caused by a fungus *Collectotrichum falcatum* which is carried year after year by infected setts, debris and it spores which remains lying in fields after the harvest of infected crop. This disease causes heavy loss to the sugar industry as well as the growers. Red rot appears in July and continues to develop till harvesting of the crop. In the initial stages, loss of colour and withering of leaves, third and fourth from the top, is seen. In the later stages, the stalk becomes dry, wrinkled and hollow. Typical symptoms of red rot are seen inside the stalk. If stalks are split open, the pith is found

reddened. The diseased tissues of the stalk emit alcoholic smell as a result of inversion caused by the pathogen. The disease is responsible for quick decline of varieties.

Development of new pathotypes in the RR flora of Tamil Nadu, the commercial varieties viz: COC-671, COC-85061, CoC-86062, CoSi-86071, CoC90063, CoC-91061, CoC-92061, CoSi-96071 and CoSi-98071 have become susceptible to red rot (Kalaimani, 2000). In Pakistan a good number of commercial varieties e.g. CoL-54, CoL-29, L-116, Triton, BL-4 and BF-162 are susceptible to red rot. The old varieties are out from the field due to one or another reason. The use of resistant/moderately resistant varieties is the cheapest practical method of disease control to avoid any epidemics. Development of new varieties is the need of the time to give boost a sugar industry in Pakistan. (Hussnain *et. al.*, 2007)

## MATERIALS AND METHODS

Thirty sugarcane genotypes were evaluated at Shakarganj Sugarcane Research Institute (SSRI), Jhang, (Pakistan) during the years 2004-2007. Plantation was done in randomized complete block design (RCBD) in two rows of 5 m length. Syringe artificial methods were used for inoculation according to method describe by Hussnain and Afghan 2001. For preparation of inoculum, a pathogenic culture of *Colletotrichum falcatum* isolated from susceptible sugarcane variety Co-1148 on potato dextrose agar medium in petri dishes. Petriplates were incubated at  $28 \pm 1^{\circ}\text{C}$  for 10 to 15 days. The culture grown on petri dishes was harvested in sterilized water at the rate of one plate per liter (approximately  $10^6$  spore per ml) and suspension was used for artificial inoculations. Twenty-five canes were taken in each genotype for inoculation and means of the canes was used for data. Inoculation was done in the month of July, when cane attained the age of 7<sup>th</sup> month. A hole was made with 20ml hypodermic needle having 16-G size on the 3<sup>rd</sup> exposed internode from bottom. Spore suspension at a concentration of  $10^6 \text{ ml}^{-1}$  was added with the same needle. The hole was then covered with moist clay to ensure optimum moisture after inoculation inside the hole. Disease severity observed after 60 days on the basis of the international scale (0 to 9) as suggested by Srinivasan and Bhat (1961).

Scale	Score
0.0-2.0	Resistance (R)
2.1-4.0	Moderately resistance (MR)
4.1-6.0	Moderately susceptible (MS)
6.1-8.0	Susceptible (S)
8.1-9.0	Highly susceptible (HS)

## RESULTS AND DISCUSSION

The disease reaction of all the thirty genotypes was given the table-1. Out of thirty genotypes, only two S98CSSG-668 and S98CSSG676 depicted resistant reaction (0.0-2.0). One genotype S98CSSG-562 showed moderately resistant reaction (2.1-4.0). Two genotypes showed moderately susceptible (4.1-6.0) reaction viz. S98CSSG-663 and S98CSSG-554 and remaining twenty five were susceptible to red rot as per method testing.

**Table-1          Reaction of sugarcane genotypes against red rot**

Pathogenicity reaction	Sugarcane genotypes
0.0-2.0 (Resistance)	S98CSSG-668 S98CSSG676
2.1-4.0 (Moderately resistance)	S98CSSG-562
4.1-6.0 (Moderately susceptible)	S98CSSG663 & 554
6.1-8.0 (Susceptible)	S98CSSG-209, 392, 494, 523, 567, 579, 582, 612, 614, 671, 691, 706, 712, 717, 718, 94, 1199, 1448, 1718, 1731, 1742, 1744, 1791, 1914 & 2175.
8.1-9.0 (Highly susceptible)	Nil

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