WEST COAST
Nut Grower Guide
By the Industry, For the Industry

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In This Issue:

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This is a great time to be a California Walnut grower.

Today, growers and handlers are investing in their future by planting trees, adding new technology, funding research, training employees, and educating consumers. Why?

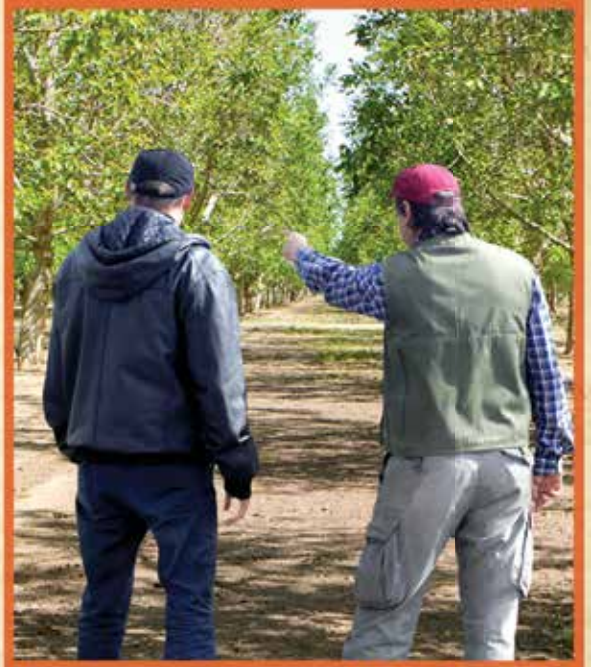
Demand is outpacing supply, production is growing and farm gate revenue is up. New markets are opening, new varieties are thriving, and new appreciation for the health benefits of walnuts is taking root after 20 years of investing in smart health research.

There's still room to grow in the U.S. and we're just getting started in China and India. Competition is ever-present and ever-increasing and other countries are seeking to capitalize on the growing demand for walnuts, so there's more hard work ahead. But so far all that hard work seems to add up to one thing: It's working.

California Walnut
Growers and Handlers
+
California Walnut Board
California Walnut Commission

BUILDING DEMAND WORLDWIDE

California Walnuts
AN INDUSTRY WORKING TOGETHER



CALIFORNIA Walnuts
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IT'S WORKING

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Come Grow With Us!

BEST PRACTICES

Woodpiles are Reservoir for Walnut Twig Beetle

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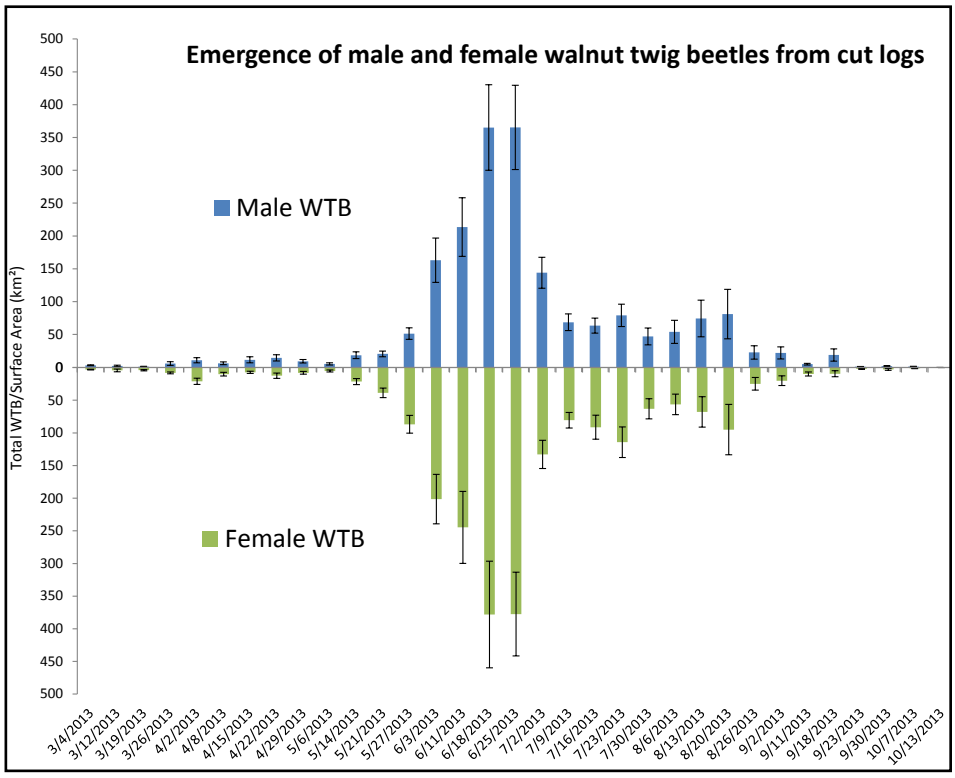
Every year growers remove dead and declining trees from orchards, generating piles of wood that may harbor potentially large populations of the walnut twig beetle, Pityophthorus juglandis (Fig 1). Though the insect is tiny (< 2 mm), the beetle can attack trees en mass, casually introducing spores of the fungal pathogen, Geosmithia morbida. Once introduced to the tree, the fungus colonizes the phloem causing tissue necrosis and subsequent canker development. A proportion of the beetles carry the fungus into the tree; the result is tree decline and potential mortality from the myriad of cankers that may coalesce over time (hence the name 'thousand cankers disease').

Figure 1. A) In-season accumulation of wood in Tulare County walnut orchards (A) has been found to harbor populations of walnut twig beetle, as evidenced by beetle emergence holes (B). Arrows indicate emergence holes.



The walnut twig beetle attacks all species of walnut, and thus far, G. morbida is only known to infect walnut. The fungus is unable to penetrate the outer bark without the assistance of the beetle; therefore, successful infection of the host is reliant on the pathogen's association with the insect pest. Consequently, efforts to detect new outbreaks of disease in uninfested areas, including native- and agro-ecosystems, rely extensively on the early detection of the walnut twig beetle. Since 2009, UCCE Farm Advisors have cooperated with USDA-Forest Service scientists to test walnut twig beetle trapping methods for development and implementation of the current nationwide trapping system. Several walnut growers in Tulare County have contributed to the success of this nationwide effort by housing walnut twig beetle traps in their orchards for long-term characterization of spatial and temporal population dynamics in commercial orchards.

Wood may be a source of walnut twig beetle

The walnut twig beetle attacks the trunk, main scaffolds, and large branches (generally > 1 inch in diameter), but does not affect the nuts. The small size of walnut twig beetle holes (< 2 mm diameter) and the fact that some cankers do not exhibit active bleeding, may allow many infections to go unidentified (Fig 2). Since thousand cankers disease does not affect the nut, the commodity itself is an unlikely culprit for disease spread. Infested wood, however, may harbor both the walnut twig beetle and the pathogen, together contributing to the potential for spread of thousand cankers disease.

The risk of disease transmission from infested wood is an important consideration for local orchard health and longevity, as well as national and international plant

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BEST PRACTICES

Woodpiles are Reservoir for Walnut Twig Beetle

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health. For example, wood removed during routine operations (ie. maintenance pruning and tree removal) and stored in or adjacent to orchards, may serve as a local source of inoculum for continued disease progress within an infested site. Storage of infested wood by firewood distributers in the proximity of walnut orchards may provide a localized "hot spot" of infestation, and also offer an opportunity for long-distance pathogen and insect dispersal. Similarly, sale of high value wood (ie. black walnut rootstock) for manufacture of items such as furniture or gunstocks, offers yet another venue for movement of infested wood to uninfested regions.

Duration of natural disinfestation of wood

In 2013, a study was initiated to address the rate of walnut twig beetle emergence from firewood, characterizing the sex ratio of walnut twig beetles emerging from infested logs as well as the duration of time required for logs to naturally become disinfested.

The overall goals of the study included:

1. Determination of air temperatures associated with emergence of walnut twig beetles from cut logs.
2. Assessment of the total time period required for walnut twig beetles to emerge from cut logs and allow for natural wood disinfestation.
3. Development of sanitation guidelines for wood removal from orchards based on the anticipated emergence characteristic of the insect from woodpiles.

In February 2013, six insect emergence chambers were established at the Lindcove Research and Extension Center in Exeter, CA. Walnut twig beetle-infested wood was cut from a mature English walnut orchard in Tulare County, and infested wood was placed in chambers, with a total surface area of wood in each chamber ranging from 15,500 cm2 to 19,000 cm2. Emerged insects were collected weekly through November 2013; all species were quantified and identified and walnut twig beetles were additionally sexed.

Figure 2. The bleeding and staining commonly associated with thousand cankers disease (A) are not always present on infected trees. In the absence of bleeding, identification of walnut twig beetle infestation requires observation of emergence holes (arrows) (B) and beetle galleries (C). A walnut twig beetle larvae is visible in photo C.

The study demonstrated that walnut twig beetle emergence from firewood progressed at a low rate from March through May (Fig 3). In mid-May emergence rates increased dramatically and peaked over a two week period in mid-late June (Fig 3). Emergence persisted in late summer from July through August and then decreased significantly in September (Fig 3). Samples collected beyond mid-September were free of walnut twig beetles (Fig 3). The rates of emergence of female and male walnut twig beetles from logs were statistically similar over time. In another study, we monitored the activity of walnut twig beetles weekly in two commercial orchards in Tulare County (Farmersville and Porterville) and in the walnut breeding block at Kearney Ag Center (Parlier). Using pheromone-baited traps, we consistently detected walnut twig beetles from February through November. The occasional trap detection of walnut twig beetle in winter was generally associated with brief episodes of unseasonably warm temperatures.

The results suggest that walnut twig beetle-infested logs should be removed from orchards by early June to prevent emerging insects from colonizing uninfested trees within the orchard. Additionally, to minimize risk of introduction of the disease to uninfested areas, infested wood intended for sale should be held for at least 4 months, and through a summer period (potentially longer, pending further research) prior to movement out of infested areas. This study is to be repeated during the 2014 growing season.