Southern California Pomology Research Update

Kirk Larson, UC South Coast R.E.C. - Irvine

- Update on new SD cultivars Benicia & Mojave
- Timeline for developing a new cultivar
- Management strategies for early-planted San Andreas and Palomar
- Breeding for resistance/tolerance
- Assessing efficacy of various soil fumigation treatments for control of M. phaseolina

Performance of new cultivars in Southern California, 2006-2010

Benicia (C225)

Mojave (C227)

Short-day strawberry breeding objectives

Excellent flavor

Consistent high fruit quality

Early production

Long, stable production cycle

Easy to grow (nursery & fruiting field)

Plant architecture that facilitates harvest efficiency

Disease & environmental tolerance

Benicia

Mojave

Three-year average[x] yield performance for high-elevation advanced short-day selections compared with Camarosa & Ventana, 2006-09

Dig/plant 9/26-9/30	Yield perform to 3/1			Yield performance to 6-8					
							Fruit		
Item	G/plt[y]	Mkt g/plt[z]	Cull (%)	G/plt	Mkt g/plt	Cull (%)	size (g)	app. (1-5)	firm. (1-5)
Benicia 3.4	396	378		4.6	2227	1791	21.6	34.4	3.1
Mojave	507	471	6.0	2176 9,792	1888 8,496	13.2	36.6	3.8	3.2
Ventana	407	345	15.2	1962	1540	21.5	32.5	3.2	3.4
Camarosa	332	269	19.0	2042	1534	24.9	31.0	2.6	3.4

Grams per plant x 4.5 = number of 12# crates/acre

[x] One-year of data for C225 and C226 (2008-09)

[y] G/plt = total grams per plant; [z] Mkt g/plt = marketable grams per plant

Three-year average[x] yield performance for high-elevation advanced short-day selections compared with Camarosa & Ventana, 2006-09

Item	*Dig/plant 10/3-10/6* G/plt[y]	Yield perform to 3/1 Mkt g/plt[z]	Cull (%)	Yield performance to 6-8 G/plt	Mkt g/plt	Cull (%)	Fruit size (g)	app. (1-5)	firm. (1-5)
Benicia 3.5	234	221		5.6	1784	1462	18.1	33.3	3.4
Mojave 3.3	259	244		5.8	1803	1570	12.9	35.8	3.7
				8,114	7,065				
Ventana	273	245	10.3	1856	1415	23.8	32.1	3.4	3.4
Camarosa	163	119	27.0	1808	1293	28.5	30.9	2.7	3.4

[x] Two years of data for C225 and C226 (2007-09)

[y] G/plt = total grams per plant; [z] Mkt g/plt = marketable grams per plant
Grams per plant x 4.5 = number of 12# crates/acre

Three-year average[x] yield performance for high-elevation advanced short-day selections compared with Camarosa & Ventana, 2006-09

	Dig/plant 10/15-10/20	Yield perform to 3/1			Yield performance to 6-8				
							Fruit		
		Mkt	Cull		Mkt	Cull	size	app.	
firm. Item	G/plt[y]	g/plt[z]	(%)	G/plt	g/plt	(%)	(g)	(1-5)	(1-5)
Benicia 3.5	219	201		8.2	1921	1613	16.0	33.5	3.4
				8,645	7,260				
Mojave 3.2	236	217		8.1	1756	1534	12.6	36.3	3.8
Ventana	252	230	8.7	1910	1559	18.4	33.1	3.4	3.4
Camarosa	182	145	20.3	1832	1381	24.6	30.9	2.8	3.4

[x] Two years of data for C225 and C226 (2007-09)

[y] G/plt = total grams per plant; [z] Mkt g/plt = marketable grams per plant

Grams per plant x 4.5 = number of 12# crates/acre

Performance of new SD cultivars compared w/ Ventana, 2009-10

	Yield perform to 3/1			Yield performance to 6-8			Fruit		
Item	G/plt[y]	Mkt g/plt[z]	Cull (%)	G/plt	Mkt g/plt	Cull (%)	size (g)	app. (1-5)	firm. (1-5)
High elevation plants - dig/plant 9/28-10/1									
Benicia	954	801	16.0	1885	1484	21.3	32.2	3.0	3.5
Mojave	809	729	10.0	1743	1446	17.0	33.8	3.7	3.2
Ventana	1237	904	26.9	2133	1530	28.3	29.4	2.8	3.2
High elevation plants - dig/plant 10/15-10/20									
Benicia	696	626		10.1	1841	1641	10.1	33.8	3.2
3.3									
Mojave	560	502	10.4	1555	1388	10.7	34.4	3.6	3.2
High elevation plants with leaves cut - dig/plant 10/11-10/15									
Ventana	751	595	20.1	2090	1699	18.7	32.5	2.9	3.3
Mojave	863	789	8.6	1968	1755	10.8	41.7	3.5	3.3

[y] G/plt = total grams per plant; [z] Mkt g/plt = marketable grams per plant

100 grams/plant = 450 crates/acre

Yield performance for new short day cultivars Benicia and Mojave compared with Camarosa & Ventana, 2010-11

HE plants - Dig/plant: 9-28/10-1

	Yield perform to 3/1			Yield performance to 6-8					
							Fruit		
Item	G/plt[y]	Mkt g/plt[z]	Cull (%)	G/plt	Mkt g/plt	Cull (%)	size (g)	firm. (1-5)	app. (1-5)
Benicia	261	220		16.0	1973	1484	24.8	31.3	3.1
3.5				8,645	7,260				
Mojave	238	216	9.2	1892	1578	16.6	33.4	3.6	3.1
~~Ventana~~	~~169~~	~~149~~	~~11.8~~	~~2200~~	~~1408~~	~~36.0~~	~~33.1~~	~~3.4~~	~~3.4~~
Camarosa	182	145	20.3	1897	1204	36.5	28.5	2.3	3.3

[y] G/plt = total grams per plant; [z] Mkt g/plt = marketable grams per plant

Grams per plant x 4.5 = number of 12# crates/acre

Timeline for developing a UC cultivar

2004: crosses
seed
plant seedlings (OS = **original stock**)

2005: evaluate seedlings
keep ~2-3% (200-300 seedlings)
clonally propagate runners (**original stock**)

05-06: 1st clonal fruiting trial (LE)
evaluate **original stock** using LE plants
propagate **original stock** at LE via runners

06-07: 2nd clonal fruiting trial (LE)
propagate **original stock** at LE & HE via runners
grower trials w/**original stock** using HE plts
UC trials w/**original stock** using LE and HE plants

07-08: 3rd clonal trail at LE & HE

propagate **original stock** at LE & HE

grower trials w/HE plts (**original stock**)

UC trials w/ **original stock** of LE & HE plts

produce **meristem plants** from best adv. selections

08-09: 4th clonal trial at LE & HE

propagate **original stock** at LE/HE

grower trials w/HE plants (**original stock**)

UC trials w/**original stock** of LE & HE plants

screenhouse plants propagated from **meristem plts**

09-10: 5th clonal trial at LE & HE

propagate original stock at LE/HE

grower trials w/HE plants (**original stock**)

UC trials w/**original stock** LE & HE plants

foundation plants propagated from **screenhouse plts**

10-11: 6th clonal trail at LE & HE

propagate **original stock** at LE & HE

grower trials w/HE plts (**original stock**)

UC trials w/**original stock** using LE & HE plts

LE propagation of **registered plants**

→ **UC and grower trials conducted with original stock sequentially propagated for 6 years without meristemming**

11-12: Certified plants of new cultivar available to growers

7th clonal trial at LE

propagate OS at LE/HE

grower and UC trials using **certified plants**

UC trials w/**original stock** at LE

We encourage growers to regularly visit UC strawberry research plots and grower cooperator plots on a regular basis to evaluate performance of advanced items

Field Days:

SCFS: last Tuesday in February

Santa Maria: 2nd or 3rd Thursday in April

Watsonville: 1st Tuesday in May


6 DRY PINTS
PRODUCE OF U.S.A.
CALIFORNIA
Shatter Resistant
Helix

Benicia


6 DRY PINTS
PRODUCE OF U.S.A.
CALIFORNIA
Shatter Resistant
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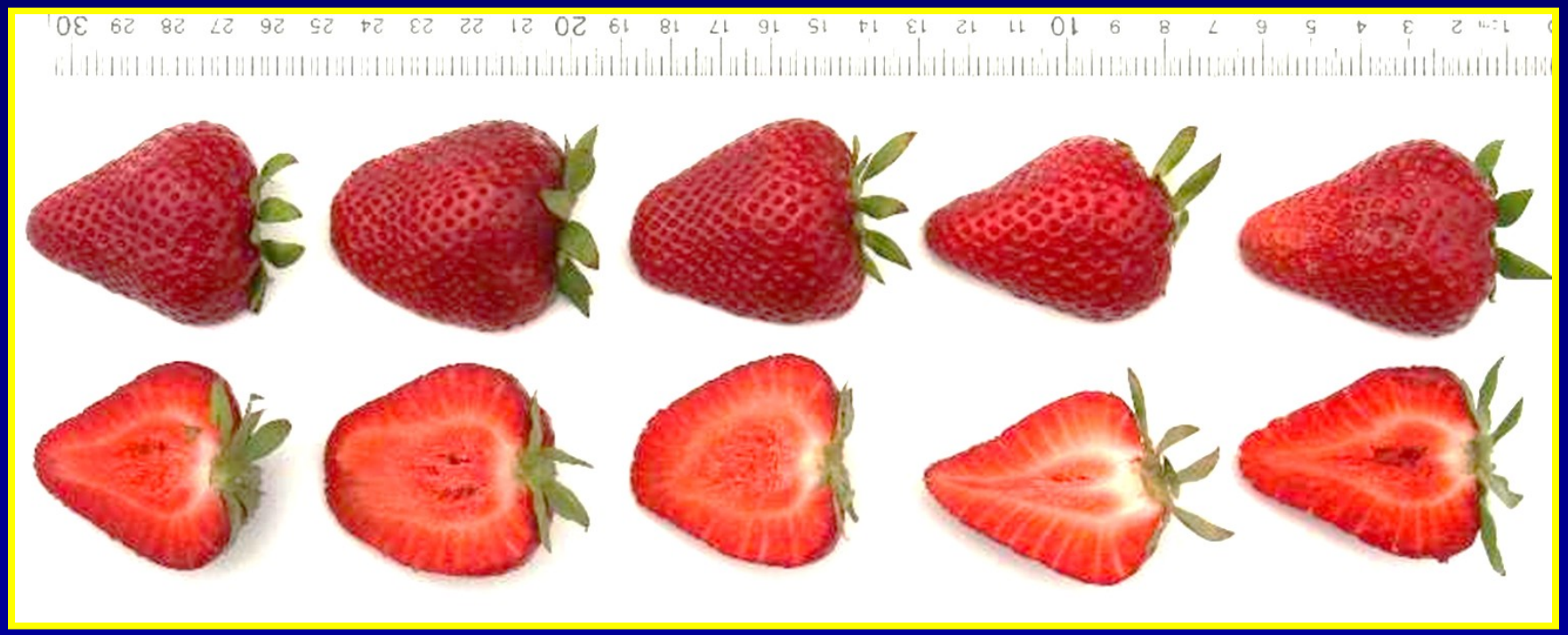
Mojave

Mojave

Benicia



Qualitative Performance Evaluations for Short-day Selections: So. Calif.

	Benicia compared with Ventana	Mojave compared with Ventana
Productivity	0	0
Production pattern	0	+
Fruit size	+	+
Firmness	+	0
Appearance	0	+
Flavor	+	+
Postharvest	+	0
Rain - weather tolerance	0	+
Disease tolerance	0	0
Mite tolerance	0	0
Harvest ease	+	+
Cull rate	+	+
Runners (nursery)	+	+

+, 0 or (–) indicates performance that is better, equal, or inferior to that of Ventana

Advanced selections: resistance/tolerance to major pathogens

	Resistance score (5 = best)		
Genotype	Phytophthora	Verticillium	Colletotrichum
Ventana	2.1	2.9	2.7
Benicia	3.5	2.1	2.6
Mojave	2.3	3.8	2.7

Benicia in Southern California

Adapted to early planting

Similar production to Ventana with greater total yield and lower cull rate

Larger fruit than Ventana

Consistently excellent flavor

Vigorous plant w/ open structure - harvest efficiency

Cautions:

- Fruit may darken in hot periods – harvest more often
- Verticillium

Mojave in Southern California

Adapted to very early planting

Earlier fruiting than Ventana with greater total yield

Larger fruit than Ventana with better flavor

Very low cull rate

Consistent fruit shape & color with bright red shine

Open plant structure - harvest efficiency

Cautions:

- Not as firm as most UC cultivars
- Phytophthora cactorum

Management strategies for early-planted San Andreas in S. Calif.

Plant before October 3, use clear or panda tarp

Use plants w/ crown diameters $\geq$0.8 cm (~0.3")

Preplant slotted CR fertilizer

Use 13-14 inch in-row plant spacing

Foliar feed when plants have 2-3 leaves

Cut bloom if plants lack vigor, want 2-3 crowns before initial fruiting

Fertilize weekly with 12N-5P-5K for 2-3 months

to build plant structure

W/ heavy fruiting, use 4N-10P-10K to maximize

Developing strawberry cultivars with tolerance to pests and diseases

UCD: *P. cactorum, V. dahliae, S. macularis, F. oxysporum, T. urticae*

UC SCREC: *C. acutatum, M. phaseolina*

Assess tolerance/susceptibility of cultivars & advanced selections to important pests/pathogens

Identify sources of genetic resistance/tolerance, incorporate into breeding lines

C. acutatum genetic screen

C. acutatum genetic screen

Evaluate ~50 cultivars & advanced selections annually

Macrophomina plant collapse in So. California

an increasingly common problem

Results for 2009-10

- 5 of 44 advanced selections had survival rates of 65-85%
- None of the 10 cultivars had survival rates > 40%
- Monterey, Portola, S. Andreas and Ventana had highest survival rates (35-40%)

Results for 2010-11:

Several advanced selections had zero mortality

Efficacy of 3 soil fumigation treatments for control of M. phaseolina in Irvine, 2011-12

Expt'l plot inoculated with MAC in 2 yrs (2010-11)

3 soil trts applied with TIF on Aug. 11, 2011:

MBPic 57:43 @ 350#/A

Pic Telone 60:40 @ 300#/A

Pic @ 300#/A

2 reps each of 5 beds for each soil treatment

Plot to be planted with HE plants in October

Plant mortality to be observed in June 2012

THANK YOU!