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2022 Statewide Pistachio Day, January 19-20

Field Fixes for Golden Hills' Weak Spots plus a Breeding-Trial Newsflash

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We thank the former California Pistachio Commission, the California Pistachio Research Board, former Kern County Farm advisor Joseph Maranto and the very many U.C. researchers, cooperating industry growers and processors without whom very little of the past three decades of research would have been possible.

Over the past 5 years or so, Golden Hills has become the first choice for new pistachio plantings in the San Joaquin Valley. Adequate statistics are not available, but there could be more than 120,000 acres of Golden Hills in California, with a significant percentage not yet bearing.

With the huge acreage increases, Golden Hills has confirmed many of its strengths. However, it has demonstrated crop production differences when compared to other commercial cultivars and some weaknesses, some of which were apparent in early field trials and some additional ones that were not.

The objective of this presentation is to focus on noteworthy weaknesses and differences in growing Golden Hills compared to it’s sister Lost Hills and to the industry standard Kerman.

A further objective is to suggest “field fixes” for some of these weaknesses and ways to address production differences.

Budding the trees

Golden Hills has proven more difficult to bud than Kerman.

The reason is not clear. The length of the Golden Hills branch that has flower buds, and which will eventually be the bud stick, tends to taper quickly.

Bud maturity is often quite variable along the bud stick, with the older buds being too old and the smaller buds too green/immature.

It is advisable to use a nursery licensed to distribute U.C. budwood and familiar with budding Golden Hills to do the budding. Another option, which is increasing in popularity, is to plant trees that were pre-budded in the nursery.

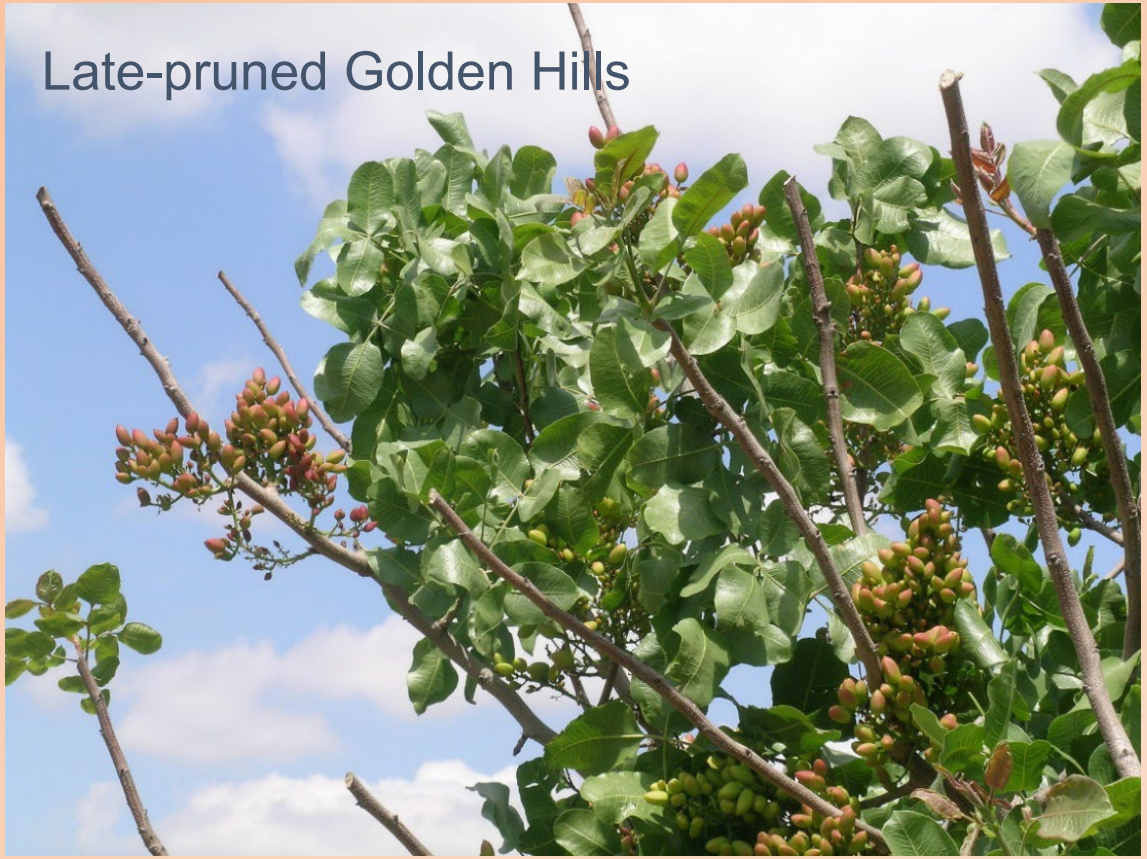
Dormant Season Tree Training

Do not tip Golden Hills late (i.e. tip by or before early February to be safe).

Apical buds begin producing auxins in the spring, which prevents buds lower on the branch from pushing. Tip the apical buds before they come out of dormancy.

Everything happens earlier with mature Golden Hills than Kerman – as much as 2 weeks earlier.

If you tip the terminal buds after the terminal buds come out of dormancy, buds a foot or more below that point will be extremely slow to push or won't push it all.



The same thing happens in Kerman, but the buds remain dormant for an additional 10 days to two weeks, giving you more time to prune a Kerman orchard in late winter.

Golden Hills has a greater tendency to split at the ‘crotch’ of the tree, which is the point were the primary scaffold branches are formed during tree training. Incidences can vary widely between orchards.

The splitting is more common when only two primary branches are formed, so it is important to form at least three primaries during initial tree training.

Golden Hills trees appear to be most susceptible to this breakage during the first few years of initial nut bearing before they are fully mature.

Some growers describe these trees as ‘smiling’ but the problem is nothing to laugh at. These splits can easily result in the loss of the tree if not addressed early.

Tree shaking during harvest appears to be associated with some of the splitting. An effective protocol for addressing the problem is to make a tour of the orchard after harvest and locate trees that are just beginning to split. Sometimes the split is not immediately obvious. The initial split is often black or 'sooty' in color as a mold grows on the 'sap' leaking from the split.

Near the top of the split, a hole is bored perpendicular to the split through the trunk and, at a minimum, a ½-inch diameter section of threaded rod is inserted through the trunk.

The rod is cut-to-fit and each end secured with a 1 3/8 inch ‘outside’ diameter washer and a nut.

Some of this splitting is associated with harvest and may occur during the “shaking” of the tree. Especially with Golden Hills, shaking should be just long and hard enough to remove the filled nuts, only.

Shaking should <u>not</u> be considered as an alternative to “poling” for removal of “mummies” or “blanks”.

Modified single leader training, as an alternative to “vase-style” pruning, may be a way to reduce splitting of the trunk at the crotch.

With single leader training there is no crotch!

To the left is a Golden Hills tree trained to a modified single-leader style by grower Paramjit Dosanjh. This type of training is being pioneered by Jeb Headrick and investigated by UCCE scientists Drs. Bruce Lampinen and Mae Culumber. The distribution of the primary scaffolds in this training style may reduce the stress at the crotch that results from conventional “vase” training.
<u>It remains experimental!</u>

Paramjit S. Dosanjh in this Golden Hills orchard planted in 2019.

So, how do we get more vegetative buds to push to form multiple primary branches (and secondary branches)?

Golden Hills has a tendency to produce fewer primary and secondary scaffold branches at the training cut. Cutting the young tree trunk or primary branches too early (or too close to the terminal bud) is more likely to result in insufficient or delayed bud push below training cut.

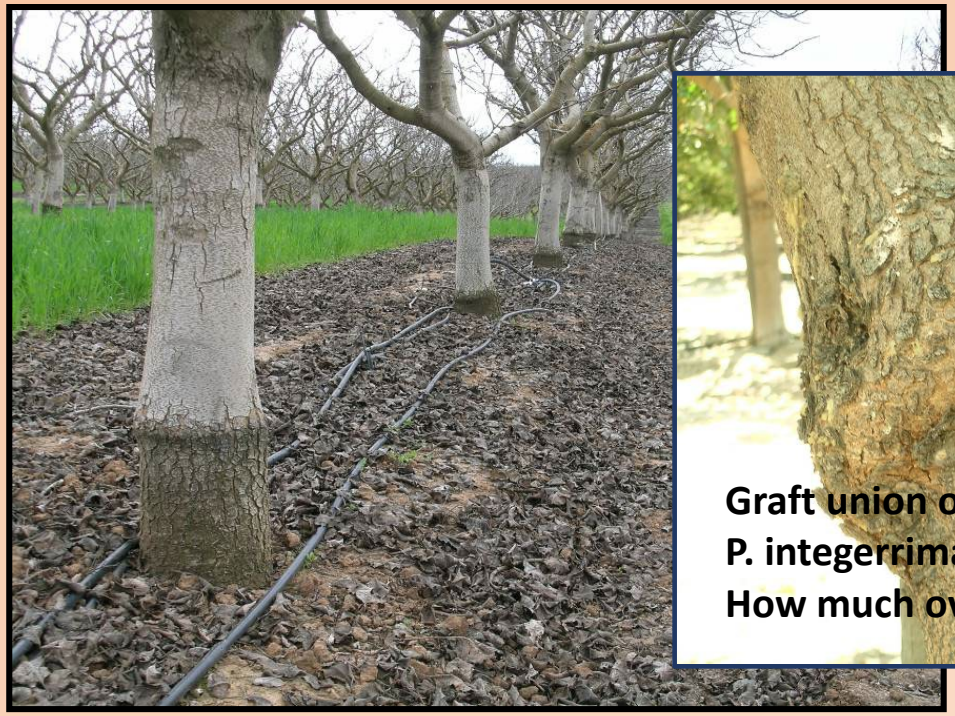
Where do I cut?

Before making the training cut, look for or wait until developing buds are present in the axils of leaves below the proposed cut.

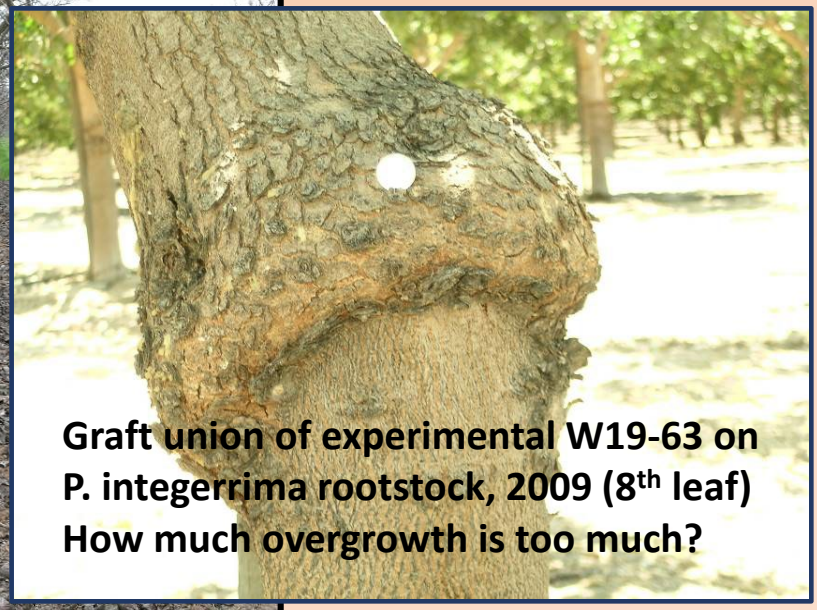
Make the training cut above a leaf axil that has a visible bud to maximize the chance that that buds in axils below the cut will push to form primary or secondary branches. This appears to be particularly important in years with “low-chill” winters.

There are some rootstock issues with new cultivars that are less obvious with Kerman.

Kalehghouchi on P. integerrima



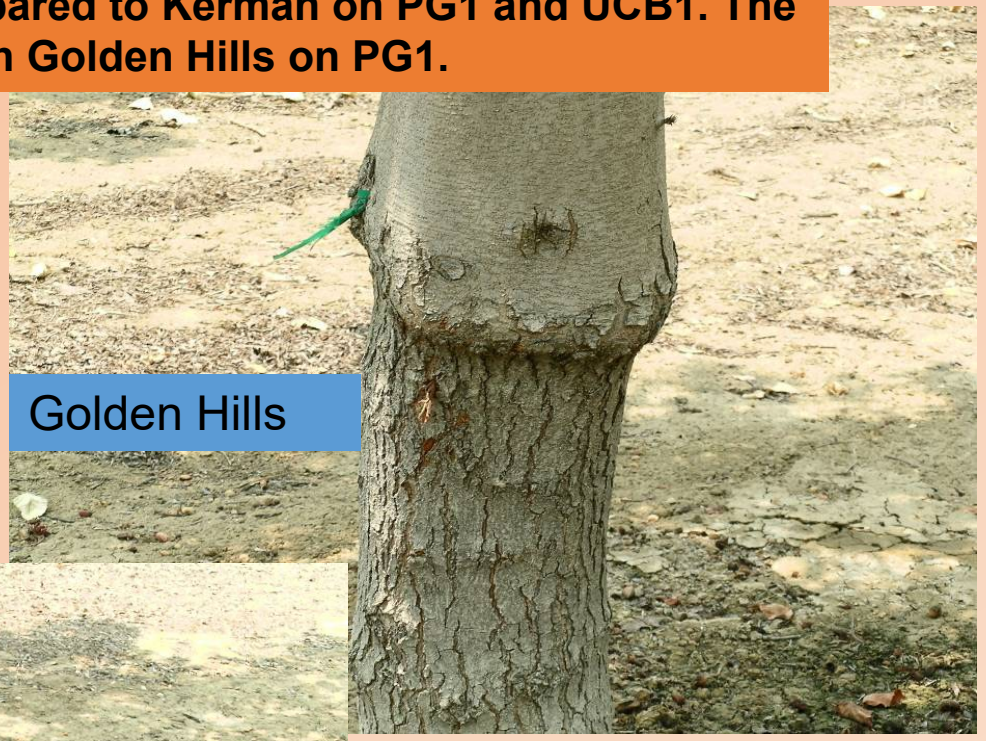
Kerman on P. integerrima

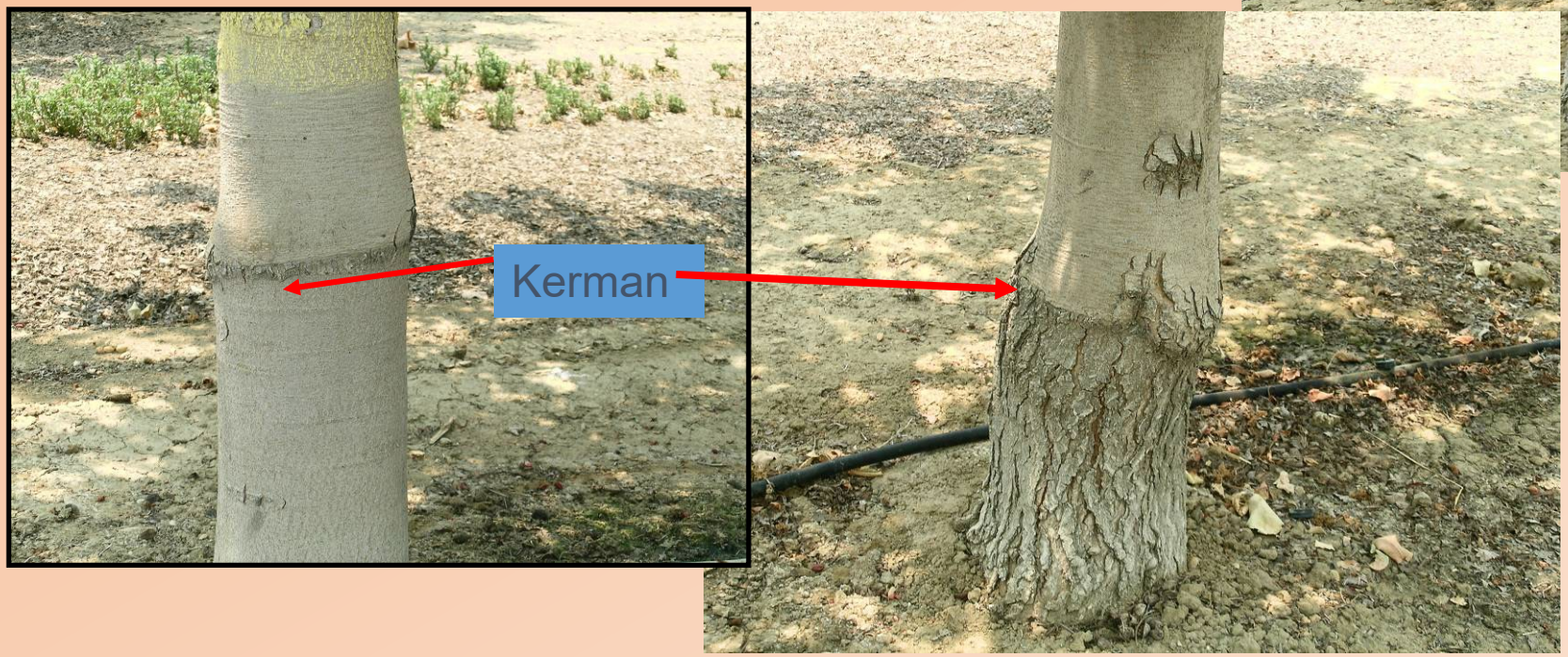


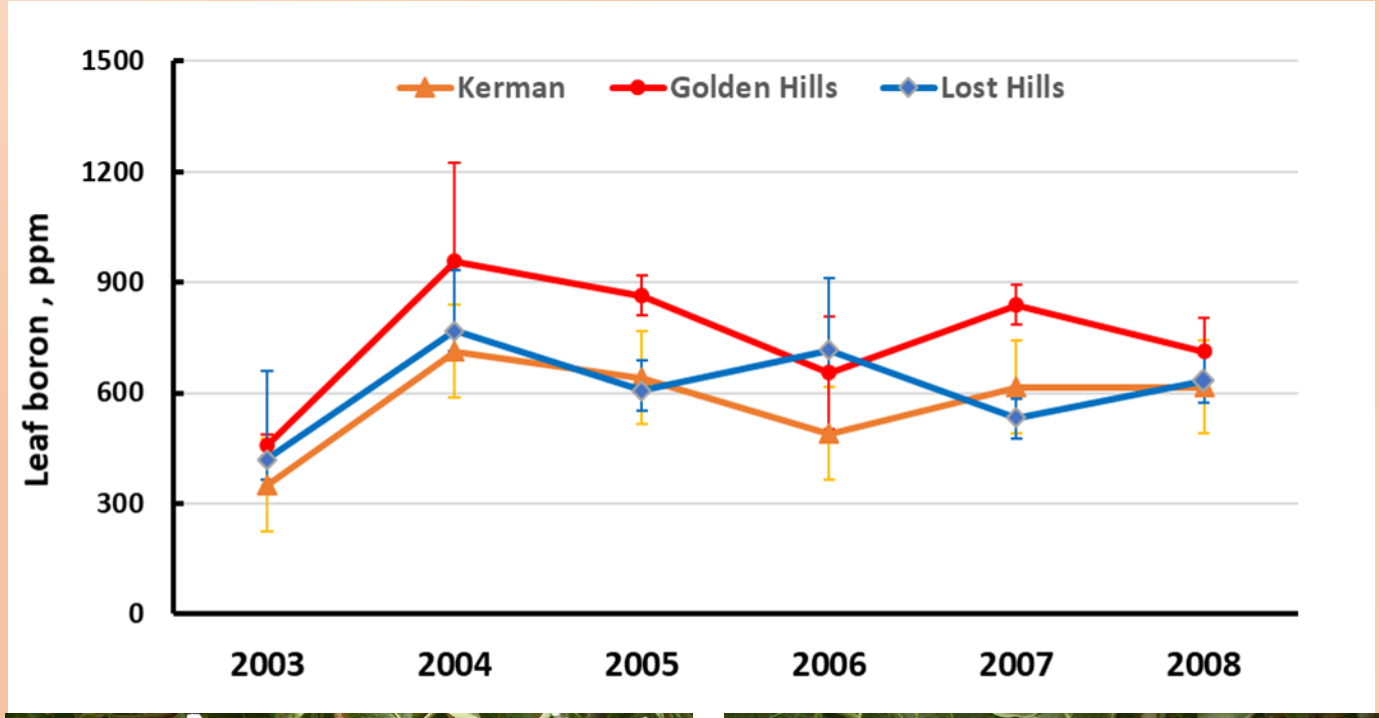
Graft union of experimental W19-63 on P. integerrima rootstock, 2009 (8th leaf) How much overgrowth is too much?

The concern is that for cultivars other than Kerman, tree “barking” increases with uneven trunk growth, and, perhaps, scion/rootstock incompatibility may become a problem as the trees grow old. The graft-union should be 30” or more above the ground to keep the harvester from grabbing it.

Golden Hills and Lost Hills trunks also increase in diameter faster than their rootstocks compared to Kerman on PG1 and UCB1. The differences are greater with Golden Hills on PG1.

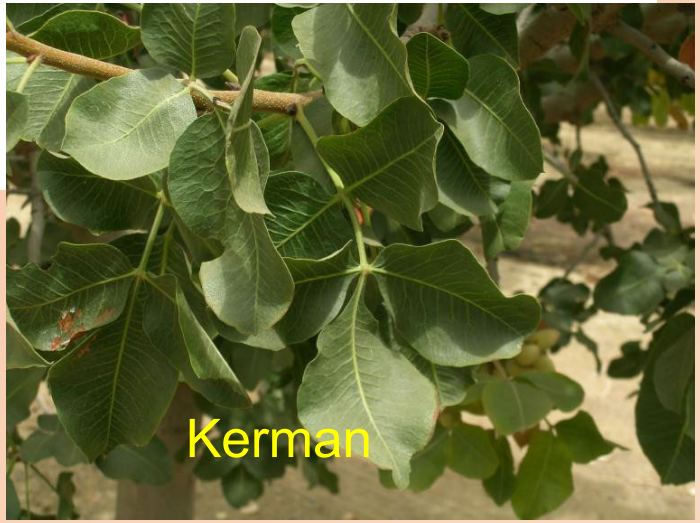






Do not plant Golden Hills if salts, especially boron, are high in the irrigation water.

Leaflet boron about 1800 ppm in early August leaf samples



Above: Boron higher in Golden Hills leaves. No difference in sodium or chloride leaf exclusion among cultivars in this trial (Wonderful Orchards – cooperators).

Above: Boron about 5 ppm in soil and high B in water too. Golden Hills on UCB-1 seedling Sept. 8, 2017 (Starrh Farms – cooperators).

Internal Kernel Discoloration (IKD)

I first became aware of this discoloration problem in some kernels of Golden Hills in 2020. It exists in Lost Hills, as well. It is fairly rare in Kerman. I have not found it in Gumdrop, but the cause and incidence of kernel discoloration requires further investigation. Evidence suggests it is not caused by insects and to date, no pathogen has been associated with it.

The incidence of discoloration varies from year to year and orchard to orchard suggesting that there is an environmental component.

As harvest approaches, the leaf canopy of Golden Hills appears to be more sensitive to scorch and subsequent defoliation than Kerman or Lost Hills. To help prevent scorch:

1. Ensure that adequate irrigation exists throughout the season, but especially, during the last three to four weeks before harvest. Minimize irrigation interruptions for crop pesticide spraying and avoid excessively long periods between shutting the water off and harvesting the orchard. Irrigate post harvest as long as the leaves are green to maximize carbohydrate production.

2. Until we learn more, avoid late season chemical sprays if possible, especially in the last two to three weeks before harvest.

Similarly, if late season sprays are necessary, such as for navel orangeworm (NOW) control, we suggest avoiding chemical adjuvants/spreaders that are known to have a higher risk of phytotoxicity and to use lower rates of adjuvants, especially late in the season.

Alternaria Late Blight has been rare in our many trials in Kern County and the westside of the SJV, but was a problem several years at a trial near Madera.

Golden Hills may demonstrate more Alternaria Late Blight infections than Kerman on leaves and nuts in environments conducive to growth of *Alternaria* (i.e. high relative humidity and dew formation during late August and September).

Golden Hills is harvested early and the leaves begin drying earlier potentially providing *Alternaria* a great place to grow later in the season in some years and locations.

Golden Hills may require a fungicidal spray (usually end of June early July) when Lost Hills and Kerman do not in the northern San Joaquin Valley and more humid areas of the southern San Joaquin Valley.

Maintaining Nut Quality in Golden Hills Through Harvest

A picture of some freshly harvested nuts of Golden Hills from the Buttonwillow Trial on August 26, 2014. Our grower cooperators were Larry and Beau Antongiovanni.

With Golden Hills, don't delay harvest until the hulls have tattered (i.e. splitting hulls). Do not use hull tatter to gauge harvest readiness with Golden Hills.

The hull of Golden Hills nuts do not tatter as much as Kerman when ready for harvest.

Once a majority of the hulls "slip" harvest can begin. Greenish, "tight" hulls, at this point, are most likely blanks.

Most of the nuts will be split and ready for harvest even if many of the hulls remain intact.

Intact hulls at harvest may reduce navel orangeworm infestation compared to Kerman and Lost Hills.

Golden Hills' Nut Cluster – these nuts are ready for harvest. The hull may feel somewhat firm on a few, but even most of these will separate cleanly from the shell in the huller.

Getting the Most Out of a Golden Hills Harvest

Kallsen Definition for a "Double Shake"

A double shake is when an orchard is harvested at two different times and roughly equal weights of nuts are removed from the tree at each of the two harvests. Each separate harvest is called a "shake".

A double shake is composed of a light, initial "bump" shake [in which rachises (clusters)] are not removed] and a 'hard' shake roughly 10 – 14 days or so later.

If more than 90% of the total nut load is removed during the first shake, the following shake is more of a “sanitation” shake and falls outside my definition of a double shake.

Bloom evaluation in randomized and replicated test trials have demonstrated that the relatively short bloom period for Golden Hills translates to more even nut maturity across the tree at harvest than is the case for Kerman or Lost Hills.

Because of the more even maturity of nuts across the tree, a double shake is unnecessary for Golden Hills, unless the bloom period was extended due to poor chill. For mature trees, when 10% of the hulls begin to slip and are ready for harvest, waiting an additional eight to ten days, will usually allow you get 95% or more of the nuts in a single shake. Don't rush to harvest.

If you shake the first nuts early for 'Golden Hills', when only 50% are ready, you will need to come back in a week or less to remove the remaining nuts in order to maintain nut quality. Most growers are not prepared to come back to the same orchard in a week or less for a double shake.

By waiting until 95% or more of the nuts are ready, you will get the majority of your crop off well before the first shake of Kerman, and suffer little loss in terms of nut quality that will occur if the second shake of Golden Hills is delayed.

Generally, in the southern San Joaquin Valley, shaking mature Golden Hills trees at the same time as mature Kerman, means something didn't go as well as it could have.

Even if a 2nd shake of mature Golden Hills is necessary, it can usually be completed before the first shake of Kerman.

High levels of adhering hull and dark stain at harvest means that the harvest was later than it should have been, assuming the nuts were processed at the plant in a timely manner.

If only the percentage of adhering hull is high and stain % is low, it suggests that the harvest was too early.

More detailed results comparing the U.C. released cultivars from 2002 through 2018 can be found in the following publication:

Kallsen, C.E., D.E. Parfitt and J. Maranto. 2020. UC pistachios show improved nut quality and are ready for harvest earlier than ‘Kerman’. California Agriculture 74(2)86-93.

http://calag.ucanr.edu/archive/?article=ca.2020a0011

A Newsflash - An Update on What's New in the Old Pistachio Breeding Program.

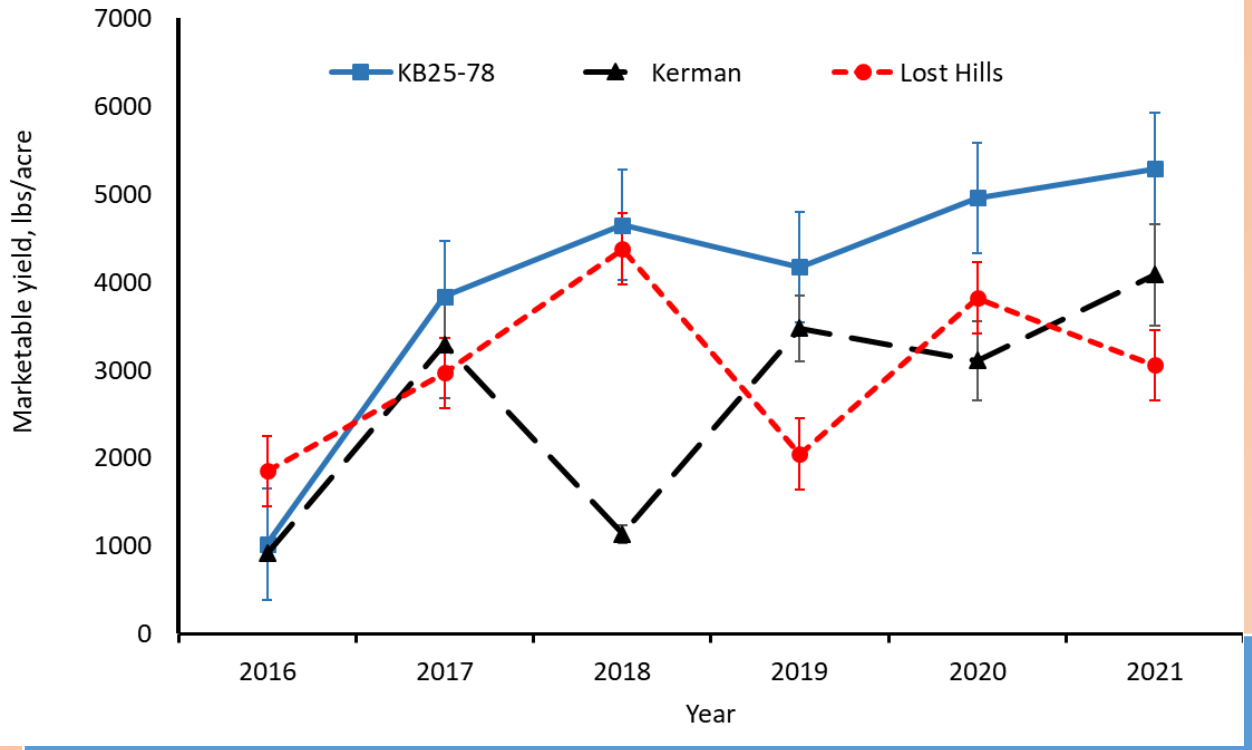

Seedling selection trial
– west of Wasco


Dwarfing rootstock trial


Coachella Valley
2021


An advanced selection
8/20/2021


Advanced selection
trial – Westside REC



Breeding-Trial Newsflash: The advanced-selection KB25-78 continues to crank out more marketable yield than Kerman and Lost Hills at this low-chill trial site planted in 2010.

Average full bloom and harvest readiness date, split nut percent, hulling percent, edible yield percent and cumulative edible yield in lbs. per acre from 2016 – 2021 (7th - 12th leaf) for cultivars and the advanced selection KB25-78 in the Jasmine Trial (Kern County).

Variety	Ave. full bloom date	Year of first harvest	Ave. harvest readiness date	Inshell split nuts, %	Hulling weight, % [A]	Edible weight, % [B]	Cumulative edible yield, lbs./acre [C]
Kerman	4/14	2016	Sept. 18	68.1 b[D]	41.5 a	33.1 ab	16,007 b
KB25-78	4/3	2016	Sept. 14	72.4 b	39.8 ab	31.2 c	23,927 a
Lost Hills	4/11	2016	Sept. 8	84.1 a	39.2 b	34.8 a	18,123 b

[A] This is the percent of total harvested green material remaining immediately after initial hulling (dry weight adjusted to 5% moisture).

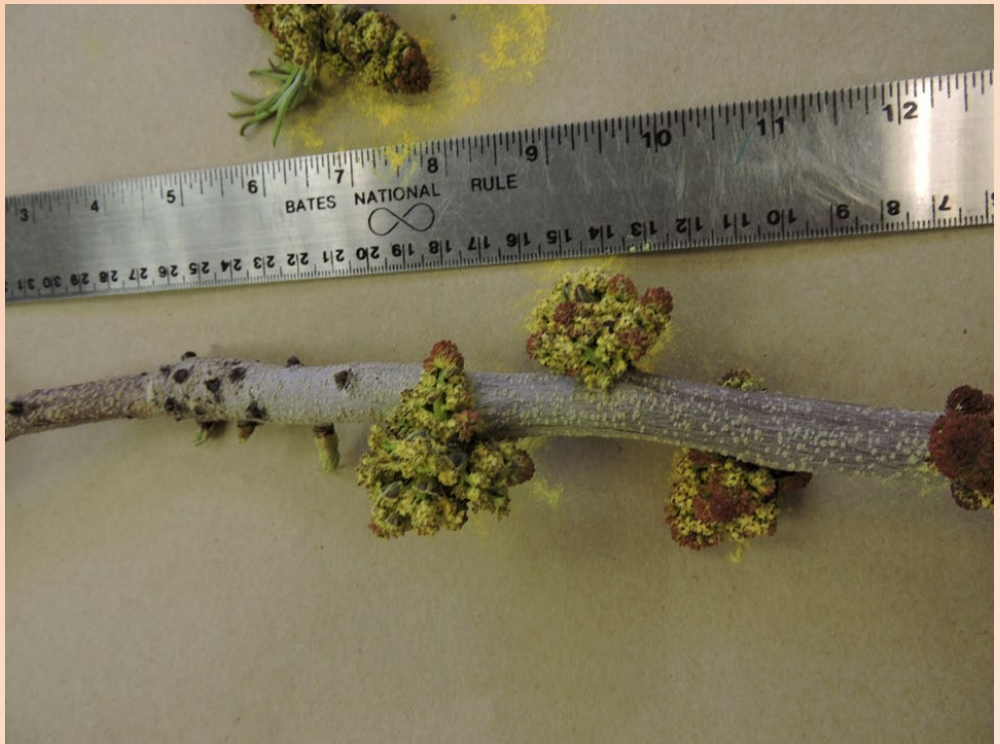
[B] This is the percent of the total green harvested material that is edible weight (i.e. yield) adjusted to 5% moisture.

[C] This is the cumulative edible weight (i.e. yield), in lbs. per acre, adjusted for 5% moisture and corrected for the percentage of male trees per acre in the orchard.

[D] Values followed by different letters in the same column denote significant differences by Fisher's protected LSD test at P≤0.05.

We have selected a “late” pollinizer for Kerman based on its performance in a number of advanced selection trials established in grower and research station trials beginning in 2014. We will be making the initial steps for requesting its release later this year. This cultivar, in combination with the previous release of the “early” Kerman pollinizer Famoso in 2016, will cover the spring bloom period for Kerman whether the previous winter was low chill or high chill. Both Famoso and this new male pollinizer, unlike Peters, are very precocious with male flowers in 4th leaf.

Newsflash Number 2.



Thank you for your attention! We may have time for questions.

I note that I am the last speaker. If the meeting closes before I have a chance to answer questions left in the Q&A box, contact me at;

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