Orchard Notes
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In This Issue

Submitted by:

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Final Chilling Hours For Yuba City

2014-2015	486
2013-2014	1016
2012-2013	1150
2011-2012	1051
2010–2011	1014
2009-2010	854
2008-09	1116
2007-08	1108
2005-06	780
2004-05	994
2003-04	886
2002-03	779
2001-02	761

Chilling hours recorded for hours below 45° F model at our office on Garden Highway starting November 1 and ending on February 28 (February 29 in 2004, 2008, 2012)

We had the lowest chilling hours this past winter since recording them at our office in Yuba City. Low chilling effects were seen on peach and walnut varieties requiring more chill hours; 'Stanislaus' peach had a lighter bloom because of bud drop in some orchards and 'Chandler' walnut had quite a staggered leaf-out and bloom.

Early Peach Harvest Predicted

Predicting peach harvest timing based on the heat units accumulated driven by temperature the first 30 days after bloom has been mostly accurate over the last decade. Temperatures those first 30 days are critical and what happens after that typically has a much smaller effect on harvest date (e.g. weather near harvest coupled with soil, tree nutrition, water status, etc.). On the average, we accumulate about 6000 growing degree hours (GDH) during the first 30 days after bloom. We've had a very warm spring so far with the highest growing degree hours (7,955) since using the model to predict peach harvest in the Sacramento Valley. Compare to 2004 with 7,788 GDH_{30} which was very early (around July 4 as I recall). Also, reference date is May 9 for 2015 and May 9 in 2004. It's possible harvest could start in extra earlies around late June this season!

The table below lists full bloom dates and growing degree hours 30 days after bloom using the Sutter County Verona CIMIS weather station for 2013-15. Prior years were calculated using the Nicolaus CIMIS station except in 2012. The table also includes the general harvest timing from 2004-2014 and the prediction for 2015.

Year	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Full Bloom	Mar 6	Mar 11	Mar 13	Mar 8	Mar 14	Mar 12	Mar 16	Mar 10	Mar 9	Mar 14	Mar 3	Mar 9
GDH_{30}	7,955	6,510	7,397	4,621 (Colusa)	4,963	5,060	6,117	5,548	7,420	4,375	6,153	7,788
Harvest Timing	Predict Very early	Normal to slightly early	Early	Later than normal	Later than normal	Later than normal	Slightly later than normal	Normal	Early	Very late	Normal	Very early

Sizing Peach Fruit

The rate of early fruit development is very dependent on the weather; the warmer the weather, the faster the fruit develop with a demand for carbohydrates 5 to 10 times higher than during a cooler spring. Anything limiting carbohydrate accumulation by the fruit can ultimately lead to smaller fruit. During cool springs, fruit takes much longer to develop and there is more time to accumulate necessary carbohydrates for fruit development and to obtain larger size. When thinning peaches, sizing peach fruit is generally more difficult when GDH_{30} days after bloom are **above** 6,000 whereas it is generally a better fruit sizing year when springtime temperatures are cooler and GDH_{30} is **below** 6,000.

With both a high GDH_{30} and very heavy fruit set in many varieties, sizing peach fruit especially on early varieties will be challenging this season. The sooner growers thin, the better the potential to size the fruit. Fortunately, many growers thinned in April. The other challenge this year is labor availability for fruit thinning. UC Davis Research Scientist Kitren Glozer and I conducted mechanical fruit thinning studies from 2005 through 2009 using a side-mount trunk shaker with computer-generated patterns and precise rpm/duration capability. The mechanical thinning + follow-up hand thinning treatment reduced thinning costs and had more #1 fruit compared to just hand thinning. However, **optimum size for mechanical fruit thinning is 20-27 mm.** Mechanical thinning at larger fruit sizes differentially takes off the biggest fruit (see Photos). All of our mechanical fruit thinning on Loadel was done in April. We also determined that in a high fruit set year, with high temperatures in the first 30 days after bloom like this year, more than 70% of the crop should have been removed by shake thinning to be able to size enough fruit and reduce the cullage. Please contact me if you want our research report summary or more information on the side-mount shaker and mechanical fruit thinning.

Compare these same peach fruit that are too large for mechanical thinning to the prunes on the right which are at maximum size for mechanical thinning.

Fruit too big for shaking (biggest fruit came off).
Optimum size for fruit thinning is 20-27 mm.
Photos by Janine Hasey.

New processing peach selections in the Dixon-Andross gap.

Tom Gradziel, Department of Plant Sciences, University of California at Davis.

A key requirement for processing peaches is a continuous supply of quality fruit to the canneries. A major goal of the UCD processing peach breeding program has been the development of a series of varieties allowing continuous harvest to complement early California varieties such as *Carson*, *Andross*, *Halford* and *Sullivan#4* (Chart 1). The remaining gap in this series is sometimes referred to as the *Dixon*-gap or *Dixon-Andross* gap and has been a particularly difficult breeding problem. This time period appears to represent a critical threshold for peach fruit development such that most seedlings resulting from traditional crosses in the breeding program tend to ripen either before or after the gap, and those few maturing within the gap are very susceptible to pit problems, including pit-fragments and red pit-staining. (Both lignin formation which gives pits their hardness and anthocyanin formation which results in the red pit-staining are in the same biochemical pathway). The commercial variety *Dixon* which ripens at this time had to be abandoned because of these problems despite its high productivity and otherwise good fruit quality, and the variety *Andross* is also very susceptible. Part of the difficulties in breeding improved varieties is the highly inbred nature of California processing peach germplasm, with most commercial varieties tracing their lineage back to only two or three original parents. Thus, an important early breeding objective was to bring in new germplasm to address these well established, as well as emerging industry problems, and to then genetically recombine this material to optimize both the desired target traits as well as commercial quality and productivity under California growing conditions. The following 3 advanced UCD selections are results of this process and contain new germplasm from Europe, South America and South Africa (Figure 1).

Kader is a newly released processing peach variety ripening just after *Carson*, though because of its ability to maintain good on-tree fruit quality can be harvested a week or more after the full-ripe stage. Trees are productive with high-quality fruit for processing (Fig. 1) and with a low incidence of pit-fragments and red pit-staining despite its maturation in the *Dixon* gap. Its high sugar content (Brix) and low acidity (pH) are

both desirable for processing as is a Brix/TA ratio of over 20 (Table 1). Fruit firmness, color and maximum size potential are comparable to *Andross* though with improved Fruit Brown Rot resistance. An exceptional potential for large fruit size allows over-thinned trees to develop correspondingly larger fruit and so maintain higher yields. The lineage of *Kader* includes breeding material from Europe and Brazil as well as traditional Californian processing peach varieties. It is the result of over 20 years of breeding efforts with most of that time spent in testing its early and mature tree productivity and fruit processing quality in each of the major California growing regions. The variety Kader was released in the summer of 2014 and virus-free foundation stock has been made available to California nurseries for commercial tree propagation.

Early#6 is the most recent advanced UCD breeding selection ripening in the Early-harvest season and combines processing peach breeding germplasm from California and South Africa. [The 'Early' designation identifies the harvest season while '**#6**' identifies its order of release for grower testing rather than order of harvest date]. Traits incorporated from the South African germplasm include improved fruit firmness and fruit brown-rot resistance, and a suppression of red-pigmentation throughout the fruit including the fruit cavity. This suppression of red-pigmentation results in a uniform golden yellow flesh color. *Early#6* ripens approximately three days before *Andross* with desirable levels of fruit sweetness and acidity along with good fruit firmness (Table 1). Trees tend to crop heavily with fruit displaying good uniformity in size, shape and color.

Early#5 ripens with to just after *Andross* and is similar to *Andross* in fruit sweetness, acidity, firmness and color. Size of commercially thinned fruit for *Early#5* as well as *Early#6* is also comparable to *Andross*, though over-thinned fruit will not continue to size as aggressively as *Andross* and *Kader*, being more comparable to *Carson* and *Dixon*. Multiyear disease evaluations by Dr. Rick Bostock at UCD have shown significantly better resistance than *Andross* or *Carson*, though not as good as *Kader* and *Early#6***.** Early, small-scale grower testing in the Sacramento and San Joaquin Valleys have received high marks from both growers and processors with more extensive grower testing recommended.

Growers interested in planting the *Kader* variety should contact their nursery as it is now fully-released and commercially available. Growers interested in establishing test plantings of *Early#5* or *Early#6* should contact Ajayab Dhaddey, CCPA or the UCD processing peach breeding program (Tom Gradziel, TMGradziel@UCDavis.Edu, Cell: (530) 400-9292).

Table 1. Fruit characteristics of Extra-Early and Early-Season UCD processing peach selections compared with standard cultivars. [Data averaged from multiple years following heavy fruit thinning to assess maximum fruit sizing potential. Higher Fruit Brown Rot numbers indicate higher susceptibility. The (a*) color value increases from green-yellow {as in *Carson* at ~5} to yellow-gold {a* =12}).

UCD Selection	Ripe Date	Brix	pH	Brix/TA	Firmness (lbs.)	Max. Fruit Weight (g)	Susceptibility to Brown Rot	Color (a*)
Carson	20-Jul	10.4	4.0	18.6	6.7	219.5	13.2	4.97
Kader	22-Jul	12.9	3.9	26.9	7.2	332.7	3.1	6.98
Early#6	30-Jul	11.7	3.8	21.4	7.3	237.9	4.2	5.73
Early#5	2-Aug	11.9	3.7	21.3	7.9	235.7	6.4	7.19
Dixon	27-Jul	12.8	4.1	32.1	5.5	226.4	16.4	6.07
Andross	2-Aug	12.6	4.1	30.8	7.6	332.2	11.7	6.87

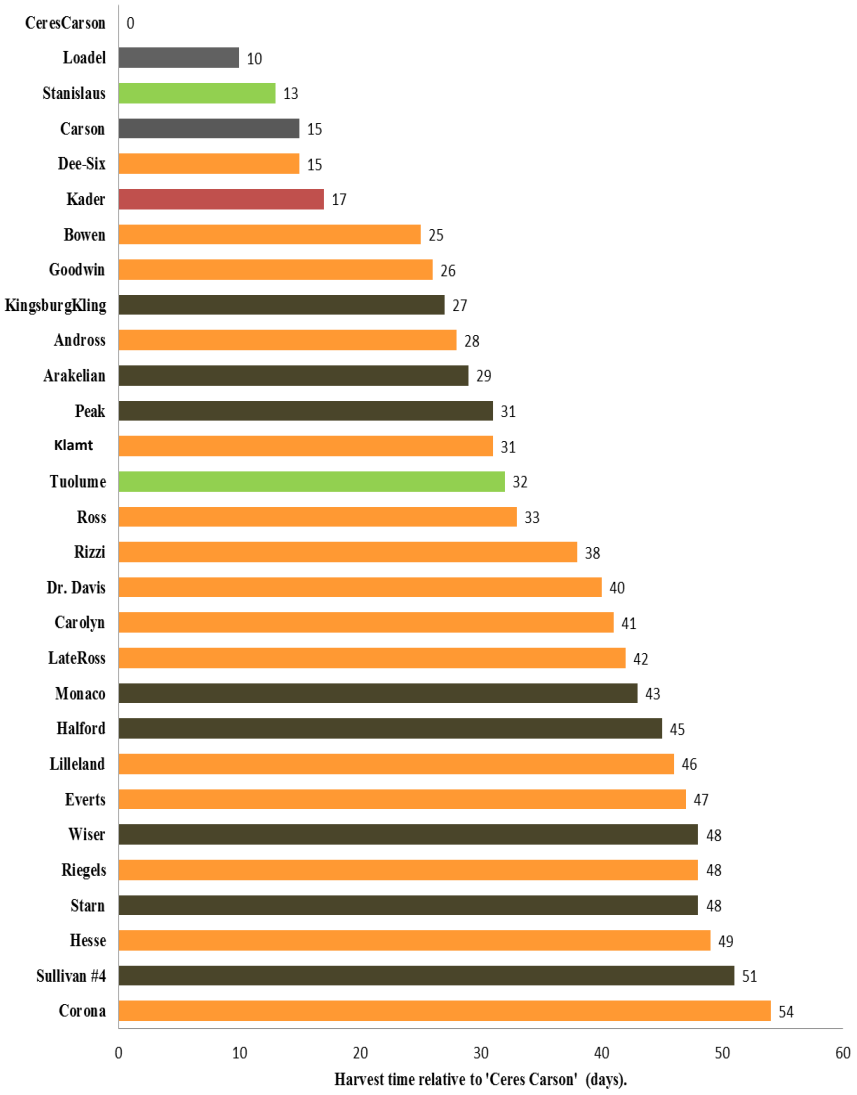

Chart 1. Harvest chart for processing peach varieties. (Gold bars are University of California selections; Green bars are from Zaiger Genetics, and Black bars are grower selections from chance seedlings).

Figure 1. Processed fruit samples for the new UCD variety *'Kader'* (top) and Advanced Selections *Early#5* (center) and *Early#6* (bottom).

Website Resources

Video clip: How to monitor for webspinning spider mites in peach and nectarine
https://www.youtube.com/watch?v=Wg_IAqZiSAM

Video clip: How to monitor shoot strikes in peach and nectarine
https://www.youtube.com/watch?v=hfsqSVOG-zE

California Institute for Water Resources
http://ciwr.ucanr.edu/California_Drought_Expertise/Drought_information/

UC Drought Management - http://ucmanagedrought.ucdavis.edu/

Calculating reference stem water potential (SWP) values for walnuts, almonds, prunes and grapes - http://informatics.plantsciences.ucdavis.edu/Brooke_Jacobs/index.php
Use station #235 – Verona for most Sutter and Yuba County tree crop growing areas.

UC Davis Fruit and Nut Center - Walnut and almond water use physiology and foliar sprays
http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=13408

Using degree-days: Video tours - http://ipm.ucdavis.edu/WEATHER/ddvideos.html
A good resource for newer growers and PCAs.

There is still room available!

Advances in Walnut Production Short Course

Sign up Now!

The Advances in Walnut Production short course will be held November 16 to November 20, 2015 at the University of California Davis. The course includes four days of instruction: lectures and field demonstrations to illustrate the relationship between walnut biology and orchard management. This University of California Cooperative Extension (UCCE) course is delivered by experienced Farm Advisors, Faculty and Specialists who represent decades of research and work experience in California walnut production.

The enrollment fee of $1,500 will cover classroom instruction, all course materials, breakfast, coffee breaks, lunches, and evening social. Reservations will be accepted on a first paid, first enrolled basis.

Please use online registration available on the UC Fruit & Nut Research & Information Center website: http://fruitsandnuts.ucdavis.edu.

For additional information, brochures are available at our UCCE office on Garden Highway. The registration coordinator is Penny Stockdale at pastockdale@ucdavis.edu or 530-752-7672.