WALNUT BLIGHT MANAGEMENT USING BUD POPULATION INFORMATION

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Depending upon weather conditions, pathogen population and walnut variety, walnut blight caused by the bacterium *Xanthomonas juglandis* can cause significant crop loss. We have measured over 50% crop damage on Chandler walnuts when overwintering bud populations were high and spring rainfall favored disease. Conversely, we have measured little to no disease on Chandler walnuts with low bud population levels even when wet spring weather favored disease. Over the years we have measured a relationship between initial inoculum in dormant buds and subsequent disease severity and have successfully used that relationship to predict disease. In the 2010 walnut blight experiments in Tehama County, spring weather and rain fall simulation using above tree sprinklers again failed to trigger walnut blight disease on Chandler due to initial low pathogen populations. Also in the 2010 experiments, we sprayed seven trees with a suspension of walnut blight bacteria and caused 61.4 percent walnut blight damage compared to 2.6 percent on unsprayed trees with a very low initial bud pathogen population. This provided another indication that the amount of pathogen in buds early in the season can influence walnut blight disease at least on late leafing varieties.

Three things are necessary for a disease to occur: pathogen, host and favorable weather. Plant pathologists refer to this as the disease triangle. If we can reduce or eliminate any leg of the triangle we can greatly favor reduced disease. We have some control over the host (late leafing varieties), no control over the weather but we can monitor the pathogen and use bud population levels to our advantage.

Walnut blight epidemics can proceed in either a monocyclic or polycyclic manner. In a monocyclic disease, infections that happened during the spring do not lead to inocolum that can spread and cause secondary infections. Infrequent rainfall during the spring can be one reason why monocyclic progress of the disease can occur. In contrast, if infections during the spring lead to productions of inocolum that can spread to and infect new tissue, the disease is polycyclic (analogous to compounded interest on money). Frequent spring rainfall would tend to favor such disease epidemics. Why walnut blight bacteria are sometimes monocyclic and sometimes polycyclic is not always clear and both have been observed in our blight experiments although monocyclic disease progress is most common. For Chandler walnuts in our experiments we have measured very low pathogen populations and very little blight damage suggesting a monocyclic growth pattern. Also in 2010 we measured 11 orchards (Chandler, Howard or Hartley) for initial pathogen population and found 7 with no detectable pathogen. Blight disease pressure is low in those orchards and that information can be used to make in-season spray decisions. Late leafing varieties with no history of damage and low pathogen population levels in buds are low risk compared to early leafing varieties with high pathogen counts in bud samples. Bud population sampling can also be used to measure if walnut blight populations are building or are adequately suppressed using spray applications.

If you would like to check initial walnut blight pathogen populations, here's what you do:

1) Sample buds in December, January, February, March or early April for late leafing varieties. Buds can be sampled to the time they start to open. Early samples will allow more time to design disease control strategies.

2) Select 100 dormant walnut spurs with nice fat terminal buds. Cut off about a 3 inch length. Spurs reachable from the ground are easy to collect and represent a good sample location because bacteria sprinkle down through the tree canopy.

3) Walk the entire area collecting a random sample. One or two buds per tree should spread the sample adequately. Deciding how many samples to collect will depend upon experience on an orchard by orchard basis. One sample could easily represent 50 acres if experience suggests reasonable uniformity.

4) Save spurs in a paper bag and store in a cool dry place. The paper bag will allow samples to breathe and eliminate condensation. The lab will select a 30 terminal bud subsample to plate on agar and save the remaining buds as a backup sample. The results will look like figures one and two.

5) Mail to CSP Labs; 3556 Sankey Road, Pleasant Grove, California 95668. You might want to phone ahead at 916-665-1581 or www.csplabs.com.

6) Cooperative Extension Advisors can help interpret results of pathogen assessments and discuss the relative disease risks those measurements indicate.

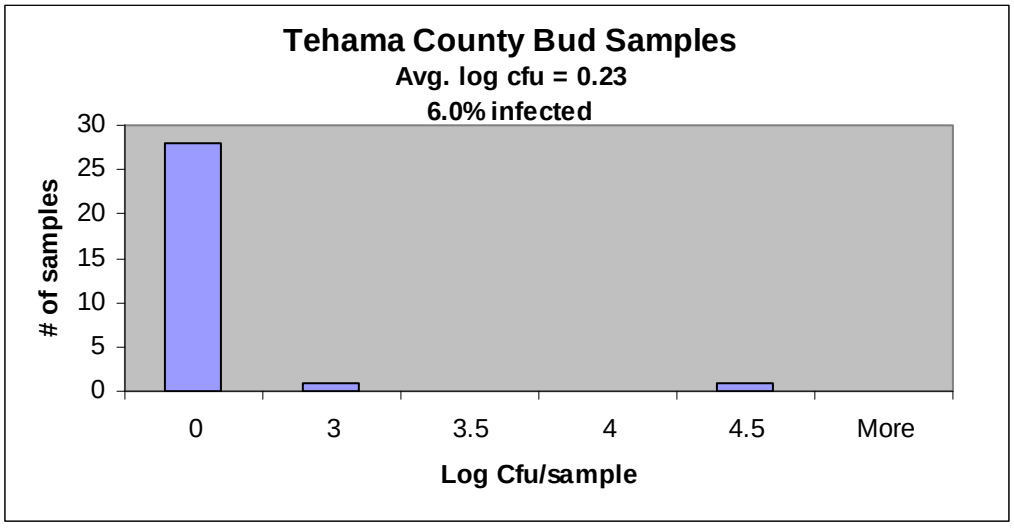

Figure 1. Incidence of populations of *X. juglandis* on Chandler walnut buds sampled following harvest on 12/1/10. This is a Histogram typical for a low population sample. Notice that over 25 buds had no

detectable pathogen and few buds were in the ten to the third (1000 colony forming units) or more range. This would be an example of a low risk orchard.

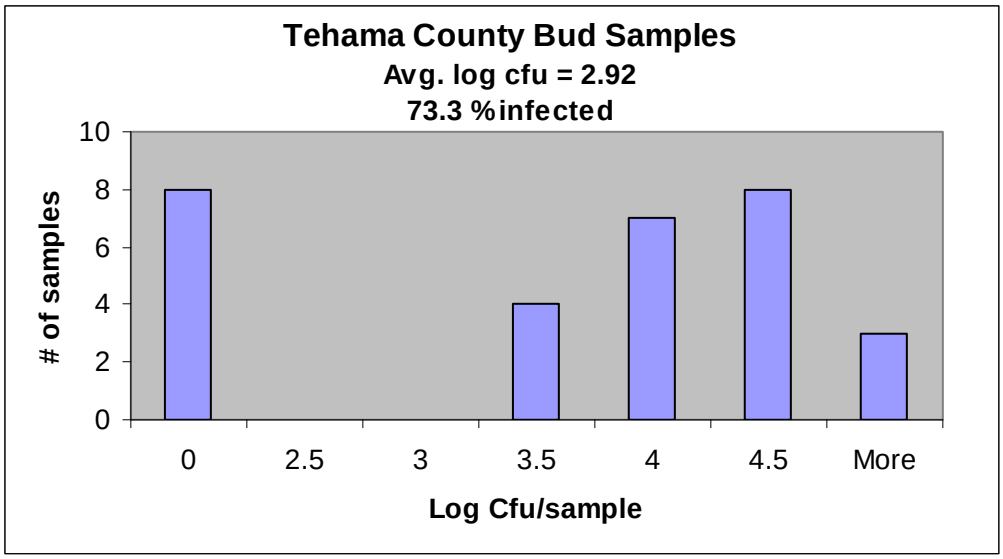

Figure 2. Incidence of populations of *X*. juglandis on Chandler walnut buds sampled following harvest on 12/1/10. This is a Histogram typical for a high population sample. Notice that only 8 buds had no detectable pathogen and most of the buds were in the ten to the fourth (10,000 colony forming units) or more range. This would be an example of a high risk orchard.