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*Submitted by:*

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## Food for Thought When Planting a New Prune Orchard

*Franz Niederholzer, UCCE Farm Advisor, Colusa, Sutter, and Yuba Counties*

If you are planning a prune orchard in the near future, here's something to think about. Prune farming is about turning sunlight into sugar: the more sunlight your trees "catch" per acre, the greater the potential crop production. Driving around the Sacramento Valley and looking at prune orchards compared to walnuts, almonds and peaches, I bet you'll see that on average **most current prune plantings allow more sunlight on the orchard floor – and so leave more money per acre on the table -- than any other major tree crop in the Sacramento Valley.**

Most prune growers are already moving to higher density plantings. Prune orchard planting distances have shrunk from 20' x 20' several decades ago to somewhere in the range of 18' wide by 14' to 16' between trees in many orchards. Many growers with older 20' x 20' plantings are interplanting down the row, thus turning their orchards into 10' x 20' plantings. Once the trees are touching and shade is solid down the row, crop potential is maxed out in that direction. If there is more cropping potential in a prune orchard design, it's in the row middles.

If you look down the rows of your current prune planting(s) and see 2-4 feet of sunlight between the tree canopies, keep that in mind when planning a new orchard. If you currently produce 3 dry tons of prunes per acre with an 18' across x 16' down the row planting, that's 40 lbs of fruit production per tree at 151 trees per acre. That same orchard should produce 3.17 dry tons/acre if planted 17' across x 16' by down the row (160 trees/acre) and 3.38 dry tons/acre at 16' x 16' (170 trees/acre). At those tighter plantings, the only difference is that there would be less sunlight growing weeds in the orchard middles. At \$2000/ton average dry fruit price to grower, that's an additional \$352 (17' x 16') to \$760 (16' x 16') per acre gross return with tighter across-the-row planting. **For a 50 acre orchard, that's \$19,000 to \$38,000 more PER YEAR than an 18' x 16' planting for simply planting 10-20 more trees per acre.** No risky new practices, variety or rootstock, just a tighter planting catching more sunlight. Narrower middles will mean tighter working conditions for harvesters. Several manufacturers I've spoken with prefer a minimum row width of 18' to give good

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equipment access, although I've been told by at least one major manufacturer that their equipment could work in an orchard with 15' across the row spacing.

Equipment size shouldn't dictate grower income potential. There are several things growers can do when planning and growing a prune orchard to improve harvester access. First, plant the orchard on an offset square pattern: it's easier to harvest (the shaker driver won't have branches from the tree in the next row over in their ear when shaking each tree down the row) and there is more space for each tree in the row compared to the same tree density planted on a square pattern. Second, prune the trees to a more upright shape, not as spreading as a peach orchard. More upright trees have less sunburn risk than those having scaffolds with wide spreading, flat angles.

Net income determines orchard profitability. With land, labor and input costs rising, income will need to rise to keep prune growers in business. Increased light interception per acre, perhaps delivered by tighter plantings on current rootstocks (or larger trees on new rootstocks) should increase production per acre. While every grower must consider their own soil and equipment options when laying out a new orchard, tighter plantings should be part of the planning conversation.



## **Potted Tree Irrigation After Planting: Getting the First Year Right**

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Counties*

Potted trees may be the nursery stock of the future, but they have challenges and a learning curve for growers accustomed to planting bare root trees. One of the major challenges is irrigating during the orchard's first year. If your orchard is planted by tearing open the root ball of potted trees at planting, spreading the roots, and turning your trees into an almost a bare root condition, then disregard the rest of this column!

Leafed out trees are actively growing and begin using water immediately after planting. The challenge is irrigation water must go directly into the potted soil media. After roughly 30 days, when the tree roots have grown out of the potting media into the surrounding native soil, irrigation water delivery must shift from the original potted root ball to the native soil.

Why this complete shift in irrigating potted trees after the first month in the ground? It's because very little water will move across the large difference in textures between the potted soil media and the surrounding native soil – especially when the local soil is a fine textured soil (loam, clay loam, etc.) common to the Sacramento Valley prune growing regions. Water applied to the native soil after planting will be drawn to the continuous small pores of the dry native soil away from the newly planted tree, and not into the larger pores of the potting media. Water applied directly to the top of the potted soil media will move freely in the potted media, but won't drain out of the potted media until the potting material is saturated, again because the water won't move easily between the two soils. In both situations, water does not move readily across the boundary between the native soil and the potting media due to textural differences.

It takes about 30 days for tree roots to grow out of the pot and into the surrounding soil under good growing conditions. So, water the potting media for the first 30 days, then check to make sure roots have grown out into the surrounding native soil (yes, you will

need to dig a hole!). If they have, move the water source, drip hose(s) or microsprinklers away from the tree. At first, put the water delivery within about a foot of the trunk, then, as the roots extend more, move the water source to its permanent location. Properly irrigating newly planted potted trees on flood irrigation (or furrow irrigation in the first year or two) is challenging unless you can individually irrigate (“tank”) trees several times during the first 30 days while the roots grow out of the potting media.

How can water be delivered directly to the potting soil and then shifted away? Here are some ideas (but not all options) offered by experienced nursery representatives:

- Stake a microsprinkler by the trunk and cap it to direct water downwards onto the potting soil. Once the roots have grown out beyond the potting media, take the cap off and move the sprinkler to a permanent location.
- Stagger a double-hose drip system so the emitters are evenly spaced along the tree row – basically making a big single line drip hose with emitters at half the distance apart along the row compared to each single hose. Throw a shovel of soil on top of the hose to keep water from running along the hose away from the tree, especially when trees are planted on cut-out berms (“islands”).
- Cut a shallow “V” in the top of the berm or island before the trees are planted and lay drip hose in the “V”, reducing the risk of water running down the hose away from the tree.

We’ve had numerous encounters that required troubleshooting irrigation problems with newly-planted potted trees, and we’ve consistently observed some common errors.

- Short irrigation sets are essential to meet tree water needs while also avoiding saturated conditions in the potting media immediately after planting.
- For the first month after planting, growers should not time irrigation by the use of soil moisture sensors set in the soil outside the potted media area. These measurements don’t show the water status of the roots in the potting media. Irrigate by water status of the root ball (dig down and feel

it) and/or the estimations of ET use by small trees (<http://cesutter.ucanr.edu/files/102712.pdf> or ask your local farm advisor for a copy of “Irrigating young trees” by R. Scott Johnson, retired UCCE orchard specialist.

- When calculating water delivery volume, use only the water delivered by the emitters close to the roots, don’t include water applied out between the trees. Water delivered by a microsprinkler or drip emitter halfway between two, newly planted potted trees is not being used by either tree.
- Don’t continue adding a large amount of water to the potting soil region for an extended period of time. This will saturate the potting soil and encourage crown rot – even in plum rooted trees (M29C, M40, M2624) that are generally tolerant of “wet feet”. This is extremely important for rootstocks that require well drained soils (hybrids like ‘Atlas’ and ‘Viking’, peach seedlings like ‘Lovell’).

Adequate root zone moisture is essential to good, sustained tree growth and root health – especially in the first leaf. Excessive soil water will drown the roots or invite *Phytophthora* infection in the crown and/or roots. Dry soil limits tree growth and eventually, survival. The extra effort to get potted tree irrigation right the first year will pay off with the best possible start for the orchard.



## Fall Prune Orchard Management Considerations Following a Light Crop (without hurting the next crop)

Franz Niederholzer, UCCE Farm Advisor, Colusa, Sutter and Yuba Counties

### Cost saving questions for fall, 2016:

- Skip fall potassium? If you applied 400-500 lbs of potassium sulfate or potassium chloride last fall and your orchard wasn't deficient in 2015, you are probably in good shape for 2017 given the very light 2016 crop. If you had a good crop in 2016 or didn't fertilizer in fall 2015, consider banding the maintenance rate of 400-500 lbs of K fertilizer late this fall after leaves are beginning to drop. Another option is to wait until early April 2017 to check crop set before starting foliar and/or water run K fertilizer applications. Waiting might be a better option given the low yields and income of this past season. On the plus side, fall K applications mean one less thing to worry about in the spring and the investment literally isn't going anywhere (it will stay in the soil to be used by the next good crop). More detailed information on K nutrition in prunes can be found at: Pages 4-5 of [cesutter.ucanr.edu/newsletters/Sacramento\\_Valley\\_Prune\\_News53275.pdf](http://cesutter.ucanr.edu/newsletters/Sacramento_Valley_Prune_News53275.pdf)
- Do you need a full dormant spray? Ask your PCA to do a spur sample to check for scale. Find videos on how to conduct a dormant spur sampling at: [ipm.ucdavis.edu/PMG/r606900511.html](http://ipm.ucdavis.edu/PMG/r606900511.html) (sampling form: [ipm.ucdavis.edu/PMG/C606/prune-dormantspursample.pdf](http://ipm.ucdavis.edu/PMG/C606/prune-dormantspursample.pdf)). If there is no need to spray for scale, but you have a history of aphid pressure, consider a light rate of pyrethroid in late October or November as a dormant spray replacement for this year. A fall pyrethroid spray will only control aphids, but that is the only annual problem in many prune orchards. Peach twig borer can be controlled with B.t. (DiPel<sup>®</sup>, Javelin<sup>®</sup>) along with bloom fungicides (doesn't harm bees). If there is not enough scale to warrant treatment, skip the full dormant spray for this year. A fall aphid spray with a pyrethroid (Asana<sup>®</sup>, Warrior<sup>®</sup>) can be tank mixed with zinc sulfate foliar fertilizer.

- Skip pruning? This is a significant savings possibility in mature orchards, but only if you are ready to shaker thin next spring if a really big crop sets. There is no savings – and probably significant income loss – if you don't prune, set a huge crop and don't thin. That will produce lots of small fruit that will break limbs, cause sunburn, and worsen *Cytospora* infections.
- Skip pre-emergence weed spray? Can you get away for a year with no pre-emergence spray? Times have changed and fleabane (see picture later in this article) is glyphosate resistant. Talk with your PCA about your options. How much money and time will a weedy orchard cost you at harvest in spilled fruit and barked trees? What are your options? Unless you can mow down the fleabane ahead of harvest, a good pre-emergence program might be worth the cost, even this year.

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### General Fall Practices to Consider in Prune Orchards:

#### Pruning:

- Avoid pruning shortly ahead of rainfall events. Rain-splash can result in costly disease spread to freshly cut branches – particularly young trees.
- Prune out existing *Cytospora* cankers by cutting several inches to a foot into the healthy wood below any symptoms (dead bark). The pruned out wood should be removed from the orchard and burned. Information on identifying *Cytospora* cankers plus a sheet of “Good” and “Bad” cuts for *Cytospora* control that can be laminated into a shirt-pocket sized handout and given to pruners can be found at: Pages 5-8 of [cesutter.ucanr.edu/newsletters/Sacramento\\_Valley\\_Prune\\_News53275.pdf](http://cesutter.ucanr.edu/newsletters/Sacramento_Valley_Prune_News53275.pdf)

#### Nutrition:

- Foliar zinc (36% zinc sulfate) can be applied at the beginning of leaf drop in late October or early November at about 20 lbs./acre in 100 gallons water/acre. Zinc may drop leaves, disrupting aphid reproduction. A low rate of pyrethroid insecticide can be tank mixed with zinc sulfate this fall for good aphid control in 2017. This spray can replace a dormant spray for aphid control, but will not control peach twig borer or

scale. A lower rate of zinc sulfate (5 lbs./acre in 100 gallons water per acre) is an effective zinc spray when applied ahead of natural leaf drop. This lighter rate will not accelerate leaf drop.

- Once leaves drop, trees won't pick up nitrogen until bud break in spring. Any nitrogen applied in the fall is likely to be leached from the root zone before spring, especially if we have a wet winter. Don't apply nitrogen until after growth begins next spring.

### Weed management:

- Following a postharvest weed survey ([ipm.ucdavis.edu/PMG/C606/prune-fallweeds.pdf](http://ipm.ucdavis.edu/PMG/C606/prune-fallweeds.pdf)), apply mid to late fall pre-emergence herbicide applications with a post-emergence, "burn down" material if needed shortly before moderate rainfall (0.25"-0.5") to move the material into the soil. Avoid applying pre-emergence materials ahead of major rain. If the weather forecast calls for inches of rain, wait. Inches of rain can move a product deeper in the soil than desired for the best weed control. Pre-emergence herbicide incorporation calls for a quarter to half an inch of rain.
- Consult your PCA about effective pre-emergence herbicides for fleabane. The traditional "Surflan/Prowl® + Goal" program doesn't give good fleabane control. Skipping a fall pre-emergence spray may cost more money than you save. "Roundup®-only" weed spray programs are no longer effective with the development of glyphosate resistant weeds like fleabane and marestail. Glufosinate (Rely®) is now registered in prunes, but good timing and repeated applications may be needed for effective fleabane control.



Fleabane (*Conyza bonariensis*) in prune orchard.

## Preliminary Observations for New Prune Rootstocks

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As soil treatment options become increasingly limited, more restrictive and less effective, the priority to identify a genetic solution to solve or reduce the replant issue is of increasing interest. One genetic solution is to find or develop rootstocks to help manage soil related problems (soil borne fungi / bacteria, nematodes and soil acidity and excess mineral accumulation). Also of interest are root and tree characteristics imparting canopy size control, good anchorage and little or no root suckering.

Recognizing the need for identifying additional rootstocks for California Prune production, University of California Farm Advisors and campus based faculty with funding from the California Dried Plum Board (CDPB) designed and planted 3 large rootstock experiments in 2011 to evaluate 29 prune rootstocks. One experiment is planted near Davis at Wolfskill on Yolo loam, a second in Yuba County on Kilga clay loam and a third in Butte county on Farwell clay adobe alternating with Nord loam. Both Butte and Yuba experienced extensive mortality and were significantly replanted in 2012. As we discuss rootstock attributes, note that trees are still too young for definitive conclusions. Preliminary rootstock data is published in the CDPB research reports available in hard copy or on line at <http://ucanr.edu/sites/driedplum>. In addition, the Prune production manual (UC ANR # 3507) has a very good chapter describing the traditional rootstock choices.

### Prune rootstocks :

- 1) Myrobalan seedling is a seed selection of *Prunus cerasifera*; Myrobalan 29C is a clonal selection of a vigorous Myrobalan seedling.
- 2) Marianna 2624 is a clonal rootstock originating in Texas from a *Prunus cerasifera* by *Prunus munsoniana* cross. M-30 and M-40 are also clonal selections possibly from the original Texas Marianna or possibly from other Marianna seedlings.

- 3) Lovell is a peach seedling rootstock (*Prunus persica*).
- 4) Krymsk 86 is a plum/peach hybrid (*Prunus cerasifera* x *Prunus persica*) that originated in the Krasnodar region of Russia.
- 5) Atlas and Viking are intraspecific hybrids of peach, almond, apricot and plum developed by Zaiger Genetics.
- 6) Rootpac-R is a plum/almond hybrid (*Prunus cerasifera* x *Prunus dulcis*) developed by Agromillora.
- 7) Citation is a plum/peach hybrid (*Prunus salicina* x *Prunus persica*) reportedly widely used as a rootstock for fresh market Japanese plum orchards in the San Joaquin Valley.

#### **Preliminary observations:**

Rootstocks in the three experiments have only been observed for six growing seasons, but so far, none of the rootstocks have shown rootstock/scion incompatibility.

All rootstocks have been visually rated for vigor. Atlas, Viking, Myrobalan 29c and Lovell impart the greatest vigor with M-30, M-40 and Krymsk 86 close seconds.

Viking, Atlas, M-30, M-40, Lovell, Citation and Krymsk 86 imparted little to no tendency to sucker in the Butte experiment. M-30 and M-40 demonstrated a slightly greater tendency to sucker at the Yuba location.

Tree anchorage was measured as degrees of lean from vertical in 2015. Viking, Atlas, M-30, M-40, Krymsk 86, Lovell, Myrobalan seedling and Myrobalan 29c are all anchored well. Krymsk 86 was the best anchored rootstock in the Yuba experiment. Viking, M-40, Rootpac-R and Marianna 2624 were well anchored at the Yuba County location, but not as well as Krymsk 86.

One interesting observation in the Butte Rootstock experiment is that in 2016, Krymsk 86 rooted trees bloomed about 3 to 5 days later compared to the other rootstocks in the experiment. With only one year of bloom data, it appears rootstock selection in prune may influence full bloom date.

Yield measurements have not favored any particular rootstock yet. Young tree age and poor pollination conditions in 2016 have made yield evaluations

questionable.

Nematode resistance is variable depending upon which species of nematode is involved. Scientific comparisons are limited but most of the prune rootstocks do not appear to impart a great deal of resistance to root lesion nematode (*Pratylenchus vulnus*). Intraspecific hybrids tend to impart some resistance to root knot nematode (*Meloidoyne spp*) while Krymsk 86 appears to be very susceptible. Lovell peach is susceptible to root knot nematode while plum is variable in susceptibility. Little information is currently available for ring and dagger nematodes.

Crown and root rot (*Phytophthora spp.*) experience is also limited but in general rootstocks with plum heritage tend to be more resistant while rootstocks with peach heritage tend to be more susceptible. Similarly, plum heritage imparts more crown gall (*Agrobacterium tumefaciens*) resistance compared to peach. Krymsk 86 appears to have resistance to oak root fungus (*Armillaria spp.*) as does Marianna 2624.

So far, bacterial canker (*Pseudomonas syringae*) symptoms have not developed at the Wolfskill or Butte County locations. At the Yuba County experiment, trunk gumming consistent with bacterial canker was observed in 2013. The most effected trees were on M-30 with 61% of the trees showing trunk gumming, followed by Myrobalan 29c (27% trees gumming) and M2624 and Myrobalan seedling, both showing 17% of trunks gumming. Three percent of the trees on M-40 and Rootpac-R showed trunk gumming, while 13% of the Krymsk 86 were symptomatic. Experience in almond rootstock experiments indicates that Lovell and Viking are quite resistant to bacterial canker compared to other rootstocks and no trunk gumming was found on either Lovell or Viking at the Yuba County experiment in 2013.

# Prune Industry Summit 2017: Exploring the Wonders of California Prunes

Mark your calendars to participate in the First California Prune Industry Summit.

**Date:** February 1, 2017.

**Time:** 9:00 am to 4:00 pm (lunch included).

**Location:** Orchard Creek Lodge, Sun City, Lincoln California.

**Program:** The comprehensive program will be delivered in a panel format featuring presentations, discussions and a poster session featuring promotional activities, performance results and research activities. The main themes are organized around:

- 1) "A conversation with Industry Leaders" where leaders representing prune growers and handlers will discuss the state of the industry and share their vision for the future of the prune industry.
- 2) "The Wondrous Prune" will feature leading dieticians and researchers sharing what we are learning about prunes and how the trend towards healthy, functional eating bodes well for California's prune industry.
- 3) "California Prune production: Issues and New Strategies" will feature University of California Farm advisors, University faculty and USDA scientists covering research critical for California prune production. Examples include new rootstocks, management for increased yield and quality, tree decline, canker diseases and lessons learned from the 2016 crop year.

For more information contact the California Dried Plum Board at 916-565-6232 or visit

[www.CaliforniaDriedPlums.org](http://www.CaliforniaDriedPlums.org)



Persons with special needs wishing to attend a program should contact the cooperative extension office in advance, 538-7201. Efforts will be made to accommodate your specific need.

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