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Submitted by:

Franz Niederholzer,
UC Farm Advisor
UCCE Colusa, Sutter
and Yuba Counties

Upcoming Meetings:

February 19	South Sacramento Valley Almond Meeting Arbuckle Golf Club 530-458-05701
February 22	Almond Institute and Walnut Day Chico Elks Lodge 530-538-7201

Butte-Glenn Almond Institute & Walnut Day -- February 22nd

Joe Connell, UC Farm Advisor, Butte County

The Butte/Glenn Counties Almond Institute /Walnut Day will be held on Friday, February 22nd with presentations from 8:30 a.m. to 2:45 p.m. at a **new location** -- **Chico Elks Lodge, 1705 Manzanita Ave., Chico**. This seminar delivered by University of California farm advisors, specialists, research scientists, the Butte County Ag Commissioner, and industry experts from the California Walnut Board will feature the following topics:

- ◆ Agricultural Commissioner's laws and regulations update
- ◆ Your Assessment at Work: 2013 California Walnut State of the Industry
- ◆ Site Selection, Soil Modification, and Replant Disease Management when Planting an Almond Orchard
- ◆ Water Management in walnuts and almonds
- ◆ Long Term Irrigated Lands Regulatory Program – A Sacramento Valley Perspective
- ◆ Dynamics of Walnut Blight Management
- ◆ Highlights of Hull Rot and Scab Control in Almonds
- ◆ Update on New Walnut Varieties and New Variety Releases
- ◆ What's new in Pest Management of Weeds and their Control
- ◆ Root Physiology and Root Functions of Almond and Walnuts
- ◆ Sprayer Calibration to meet Application Regulations and Save Money

This seminar is open to the public. Cost \$15.00/person includes lunch and meeting expenses. For more information about the program, call (530) 538-7201 or visit our website: <http://cebutte.ucanr.edu>.

Groundwater Nitrogen Dilemma

Richard P. Buchner – UC Farm Advisor, Tehama County

Nitrogen is a key element for almond production. Economics plus a potential for leaching nitrogen ($\text{NO}_3\text{-N}$) below the root zone necessitates efficient use. Application estimates vary, but many almond farmers apply something like 200 pounds of nitrogen per acre per year. Hopefully all of that nitrogen is captured in the tree root zone. Under certain circumstances, losses can occur to volatilization, denitrification and possible leaching below the root zone. It's in everyone's interest to minimize those losses.

As interest in groundwater nitrogen increases, farm managers across California are going to be placed in the position of documenting efficient nitrogen application and where applied nitrogen goes. Fortunately for the almond industry, research on a "Nutrient Budget Approach and Optimization of Fertilizer Management in Almond" (Patrick Brown et al. at UCD) is underway and starting to offer answers for nitrogen management (Almond Board of California 2012 Research Update).

Just how serious ground water nitrate contamination from agricultural sources is for the Sacramento Valley is still to be determined. Recent studies focused on the southern San Joaquin Valley and the Salinas valley. Additional data will be needed from other regions of the state to sort out how serious of a problem actually exists and what sources contribute to the problem.

Work done by Cooperative Extension Farm Advisors in 1999 looked at $\text{NO}_3\text{-N}$ groundwater levels across the Sacramento Valley. Analysis at fifteen locations from Yolo to Tehama County showed a range of 0 to 11.1 ppm $\text{NO}_3\text{-N}$ in well water samples. 11.1 ppm $\text{NO}_3\text{-N}$ would be 30.2 pounds of Nitrogen per acre-foot ($\text{NO}_3\text{-N}$ (ppm) \times 2.72 = pounds of nitrogen per acre-foot of water). Assuming 3 acre-feet of applied water, irrigating with that water could contribute 90.6 pounds of nitrogen per acre. This is a potentially valuable resource whose contribution you should know about in your wells when irrigating. Factoring in nitrogen contributions from irrigation water is an important part of making your farming operation efficient and cost effective. Depending upon location, ground water nitrogen is definitely worth looking at.



Bee Careful with Pesticides

Eric Mussen, Extension Apiculturist, UC Davis

Beekeeper complaints about the failure of their bees to emerge from the pupal stage, beginning 17 days after applications of the fungicide Pristine® to almonds, prompted a three-year investigation into the cause. Research showed that the fungicide, itself, harmed neither adult nor immature bees. The organosilicone adjuvant did not appear to be the problem, either, although a number of adjuvants can harm honey bees.

The unexpected discovery was that an insect growth regulator (IGR), diflubenzuron, had been added to the tank mix and applied with the fungicide at full bloom, apparently to assist in controlling peach twig borer. This type of growth regulator inhibits the production of chitin, the basic structural compound of an insect exoskeleton. Thus, the pupae could not develop into functional adults.

Insect growth regulators have been used on field and row crops, later in the season, with little harm to colonies. However, later in the season, other pollens are likely being consumed, in addition to the IGR-contaminated pollen. In the case of almonds, honey bees gather little else other than almond pollen, so they will be eating significant doses of whatever might be contaminating the pollen. In this particular

situation, it appears that too much IGR made its way into the larval diet and caused brood loss. Usually, the addition of *Bacillus thuringiensis* (B.t.) to the tank mix would be a much more reasonable twig borer treatment from the standpoint of bee safety.

Despite the fact that no bee-toxicity warning may appear on the product label, or that the label might even state “safe for bees,” the testing behind those statements usually relates to studies conducted on acute toxicity to adult worker bees. Obviously, adult bees are no longer producing chitin, so exposure to IGRs should not damage them. It is the immature stages that require protection, and current regulatory protocol does not mandate testing for negative effects of active ingredients, formulated products, adjuvants, or other “inert ingredients” on immature honey bees.

Probably no pesticide is totally benign to a honey bee colony. Pesticides are designed to kill (“-cides”). The best way to protect honey bees from poisoning is to reduce or eliminate the amount of pesticides that are returned to the hive in forager bees’ pollen pellets. Many early-season tree crops shed their pollen in the morning and the bees are likely to collect nearly all of it by early in the afternoon.

By checking for pollen loads on foraging bees on the bloom, an applicator can determine when the pollen foragers have basically finished foraging for the day. At that time, pesticides that are not acutely toxic to honey bees can be applied to the crop. Nectar foragers that still may be visiting the contaminated bloom do little to contaminate the pollen stores. By avoiding contaminating pollen and pollen foragers, applicators can go a long way toward protecting the health of honey bee colonies.



Almond orchards with wild insects have higher fruit set

Claire Brittain^{1,3}, Claire Kremen², Neal Williams³, Robbin Thorp³, Stephen Hendrix⁴, Alexandra-Maria Klein¹.
¹Leuphana University of Lüneburg, Germany, ²University of California, Berkeley, ³University of California, Davis, ⁴University of Iowa

Summary: Observations of flower visitors in almond orchards in Colusa and Yolo Counties found that flower visits by wild insects were positively related to the amount of natural habitat surrounding the orchard. Those orchards where there were lots of wild insects visiting flowers showed a higher percentage fruit set (percentage of flowers developing into nuts).

A team of researchers has been investigating the “free” pollination service that wild insects can provide to almonds in California. In 23 orchards across Colusa and Yolo Counties almond flower visitors were observed and fruit set monitored. The orchards varied in terms of their landscape context. Some orchards had high amounts of surrounding natural habitat (>30% within a 1km radius), some had low surrounding natural habitat (<5%) and a third group had low surrounding natural habitat but with a strip of semi-natural, often riparian habitat running along one edge of the orchard.

We found that almond orchards with high amounts of surrounding natural habitat received many more flower visits from wild insects, predominantly wild bees, than orchards with low surrounding natural habitat (Fig. 1a). The orchards with a semi-natural strip had more wild insect visits than the orchards with low surrounding natural habitat. We found the same pattern with fruit set. Those orchards that had high amounts of surrounding natural habitat and more wild insect visits had greater fruit set (Fig. 1b).



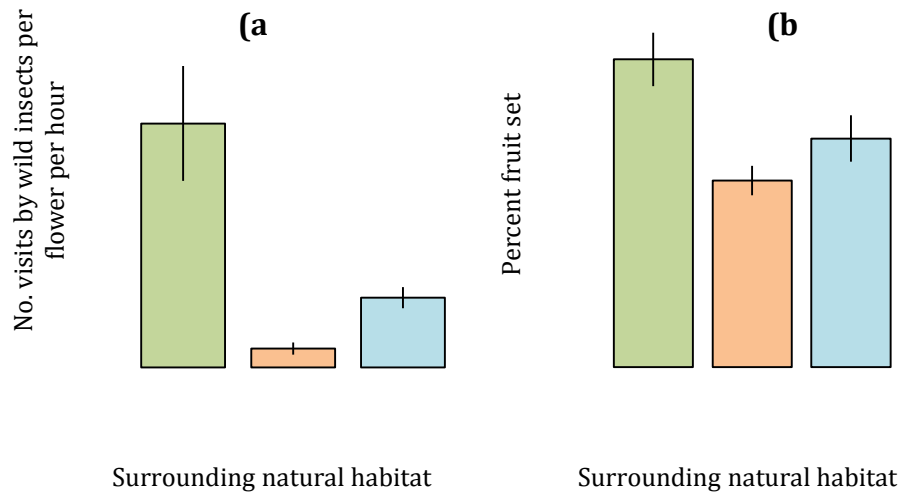


Figure 1. How the rate of almond flower visits by wild insects varied with the amount of natural habitat surrounding the orchard (a) and how this followed through to the percent fruit set (percentage of flowers developing into nuts – nuts were counted in July) (b). The colored columns represent the average per orchard and the black bars represent the variation between orchards.

Conclusions: Our results show that almond orchards can receive “free” **pollination** service from wild insects which can supplement honey bee pollination and result in greater fruit set. This highlights the importance of conserving the remaining **natural habitat** around almond orchards. In addition we found that where little natural habitat remains, lesser gains can be made by having a **semi-natural strip** of vegetation adjacent to the orchard. The degree of benefit these strips bring is likely to depend on how attractive the plants in the strip are to **wild bees**. *For further information please contact Claire Brittain at claire.brittain@uni.leuphana.de*



Nickels Field Day Set for May 15

Franz Niederholzer, UC Farm Advisor Sutter, Yuba, Colusa Counties

Save the date – Wednesday, May 15 – to attend the annual field day at the Nickels Soil Lab in Arbuckle. The final agenda is not yet set, but in-the-field talk topics will include bee health/availability in 2013, bee pastures to improve bee health, navel orangeworm monitoring/control, and other timely subjects. This event is free to the public. More detailed information (final agenda, lunch cost and registration, and lunch speaker) will be available in late March. In the meantime, please save the date for a valuable meeting with up-to-date, research-based information and discussion with ag professionals from around the region.



Springtime disease control

Joe Connell, UC Farm Advisor Butte Co.

Brown rot, jacket rot, shothole, scab, and anthracnose disease control efficacy is presented in the following tables showing relative fungicide effectiveness and appropriate timing for control of these diseases.

Full protection against **all** six diseases usually requires at least two fungicide applications during and shortly after bloom followed by continued treatments as needed if wet weather persists. Moisture from rain, fog, and dew favors all the diseases listed in the table.

Brown rot - This disease is favored by frequent rains accompanied by warm temperatures during bloom. Individual flowers from pink bud to the start of petal fall are susceptible. Flower parts including stigmas, anthers, and petals are all susceptible to infection.

Botrytis blossom blight, jacket rot, and green fruit rot - Infections are usually initiated on senescing floral parts. The fungus progresses from the diseased flower jackets into the developing fruit causing them to rot or drop. This disease is sporadic and associated with moisture and cool conditions during bloom and early nut development. Green fruit rot most commonly affects nuts that are tightly packed together in clusters.

Shothole - Occasionally a few blossom infections are found on the jackets. The primary concern is leaf infections which can lead to defoliation and yield loss. Periods of 10 to 16 hours of continuous moisture are needed for shothole infection of leaves. Therefore, the primary objective of shothole sprays is protection of the foliage from bloom until five weeks after petal fall. Once spore producing sporodocia form in leaf lesions the disease can become epidemic if subsequent rains occur.

Scab - The scab fungus begins its seasonal cycle by producing spores on old twig lesions from about late March to mid-April. If rain occurs after twig lesions sporulate, an epidemic scab outbreak can be present by June. Scab infections occur on both leaves and hulls ultimately producing oily greyish black spots on both. Severe infections cause premature defoliation. This disease is favored by protracted spring rains. Sprays after petal fall timed when twig lesions are beginning to sporulate have controlled scab. Later sprays have provided additional control in wet springs.

Leaf blight - With springtime moisture the leaf blight fungus attacks leaf petioles, and by June, infected leaves suddenly wither and die. During late autumn and winter the fungus grows from previously infected petioles into twigs to kill axillary buds. This disease can also be serious following summer rainfall. Sprays used from petal fall to five weeks after, have also controlled leaf blight in most seasons.

Anthracnose - This fungus overwinters as spores in infected mummies left on the tree or in dead twigs resulting from infections the previous year. New infections are initiated when spores are splashed by heavy continuous rains to the bloom or to the developing nuts. Infections can occur as long as rains continue thus requiring extended fungicide protection. Summer infections can occur if sprinkler irrigation contacts the tree canopy.

Spray materials must be **applied with good coverage** and **dried on** before rain to be effective and to reduce the chance of resistance developing. The “best” program for one orchard may not be the “best” for another. Different classes of materials should be rotated in a spray program to reduce the chances of resistance developing (and to reduce the loss of our currently effective materials).

See the UCIPM website, <http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf> for more information.

ALMOND: FUNGICIDE EFFICACY

Fungicide	Resistance risk (FRAC) ¹	Brown rot	Jacket rot	Anthrax-nose	Shot hole	Scab ³	Rust ³	Leaf blight	Alternaria leaf spot ³	PM-like ⁵	Silver leaf
Adament	high (3/11) ³	++++	++	++++	+++	+++	+++	ND	++	+++	----
Bumper/Tilt ⁴	high (3)	++++	+/-	++++	++	++	+++	ND	++	+++	----
Distinguish	high (9/11)	++++	++++	++++	++	ND	ND	ND	ND	ND	----
Indar	high (3)	++++	+/-	+++	++	++	NL	ND	+	ND	----
Inspire Super ⁴	high (3/9)	++++	++++	ND	+++	+++	+++	ND	+++	ND	----
Luna Sensation	medium (7/11) ^{3,7}	++++	++++	++++	++++	++++	+++	ND	+++	+++	----
Pristine	medium (7/11) ^{3,7}	++++	++++	++++	++++	++++	+++	ND	+++	+++	----
Merivon*	medium (7/11) ^{3,7}	++++	++++	++++	++++	++++	+++	ND	++++	++++	----
Quash ⁴	high (3)	++++	++	++++	+++	+++	++++	ND	++++	+++	----
Luna Experience	medium (3/7) ³	++++	+++	++++	+++	++++	++++	ND	+++	+++	----
Quadris Top	medium (3/11) ³	++++	+++	++++	+++	++++	++++	ND	+++	+++	----
Quilt Xcel	medium (3/11) ³	++++	+++	++++	+++	++++	++++	ND	+++	+++	----
Rovral + oil ⁸	low (2)	++++	++++	----	+++	+/-	++	ND	+++ ⁹	ND	----
Scala ³	high (9) ^{3,7}	++++	++++	ND	++	----	ND	ND	+	----	----
Tebuzol (Elite**)	high (3)	++++	+/-	+++	++	++	+++	ND	+	ND	----
Topsin-M/T-Methyl/Incognito ²	high (1) ^{2,7}	++++	++++	----	----	+++ ⁸	+	+++ ⁶	----	++	----
Vanguard	high (9) ^{3,7}	++++	++++	ND	++	----	ND	ND	+ ⁹	----	----
Fontelis*	high (7) ⁴	++++	++++	++	++++	+++	+++	ND	+++	ND	----
Abound ⁴	high (11) ^{3,7}	+++	----	++++	+++	++++	++++	+++	+++ ¹⁰	+++	----
Elevate	high (17) ⁷	+++	++++	----	+	ND	ND	ND	+++ ¹⁰	ND	----
Gem ⁴	high (11) ^{3,7}	+++	----	++++	+++	++++	++++	+++	+++ ¹⁰	+++	----
Laredo	high (3)	+++	----	++	++	----	+	+++	----	+++	----
Rovral/Iprodione	low (2)	+++	+++	----	+++	----	----	ND	+++ ⁹	----	----
Nevado											
Bravo/Chloro-thalonil/Echo	low (M5)	++	NL	+++	+++	+++ ¹⁵	++++	NL	NL	----	----
/Equus ^{11,12}											
Captan ^{4,12}	low (M4)	++	++	+++	+++	++	----	+++ ⁶	+	----	----
CaptEstate*	low (M4/17)	+++	+++	+++	+++	+++	----	+++	+	----	----
Maneb**	low (M3)	++	+	++	++	++	+++	++	----	----	----
Ph-D	medium (19)	++	+++	----	++	+++	+++	ND	++++	ND	----
Syllit*	Medium (M7)	+	----	ND	+++	++++	ND	ND	+	ND	----
Rally ¹³	high (3)	+++	----	++	+/-	----	+	+++	----	+++	----
Ziram	low (M3)	++	+	+++	+++	+++	----	++	+	----	----
Copper ¹³	low (M1)	+/-	+/-	----	+	+++ ¹⁵	----	----	ND	----	ND
Copper + oil ¹⁴	low (M1)	ND	ND	----	+	+++ ¹⁵	----	----	ND	----	ND
Lime sulfur ¹²	low (M2)	+/-	NL	----	+/-	+++ ¹⁵	++	NL	NL	----	NL
Sulfur ^{4,12}	low (M2)	+/-	+/-	----	----	++	++	----	----	+++	----
PlantShield	low	----	----	----	----	----	----	----	----	----	+++***

Rating: +++++ = excellent and consistent, +++ = good and reliable, ++ = moderate and variable, + = limited and/or erratic, +/- = minimal and often ineffective, ---- = ineffective, NL = not on label, and ND = no data

* Registration pending in California

**Not registered, label withdrawn or inactive

*** Section 24C (special local needs) registration approved in California.

¹ Group numbers are assigned by the Fungicide Resistance Action Committee (FRAC) according to different modes of actions (for more information, see <http://www.frac.info/>). Fungicides with a different group number are suitable to alternate in a resistance management program. In California, make no more than one application of fungicides with mode of action Group numbers 1, 4, 9, 11, or 17 before rotating to a fungicide with a different mode of action Group number; for fungicides with other Group numbers, make no more than two consecutive applications before rotating to fungicide with a different mode of action Group number.

South Sacramento Valley Winter Almond Meeting

[Arbuckle Golf Course](#)

Feb 19, 2013

2 hours of PCA CE requested (0.5 hrs Laws & Reg; 1.5 hrs "Other")

2.5 hours of CCA CE hours requested (1 hour Nutrient Man.; 1.5 hours IPM; 0.5 hrs Crop Man.)

Refreshments sponsored by Helena Chemical Company

8:00 Sign-in and Coffee

8:30 Nickels almond trial updates: pruning, rootstocks, and NP pollinator varieties.
Franz Niederholzer, UC Farm Advisor, Colusa/Sutter/Yuba Counties

9:00 Navel orangeworm management in the Sacramento Valley.
Dr. Frank Zalom, Entomology Department, UC Davis

9:30 Herbicide resistance, biology, and current weed management research.
Dr. Lynn Sosnoskie, Plant Sciences Department, UC Davis

10:00 Weed management and control.
Dr. Brad Hanson, Plant Sciences Department, UC Davis

10:30 -- Break

10:45 Ag Commissioner's Office update.
Jack DeWit, Colusa County Ag Commissioner's office

11:15 Nitrogen management in almond: what have we learned?
Franz Niederholzer, UC Farm Advisor, Colusa/Sutter/Yuba Counties

11:45 New spring leaf sampling program for almond.
Sebastian Saa, Plant Sciences Department, UC Davis

12:15 Adjourn

Please note: PCA scantron sheets will not be accepted and PA certificates of attendance will not be available until you are leaving the meeting.

ALMOND INSTITUTE & WALNUT DAY

Friday, February 22, 2013 – [Chico Elks Lodge, 1705 Manzanita Ave., Chico](#)

7:30 - 8:30 Registration Table Open ----- Pick up lunch tickets

(Cost \$15.00/person to cover lunch and meeting expenses)

PROGRAM

Moderator: Joe Connell, UCCE Farm Advisor, Butte County

8:30 Agricultural Commissioner's Laws and Regulations Update

Richard Price, Agricultural Commissioner, Butte County

9:00 Your Assessment at Work: 2013 California Walnut State of the Industry

Dennis A. Balint, Executive Director/CEO, California Walnut Board/Commission

Jennifer Olmstead, Marketing Director, Domestic

Carl Eidsath, Technical Support Director

9:30 Site Selection, Soil Modification, and Replant Disease Management when Planting an Almond Orchard, David Doll, UCCE Farm Advisor, Merced County

10:00--10:15 Break – coffee & pastry sponsored by the California Walnut Board

10:15 Water Management in Almonds and Walnuts

Dr. Ken Shackel, Professor, Plant Science, UC Davis

10:45 Long Term Irrigated Lands Regulatory Program – A Sacramento Valley Perspective

Bruce Houdesheldt, Director, Regulatory Affairs, Northern California Water Assoc.

11:15 Dynamics of Walnut Blight Management

Dr. Jim Adaskaveg, Plant Pathology, UC Riverside

11:45 Highlights of Hull Rot and Scab Control in Almonds

Dr. Jim Adaskaveg, Plant Pathology, UC Riverside

12:15 Lunch ---- pre-registration required

12:45 Update on New Walnut Varieties and New Variety Releases

Chuck Leslie, Walnut Breeding Program, Plant Science, UC Davis

1:15 What's new in Pest Management of Weeds and their Control

Bob Johnson, UCCE/Almond Board Intern, Weed Science, UC Davis

1:45 Root Physiology and Root Functions of Almonds and Walnuts

Joe Connell, UCCE Farm Advisor, Butte County

2:15 Sprayer Calibration to meet Application Regulations and Save Money

Franz Niederholzer, UCCE Farm Advisor, Sutter Yuba Colusa Counties

2:45 Adjourn

Continuing Education Credits Approved: 1.5 hours of Laws & 2.0 hours of Other

Note New Location!

Butte/Glenn Counties ALMOND INSTITUTE & WALNUT DAY

Friday, February 22, 2013 – Chico Elks Lodge, 1705 Manzanita Ave., Chico



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