



The Pomology Post

Madera County

Volume 42, November 2003

Shredding and Smoke

by Brent Holtz, University of California, Madera County



Senate Bill (SB) 700, sponsored by Senator Dean Florez (D-Shafter), recently passed the House and Senate and was signed by Governor Gray Davis. SB 700 will impose more stringent air quality standards on Agriculture and remove the air permit exemption that agriculture had been operating under for the last 56 years. It appears that SB 700 will phase out the open field burning of tree crop prunings by January 1, 2006. There will be many issues subject to discussion on the actual implementation of SB 700, but growers should begin looking at alternative methods to remove their prunings. The San Joaquin Valley Unified Air Pollution Control District restricts the burning of agricultural wastes and will be forced to implement SB 700.

In the San Joaquin Valley of California almond trees are pruned every year after harvest in the late fall or early winter. Prunings are typically removed from orchards with a “buck-rake” mounted on a tractor, placed in burn piles, and burned green, generating large amounts of smoke. In 2003, the San Joaquin Valley had 530,000 bearing acres of almonds. Preliminary studies have shown that approximately 2,000 pounds per acre are removed annually in prunings (Almond Board 1998). This would result in the burning of approximately 530,000 tons of green almond prunings per year.

The wood chipping or shredding of almond prunings could provide an alternative to burning that could add valuable organic matter to San Joaquin Valley soils typically low in organic matter. A small percentage of almond growers have been chipping or shredding their prunings, some for over 14 years because they are farming on the agricultural-urban interface where brush burning is prohibited because of its close proximity to urban housing. Other growers have chipped or shredded their prunings solely to add organic matter to their soils. But many growers

fear that wood chips or shreds will interfere with harvest and take valuable nutrients away from their trees because of their high carbon to nitrogen ratio. If wood chips and shreds can be shown not to interfere with harvest or take valuable nutrients from trees, then growers would be more likely to adopt chipping or shredding as an alternative to burning, especially if advantages to soil health and nutrition could also be demonstrated.

Wood chipped orchard soils were sampled and compared to non-wood chipped orchard soils, and an experiment was established where soil was mixed with or without wood chips and placed in containers, each with an almond tree, to investigate the effect of wood chips on leaf-petiole and soil nutrient status, plant parasitic and free-living nematode populations, water infiltration, and basidiomycete (wood rotting mushrooms) populations and their ability to aggregate soil.

Soil analysis after three years showed higher levels of calcium, magnesium, sodium, chloride, boron, zinc, manganese, iron, copper, carbon,

phosphorus, potassium, ammonium, and % organic matter in wood chipped soils. There was less manganese, iron, and nitrate in the wood chipped soils after two years but by the third year manganese and iron levels were significantly increased while nitrate levels were higher in wood chipped soils. The soil pH was significantly reduced all three years. Tissue analysis was performed on leaf petioles for four years. After the first year trees growing with wood chips had significantly less nitrogen, zinc, and manganese, while phosphorus was significantly increased. After the second season trees with wood chips no longer had significantly less nitrogen or manganese while phosphorus and potassium levels were significantly increased. Zinc levels were still significantly decreased in trees growing with wood chips. After the third season trees growing with wood chips had higher nitrogen levels while phosphorus, potassium, calcium, zinc, manganese and iron levels were all significantly higher. By the fourth season nitrogen and iron levels were significantly higher in leaf petioles from trees growing with wood chips. But potassium and calcium levels were no longer significantly greater in tree with wood chips, while phosphorus, zinc, manganese, and boron levels remained significantly higher. After two years trees growing with wood chips had less shoot growth, but by third and fourth year trees growing with wood chips had significantly more current season shoot growth. Water infiltration was significantly greater in wood chipped soils. There were more free-living bacterial (bacterivorous) and fungal feeding (fungivorous) nematodes in the chipped soils when compared to non-

chipped soils. More basidiomycetes were counted in wood chipped soils and detected at higher levels with ELISA. Larger soil aggregates were found in wood chipped soils. Undisturbed wood chipped soils had more soil aggregates than disturbed soils.

The practice of wood chipping almond prunings instead of burning appears to be a promising alternative to agricultural burning that could reduce air pollution and provide almond growers with a more sustainable method of brush removal. Please come see a commercial shredding demonstration on November 19, 2003, 10 AM, Andrews farms, 14507 Ave 7 (approximately 19 miles west of highway 99, see map) in Madera County.

Fight this Pistachio Pest NOW!

By Craig Kallsen, University of California, Kern County

Navel orangeworm, *Amyelois transitella*, wreaked havoc on the economic returns of many growers in the San Joaquin Valley this season. This pest is particularly insidious in that not only does it directly reduce yield by reducing the number of harvested nuts, but infested nuts that are missed during processing end up in consumer packaging. During the past season, it was common for growers to find 2% or more of their nuts arriving at the huller infested with navel orangeworm. Levels of 5% or more of infested nuts will probably result in the entire load of nuts being processed as shelling stock or lesser products instead of being packaged

as the more valuable in-shell nuts that consumers associate with pistachios.

Early-season infestations in an orchard can be determined based on the use of egg traps baited with mixtures of almond press cake and almond oil. The first generation of moth egg-laying activity usually peaks in late April and early May and the second generation in late June or early July. Generally, however, only the third generation is treated with chemicals. If populations are high early in the season, appropriate insecticides (azinphosmethyl, phosmet, carbaryl, permethrin) are applied approximately 300 to 400 degree-days after third-generation egg laying beings, usually in early August. If third generation egg-traps lose their effectiveness, treating 1300 degree-days after the onset of second generation egg laying will approximate the appropriate time for treating third generation navel orangeworms.

Frequently navel orangeworm populations do not reach damaging levels until late in the season. In early to mid-August, if the orchard has not yet been treated, nuts can be collected from the field and examined with a magnifying glass. The greater the number of early split nuts the more likely it will be that navel orangeworm is a problem. Usually a sample of 100 to 200 randomly collected nuts from the orchard are inspected, and if 3% to 4% of the nuts have eggs, the orchards will be treated with a registered insecticide. In an untreated field, the percent infestation of the nuts can climb by 1% a week. Generally the later in the

year that pistachios are harvested, the greater the number of infested nuts. As many growers discovered this past year, chemical control may not be adequate to reduce infestations sufficiently.

Navel orangeworm does not overwinter in the egg, so it is dependent for survival as a larva in unharvested nuts left on the tree or on the ground during the winter in the San Joaquin Valley. The pest has the ability to fly inter-orchard distances, so effective control is dependent on measures conducted on an area-wide basis.

Adequate control in pistachio orchards involves both insecticide application and winter sanitation. In an isolated orchard, the primary source of infestation is from last year's nuts. Most growers are shaking or poling the old unharvested nuts from the tree sometime during the period from November through February. The sooner the old nuts are on the ground and blown off the berm into the middles between tree rows for destruction or burial, the sooner navel orangeworms will lose overwintering sites. Some data

suggest that nuts left on the berm provide a more favorable habitat for survival than those left in the tree, so destruction of the nut is necessary for control. The harvest results are in and the message is clear. The navel orangeworm is a pest with significant potential to seriously damage the pistachio industry. Beating the navel orangeworm will require vigilance at home, an unusual degree of cooperation among neighbors, and a multifaceted control strategy involving monitoring, targeted insecticide treatment, orchard sanitation, and further research.

Coming Events:

31st Almond Industry Conference, December 3-4, 2003 at the Modesto Centre Plaza. Contact the Almond Board of California, Modesto, 209-549-8262. www.AlmondBoard.com

Tri-County Walnut Day, February 5, 2004, Visalia, CA. Contact: Bob Beede for more information, 559-582-3211 Ext. 1-2737.

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Sincerely,

**Brent A. Holtz, Ph.D.
Pomology Farm Advisor**

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University of California Almond Brush Shredding Demonstration

November 19, 2003

10:00 AM - 12 Noon

Location: George Andrew's Ranch, 14507 Avenue 7, Madera CA

- 10:00 AM Introduction: Brent Holtz, UC Pomology Farm Advisor Madera County
- 10:10 AM Brush burning regulation SB 700 (Florez)
Jose Martinez, San Joaquin Air Pollution Control District
- 10:30 AM Cost-sharing of brush shredding or chipping
Don Nielson, Natural Resource Conservation Service
- 10:45 AM Wood chipping almond brush and its benefits for San Joaquin Valley Soils
Brent Holtz, PhD, UC Pomology Farm Advisor Madera County
- 11:15 AM Shredding almond prunings—a grower's perspective
Larry Lowder / Chester Andrews, Andrew's Farms
- 11:30 AM Joe DeAnna's shredding demonstration
Joe DeAnna, custom brush shredder and harvester

