
RosBreed Supplement: Development of Cultivars with Higher Soluble Solids

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Abstract

The set of progenies using parents with high, medium and low soluble solids content were established both in California on the Burchell Nursery site and in Texas on the Horticulture Farm. As available, the parents were assessed for soluble solids (range 10 – 22 Brix) and titratable acidity (0.27 to 1.11). Comparison of data from California and Texas indicated that the soluble solids content was consistent across locations. In Texas, selections of fruit were about 2 weeks ahead of those in California due to warmer spring temperatures. Total sugars ranged from 110 to 202 mg/g FW. DNA was also collected and sent into the genotyping center for analysis. Fruit will be evaluated in the 2011 season.

Objectives (Current & Future Timetable, if extended duration)

Year 1:

- Establish the parents and the progenies in both California and Texas.
- Assess the parents for their quality (soluble solids, individual sugar levels, titratable acidity).

Accomplishments in 2010

Established the parents and the 8 progenies in both Texas and California

Burchell Nursery (John Slaughter) established a block at their Fowler location with budwood collected from Texas. They budded 4 trees of each parent and 1 one each of the 350 segregating seedlings. These were done in the spring and most of these trees should have fruit this coming summer. The same materials were planted in a dedicated plot on the Horticulture Farm at Texas A&M University. Although we do not expect much fruit from these trees this coming year, we do expect fruit from the original seedling trees which were planted in the spring of 2009.

Assess the parents for their quality (soluble solids, individual sugar levels, titratable acidity)

In California, fruit of the high sugar selections (Y426-371, Y434-40, and Y435-246) were collected by David Ramming from the USDA evaluation blocks and samples of the TX selections

were collected by either David Byrne and/or Eric Gaarde from the evaluation blocks at Burchell Nursery plots in Fowler. All Texas samples were collected by David Byrne in the TAMU evaluation blocks in College Station, TX.

Table 1. Quality data from California and Texas on the parents of the high sugar progenies.

Cultivar	Ripe Date		Soluble solids		Titrable acidity
	California	Texas	California	Texas	California
Y426-371	09 June	-	13.5	-	0.49
Y434-40	04 June	-	17.5	-	-
Y435-246	01 June	-	22.5	-	-
Galaxy	-	13 June	-	12.5	-
Victor	25 May	08 May	10.0	11.0	1.07
TX2B136	05 June	15 May	12.6	11.0	1.11
TX3E213LW	16 June	12 June	12.2	12.5	0.27
TXW1490-1	16 June	-	13.0	-	0.95

Table 2. Total, sucrose and fructose content (mg/g FW) of selected parents of the high sugar progenies as determined by HPLC.

Cultivar	Total sugars	Sucrose	Fructose	Soluble solids
Victor	110	94	16.2	10-11
TX2B213LW	146	135	10.7	12.2-12.5
TXW1490-1	155	141	14.0	13
Y434-40	161	147	14.5	17.5
Y426-371	183	168	14.8	13.5
Y435-246	202	195	7.0	22.5

The ripe dates for the same genotypes in Texas were generally earlier due to warmer spring and summer temperatures although there were no consistent differences in soluble solids content. The low acid genotypes evaluated (Y426-371 and TX3E231LW) had titratable acidity less than 0.5 %. The lowest soluble solids (Table 1) and total sugars (Table 2) was found in Victor and the highest were the three USDA selections (Y426-371, Y434-40, Y435-246) (Tables 1 and 2). In general, the vast majority of the sugar was in the form of sucrose which ranged from 94 mg/g FW to 195 mg/g FW. The total sugar content was well correlated with the soluble solids content of the fruit except for the Y426-371 genotype which ranged from 10.8 to 16 Brix in the samples examined. In previous years the Brix of this genotype was generally above 20.

Other RosBREED Activities

- Tissue was collected of the parents and selected progeny for DNA extraction and genomic analysis. This work is being done by Genotyping Team Leader, Nahla Bassil at the USDA-ARS National Clonal Germplasm Repository, Corvallis, OR 97333.
- We attended a training session to learn the software that will be used to analyse the pedigree structure and the phenotypic and genotypic data to identify markers associated with higher sugar content in the progenies. Activities leading up to this

workshop involved developing a pedigree database for all of the progenies involved in this project. This includes those from the programs of Tom Gradziel (UC Davis), John Clark (University of Arkansas), Ksenija Gasic (Clemson University) and David Byrne (Texas A&M University).

Next year, we will begin taking quality data on the established plot in California and the original seedling block in Texas. This data will be incorporated into the genetic analysis software along with similar data from the breeding programs run by Tom Gradziel (UC, Davis), Ksenija Gasic (Clemson University), and John Clark (University of Arkansas). This analysis along with molecular marker data being generated by the RosBREED project will lead to useful markers to enhance our ability to develop high sugar stone fruit.

