University of California Cooperative Extension Butte County

UC CE University of California Cooperative Extension Agriculture & Natural Resources

# OLIVE NOTES

April 8, 2014

***In This Issue:***



*Joe Connell*
UCCE Farm Advisor
Butte County

## UCCE Sacramento Valley Olive Day – April 29, 2014
## Veterans Memorial Building, 1620 Solano St., Corning

Co-Sponsored by Musco Family Olives, Bell Carter Olives, California Olive Ranch, West Coast Olives, Tehama Co. Ag. Commissioner, and UCCE Glenn, Tehama and Butte Counties

8:00 a.m. **Registration**

**Moderator** – *Dr. Dani Lightle, UCCE Farm Advisor, Glenn, Butte & Tehama Cos.*

8:30 **Agricultural Commissioner's Update**
*Doug Compton - Tehama County Agricultural Commissioner's Office*

9:00 **Mechanical Harvest of Table Olives – Research Update**
*Dr. Louise Ferguson- UCCE Olive Specialist, Plant Science, UCD*

9:30 **Olive Pest Management Districts Update**
*Glenn and Tehama Counties, Speakers to be determined*
**Olive Fly and Brown Marmorated Stink Bug Identification**
*Dr. Dani Lightle, UCCE Farm Advisor, Glenn, Butte & Tehama Cos.*

10:00 **Alternate Bearing in Olive**
*Dr. Elizabeth Fitchner, UCCE Farm Advisor, Tulare Co.*

10:30 **Break**- *Refreshments provided by West Coast Olives*

10:50 **Water Management Under Drought Cutbacks**
*Joe Connell, UCCE Farm Advisor, Butte County*

11:20 **Olive Oil Market and Future Market Potential**
*Paul Vossen, UCCE Farm Advisor, Sonoma County*

**Continuing Education hours requested:**
**0.5 hour other,**
**0.5 hour laws and regulations**

12:00 **Lunch** - *Courtesy Musco Family Olives, Bell Carter Olives and California Olive Ranch*

**Please phone (530-865-1107) or email (jesamons@ucanr.edu) with your reservation for the Complimentary lunch by April 24th so that we may accommodate all guests.**

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

## New Farm Advisor Introduction

*Dani Lightle, UC Farm Advisor, Glenn, Butte & Tehama Counties*

On February 10th, 2014, I began working as the new Orchard Systems farm advisor based in Glenn County.

I grew up in northern Ohio and earned my bachelor's degree in Biology in 2007. Subsequently, I studied invasive forest insect pests for a year at The Ohio State University. I moved to Corvallis, Oregon in 2008 and switched to research in small fruit agricultural systems. In 2013, I completed my PhD in Entomology with a minor in Plant Pathology from Oregon State University. From 2008 to 2013 my research focus within small fruit cropping systems included biological control, transmission and control of insect-transmitted plant pathogens, and management of plant viruses.

Throughout my time in Oregon, I strove to maintain a strong working relationship with small fruit producers in order to make sure my research was both relevant and useful. I look forward to creating similar relationships with Sacramento Valley farmers and invite you to contact me with your questions, concerns, or just to introduce yourself. I can be contacted by email at dmlightle@ucanr.edu or by phone by calling the Glenn County extension office at 530-865-1107.

## Olive Fruit Fly Management

The maximum tolerance for olive fly in **oil olives** depends on the individual processor, but is usually around 10% damage. For **table olives** the tolerance for olive fly damage is virtually zero.

You need to manage olive fly if you're going to produce excellent quality olives for oil or table use. Currently, GF-120 NF Naturalyte Fruit Fly Bait (a formulated Spinosad bait produced by Dow AgroSciences LLC) is available as a sprayable, insecticidal material that is also approved for organically grown olives. When using an "all terrain vehicle" (ATV), the solution should be applied to the upper half of each tree, in every other row each week (divide the amount of solution per acre by the number of trees per acre to determine the amount of solution to apply per tree). The following week, the alternate unsprayed rows should be treated in a similar manner. For best effect, large droplets (4–5 mm in diameter) are needed so they do not dry out too quickly. When using a handgun applicator for individual trees, cover approximately a 2-foot diameter area within the tree canopy on the north or east side of each tree. Do not use flat fan nozzles. For best results, about three to six 5 mm diameter droplets per square foot of foliage are necessary.

Olive fruit fly populations are usually relatively low during the heat of the summer but increase substantially in September resulting in damage by harvest. Damage to fruit is certain to occur if sprays to control olive fly are not being applied. Monitoring your own orchard with traps will give you an idea of population trends over the season and can help you evaluate your spray program effectiveness. Additional information on OLF control is available in our office. Stop by or call for more information, 538-7201 or visit the UC IPM website at:
http://www.ipm.ucdavis.edu/PMG/r583301311.html

## Olive Production Manual, 2nd Edition

Released in 2005, this manual quickly became a bestseller as the definitive guide to olive production in California. If you don't have it already, you'll want to update your library with this edition that includes new chapters on deficit irrigation, an expanded chapter on olive oil production, and coverage of four new pests, including the olive fly. The 180-page manual is fully illustrated with 40 tables, 19 line drawings, 36 charts, and 100 color and black and white photos. Includes production techniques for commercial growers worldwide - from orchard planning and maintenance to harvesting and postharvest processing.

*Olive Production Manual, 2nd Edition*, ANR publication 3353, is available for $35.00 in our Butte County Cooperative Extension office, call (530) 538-7201 for more information.

## Fertilizer Application

Now is the time to apply nitrogen fertilizers. Additional rain or irrigation following the application will move the nutrients into the root zone. Tree nutrition can be further checked with a leaf analysis this coming July. The three nutrients that are most likely deficient in our area are nitrogen, potassium, and boron. If any one of these elements is deficient your olive trees will not be able to produce at the maximum level.

## Irrigation

High temperatures and longer days will cause olive trees to use soil moisture at a rapid rate as bloom approaches. Begin to plan for the irrigation season soon. We are currently in an important stage for the developing olive bloom. If additional rains don't come, bloom can be adversely affected and fruit set can be reduced if the trees suffer water stress. Water stress during the spring floral development period increases pistil abortion and reduces the number of flower clusters and flowers formed. Stress following bloom increases natural fruit drop.

Our olive orchard soils are shallow, rocky, and often have a limited soil water reservoir. Shortly after rainfall ceases, the available water in the soil profile can be used up very quickly.

If trees run out of water, all growth processes are adversely affected. Don't let water stress reduce fruit set or negatively affect new shoot growth thereby making alternate bearing problems more severe.

For a complete discussion of the water budget method of irrigation scheduling, call our office and ask for the free publication "Scheduling Irrigations in Butte County Evergreen Orchards". This leaflet contains tables on water use that can be used to plan an entire season's irrigation schedule based on your orchard conditions and historical weekly tree water use.

## Olive knot, an old disease causing new problems

*J. E. Adaskaveg[1], H. Forster[1], M. L. Wade[2], J. H. Connell[3] and J. Post[1] , University of California, Riverside, [2]Arysta Life Science, Cary NC, [3]UCCE Butte County, and [4]AgAdvisors, Yuba City, CA*

Olive knot has been known as a disease of olive (*Olea europaea*) in California for over a hundred and twenty years. The disease is caused by the bacterial pathogen *Pseudomonas savastanoi* pv. *savastanoi* and is distributed in many olive production areas worldwide. With the recent establishment of high-density plantings and mechanical over-the-row harvesting and pruning operations to optimize yields and reduce labor costs, the associated increase in bark injuries has contributed to severe outbreaks of olive knot.

Furthermore, olive growing areas in California have expanded into the northern Central Valley floor (Zone 8) that is more prone to winter freezes. Frost cracks in the bark of olive trees may serve as infection sites for the pathogen and lead to subsequent disease epidemics. Historically, the California olive industry was located in the warm thermal belts surrounding the edges of the Central Valley (Zone 9) that are much less prone to winter freezes.

Fig. Olive knot

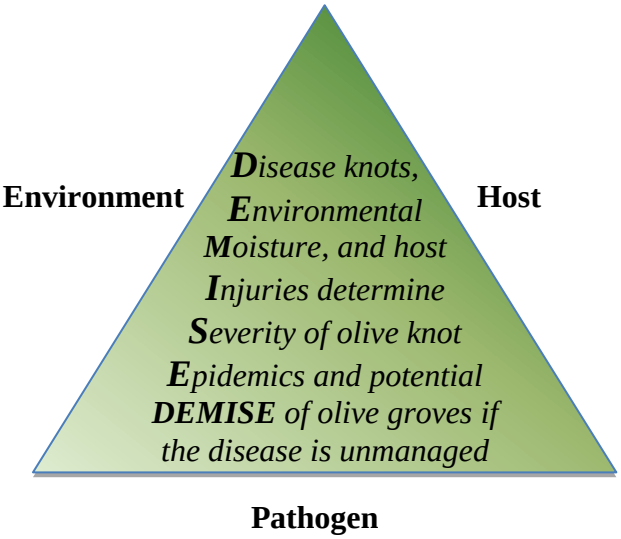
Symptoms of olive knot include galls or "knots" that can develop on branches, trunks, and even leaves. Severe infections can result in hundreds of knots per tree resulting in defoliation and twig and branch dieback with subsequent reductions in crop yield. All varieties are susceptible, but some are more susceptible than others. Mission and Ascolano are less susceptible; whereas Manzanillo, Sevillano, and Nevadillo are more susceptible. Among newer varieties planted in California, Arbequina, Arbosana, and Koroneiki are very susceptible to the disease.

The pathogen is a wound colonizer. Common plant entry points include leaf and fruit scars (abscission scars), freeze cracks, and hail damage. With the development of mechanical harvesters, abrasions caused by equipment that injure the bark have become major sites for entry of the pathogen into the plant. Plant injuries eventually heal and then are not susceptible to infection anymore, but protection is needed for a minimum of three weeks to prevent pathogen colonization of the wound.

Once the bacteria enter the plant, they multiply and produce indole acetic acid (IAA), a plant growth regulator that causes host cells to enlarge and multiply resulting in the formation of a gall. This structure is a reservoir for new inoculum to be

produced, and under wet conditions, bacteria will ooze out and cover the knot.

Water splashing from irrigation or wind-driven rain disseminates the pathogen to new infection sites. In California, infections occur mostly in the rainy late fall, winter, and spring seasons, but knots do not develop until new growth occurs in the spring and summer.




Infection can occur over a wide range of temperatures and therefore, wetness is the main environmental factor favoring disease development. Thus, the number of olive knots that provide inoculum (amount of ***D***isease), favorable ***E***nvironmental wetness or ***M***oisture, and the extent of available host ***I***njuries, are critical factors of the disease triangle (host, pathogen, and favorable environments) that determine the ***S***everity of olive knot ***E***pidemics and the potential ***DEMISE*** of olive groves if horticulturalists do not manage the disease.

Management of olive knot is difficult. Horticultural practices such as proper irrigation and fertilization that promote healthy tree growth and minimize tree stress will result in less leaf drop and thus, reduce potential infection sites. Exclusion of the pathogen, sanitation and selective removal of diseased twigs and branches, as well as preventing or realistically minimizing injuries are the basis of the most successful strategies. Introduction of the pathogen should be avoided at establishment of plantings by using disease-free nursery stock. Because the bacterial pathogen may be carried on pruning equipment, frequent disinfection is necessary. Pruning out diseased branches is most beneficial if done at early stages of disease occurrence in the orchard when eradication or significant reduction of the pathogen (i.e., inoculum) can still be successful. Pruning should be done during dry weather (i.e., late spring and summer) to remove infected branches and to avoid re-infection of pruning cuts. Mechanical pruning and harvesting should not be done before or during extended rainy periods.

Few chemical treatments are currently available. Painting galls with Gallex® can be a successful therapeutic treatment but is very labor intensive. Spray applications of copper-containing bactericides are protective treatments for leaf scars and other injuries. These treatments have been very effective in minimizing the disease for many years. These treatments need to have repeated applications to protect new wounds as they occur and to maintain copper levels on the plant that are toxic to the pathogen. A minimum of two applications per year is usually necessary: one in the spring when the normal leaf drop occurs and one in the fall immediately after harvest and before the rainy season.

Additional applications may be needed if conditions warrant, such as hail storms or high rainfall-low temperature periods in mid-winter that may cause cold injury. Copper treatments have to be applied before the injuries occur. Their post-infection activity is very short and treatments are ineffective when applied 24 hours or longer after an infection period. For this reason, protective treatments need to be applied within hours following injury.

***Protective treatments need to be applied within hours after mechanical harvesting.***

In recent years, new copper formulations have been developed with reduced metallic copper equivalent (MCE). The efficacy of copper treatments has been questioned by growers experiencing increases in olive knot in some locations. Two factors are involved: 1) Historically, the pathogen was very sensitive to copper; however, copper resistance has commonly developed in numerous other bacterial plant pathogens; and 2) With less MCE available in newer formulations of copper products, sufficient amounts of copper may not be available to provide protection over an extended period of time (e.g., several weeks).

In recent surveys of northern California olive groves that we conducted, most populations of the olive knot pathogen in California had a reduced sensitivity to copper. We demonstrated, however,

that higher rates of copper products are still toxic to the pathogen and prevent bacterial growth and disease from developing. Research is ongoing to determine if treatments using newer copper formulations have the necessary persistence to provide extended protection.

***Although strains of the pathogen less sensitive to copper are present in California, higher rates of copper products are still effective in preventing olive knot.***

Based on historical guidelines, copper-lime (Bordeaux) mixtures at 8 to 10 lbs. copper sulfate and 8 to 10 lbs. freshly hydrated lime per 100 gal water have been used to protect trees from olive knot and other diseases such as peacock spot for decades.

A common Bordeaux mixture for other crops in California uses a modified version with fixed copper formulations. For this, 2 lbs. MZE (metallic zinc equivalent used as zinc sulfate), 1.5 to 2 lbs. MCE (used as a fixed copper), and 4 lbs. hydrated lime (used as calcium hydroxide) per 100 gal of water are applied to a crop acre as a spray tank mixture (Note: the materials have to be added in the order of: zinc, copper, and then lime). This strategy allows for fixed coppers to be used which are formulated for ease of use and to minimize plant injury. Additionally, lime helps to extend the residues of zinc and copper on the plant and also helps to prevent phytotoxicity. For use on olive, the main role of zinc sulfate is not nutritional but to acidify possible alkaline water and increase the solubility of copper before adding the hydrated lime during mixing.

Currently, we are evaluating a number of different products with new modes of action against bacterial pathogens, including *P. s.* pv. *savastanoi*. We are exploring treatments that may be applied to trees during periods with high risk of infection. One of the most effective treatments identified that protect plant wounds from the pathogen is kasugamycin. This antibiotic is not used in animal or human medicine. Furthermore, no residues will occur on the crop if the use strategy is to apply immediately after harvest, during the winter period, or before flowering in the spring. Currently, we are supporting its registration in the United States for bacterial disease management on several crops.

We are also developing non-corrosive sanitizers for mechanical harvesting and pruning equipment that are highly toxic to the pathogen, killing bacterial cells within seconds even when bacterial ooze from knots is smeared on hard surfaces. Sanitizers could also be automatically applied to equipment with built-in application systems on the harvesters and pruning machinery. This way dissemination of the pathogen can be prevented or reduced.

We hope to develop programs that integrate products with different modes of action to prevent the selection of resistance to any one product and to increase the level of disease control to allow for mechanical harvesting and pruning in high-density olive production systems in California. These horticultural transformations in olive production are essential for the future success of the olive industry in California. Thus, as with any high intensity agricultural system, the inputs for disease control will also need to increase.

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