FRESH MARKET TOMATO BREEDING: VISIONS OR FOLLY

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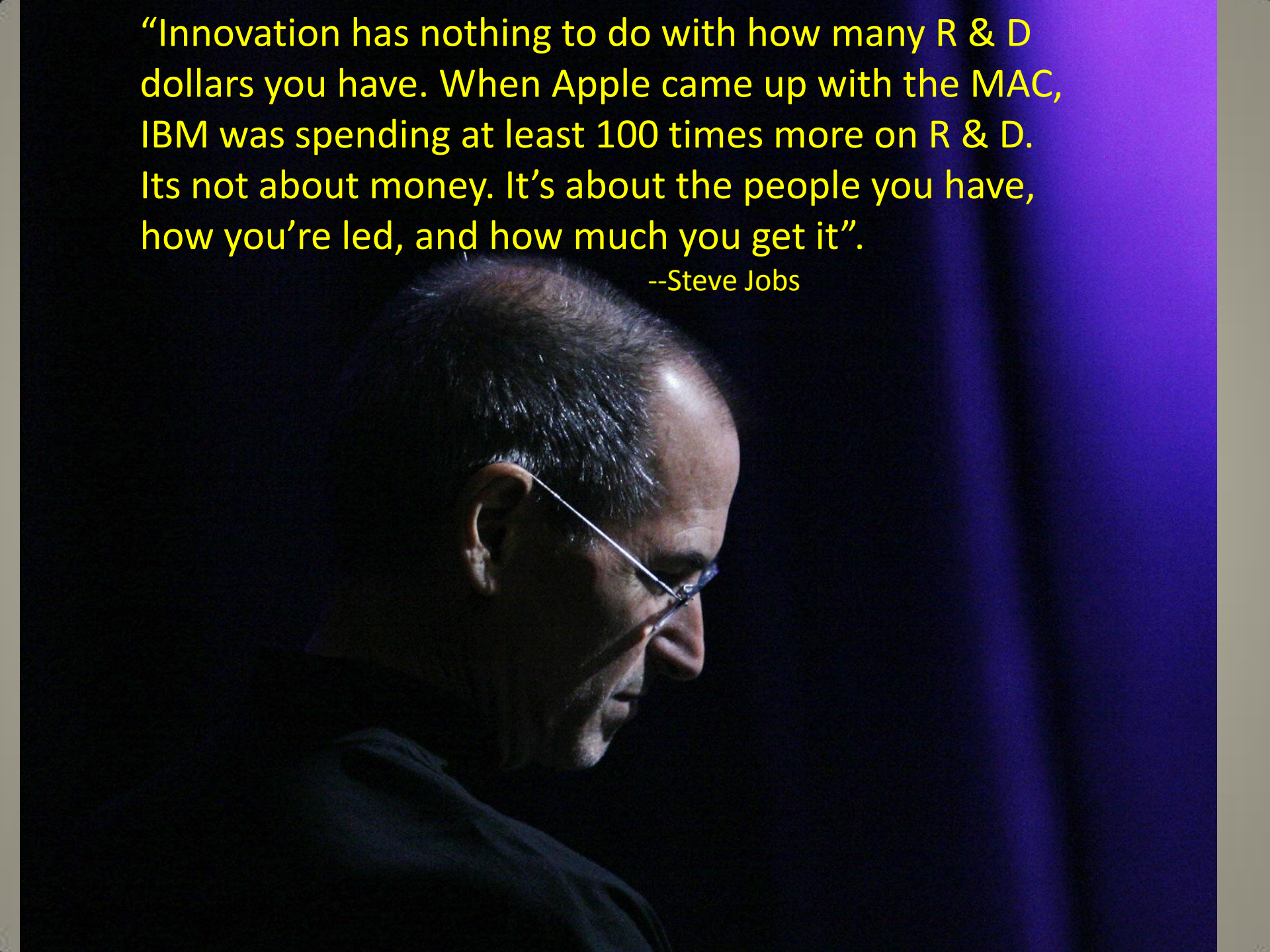
UF UNIVERSITY of FLORIDA IFAS

The Tomato Marketplace

- Who decides what types of tomato varieties get bought and sold?
- How many of the tomato buyers have asked any tomato breeders our opinions?
- Where are the rich entrepreneurs who want to market novel tomato products?
- Can we get some dialogue going with these mysterious people?

Tomato Breeders are which of the following?

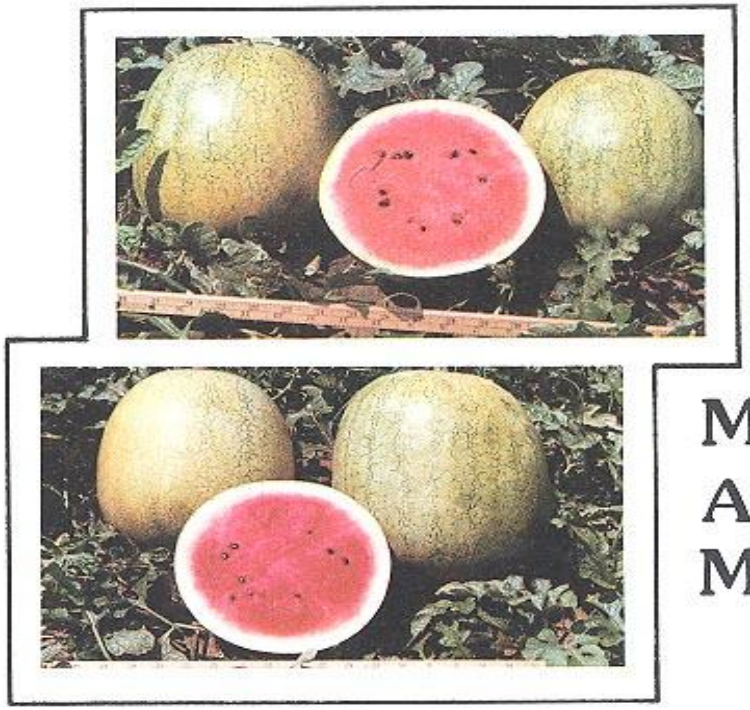
- A) Pawns subject to the whims of clueless business people, administrators and lawyers
- B) An angry mob that doesn’t like to be called pawns
- C) The secret envy of molecular geneticists and plant pathologists
- D) It is not politically correct to say anything about this topic


“Innovation has nothing to do with how many R & D dollars you have. When Apple came up with the MAC, IBM was spending at least 100 times more on R & D. Its not about money. It’s about the people you have, how you’re led, and how much you get it”.
--Steve Jobs

Novel Breeding Ideas: the good, the bad and the ugly

- Many turn out to be bad ideas- unexpected roadblocks and/or costs
- Some are good but no one bothers to market the finished product
- Occasionally they work and the rewards are huge-is the risk worth it?

December 1986 Circular S-336



MINILEE AND MICKYLEE

Two Icebox-Type Watermelon Cultivars with Excellent Fruit Quality and Resistance to both Anthracnose and Fusarium Wilt

J.M. Crall

Agricultural Experiment Station
Institute of Food and Agricultural Sciences
University of Florida, Gainesville
J. M. Davidson, Dean for Research

June 1978 Circular S-259

FLORIDA STAYSWEET

A High-Quality sh_2 Sweet Corn Hybrid

EMIL A. WOLF

Agricultural Experiment Stations
Institute of Food and Agricultural Sciences
University of Florida, Gainesville
F. A. Wood, Dean for Research

LET'S TAKE A LOOK AT FRESH MARKET TOMATOES!

Israeli, Florida experts work to solve common problems

MIRIAM WIDMAN
Herald Business Writer

Nachum Kedar is an example of international cooperation.

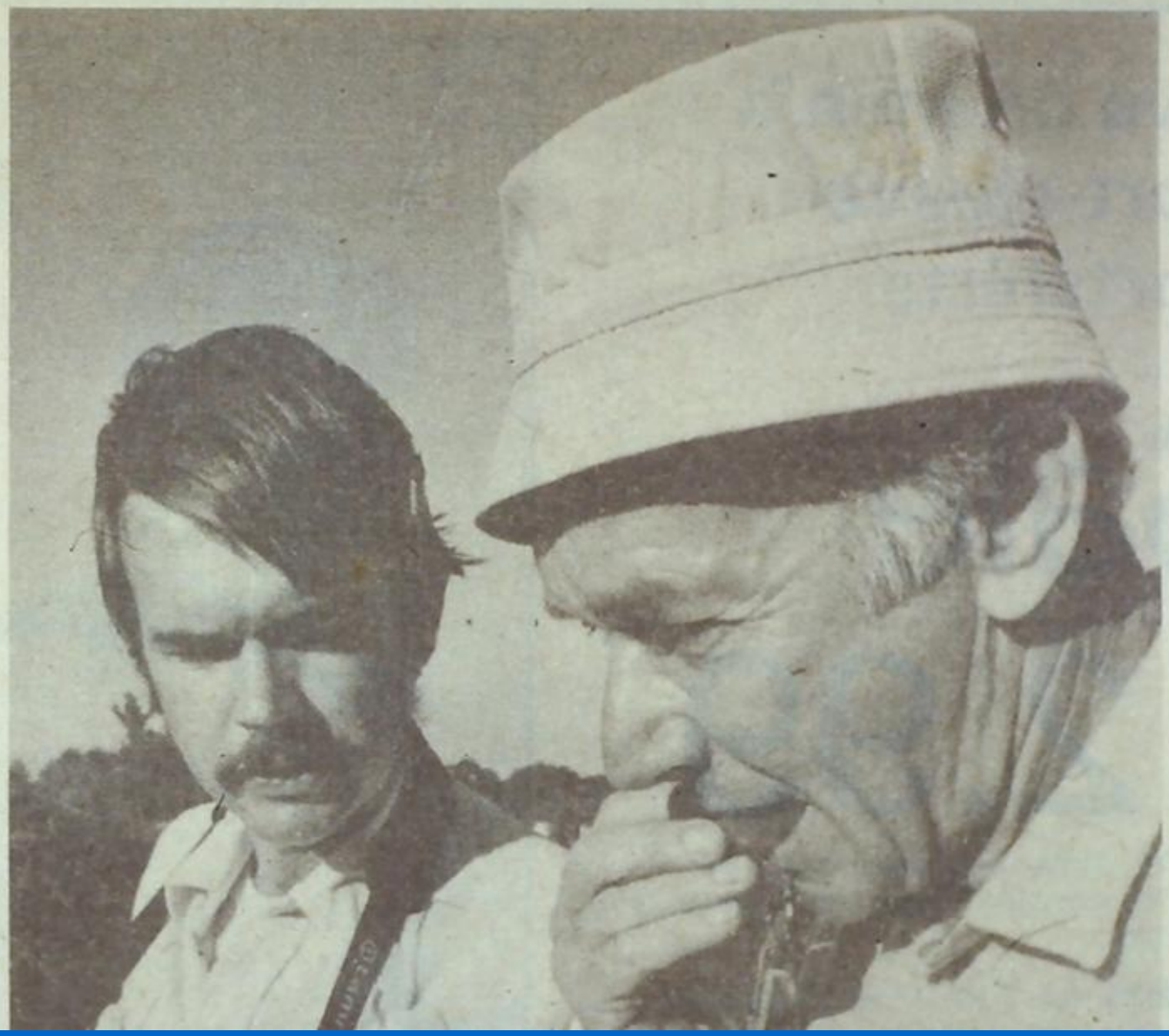
The 64-year-old Israeli scientist is conducting tests on tomatoes at the Gulfcoast Research Center off State Road 70 to solve problems both Israel and Florida face.

"In Israel, we have a lot of problems with breeding tomatoes," he said.

"Some of them don't look so nice," adding the problem stems from a "blossom end" that's too large. The blossom end is on the opposite side of the stem.

"In Florida they have a little bit of the same problem," he added. "Quite a big percentage of tomatoes are not sold because of this problem.

"We have something in common."



TYPES OF TOMATOES TYPICALLY IN THE USA SUPERMARKET 2011

- LARGE ROUND-Field grown
- LARGE ROUND-Greenhouse grown
- TOMATOES ON THE VINE (TOV)-Greenhouse grown
- PLUM TOMATOES-field grown
- COCKTAIL TOMATOES-Compari, Amarosa etc.-Greenhouse grown
- GRAPE TOMATOES-Field grown
- HEIRLOOMS-Ugly Ripe

Relative Importance of Tomato Quality Attributes

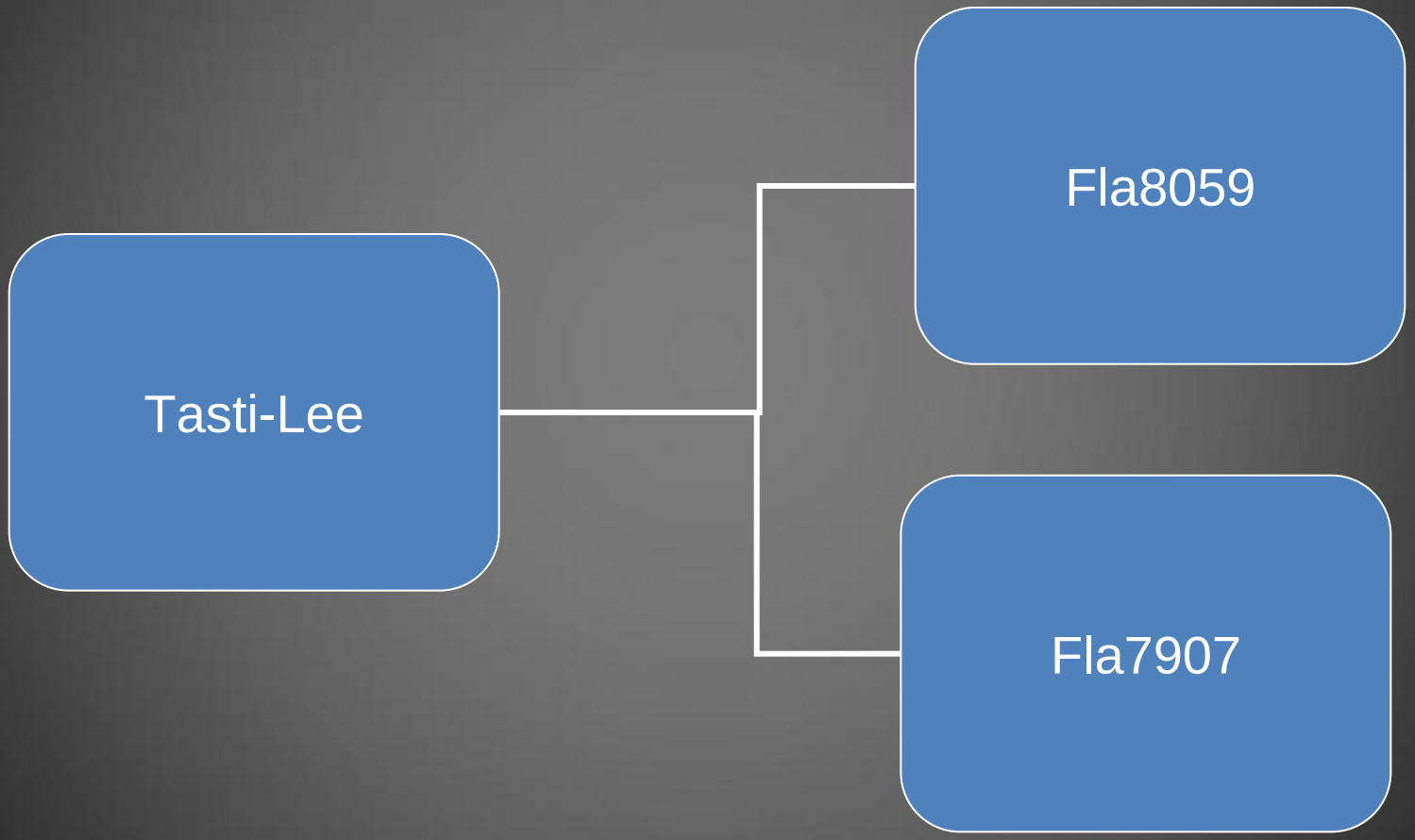
	JUDGE			
CHARACTERISTIC	PRODUCER	HANDLER/ RETAILER	FOOD SERVICE	CONSUMER
APPEARANCE	XX	XX	XX	XX
FIRMNESS	XX	XX	XX	XX
SHELF LIFE	X	XXX	X	X
RIPENING BEHAVIOR	XX	XX	X	X
TEXTURE				XX
NUTRITION				X
FLAVOR				XXX
FRUIT SIZE	XX	XXX	XX	
YIELD	XXX	X		
DISEASE RESISTANCE	XXX	X		
EASE OF HARVEST	XX			

TOMATOES
PRIDE of RUSKIN
TOMATOES
PRIDE of RUSKIN
TOMATOES

TOMATO FLAVOR NOTES

1. BITTER
2. MUSTY (DIRTY SOCKS)
3. ASTRINGENT (DELTA)
4. ETHANOLIC (MTOH)
5. METALLIC
6. SOUR (OVERRIPE)
7. VEGETATIVE (GRASSY)
8. BLAND
9. SWEET
10. ACID
11. BALANCED
12. FRUITY/FLORAL

Parents of Tasti-Lee Hybrid



Tasti-Lee™ ('Fla. 8153') Features

- ✓ Seed Available from Bejo Seeds
  - ✓ -Contact Greg Styers:
  - ✓ Email: G.styers@bejoseeds.com
  - ✓ Phone: 805-689-1627
- ✓ High Lycopene crimson *(og^c)* gene
- ✓ Superior Flavor
- ✓ Heat-Tolerant
- ✓ Fusarium Wilt Race 1, 2, & 3 Resistant
- ✓ Candidate For Premium Tomato Market

Overall Flavor Sensory Panel Data Fall 2004 (GCREC)and Winter 2005(TREC)

Rated on a scale of 1-9 where higher numbers mean better flavor

Variety [z]	Overall Flavor	
	Fall '04	Winter '05
Fla. 8408	5.77 a[y]	- - - -
Tasti-Lee	5.35 a	6.03 a
Sanibel	- - - -	4.45 bc
Florida 47	4.43 b	4.33 bc
Florida 91	4.35 b	- - - -
Solar Fire	3.74 bc	5.00 b
Ugly Ripe	3.35 c	3.83 c

[Z] Ugly Ripe was store bought, all other harvested table ripe in Fall '04 and breaker in Winter '05

[Y] Mean separation in columns by Duncan's multiple range test at $p < 0.1$

Sensory Panel Data
Balm, Spring 2005

Rated on a scale of 1-9 where higher numbers mean better flavor or more sweetness or acidity

Variety [z]	Overall Flavor	Sweet-ness	Acidity
Fla. 8393	5.38 a[y]	4.52 ab	5.28 a
Tasti-Lee	5.35 a	4.62 a	4.41 b
Fla. 8408	5.17 a	4.83 a	3.79 b
Florida 47	4.00 b	3.93 bc	3.76 b
Store-F	3.59 b	3.66 c	2.74 c
Ugly Ripe	3.35 b	3.55 c	3.90 b

[Z] All harvested at table ripe stage except Store F and Ugly Ripe were store bought

[Y] Mean separation in columns by Duncan's multiple range test at $p < 0.1$

Flavor Summary for 'Tasti-Lee'at Release in 2006

Sensory panel:

- Consistent performance, always in most preferred group, significantly better than Florida 47 and any other commercial variety in 6 of 7 panels, always more preferred than store-bought samples.
- Chemistry: Tendency to be higher in soluble solids but especially sugars, good acid balance, nothing clear on volatiles yet (need to analyze further).

Tasti-Lee
Fla. 8570

Marketable yield, fruit size, and culls for tomato hybrids grown at Pine Island Farms, Dade County, Florida. Winter 2010.

Hybrid	Marketable yield (25 lb box/A)	Fruit size (g)	Culls (% by wt.)
Fla. 8314	1806 a[z]	144 e	29 d
Fla. 8455	1538 ab	183 ab	32 cd
Tasti-Lee	1529 ab	154 de	33 b-d
Sanibel	1478 ab	175 bc	43 ab
Fla. 8787	1301 ab	187 ab	41 a-c
Florida 47	1267 ab	195 a	41 a-c
Tribeca	1242 b	162 cd	48 a

[z] Mean separation in columns by DMRT at $P \leq 0.05$.

TBRT ’06: Why Tasti-Lee Will Not Succeed

1) There is no category for such a tomato and it will not get shelf space
2) No one is interested in such a tomato, it is a threat to present business practices
3) The flavor is not good enough to make a difference
4) Etc.

TBRT ’06: Why Tasti-Lee Will Succeed, Change the Entire Fresh Market Tomato Industry and Usher in World Peace

1) Good Marketing Strategy Employed
2) Good Field Production, Reliability
3) Consistent Superior Flavor and Color Quality
4) Health Aspects

The next best thing: Does Jay Scott hold the future of decent store-bought tomatoes in his hands?

By Barry Estabrook
Special to The
Washington Post
Wednesday, May 5, 2010

Some Highlights From the University of Florida Tomato Breeding Program

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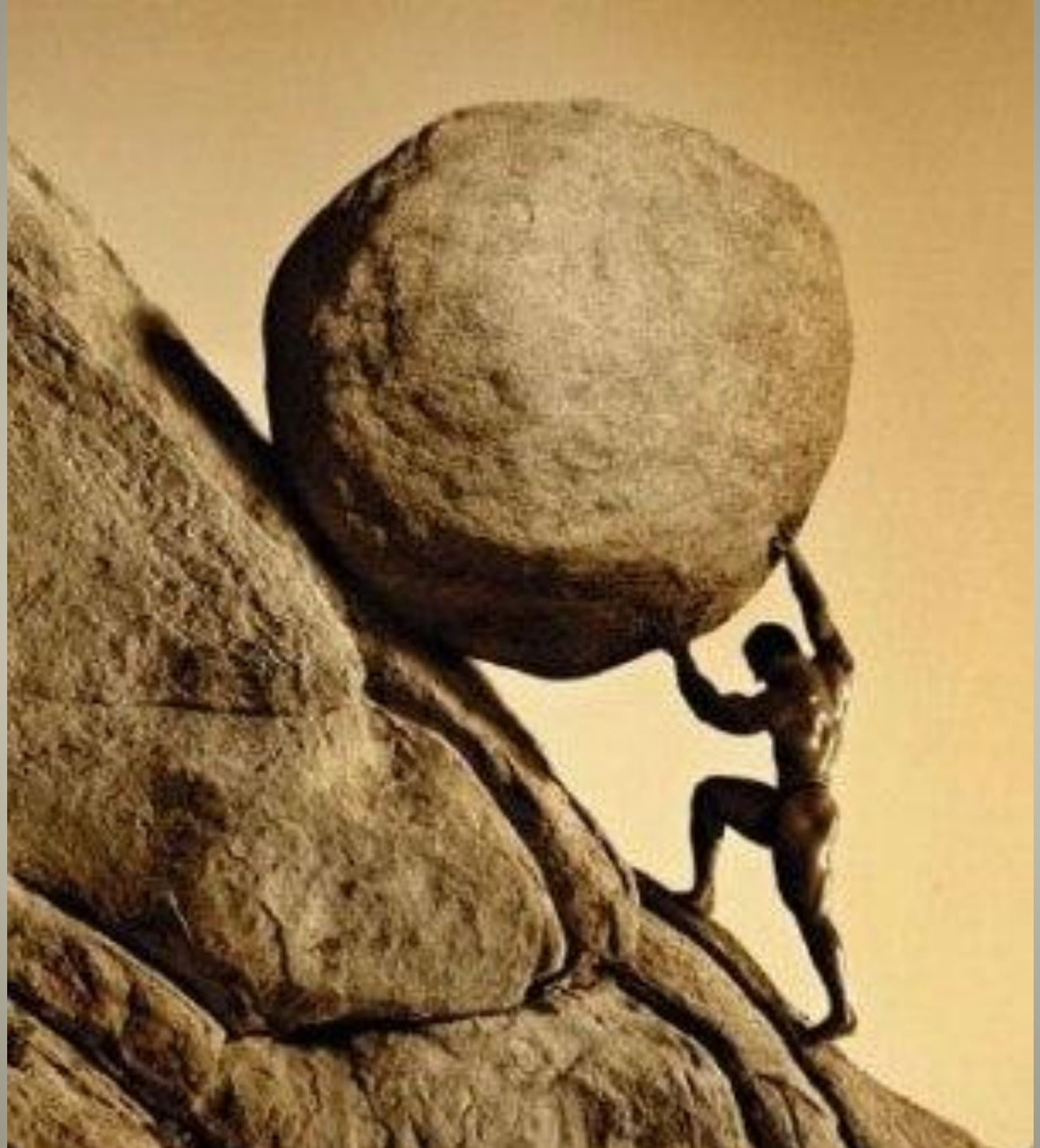
BK2FUT
BACK
TO THE FUTURE™
Salute To 80s

BREAK.com

J. Scott's Vision for the Florida Tomato Industry of the Future

- Food Service: Mature green tomato varieties, will be jointless, CGH types that will not be staked and harvested by machine
- Supermarket: Vine–ripe tomato varieties of the Tasti-Lee type will be staked and hand harvested



Bejo Seeds
Florida W
Tasti-Lee
TM
Health • Flavor • Freshness
PrimaBella

$7.99
Olive Oil
Extra Virgin
Olive Oil

Tasti-Lee: The Present

1. There is supermarket demand-expanding
2. Overall the fruit quality has been very good-will it continue?
3. Selling at $2.49/lb, growers get $1.25/lb.
4. Three growers “all in”, most growers business as usual.

"If you have ever eaten a tomato—or ever plan to—you must read Tomatoland. *It will change the way you think about America's most popular 'vegetable.' More importantly, it will give you new insight into the way America farms."*

—Ruth Reichl

TOMATOLAND

How Modern Industrial Agriculture Destroyed Our Most Alluring Fruit

BARRY ESTABROOK

Building a better Florida tomato

It may not be a scientific breakthrough on the order of curing cancer, but a University of Florida horticulturist has proven if you build a better tomato, the world may well beat a path to your dinner table. The Tasti-Lee is the result of five years of experimenting, teamwork and patience paying off in a mass market tomato that actually tastes like a tomato. If those sorts of skills can produce a tastier tomato, surely Washington could rely on those values to produce more jobs and a tidier federal budget.

Working out of UF's research laboratory in Hillsborough County, Jay Scott combined two strains of tomato to create the Tasti-Lee, a rich crimson variety that retains a juicy, flavorful sweetness. Think of the Tasti-Lee as the Gatorade of fruit. For this is not merely some idle culinary curiosity. It is enhanced economic development on the vine. Florida accounts for nearly one-third of all fresh tomatoes grown in the United States and almost all tomatoes harvested during the fall and winter.

With the recent publication of Barry Estabrook's *Tomatoland*, a harsh criticism of an agricultural industry that too often grows a rock-hard, bland product engineered more for portability than flavor, Scott's Tasti-Lee could go a long away toward revitalizing the state's reputation for quality, consumer-friendly produce.

The Tasti-Lee raises expectations Americans should demand from the farmland and the homeland. A country with the innovation and determination to grow a tastier tomato ought to be able to come together to produce a more fertile economy and a more sustainable budget.

Trait Integration

Traits

Ty-2

Ty-3

Ty-4

Ty-5

(Ty-6)

Sw-5

Sw-7

Frl

Pto

Ph-2

Ph-3

(Graywall R)

(Non-blighting)

Recurrent Parents

7770	8208	8599
7776	8249	8608
7781	8283	8611
7804	8293	8620
7907B	8296	8623
7946	8297	8626
7949B	8436B	8640
7987	8490B	8646
8000	8493C	8650
8021	8495	8653B
8044	8499	8735
8059	8589	8820
8083	8590	8834
8111B	8591	8835
8124C	8592	

Phase 2: A Fruity-Floral 'Tasti-Lee'

- Working on stable expression of the Fruity-floral flavor note
- Backcross Fruity-Floral into both parents of 'Tasti-Lee'
- Issues:

  - Inheritance=?

  - How to select for fruity-floral: Yikes!

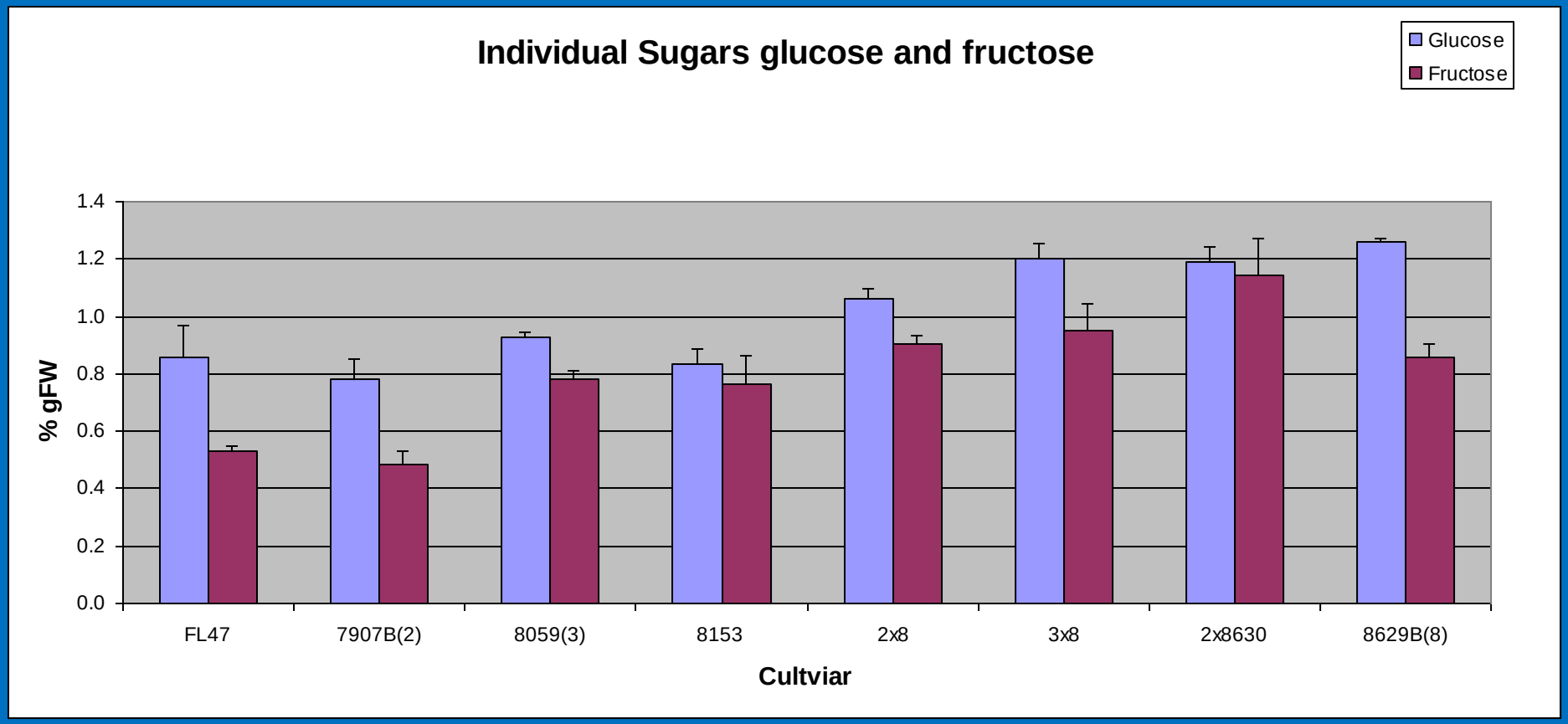
Modified Backcrossing of Fruity/floral into Tasti-Lee Parents

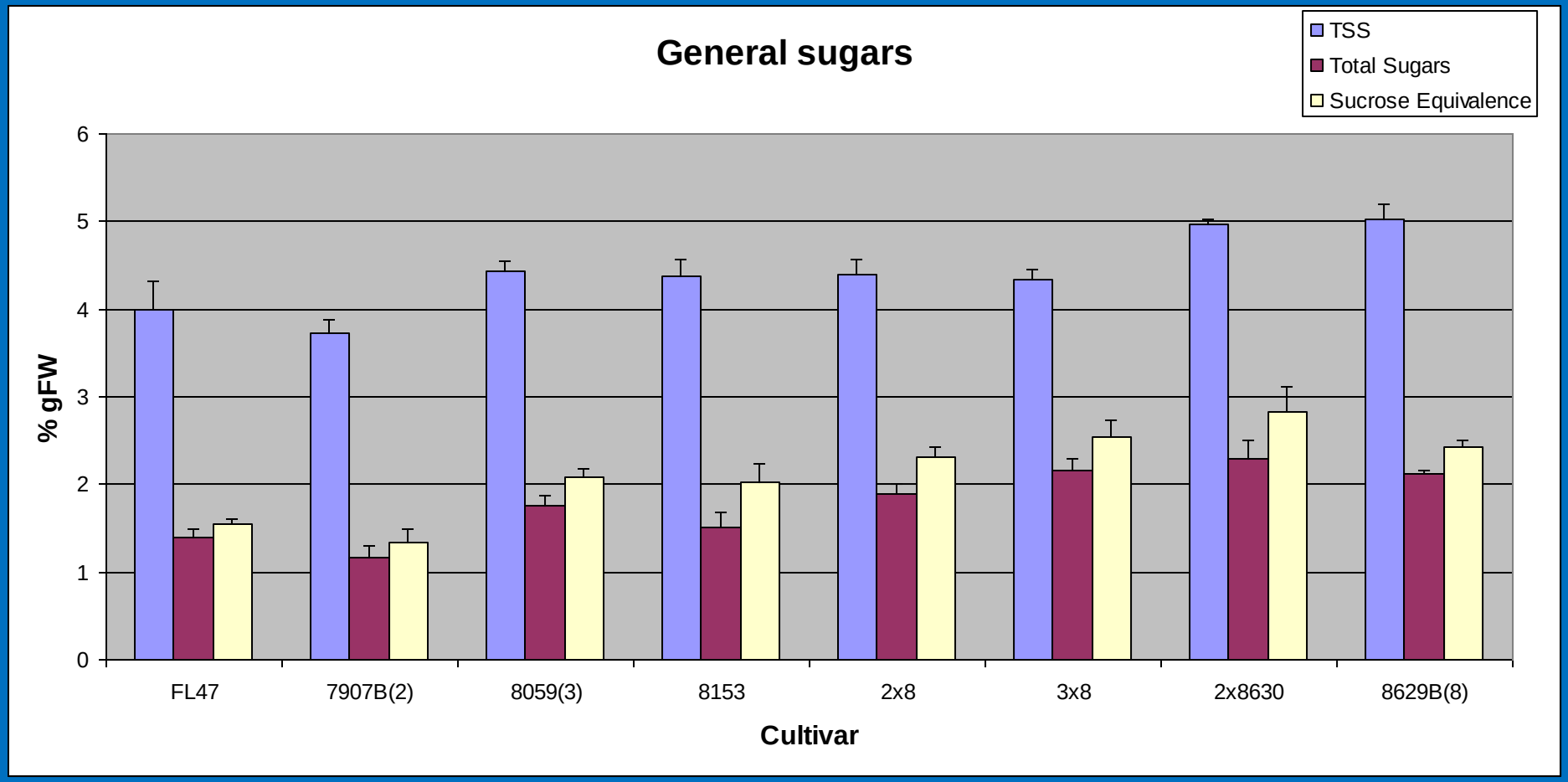
- Fall ‘05: 2 parents crossed with 5 donors
- Spring ’07: Fla. 8629 selected (7907x8570)F_4
- Fall ’07 (late): 13 pollens crossed=15 F_1’s
- Spring ‘09: 15 F_2’s, 20 plants each, 14 selections, 1 with fruity/floral= Fla. 8792 pedigree= (8059x8629)F_3
- Fall ‘09 8792 determined to be fruity/floral, thus 4 years to get to “BC_3"

Experienced sensory panel results for tomatoes in December 2008 at the Gulf Coast Research and Education Center.

Pedigree	Overall Flavor	Sweetness	Acidity
7907B x 8630	6.06 a[z]	5.27 a	4.37 b
Fla. 8629	6.03 a	5.43 a	4.20 b
8059 x 8629	5.86 a	4.91 ab	5.11 a
7907B x 8629	5.83 a	5.09 ab	4.49 ab
Fla. 7907	4.66 b	4.49 bc	4.34 b
Fla. 8059	4.56 b	4.18 cd	4.68 ab
Fla. 8153 (Tasti-Lee™)	4.37 b	3.91 cd	4.34 b
Florida 47	3.66 c	3.60 d	4.09 b

[z] Mean separation in columns by Duncan's multiple range test at $P \leq 0.1$.

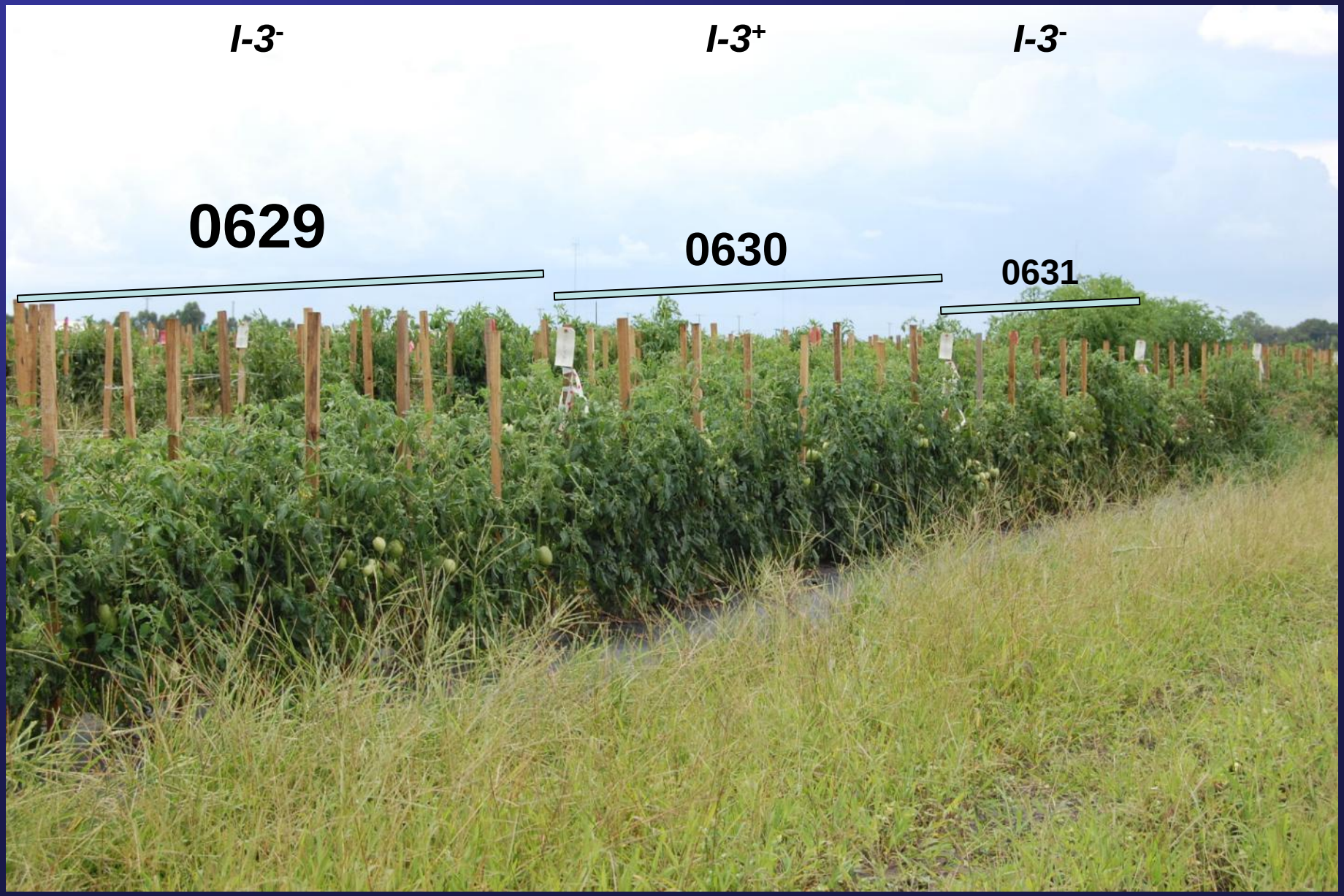

Individual Sugars glucose and fructose
Glucose
Fructose
% gFW
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
FL47
7907B(2)
8059(3)
8153
2x8
3x8
2x8630
8629B(8)
Cultviar


General sugars
TSS
Total Sugars
Sucrose Equivalence
% gFW
0
1
2
3
4
5
6
FL47
7907B(2)
8059(3)
8153
2x8
3x8
2x8630
8629B(8)
Cultivar

Fla. 7946

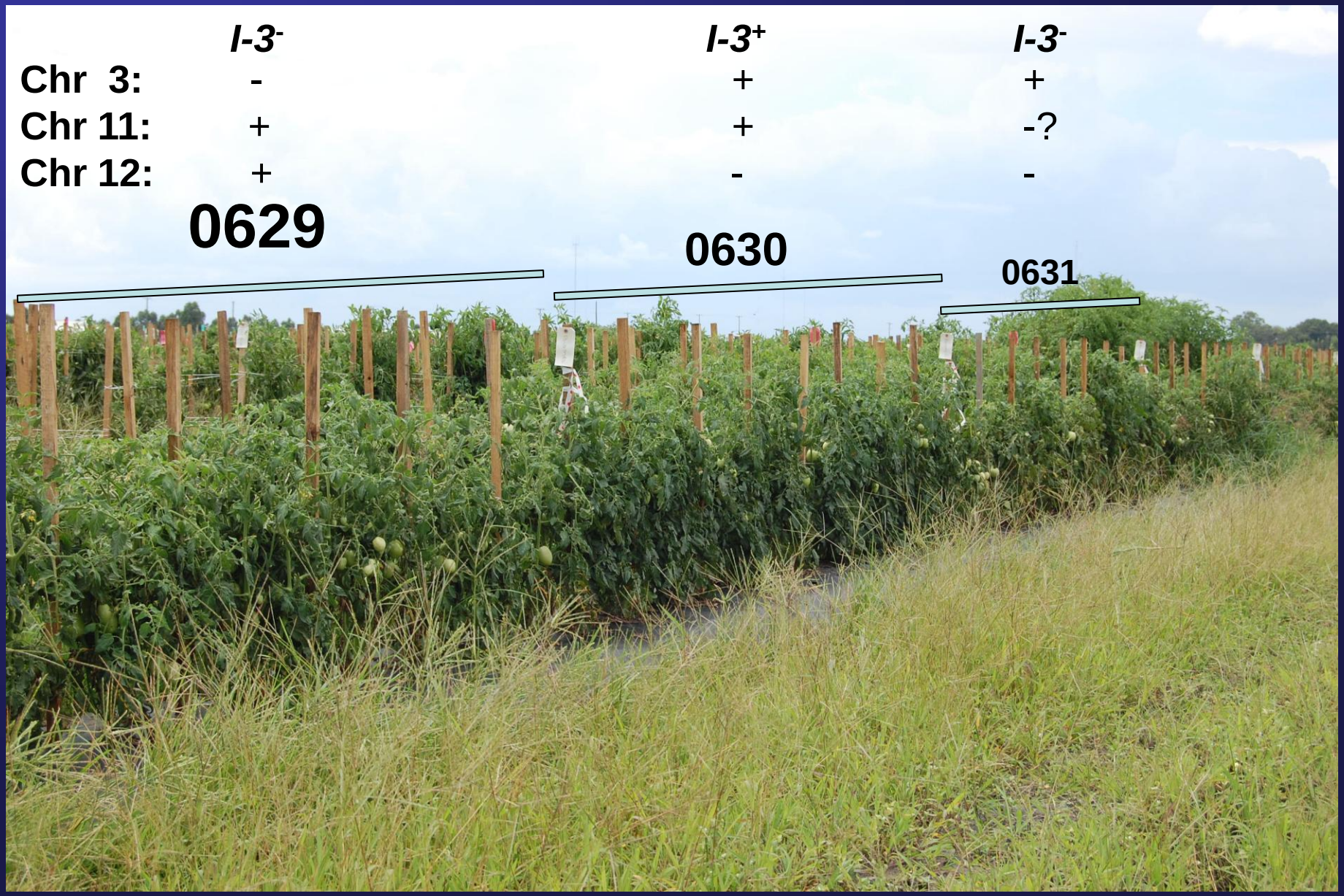
Fla. 8517

7946 x 8517 selections:



0630

Severity Rating = 2.5


I-3-
I-3+
I-3-
Chr 3:
-
+
+
Chr 11:
+
+
-?
Chr 12:
+
-
-
0629
0630
0631

Fla. 8208 x Fla. 8626

Fla. 8208 x Fla. 8626
Brand X

VISIONS OR FOLLY

- With Tasti-Lee we are giving the consumer a voice, at the least it is an interesting experiment
- Could be implications for other produce items if successful
- And if you have gotten this far w/o drowsiness or distain– if there is a conventional way of doing things always consider the opposite as a possibility

Woof Woof^3 *
* “The End” in
doggese