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ORCHARD FACTS

June 23, 2008

Vol. IX, No. 4

In This Issue

Bill

Bill Krueger
Farm Advisor

Sacramento Valley Walnut Newsletter

Codling Moth Management in Walnuts Using Pheromone Mating Disruption

Field Meeting

Tuesday, July 29, 8:30 a.m.

Location: Lang Orchards LLC on Co. Rd 18 just west of Co. Rd. 99 intersection
Yolo County, 5 minutes north of Woodland (see map next page)
PCA & CCA credits pending

- Learn how codling moth can be suppressed in walnuts using pheromones
- Presenting new technology that can help you optimize your pest control

Topics and Speakers-

How Pheromone Mating Disruption Works
Steve Welter, Entomology Professor, UC Berkeley

Monitoring The Codling Moth Populations and Making Decisions On When Supplemental Insecticides Are Required and When They Are Not
Carolyn Pickel, UC IPM Advisor

Implementing Pheromones Throughout San Joaquin County for Overall Reduction In Codling Moth Population
Joe Grant, Farm Advisor, UCCE San Joaquin County

Economics of Adoption
Kimberly Steinmann, Student, Ecology, UCD

Being a Good Neighbor: Reality of Pheromone Drift
Carolyn DeBuse, Farm Advisor, UCCE Solano/Yolo Counties

Grower Update
Kyle Lang

Demo of Puffer and High Trapping System
Steve Wulfert, Suterra

*Added discussion on the codling moth granulosis virus which is being studied as a natural controlling agent specifically for codling moth.

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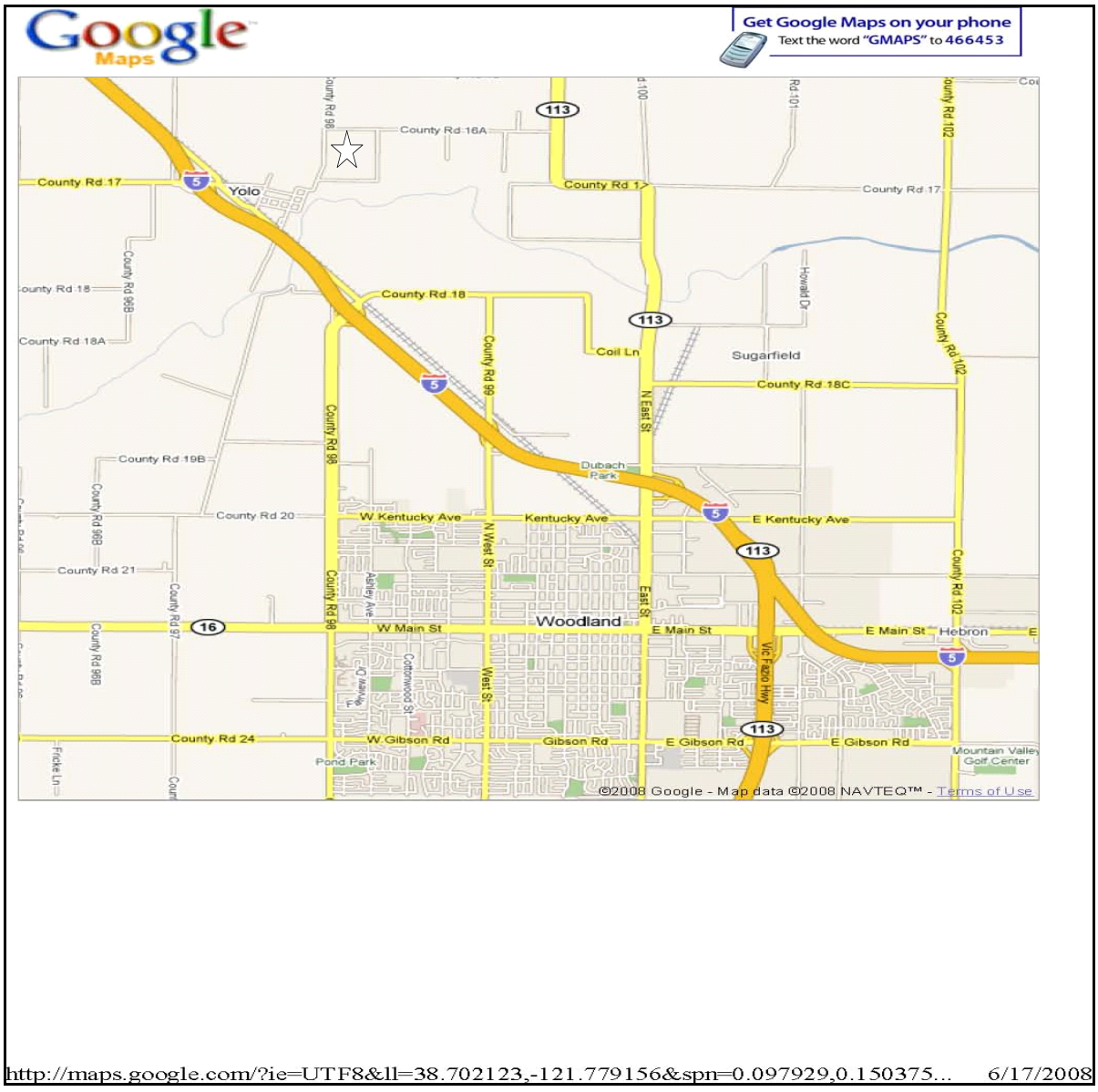
For more information contact Carolyn DeBuse (707)784-1320 or Mark Cady (530) 756-8518 ext. 20.
If special accommodations are required, please contact the Solano/Yolo UCCE
at (530) 666-8143 one week in advance of the meeting.
Map for field day July 29th, Yolo County

Lang Orchards



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CODLING MOTH MANAGEMENT

Richard Buchner [1] and Carolyn Pickel [2]

Codling Moth in walnut is a difficult pest to control due to the challenge in choosing accurate spray timing to cover the long egg hatch period and the necessity for good spray coverage. Currently, the most effective way to time codling moth sprays is to monitor traps and follow degree days to interpret trap data and predict egg hatch. The best chance for successful control is to monitor individual orchards and develop a feel for codling moth activity both during the season and historically.

Degree Days As with many organisms, temperature controls codling moth growth and development. Accumulated heat units are referred to as Degree Days. One Degree Day is one day (24 hours), with the temperature one degree above the lower developmental threshold. For example, if the minimum development threshold is 50° F and the temperature remains at 51° F for 24 hours, one Degree Day is accumulated. Codling moth thresholds are 50° F and 88° F. Charts are available to calculate Degree Days using maximum and minimum temperatures; however, inexpensive temperature sensors are available that directly output Degree Day accumulations. Degree Day and weather information is also available at the UCIPM website http://www.ipm.ucdavis.edu

Codling Moth Traps The second component of a codling moth monitoring program includes traps. Traps are used to verify flight activity and monitor populations. Traps are often hung high in the tree canopy and use pheromone, pear volatile, or a combination of the two as a lure. Recent USDA research shows orange/red delta traps are the best to use for codling moth. These traps catch many more moths than the wing traps so you will have to develop experience on how to use them. Unfortunately, traps are not good indicators of damage probably because of the many factors that influence trap performance.

Codling Moth Activity Codling moth over-winter as fully grown larvae in bark cracks on tree trunks and limbs. Over-wintering larvae emerge as adult moths in the early spring. The monitoring season begins by hanging codling moth traps in orchards by mid-March before the first codling moths emerge. The goal is to get traps out early enough to record several dates with zero catch to confirm that traps are out early enough to guarantee first moth catch. Bio-fix is the first date when moths are consistently found in traps. To predict egg hatch, begin accumulating Degree Days from the biofix. If a spray is necessary, University of California Integrated Pest Management (UCIPM) suggests a treatment timing at 300 Degree Days after the first male biofix (pheromone lure) and 250 Degree Days after the first female biofix (pear volatile or combo lure). Degree Days are also used to predict the second peak of the first flight or "1B". Trap catch increases at 600-700 Degree Days identify the "1B".

The second flight (second biofix) usually occurs when trap catches increase at an average value of 1060 Degree Days from the first biofix (800-1300 is the possible range). Well maintained traps checked frequently will confirm and fine tune Degree Days at the second bio-fix. If a spray for the second flight is necessary, UCIPM suggests timing at 250 Degree Days from the second bio-fix. Codling moth typically has three generations in the upper Sacramento Valley. Third generation activity is monitored the same way as the second.

Current Situation For three walnut orchards in Tehama County, male biofix occurred on 3/24/08. First females were caught 4/11/08 to 4/14/08 with sunset temperatures suitable for egg laying. Degree Days *(figure 1*) are at 997 as of 6/9/08 suggesting that trap increases after that date will be the start of the second flight. Trap catches will confirm the second biofix and reset Degree days accumulations to zero.

DATE	*DEGREE DAYS*	*DATE*	*DEGREE DAYS*
3/24	0 (Biofix Male)	5/05	372
3/27	25	5/08	423
3/31	35	5/12	487
4/03	56	5/15	556
4/07	87	5/19	662
4/10	104	5/22	719
4/14	168 (Biofix female)	5/27	772
4/17	191	6/03	877
4/21	224	6/05	911
4/25	241	6/09	997
4/28	293	6/13	1092
5/01	323	6/16	1162

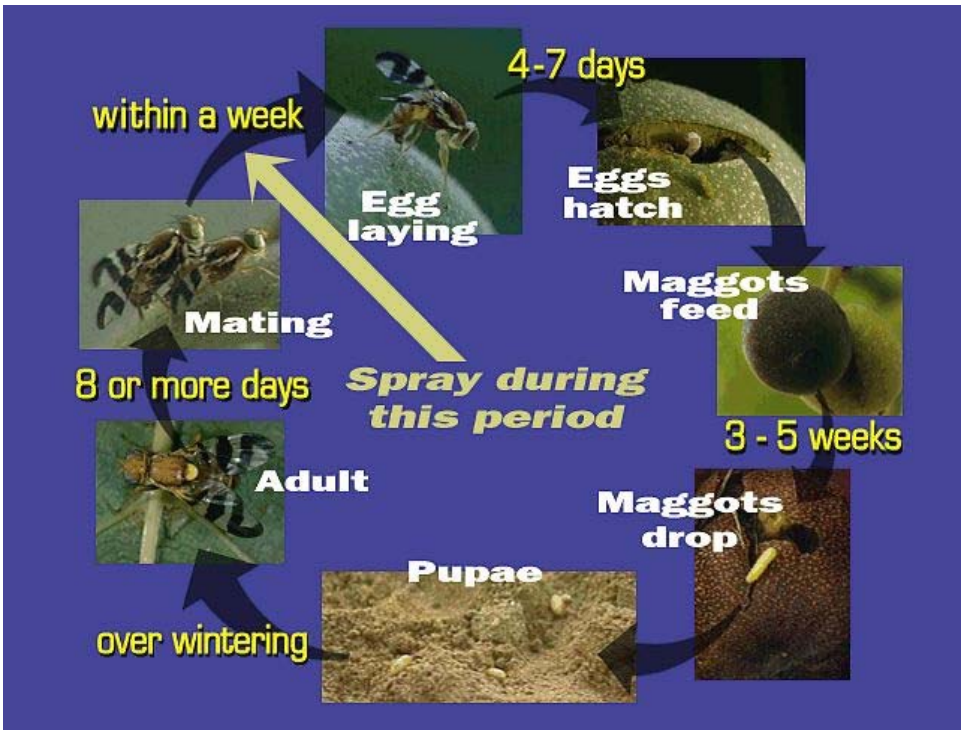
Figure 1. Day Degree accumulations for a southern Tehama County walnut orchard. Accumulations start at a 3/24 male biofix.

[1] Farm Advisor - Tehama County
[2] IPM Advisor - Sacramento Valley

WALNUT HUSK FLY BIOLOGY, MONITORING, AND SPRAY TIMING

Janine Hasey, UC Farm Advisor, Sutter and Yuba Counties

For some growers, walnut husk fly (WHF) is their primary orchard insect pest. The colorful husk fly has a yellow spot on its back, dark triangular bands at the wing tips, and is about the size of a house fly. English walnut varieties such as Tulare, Hartley, and Franquette are the most susceptible to husk fly damage although all varieties can be infested. Husk flies produce one generation per year overwintering as pupae in the soil. They emerge as adults in the Sacramento Valley from mid-June through September with peak emergence from mid-July to mid-August. About one percent of the pupae survive for two years in the soil.



Life Cycle: Understanding the life cycle is important to spray timing and effective control. After emergence, it takes a female about 2 weeks to mate, develop eggs and start laying them into the walnut husk. The most effective spray timing is the period when the female is developing eggs before egg laying occurs. Once eggs are deposited, they hatch into white maggots within about 5 days and feed on the husk for 3 to 5 weeks before dropping to the ground, burrowing into the soil, and pupating.

Damage: First symptoms are the small "stings" in the husk where eggs were deposited. The husk turns black and soft as maggots feed inside the husk, causing stains on the nutshell which cannot be removed by normal bleaching. Stained shells cannot be sold in-shell. Early infestations can have a significant impact on kernel quality and substantially reduce the crop's value.

Hang yellow sticky traps charged with ammonium carbonate by mid-June:

-High in tree
-Shady and damp areas
-North side of tree
-Monitor 2-3 times/week, (3 times/week to detect first flies)
-Keep clean, sticky, charged

Monitoring and Spray Timing: Since WHF is not driven by temperature and development is related to food availability, there are no degree-day models as with codling moth to time sprays. Each orchard must be monitored for husk fly activity to decide if and when to treat. Yellow sticky traps charged with an ammonium carbonate lure work best. Past damage and "hot spots" will help with trap placement; hang two traps every 10 acres. Walnut husk fly is not likely to stay confined to a single orchard if there are other walnut orchards within ½ mile.

Monitoring options: Visit the UC IPM Pest Management Guidelines website at http://ipm.ucdavis.edu and click on walnut, then husk fly to get details, photos of sexing flies and finding eggs, and monitoring forms for the following methods:

- Monitor for eggs (the most accurate)
  - Time spray when the first female with eggs is found
- Monitor trap catches
  - Spray when a sharp increase occurs
  - If using GF 120 in low population orchards, spray at 1st fly.
- Monitor for stings
  - Spray at 1st sting (but damage has occurred)

- Continue monitoring through the season. Typically there is a 3 week interval between sprays. Treat up to 3 weeks before harvest.

  After emergence, it takes 2 weeks for a female to mate and develop eggs before she starts laying.

  A short-residual insecticide plus bait will generally kill WHF for about 10 days.
- The 3 week interval is based on killing all the flies with the previous spray

Treatment Options: There are several insecticides, both for conventional and organic orchards, effective against husk fly and all should have bait added to the treatment except GF-120 (contains its own bait). Full coverage is not that critical if you add bait which lures the fly to the treated leaves where it comes into contact with the insecticide. The exceptions are high population orchards with extensive previous damage; these should have full coverage sprays at full rates of insecticides and bait with every row sprayed. The UC IPM website above lists the insecticides, baits and rates to use for WHF control. Aphid control will also help reduce the movement of husk flies within and between orchards by reducing the sugary food source of aphid honeydew.

BE WATCHING FOR SPIDER MITES OR APHID INFESTATIONS

Bill Krueger, UCCE Glenn County

Web spinning mites (spider mites) may develop high populations in the late spring or early summer as temperatures rise. Light bronzing of the leaves is and indication of an increasing population. As the population develops, clusters of brown leaves are noticed. Heavy feeding results in webbing-over of the leaves and, ultimately, the defoliation of the infested leaves.

Spider mites are usually kept below damaging levels by natural enemies unless they are disrupted by broad spectrum pesticides. Use selective materials whenever possible when treating other pests and avoid dusty conditions and water stress, which also favor mite development. The most dependable natural enemy is the western predatory mite which can be seen by using a hand lens. It is generally clear and pear-shaped and will be moving more rapidly than the spider mites. Six spotted thrips can also be an effective predator, but may come into the orchard too late to control the pest before economic damage occurs.

Monitoring. Starting in late May or early June and continuing through August at weekly intervals, randomly select ten trees in the orchard and check ten leaflets per tree (5 low and 5 high). Look for web spinning mites, predator mites and six spotted thrips.

Treatment thresholds where organophosphate or pyrethroid insecticides are not used.

- 30-40% infested leaflets if predators are on less than 10% of the leaflets.
- 40-50% infested leaflets if predators are on 40-50% of the leaflets.
- If predators are on 50% or more of the leaflets, a treatment should not be necessary.

Where organophosphates or pyrethroid insecticides are used.

- 10% infested leaflets if predator mites are on less than 10% of the leaflets.
- 20% infested leaflets if predators are on more than 20% of the leaflets.

There are a large number of materials available for controlling spider mites with different modes of action and characteristics. Select a material to fit your situation. Avoid using materials in the same mode of action group more than 2 times per year to reduce the risk of resistance development.

Aphids. There are two aphid species that damage walnuts, the walnut aphid (a small yellow aphid usually found on the lower surface of the leaf) and the dusky veined aphid (larger yellow aphid with dark banded spots that feeds near the mid vein on the upper surface of the leaf). In recent years, a white form (morph) of the walnut aphid has been found in the Sacramento Valley. Populations of the white morph tend to build later in the season than the normal yellow aphids. Aphid feeding produces honeydew and a sooty mold growing on the honeydew turns the leaves black. Aphid feeding can reduce tree vigor, yield, nut size and quality.

Walnut aphid will usually be controlled by the introduced parasite, *Trioxys pallidus*. *Trioxys* can be disrupted by sprays to control other pests or by hyperparasitism (parasitism of the parasites). In-season oil sprays have also been shown to disrupt *Trioxys.* Treatment materials that control other pests such as codling moth and walnut husk fly will normally control hyperparasites but may increase spider mite problems.

Begin sampling in May and continue through shoot and nut growth. Collect 5 sub terminal leaflets from 20 trees. Treatment is recommended if there are more than 15 healthy walnut aphids per leaflet. Treatment of dusky veined aphid is recommended if 10% of the leaflets have colonies of 6 or more aphids.

For more information on these and other pests, including pictures and treatment options, consult UC Pest Management Guidelines for walnuts available online at http://ucipm.ucdavis.edu or through your local Farm Advisors' office.

JULY - TIME FOR LEAF ANALYSIS

Joe Connell, UC Farm Advisor, Butte County

Leaf analysis is best taken in July when nutrient levels in leaf tissue are stabilized. Critical values to help guide you in your fertilization practice have been established for walnut by U.C. researchers. Analysis can reveal specific nutrient deficiencies or can alert you to potential problems that might be developing. Having a baseline of nutrient levels in your orchard also provides a useful standard that allows you to compare to future trends. In addition, by keeping the trees in the optimum zone for nitrogen, leaf analysis can save on fertilizer costs by helping to avoid over fertilization.

Concentrations of nitrogen, phosphorus, and zinc on a leaf dry-weight basis start very high early in the season and decline rapidly to a fairly steady state after mid-June, levels plateau and then drop off again from September to leaf fall. Potassium starts high in the spring then decreases reaching a plateau about the same time as nitrogen, phosphorus and zinc. Concentrations of magnesium, manganese, boron and chloride remain fairly constant or increase slightly during the season. Boron, chloride, and sodium however, will increase steadily if excess amounts are present in the soil or water. Calcium is the one element that always starts low and increases steadily over the season as the leaves age.

To represent the nutrient status of a large uniform orchard collect representative leaflets from many trees in a survey pattern across the orchard. Collect about 50 terminal leaflets picked at random from spurs about 6 to 8 feet from the ground and place in a paper bag. Leaflets 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 to see if tree nutrition might be involved.

Critical Nutrient Levels for Walnut

	Deficient Below	Optimum
Nitrogen (N)	2.3%	2.3 – 2.7 %
Potassium (K)	0.9%	adequate over 1.2 %
Zinc (Zn)	18 ppm	----------
Manganese (Mn)	---------	adequate over 20 ppm
Boron (B)	20 ppm	36-200 ppm

Not all elements need to be run each time you have an analysis done. If you already have a complete baseline analysis, I'd spend money checking only those elements where you suspect a possible deficiency or are interested in the leaf levels for a specific element. Using the shotgun approach where all elements are routinely checked every year is unnecessary. For more information on sampling procedures and critical values, the publication “Guide to Efficient Nitrogen Fertilizer Use in Walnut Orchards” is available from your local UCCE office as is a list of labs performing leaf analysis.

Deficiencies that are most common in this area are nitrogen, potassium, and zinc. Zinc deficiency, most common in sandy soils and old barnyard locations, is easily identified in the field from leaf symptoms early in the season. In addition, zinc leaf levels may not be meaningful due to surface contamination from zinc containing sprays that can’t be washed off. Boron deficiency is sometimes deficient near the foothills. Manganese deficiency is sometimes seen where soils are kept too wet or in areas with high water tables. Useful critical values are not established for iron or sulfur levels in walnut leaf tissue.

Remember, leaf analysis is only a helpful guide in orchard management. Leaf levels should be considered along with orchard appearance and growth before corrective action is taken. Visual observation is an excellent complement to any lab analysis. Make sure that a deficient element is really the problem before you seek fertilizer applications as a solution.

WALNUT GROWER REFERENDUM

Janine Hasey

The California Walnut Commission voted to request a referendum for growers during their annual spring meeting. Growers will be asked to consider an increase in the assessment cap from the current $0.01 to a new cap to be set at $0.015 per in-shell pound. Growers should be aware that the referendum will be held in early August.

NEWSLETTERS AVAILABLE ELECTRONICALLY

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