COOPERATIVE EXTENSION ... UNIVERSITY OF CALIFORNIA

FRUIT AND NUT NOTES

TEHAMA COUNTY **SEPTEMBER 2007** Volume 7

1754 Walnut Street, Red Bluff, CA 96080 Phone (530) 527-3101 Email: rpbuchner@ucdavis.edu

Richard P. Buchner
UC Farm Advisor -Orchard Crops, Tehama County Director

Prepared by Spring Severson
Office Secretary

IN THIS ISSUE:

SACRAMENTO VALLEY REGIONAL PRUNE NEWSLETTER

Nematode Problems in Prune Production

Richard P. Buchner, UC Farm Advisors, Tehama County and
Michael V. McKenry, UC Extension Specialist, Nematology

Nematodes are microscopic, unsegmented roundworms which occur nearly everywhere. Food sources include bacteria, protozoa, earthworms, flowering plants, trees, fish, wild and domesticated animals and man. Several nematode species live in soils and feed on or within plant tissue. These are the plant parasitic nematodes. They utilize a spear or stylet at the head end to feed on plant tissue. They can migrate and reproduce anywhere in the root zone but tend to be most plentiful at the 6 to 36 inch depths. Plant parasitic nematodes can cause significant damage to prune and other orchard crops. Damage from nematode activity may include:

1) Plant parasitic nematodes weaken trees by damaging root tissue. Severity is due to nematode species, population level and soil type combined with orchard management practices.
2) Ring nematodes are typically associated with bacterial canker.
3) Plant parasitic nematodes may transmit virus.
4) Plant parasitic nematodes are almost always involved when an old orchard is removed and new trees are planted. The replant problem is not completely understood, but plant parasitic nematodes are the component of this problem that can cause lifelong, low level debilitation of an already restricted root system.

If prune growers are observing any of these problems and/or plan to replant, consider a soil analysis to

check for ring nematode, *Mesocriconema xenoplax*, root lesion nematodes, *Pratylenchus vulnus*, *Pratylenchus penetrans*, *Pratylenchus thornei*, *Pratylenchus neglectus*, or *Pratylenchus scribneri*, dagger nematode, *Xiphinea americanum* or pin nematode, *Paratylenchus hamatus*. There can be other genera and species of plant parasites in your orchard but these are the most common. Samples need to go to a lab with experience in identifying nematode species.

Prune growers need to be concerned about ring and lesion nematodes particularly when they replant after any perennial crop. Damage caused by *P. penetrans* is unknown but it occurs at high enough population levels to be associated with damage.

In prune orchards it is common for ring and lesion nematodes to occur together, but the damage they cause is quite different. The preferred feeding site of ring nematode is the smallest feeder roots. Adult stages are sedentary but smaller, younger stages are capable of moving through soil. It builds to highest population levels on Marianna 2624 followed by Nemaguard, followed by Lovell rootstock. The ring nematode host status of Myrobalan 29C is unclear but it is apparently a poorer host than Marianna 2624. This nematode develops its highest population levels in highly porous soils. Sand, loamy sand, and coarse sandy loam soils that infiltrate water quickly provide its best habitat. Fine sandy loam soils that are relatively slow to infiltrate water will support this nematode but not at levels high enough to permit extensive population build-up. Clay loam soils that are well structured also provide adequate opportunity for ring nematode build-up.

Root-lesion is an endoparasitic nematode and may feed and lay eggs outside the roots or within. On occasion, roots of prune may exhibit dark lesions due to nematode feeding but by the time this damage is evident there is considerable damage already done. This nematode can often be found together with ring, but lesion nematode by itself is not a pre-disposing agent for Bacterial Canker. Adults, juveniles and egg stages of both these nematodes survive in soil without food for lengthy periods of time. In settings where we have killed roots of old trees with a systemic herbicide expect 5% of the original lesion nematode population to remain in soil for 5 years after tree removal.

The one best time to manage nematode problems and replant problems is prior to planting. Each of the following considerations is important.

1) Soil fumigation is relatively expensive but very effective. A proper pre-plant fumigation for clay loam soils will cost double and require more care than the same fumigation applied to sandy loam soil. Methyl bromide is the preferred fumigant for clay loam soils whereas in sand to sandy loam soils 1,3-dichloropropene applied to well-dried soil will perform adequately.
2) Purchase certified nematode-free nursery stock. Nursery trees free of nematodes are a requirement in California.
3) Choose the best rootstock for your soil conditions. Consider soil texture, diseases and nematodes.
4) Post-plant nematicides that perform well in sandier soils may not be useful in clay loam soil. Thus, consider pre-plant fumigation as one of the few chemical treatments available when replanting orchards into finer textured soil.
5) In replant settings a first-year growth advantage is achieved by treating old trees with a registered systemic herbicide, waiting one full year, proper soil profile preparation, replanting on a rootstock with different parentage and then applying starter nutrients at time of planting. This program referred to as "starve the soil ecosystem and replant with different rootstock parentage" needs further evaluation with a wider range of rootstocks. The value of this program can be hidden by good soil fumigation. This program alone will not provide more than a 50% reduction in nematode populations, but it will provide relief from the rejection component of the replant problem. Additional steps will be needed to manage nematode populations. Additional nematode control can be achieved by selecting rootstocks with resistance to the specific nematodes.

Post-plant nematicides can improve vigor and yield of prunes that are infested with nematodes. There are some serious considerations relative to their performance.

1) Nematicides that rapidly degrade within 24-48 hr should not be utilized in clay loam soils. By the time the active ingredient moves adequately through soil and into soil particles the concentrations are too low to provide adequate nematode reduction. The half-life of Enzone in soil is about 24 hr. Its use in sandy soils can provide dramatic benefit but there may be minimal benefit in clay loam soils.
2) The most economic procedure for delivering nematicides is via chemigation. Other delivery methods may not be economic. The chemigation process for delivery of nematicides is not the same as it is for delivery of fertilizers. For nematicides the goal is to reach as many roots as possible without experiencing excessive dilution of the product.
3) Post-plant nematicides may be relatively specific in their performance. Enzone performs well against ring nematode but only short-term relief is achieved against root-lesion. In field settings DiTera appears to perform best against root-lesion nematode.

For additional information on the replant problem try Dr. McKenry's website http://www.uckac.edu/nematode/

Pruning and Training Prune Trees

Joe Connell, UC Farm Advisor, Butte County

This is a good year to dormant prune mature orchards since due to the small crop in certain areas the stage is set in many orchards for a large crop next season. Dormant pruning renews fruit wood and moderates a heavy crop load reducing limb breakage, potassium deficiency, small fruit size and high dry away ratios. It is also the first step toward eliminating *Cytospora* cankers and the dead wood associated with them.

Training young trees:

We know from research conducted by Cooperative Extension over 20 years ago in Sutter County that "long" pruning is a good way of growing large trees more quickly and improving production early in the life of the orchard. We also know that heavier or "short" pruning results in smaller branches, reduced fruiting capacity, and also increases the time it takes for trees to come into production.

The following simplified program is one way of producing large trees with good production at an early age while at the same time avoiding the complexities and problems which can arise from not heading new growth.

For one year old trees at the first dormant pruning, select three primary scaffolds or branches and head them no shorter than 20 to 30 inches in length. Save thin, horizontally growing, non-competitive branches for early production. This is the normal program most prune growers follow.

For two year old trees at the second dormant pruning, select two secondary branches on each primary branch and leave them long but be sure to head them at about five feet of new growth. This will give you a tree about 9 or 10 feet tall at the end of the second dormant pruning. Leaving these branches five feet long is the key to good spur formation and cropping in the fourth and fifth years. Save thin, flat growing, non-competitive branches for early production. If you "short" prune these secondary scaffolds back to 20 to 30 inches in length and strip off lateral fruitwood you will not have much spur growth or early production.

Long pruning at the second dormant pruning is a key practice for training young trees. If your trees had second year growth that isn't much longer than five feet it's also important to remember that these secondary scaffolds should always at least be "tipped" when dormant to avoid setting fruit near the end of the scaffold. Untipped secondary scaffolds can bend down dramatically with the weight of shoots or fruit and can be lost as good secondary branches if tipping is not done.

For three year old trees at the third dormant pruning, finish developing the top of the tree by thinning out the tertiary branches arising from each secondary branch to a single branch and head them at 30 inches in length. You should also head any particularly vigorous lateral branches at about 30 inches.

If you have a three year old orchard that you pruned severely last winter you can still get some early production with proper pruning this winter. This winter, select one or two tertiary branches on each of your short secondary branches and head these at five feet of new growth. This will help develop good spur growth on these branches next season for cropping in the fifth and sixth years. Remember, if you continue to prune these tertiary branches back to 20-30 inches in length you will not have much crop until the sixth year.

Good production and early returns are important goals in all orchard systems. This pruning system is a simple way to help you achieve this success.

Fall Spray Controls Prune Aphid the Next Season—Fall, 2007

Franz Niederholzer, UC Farm Advisor, Sutter/Yuba Counties
Carolyn Pickel, UC IPM Area Farm Advisor, Sacramento County
Richard Buchner, UC Farm Advisor, Tehama County
Bill Krueger, UC Farm Advisor, Glenn County

Summary: In three years (2003-2005) of University of California research, fall pesticide spray consistently controlled plum aphids (leaf curl plum aphids and mealy plum aphids) the following year, providing an option to replace the dormant spray for aphid control. Options for peach twig borer and scale control are also discussed.

The traditional dormant spray in prune orchards controls several key orchard pests including peach twig borer (PTB), San Jose scale (SJS), and plum aphids. However, dormant orchard spraying is increasingly regulated due to recent findings of dormant-season pesticides (diazinon, chlorpyrifos and others) in surface waters. If use of the dormant spray is eliminated or further regulated, prune growers have limited options for integrated pest management (IPM) of plum aphids. Registered, effective pesticides for aphid control (Asana®, diazinon, etc.) are broad-spectrum materials (non-selective poisons) that when sprayed in-season can harm beneficial insects that provide natural (and free!) spider mite and scale control. To increase prune/plum pest control options, University of California researchers and farm advisors began to field test fall (late October – November) spray timings for aphid control. Both speed sprayer and handgun, single-tree trials were conducted. Low rates of labeled pesticides (Asana®, Imidan®, diazinon, and/or Actara®) were tested. Oil was not included with pesticides treatments, as previous studies showed it did not affect aphid control, and use of oil is incompatible with zinc sulfate, a foliar nutrient commonly applied in the fall. **In all three years of this study (2003-2005), fall pesticide applications gave excellent plum aphid control the following year.** There were distinct differences between pesticide materials (see Table 1) with the more persistent materials providing more effective aphid control. In fall, 2006, at least nine growers used Asana® (totaling over 1500 acres) in Sutter and Yuba Counties. Control was excellent in all but one field. We can't explain why control was excellent in so many orchards, but unsatisfactory in one.

Based on these consistently positive results, prune growers can add a fall spray to their list of effective options for plum aphid control. This spray timing is very effective on aphid -- the most important pest in plum/prune production. Fall spraying is usually easier to plan due to generally better weather conditions at that time compared to winter, and could become the preferred spray timing for orchards on heavy ground where orchard access is often difficult during January and February.

Effective aphid control — at any time -- requires excellent spray coverage. This is especially true with the fall spray. Pesticides for aphid control should be applied to every row at a slow tractor speed (2-2.5 mph) using carefully calibrated sprayers. (The same sprayer rules should apply to dormant sprays, too.)

While the fall spray has not yet been shown to be a complete dormant spray replacement, there are other effective options for PTB that allow growers to avoid spraying in the full dormant season (January and February). Effective PTB control practices that compliment a fall spray for aphids include a bloom spray or in-season spray with materials that don't harm beneficial insects and mites including B.t. (Dipel®, Javelin®, etc.), Intrepid® and Success®.

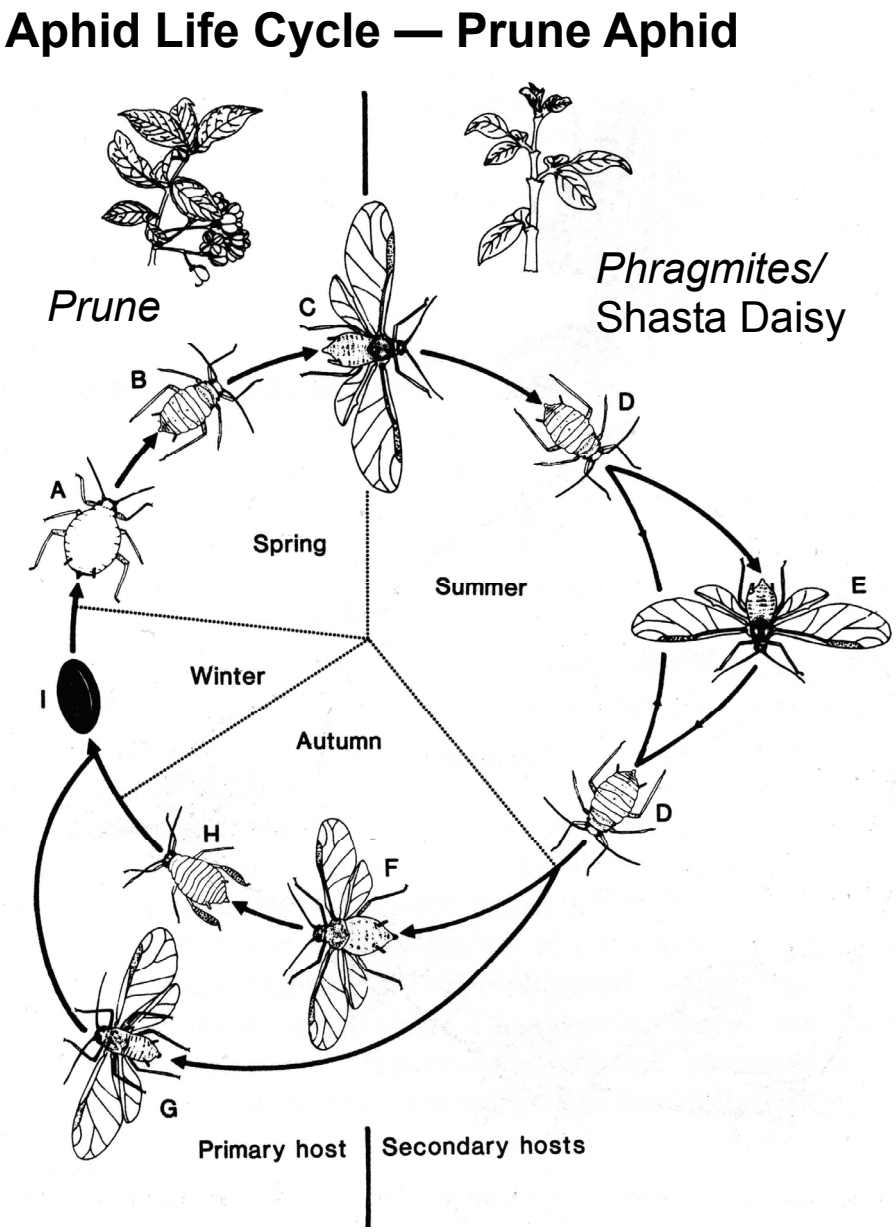
What about scale? Because spray coverage is so important to effective scale control, delayed dormant timing is still the best option for scale control. However, in our experience, few orchards in the Sacramento Valley have enough scale to justify spraying. **A dormant spur sample is the best way to check scale levels**. When results of this simple test show a need for scale control, high rates of oil (4gallons/acre) can give good control of low to moderate SJS populations when applied in the delayed dormant period. An effective pesticide (Supracide®, diazinon, Lorsban®, Seize®, etc.) should be added to the tank with oil if the dormant spur samples show high scale populations. If the dormant treatment is skipped and scale are found in spring an in-season spray with oil and/or Seize® can give good scale control if necessary. Information on how to sample dormant spurs to determine if scale control is needed available from your local UC Farm Advisor or on the web at: http://www.ipm.ucdavis.edu/PMG/r606900511.html.

Table 1. Plum aphid control materials, rates, and relative control results when sprayed once from mid-October through November.

Material	Rate/acre	Aphid control
Asana®	3*-4.8 oz	Excellent
diazinon	2 pints	Poor -- Fair
Imidan®**	2.125-4.25 pounds	Good -- Excellent
Actara®	3 oz	Good (October) Poor (November)

*Below labeled rate.

** Imidan was tested because it breaks down quickly in water and will have less impact on surface water quality and aquatic life.



F – gynopara
G – male
H – ovipara

Prune Aphids: Life Cycle and Over Wintering Biology

Nick Mills, Entomology Department, UC Berkeley

The life cycle of both mealy plum aphids (MPA) and leaf curl plum aphids (LCPA) is quite complex. They both spend the winter as eggs laid at the base of buds on twigs in the outer part of the canopy of prune trees. These eggs hatch in spring to produce a series of generations of aphids on the foliage through the early part of the year. Once the prune foliage has matured, (occurs earlier on older trees than on younger or more heavily irrigated trees) the aphids migrate to alternate host plants for the summer. In the case of MPA, they migrate to cattails and this normally happens in early June, but for LCPA the migration is to composite weeds and ornamentals, such as Shasta daisy, and the flight occurs in early May. Having spent the summer on their alternate host plants both aphids return to prune orchards in the fall. The first aphids to return produce nymphs that develop on the foliage into egg-laying females. These egg-laying females must then mate with returning male aphids before they move onto the twigs to lay their overwintering eggs. Each female is thought to be capable of laying only 6-7 eggs each, and these eggs must escape the attention of generalist predators if they are to hatch the following spring.

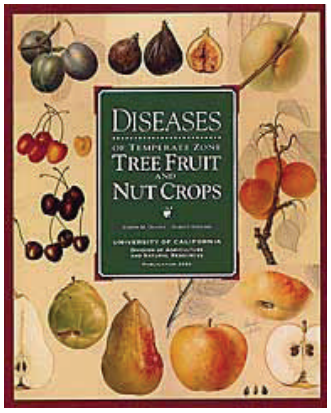
The need to develop alternatives to dormant oil sprays for the control of aphids in prunes has generated interest in a greater understanding of the timing of the phases of the life cycle that occur late in the season through winter and into early spring. From observations using yellow pan traps filled with water to collect aphids returning to prune orchards in the fall, we have found that the return migration of male aphids of both species begins in mid October and continues through November. Field observations in the fall of 2004 and 2005 confirmed that for MPA, nymphs that are destined to develop into egg-laying females can be found in small numbers on prune trees throughout November. This suggests that fall treatments for the control of MPA could be applied as late as mid November and still result in a substantial reduction in overwintering aphid eggs. However, we have not been able to find nymphs of LCPA in prune orchards in the fall and so have not been able to confirm a similar timing for this aphid species.

In addition, we have been estimating the timing of egg hatch of both MPA and LCPA from examination of aphid eggs collected at regular intervals from prune orchards in the Winters area in 2004-05 and 2005-06. Before egg hatch can take place, aphid eggs must first complete an obligatory phase of overwintering diapause that is determined by chilling, in much the same way that prune buds require chilling to terminate dormancy. For MPA we estimated that diapause was completed around Jan 24 in 2005, but somewhat earlier around Jan 9 in 2006. We found sufficient eggs of LCPA in only one of these two years and estimated the end of diapause to be Feb 2 in 2006, later than that for MPA. The time taken for eggs to hatch after diapause is completed depends on the accumulation of sufficient temperature above a threshold, for egg development to reach the thermal requirement for egg hatch. The threshold temperature for development for both aphids is 37-39^{o}F and preliminary data suggest that eggs of MPA have a higher thermal requirement for egg development than eggs of LCPA. An earlier termination of diapause coupled with a higher thermal requirement for egg hatch in MPA, with the reverse being the case for LCPA, results in a very similar timing of egg hatch for both aphid species. We estimated egg hatch to be around Feb 17 in 2005 and Feb 12 in 2006 for MPA and Feb 12 in 2006 for LCPA.

These investigations will help us to clarify the windows of activity of prune aphids both in the fall before egg laying begins and also in the spring after egg hatch. This information will be very valuable for understanding the options for timing of either pre-dormant or delayed dormant control treatments for aphids as alternatives to dormant sprays.

UC Publications Available to Purchase

Available at the Cooperative Extension Office or from the UC Online Catalog.
Questions? Call Tehama UCCE Office 537-3101



DISEASES of TEMPERATE ZONE TREE FRUIT & NUT CROPS

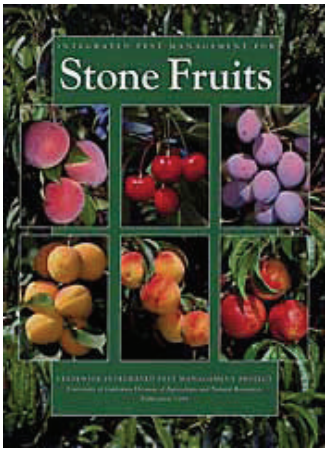
An encyclopedic work on the diseases and disorders affecting pome fruits, stone fruits, nuts, olives, figs and several minor fruits grown in temperate zone areas. This comprehensive volume gives the history, causes, symptoms, and control methods for nearly 200 diseases. Includes 56 pages of helpful color plates, an index and extensive references,. This is a must have for production consultants, plant pathologists, agricultural libraries and agricultural educators.

 # 3345 $60.00 + tax = **$64.35**

WEEDS of CALIFORNIA

This encyclopedic yet easy-to-use guide is the most comprehensive guide available on weeds in the Western United States. Package includes a CD of all of the photographs from the book..

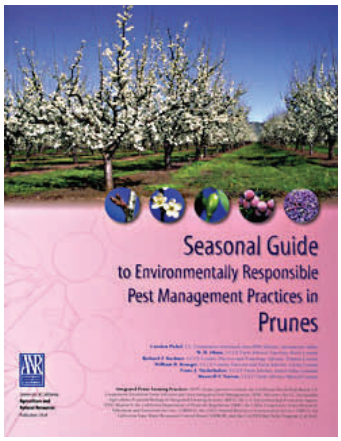
 # 3488 $100.00 + tax = **$107.25**



Integrated Pest Management for STONE FRUITS

This encyclopedic yet easy-to-use guide is the most comprehensive guide available on weeds in the Western United States. Package includes a CD of all of the photographs from the book, suitable for use in PowerPoint presentations.

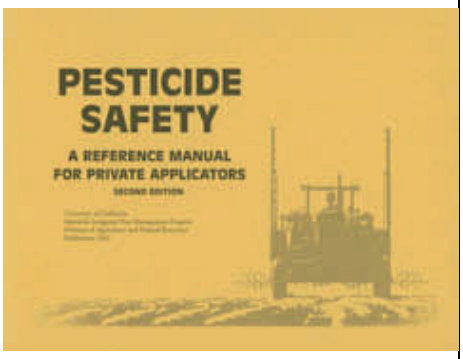
#3389 35.00 +tax=**$37.53**



SEASONAL GUIDE –to Environmentally Responsible Pest Management Practices in PRUNES

This handy full-color guide takes you through the year based on the stages of growth with an easy to understand approach to environmentally friendly pest management.

#21624 $7.00 + tax=**$7.51**



PESTICIDE SAFETY—Private Applicators Study Guide

Updated 2006. All California farm owners, managers, and employees involved with the use of pesticides should have this manual. Covers pesticide labels, mixing and applying pesticides, hazards of pesticide use, and pesticide emergencies.

#3383 $7.00 + tax **= $7.51**

#3394 (Spanish) $7.00 + tax **= $7.51**

TEHAMA COUNTY
and
SACRAMENTO VALLEY REGIONAL
PRUNE NEWSLETTER

Cooperative Extension
University of California
1754Walnut Street
Red Bluff, CA 96080
"52"

PRSRT STD
US POSTAGE
Paid
Red Bluff
Permit No. 112