

## Low sugar genetic stocks for mapping studies for sugar content in sugarcane

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Sugarcane (*Saccharum spp.* Hybrid complex) is a complex polyploid, which is the main precursor of sugar. The cultivation and improvement of sugarcane has been going on, mainly for increasing yield and sugar content and also for other traits like stress resistance. The genetic complexities and the irregular and non-synchronous flowering behaviour make this crop, a difficult choice for targeted breeding and other genetic studies. Improvement in terms of sugar yield and sugar content forms an important breeding objective in this crop. Even though many elite varieties have been developed through conventional breeding strategies, the classical breeding techniques may not be solely sufficient for aiding the crop improvement programmes. The availability of a vast array of molecular tools helps in complementing the ongoing breeding programmes. These include the application of molecular markers, expression studies with respect to the various players involved in sugar metabolism, transformation studies etc (Ming *et al.* 2006; Swapna and Srivastava 2012, Wu and Birch 2007, 2010). As a part of our attempt to develop mapping population for marker identification and mapping, a few clones with low sugar content were identified from bi-parental crosses.

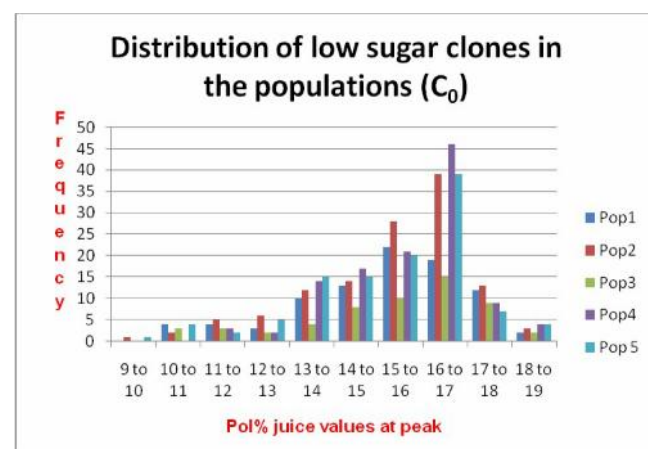
For development of a suitable population for molecular studies the availability of parental lines with sufficient contrast is of utmost importance. Since the sugarcane clones under commercial cultivation may not exhibit a sucrose content of less than 16 % (pol in juice), the availability of parental clones with sufficiently low sucrose content may pose a problem for molecular studies like development of mapping population. Hence work on identifying low sugar clones (pol% juice 12-13%) was initiated simultaneously.

A few bi-parental crosses were attempted as a part of developing mapping population (Table 1). Along with the selection of high sugar clones in the seedling generation, with an HR brix value of 20% or above, a simultaneous selection of clones with HR brix values in the range of 10-15% or below was also carried out. Juice analyses were done in the subsequent generations. Those clones with pol% juice in the low sugar range (not more than 12-13%) were earmarked and juice analysis was repeated during February-March to ensure that the pol% juice values are in the same range even during peak period. This was continued upto  $C_3$  generation and those clones which consistently exhibited a low sugar content were selected as probable low sugar parental lines.

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Table 1 Number of low sugar clones selected from the different crosses in various generations

Cross	Total number of seedlings screened	No. of low sugar clones selected			
		$C_0$	$C_1$	$C_2$	$C_3$
CP-61-23 x CoH 70	89	11	7	2	1
ISH 100 x Co 1158	123	14	7	2	2
CoLk 7901 x HR-83-65	56	8	5	5	5
CoLk 94184 x ISH 176	116	5	5	3	1
CoLk 94114 x ISH 176	112	12	9	8	8



The seedling generation had a few number of clones exhibiting an HR Brix reading in the range of 10-15% (Fig 1). On an average this was approximately 12-15% of the total number of seedlings screened in the different crosses. These low sugar clones were evaluated for three consecutive generations from November to February- March.

Based on the phenotype, mean observations on juice quality parameters like HR Brix and pol % juice during peak period, three genotypes were selected (Table 2) for inclusion in the National Hybridization Garden (NHG) at Sugarcane Breeding

Institute, Coimbatore. These genotypes will be used as parental material for development of new mapping population.

Table 2 Mean juice quality parameters of the three low sugar genotypes

Genotype	Parentage	Pol% juice
'LG 07951'	CP 61-23 x CoH 70	12.2
'LG 06952'	ISH 100 x Co 1158	11.42
'LG 06953'	ISH 100 x Co 1158	13.2

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