UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION TULARE COUNTY

Prune News

May 2000

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Steve Sutter, University of California Area Personnel Management Farm Advisor, has recently created a UC Davis e-mail list he will manage from Fresno called ***ag-busnet***. The electronic network will extend and supplement his printed APMP *Newsletter*, providing more California growers, packers, farm labor contractors, pest control operators and advisers, officials, and others with brief articles, news, and time-sensitive notices in the broad area of agricultural and personnel management.

Ag-busnet topics will include agricultural labor, payroll tax, and safety compliance, services for employers and farm workers, proposed and enacted legislation, and more. Subscription is free. You'll get an electronic confirmation and instructions. The e-mail addresses on this list are confidential. To join ***ag-busnet*** just e-mail a request that includes your name, firm or organization, city, and state to Steve Sutter at srsutter@ucdavis.edu. For further details, call Steve Sutter at (559) 456-7560.

Prune Production/Value Reported by Ag. Commissioner

Tulare Co. Ag Commissioner Lenord Craft, reports the following 1999 production and value data for French prunes in Tulare Co.:

				Production		Value	
	Year	Harvested Acreage	Per Acre	Total	Unit	Per Unit	Total
Prunes – Processed	1999	8,871	2.04	17,500	Ton	825.00	14,438,000
	1998	6,093	1.53	9,060	Ton	846.00	7,665,000
Fresh (Fresh wt. Basic)	1999	X	X	1,830	Ton	1,440.00	2,635,000
	1998	X	X	840	Ton	1,750.00	1,470,000

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Cooperative Extension Work in Agriculture and Home Economics, U.S. Department of Agriculture, University of California, Tulare County Cooperating

Prune Rust and Brown Rot Strategies Prior to Harvest

Prune Rust (caused by the fungus *Tranzschelia discolor):*

The prune rust organism infects prune leaves in late spring coincident with occurrence of moisture; infection does not usually occur prior to late May. Infection is evident as yellow, angular spots on the upper leaf surface. Red-brown spore masses occur at the point of infection on the undersides of leaves. Infected leaves defoliate prematurely.

Damage from prune rust occurs when infected leaves defoliate. In the Southern San Joaquin Valley, defoliation from rust usually occurs after harvest, no economic damage results; indeed, experiments in Porterville conducted for three years on the same trees proved no economic damage (production, quality, or return crop) occurred from post harvest defoliation due to rust.

To make sensible treatment decisions, we suggest monitoring trees beginning in May. Look at a good representative number of trees in each block (be sure to look at young trees, replants and hanging branches – these seem to get infected first) each week. Observe leaves on the same trees weekly. If rust is observed up to 5-6 weeks prior to harvest, treatment is recommended. Rust infection within 5 weeks of harvest is not likely to result in significant pre-harvest defoliation to cause damage.

If treatment is needed (i.e., prior to 5-6 weeks of harvest), Wettable sulfur, Rovral, or Break are suggested materials.

Brown rot (caused by the fungi *Monilinia laxa* and *Monilinia fructicola):*

The brown rot fungus infects prune blossoms and fruits as they ripen in July and August. Prior to harvest, infection usually develops where fruits touch, "clusters" of fruit are especially susceptible, where some external injury has occurred (usually leaf roller or peach twig borer damage).

The best protection from brown rot is a management plan that includes a pre-bloom or bloom treatment. Bloom treatments eliminate "blossom brown rot" to minimize inoculum that carries over into the fruit ripening period. Pre-harvest treatments have been shown to provide protection as well when applied about 5 weeks prior to harvest, as fruits touch. If wet weather occurs following 7 – 14 days of treatment, additional treatment may be necessary. Remember, however, that pre-harvest treatment effectiveness is best following a bloom program. Rovral, applied for prune rust, provides brown rot protection as well.

July is the Time for Leaf Tissue Analyses

Leaf analyses provide excellent information to guide an orchard's fertilization program. July (August for pistachios) is the month to take leaf samples for analyses of the orchard's nutrient status.

The elements of most common concern that require annual monitoring are:

Prunes

Nitrogen	(N)
Potassium	(K)
Zinc	(Zn)
Copper	(Cu)

In special situations, sodium (Na), chloride (Cl), magnesium (Mg), manganese (Mn), and calcium (Ca) can be problems as well. Table 1 provides critical levels for these nutrients in prune crops.

NOTE: Always observe your trees carefully to detect visual symptoms of nutrient deficiency or excess. Visual observations provide an excellent complement to any lab analyses and indicate when special analyses are needed.

Critical Nutrient Levels for Prunes[1]

% Nitrogen (N)[2]	
Optimal	2.3 – 2.8
Def. Below	
% Potassium (K)[3]	
Optimal	1.3 - 2
Def. Below	1.3
% Magnesium (Mg)	
Optimal	.25+
ppm Manganese (Mn)	
Optimal	.20+
% Calcium (Ca)	
Optimal	1.0+
% Chloride (Cl)	
Optimal[4]	—
% Sodium (Na)	
Optimal[4]	—
ppm Boron (B)	
Optimal	30 – 60
Def. Below	25
Excess	80
ppm Zinc (Zn)	
Optimal	18+
Def. Below	18
ppm Copper (Cu)	
Optimal	4+

1 Leaves are from spurs (fruiting and nonfruiting).
2 Percent nitrogen in August and September samples can be 0.2-0.3 lower than July samples and still be equivalent.
3 Excess Na or Cl causes reduced growth at levels shown. Leaf burn may or may not occur when levels are higher. Confirm salinity problems with soil or root samples.
4 Phosphorus levels should not be allowed to go below .1%.

Watch for ESPS Field Meeting Announcement

Our Environmentally Sound Prune Systems (ESPS) project, a project designed to demonstrate and implement alternative practices to reduce pesticide use and conserve natural resources, is continuing in the Southern San Joaquin Valley. We will be scheduling a field meeting soon for growers and PCA's to review progress of this project and share this, and past years, results.

Relationships Among Leaf Potassium Concentration and Fruit Production Characteristics in "French" Prune in 1998 and 1999

by Steve Southwick, Jim Yeager, Kitren Glozer, Bill Olson, Rick Buchner, Bill Krueger and Steve Sibbett

Potassium (K) is an essential element in prune production and helps to maintain a healthy orchard. Potassium deficiency has been an historic problem in prunes, possibly contributing to decreased yields, smaller fruit size and reduced tree vigor. Currently a concentration below 1.0% leaf K is considered deficient for prunes, while a leaf K level above 1.3% is considered adequate (1-1.3% is considered normal and adequate in late July-August; Carlson and Uriu, 1981). We have previously demonstrated that yield is not enhanced by foliar application of K to trees that have leaf concentrations of 1.3% K or more as of April (Southwick et. al., 1996). In this multi-year study we found that dry yields were increased with K application (if leaf analyses indicate a K level below 1.3% in April) without a decrease in fruit size or increase in drying ratio. Nonetheless, there is concern among growers, farm advisors and PCA's that the leaf concentrations currently recommended by UC are too low. Many growers are trying to obtain mid-July leaf K values of 2.0% or more because they believe that these levels will help

to maintain large crops of good sized fruit that have improved drying ratios. Trees may look better when grown with higher K than those levels recommended by UC (that is, the level of scorch is reduced in the leaves). Potassium fertilization ranks as one of the highest cost fertilizer inputs that a prune grower can make especially if the grower is trying to achieve leaf K concentrations of 2.0%.

The critical K levels currently used were established more than 50 years ago, when prune orchards were planted at lower densities and production practices conformed to different expectations of yield and fruit size. The old critical levels were developed by linking leaf analysis of K and visual symptoms of K deficiency, without any correlation to yield, fruit size or drying characteristics. Establishing nutritional adequacy levels of leaf K concentration based on yield and fruit size would appear to be more relevant than those based upon symptomology. We surveyed many prune orchards throughout California to explore the relationship between leaf K concentration in mid-July with yield, fruit size and drying ratio in an effort to determine whether growers were possibly over fertilizing with K fertilizer.

Procedures

Survey, 1998:

Sixteen orchards were surveyed in 1998 and individual trees distinguished by initial leaf K concentration as measured at the beginning of June and in late July-early August, i.e., classifying trees using current industry standards. The orchards in the survey were chosen because they showed a range of leaf K early in the spring (April to May) that was quite variable throughout each orchard, among orchards within a county, and among counties.

Survey, 1999:

The same 16 orchards and individual trees were sampled as in 1998 for early leaf %K concentration (approximately 5 May) and late July to early August (30 July-10 August). In 1999 we added a June leaf collection, made from 19-24 June. Fruit were commercially harvested from 24 August to 2 September; fruit samples were taken for determination of drying ratio, dry count/lb and dry yield/tree in order to develop relationships between fruit quality and yield, and leaf K concentration over each growing season.

The 1998 season was unusual, with extended rains and cool temperatures through bloom and into early summer. Cropping was not heavy at any location in 1998. Weather patterns in 1999 were quite different, with good chill accumulation, a single late freeze (which may have had some localized effects on set), cool temperatures in a relatively dry spring, and a very cool summer. Cropping was closer to normal levels in 1999 than in 1998. Data from two years was used to test industry standards of adequacy of potassium in French prune culture under typical orchard practices used in California today.

Observations From the Survey

There was variation from orchard to orchard as one would expect in a survey. Nevertheless, we have determined the following: 1) spring (May 1998 and April – May 1999) leaf K concentration is fairly well correlated with mid-summer (mid-July 1998) an early summer (late June 1999) leaf K concentration, respectively; 2) no beneficial relationship between fruit size, drying ratio or dry yield has been found with spring or summer (June or mid-July) leaf K concentration above 2%, either when evaluating all surveyed orchards together or as individual orchards.

The survey of leaf potassium status in "French" prune orchards throughout California suggests over fertilization. Many orchards surveyed had mid-July leaf K concentrations well over 2% and some were as high as 4 and 5%. From the survey, mid-July leaf K concentrations over 2.0% do not appear to help increase fruit size or yield or improve drying ratios. Potassium fertilization and the need for K fertilization in prune production is important, but growers may be using more K fertilizer than necessary to derive any improvements in production or fruit qual-

ity. We suggest that mid-July leaf K concentrations for adequacy should be from 1.3 to 2.0%. If above 2.0%, that would be considered to be excessive and growers should consider not applying additional K fertilizers. Leaf concentrations below 1.3% would suggest addition of K fertilizers.

Gophers

We see considerable gopher problems each year in prunes. I have been to three orchards so far this year where gophers have killed trees. The following, taken from our *IPM Manual for Apples and Pears,* provides an excellent review of gophers and their management.

Pocket gophers feed on the bark of the tree crowns and roots, often girdling young trees just below the soil line and causing them to die. The vigor of older trees is reduced when gophers feed on roots. Pocket gophers also interfere with irrigation by chewing through drip irrigation lines. Their burrows divert irrigation water causing stress to young trees and resulting in extensive soil erosion. The mounds of soil used to plug burrow entrances can interfere with orchard floor management by dulling mower blades.

Pocket gophers are rarely seen, but the mounds of soil that plug burrow entrances are easy to spot. Gophers dig tunnels 6 to 12 inches below the surface, push the soil out lateral exits, and plug these openings. On irrigated lands, gophers breed throughout the year with a peak in late winter; in a year, females may bear up to three litters averaging five to six young.

An orchard surrounded by frequently cultivated fields tends to have fewer gopher-related problems than one that borders alfalfa fields, pasture, woodland, or other uncultivated areas. Except where flood irrigation is practiced, the orchard environment is favorable all year for pocket gophers, and their populations increase steadily unless control is practiced. Flood irrigation tends to discourage buildups of gopher populations, but it does not eliminate them. In some cases, it may even increase the potential for damage by forcing gophers to high ground at the base of trees. This is particularly a concern in orchards where trees are planted on berms or mounds.

Generally, gophers prefer to feed mostly on roots of herbaceous plants and weeds; they especially like perennial clovers. When plants in the ground cover dry out in late summer or fall, gophers may feed exclusively on tree roots and underground parts of the trunk.

Underground tree damage is indicative of gophers; meadow mice feed a few inches below and above the soil line and rabbits always feed aboveground. Because gopher damage is not readily visible, it often goes undetected until the tree shows signs of stress. Injured trees can sometimes be repaired by bridge-grafting or inarching. Heavy pruning may also help tree recovery.

Management Guidelines

Monitor gophers in late fall, winter, or spring. Monitor orchards with ground covers more vigilantly than clean-cultivated orchards because ground covers encourage gophers and meadow mice.

Gopher activity is more pronounced after a rain or irrigation because gophers increase digging when soil is moist. The fresh mounds and the newly dug soil differs in color from undisturbed soil surrounding the mound. Detection is also easier after mowing when the ground cover is low.

You have two control options when gophers appear in the orchard: toxic baits or traps. Baiting and trapping can be done at any time of the year, but both methods are easier when the soil is not too dry or hard. Toxic baits are distributed either by tractor-drawn mechanical bait applicators or by hand probes.

Baiting. The mechanical bait applicator constructs an artificial burrow beneath the soil and deposits

poisonous grain at fixed intervals. The artificial burrow intercepts most gopher burrow systems or is soon burrowed into. In either case, pocket gophers readily explore new tunnels and eat the bait. Limit use of mechanical bait applicators to areas of the orchard where gophers are present.

Hand-baiting or setting traps may sometimes be more practical than using a mechanical bait applicator. This is true of an orchard with rocky soil. Adequate soil moisture is essential for proper mechanical burrow construction.

Hand-baiting is generally used when a mechanical bait applicator cannot be used, or is not practical, such as in small acreages or where there are only a few gophers. Commercial grain baits are dropped into tunneled runways through a small opening made with a pointed probe. The probe is used to locate main runways so bait can be placed where gophers will find it. A runway usually connects two mounds at a depth of 6 to 12 inches. Probing should be done 12 to 18 inches from a fresh mound, or between two fresh mounds, as these indicate the most recent presence of gophers. When the runway is located, the probe drops about 2 inches as it passes through it. Enlarge the opening to the runway by rotating the probe or by using the large end of the probe. Drop bait in the burrow at two or more places in each runway. Cover the probe hole with a clod or rock to keep out light and to prevent dirt from falling on the bait. Hand probes that deposit bait into the runway are also available.

Baits. Single and multiple dose baits are registered for gopher control. Single dose baits can be used with the mechanical bait applicator or with hand-probing, and are available commercially or from many county agricultural commissioners. Multiple dose (anticoagulant) baits are available for gopher control, but these baits are not appropriate for use with a mechanical bait applicator because the machines are not designed to apply sufficient amounts of bait. Use hand-probing to apply and anticoagulant bait and carefully follow the label as to the amount of bait to use. Follow label directions for application.

Trapping. Traps are also useful in controlling small infestations of gophers, but are labor intensive and expensive to purchase and replace.

To set out traps, locate the main tunnel, with a thin metal rod or a specially designed metal probe. In main runways, place two traps in the hole facing opposite directions to intercept gophers coming from either end of the burrow. Mark traps above ground with engineering flags and anchor them by wire to a stake. If a trap shows no sign of visitors within 48 hours, move it to a new location. Gophers are essentially solitary animals, but during spring more than one gopher may enter a burrow system. If you catch a gopher during this period, reset and leave traps in the same tunnel system.

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