# **California Cling Peach Advisory Board**

## 2008 Annual Report

Project Title:	Regional Testing of New Cling Peach Selections Tom Gradziel & Carlos Crisosto		
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### Summary:

Good weather conditions throughout the 2008 season provided excellent opportunities for the evaluation of UCD Experimentals in regional grower pots. Experimental selections currently being regionally evaluated include Ultra-Early #1, Ultra-Early #2, Ultra-Early #3, Extra-Early#1, Extra-Early#2, Early#4, Early#5, Late#2, Late#4, Extra-Late#1, Extra-Late#2, Extra-Late#4, Extra-Late#5, Extra-Late#6, Extra-Late#7, Compact#1, Compact#2, and Compact#3. Unique to the 2008 season was the occurrence of a late spring frost which was associated with later aberrant fruit development in susceptible Experimentals and established varieties. Frostassociated aberrant fruit development entailed moderate to deep splitting or clefts of the fruit tissue though not necessarily including pit-splitting. Fruit clefts were always associated with early-season embryo abortion which appeared to be the consequence of the spring frost. Most UCD Experimentals continued to show good grower/processor promise with a few selections such as Early#4 and Late#2 expressing significant deficiencies in fruit or tree quality. Multiyear regional evaluation data is now available for selection Ultra-Early #1 and based on promising grower and processor feedback, this selection will be considered for cultivar release. Extra-Early#1 and Early#5 also continue to look very promising for their season, however more extensive assessment of regional variability is still needed. UCD experimentals expressing a compact growth habit which reduces tree size to 1/2-2/3 of normal, continued to look hopeful. Subtle but possibly important differences in growth habit were observed in the southern San Joaquin relative to Sacramento valleys. Four 'Long-keeper' selections with potential for facilitating mechanical harvest, Extra-Late#4, Extra-Late#5, Extra-Late#6 and Extra-Late#7, continued to perform well, even with minimal fruit thinning. These 'Long-keeper' selections also demonstrated good cold-storage potential though even better quality was achieved by allowing fruit to store 'on-tree' for up to eight weeks after full-ripe stage. In response to recent industry requests, a large number of new trees of UCD Experimentals have been propagated for regional grower planting in 2009 and 2010 which, would more than double the size of the current project.

#### **Objectives:**

- A. Accelerate testing and development of processing peach selections facilitating mechanical management/harvest under California grower conditions. Continue evaluation of current candidates for Dixon, Andross, Halford, and Corona variety replacement and early season extension.
- B. Compile detailed maps of all UCD selections now in regional testing. Collect, summarize, and distribute results from 2008 regional evaluations to grower, processor and research cooperators.
- C. Evaluate alternatives to low-volume high-throughput fruit sample processing at the UCD Pilot Plant in anticipation of probable loss of this facility in 2009-10.

Good conditions for tree growth and fruit development were present in 2008 which allowed comprehensive fruit evaluations of cling peach Experimentals planted in 2004 or earlier, including Ultra-Early #1, Ultra-Early #2, Ultra-Early #3 Ultra-Early #4,, Extra-Early #1. Extra-Early #2. Early#4. Early#5. Late#2. Late#3. Late#4. Extra-Late#1.

Extra-Late#2, Extra-Late#3, Early#4, Early#5, Late#2, Extra-Late#1 & Extra-Late#2. [Regional selection] designations are based on the Maturity period -followed by a number indicating sequence of release for grower testing]. A late-season frost in April, 2008 also allowed the evaluation of individual genotype sensitivity to frost damage. Selections evaluated showed good to moderate levels of frost tolerance with the exception of Early#4 which was more severely affected. Frost damage was expressed as a fairly rapid fruit drop, followed by a second delayed drop associated with slight shriveling of the fruit flesh particularly at the shoulders near the suture.

pronounced fruit splitting was observed at ripening for many selections and standard cultivars, but appeared particularly severe for fruit ripening in the *Early*-ripening season including Early#4, Early#5, and the Goodwin and Andross varieties. Splitting almost always occurred at the fruit suture line and was expressed either as a slight creasing to complete cleavage of the fruit flesh to the underlying stone (Figure 1). Split-pits were rarely associated with flesh split-fruit, though both were more pronounced in 2008 particularly on sandy soil sites. Of the hundreds of the cleft-fruit examined, all showed evidence of early embryo abortion (Figure 2). Based on previous field experience, it was concluded that the embryo abortion was a delayed consequence of the April frost. Although sufficient embryo development had occurred to promote apparently normal early fruit development, the later collapse of the embryo would change the balance of growth factors affecting later fruit development while the collapse of associated vascular

bundles feeding the embryo (which are located parallel to the suture line) predisposed the already damaged flesh to splitting. The occurrence of cleft-fruit also occurred in Late and Extra-Late varieties though at lower frequencies. No incidence of this disorder was observed in the Extra-Late#4, Extra-Late#5, Extra-Late#6, and Extra-Late#7 selections recently released for arower testing (these selections flower earlier than traditional

(causal?) with cleft-fruit.

Figure 2. Abortion of fruit embryo always associated



Figure 1. Frost induced peach fruit-clefting in 2008 regional

samples.



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peach and so fruit may have developed beyond the critical frost vulnerability stage), or in the *Ultra-Early #1* plantings in the Sacramento and lower San Joaquin valleys.

Plantings of *Ultra-Early #1* at the Kearney Agricultural Center in Parlier, California are now in full production with fruit samples being evaluated at the nearby Kingsburg cannery. As in previous years, fruit developed exceptional size, color, and firmness for processing peach ripening 10 days before Loadel (Figure 3a). Flesh color is orangegold, and develops before skin color, allowing good flesh color grading station scores

even when some green remains at fruit skin (Figure 3a). Fruit also show good long-keeping ability with good raw and processed product available up to 10 days after the tree-ripe date (Figure 3b). The orange-gold color did not appear to be a problem in processing at the Kingsburg plant because of its very early harvest season and because most of the fruit was being sent for dicing. *Ultra-Early #1* fruit can show asymmetrical development, particularly in San Joaquin Valley sites resulting in irregular shaped fruit, sometimes with protruding sutures. Asymmetrical fruit, however, do not appear to be a major concern since most fruits are being sent for dicing during this season.

Two other UCD Experimentals approaching their 10th leaf at KAC are *Late-#2* and *Late-#3/ Compact #1. Late-#2* continues to produce good

quality fruit (Figure 4) though pre-harvest fruit-drop can be comparable to adjacent Dr. Davis plots during bad years. Trees showed good productivity in 2008, and demonstrated very good fruit-wood replenishment throughout the tree. Mature *Compact #1* trees at KAC have stabilized at approximately 60% standard size (see Figure 5). The productivity is good despite the tendency to have excessive blind bearing-wood in that environment. Fruit have exceptional firmness and

long-keeping ability but maybe too irregular in shape and size (along with blind-wood) for commercial release. The more advanced



Figure 3a. Ultra-Early#1 harvested at treeripe stage.



Figure 3b. Ultra-Early#1 harvested 10 days past tree-ripe.



Figure 4. Raw fruit samples of Late#2 harvested in 2008.

compact-sized processing peach experimentals, Compact #2 and Compact #3 combine the compact tree size with improved fruit and bearing-wood quality. Several hundred of these experimentals have been propagated for grower planting in 2009 and an older seedling plot of compact selections has been maintained at the Davis campus to evaluate training, pruning, thinning and harvest options with this modified architecture (Figure 6).

A replicated test plot of the *Extra-Late#4, Extra-Late#5, Extra-Late#6,* and *Extra-Late#7* Long-Keeper selections (Figure 7) established in Winters, California was used to evaluate crop sizing-ability under no-thin conditions as well as evaluate fruit post-harvest storage potential when held either in the cold room at



40° and 'on-tree'. Preliminary tests in 2008 determined that even with no thinning applied (Figure 8) over 93% of fruit harvested achieved minimal commercial size (Figure 9). Fruit from non-thin scaffolds had good raw

Figure 5. KAC test-plot showing Extra-Early#1 (top 5 rows), Extra-late#1 (midddle 5 rows) and Compact#1 (row 11).

fruit (Figure 10) and processing quality though maturity with delayed by 2 to 4 days.



Figure 6. Compact-tree processing peach evaluation plot at Davis, CA.



Figure 7. Extra-Late Long-Keeper evaluation plot at Winters, CA.

Representative fruit samples are shown in Figure 11 for the variety Corona and UCD Experimental *Extra-Late#6 (EL#6 )* held in storage for eight weeks at 40° C, *EL#6* held 'on- tree' for four weeks post-ripe then moved to cold storage for four weeks and finally, *EL#6* held for eight weeks post-ripe on the tree. Average fruit firmness (in grams) at the end of the experiment is presented in Figure 12 while average 'R'-value (RGB- scale) of flesh color at a depth of 1



Figure 8. Unthinned scaffold on EL#7.

cm is presented in Figure 13. No significant differences were seen in fruit firmness, but this was primarily because of the flesh mealiness and water loss developing in Corona with storage. Flesh deterioration was apparent in the Corona samples and to a lesser degree EL#6 samples held for eight weeks in cold storage. Fruit held 'on-tree' for four weeks then storage for four weeks showed less damage, while fruit stored 'on-tree' for eight weeks showed the least amount of damage. Some distinct mealiness was apparent in EL#6 by eight weeks (both from tree and cold storage) but the low bruising potential for these Extra-Late selections resulted in tissue bleaching rather than bruising/browning (as is apparent in the cut fruit and top-right of Figure 11). Several hundred trees of the Extra-Late#4, Extra-Late#5, Extra-Late#6, and Extra-Late#7 Long-Keeper selections have been propagated for grower test planting in 2009 with a similar number of propagations planned for 2010. Updated field assessments of the most promising Experimentals in regional plantings are summarized in the following appendix. More detailed data on raw and processed fruit characteristics as well as images of raw and processed fruit samples from the different years are available on request. [Most processed fruit samples in Appendix A were from the 2007 season since processed fruit samples were partially dried prior to imaging to better differentiate differences in





Figure 9. Typical fruit size for EL#7 unthinned scaffold.



Figure 11. Representative fruit of Corona & EL#6 at 8 wk cold storage; EL#6 at 4 wk on tree + 4 wk storage; EL#6 -8 wk on tree showing whole & halved fruit.

Figure 10. Raw fruit sample of EL#7 from unthinned scaffold.



Figure 12. Fruit firmness (gms) of EL#6, EL#5, EL#4, & Corona at 8 wk cold storage; EL#6 at 4-wk on tree + 4 wk storage; EL#4 8 wk on tree storage.

flesh/pit characteristics].

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Figure 13. 'R' color value for Corona & EL#6 at 8 wk cold storage; EL#6 at 4 wk on tree + 4 wk storage; EL#6 -8 wk on tree.

#### Appendix A. Description of 2007 processed selections currently in regional grower tests.

**ULTRA EARLY#1.** Fruit ripens 7-10 d before Loadel. Very early ripening fruit are similar in size and shape to Carson but with firmness comparable to Loadel Flesh color yellow to orange-gold. Low flesh bruising even when overripe. No red pigmentation is observable in the skin or pit. Fruit flesh color precociously before skin and so allow some early pick without loss in color quality. Pit tips of 2 cm or greater may be present after warm springs as in 2008. Trees are vigorous and productive for the season. Some split pits (1-2%) and early fruit drop in 2006 and 2008. Tree allocation and site: 35 Sacramento Valley, 50 San Joaquin Valley.



EXTRA EARLY#1. Fruit ripens between Carson and Dixon and because it hangs well on the tree can be

harvested up to Andross. Individual trees may show approx. 3 d later maturity indicating a possible problem with uniformity of ripening among trees. Fruit has good size, firmness and symmetry with a medium sized, somewhat ragged pit cavity. Flesh color is golden-yellow similar to Goodwin, occasionally showing traces of green pigmentation on shoulders and in the pit which cooks-out with canning. Flesh shows low bruising potential. Skin is yellow-gold with up to 40% showing red blush. Fruit drop, split pits, and pit fragments were infrequent in 2006-2008.



Fruit can be somewhat asymmetrical at the suture with one cheek slightly larger than the other. Fruit torque-pits readily. Slight pink in pit cavity in some 2008samples but cooked out and absent in cans. Tree allocation and site: 38 Sacramento Valley, 70 San Joaquin Valley.

EARLY#4. Fruit ripens between Dixon & Andross. Fruit is only medium and size and slightly irregular in

shape. Flesh is firm at the full ripe stage but can become soft particularly along the shoulders if overripe. Flesh color is a gold-yellow, with slight pink in pit possible when overripe. Flesh shows low potential for bruising/browning. Skin color is yellow to golden with up to 30% covered with a red blush, with more intense red color with higher light exposure. Some split pits with associated pit fragments. Some preharvest fruit drop in 2007. Although not as high a quality as Extra-Early#1 or Late#5, the Dixon ripening season may offer this



item some commercial potential. Tree allocation and site: 45 Sacramento Valley, 50 San Joaquin Valley.

EARLY#5. Fruit ripens with Andross. Fruit are medium large, being somewhat larger than EARLY#4 or

Goodwin. The pit cavity is larger with a somewhat ragged appearance. Some pit fragments and split pits (3%) but less than Andross. Flesh color is a golden yellow, similar to Andross with a golden yellow skin with up to 30% red blush. Fruit are firmer than EARLY#4 with some softening occurring on shoulders and at the suture as the fruit become overripe. Fruit tend to hang well on tree without significant loss in quality though pit cavities will gain a slight reddening by 10 – 14 d after full-ripe. In hotter



regions such as the southern San Joaquin, some fruit flesh may develop a reddish stain when 5+ d overripe. Some fruit drop and brown rot observed in 2007 & 2008. Tree allocation and site: 55 Sacramento Valley, 51 San Joaquin Valley.

LATE#2. Fruit initially ripened between Halford & Starn but ripened a week after Halford in 2007 and

after Starn in 2008. Fruit are large with a medium sized and somewhat ragged pit. Flesh is uniform golden yellow with clean to slightly pink pit . Fruit skin is a golden yellow with less than 20% red blush. Fruit shape is oval to somewhat angular. Flesh is firm even with increasing age though some water soaking sometimes occurs near the skin surface. Water-soaked areas are susceptible to bruising if damaged. Some pit splits, and brown rot observed in 2007 & 2008 with heavier preharvest drop in 2008. The tree is very productive with bearing what common even on older wood. Tree allocation and site: 38 Sacramento Valley 52 San Joaquin Valley.



LATE#4. Fruit typically ripens between Dr. Davis and Monaco but will hold on tree until after Halford. Fruit are large with a medium sized and somewhat ragged pit. Flesh is uniform yellow-gold to orange-gold with a clean pit . Fruit skin is an orange-gold with no red blush. Fruit shape is oval. Flesh is firm even with increasing age. Trees are very productive and amenable to mechanical harvest. Low flesh bruising. Low fruit brown rot. Some, but low levels of splitpit, drop and brown-rot observed in 2008. Tree allocation and site: 10 Sacramento Valley 50 San Joaquin Valley.



**Compact#1.** The tree is productive and compact, being approximately 1/2 standard height. Fruit are of

very good quality with a good (on-tree) holding ability allowing in one week delay in harvest if necessary. Fruit flesh is uniform yellow as is the skin which is free of red pigmentation. A few elongated pit tips were present in 2007 & 2008. Because of high leaf density from shorter internodes, secondary branching is reduced in section resulting in blind wood which can later sunburn is not managed. Some fruit brown-rot and preharvest drop observed in 2008. Split pits (<2%) observed in 2007.

Tree allocation and site: 12 Sacramento Valley 12 San Joaquin Valley.

Compact#2. The tree is productive and compact, being approximately two thirds standard height. Fruit ripen with Dixon will hold on the tree until Andross. Fruit are of very good quality with a good (on-tree) holding ability allowing in one to two week delay in harvest if necessary. Fruit flesh is uniform yellow to yellow-gold and is free of red pigmentation even when overripe. Skin is yellow-gold with up to 30% red blush. Trees are productive with little blind wood. Amenable to mechanical harvest. Low flesh bruising. Low fruit brown

Tree allocation and site: 10 Sacramento Valley 20 San Joaquin Valley. rot.

**Compact#3.** The tree is very productive and compact, being approximately two thirds standard height. Fruit are of very good quality with a good (on-tree) holding ability allowing in one to two week delay in harvest if necessary. Fruit ripen with Halford will hold on the tree until Corona. Fruit flesh is uniform yellow as is the skin which is free of red pigmentation. The fruit pit cavity is free of red-staining, though 10d over and older fruit will often show a slight brown pit- imprinting, which after canning can appear as a slight pink imprinting in the pit. Trees are very productive

with little blind wood. Amenable to mechanical harvest. Low flesh bruising. Low fruit brown rot. Tree allocation and site: 100 trees 10 San Joaquin Valley.







EXTRA LATE#1. Fruit ripens with to just after Corona. Fruit are medium to large in size with a moderately small pit. Flesh color is uniform yellow gold with no red pigmentation in the pit cavity. Skin color is a uniform yellow without red pigmentation. Fruit are medium firm, yet maintain better firmness and fruit texture than the adjacent Corona plantings. Pit cavities are relatively free from split pits and fragments. Some fruit drop as well as brown rot fruit were observed in 2007 & 2008. Tree allocation and site: 41 Sacramento Valley 50 San Joaquin Valley.



EXTRA LATE#2. Fruit ripened between Starn & Sullivan#4. Fruit are medium in size with a medium sized

and sometimes ragged pit cavity. Some split pits (4%), pit fragments, pit tips and early fruit drop were apparent in 2006 & 2008 with increased levels seen in 2007. Fruit show improved firmness relative to Starn and Corona, though some water soaking in softening occurs with over ripening particular on the shoulders into suture area. Fruit color is a yellow gold to orange-gold and can be distinctly darker and commercial cultivars in this maturity period. Fruit show resistance to brown rot and sour rot in



lab assays though brown rot on field fruit was observed in 2007 & 2008. Tree allocation and site: 49 Sacramento Valley, 50 San Joaquin Valley.

Extra Late#4. Fruit ripen up with Starn and Corona. Fruit are of good quality with a good (on-tree)

holding of 4 weeks or more, allowing delayed harvest if necessary. Fruit is uniform and symmetrical, has high soluble-solids, medium in size and with a small, clean pit cavity. Fruit flesh is firm and easily pitted, but occasionally maintains a greenish tinge when processed. Fruit sizes can be irregular from the same tree. Fruit color is yellow gold with no red pigmentation in the pit cavity, flesh or skin. Pit cavity is medium large and somewhat ragged. Flesh firmness is maintained for three weeks after fruit ripening allowing delayed harvest. Fruit show improved



resistance to bruising and to brown-rot infection in the lab though some brown drop and fruit drop observed in the field in 2007. Processed fruit possess good flavor, color and firmness but with a slightly detectable tannic essence. Tree allocation and site: 200 Sacramento Valley, 200 San Joaquin Valley.

Extra Late#5. This selection is a sib-line to (and so very similar to) Extra Late#4. Fruit ripen up with Starn

and Corona. Fruit is uniform and symmetrical, medium in size and with a small, clean pit cavity. Fruit size tends to be more uniform in shape than sib-lines though with a more pronounced flower bud breaking after warm springs. All sibs flower approx. 5 d before Ross. Fruit color is yellow gold with no red pigmentation in the pit cavity, flesh or skin. Fruit flesh is firm and easily pitted, but occasionally maintains a greenish tinge when processed. Flesh firmness is maintained for three weeks after fruit ripening allowing delayed harvest. Fruit show high soluble-solids,



improved resistance to bruising and to brown-rot infection. Processed fruit possess good flavor, color and firmness. Tree allocation and site: 200 Sacramento Valley, 200 San Joaquin Valley.

Extra Late#6. This selection is a sib-line to (and so very similar to) Extra Late#4. Fruit ripen up with Starn

and Corona. Fruit is uniform and symmetrical, medium in size and with a small, clean pit cavity. Fruit sizes are uniform, but slightly smaller than other sib-lines. Fruit color is yellow gold with no red pigmentation in the pit cavity, flesh or skin. Fruit flesh is firm and easily pitted. Flesh firmness is maintained for three weeks after fruit ripening allowing delayed harvest. Fruit show high soluble-solids, improved resistance to brown-rot infection and may be resistant to plum pox virus. Processed fruit possess good flavor, color and firmness but with a slightly



detectable tannic essence. Trees are productive even with minimum thinning. In 2007 this was the most uniform Extra-late selection in terms of fruit size, shape and color Tree allocation and site: 200 Sacramento Valley, 200 San Joaquin Valley.

**Extra Late#7.** This selection is a sib-line to (and so very similar to) Extra Late#4. Fruit ripen up with Starn and Corona. Fruit is uniform and symmetrical, medium in size and with a small, clean pit cavity. Fruit color is yellow gold with no red pigmentation in the pit cavity, flesh or skin. Fruit flesh is firm and easily

pitted. Flesh firmness is maintained for three weeks after fruit ripening allowing delayed harvest Fruit show high soluble-solids, improved resistance to bruising, flesh browning and to brown-rot infection. EL#7 showed the best cold storage potential (8Plus weeks) of the EL selections tested in 2007 & 2008. Some brown rot observed in field in 2007 & 2008 but very high disease pressure was present due to late summer rains. All Extra-Late selections also showed some unusual insect damage in 2007 but the pest was not identified. Processed fruit



possess good flavor, color and firmness but with a slightly detectable tannic essence. Trees are productive even with minimum thinning. Tree allocation and site: 200 Sacramento Valley, 200 San Joaquin Valley.

Ultra-Early#3	Jim Jackson	50	Kingsburg?	
Ultra-Early#3	Kearney Ag. Center	100	Parlier	Field 97
Ultra-Early#3	Wolfskill	2	Winters	Wolfskill-NSW
Extra Early #1	Jim Jackson	50	Kingsburg?	
Extra Early #1	Kearney Ag. Center	100	Parlier	Field 97
Extra Early #1	Paul Rai	50	Yuba City	Taylor Rd
Extra Early #2	Kearney Ag. Center	20	Parlier	Field 97
Extra Early #2	Paul Rai	50	Yuba City	Taylor Rd
Early #4	Kearney Ag. Center	5	Parlier	Field 97
Early #4	Richard McPherrin	80	Yuba City	Saunders Rd.
Early #5	Kearney Ag. Center	5	Parlier	Field 97
Early #5	Richard McPherrin	80	Yuba City	Saunders Rd.
Late#2	Kearney Ag. Center	5	Parlier	Field 97
Late#2	Richard McPherrin	50	Yuba City	Saunders Rd.
Late#2	Sarb Atwal	50	Yuba City	Feather River Blvd.
Late#2	Wolfskill	10	Winters	Wolfskill-NSW
Extra-Late#1	Kearney Ag. Center	100	Parlier	Field 97
Extra-Late#1	Pat McCay	50		
Extra-Late#1	Wolfskill	7	Winters	Wolfskill-NSW
Extra-Late#2	Kearney Ag. Center	15	Parlier	Field 97
Extra-Late#2	Mark Nolan	30	Marysville	
Extra-Late#2	Parminder Sarwat	30	Ballico	
Extra-Late#2	Richard McPherrin	50	Yuba City	Saunders Rd.
Extra-Late#2	Sarb Atwal	50	Yuba City	Feather River Blvd.
Extra-Late#2	Wolfskill	4	Winters	Wolfskill-NSW
Extra-Late#4	Gus Obertier	70	Ceres	
Extra-Late#4	Paul Von Konynenberg	100	Modesto	Stoddard Rd.
Extra-Late#5	Gus Obertier	70	Ceres	
Extra-Late#5	Paul Von Konynenberg	100	Modesto	Stoddard Rd.
Extra-Late#6	Gus Obertier	70	Ceres	
Extra-Late#6	Paul Von Konynenberg	100	Modesto	Stoddard Rd.
Extra-Late#7	Gus Obertier	70	Ceres	
Extra-Late#7	Paul Von Konynenberg	100	Modesto	Stoddard Rd.
Compact#1	Kearney Ag. Center	15	Parlier	Field 97/EL3
Compact#1	Wolfskill	2	Winters	Wolfskill-NSW
Compact#2	Wolfskill	4	Winters	Wolfskill-NSW
Compact#3	Paul Von Konynenberg	100	Modesto	Stoddard Rd.

Table 1. Grower sites for current Regional Trials.