University of California **Cooperative Extension** **Butte County**
Agriculture & Natural Resources

CITRUS NOTES

In This Issue:

Citrus Growers' Educational Seminar -- Northern California Program

Sponsored by: University of California Cooperative Extension and Citrus Research Board

When: Friday, October 29, 2010
Where: Auburn Veterans Memorial Hall --- 100 East Street, Auburn, CA
Cost: $20.00 per person includes lunch and course materials
For Planning Purposes, *Please* use attached Advance Registration Form
Registration Opens at 8:15 A.M. -- Sessions Begin at 9:00 A.M.

Introduction to Program and Seminar
Cindy Fake, Horticulture & Small Farms Advisor, UCCE Placer & Nevada Counties
Foliar Nutrition
Dr. Carol Lovatt, Professor, Department of Botany & Plant Sciences, UC Riverside
Alternate Bearing Mitigation in Mandarins
Dr. Carol Lovatt, Professor, Department of Botany & Plant Sciences, UC Riverside

Asian Citrus Psyllid / HLB Disease Panel
Moderator – Joe Connell, Farm Advisor, UCCE Butte County
South of the Border – What's happening in Mexico?
Jim Cranney, President, California Citrus Quality Council
Detection Strategies
Darryl Mitani, Sr. Ag & Standards Inspector, Placer County Dept. of Agriculture
Biocontrol of ACP
Dr. Kris Godfrey, Agricultural Biologist, Biocontrol Program, CDFA
ACP Treatment Strategies
Dr. Beth Grafton-Cardwell, UC Riverside Entomologist & Director of Lindcove (LREC)
Citrus Nursery Laws, Regulations & Quarantines
Thomas Delfino, Executive Director, California Citrus Nursery Society
Summary, Wrap-up with Q & A

Lunch
***"6 in 60…"* News Shooters on the latest developments & new technologies for California citrus**
Ted Batkin, President, Citrus Research Board

Adjourn – 2:00 P.M.
Program approved for 3.5 hours of continuing education credit

2279 Del Oro Ave. # B, Oroville, CA 95965 (530) 538-7201 FAX (530) 538-7140 Email: cebutte@ucdavis.edu Web Page: cebutte.ucdavis.edu

Dr. Jim Adaskaveg, Plant Pathologist, UC Riverside and Joe Connell, UC Farm Advisor, Butte County.

fall. Although you never know about the weather, we do know that if heavy rain occurs after color break we can have significant mandarin rind

breakdown. This problem can destroy much of the crop…. and, the problem is largely preventable.

Pre-harvest rind decay of mandarins in California generally occurs shortly after rain falls and is most severe on Satsuma mandarins. Although some researchers have associated the problem with fungi such as *Alternaria* species, our isolations from affected fruit were inconsistent. Re-inoculations with the isolated fungi (e.g., species of *Alternaria, Fusarium, Macrophomina, Ulocladium,* and *Cladosporium)* only sometimes reproduced disease symptoms and only on water-soaked fruit. Furthermore, in preliminary field trials that were conducted in Butte Co. in the fall of 2002 and 2003, fungicide treatments that included Topsin-M®, Pristine®, and Abound® only reduced the incidence of disease from 99% in the control to approximately 90%. These data suggested that mandarin rind breakdown is a physiological, abiotic disorder of fruit rather than a pathological problem and the fungi isolated are rather secondary causes of rind decay than primary pathogens.

Rind breakdown of citrus was previously reported by Fawcett and others in the 1930s. Wet weather combined with a sudden decrease in temperature was shown to result in liberation of rind oil and collapse of cells just under the cuticle. In our laboratory studies with Satsuma mandarins, symptoms could be reproduced by water soaking of the fruit.

In laboratory and preliminary field trials in 2003 fruit treatments with water repellants (e.g., postharvest fruit coatings, an agricultural anti-transpirant, or a summer oil) reduced the incidence of rind breakdown to very low levels. Field trials were again conducted in the fall of 2004 in Butte County. Fungicide treatments were ineffective in the Butte Co. trial. In all trials, applications of Vapor-Gard or Omni oil significantly reduced the disorder (Table 1). In all programs with Vapor-Gard and Omni Oil, a first application was made at the end of October and there was no significant difference in efficacy when additional applications were done. When trees were protected from rainfall using a tent, in both 2003 and 2004 (Table 1), the disorder could not be detected indicating the rind breakdown is correlated to rainfall.

In summary, results from our trials support previous findings by Fawcett and others that mandarin rind disorder is an abiotic, weather-related problem of mature fruit that has undergone a green to orange color change. Furthermore, we developed economical treatments that can significantly reduce the disorder.

Table 1. Effect of fungicides and rain protecting materials on mandarin rind disorder in Butte Co. 2004

No.	Treatment*	Product Rates (/200gals/A)	Application Dates				Incidence of MRD (%) & LSD
			Oct. 22	Nov. 9	Nov. 19	Nov. 26	
1	Check	---	---	---	---	---	33.67 A
2	Abound	12.8oz	@	---	@	---	31.25 A
4	Vapor Gard	1gal	@	@	---	@	5.85 B
5	Vapor Gard	1gal	@	---	---	---	4.00 B
7	Omni Oil	6qt-0.75%	@	@	---	@	1.25 BC
8	Omni Oil	6qt-0.75%	@	---	---	---	1.96 BC
9	Vapor Gard/Nordox	1 gal/6 lb	@	---	---	---	5.80 B
10	Tent Protected	---	---	---	---	---	0 C

* - Treatments were applied using an air-blast sprayer calibrated to 200 gal/A.
** - Incidence of mandarin rind disorder (MRD) is based on the evaluation of 100 fruit per tree.

Citrus blast

Blast is caused by the bacterium *Pseudomonas syringae* and is severe only in the northern California counties of Butte, Glenn, and Tehama.

Heavy rains, strong winds, and low temperatures are ideal conditions for citrus blast development. The blast organism usually enters through injured tissues or wounds. Bark splitting from freeze injury can be an avenue of entry for the bacteria. Winds that tatter leaves and crack leaf petioles contribute to blast damage. Thorn, hail, or insect injuries to leaves are other avenues of entry for the disease organism.

Blast lesions often start at the leaf petiole. Leaves affected by blast wilt rapidly and dry on the tree. The dried leaves may fall leaving the leaf petiole behind or the entire leaf may remain stuck on the tree. In severe attacks, twigs are girdled and killed. If the twig isn't killed, callus will form at the edge of the twig lesion and the diseased spot will be covered by a reddish brown scab or crust. Blast is most severe on the exposed sides of the tree. In our area, usually the south side and the tree tops are most seriously affected.

The most effective control is a spray before the first rain in late October to early November of a 10-10-100 Bordeaux mixture. Complete coverage using 10-25 gallons of spray per mature tree is the recommended rate. Bordeaux 10-10-100 is made by mixing 10 lbs. copper sulfate (bluestone) containing 25% metallic copper and 10 lbs. fresh hydrated lime in 100 gallons of water. If you hesitate to spray because Bordeaux is hard to get off the fruit (sometimes a problem with pebbly-skinned mandarins), harvest first and then spray.

Commercially prepared fixed copper materials such as Kocide® or Nordox® are easier to use than a Bordeaux mixture since they can be added to the spray tank directly. Their only drawback is that they are not as persistent as a Bordeaux mixture. Sprays applied soon will also protect the fruit from fungal infections that reduce quality and cause losses.

Sprays applied in fall will help protect leaves and shoots from winter storms. In years with heavy rainfall, a second spray in late January is appropriate. Remember, a spray application has to be applied before blast injury occurs in order to protect the tissues. Cultural practices that harden off growth in the fall before wet, cold weather comes will help reduce the severity of blast damage. Avoid late season fertilization….the last nitrogen should be applied in late May. Using these cultural and chemical controls will help reduce citrus blast and the severity of blast damage to the tree.

Fruit brown rot

A *Phytophthora* fungus causes brown rot of citrus fruit. Soft brown spots will develop on fruit in the tree usually followed by fruit drop. Fruit close to the ground is the most easily rotted since fungus spores are splashed up onto the fruit from the soil by rain. Brown rot can occur anywhere within the tree's canopy and may be found higher in the tree along drive rows where vehicles have splashed mud up into the tree.

When sprays are applied early enough, this disease can be prevented by the same treatments that control citrus blast.

Nutrient deficiency symptoms

Zinc: This is the most widespread and damaging micronutrient deficiency of citrus in California. It is commonly called "mottle leaf" because of the distinctive leaf pattern it produces on most citrus species.

Excessive phosphate or nitrogen has been shown to bring on or increase zinc deficiency. Reduced vigor, lower production, smaller fruit size, and lower fruit quality all result from insufficient zinc in the tree. Symptoms indicating mild deficiency may have little effect on yield in oranges.

Zinc does not move to successive new growth flushes. Applications of zinc sprays may be necessary on each major flush of growth to keep the tree free of deficiency symptoms.
Mottling becomes more pronounced with more severe deficiency. Leaves are smaller and pale in color, and more growth terminals are affected. In cases of severe deficiency, twig dieback is apparent, resulting in bushy, stunted trees. Symptoms of zinc deficiency are usually more noticeable on the south side of the tree.

Manganese: Manganese deficiency is common in most citrus areas of California, and is particularly

evident in the spring after a cold winter. Because it frequently occurs in combination with deficiencies of zinc or iron or both, its symptoms may be overshadowed.

A slight reduction of tree vigor and yield is associated with mild manganese deficiency. If visual symptoms persist in leaves over 5 months old, yield is probably adversely affected. Defoliation, loss of vigor, and lower yields are the result of severe deficiencies. The area between the veins in the leaf becomes increasingly lighter in color as the deficiency becomes more severe. In extreme cases the area takes on a whitish-green cast, and the symptom is accompanied by premature leaf drop. Symptoms of manganese deficiency are usually more noticeable on the north side of the tree, and are more pronounced in the spring growth flush.

Potassium: Symptoms of potassium deficiency are yellow to yellow-bronze chlorotic patterns on older leaves. On orange, the chlorosis develops primarily on leaves behind fruit, and may not be easily recognized even when the deficiency is severe. Visual diagnosis should be confirmed by leaf analysis.

Nitrogen: Nitrogen deficiency is sure to occur if orchard fertilization is not practiced. For mature trees, 1 to 1 1/2 pounds of actual nitrogen per year applied in February are usually sufficient. Excessive amounts of nitrogen will reduce fruit size and quality and may delay maturity.

Symptoms of nitrogen deficiency include an overall yellowing of the tree canopy and lack of vigorous new growth.

Leaf analysis

Leaf analysis in citrus is best performed in September-October when nutrient levels in leaf tissues are stabilized. Excellent critical values to help guide you in your fertilization practice have been established for citrus by U.C. researchers. Analysis can reveal specific nutrient deficiencies or can alert you to potential problems that might be coming up.

Collect 5 to 7 month-old, terminal, spring-cycle leaves from non-fruiting and non-flushing shoots. Leaves selected for analysis should be free of obvious tip burn, insect or disease injury, mechanical damage, etc., and should be from normal, healthy trees. If you have a weak area and you'd like to diagnose the problem, sample that area and compare the results with those of a sample from your best area.

Critical Nutrient Levels for Citrus

	Deficient below	Optimum
Nitrogen(N)	2.2%	2.40-2.60%
Phosphorus (P)	0.09%	0.12-0.16%
Potassium (K)	0.40%	0.70-1.09%
Zinc (Zn)	16 ppm	25-100 ppm
Manganese (Mn)	16 ppm	25-200 ppm
Boron (B)	21 ppm	31-100 ppm

Deficiencies that are most common in this area are Nitrogen (N), Potassium (K), Zinc (Zn), and Manganese (Mn). Boron (B) and Phosphorus (P) are sometimes deficient in the Oroville foothills.

Citrus trees in the Sacramento Valley need zinc regularly, and may need manganese. Zinc and manganese are normally applied as a foliage spray. The best time to apply them is in the spring when the new growth is about half expanded.

Citrus Growers' Educational Seminar Reservation Form

For planning purposes, we are asking that you please make an advance reservation

Cost: $20.00 per person includes lunch and course materials

To register, please mail coupon no later than Friday, October 22nd - *or* - advise via phone (559) 738-0246, fax (559) 738-0607, or e-mail: info@citrusresearch.org by noon Monday, October 25th.

*(You may pay at the door – **cash or check only**)*

---------- Clip here ----------

Please make ___ reservations for the **Citrus Research Growers' Seminar in Auburn** on October 29th, 2010.

Name: _____

Address: _____

Phone: _____ Fax: _____ E-Mail: _____

Enclosed is my check in the amount of $_____. *Make check payable to Citrus Research Board.* Mail check with this form to: Citrus Research Board, P.O. Box 230, Visalia, CA 93279