California Cling Peach Advisory Board
2011 Annual Report

Project Titles: Regional Testing of New Cling Peach Selections

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2011 Summary

Three UCD processing peach selections now in regional grower testing (*Ultra-Early#1, Extra-Early#1* and *Extra-Late#*1) have been advanced to the final evaluation stage prior to patenting and release. Ongoing analysis of the previous 6 years of field data document fruit sizes for these items which are comparable to current industry standards (Table 1). With the exception of *Ultra-Early#1*, average fruit sizes of UCD selections tended to be somewhat smaller than commercial standards, probably as a consequence of their derivation from an more exotic lineage (as discussed in the Variety Development 2011 Annual Report). This more exotic germplasm, however, has facilitated genetic improvements in areas previously unattainable using traditional

	Ultra Early#1	Loadel	Carson	Extra Early#1	Andross	Extra Late#1	Halford
Average Fruit Diameter	2.36	2.21	2.28	2.89	3.15	3.05	3.13
STD	0.31	0.27	0.27	0.23	0.3	0.24	0.32

Table 1. Average fruit size of UCD advanced selections and standard cultivars from regional fruit samples harvested in 2008-11.

Selection	Average Brown-Rot Severity	STD
UltraEarly#1	1.20	1.48
Carson	13.19	6.10
ExtraEarly#1	3.11	2.89
Early#4	3.14	2.53
Early#5	6.39	6.19
Early#6	4.24	4.43
Goodwin	5.83	4.98
Ross	21.28	7.01

Table 2. Six year average of brown-rot severity scores for advanced UCD processing peach selections and cultivar standards. (Severity score is the product of average lesion diameter by incidence of infection; see a Bostock 2011 Annual Report).

California peach varieties as parents. An example can be seen in the enhanced levels of fruit Brown Rot resistance in current advanced selections (Table 2) and is even more apparent when data from more recent breeding generations are included (Figure 1). Similar progress is apparent in overall improvement in fruit firmness relative to traditional California standard varieties (Table 3). The maintenance of desirable levels of fruit firmness in advanced breeding selections is particularly notable since these selections are often evaluated at the tree ripe stage and again at 1 to 2 weeks after initial tree ripe, whereas the commercial standard varieties are typically only evaluated at the tree-ripe stage (since fruit typically deteriorate rapidly after this time). A number of more recent processing peach candidates now in grower testing also continued to show promise, particularly selections *Early*#6 and *Extra-Lates #4*-7 (see 2010 Annual Report). The long-term nature of the regional trials has also been useful in evaluating the potential implications of climate change in California production, particularly the susceptibility/ tolerance of new breeding selections to changes in winter chilling units and subsequent heat units. One breeding approach we are using to address climate change effects involves the selection of seed-parents based on their relative tolerance to bloom fluctuations resulting from chilling/heat unit variability (as well as fruit and tree qualities). This allows more flexibility in the selection of pollen parent (typically the source of the more exotic germplasm). Early results support a general value of this approach. Figure 2 shows the difference of bloom stage [*pink-tip, popcorn, open-flower, petal fall*] between the earliest and latest flowers on the same branch. Relative to *Andross*, *Goodwin* shows a more uniform overall bloom contributing to a more uniform fruit ripening time.

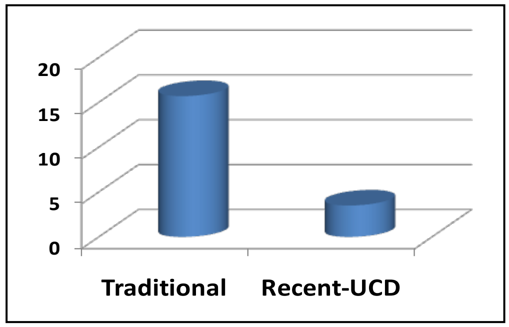


Fig. 1. Six year average of brown-rot severity scores for UCD breeding lines develop since the mid-1990s vs. traditional California commercial cultivars developed previously.

Selection	Average Firmness (lbs.)	STD
UltraEarly#1	7.0	1.0
Carson	6.4	0.6
ExtraEarly#1	7.2	1.2
Dixon	5.1	1.5
Goodwin	6.5	0.9
Andross	6.6	1.2
Early#6	7.1	1.1
ExtraLate#1	7.2	0.5

Table 3. Four year average of fruit firmness for advanced UCD processing peach selections and cultivar standards.

Project Review: 2011

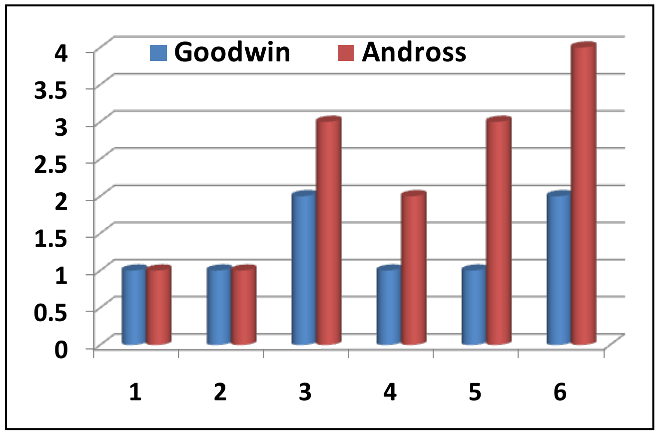


Fig. 2. Differences in individual shoot bloom stages over 6 consecutive years as an indicator of tolerance varying chilling/heat units so climate change.

Of the three selections currently being advanced to the final evaluation stage prior to release, *Extra-Late#1* represents a more traditional breeding lineage while the remaining 2 (*Ultra-Early#1,* and *Extra-Early#1*) represent an important transition of Breeding and Regional Testing priorities. Because of the more stringent production requirements of processing relative to fresh fruit varieties (higher yields with lower inputs within a productive orchard-life expectancy of 20 years or more, and consequently, the need for long-term field testing before a new variety can be safely recommended for large-scale grower plantings), public rather than private breeding programs have provided most cultivars currently planted commercially (Figure 3). Initial (early to mid-1900s) breeding priorities were for high orchard and processing case-yields and a extended harvest season to allow efficient use of expensive canning facilities. With the establishment of a series of California adapted varieties providing uninterrupted raw product supplies to the cannery, breeding priorities evolved towards the replacement of varieties whose defects, such as pit-fragments, red pit-staining and soft fruit, resulted in decreased case-yields (inset, Figure 3) even though many

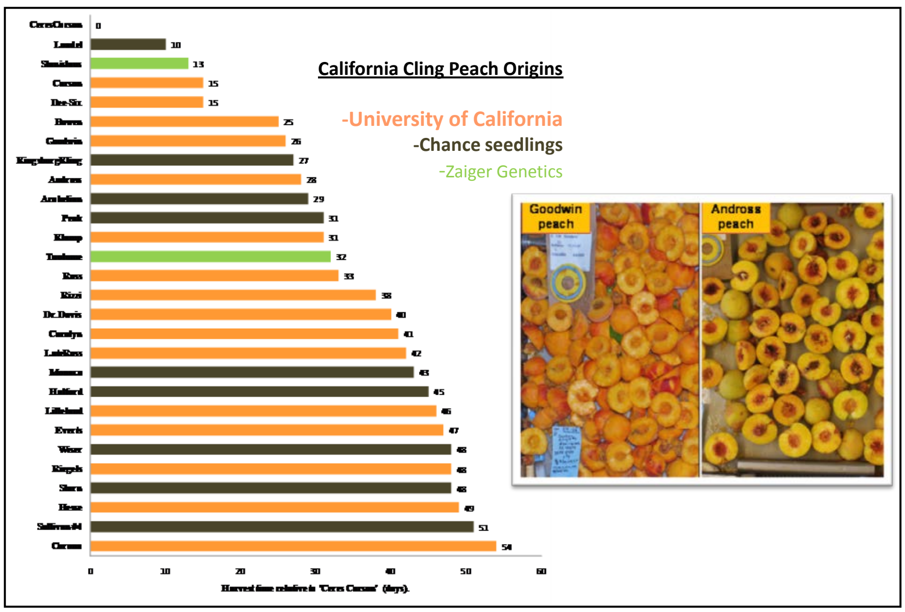


Fig. 3. Major California processing peach cultivars and origin. (Inset: comparison of fruit pit quality as an indicator of potential processing case-yields for the varieties *Goodwin* and *Andross*.

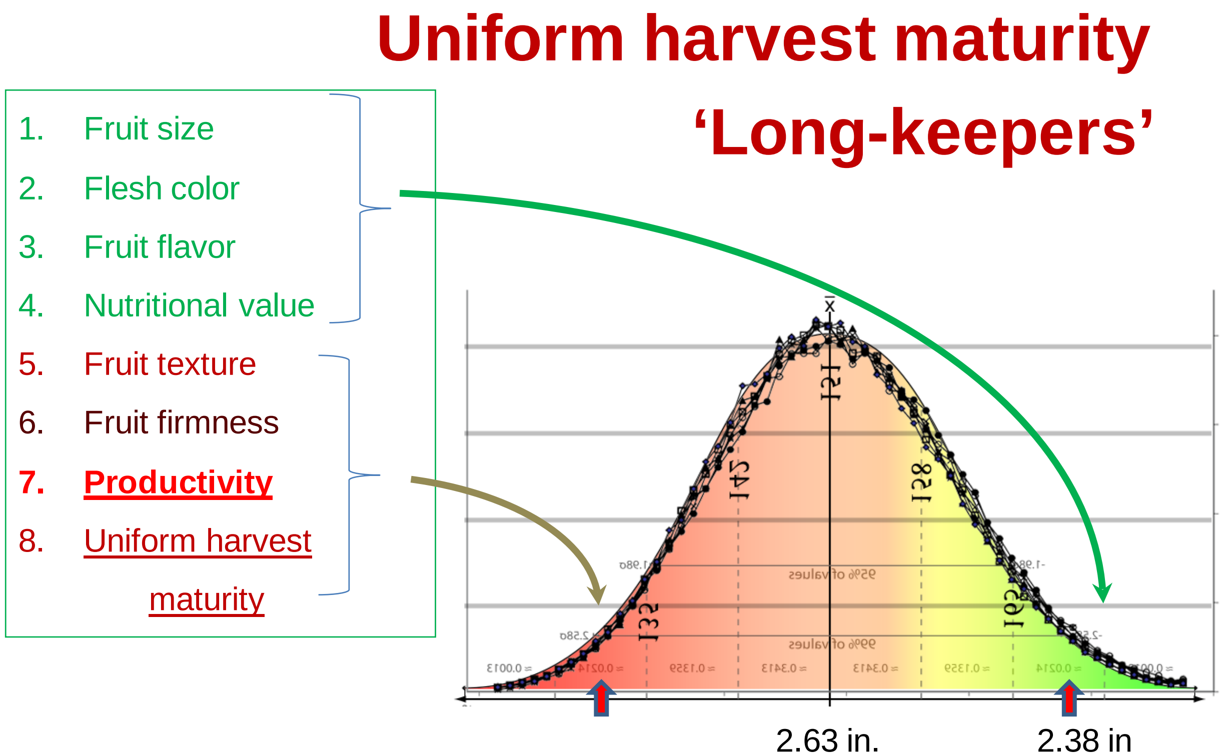


Fig. 4. Breeding strategy targeting the suppression of fruit deterioration after normal tree-ripening (long-keeper trait) as a means to improve yields as well as a number of associated fruit traits. *Long-keeper* cultivars would allow a delayed harvest of one week or more, thus allowing green and undersized fruit to continue to develop to full commercial quality. In preliminary tests, yields have increased 5-10% with a ~90% decrease in culls.

of these varieties (including *Dixon, Andross, Halford* and *Corona*) showed some of the highest orchard yields. Over the last 20 years, while the need for high orchard and case-yields has remained, reductions in labor and agrochemical availability required these yields to be achieved with lower inputs. New and sometimes exotic (i.e. derived from related species such as almond) germplasm was brought into the breeding program in the early 1990s, initially targeting improved disease resistance and specific harvest

Fig. 5. Breeding selection *Early#6* as an example of a *Dixon-Andross* season *long-keeper* genotype showing quality of 2010 fruit harvested one week (left) and two weeks (right) after the full ripe stage.

seasons (*Dixon-Andross*) but ultimately also targeting improved yields and quality. Because fruit quality, and in particular, yield are complex traits controlled by a very large number of genes, the very act of new gene introduction (i.e. reshuffling the genetic deck) inherently reduced the opportunities for significant yield improvements particularly when the traditional standards for high yields (*Andross, Halford*, etc.) where the consequence of almost a century of rigorous industry selection (as discussed in the Variety Development Annual Report). To compensate, highly touted opportunities for improved breeding efficiency through the use of new biotechnologies, primarily molecular marker assisted selection have been pursued. As discussed in the 2011 Variety Development Annual Report, however, the inherently reductionist approach of these technologies probably limits their application to relatively simply controlled genetic traits and preclude their applicability to complex traits such as yield. [Basic RosBreed strategies were initially developed at UCD as part of our collaborations with the labs of Drs. Crisosto and Dandekar, giving us over 10 years experience with the application of these techniques to actual cultivar development]. Consequently, the optimization of a trait as complex as yield can be achieved only through careful parental selection and the generation and evaluation of very large numbers of progeny. The UCD breeding program has thus maintained its capacity for large breeding population generation and evaluation through the development/adoption of low-input/high-throughput field practices (summarized in the 2010 Mechanization Project Report) as well as accelerated evaluation in Regional Grower Testing (summarized in previous Regional Testing Reports). Concurrently, we are pursuing high orchard and processing yields through the novel but less complex genetic

Fig. 6. Breeding selection *Early#6* , a *long-keeper* genotype, showing quality of 2011 fruit harvested 10 d after the full ripe stage. (Inset graph shows relative brown-rot severity)

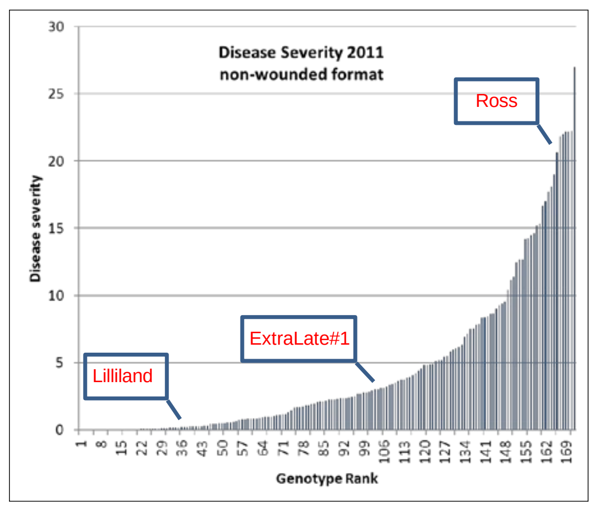


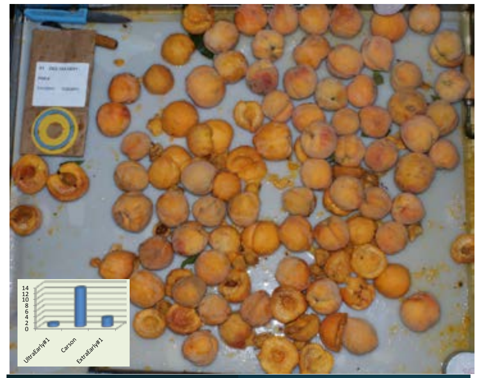
Fig. 7. Distribution of Disease Severity for 2011 UCD breeding genotypes tested by Dr. Bostock. Most advanced breeding selections show resistance levels between *Lilliland* and *Extra-Late#*1 while most commercial varieties are more similar to *Ross*.

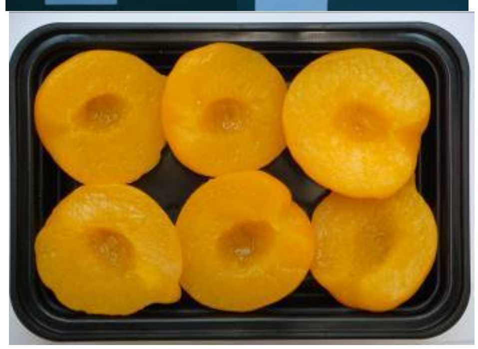
modification of fruit ripening patterns as summarized in Figure 4. *Ultra-Early#1,* and *Extra-Early#1* represent the first generation examples this approach as the fruit can be maintained on the tree for up to 14 days after-the initial fruit-ripe date (see following Advanced Selection summaries). In addition, further improvements are being achieved in the next-generation of this breeding approach as shown by recent performance of selection *Early#6* (which has the potential to supply fruit from the *Carson* to *Andross* season), and *Extra-Late #4-7* (which have the potential to supply fruit from the Starn season to several weeks thereafter). Examples of the potential high fruit quality and post-ripening fruit integrity is shown for *Early#6* in Figures 5 and 6. In addition to post-ripening fruit integrity (*Long-keeper* trait), improvements have also been achieved in resistance to fruit brown-rot (see Figure 7) and flesh tissue browning/bruising. These selections, along with the Compact-tree/Long-keeper selections *Compact*#2 and *Compact*#3 have been the principal breeding parents for the continued advancement of this trait. However, the exotic origin of this material (Figure 8) which has allowed access to these valuable traits also, inherently, includes the risk of introducing undesirable characteristics to new processing peach varieties which may not become fully evident until early stages of production. Continued and extended regional testing is thus necessary to both accelerate the development of these opportunities and to identify/rogue out possible undesirable associations. As discussed in the Variety Development Annual report, marker-assisted-selection may facilitate the identification/rogueing out of such undesireable traits. An update of advanced selections currently in regional grower trials follows, with emphasis on the 3 selections currently under consideration for release to the California industry. [Virus-free Foundation Nursery stock has been established at Foundation Plant Services (FPS) for these 3 advanced selections].

Fig. 8. Important UCD parents for the breeding of the *long-keeper* trait showing predominantly exotic origins and so higher risk of also introducing undesirable traits.

Descriptions of promising UCD selections currently in regional grower tests.

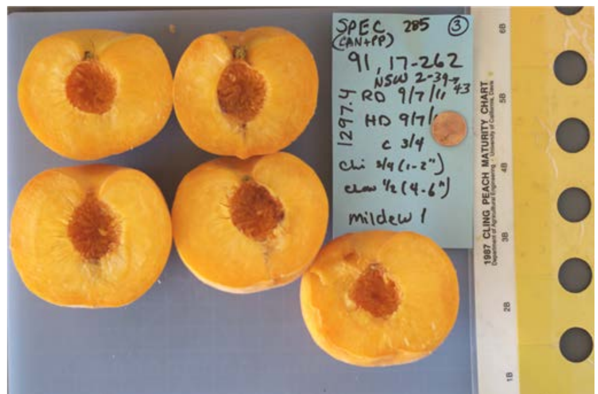
ULTRA EARLY#1. This selection is derived from a combination of Brazilian and Eastern European peach germplasm from the now ended Rutgers University breeding program of Dr. Fred Hough. While apparently possessing only peach germplasm, it is unique for clingstone peach as it combines very good size and cropping potential with a very early maturity of approximately 7-10 d before *Loadel*. (When utilizing traditional California processing peach germplasm, fruit cropping potential decreased dramatically for selections maturing before *Loadel*, contributing to a general perception that yield potential this early in the season was limited by insufficient heat units. Several of the more diverse clingstone peach breeding lines from the Rutgers University program demonstrated that good fruit size and productivity could be achieved with proper genetic selection. *Ultra-Early#1* is also distinguished by a good fruit flesh firmness and fruit brown-rot resistance (Tables 1-3 and images at right. {Uppermost image shows fruit at two weeks passed tree-ripe stage while remainder are at tree-ripe}). Fruit are similar in size and general shape to *Carson* but with firmness comparable to *Loadel* . As demonstrated by the images at right, fruit can be very irregular in shape which limits their value for processing as fruit halves. The good firmness and color make them suitable for slicing (though pitter alignment has occasionally been a problem) and well suited for dicing (which is a major use of fruit in this very early season). Skin and flesh color is gold to orange-gold with only slight blush. Fruit show low levels of flesh bruising even when overripe. No red pigmentation is observable in the skin or pit though some slight pink in flesh can occur in overripe fruit. Fruit flesh colors precociously before skin and so allows some early pick without loss in color quality. Fruit tip beaking of 2 cm or greater may be present after warm springs. Some split pits and early fruit drop have been observed with up to 8% splits observed in 2010. Most grower test sites (including an organic orchard) are in the lower San Joaquin Valley near the Kingsburg DelMonte cannery because of its capacity begin peach processing in this very early-season. Additional test plantings are present Sacramento Valley, however, since some of the more northern canneries are interested in a very early peach which can be grown and processed organically. (The early processing time is required to avoid later contamination with nonorganic produce). The good productivity, firmness, color and in particular, disease resistance of *Ultra-Early#1* may make it particularly well suited for this use. Ultimately, processor actions will determine the commercial value of this selection, and extensive processor feedback is being solicited prior to a decision concerning its commercial release.





EXTRA EARLY#1. Fruit ripens just after *Carson* but because it maintains good fruit integrity on the tree following a full ripe stage, can be harvested through the *Dixon* season until *Andross* time. Fruit have demonstrated good size, firmness and symmetry (Tables 1-3, images at right) with a medium sized, somewhat ragged pit cavity. Fruit are generally symmetrical; though occasionally show some cheek asymmetry similar to *Goodwin* with which it shares some lineage. Flesh color is golden-yellow, also similar to *Goodwin* and also occasionally showing traces of green pigmentation on shoulders. Flesh shows good firmness as well as low bruising/browning potential. Skin is yellow-gold with up to 80% showing stippled red blush. Fruit drop, split pits, and pit fragments were relatively low in 2006-20011 evaluations with some drop at KAC plantings in 2009 & 2010. Fruit are similar in size and shape to the *Dixon* cultivar but without the red-it staining and excessive pit fragments associated with *Dixon*. Figures at right show fruit samples from 2011 (upper image), and compared with 2009 *Dixon* samples (center). Lower image shows cut-out samples earlier processing. Some fruit cheek asymmetry at the suture line is apparent with one cheek slightly larger than the other though fruit aligned and pitted readily on standard Atlas pitters. Some slight pink discoloration of in pit cavities was observed in some 2008 and late-harvested (overripe) 2009 & 2010 samples but, when present in fresh samples, this slight pink coloration was apparently lost in cooking as it was absent in later cut-out evaluations. Early test plantings of this selection included a few atypical trees which ripened 4-5 days after most trees in the selection, suggesting that some variability in maturity time may be present. Subsequent test plantings, including all grower test plantings, were propagated from individual Foundation trees established at FPS in virus-free isolation blocks. No deviations from fruit ripening time were observed in either Foundation or subsequently propagated trees suggesting that the early off-types were the result of propagation error. Because of its proven track record and because of the need for productive, defect-free cultivar ripening in this crucial season, *Extra-Early#1* is being prepared for probable release within the next two years. Advanced selection *Early#6* may ultimately prove superior to this selection in fruit quality and productivity and overlaps with it from later the *Dixon* to *Andross* season. However, it will still be several years before sufficient data is collected for its thorough evaluation.

EXTRA LATE#1. The lineage of *Extra-Late#1* includes traditional California germplasm with only minimal and largely diluted novel germplasm from the nectarine plant introduction also found in the *Dr. Davis* lineage. Fruit ripens with to just after *Corona*. Unlike the more recent *Extra-Late#4-7* selections, *Extra-Late#1* shows only moderate levels of the *long-keeper* post-ripening fruit integrity trait and fruit brown-rot resistance (as comparable to *Halford*, see inset graft on top image at right). Fruit, however, are medium to large in size with a moderately small pit contributing positively to processing case-yield. Flesh color is uniform yellow gold to orange-gold with associated higher levels pro-vitamin A and antioxidant compounds. In some years flesh color can approach that of *Hesse*. No red pigmentation has been observed in the pit cavity. Skin color is a uniform yellow gold, also without red pigmentation. Fruit are medium firm to firm, and consistently maintain better flesh firmness and fruit texture than the adjacent *Halford* and *Corona* in regional test-plantings. Pit cavities are also relatively free from split pits and fragments. Fruit flesh show low bruising potential but some bruised fruit and flesh browning was observed in somewhat overripe 2009 samples. Some fruit drop as well as brown-rot fruit were observed in 2008, 2009 and 2011. Images at right show: (top) 2011 regional trial fruit samples harvested at 1 week after tree-ripe date {halved fruit below sizing ring were cut 24 hrs earlier to evaluate (relatively low) fruit browning potential}. Center image shows samples of Winters, CA planted *Extra-Late#1* compared with samples from nearby *Halford* demonstrating comparable size but without pit problems. Bottom image shows previously processed cut-out samples with high color and good pit cavity quality.



EARLY#4. Fruit ripens between with 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 moderate to low potential for bruising with browning often present in water-soaked shoulders after injury. 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 in 2007 & 2010 and pit tip in 2009.

Some preharvest fruit drop in 2007 & 2010. Although not as high a quality as Extra-Early#,1 Early#5 or Early#6, the Andross ripening season may offer this item some commercial potential. Tree allocation and site: 45 Sac, 50 San Joaquin Valley.

EARLY#5. Fruit ripens with to just after 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 to crimson 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 may show some 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 7+ d overripe. Some fruit drop and brown rot observed in 2007 -2010. Flesh shows low bruising/browning potential. Tree allocation and site: 55 Sacramento Valley, 51 San Joaquin Valley.

EARLY #6. Recently advanced selection derived from South African germplasm combining the long-keeper potential of Late#4 with a more traditional golden-yellow flesh color, and a maturity time within the crucial Dixon-Andross season . This selection has consistently shown superior fruit productivity, size, color and harvest and post-harvest firmness over a multi-year test period. Fruit is large, uniformly round and firm even when overripe. Fruit show no red blush on the skin and, more importantly, no red stain development in the fruit pit cavity even up to two weeks passed the full-ripe date. Pit cavity is medium to large and somewhat ragged. Fruit ripen just before Dixon and because of the ability of ripe fruit to hang on the tree for extended periods can be harvested with or up to Andross. The tree is productive with low pre-harvest drop and good levels of field-resistance to fruit brown-rot.

LATE#2. Fruit ripen with to just after Starn. Fruit are large with a medium sized and somewhat ragged pit. Flesh is uniform golden yellow with clean to only slightly pink (when overripe) pit . Fruit skin is a golden yellow with less than 20% red blush. Fruit shape is oval to somewhat angular. Flesh is usually moderately firm but softness was observed in some Sacramento Valley samples in 2009 & 2010. Some water soaking has been observed near the skin surface apparently due to pitter bruising. Water-soaked areas are susceptible to bruising if damaged. Some pit splits, and brown rot observed in 2007 - 2010 with heavy pre-harvest drop in 2008-2010. The tree is productive with bearing common even on older wood and can size welleven in clusters. 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 medium 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. Fruit have brix with a slight astringency in post-ripe fruit. Low flesh bruising obswerved in 2009-11as well as fruit brown rot in lab and field. Some, but low levels of split pit, drop and brown-rot observed in 2008. Tree allocation and site: 100 Sacramento Valley 100 San Joaquin Valley.

Compact#1. The tree is productive and compact, being approximately 1/2 standard height. Fruit ripen at the Monaco time, and have good quality with a good (on-tree) holding ability allowing over 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 thru 2009. Because of high leaf density from shorter internodes, secondary branching is reduced resulting in blind wood which can later sunburn if 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 1/2 to 2/3 standard height. Fruit ripen with Dixon and will hold on the tree until Andross time. Fruit are medium size, of very good quality with a good (on-tree) holding ability allowing in 1 to 2 week delay in harvest if necessary. Fruit can be only moderately firm but with high brix, low bruising and moderate resistance to fruit brown rot. Fruit flesh is uniform gold to yellow- and is usually free of red pigmentation even when overripe though some red observed in 2008. . Skin is yellow-gold with up to 40% red blush. Trees are productive with little blind wood and low preharvest drop making them amenable to mechanical harvest. Low flesh bruising/browning observed in 2009-11 with ~6% splits observed in 2010-11. Tree allocation and site: 120 Sacramento Valley 100 San Joaquin Valley.

Compact#3. The tree is very productive and compact, being approximately 2/3 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 Monaco to Halford but 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, low fruit brown rot and bruising, making them amenable to mechanical harvest. Tree allocation and site: 100 trees 10 San Joaquin Valley.

EXTRA LATE#2. Fruit ripened with to after 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 – 2009 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 than commercial cultivars in this maturity period. Fruit show some resistance to brown rot and sour rot in lab assays though brown rot on field fruit was observed in 2007, 2008 & 2010. Tree allocation and site: 49 Sacramento Valley, 50 San Joaquin Valley.

Extra Late#4. Fruit ripen with to just after Corona. Fruit are of good quality with a good (on-tree, *long-keeper*) holding of 4 weeks or more, allowing delayed harvest if necessary. Fruit is uniform and symmetrical, has high soluble-solids, is 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 which can give the canned fruit a more orange hue though not as dark as Kakamas. Fruit firmness for Extra Lates#4-*7* in 2011 was softer than typical, being between 5.5-7lbs at tree-ripe though this may have been a measurement error. 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. Middle mesocarp flesh is unusually firm which is maintained for three weeks after fruit ripening allowing delayed harvest. Fruit of this EL series can maintain a greenish tinge on skin which may contribute to improved resistance to bruising and to brown-rot infection in the lab and field though some brown rot and fruit drop observed in the field in 2007, 2009 and 2011. Processed fruit possess good flavor, color and firmness but sometimes with a slightly detectable astringent aftertaste. Tree allocation and site: 400 Sacramento Valley, 400 San Joaquin Valley.

Extra Late#5. This selection is a sib-line to (and so very similar to) Extra Late#4. Fruit ripen with Sullivan#4. 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. Extra Lates#4-*7* flower approx. 5 d before Ross. Fruit color is yellow gold with no red pigmentation in the pit cavity, flesh or skin. As with Extra-Late#4 some fruit color was more orange in 2009 than previous years. Fruit flesh is firm and easily pitted, but occasionally maintains a greenish tinge when processed. Fruit firmness in 2011 was softer than typical, being between 5.5-7lbs at tree-ripe. 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. Slight pre-harvest drop in 2010-11 with 4% splits in some 2011 samples. Processed fruit possess good flavor, color and firmness. Tree allocation and site: 400 Sacramento Valley, 400 San Joaquin Valley.

Extra Late#6. This selection is a sib-line to (and so very similar to) Extra Late#4-5&7. All Extra Lates#4-*7* flower approx. 5 d before Ross. Fruit ripen with Starn to Sullivan#4. 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. Skin can maintain greenish tinge at full ripe. Fruit firmness for Extra Lates#4-*7* in 2011 was softer than typical, being between 5.5-7lbs at tree-ripe though this may have been a measurement error. Fruit flesh is typically 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 show some resistant to plum pox virus (currently being evaluated in Spain). Fresh fruit may have a slightly astringent aftertaste which may be related to bruising and fruit brown rot resistance. Processed fruit possess good flavor, color and firmness. In 2007, 2009 & 2010 this was the most uniform Extra-late selection in terms of fruit size, shape and color . Tree allocation and site: 400 Sacramento Valley, 400 San Joaquin Valley.

Extra Late#7. This selection is a sib-line to (and so very similar to) Extra Late#4-6. Fruit ripen with Starn to Sullivan#4. 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. Some fruit color was more orange in 2009 than previous years though part of the problem was a n insufficient lye-peel in processing. Fruit flesh is firm and easily pitted. Flesh firmness is maintained for three weeks after fruit ripening allowing delayed harvest Fruit show med to 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 evaluated in 2007 & 2008. Some brown rot observed in field in 2007, 2008 & 2010 but very high disease pressure was present due to late summer rains. Few splits in 2010 but some pre-harvest drop observed in 2011 with up to 5% splits in some 2011 samples.. 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 astringency which may be related to bruising and fruit brown rot resistance.. Trees are productive with minimum thinning. Tree allocation and site: 400 Sacramento, 400 San Joaquin Valley.

Current Regional Trial Grower Sites

Seq.	Selection	Grower	No. of Trees	City
1	UltraEarly#1	Bob Quatrin	100	Kingsburg
1	UltraEarly#1	Jim Jackson	50	Kingsburg?
1	UltraEarly#1	Kearney Ag. Center	55	Parlier
1	UltraEarly#1	Wolfskill	2	Winters
1	UltraEarly#2	Kearney Ag. Center	5	Parlier
1	UltraEarly#2/	Wolfskill	1	Winters
1	UltraEarly#2/3?	Bob Quatrin	50	Kingsburg
1	UltraEarly#3	Bob Quatrin	50	Kingsburg
1	UltraEarly#3	Jim Jackson	50	Kingsburg
1	UltraEarly#3	Kearney Ag. Center	100	Parlier
1	UltraEarly#3	Wolfskill	2	Winters
2	ExtraEarly#1	Jim Jackson	50	Kingsburg
2	ExtraEarly#1	Kearney Ag. Center	100	Parlier
2	ExtraEarly#1	Paul Rai	50	Yuba City
2	ExtraEarly#2	Kearney Ag. Center	20	Parlier
2	ExtraEarly#2	Paul Rai	50	Yuba City
3	Early#4	Kearney Ag. Center	5	Parlier
3	Early#4	Richard McPherrin	80	Yuba City
3	Early#5	Kearney Ag. Center	5	Parlier
3	Early#5	Richard McPherrin	80	Yuba City
4	Late#2	Sarb & Kuldip Atwal	50	Olivehurst
4	Late#2	Kearney Ag. Center	5	Parlier
4	Late#2	Wolfskill	10	Winters
4	Late#2	Richard McPherrin	50	Yuba City
5	ExtraLate#1	Kearney Ag. Center	100	Parlier
5	ExtraLate#1	Wolfskill	7	Winters
5	ExtraLate#1	Pat McCay	50	Davis
5	ExtraLate#2	Parminder Sarwat	30	Ballico
5	ExtraLate#2	Mike Nolan	30	Marysville
5	ExtraLate#2	Sarb & Kuldip Atwal	50	Olivehurst
5	ExtraLate#2	Kearney Ag. Center	15	Parlier
5	ExtraLate#2	Wolfskill	4	Winters
5	ExtraLate#2	Richard McPherrin	50	Yuba City
5	ExtraLate#4	Gus Obertier	70	Waterford
5	ExtraLate#4	Wolfskill	2	Winters
5	ExtraLate#5	Gus Obertier	70	Waterford
5	ExtraLate#5	Wolfskill	2	Winters
5	ExtraLate#6	Gus Obertier	70	Waterford
5	ExtraLate#6	Wolfskill	2	Winters
5	ExtraLate#7	Wolfskill	2	Winters
5	ExtraLate#7	Gus Obertier	70	Waterford
6	Compact#1	Kearney Ag. Center	15	Parlier
6	Compact#1	Wolfskill	2	Winters
6	Compact#2	Wolfskill	4	Winters
6	Compact#3	Davis	1	Winters

Current Regional Trial Grower Sites. (continued from previous page)

Year	Selection	Grower	No. of Trees	City
2009	Compact#2,	Pete Martini	101	Escalon
2009	Compact#2,	Sarb Johl	100	Live Oaks
2009	Compact#3	Gary Schnitzler	96	Kingsburg
2009	Compact#3	Runjit Davit	103	Live Oaks
2009	Compact#3	Paul J. Van Konynenburg	100	Modesto
2009	ExtraEarly#1	Harvinder Kullar	119	Ballico
2009	ExtraEarly#1	Wil Sohal	45	Sacramento
2009	ExtraEarly#1	Sean Carberry	55	Yuba City
2009	ExtraLate#4	Paul J. Van Konynenburg	100	Modesto
2009	ExtraLate#4	Gus Obertier	130	Waterford
2009	ExtraLate#4	Sarb Johl	50	Live Oaks
2009	ExtraLate#4	Mohinder Ghag	24	Live Oaks
2009	ExtraLate#5	Mohinder Ghag	104	Live Oaks
2009	ExtraLate#5	Paul J. Van Konynenburg	100	Modesto
2009	ExtraLate#6	Mohinder Ghag	113	Live Oaks
2009	ExtraLate#6	Paul J. Van Konynenburg	100	Modesto
2009	ExtraLate#7	Mohinder Ghag	114	Live Oaks
2009	ExtraLate#7	Paul J. Van Konynenburg	100	Modesto
2009	Late#4	Lou Boer	51	Ceres
2009	Late#4	Runjit Davit	98	Live Oaks
2009	Late#4	Gus Obertier	55	Waterford
2010	Early#6	Rajinder Chohan	315	Yuba City
2010	ExtraEarly#1	Rajinder Chohan	315	Yuba City
2010	ExtraLate#4	Eric Spycher	78	Ballico
2010	ExtraLate#5	Eric Spycher	78	Ballico
2010	ExtraLate#6	Eric Spycher	78	Ballico
2010	ExtraLate#7	Rajinder Chohan	315	Yuba City
2010	Late#4	Norman Kline	22	Riverbank
2010	Late#4	Eric Spycher	186	Ballico
2010	ExtraLate#4	Norman Kline	206	Riverbank
2010	ExtraLate#5	Norman Kline	226	Riverbank
2010	ExtraLate#6	Norman Kline	270	Riverbank
2010	ExtraLate#5	Marjorie Bishop	22	Modesto
2010	ExtraLate#6	Marjorie Bishop	7	Modesto
2010	Late#4	Marjorie Bishop	74	Modesto
2011	Early#6	Satinder Davit	25	Live Oaks?
2011	Late#4	Pete Martini	xxx	Escalon
2011	Early#6	xxx	300	xxx
2011	Late#4	xxx	300	xxx