

"Sugarbeet Genetics, Genomics, and Germplasm Enhancement "

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Accession	Lineage	emergence	T/A	%sucFW	Suc/A	%DM	%water	%sucDM	APH	Rhizoc	Fusarium	RZ№
EL-A021744	Low water elites	67.3	20.2	18.4	7467.2	23.2	76.8	79.5	1.7	3.4	2.0	2.5
EL-A022463	F5 SR Comp x 07RangeA	32.0	22.1	18.4	8132.3	22.8	77.2	80.6				
EL-A022471	low water IC1 - A	61.8	22.1	18.5	8154.1	22.6	77.4	82.0	1.5		1.9	
EL-A022459	SR Suc RZM IC2	71.3	21.5	18.6	7985.1	22.5	77.5	82.8	1.4	3.2	2.0	
EL-A022465	low water IC1 - EL	64.0	20.5	18.4	7485.6	22.5	77.5	81.8	2.3		1.8	
EL-A021733	Rhizoc elites	81.8	18.2	17.6	6382.3	22.4	77.6	78.8	1.4	3.5	2.1	4.2
EL-A021725	(95HS2/sel) x 07-5E	41.3	18.6	17.8	6670.6	22.4	77.6	79.4	3.1	3.5	1.7	
EL-A021602	95HS2/sel/sel	74.3	23.1	18.1	8413.8	22.3	77.7	81.1	2.3	2.7	1.6	3.3
EL-A022446	low water IC1 - D	67.5	21.4	17.9	7652.6	22.3	77.7	80.3	2.1		1.9	3.1
EL-A021842	SR96 sel //	79.5	25.3	17.7	9000.9	22.2	77.8	79.9	1.7	3.9	1.7	3.4
EL-A022462	low water IC1 -B	83.0	23.5	18.3	8567.5	22.1	77.9	82.6	1.5		1.8	
EL-A015019	SR Comp F4 (unselected)	78.8	22.6	17.9	8099.8	22.1	77.9	81.2				
EL-A021841	HS elites	93.8	24.9	17.9	8896.8	22.1	77.9	81.0	2.6	4.3	2.1	3.0
EL-A015020	SR Comp F4 (14%)	83.3	26.4	17.2	9086.5	22.1	77.9	77.9				
EL-A015022	SR Comp F4 (16-17%)	76.5	19.0	17.5	6702.0	22.0	78.0	79.7				
EL-A022447	low water IC1 - cerc	81.0	24.1	18.0	8735.6	22.0	78.0	81.8	2.2	4.1	1.5	
EL-A022426	C40 high sucrose x SR	74.8	21.9	17.5	7704.9	21.9	78.1	79.9	1.5		2.6	
EL-A019277	Joe's-mix of 04 roots	61.8	21.6	18.1	7779.9	21.9	78.1	82.2	1.8	2.1	1.5	
EL-A022469	SR RZM Rhizoc B IC	68.8	23.1	17.7	8175.1	21.8	78.2	81.1	1.8	3.0	1.7	
EL-A022452	low water IC - C	60.0	22.4	18.0	8051.0	21.8	78.2	82.7	2.5		2.2	
EL-A021734	SR96/sel	76.5	24.0	17.6	8515.4	21.7	78.3	80.9	2.0		1.7	3.4
EL-A015021	SR Comp F4 (10-12%)	66.0	25.5	17.0	8718.5	21.5	78.5	79.3				
EL-A021500	Mix: EL0204+SR+Suc-2003	50.3	20.7	17.2	7143.5	21.3	78.7	80.6	1.8	3.6	2.2	2.3
EL-A022453	RZM RZC Hero IC	57.8	23.6	17.5	8269.5	21.3	78.7	82.2	2.0	2.7	1.3	3.8
EL-A013703	FC mix	83.5	19.6	16.8	6635.4	21.2	78.8	79.4	3.0	1.6	1.4	6.1
EL-A015029	EL53 (1)	60.0	21.2	16.0	6804.3	21.0	79.0	76.3			2.2	
EL-A012858	EL0204	53.8	23.7	16.3	7693.9	20.7	79.3	78.9				
HM7172Rz	commercial	83.5	20.5	18.7	7746.0	25.1	74.9	75.0				
Crystal 827RR	commercial	64.5	24.1	19.2	9237.5	24.6	75.4	78.3				
HM2771Rz	commercial	69.8	22.2	19.6	8742.3	24.4	75.6	80.3				
Beta 5930R	commercial	67.5	22.6	18.6	8460.0	23.8	76.2	78.5				
Beta 5833R	commercial	45.5	25.9	17.9	9266.2	23.4	76.6	76.7				
HM27RR	commercial	59.5	19.1	18.6	7131.8	23.4	76.6	79.5				
E17	commercial	69.8	27.9	17.8	9861.7	23.1	76.9	77.0				
Beta 5451	commercial	50.8	22.0	17.9	7879.4	23.0	77.0	77.9				











Sugar beet (from the Atlas des Plantes de France, 1891)

1747 – Marggraf Beet crystals = cane crystals

1784 – Achard Selected first sugar beet

1830's – Vilmorin Selected high sugar mother roots & tested progeny



for flowering: (greenhouse protocol)

Req's vernalization: (5° C, Oct 1 – Dec 30⁺)

Bolting B-annual, bb biennial (Jan – Feb)

> Flowering (March-April)

Seed harvest & processing (June-July)

science-sugar-beet-hemoglobin-blood-substitute-02271.html



MM or Mm

Kern: Am.Crystal Sugar Co.

Pollen control is key to beet breeding



Shuana Bushey, USDA-ARS

Fertile anther - normal cytoplasm Cytoplasmic MS anther - sterile cytoplasm Expression of O-type CMS requires 3 recessive genes: *xx*, (*yy*), *zz* (2 are linked)









Experimental seed production -> complex self-incompatibility system



Breeding in open pollinated crops: Manipulating gene frequency where gene function(s) unknown











Mother root selection (mass selection with or without progeny testing) Sib-mating (Pair crosses)

Inbreeding via dominant self-fertility allele (S^t; suppressor of self-incompatibility?) Hybrids enforced with nuclear or cytoplasmic male sterility



































