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University of California
Agriculture and Natural Resources
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TREE AND VINE NOTES

January 2011

2011 North San Joaquin Valley Almond Day

Sponsored by the University of California Cooperative Extension

January 19, 2010. 8:30 a.m. - 12:00 noon

Stanislaus County Agricultural Center
Service and Crows Landing Roads, Modesto

2.0 Hours of Continuing Education Credit Pending

3.0 Hours of CCA hours pending

7:30 Registration begins

8:30 Welcome

8:40 – 9:10 Considerations when selecting almond varieties

- Roger Duncan, UCCE Farm Advisor, Stanislaus County

9:10 – 9:40 Developing Management Programs for Spider Mites and Leaffooted bug

- David Haviland, entomology advisor, UCCE Kern County

9:40 – 10:10 Determining your almond orchard's irrigation needs

- David Doll, UCCE Farm Advisor, Merced County

10:10 - 10:30 Break

10:30 – 11:00 Update on Management of Almond Foliar Diseases

- Dr. Jim Adaskaveg, Department of Plant Pathology, UC Riverside

11:00 – 11:30 Almond orchard recycling and the effect on nematodes and other replant problems

- Brent Holtz, UCCE Farm Advisor, San Joaquin County

11:30 – 12:00 IPM strategies to manage the replant problem in almonds

- Dr. Mike McKenry, UC Kearney Agricultural Center

12:00 Adjourn

Mechanical Blossom Thinning in Peaches

Maxwell Norton, UCCE Farm Advisor

Cooperative Extension has made some good progress in testing the new mechanical blossom thinning equipment. Last year, Roger Duncan demonstrated that the process makes sense economically. This year we will be doing more field demonstrations. For the string thinner to work the block must be uniform and not have old hangars sticking out. Perpendicular V or quad V training systems are the best. We may also be able to test a new machine in this area that mechanically thins the green fruit directly on the hangers instead of grabbing the trunk. If you are interested trying out in either or just want to see them in action – let me or Roger know well in advance.

Peach Board Updates Web Site

By Maxwell Norton

The CA Cling Peach Board has updated its web site at www.CalClingPeach.com. In it you will finds lots of good materials for marketing peaches, nutrition information, recipes and even a student site. Growers should be sure to check the "Growers Section." The CA Canning Peach Association also has lots of good information about the industry at http://www.calpeach.com. Bookmark them both on your computer.

Controlling Glyphosate-Resistant Weeds in Orchards with Rely: Understanding the Issue and Managing the Solutions

Brad Hanson, UC Weed Extension Specialist, Davis
Doug Munier, UC Farm Advisor, Glenn, Butte, and Tehama Counties

By now, many tree fruit and nut producers in the Central Valley are familiar with glyphosate-resistant weed species. In the north Sacramento Valley, glyphosate resistant ryegrass is widespread. In the south Sacramento Valley and through much of the San Joaquin Valley, many horseweed and hairy fleabane populations are no longer controlled with formerly effective glyphosate applications with herbicide-resistant weeds, spontaneous changes or mutations in the DNA of an individual plant can lead to changes in plant biochemistry and result in loss of efficacy of a single herbicide or whole classes of herbicides for the new biotype. When a resistant biotype is first introduced into a field, whether from a new mutation or seed introduction from another area, it is usually a single plant or perhaps a few individuals and probably is a not a noticeable weed problem. However, if those resistant plants produce seed and the same herbicide is used again (and again) the resistant biotype can become dominant in the population in just a few generations.

For most conventional fruit and nut producers, rotating herbicide modes of action is a critical first step in reducing problems with herbicide resistant weeds while ensuring the viability of currently available herbicides. However, wherever feasible, non-chemical weed control techniques like mowing, tillage, and hand weeding should also be used to supplement chemical weed control tactics.

One post emergence herbicide that is becoming more important in tree and vine crops is glufosinate, commonly sold in California as Rely, Rely 200, or the newest formulation Rely 280. Rely is a very good, broad spectrum herbicide that can provide control of many common weeds, including several glyphosate-resistant species. However, similar-sounding chemical names and Rely marketing strategies have led to some confusion about the relative strengths of glyphosate and glufosinate.

The biggest difference in weed control efficacy of these two herbicides is related to the translocation, or systemic movement, of the active ingredient once it enters the plant. Glyphosate is generally very well translocated in susceptible plants while glufosinate translocation is much more limited. Because of the reduced levels of translocation, good coverage (adequate water volume, nozzle and pressure selection) is much more critical for glufosinate compared to glyphosate.

On small broadleaf weeds, glufosinate and glyphosate often provide very similar levels of control as long as spray coverage is adequate. Because the growing point of grass weeds is below the soil surface, these weeds can be more difficult to fully control with glufosinate; good burn down of treated tissue is usually observed, but regrowth can occur. Similarly, in established perennial weeds, glufosinate is usually less effective than glyphosate due to regrowth after the initial burn down.

Although Rely does not have the same weed control properties as glyphosate, especially for grasses and perennial weeds, it is a very useful herbicide for reducing selection pressure for new glyphosate-resistant weed biotypes and for managing existing glyphosate-resistant populations. Glufosinate and glyphosate have completely different target enzymes in different biosynthetic pathways. Thus far, there are very few reports of resistance to glufosinate and no reports of glyphosate-resistant weeds also being resistant to glufosinate.

Thumbnail comparison of glyphosate and glufosinate herbicides.

Chemical name	***Glyphosate***	***Glufosinate***
Trade name(s)	Roundup, Durango, Honcho, etc	Rely, Rely 200, Rely 280
Mode of action	Inhibits EPSP synthase (EPSPS) enzyme	Inhibits glutamine synthetase enzyme
Selectivity	Non-selective	Non-selective
Soil activity	Essentially none	Essentially none
Translocation	Very good	Limited
Coverage needed	Less critical	Critical – especially on larger weeds
Broadleaf weed control	Broad spectrum. Good control of small to medium plants but can vary with large weeds.	Broad spectrum. Good control of small weeds, less effective on large weeds or dense stands due to coverage.
Grass weed control	Broad spectrum. Usually good control of vigorously growing grasses.	Broad spectrum. Control can vary by size - seedling grasses often controlled, small established grasses may be burned down but regrow, some success with medium-sized grasses nearing maturity
Perennial weed control	Good – can vary depending on plant size and time of year	Poor – burns tops; however plants often regrow from roots/rhizomes
Resistance reported	Yes, in California – ryegrass, horseweed, hairy fleabane, others suspected. 19 species worldwide.	Not in California. Ryegrass in Oregon, goose grass in Malaysia.

When used as part of a well-planned weed management program, Rely can be an effective weed control and resistance management tool for orchard crops on which it is labeled. It is important to remember that Rely does not translocate as well as glyphosate and applications should be planned accordingly. Best season-long weed control and reduced selection of herbicide-resistant weed biotypes is likely to be obtained using combinations of preemergence herbicides, postemergence applications of glyphosate and glufosinate or other burndown materials, and non-chemical control tactics wherever possible.

Rely is currently labeled for use in apples, grapes, and tree nuts; however, the manufacturer is seeking additional registrations for stone fruit and other perennial crops. Always read and follow current label instructions to avoid crop injury and illegal herbicide applications.

Potassium Nutrition in Vineyards

by Chuck Ingels, Paul Verdegaal, Stuart Pettygrove, and Ria DeBiase
UC Cooperative Extension

Potassium in Vines

Potassium (K) is required by plants in large amounts. It has a major role in many plant processes, such as promoting root growth, increasing fruit size, and providing key features in metabolism that include the formation of starch, translocation of sugars, stomata regulation, and the formation of xylem vessels. The K concentration in grapevines can range from 1 to 4% on a dry weight basis, depending on the tissues and time of sampling. Harvest removes about 5 lbs. K/ton of grapes, although this varies, based upon the rootstock and cultivar being grown. Varieties with high K demand, such as Cabernet Sauvignon, Merlot, Cinsaut, or Syrah, should not be grafted to rootstocks prone to K deficiency if soil levels are low. UC research has shown that vines on rootstocks with *Vitis berlandieri* genetic background, such as 420A, 110R, 5BB, 5C, and 1103P are sensitive to K deficiency. Freedom, 1616C, SO4, and 039-16 are examples of rootstocks that provide high K to the scion vines.

Annual soil analyses are of relatively little value in determining vine K needs since there are so many other factors that affect uptake and utilization, including soil type, texture and depth; amount of soil compaction; root pest damage; variety; rootstock; irrigation practice; and crop size. Petiole analysis has been the main tool for assessing K status and the need for K applications to vines. Petioles are usually collected at bloom from leaves opposite the cluster position on the shoot. Vines are generally sufficient at 1.5 to 2.0%, and deficiency may occur at 1.0% or less. Though it is not a completely reliable tool for making K management decisions, petiole analysis is the most consistent guideline currently available.

Potassium Deficiency

Grapevines tend to show K deficiency when they are heavily cropped and maintenance applications of K have not been made in the vineyard. Deficiency can be more likely to occur under these conditions:

- Soil cut areas
- Areas where the K-rich surface soil was removed during land leveling
- On sandy soils that have low native K fertility
- On clay soils of certain geologic origin
- Shallow soil areas
- Poorly drained soils
- Where soil pests have caused root problems
- Water stress can also increase this deficiency by reducing vine uptake of K – keep this in mind when using deficit irrigation on red grapes.


K deficiency

Deficiency symptoms can appear in early spring in cool, wet years, into June, but mild deficiencies will not be seen until just before harvest. The first symptom is a fading of green color at the leaf edges and between the main veins, while leaf margins tend to curl upward. The leaves may turn chlorotic and begin to turn brown on the margins, and some leaves may die as the deficiency becomes more severe. Severe K deficiency also reduces vine vigor and crop yield, and can result in defoliation. Oftentimes petioles can remain attached as blades defoliate. Vines also tend to have fewer and smaller clusters that are tight, with unevenly colored, small berries.

Local Soil Composition and K Fixation in Soil

Soil composition plays a large role in which areas of a vineyard are K deficient. K ions are strongly adsorbed on clay; without this adsorbing ability, the soluble K in sandy soils is easily leached from surface soil. Therefore, sandy soils or sand streaks often have less plant available K.

Soils high in clay or silt content may also need added K because of their K fixing capacity. In K fixation, clay minerals remove K from solution by trapping it on sorption sites within the mineral layers. Many soils in the San Joaquin Valley have high K fixing capacity and can tie up 50% or more of added K fertilizer. This K is not lost, but rather stored between layers of clay and slowly released in soil solution as exchangeable K. However, most will not become available fast enough during times of high K demand, especially following veraison. The actual K available for plant uptake represents a very small fraction of the total K in soils – it is found in the soil solution and on the cation exchange sites of both clay particles and humus. This is why soil K levels have generally not been reliable criteria for indicating the actual K status of grapevines.

The major clay minerals responsible for K fixation are illite, weathered mica, smectite, and vermiculite. Soils high in vermiculite are found on the east side of the Central Valley of California including in the Lodi wine grape district, especially on landscapes with soils deriving from granitic parent material and that are weakly to moderately weathered. Vermiculite is a clay mineral, but actually it can be found in the silt and fine sand size fractions, which explains why coarse-textured soils are often found to fix K. In recent years, graduate students and staff in the UC Davis laboratories of Drs. Randy Southard, Toby O'Geen, and Stu Pettygrove have examined the K fixing capacities of soils in Sacramento and San Joaquin counties and have developed a map of five general regions with similar "soilscape" characteristics. These regions help predict the likelihood of soil's K fixing capacity. Soils with a high K fixation potential may need greater K applications to reverse any deficiencies. We are currently comparing fertilizer applications in vineyards having high and low soil K fixation in both Sacramento and San Joaquin counties.

Potassium Fertilization

Response to a K fertilizer strategy may be influenced by several factors, including soil type and depth, variety, rootstock, cropping pattern, time of year and irrigation system or general growing conditions, especially if in a drought or a heavy rainfall year.

The particular form of K fertilizer chosen offers no inherent advantage as grapevines don't care how their needed K becomes available, only that it is available. However, particular formulations of K do offer advantages to growers, such as cost and convenience of application vs. possible soil effects (e.g., acidification of soil, salinity, etc.). Foliar sprays for K are not without benefit, but at best they reduce foliar symptoms, at great cost.

K can be applied in the fall as long as field access is possible. Early spring applications in bulk or through drip systems can be as effective, depending on formulation and timing.

For a comparison of some general formulations of K fertilizer see the table below

Potassium Product	% K_2O*	% K	Advantages and Disadvantages
DRY FORMS			
Potassium sulfate K_2SO_4	53	43	Most popular due to safety to plants and high K content; contains 18% sulfur. Low solubility limits liquid formulation; readily applied with gypsum solution applicators for drip.
Potassium chloride KCl	62	51	Highest K analysis and lowest cost; high solubility for liquid formulations. Chloride can cause salt injury.
Potassium nitrate KNO_3	46	38	Contains 14% N. Most expensive dry form.
Potassium-magnesium sulfate, $K_2SO_4 \cdot 2MgSO_4$	22	18	Contains 10% magnesium (Mg) to offset potential Mg deficiency. High cost for K content; Mg may interfere with K uptake.
LIQUID FORMS			
Potassium thiosulfate $K_2S_2O_3$	25	21	Contains 17% sulfur; acid-forming for alkaline soils.
Potassium carbonate K_2CO_3	30	25	High pH is suitable for acid soils; high solubility for liquid formulation and drip irrigation.
Potassium sulfate K_2SO_4	8	7	N (as ammonia) is commonly included in the formulation to assist K_2SO_4 solubility.
Potassium chloride KCl	8 or 10	7 or 8	Most economical liquid formulation. Often sold with 2% N content.

*Multiply K_2O (called *potash* by the fertilizer industry) by 0.83 to determine actual K content.
Source: Raisin Production Manual. 2000. Pub. #3393;

Generally, K use by grape vines can be as much or more than annual N demand, but the need for K applications is often not as critical as N. This is because K doesn't leach from the soil profile as readily as N and certain soil types provide enough K for fairly long periods under moderate crop demands.

Because of the strong fixing capacity of some soils and the relatively slower movement of K, a single heavy application (a "slug") of fertilizer is needed to quickly mitigate K deficiency and show a vine response.

The method of application and formulation of K will be determined by how fast a response is needed and how long it has been since any K was applied, or whether a more maintenance type strategy is being used.

Talk with your PCA or fertilizer company about what you want to accomplish and how fast, and try to keep your winery in "the loop". Some important considerations are:

- What is the soil type?
- Are there some soil concerns, such as pH, salinity, or drainage?
- How long has it been since K was applied, if ever?
- Are symptoms present in just the leaves, in the fruit, or in certain sections of the vineyard?
- What have the yields been in recent years?
- What is the comparative cost per unit of K_2O?
- How can the formulation of choice be applied, and at what cost?
- When do you want to apply the fertilizer?

Whether you choose a dry formulation in the fall, or dry in early spring, or liquid in late spring/summer, or a combination depends more on your operation and schedule than on critical periods of the vines' ability to use K. Do talk with your winery about your strategy as some wineries have concerns about amount or timings of K. Generally, there is no hard or fast rule on K application, amount or timing, but too much K just before or just after veraison can affect K uptake by fruit and pH. However, the interaction of available nutrients, soil type, crop load, irrigation management, variety and rootstock make it complicated to predict. All the more reason to stay in communication with your winery or grape buyer.

For more information on K composition of local soils, see "Soil-landscape model helps predict potassium supply in vineyards", Calif. Agriculture, vol. 62, no. 4, p. 195-201 (Oct.-Dec. 2008).

Proper Almond Tree Planting

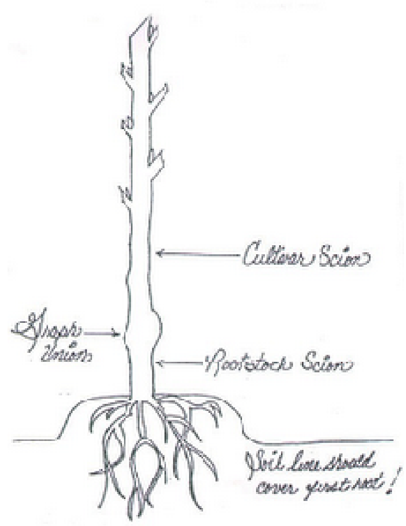
By David Doll (UCCE Merced) and Brent Holtz (UCCE San Joaquin)

When planting a new orchard, precautions should be taken to prevent tree loss. Care should be taken to reduce direct damage to the trees. Trees should be planted as soon as possible once received from the nursery. Always cover bare roots with a tarp when transporting trees on back of a trailer, making sure to keep the roots moist. If the trees are heeled in, fumigated soil or sawdust should be used and excess moisture should be avoided. Cold storage should be avoided if possible. If cold storage is necessary, then trees should be fully dormant and the roots kept moist.

Care should be taken to ensure that trees are properly planted. In heavy soils, planting on berms is recommended to help drain water away from the crown of the tree. Berms should be pulled before planting to ensure that the graft union is above the soil. Do not pull a berm after planting as this may cover the graft union. Planting depth after settling should be no deeper than in the nursery and the graft union should always be well above the soil line. Holes should be dug deep enough to accept the root system; no deeper. If a crust or soil glaze occurs, break up or slice to ensure proper root growth. Planting trees high will help reduce losses to the root disease Phytophthora. The only exception is trees grafted to Marianna 2624 plum rootstock; they should be planted at the same depth they were at the nursery to avoid suckering from the roots.

When planting, try to follow some of these tips:

1. Dig a hole deep enough so the roots are spread out and not cramped,
2. plant the trees so that the nursery soil line is above the current soil line,
3. plant the highest root a little above the soil line and cover it with extra dirt,
4. when planting allow for 3-6 inches of settling in the planting hole.



Upon planting, soil should be tamped firmly with the foot to eliminate air pockets. Be careful not to break any roots. After planting, trees should be tanked in with 1 to 3 gallons of water unless the soil is very moist. This water will help moisten dry soil and fill in small air pockets. Avoid over irrigation as excess water may cause saturated conditions that kill small roots due to poor aeration and/or the root pathogen Phytophthora. More water should be used if trees are planted late during warm weather, planted in dry soil, or if the soil can not be tamped firmly around the roots due to soil conditions. Keep in mind that a rain immediately after planting does not provide enough water to settle the soil around the root system.

Fertilizers should not be applied until after the trees leaf out. Apply small amounts of fertilizer, no more than one ounce of actual nitrogen, frequently throughout the first growing season. If using granular fertilizers, make sure that they are applied within the wetting pattern of the irrigation system. Avoid applying fertilizers to the trunk of the tree to prevent burning. Never apply fertilizers to the planting hole as this may burn back fine feeder roots.

Careful planning and preparation from the beginning will yield a good return for the efforts applied. Mistakes made at the beginning of an orchard will be present for the duration of the orchard’s life. This is one of the times in which effort or expense should not be spared.