



Central Coast Agriculture Highlights

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JULY 2006

Post Harvest Evaluations of Off-Season California Blueberries

Mark Gaskell



Fresh blueberry production has been increasing steadily in California over the past few years driven for the most part by attractive prices for off-season fruit. Mild growing areas near the coast permit the harvest of berries throughout the winter months, and early season production begins in late April from more inland areas. Growing conditions can be quite variable during these off-season production periods - particularly along the coast. Warm, sunny periods are interspersed with cool, foggy periods, and fruit production varies dramatically depending upon adequacy of temperatures to ripen the fruit.

Maintaining fruit quality is important during these periods, and we have initiated a project to sample and analyze different varieties of blueberries that are in production at different times. It may be possible to detect predictable differences among varieties so that growers can avoid potential post harvest problems with fruit during specific production periods. Some varieties may be better suited to production during these periods, and growers should have that information available to assist in the selection of the most appropriate varieties.

Fruit flavor and post harvest shipping and storage quality are the most important characteristics of concern. Fruit flavor is determined by many compounds, including sugar, starch, acids,

and specific flavor components. Acids are an important flavor component. A very acid fruit tastes unpleasant, but some residual acid gives fruit freshness, interest and a distinct fruit flavor, and without some

acid, fruit tastes flat. People vary in their tolerance to acid, and expectations may also vary with the harvest season. Sugars are also changing in the fruit as the fruit matures, and sugars determine the sweetness of the fruit. But a fruit with 10% sugar and low acid will seem sweeter to many people than a fruit with 20% sugar and high acids. Growers involved in farmer's markets and other direct marketing sales report comments from buyers who object to both high sugar/low acid fruit and to high acid/low sugar fruit.

We conducted post harvest quality evaluations of selected varieties of off-season California blueberry fruit during the 2006 season. Samples were sent to the post harvest physiology lab at UC Davis where Post Harvest Physiologist Beth Mitcham and her laboratory supervisor Bill Biasi performed various lab analyses and organized taste panels to evaluate the different varieties. Fruit was harvested weekly throughout March and April from a farm near Lompoc, CA. The different analyses were performed on the varieties Sharpblue, Sapphire, Misty, Jewel, and Emerald.

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Fruit were packed into plastic clamshells and shipped overnight to UC Davis in coolers with cold packs to help maintain cool temperatures. Fruit quality was evaluated upon receipt using laboratory procedures and evaluations by a taste panel. Quality parameters measured were firmness (using a FirmTech Firmness Analyzer), external color (using a Minolta Colorimeter), soluble solids, and titratable acidity (3 to 5 replicates of 10 fruit each). Subjective ratings for leakiness, shrivel, decay, and overall condition were done on an entire clamshell container comprising each replicate (3 to 5 replicates per variety) rather than individual fruit assessments.

Sensory evaluations were conducted by a panel of fifteen trained tasters to rate the blueberries for crispness, mealiness, sweetness, tartness, blueberry flavor, and off-flavors. For each variety the panelists were given 3 replicates of 3 to 5 berries each. The identity of each variety was concealed using 3-digit random numbers.

RESULTS

Subjective ratings for leakiness, shrivel and decay did not detect any significant problems with these characteristics, but consistent patterns emerged for firmness, soluble solids, and titratable acidity across the ten-week sampling period.

Firmness was lower in Sapphire and Jewel, and firmer in Sharpblue, Misty and Emerald most weeks (Fig. 1). Weekly taste panel evaluations also rated Jewel lowest in “crispness” (data not shown).

These firmness differences of course have implications for growers who wish to ship long distances as Jewel in particular is high yielding and produces good fruit sizes but may present handling problems without careful post harvest management.

The five varieties also differed in soluble solids and titratable acidity. Jewel and Emerald were lowest most weeks in soluble solids, and Misty and Sharpblue by comparison were consistently high (Fig. 2).

Emerald by comparison was consistently high in titratable acidity, and Sharpblue and Sapphire lower each week during the harvest period.

In taste panel evaluations, Sharpblue and Misty were consis-

tently rated relatively high on the “sweet” scale by panelists, and Emerald low in comparison (Fig. 4). Misty’s high rating likely resulted from relatively high sugars combined with moderate acidity. Sharpblue was high in sugars and relatively low in acids.

Emerald and Jewel were consistently the largest berries over the sampling period and Sharpblue the smallest (Fig. 5). These observations are consistent with grower’s experience with these varieties and data previously reported here and elsewhere.

In summary, the most popular southern highbush blueberries for off-season production grown at coastal California locations vary in several important post harvest quality characteristics. In previous post harvest studies with these varieties characteristics such as soluble solids and titratable acidity varied with harvest period. The 2006 season was marked by an unusually cool and wet March and April period that has affected fruit crops throughout the state. Some blueberry post harvest quality characteristics such as soluble solids or titratable acidity may be affected by growing conditions such as temperatures and solar radiation levels. Because of the unusual spring growing conditions in 2006 with cool, overcast conditions throughout much of March and April, the variations seen across harvest dates this season may not be representative of a more typical season. Further studies with this group of blueberry varieties are needed to expand this base of knowledge into a wider range of growing conditions.

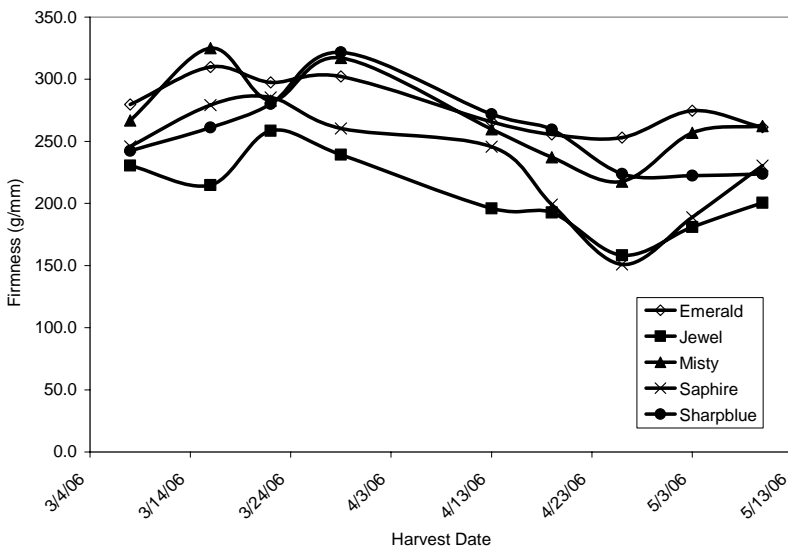


Fig. 1. Weekly fruit firmness ratings of five varieties of blueberries. 2006 season.

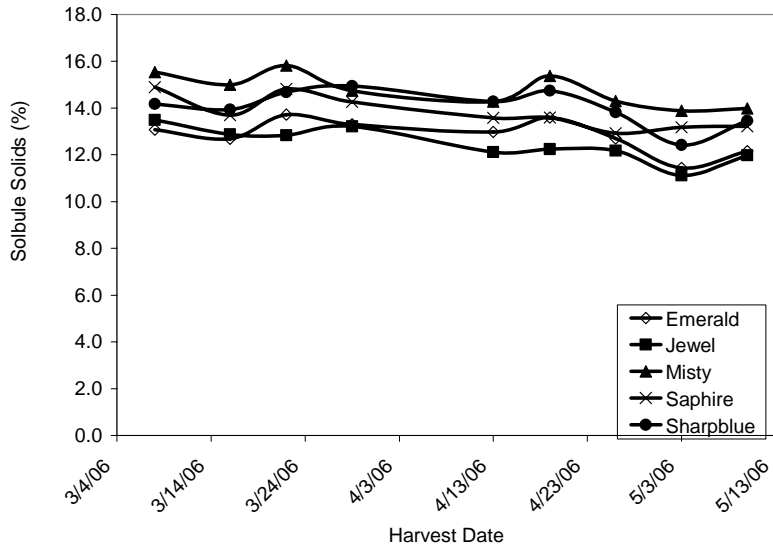


Fig. 2. Weekly soluble solids analyses of five varieties of blueberries. 2006 season.

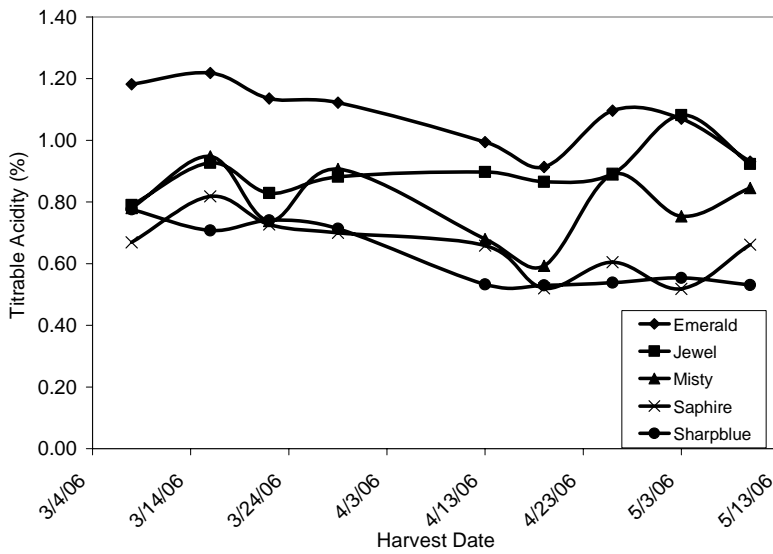


Fig. 3. Weekly titratable acidity analyses of five varieties of blueberries. 2006 season.

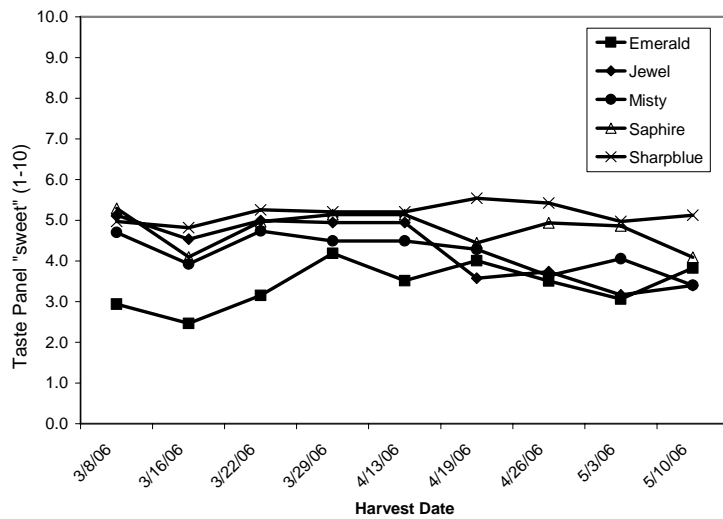


Fig. 4. Weekly taste panel evaluations (scale 1-10) of "sweetness" of five blueberry varieties (10=sweetest). 2006 season.

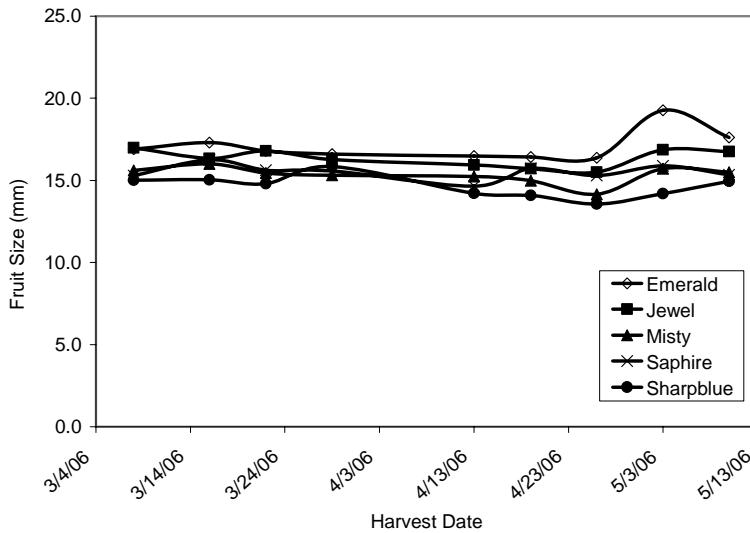


Fig. 5. Weekly average fruit size of five blueberry varieties. 2006 season.

Federal Crop Insurance Programs for Blueberries and Blackberries

Mark Gaskell

Federal crop insurance is now available in California for fresh blueberries by prior written agreement and on a trial pilot basis for fresh blackberries in Santa Cruz and Monterey Counties. The insurance is available through the USDA Risk Management Agency and covers the value of the damaged crop, but the insurance must

be purchased prior to damage occurring. Each specific crop is insured separately, and there is a minimum production requirement for insurability.

Typically, the more coverage desired, the higher the premium,

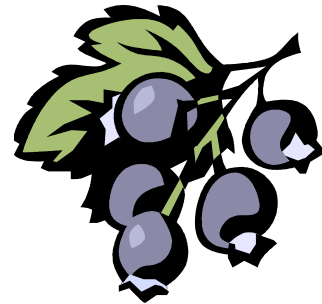
but under the existing programs, the premium is partially subsidized.

Causes of damage for which insurance is available include:

- Adverse weather
- Insects
- Diseases
- Fire
- Failure of irrigation water supply
- Wildlife

And specific restrictions may apply.

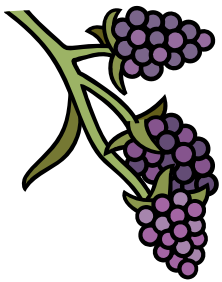
These insurance programs begin November 21, 2006, for insurance during 2007. The coverage ends on destruction of the crop, final adjustment of a loss, harvest of the crop, or crop abandonment, whichever comes earlier.



For additional information contact:

Sandy Sanchez
 Risk Management Agency
 (530) 792-5890
sandy.sanchez@rma.usda.gov
 Or visit the local county FSA office or visit the USDA - RMA website at
www.rma.usda.gov

The final date for purchasing crop insurance is **November 20, 2006**.



Position Vacancy Announcement

University of California Cooperative Extension
Division of Agriculture & Natural Resources

Vegetable & Strawberry Crops Advisor #ACCSO-05-01-R

Location: Santa Barbara (Santa Maria, headquarters) and San Luis Obispo Counties, California

Closing Date: To assure full consideration, application packets must be received by
July 21, 2006 (open until filled)

Background: The geographic area served by this position will include Santa Barbara and San Luis Obispo Counties. The advisor will have his/her primary office in Santa Maria (Santa Barbara County), California.

Santa Barbara (SB) and San Luis Obispo (SLO) Counties have approximately 105,000 acres of crop land devoted to vegetable production, and 4,500 to 5,000 acres devoted to strawberry production. The estimated value of the vegetables produced is \$550 million. The strawberry crop is valued at approximately \$200 million. The grower community is extremely diverse; and both counties have a large concentration of small farm operations with approximately 450 growers. This area has several of the largest vegetable and strawberry production operations in California, comprised of approximately 110 growers. The strawberry season begins in October/November and continues through August. The primary vegetable crops are cool season vegetables, which are grown year-round. The warm season crops - peppers, squashes, beans, tomatillo, and sweet corn - are also grown. This position will also have inquiries from growers for problem-solving with cut flowers, greenhouse-grown crops, and several of the largest vegetable transplant producers in California.

Nature and Purpose: The Vegetable/Strawberry Farm Advisor has responsibility for conducting an educational and applied research program for the vegetable and strawberry industries in Santa Barbara and San Luis Obispo Counties. The advisor will identify and assess the needs of clientele; conduct surveys and field trials addressing identified problems; and develop appropriate educational outreach programs to bring about improved practices among the clientele.

Education: A minimum of a Master's degree in either Plant Science or Pest Management, or closely related discipline is required.

How to Apply: To be considered, applicants must submit the following **four** components (by hard copy) of the Application Packet:

1. Cover Letter indicating interest in the position.
2. UC-DANR Academic Application form, which can be downloaded in PDF format from this website <http://ccsr.ucdavis.edu>
3. Brief résumé.
4. College Level Transcripts (original transcripts preferred, however, legible photocopies of original transcripts will be accepted. Transcripts downloaded from websites will not be accepted.)

To request a UC-DANR Academic Application packet, contact the Regional Office by e-mail at:

ccsracadrecruitment@ucdavis.edu

Return completed application packet to:

Cheryl Gneckow, Academic Recruitment
DANR - Central Coast & South Region, #213
University of California
Riverside, CA 92521
Phone: (951) 827-2529; Fax: (951) 827-2328

Cattle with Chocolate Blood

Wayne Jensen

This is a topic we talked about in the past, but I hope it will serve as a refresher for you based on this year's rains and the abundant production of plants growing on your grazing lands. This is a timely article from Dr. John Maas, our Extension Veterinarian at the University of California, Davis. It is timely because this situation has occurred locally in past years.

The disease that can cause cattle to have "chocolate blood" is called nitrate toxicity. Nitrate toxicity affects grazing cattle in California every year, and periods of abnormal rainfall or drought conditions can both increase the chance of this problem affecting your herd. In this column we will try to answer some of the common questions regarding this toxicity.

What does nitrate toxicity look like in cattle?

Acute poisoning can occur within 30 minutes to 4 hours after ingestion of plants or water high in nitrates. Thus, the problem occurs very quickly, and often the cattle are observed to be normal one day and dead the next day. A very early sign is salivation followed by frequent urination. Soon after, the cattle exhibit difficult breathing, increased respiratory rate, and dark brown or "chocolate" colored blood and mucous membranes. The animals then become weak, reluctant to move, and have convulsions before they die. It is common to simply find some of the cattle dead. If pregnant cattle receive a dose that is not quite deadly, they may abort soon after recovering.



Redroot Pigweed
Amaranthus retroflexus L.



Milk Thistle
Silybum marianum (L.) Gaertn.

What causes the problem?

High levels of nitrates (or nitrites) in the feed or water are the cause of nitrate toxicity. These compounds are converted to nitrites in the rumen of cattle, and the nitrites are absorbed across the rumen wall and into the blood stream. The nitrite in the blood reacts with hemoglobin to form a compound (methemoglobin) that can no longer carry oxygen to the cells of the body. Thus, the cattle simply cannot deliver oxygen to their vital organs - brain, heart, etc. As you can imagine, death quickly follows a lethal dose.

Where do the nitrates come from?

Nitrates are nitrogen-based compounds and can be high in water sources when this water collects runoff from fertilizers, decaying organic matter, animal wastes or other nitrogen sources. The nitrate amounts are generally higher after periods of excess runoff - spring snow melt, irrigation runoff after fertilization or heavy rains. Occasionally, deep, drilled wells can also have high levels of nitrates. Certain weeds

are high in nitrates, such as pigweed, lamb's quarters, dock, Johnson grass, Jimsonweed, nightshade, Russian thistle, and milk thistle (*I can recall locally where a number of cattle were found dead lying among this thistle*) - all of which occur commonly in California. Additionally, almost any crop can have high nitrate levels; however, Sudan grass hay and oat hay are more likely to have levels of nitrates that are potentially toxic.

How do you know if nitrate toxicity is the problem?

If your cattle die acutely, and there has been a recent change in feeding practices, such as feeding high-risk hay (oat hay, Sudan grass hay, etc.), change in water supply, moving from one field to another - you should suspect nitrate toxicity as a problem. There are a number of other common causes of acute death in cattle, such as Red water, Anaplasmosis, and other toxicities that must be considered. Your veterinarian, working with the California Animal Health and Food Safety Laboratory, can perform

tests on the dead cattle to determine the cause of death. For nitrate toxicity, samples from the eye of the dead cattle can be very useful to diagnose nitrate problems. Also, rumen samples, feed samples, and water samples are usually analyzed. The diagnosis is not an easy one, and if you don't pin it down after the first round of dead cattle, more problems will follow.

How do you treat affected cattle?

There is an antidote for nitrate toxicity. The most common treatment is methylene blue. This is a chemical that restores the hemoglobin so it can carry oxygen again. It is administered intravenously by your veterinarian, and treatment should be started very soon after the cattle are affected. Treatment must usually be done within an hour or so of when the cattle first become ill to be effective. All cattle must be immediately moved from the suspected source of the nitrates.

How do you prevent nitrate toxicity?

First of all, make sure the cattle are not exposed to weeds that contain high levels of nitrates - pigweed, lamb's quarters, Johnson grass, nightshade,

or thistles. Cattle will not eat these weeds in any amount unless forced to by lack of quality forage. Be sure high risk water is not available to the cattle. If surface water or well water is thought to be a risk, have it tested before allowing cattle access. Thoroughly test before feeding any high-risk hays, such as Sudan grass hay, oat hay, particularly if it has been stressed by drought, high rates of nitrogen fertilization or frost before harvesting.

What levels of nitrates should you be concerned about?

The concentration of nitrates and nitrites is commonly expressed in a variety of different terms. Before making any decisions consult with your veterinarian to make certain of the units of measure and any appropriate conversion. The nitrate concentration can vary tremendously within a stack of hay. When testing hay, be sure to sample at least 40 bales of hay from different parts of the stack. Below is a list of water and forage concentrations of nitrates and associated risks.

Water - ppm (parts per million) nitrate (NO₃)

- 0 - 44 not harmful
- 45 - 132 slight possibility of harm
- 133 - 220 risky over long period of time
- 221 - 660 some losses expected
- 661 - 880 increased losses expected
- 880 and Above heavy, acute losses

Feed - nitrate nitrogen (NO₃-N) content

- 0.0 - 0.1% safe under all conditions
- 0.1 - 0.15% safe for cattle EXCEPT pregnant cows
- 0.15-0.4% increasing level of risk, limit amount to keep total diet below 0.15% of nitrate nitrogen
- Over 0.4% do not feed



Nightshade



Johnson grass



Broadleaf dock

New Publications from UC



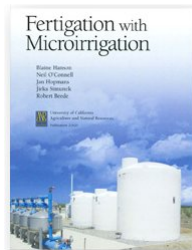
Franklin Laemmlen, Farm Advisor Emeritus

Communications Services at the University of California at Davis has recently released several publications which may be of interest to Central Coast readers. The first one is a "retail only" item and can be purchased for \$25.00 plus tax from our office. All other publications listed are online and can be viewed and/or downloaded FREE by going to the website listed.

NEW FOR RETAIL SALE ONLY

Fertigation with Microirrigation

Blaine Hanson,
Neil O'Connell,
Jan Hopmans,
Jirka Simunek,
Robert Beede



Fertigation is the process of applying fertilizer through an irrigation system by injecting the fertilizer into the irrigation water. Microirrigation can apply water and chemicals in precise amounts and locations through the field. This manual helps guide users through strategies and decision making for fertigation with nitrogen, phosphorus and potassium, and gypsum. It discusses the environmental effects of chemical applications, and focuses on nitrogen management to reduce groundwater pollution. The guide also covers the characteristics of selected fertilizers commonly used for fertigation, long- and short-duration strategies, how to calculate injection rates, frequency considerations, how to apply fertilizers uniformly, mixing considerations, injection devices, and how to prevent backflow.

Publication Number: 21620
\$25.00

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A Planner's Guide for Oak Woodlands

Wayne Jensen

First published in 1992, *A Planner's Guide for Oak Woodlands* was the first such manual of its kind. Designed for professional planners, consultants, and landscape architects, this new edition provides science-based information that can guide decision-making.

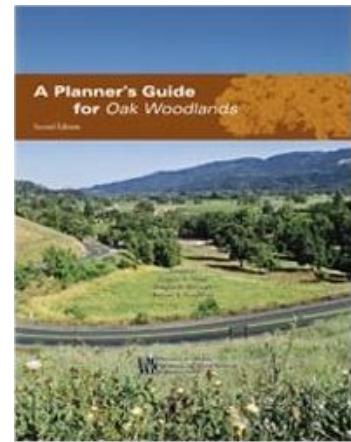
Chapters cover a range of planning and conservation topics including:

- Biology of Oak Resources
- Wildlife Habitat
- Watershed Management
- Regional Planning

- Mapping Resources and Modeling Risk for Improved Land Use Planning
- Ordinances

The 116-page second edition also features a sturdier binding and more photographs.

The encroachment into oak woodlands addressed at the time of the first edition has not stopped, and in some cases it has continued at an alarming rate. As more development occurs in the oak woodlands, this guide can provide a framework for preserving this icon of the California landscape.



Publication No: 3491
Author: Gregory A. Giusti
\$15.00

SAVE THE DATE!

THE 6TH CALIFORNIA OAK SYMPOSIUM

California's Oaks: Today's Challenges, Tomorrow's Opportunities

October 9 - 12, 2006

Doubletree Hotel, Rohnert Park - Sonoma County

The focus will be on science, management, conservation, planning, and policies related to California's oak woodlands. Topics will include monitoring, restoration, regeneration, livestock relations, utilization, recreation, ecology, fire, wildlife, easements, and pest and diseases.

Academics, planners, conservation practitioners, foresters, arborists, and oak enthusiasts should participate. Please consider presenting a paper at the conference and in the proceedings, displaying a poster, assembling a panel of speakers on a special topic, putting up a display, making a financial contribution and, of course, attending the meeting.

Visit the conference web site

<http://danr.ucop.edu/ihrmp/symposium.html>

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