COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

TREE AND VINE NOTES

JANUARY 2009

USDA Environmental Quality Incentives Program

USDA will be giving grants to farmers for various environmental quality improvements on their farm. Examples would be water conservation, irrigation efficiency, organic system plans, conservation practices related to organic production, or methane digesters. There may be other practices as well. For more information contact your local NRCS office. In Merced the number is: 723-3714 extension 3.

Notes on Degree-day Calculations by Mark Battany, Farm Advisor, San Luis Obispo Co.

Growing Degree Days are the unit used to describe the heat summation over a period of time. However, there are multiple ways to calculate Growing Degree Days from the same data set; therefore it is important to use the same method if doing any comparisons.

Growing Degree Days (GDD) are the standard unit of measure we use to summarize the heat summation over a period, such as the entire growing season or the developmental period for an insect pest.

Until fairly recently, the most practical device for measuring temperatures was the max-min thermometer. This device only had to be read once per day, because it physically recorded the most recent maximum and minimum temperatures. Due to the widespread use of these devices in the last century, most of our historical temperature data consists of daily max-min values. When early studies of California vineyard climates was conducted by Amerine and Winkler in the 1940s, they naturally relied on this type of data, producing the classifications of the climatic Regions I - V throughout the state.

The advent of electronic dataloggers in recent years have now enabled us to take temperature readings at much finer time scales, and thus make heat summations which more accurately describe the actual local conditions. However, because the numbers differ based on which summation method is employed, it is important to know the calculation method used if comparing numbers. If we are comparing to the older Amerine and Winkler numbers, we should calculate following the method they used.

The simplest method with max-min data uses the following formula for each day; this was the method used by Amerine and Winkler: GDD = (Daily Max + Daily Min)/2 — 50
where 50 °F is the base line temperature (below this temperature virtually no growth occurs). All positive daily GDD for the period of interest are then summed together. This simple method essentially makes the assumption that the temperature rises and falls at a constant rate between the minimum and maximum values each day; obviously this is not the case under most conditions. More advanced formulas that use the daily max-min values are also employed; these are explained in detail at the following UC IPM website:

http://www.ipm.ucdavis.edu/WEATHER/ddconcepts.html

If we use hourly temperature data in the calculation of the heat summation, the results will be different from degree-days calculated with the daily max-min values. Summations using hourly data may be quite a bit lower than those based on daily max-min values.

UC costs of growing mandarins

New studies showing costs of establishment and production of mandarins are now available from UC Cooperative Extension at coststudies.ucdavis.edu

New Book on Settling Disputes is Available Free On-Line

The second edition of Party-Directed Mediation: Helping Others Resolve Differences is now on-line. This book explains two mediation models in depth. The first model is used to deal with conflicts among peers; the second, disputes between superiors and subordinates.

Party Directed Mediation is an effort to present practical, sound, research-based ideas hopefully leading to the improved management of deep-seated interpersonal conflict. While many of the concepts were originally developed through research in agriculture and agri-business firms, the methods (Party-Directed Mediation and Negotiated Performance Appraisal) have since drawn the interest of a wide range of people throughout the world.
The methods used require more time than traditional mediation, but are particularly well suited to volunteer mediators, intercultural conflicts when issues of saving face are important, and other conflicts in which emotional factors are high.

This approach is especially geared to help parties who will continue to live or work together after the mediator goes home, and need to learn interpersonal negotiation skills for handling future differences.
The full URL is http://www.cnr.berkeley.edu/ucce50/ag-labor/7conflict/
or alternatively, try http://tinyurl.com/3kzu5.

Hard copies of the first edition are available for free while supplies last at the Merced and Stanislaus Cooperative Extension offices and possibly others. You may have to pay for postage if you want it shipped.

Dormant Spray Options for Peaches by Janine Hasey, Farm Advisor, Sutter-Yuba Counties

The pesticides used in the conventional dormant spray include oil, an organophosphate or pyrethroid and copper. The target pests controlled by the oil are San Jose scale (low to moderate populations) and European red mite, the organophosphate controls peach twig borer and San Jose scale, pyrethroids control peach twig borer (not scale), and copper controls peach leaf curl. Delayed dormant spray timing (late January to mid-February before bloom), is more effective than dormant spray timing for controlling San Jose scale, European red mite, and peach leaf curl. Another benefit to spraying later during the dormant period is more orchard floor vegetation reducing pesticide runoff potential. A good reason to delay the dormant spray this year is to avoid any tree damage from dormant oils because of the very dry soil conditions.

Growers have several dormant spray management options available to them to potentially reduce costs while reducing runoff potential. The first option is to monitor for these pests by taking dormant shoot samples. These samples will help you determine the levels of San Jose scale and European red mite populations and the most appropriate pesticide and rates to use. If San Jose scale is below 10 percent, oil alone should be an effective control. If over 10 percent, then consider using an organophosphate such as Supracide or the insect growth regulator Seize. When applying organophosphates, pyrethroids, or any pesticides, they should not be applied 48 hours before a predicted rain event to avoid runoff. Secondly, there are more dormant or bloom time control options available with newer chemistries that have reduced hazard to the environment, greater worker safety, and are replacements for the traditional broad spectrum contact pyrethroids and organophosphates. These include biological insecticides (Bt), Spinosyns (Delegate), or insect growth regulators (Intrepid, Dimilin, Seize) listed in the table below.

For peaches, reduced hazard insecticide programs build from the basic dormant/delayed dormant spray which is oil for scale and copper for peach leaf curl. In the table below are insecticides that have been demonstrated to be effective. Bt, Spinosyn, and Intrepid also control oblique banded leafroller which is an occasional peach pest. Seize applied delayed dormant with the oil and copper spray, has been very effective in reducing or eliminating scale in peach orchards where it was used on blocks with over 10 percent San Jose scale as determined from annual dormant shoot sampling. Alternating with different materials and chemistries every year will help manage insect resistance and help ensure that our insecticide tools remain effective.

Target Insect	Material	Rate*	Spray Timing*
Peach twig borer	*Bacillus thuringiensis* (Bt)	1 lb or 1 qt/acre	2 bloom sprays often with brown rot timing
Peach twig borer	Delegate (Spinosyn)	3-7 oz/acre	Delayed dormant
Peach twig borer	Dimilin 2L	12 oz/acre	Delayed dormant
Peach twig borer	Intrepid 2F	8-16 oz/acre	Delayed dormant
San Jose scale	Seize 35WP	4-5 oz/acre	Delayed dormant + 2 gal oil/acre

Always consult the pesticide label before applying.

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Disease Digest: Phytophthora Root and Crown Rot

By: David Doll, Farm Advisor, Merced County

Crops affected: Most Deciduous fruit and nut trees, including almond, peach, and walnut.
Casual Organism(s): *Phytophthora* species
Etymology of Phytophthora: Latin, *Phyto* = Plant, *Phthora* = Destroyer

Root and crown rot of fruit and nut trees has caused major losses within orchards around the world. First reported in California in 1912, Phytophthora root and crown rots are found throughout the San Joaquin and Sacramento valley. Throughout Merced County, several areas of clay to clay-loam series soils have severe Phytophthora problems, which can be attributed to higher water holding capacity of these soils in comparison to sandier soils.

The effect of Phytophthora spp. on root systems are often not noticed until the above ground parts of the tree show symptoms. Symptoms of Phytophthora damage are usually observed by poor tree vigor, loss of scaffold branches, and gumming or bleeding found around the tree trunk. Orchards affected by Phytophthora crown rot can suffer tree loss quickly, especially during the spring when winter-infected trees collapse during the first hot spell and during periods of high heat in which over-irrigation easily occurs. This is in contrast to tree loss that is attributed to root rot. In this case, by the time most growers recognize the symptoms, several trees are in a declining state due to a long period of infection (several years). Careful observance of the orchard can reveal problems and warrant remediation before the manifestation of severe orchard losses.

In the orchard, symptoms of crown rot usually include cankers that are centered at the crown or lower part of the trunk. Removal of bark in affected areas will reveal brown or black sap-wood that may be gum soaked with stone fruit trees or slimy with pome and walnut trees. Cankers are clearly delineated, with very little dis-colorization in the wood that is found outside the necrotic areas. Removal of soil from around the trunk will reveal the canker's infectious path, moving up the tree from the soil. In some cases, cankers may extend some distance up the trunk. Crown rot kills the tree through phloem damage which prevents the conduction of nutrients up the tree.

In the case of Phytophthora root rot, cankers found above the soil line are rare. In this case, the disease severely affects roots of all sizes, removing the trees ability to pull water and nutrients from the soil. Trees suffering from root rot will have black, mushy roots which can be observed upon excavation. Roots and soil may have a "rotten egg" smell. This smell, however, is not from the disease itself, but from the anaerobic conditions caused by excessive soil moisture. Tree death occurs when a substantial part of the root system is infected, causing tree collapse due to the inability to pull water and nutrients from the soil.

Isolations from California fruit and nut orchards have revealed over 16 different species of *Phytophthora* causing tree decline. The disease agent is typically introduced into orchards through plant material, infested soil, or contaminated irrigation water. Once a susceptible host becomes available and is infected, rapid population growth occurs, producing survival structures that are able to survive for several years, if not decades, within the soil. This process provides an opportunity for *Phytophthora* to develop resistance towards chemical control measures such as mefenoxum (Ridomil) and fumigation.

Field observations support the conclusion that wet and cold climates will increase Phytophthora loss in an orchard. This is due to these weather conditions being conducive to pathogen growth. Soils that are constantly wetted and kept at or above the soil saturation point have higher disease rates than trees watered slightly below saturation point. This can happen through winter rains or improper irrigation management. Periods of rainfall or water standing for over 24 hours can provide enough moisture for Phytophthora infection, regardless of the season. Cooler temperatures do not inhibit the growth of Phytophthora, and may increase pathogen reproduction thus increasing disease.

The first step in disease management is prevention. Disease spread can be reduced by cleaning equipment that may have been used in areas infested with Phytophthora. When planting a new orchard, choose locations that do not hold water. Plant the trees high on raised berms, being careful not to have the soil line above the graft union as the scions tend to be highly susceptible to Phytophthora. Use of resistant rootstocks is strongly encouraged.
Since water plays a key role in disease development, irrigation practices should be modified in areas at risk for Phytophthora to more frequent, shorter watering periods. Over-watering should be avoided, especially during periods of low water use by the tree. Also, irrigation sets should not exceed 24 hours. Furthermore, use water guards to prevent water from splashing on trees, employ practices that promote good water infiltration and penetration, and try to reduce soil compaction.

Even though proper water management is critical in disease prevention for healthy trees, it has a minimal effect on trees that are currently infected. Research has demonstrated the effectiveness of foliar applications of Phosphorous acid (NOT PHOSPHORIC ACID!). Apply to trees that are fully leafed out on 2-4 week intervals, with no more than 6 applications per year. Soil applications and dormant sprays of phosphorous acid have provided some disease suppression. Phosphorous acid has only been demonstrated to control Phytophthora diseases; therefore, applications suggested for other purposes have not been proven by research and may be unnecessary.

Use of genetic resistant or tolerant rootstocks to help reduce the impacts of the disease has been an area of focus in many research trials. Within walnut, Paradox rootstock is significantly more resistant to *P. cactorum, P. citrophthora, P. drechsleri,* and *P. megasperma,* and is somewhat more resistant to *P. citricola* and *P. cinnamomi* than Northern California Black rootstock or English rootstock. Furthermore, newly developed Paradox genetic lines have demonstrated increased resistance to *P. cinnamomi* and *P. citricola* in comparison to the currently available Paradox rootstocks. In greenhouse studies, RX1 has exhibited resistance to both of these *Phytophthora* species, while VX211 has expressed resistance to *P. citricola*. These rootstocks, however, have not been thoroughly field tested. Within almond and peach, in comparison to Nemaguard and Lovell, Peach/Almond Hybrid rootstocks are more susceptible to Phytophthora, while Marianna 2624 is less susceptible towards the disease. Viking and Atlas have the same level of resistance as Nemaguard and Lovell.

Since not all *Phytophthora* species are the same, the performance of resistant rootstocks will vary by which species is present. Therefore, it is necessary to confirm which species of *Phytophthora* is present before orchard replanting. Contact your local farm advisor for sampling of suspected diseased trees before removal. For all tree crops, rootstocks provide a line of defense, but are only one piece of the puzzle. It is best to apply as many, if not all, orchard management practices in order to successfully manage Phytophthora.

Plant New Trees High

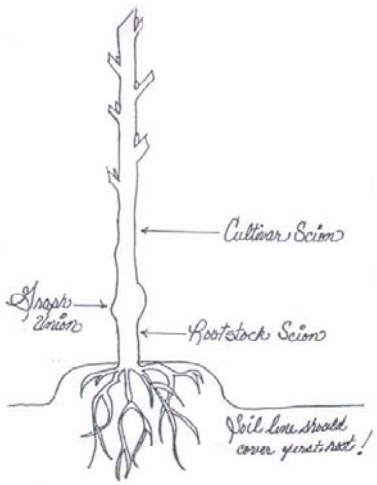
By: Brent Holtz, *Farm Advisor, Madera County*

One of the worst things that can happen to young trees from nurseries is that they are often planted to deep. Sometimes though they are initially planted at the right height, but then a berm is thrown up around the trees and their crown (the graft union between the scion and rootstock) is covered with the soil from the berm. I saw many diseased trees last spring that had *Phytophthora* root and crown infections and every one of them had their graft union below the soil line; sometimes the union was more than six inches below. If you are planting or replanting, trees should be planted high on small mounds as shallowly as possible. Planting depth after settling should be no deeper than in the nursery, and the graft union should always be well above the soil line.

Try to follow some of these planting 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 then cover it with extra dirt, and
4. when planting allow for 3-6 inches of settling in the planting hole.

I have never seen trees die from being planted too high, but I have seen many trees killed by being planted too low. Most soils in Madera County are heavy with a high clay content. These soils have slow water percolation, drain slowly, and remain saturated longer than well drained sandy soils. The mound around the tree trunk forces excess water to drain away from the tree, thus reducing the length of time the crown is exposed to excess surface moisture. Saturated soil conditions can occur at plating if the trees are irrigated too heavily, or when a high rainfall winter and spring occur. Some orchards survive years before a wet spring kills trees that settled too deep or had their crown covered with a berm. Plant the tree right the first time!

After making a strong case for planting the trees high, there is one exception. If you are planting on Marianna 2624 plum rootstock you should plant your trees the same depth they were planted in the nursery. With this rootstock, planting trees too high will cause them to sucker from the roots. Marianna 2624 is fairly resistant to *Phytophthora* and it can also tolerate excess soil moisture better than other rootstocks.



Be Careful at Irrigating Trees Planting Time

By: Brent Holtz, *Farm Advisor, Madera County*

It is often recommended to "tank" or irrigate new trees in following planting. The purpose is to settle and firm soil around the new root system and eliminate air pockets which may dry delicate root hairs. This is sound advice in those soils which are dry, sandy, or cloddy, etc. In many situations irrigation is not needed and may be quite detrimental to those fruit trees that are sensitive to excess water. Poor growth of many new orchards can be attributed to excess water at planting time. Consider the following:
1) In most cases we are planting new trees into wet soil- and adequate soil moisture is present,
2) tamping soil firmly with your foot is sufficient to firm most alluvial soils around new roots to eliminate air pockets. I like to just add about a gallon of water to the root ball in order to fill in small air pockets that could dry roots
3) actual irrigation at planting could over saturate the soil around the young root system, and as new, tender feeder roots grow into saturated soils, conditions are excellent for their death due to lack of aeration and/or *Phytophthora* infection. Once this occurs, poor growth or tree death usually follow.

Use good judgment. Tank or irrigate trees at planting under the following conditions:
1) if you are planting late and the weather is warm,
2) if the soil is dry, and
3) if the soil can not be tamped firmly around roots due to clods etc.

If you do not have these conditions, you may be able to delay the first irrigation until trees are growing well (8-10 inches of new growth). Remember, new trees are not using much water because they have few leaves, spring temperatures are cool, and there is usually a good residual supply of soil moisture that new roots can grow into.