

Will Incorporation of Mechanical Pruning Influence Yield and Size of Prunes?

Elizabeth J. Fichtner, UCCE Farm Advisor, Tulare County

Commercial orchards of 'French' prune (*Prunus domestica*) in California are typically hand pruned using loppers and ladders, the most expensive on-farm activity for growers. Recent studies conducted in the Sacramento Valley suggest that mechanical pruning techniques, in combination with less-detailed hand-pruning from the ground, may reduce pruning costs without adversely affecting yield or fruit size. In 2010 and 2011, a study was conducted in Tulare County to determine the impact of mechanical pruning on tree height, canopy light interception, yield and fruit size. In February 2010, four pruning techniques (standard hand prune with loppers and ladders, mechanical flat-topping, mechanical V-Cut, and hand pruning from pruning towers using hydraulic-powered saws) were established in a commercial prune orchard near Porterville, CA. These treatments were replicated in 2011 with the single exception that rows pruned with pruning towers in 2010 received only standard hand pruning in 2011. This alteration in protocol between the two experimental seasons was made because pruning-tower use did not achieve cost-savings over standard hand pruning alone. All treatments other than the standard hand-pruning treatment were followed by less-detailed hand-pruning, using pole saws and pole loppers from the ground.

In both the 2010 and 2011 field seasons, pruning treatment had no effect on either fresh or dried yield of prunes. Total yield in the experimental block more than doubled in 2011, as compared to the 2010 harvest. The northern geographic region of the orchard exhibited higher yield in both 2010 and 2011 (Figure 1A). Interestingly, the region with highest fruit production also achieved higher percent light interception than the other regions of the orchard utilized in the study (Figure 1B). Pruning treatment, however, did not affect canopy light interception. In both 2010 and 2011, pruning treatment did not adversely affect individual fruit size, as determined by individual weight of dehydrated fruit. In October 2010, prunes were additionally run through a nested screen sizer to determine affect of pruning treatments on commercial fruit size. In 2010, pruning treatment did not affect the categorical distribution of fruit into commercial fruit size categories, suggesting that pruning treatment did not affect economic value of fruit based on size. Distribution of fruit into commercial size categories is not yet complete for the 2011 harvest. This data, as well as 2011 orchard light interception data, will be presented at the annual Southern San Joaquin Valley Prune Day in February 2012.

The results of two experimental field seasons suggest that use of a mechanical flat-top or "V-Cut", followed by less-detailed pruning from the ground, do not influence yield or fruit size. The impact of multiple years of successive mechanical pruning on 'French' prune trees is unknown. The economic savings of adding a mechanical pruning component is determined largely by the cost of the subsequent hand labor component.

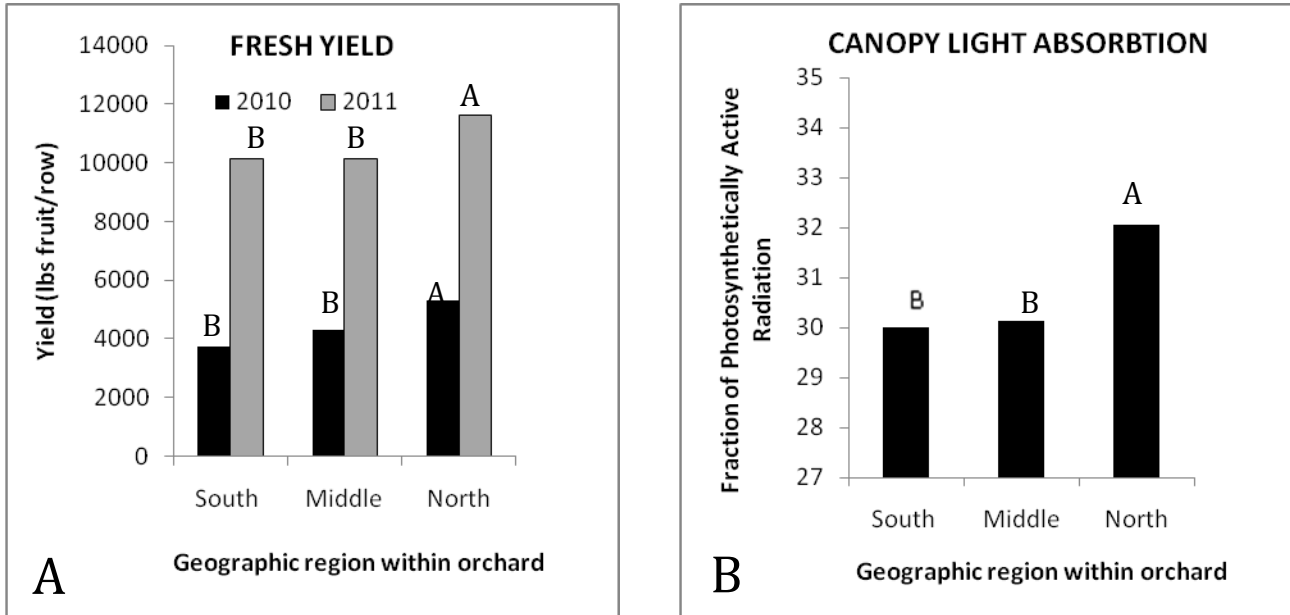


Figure 1A. Fresh yield was analyzed separately in 2010 and 2011. The northern region of the experimental orchard exhibited higher yield in both years. Figure 1B. Canopy light interception was greatest in the northern geographic region of the experimental orchard.

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New Prune Rootstock Research is Underway

Carolyn DeBuse, UCCE Farm Advisor, Solano and Yolo Counties

It has been a long time since a rootstock research project has been undertaken for prune. The prune industry has been lucky to have a small selection of durable, proven rootstocks that have worked well enough. There is hope that we can find a better rootstock for many of the problems the industry faces such as excessive suckering, poor anchorage, soil borne nematodes and fungal pathogens. UC Cooperative Extension advisors and specialists have initiated a rootstock research project to look at rootstocks that have been imported from other countries or bred for *Prunus* species but not yet tested in the California climate with French prune.

The project consists of two large replicated trials of the most promising rootstocks placed in growers orchards and one smaller trial of rootstocks that may have a possibility but have had very little testing until now. The rootstocks to be tested in the large trials are M30, M40, M58 (all three are from the Marianna plum series), HBOK 50 (Peach), Krymsk 1 (plum hybrid), Krymsk 86 (peach/plum hybrid), Rootpack R (plum/almond hybrid), and Emphyrean 2 (European plum: *P. domestica*). These are being compared to currently grown rootstocks – Myro 29C, M2624, Myro seedling, and Lovell seedling. The

large rootstock trials were planted this spring in Yuba and Butte Counties. In following years, we'll provide research updates on these trials as we observe effects on anchorage, tolerance to Bacterial Canker, nematode resistance, compatibility, yield and fruit quality, and overall performance.

Considerations When Removing Prune Orchards

Joe Connell, UCCE Farm Advisor, Butte County

If you're removing an old prune orchard to replant prunes, or if you're taking out a block with plans to convert to another orchard crop, there are some things you should consider before the trees are removed. We know that Sacramento Valley prune orchards are primarily hosts to ring and root lesion nematodes (*Criconeoides xenoplax* and *Pratylenchus vulnus* respectively). These nematodes can affect establishment of a new prune orchard, since high ring nematode populations aggravate the bacterial canker problem in young trees.

The root lesion nematode can be especially problematic if a prune orchard is removed and the new orchard is planted to walnuts. Walnuts are an excellent host for root lesion nematode, and this nematode will stunt the growth of new walnut trees if populations are not controlled. If root knot nematode (*Meloidogyne incognita*) is present in the prune orchard, following prunes with an almond orchard planted on Krymsk 86 rootstock could also be problematic, since this rootstock is especially susceptible to root knot nematodes.

Sampling and diagnosis for the presence or absence of nematodes should be done **before** an existing orchard is removed. Having a nematode test done on soil sampled from a site will help inform your decisions about how to remove the existing orchard and what needs to be done before replanting the specific block. Nematode soil pests can persist for the lifetime of the orchard and must be dealt with when replanting. Instructions for soil sampling for nematode testing can be found at <http://www.ipm.ucdavis.edu/PMG/r606200111.html>.

Dr. Michael McKenry, Nematologist at the UC Kearney Agricultural Center, has suggested that starving an existing nematode population by killing the complete root system before stumps are pulled out and switching to an unrelated rootstock can help with the replant problem and potentially reduce nematodes. To employ this strategy, harvest fruit as soon as possible, then, before mid-October, irrigate deeply, sample for nematodes, cut off old trees at trunk level, and apply a systemic herbicide to the cambium on cut trunks. Used this way, glyphosate will effectively kill prune roots. Wait at least 60 days before removal of the old treated tree trunks. Then, it's essential to wait for at least one full year (12 to 18 months) before replanting to minimize the replant problem. The longer the period, the greater the likelihood of success. This herbicide treatment will not reduce populations of root lesion or other nematodes living in the soil, only those within roots. It effectively removes the roots as a food source for nematodes. The ring nematode, if prevalent in a potential bacterial canker site, can be reduced in number without causing a biological vacuum by growing sorghum x sudangrass for one full year.

Adequate nematode control is accomplished by fumigating the surface five feet of soil profile. Spot treatments at tree sites or strip treatments 8 to 12 feet wide will only provide one year of nematode relief. If root lesion or ring nematodes are considered to be a future problem, solid fumigation should be employed, or expect to treat the new orchard annually with post-plant nematicides. For more information refer to Dr. McKenry's website at:

http://www.uckac.edu/programs/Nematodes/IPM_guidelines_for_replanting/

Prune Orchard Fertility Review: Focus on the “Key 3”

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

Fall is a good time to review the past season and plan for the next. What was new or different this past year? What are the basic inputs required to maintain high yields and return a profit?

Some things don't change. Adequate prune orchard mineral nutrition is critical to maintaining high yields and good orchard health. Focus on maintaining the “Key 3” – nitrogen (N), potassium (K), and zinc (Zn). Although in certain orchards other elements may be important based on local conditions, adequate N, K, and Zn are needed across the region for good prune orchard yields.

Some things do change. Fertilizer costs are up. Prune prices are steady to dropping. Maintaining good return on your fertilizer investment is key to staying profitable. Don't pay more for fertilizer than you need.

Here's a quick prune orchard fertility review, in order of importance to prune production.

Potassium (K) is the most important mineral nutrient in prune production. Prune fruit accumulate potassium steadily from bloom through harvest. In July and early August, as root growth slows and soil moisture is used rapidly, tree K uptake may decrease. However, fruit K needs are unchanged and fruit “pull” K from the rest of the tree, especially leaves. This causes leaf K content to drop, risking potassium deficiency if leaf K levels were not high enough going into summer. Potassium deficiency starts a devastating cascade of trouble -- potassium deficiency → leaf scorch and drop → sunburn → *cytospora* infection → leading to limb or scaffold death and → a loss of orchard production that can last for years. Keeping adequate potassium in a prune orchard is essential to sustainable production.

Prune fruit need a lot of potassium. Prune orchards with a heavy crop need a lot of potassium. Traditional University of California annual K fertilizer maintenance programs suggests 400-500 pounds of potassium sulfate (0-0-50; sulfate of potash) per acre banded in the fall in orchards that are solid set irrigated or shanked in where orchards are cultivated or flood irrigated. Orchards with well drained soils that receive significant winter rains can use potassium chloride (0-0-60; muriate of potash) at about the same rate. Those rates cost \$200-220/acre in today's market – a huge amount of money to ante up before you know what your crop will be like the next year.

Alternative plans to a big slug of K in the fall are 1) injecting potassium fertilizer through drip or micro-sprinkler irrigation lines in the spring and summer, 2) a steady foliar program of a minimum of the equivalent of 100 pounds of KNO_3 /acre or 3) some combination of option 1 & 2. In season K fertilization allows growers to check the crop size before putting on any K fertilizer. A light crop may require very little if any K fertilizer.

Traditional fertilizers such as ground applied potassium sulfate and foliar applied potassium nitrate are proven effective. Be careful when looking at new products, as those have risks as well. Here are some examples...

- Potassium thiosulfate (KTS, 0-0-25) is an effective liquid fertilizer that can be injected through micro-irrigation systems. However, high rates of KTS (more than 10 gallons/acre/application) can damage or kill trees depending on the orchard conditions.
- Alternatives to KNO_3 for foliar K fertilization are available in the market. Many are liquids that are easier to mix than solid fertilizers. Potassium nitrate (KNO_3) is a good, efficient foliar

fertilizer that won't burn leaves when applied at reasonable rates (20-25 lb KNO₃/acre in 100 gallons. When using liquid potassium foliar fertilizers to replace KNO₃ in a spray-only program (no soil applied K fertilizer) in an orchard carrying a good crop, use the amount of material equivalent to 100 lbs of KNO₃/acre/season. Multiple sprays will be needed, just as in a KNO₃ program. Otherwise you run the risk of under-supplying your orchard with potassium.

A solid potassium fertilizer program is a cornerstone of a good prune orchard management program. Cutting corners with your potassium fertilizer program can put the health of your orchard at risk.

Nitrogen (N) is essential for good prune production and tree health. Nitrogen deficient prune trees make fewer flowers and therefore set smaller crops. Prune trees with low N levels are more susceptible to bacterial canker than trees with adequate levels of N. Trees store N over the winter in woody tissue to use in spring growth. An orchard with a good leaf N level in July leaf samples (good storage reserves) shouldn't need N fertilizer until mid-April the next year once the crop can be checked. Light crops mean lower N fertilizer need, much like K. If July leaf N levels are low, an application now, before trees go dormant, may be warranted. If you plan to do this, remember that trees have limited N storage space and that once leaf drop occurs, prune trees don't absorb N from the soil. If you are going to apply fertilizer N now, use low rates (<50 lb N/acre) and get it on early (not later than September).

Zinc (Zn) is important to healthy growing points in plants. Bloom through spring is the time when the most growing points are found on plants and so is the period of highest zinc demand. To meet this timing need, zinc is usually applied as a foliar fertilizer in the fall or spring. A high rate (20+lb/acre) of zinc sulfate (36%) sprayed in the fall once natural leaf drop begins delivers zinc to prune trees and removes leaves. In my experience, early defoliation following a fall zinc sulfate spray won't occur if the orchard is dry. A good alternative to a high rate of zinc in the fall is 4-6 lb/acre 52% zinc (neutral zinc, etc.) in the spring, preferably before leaves reach full size and no later than mid-May. There are many different zinc foliar materials. Many effectively move zinc into trees, but cost and risk of phytotoxicity vary from product to product. Talk with your PCA about the most cost effective options that supply sufficient elemental zinc.

Prune Research Reports Now Available on the Internet

Prune research reports from 1961 – 2010 are now available, free, on the internet at: <http://ucanr.org/sites/driedplum/>. Are you curious about aphid management or potassium nutrition? Type "potassium" or "aphids" into the search "box" on the site and hit the "search" button. Not sure what topic it is you want – potassium, potash, fertilizer, or nutrition – click on "Reports by Category" to see all the categories in the data base. Want to see all the reports from a certain year? Click on "Reports by Year". This valuable web resource was supported by a grant from the California Dried Plum Board to the University of California, Davis Fruit and Nut Research and Information Center with support from the UC ANR Communications Information Service Center.

University of California
Cooperative Extension
Tulare County
4437B S Laspina St
Tulare, CA 93274-9537

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Elizabeth Fichtner
Farm Advisor

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