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ORCHARD FACTS

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In This Issue

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Sacramento Valley Prune Newsletter

Hand and Mechanical Pruning Comparisons for French Prunes

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Prune trees are pruned to thin fruitwood, improve fruit size, reduce alternate bearing and control tree size and shape. Selective hand pruning with ladders and loppers, one of the most expensive cultural practices, has long been thought best because the selectivity cannot be matched by mechanical pruning. Previous studies of mechanical pruning have shown pruning severely enough to achieve equal fruit size and value per ton as hand pruned treatments resulted in reduced yield. Increasing labor costs and new developments in mechanical pruning equipment have increased interest in pruning strategies that incorporatel cost effective mechanical pruning strategies.

Between 2006 and 2009, nine pruning strategies were compared in a mature highly productive French Prune block with 183 trees per acre planted north-south at a spacing of 14 x 17 feet. Prior to the beginning of pruning treatments, the trees were 17-18 ft. tall. The hand pruned treatment with ladders and loppers (Std) has remained constant during the four years of the trial and is intended to represent a typical dormant hand pruning. The other treatments in addition to the mechanical pruning treatments, summarized in Table 1, have been hand pruned annually from the ground **without** the use of ladders using a combination of pneumatic pole pruners, pole chainsaws, pole loppers and long handled loppers. This pruning was less detailed, removing fewer large branches to allow light penetration into the canopy. The differential mechanical pruning treatments included flat topped (T) at approximately 15 feet, “roof topped” (RT) at 12 feet on the outside of the tree and 15 feet in the row center, “V” by making a slanted cut on the east and west side of the tree row to form a V in the center of the tree 12-14 feet at the bottom center and 17 feet at the top on the outside and a “Mohawk”(MH) where slots were cut in the shoulder of the canopy on both sides of the row, leaving the center uncut. Mechanical pruning timings included dormant (D), summer (S) in June and post harvest (PH) in September. After the first year, due to an excessively vigorous response, the dormant mechanical pruning timing was shifted to post harvest to reduce vigor.

During the trial, there have been two years of moderate crops (2006 and 2008) and two years of heavy crops (2007 and 2009). In the first year of the study, all mechanical treatments had a higher yield and value per acre than the standard pruning treatment (Table 1). This was due to a moderate fruit set overall which resulted in good fruit sizes with no differences in value per ton between treatments. The standard pruning treatment reduced the total yield and, therefore, the value per acre. In 2007 and 2009, fruit set was heavy and all of the treatments required intervention to size the fruit and prevent tree damage in addition to the mechanical pruning treatments. These steps included mechanical thinning, mechanical skirt pruning, cluster thinning with poles, mechanically cutting a narrow alley (1 to 2 feet) in the row middle and propping as needed.

The estimated cost with overhead for the standard hand pruning has been $3.25/tree or $594/ac. The dormant ground pruning with overhead is estimated to cost about $200/acre. The mechanical pruning is estimated to cost about $40/acre, so the mechanical plus dormant pole saw pruning would cost about $240/acre.

Through the first three years of the trial, combined value per acre for all mechanically pruned treatments was greater than the standard pruned treatment (Table 1). While data for 2009 is not completely summarized, dry yield per acre was the lowest for the standard pruned treatment and there were no differences in dry count per pound for any of the treatments. These results indicate an opportunity to reduce pruning costs while increasing net return per acre.

Table 1. Treatment and Value Summary 2006-2008

	Mechanical Pruning Trtmnt			Value/acre as % of Standard							
Trt	2006	2007	2008	2006		2007		2008		Cumulative 06-08	
1	DT			165%	ab	104%	dc	84%	bc	111%	bc
2	DT	S RT		145%	abc	113%	abcd	113%	abc	120%	ab
3	Std	Std	Std	100%	d	100%	d	100%	bc	100%	c
4	DV	SV		130%	cd	120%	ab	143%	a	129%	a
5	DV(eastside)		PH RT	162%	ab	126%	a	82%	c	120%	ab
6	SV		PH T	167%	ab	111%	bcd	103%	bc	121%	ab
7			PH V	171%	a	116%	abc	110%	bc	127%	a
8	D RT	SV		160%	ab	102%	d	115%	ab	119%	ab
9	D MH	S MH		125%	cd	119%	ab	114%	abc	119%	ab

Percentages followed by different letters are significant at the 5% level using Fischer's test

Mechanical treatments: T = flat top, RT = roof top, V = V cut, MH = Mohawk
Timing: D = dormant, S = summer, PH = post harvest

Footnote: [1] UCCE, [2] Grower

Zinc as an Orchard Management Tool

Richard P. Buchner, UCCE Farm Advisor, Tehama County

Zinc deficiency is probably the most common micro-nutrient affecting prune trees. Micro-nutrients are chemical elements used in relatively small quantities by plants and are essential for growth and development. Zinc deficiency can be diagnosed using visual and/or leaf tissue analysis. The University of California has established critical leaf tissue levels at 18 ppm for spur levels sampled in July. Sample leaves are selected from fruit spurs reachable from the ground and picked at random around the tree at different heights. One or two leaves can be taken from each of about 50-60 spurs for total of about 100 leaves. Zinc is considered deficient below 18ppm. Visually the beginning and less severe stages of zinc deficiency are often characterized by interveinal chlorosis of older leaves at the lower shoot positions. Leaves slightly zinc deficient are only slightly reduced in size, but show many small chlorotic areas between their lateral veins. If zinc deficiency is moderate to severe, symptoms are typically seen as trees leaf. The first evidence is delayed opening of vegetative and flower buds. A zinc sufficient tree could be in full leaf while a severely zinc deficient tree or shoot is just beginning to leaf. When vegetative buds do open, the leaves are small, chlorotic and appear in tufts, often described as “little leaf”. In severely deficient cases, terminal dieback may occur. As the season progresses, normal leaf growth tends to mask early season zinc deficiency symptoms making visual evaluation more difficult. Fruits on zinc deficient shoots or trees are markedly smaller in size than are normal fruits.

Soil applications to correct zinc deficiency produce variable results and are not normally recommended. Soil type and texture, severity of the deficiency, tree age and zinc source all complicate getting zinc into trees. Many prune orchards are planted on heavier clay soils which tie up or fix zinc, making it unavailable for plant use. Typically zinc correction strategies involve foliar and dormant sprays. Spray application in early spring, before leaves reach full size, are effective. Zinc should not be applied after mid-May due to the risk of phytotoxicity with certain zinc materials. A fall spray of zinc sulfate applied at the beginning of normal leaf drop can also correct zinc deficiency. Leaf burn and defoliation, depending on material rate, usually occur but are not considered detrimental to tree performance and may help with other orchard management objectives. Reasons to consider fall zinc applications:

1) Effective to correct zinc deficiency.

2) If defoliation occurs after a fall zinc spray, the danger of trees blowing over is reduced.

3) Loss of foliage can facilitate early tree pruning.

4) Zinc sprays applied mid-October to November, reduce aphid habitat if defoliation occurs.

5) Zinc can be tank mixed with a fall aphid spray to "kill two birds with one stone".

6) Fall sprays have the advantage of being easier to plan. Orchard floors are dry and weather is more spray friendly.

Late Fall, a Time For Potassium Soil Applications

Joe Connell, UC Farm Advisor, Butte County

Maintaining adequate potassium (K) nutrition is especially critical for prune trees and fall is an excellent time to address K deficiency through soil potassium applications. Before K deficiency was understood and we were able to correct it, "prune dieback" limited the areas where prunes could be successfully grown. Today we can review July leaf analysis results and determine if low potassium levels may be limiting prune production or contributing to branch dieback. Potassium is adequate when over 1.3% in leaf tissue, but is deficient if leaf analysis shows K to be less than 1.0%.

Potassium is found in one of three forms in the soil: fixed K, exchangeable K, and K in solution. Fixed K is tightly held within soil particles or is part of potassium-bearing minerals and may only be very slowly released through weathering. Exchangeable K is attached by electrostatic charges to soil particles and is in flux with potassium ions in the soil solution. Soluble K consists of ions moving freely within the soil solution constituting a readily available form of K. At any given time, a soil will contain a unique balance of fixed, exchangeable, and soluble potassium characteristic of that soil type. Potassium is thus in equilibrium and moves back and forth between these states as the supply of K^+ and other cations varies.

Potassium ions (K^+) have a one plus charge and are readily absorbed by negatively charged soil clay particles becoming unavailable to the tree. Avoid any type of application that broadcasts potassium over a large soil area because more of the K becomes fixed. UC research showed that four years of broadcast applications only moved K 6 inches down into the soil while banded treatments penetrated 2 feet. Banded treatments have worked well under non-tillage, but if you cultivate, shank the band in to get the material closer to the root zone. Applying a gypsum (calcium sulfate) band overtop of previous potassium bands can help free up more potassium. The calcium ions (Ca^{++}) in gypsum have a plus two charge and will displace potassium ions on the clay particles thus freeing up more potassium to remain in the soil solution while moving it deeper into the root zone. Gypsum banded at a rate of 1000 to 4000 pounds per acre in the same location as previous potassium bands will improve K availability.

Massive doses of 2000 lbs. potassium sulfate per acre applied in bands overwhelms the soils ability to fix all the K in the enriched zone and has corrected a deficiency for about 4 years. Rather than waiting to apply an expensive massive dose, UC research later demonstrated that annual Fall "maintenance" applications of potassium sulfate at 500 lbs/acre banded annually in the same location 4-5 feet out from the tree trunk on both sides of the tree row would maintain K levels before a deficiency became apparent. Injecting K through in-season drip irrigation is also an efficient potassium delivery system that is effective because the amount of K is very high in the wetted area thus penetrating well enough to be picked up by the tree.

Soil applications of potassium sulfate (54%K_20) or potassium chloride (63%K_20) are most commonly applied in November after leaf drop begins. Potassium chloride can cause chloride toxicity if chloride is taken up or remains in the root zone. To avoid any chloride uptake and improve safety, apply potassium chloride later if active leaves are still on the tree. Potassium chloride should not be used on weak trees, young trees, or in orchards with water tables, hardpan, stratified soils or any restriction which would prevent chloride from moving out of the root zone. Chloride should be applied early enough to provide for adequate leaching (approximately 10 inches of rainfall). If rainfall is insufficient, then winter irrigation is recommended. If in doubt, use potassium sulfate.

World Prune Situation

Rich Peterson, Executive Director, California Dried Plum Board

Gone are the days when California was the dominant world prune supplier with a market share of over 70%. Orchard removal and inclement weather have reduced California's market share to about 50% in a normal year. Meanwhile, France, which has historically been the #2 producer, has been surpassed by Chile with Argentina right behind. World prune production is expected to increase by 30% over the next 5 years due primarily to South American expansion.

World Prune Production Forecast (x 1000 t)			
	2009	**2014**	**% change**
Argentina	40	50	+ 25%
Australia	6	7	+ 21%
CA. USA	139	147	+ 6%
Chile	55	120	+ 118
France	45	45	0
Italy	1.7	1.6	0
South Africa	1.5	2	0
World Total	288	373	+30%

Source: International Prune Association

Aggressive planting by both Chile and Argentina has led to prune surpluses that have threatened California's exports which account for about 50% of total industry sales annually. Chile and Argentina each sell only about 5% of their crops in their domestic markets, leaving the export market as the outlet for their incremental prune production. Unfortunately, Chile and Argentina don't use marketing support to expand export markets as California does; they employ low pricing to steal market share from California and France.

It has recently been reported that Argentine prune growers have refused to deliver as much as 25% of their crop due to a lack of exporter demand. The result has been fruit being sold on consignment for whatever the grower can get with the rest being stored until the quality of the predominately small, sun-dried fruit deteriorates to the point where it has no value.

Excellent quality, large size fruit will be the key to profitability for California growers. This must be supported by food safety programs and export marketing campaigns that can convince international buyers that California prunes are worth their premium prices.

Sutter/Yuba Ag Spray Field Meeting

October 21, 2009

Sierra Gold Nursery
5320 Garden Hwy
Yuba City, CA

3.5 CE units (3.0 "other" and 0.5 laws and regs) have been approved.

8:00 a.m. **Sign-in and coffee**

8:15 **Welcome, introductions, meeting overview**

8:30 **New spray technology demo and discussion**

Roby Ratcliffe, Sierra Gold Nursery

9:00 **Calibration Basics.**

Franz Niederholzer, UCCE Farm Advisor, Sutter/Yuba Counties
Lynn Wunderlich, UCCE Farm Advisor, El Dorado and Amador Counties
John Roncoroni, UCCE Farm Advisor, Napa County

9:45 **Break: Coffee and snacks**

10:00 **Breakout groups:**

1) Airblast sprayer calibration
   Lynn Wunderlich, UCCE Amador/El Dorado Counties
2) Spray nozzle design and drift management
   Franz Niederholzer, UCCE Sutter/Yuba Counties
3) Getting the most out of your preemergent herbicide: Weed strip sprayer calibration, set up, and herbicide selection
   John Roncoroni, UCCE Farm Advisor, Napa County

11:30 **Tower airblast sprayer demo**
Franz Niederholzer, UCCE Farm Advisor, Sutter/Yuba Counties

12:00 **Review of new regulations for ground and surface water protection**
Jan Kendel, Sutter Co. Ag Commissioner's Office

12:30 **Meeting ends**

Co-sponsored by University of California Cooperative Extension, Sutter County Ag Commissioner's Office, and Yuba County Ag Commissioner's Office.