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SCREENING SUGARCANE GENOTYPES RESISTANCE AGAINST SMUT DISEASE

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ABSTRACT

Sugarcane is one of the most important cash crops of the India. Study was carried out for screening the twenty two sugarcane genotypes along with four checks were tested against whip smut disease under artificial inoculation conditions in the field during the year 2016-17. They are planted during 2016-17 in station trial for the Suru seasons at Central Sugarcane Research Station, Padegaon. Out of 22 sugarcane genotypes, eleven genotypes i.e. PDN 15003,PDN 15006,PDN 15009,PDN 150010,PDN 15012,PDN 15007,PDN 15011 with the check Co 94008,CoM 0265, Co VSI 434,Co 86032 found resistance against the smut, While Co PDN 15001 found susceptible to the disease. The resistant genotypes were advanced further for incorporation in multilocation trials. They are also used as the source materials in future for resistance.

KEYWORDS:*Sugarcane, Saccharum officinarum L., Ustilago scitaminea, Whip-smut,*

INTRODUCTION:

Sugarcane (*Saccharum officinarum* L.) is one of the most important food and cash crop of the tropics and subtropics which was cultivated in about 121 countries encompassing approximately half of the world. They are playing an important role in Indian economy and a key role to the socio-economic prosperity in the state of Maharashtra. Sugarcane was cultivated on 8.35 lakh hac.area in Maharashtra (2015-16) with the production of 83.79 lakh tone and productivity is 88 t/ha(Anonymous 2015). The Govt. of India take a decision of blending the ethanol in petrol at 10 % so in future may enhances its importance. The crop being a long duration crop attracts a number of insect, diseases and nutritional disorders. Insect pests and disease cause 20% and 10-15% yield loss respectively. More than 150 diseases recorded so far on the sugarcane some seriously affecting sugarcane production in India (Viswanathan et.al., 2008). Whip-smut caused by *Ustilago scitaminae Sydow.* Causes considerable losses in cane yield and quality. It is a serious disease of sugarcane in Tamil Nadu, Karnataka, Andhra pradesh and Maharashtra (Alexander, 1975). Sugarcane farmers have experienced varying degree of crop losses due to occurrences of smut. The disease causes yield losses to the tune of 39 to 50 % in plant cane crop and 53 to 73 % in the ratoon crop in India. (Ferreira and Comstack, 1989). Therefore the present study was attempted to identify the sugarcane

genotypes resistant to the disease.

Management of plant diseases through host resistance is considered as one of the best options available for crop protection. Plant breeders focus a significant part on selection and development of disease resistant genotypes to minimize the smut disease problem. Hence a total of 22 sugarcane genotypes included in the station trial (Early and Midlate) were assessed for their reaction to whip smut disease by artificial inoculation under field conditions at the Central Sugarcane Research Station, Padegaon during 2016-17 Suru seasons with a view to find out the sources of resistance for their further exploitation in breeding programme.

MATERIALS AND METHODS

Twenty two genotypes having four checks were tested against whip smut disease under artificial inoculated conditions and in *Suru* season during 2016-17 at the Central Sugarcane Research Station, Padegaon. They are planted in Randomized Block Design having plot size 6 m x 2 rows. Two eye budded sets of each genotype from rod row trials were artificially inoculated by soaking them for 30 minutes in fresh viable (90 to 95% viability) smut teliospore suspension (@ 10 g teliospore powder per 50 lit of water) having spore load of 106 to 108 teliospores ml-1 (Shinde et al., 1985 and Chirme et al., 1998). The treated sets were planted in moist soil in the field @ 15 sets per row of 6 m length. All the package of practices are followed. The observations on germination were noted at 30 and 45 days after planting and the incidence of smut was recorded at fortnightly interval up to harvest.

Smut incidence was calculated as percentage of clumps infected out of the total clumps. Affected clumps were rouged out and destroyed to avoid secondary infection. Based on the cumulative smut incidence, the genotypes were categorized as per Shah et al. (1997) and Anonymous (2011) as follows.

Smut Reaction	Incidence (%)
1. Resistant (R):	0.00 clumps affected
2. Moderately Resistant (MR):	0.01 to 10.00 clumps affected
3. Moderately Susceptible (MS):	10.01 to 20.00 clumps affected
4. Susceptible (S):	20.01 to 30.0 clumps affected
5. Highly Susceptible (HS):	More than 30.00 clumps affected

RESULTS AND DISCUSSION:

The smut disease causes yield losses to the tune of 39 to 50 % in plant cane crop and 53 to 73 % in the ratoon crop in India, The results are presented in Table 1. Out of 22 sugarcane genotypes, 11 genotypes showed resistant reaction to smut disease i.e. PDN 15003, PDN 15006, PDN 15009, PDN 15010, PDN 15012, PDN 15007, PDN 15011, CoM 0265 , Co 86032 , Co 94008 , CoVSI 434 resistant reaction to smut disease.

while 03 genotypes PDN 15004, PDN 15005,Coc 671exhibited **moderately resistant and 07 genotypes recorded moderately susceptible(PDN 15001,PDN 15002,PDN 15008,PDN 15013,Co 99004,Co 740, CO 7219) and 1 genotype (Co PDN 15001) found susceptible,** reaction to smut disease under artificially inoculated conditions in the field. All the resistant lines are tested for further breeding multilocation trials.

Volume - 6 | Issue - 11 | December - 2016

Table 1. Incidence of smut on sugarcane genotypes from Station trial (Early & Midlate) under artificially inoculated conditions

Sr. No.	Genotype	Parentage	Smut %	Reaction	Sr. No.	Genotype	Parentage	Smut %	Reaction
1	CoPDN 15001	Co 8213X CoT 8201	20.75	S	12	PDN 15013	Co 87012 GC	12.50	**MS**
2	PDN 15001	Co 98010X Co 775	18.37	MS	13	PDN 15007	CoM 0265xCo94008	0.00	**R**
3	PDN 15002	Co 1148X Co S 8634	14.63	MS	14	PDN 15011	CoM 0265xCo94008	0.00	**R**
4	PDN 15003	Co 9806xCo62175	0.00	**R**	15	Co 99004*	----	12.50	**MS**
5	PDN 15004	CoM 0265X CoM 94012	7.14	MR	16	Co 94008*	-----	0.00	**R**
6	PDN 15005	CoM 0265X CoM 94012	5.45	MR	17	CoM 0265*	…..	0.00	**R**
7	PDN 15006	CoM 0265xCo94008	0.00	**R**	18	Co 86032*	----	0.00	**R**
8	PDN 15008	CoC 671 X IK 7691	14.89	MS	19	VSI 434*	-----	0.00	**R**
9	PDN 15009	CoM 0265xCo94008	0.00	**R**	20	CoC 671*	-----	5.17	MR
10	PDN 15010	CoM 0265xCo94008	0.00	**R**	21	Co 740*	-----	14.29	MS
11	PDN 15012	CoM 0265xCo94008	0.00	**R**	22	Co 7219*	------	16.28	MS

(* ruling varieties)

It is confirmed from the present study that the sources of resistance against whip smut are available in sugarcane which can be utilized in breeding programme for evolution of new high yielding sugarcane varieties with in-built resistance to whip smut (Afghan et al., 1995, Sabalpara and Vaishnav, 2002 and Ali Khan et al., 2009). The resistant germplasm against whip smut of sugarcane plays a key role for evolution of resistant varieties through breeding programme (Begum et al., 2007).

Snyman *et al.*, (2007) suggested that donor plants require conventional screening for the presence of known pathogens prior to micro propagation.

CONCLUSION AND RECOMMENDATION

From above table we concluded that the genotypes with the parentage as CoM 0265 or Co M 094012 having the unique quality to show the resistant reaction against the smut disease Those parentages was released as best commercial variety in Maharashtra and adjoin state. The resistant sugarcane genotypes can be used as donor parent for breeding programme or if found good commercial characters contributing the quality ones may go further for release them as commercial variety for cultivation as their pedigree ones.

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