

The authors respond:

Mr. Olson asks how we can make a statement about the chemical soil quality when we do not investigate all the possible elements that make up soil. Nitrogen, organic matter content, some measure of microbial activity and soil density are measures often used to assess the suitability of soil for agricultural purposes. These properties are indicators of change in the chemical, microbiological and physical properties of soil. Would our conclusions have been different had we measured many other parameters? Perhaps, but those that we measured provide a good look at some of the most important soil constituents that are likely to change the most on agricultural lands over the time period in question.

Mr. Borst suggests that the changes we measured are incompatible and that the clay data are a function of the method used to measure the clay content. All samples were treated the same in the laboratory, and we know of

no reason to suggest that the archived samples would behave differently than the new samples in the particle-size analysis.

Soil quality is, as Mr. Hoekstra observes, a qualitative not quantitative parameter. We agree that the concept is qualitative, but as scientists, we try to inform the qualitative with quantitative information. The clay percentage changes may be a function of erosion, deep plowing, land-leveling or natural variability. Among the variables measured, we have the least confidence in the differences reported for the clay values. The samples were taken where landowners would give us permission based on the location of samples collected long ago. Analyses were carefully done, appropriate statistics were applied and conclusions drawn.

A more complete statistical analysis of our findings can be found in *Geoderma* 113(3-4):215–30.

Research update

Breeding and genetics key to stemming Pierce's disease

Classical breeding combined with modern gene-splicing techniques may be the key to maintaining and creating grape hybrids resistant to Pierce's disease, UC scientists told a workshop for North Coast vintners. The workshop, held April 22 in Napa and hosted by UC Riverside's College of Natural and Agricultural Sciences, was designed to give local growers and vintners the latest information on the deadly plant disease.

While the nonnative glassy-winged sharpshooter (GWSS) — which transmits the Pierce's disease (PD) pathogen *Xylella fastidiosa* — has not become established in northern premium wine-grape growing areas, it has made inroads and damaged several hundred acres of vines in Southern California. This voracious insect — a highly efficient vector for the disease — has spread northward from Southern California to Kern and Tulare counties.

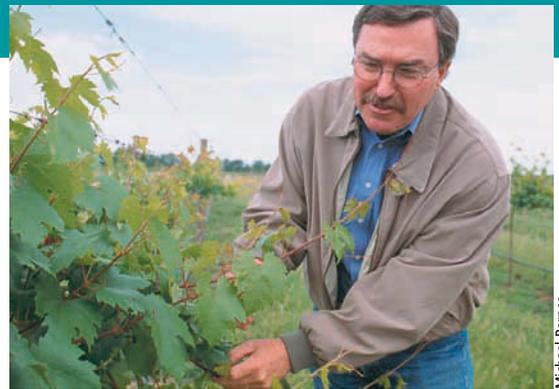
UC Davis geneticist Andrew Walker is breeding varieties to confer disease resistance without losing flavor characteristics suitable for the table-grape, raisin and wine industries. However, he estimates it may be 15 to 20 years before disease-resistant commercial wine-grape varieties are available.

Scientists typically search for disease-resistance characteristics in wild but related species. Walker and his colleagues are using four wild species that show PD-resistance, all from the southeastern United States. They are also experimenting with dozens of resistant selections from breeders there.

"Breeding grapes can be frustrating," Walker says. "Wild species are often hard to classify; they are hybrid forms that can vary between parental extremes. For instance, the same species could have members that are very resistant or very susceptible to Pierce's disease. We can not select parents for breeding without extensive pretesting to ensure they have the high levels of resistance we need."

The process of identifying genes for resistance to Pierce's disease could be shortened by using gene-mapping techniques similar to those used to map the human genome. It may be many years before the grape genome is completely mapped, but Walker and colleagues have begun to build basic maps that will help them find genes that confer resistance, as well as identify better hybrids for breeding purposes.

However, Walker warned: "You can isolate a desirable gene from one grape species and splice it into the chromosome of another, but you currently have little control over where the new gene is placed on a chromosome, or how it is expressed. In many ways, gene-splicing techniques involve as much trial-and-error as traditional breeding techniques."



Michael Barnes

UC Davis geneticist Andrew Walker and colleagues are studying the grape genome, in order to identify genes that confer resistance to Pierce's disease and other grape maladies.

Research update

UC Riverside plant pathologist Donald Cooksey also emphasized the variety of genetic strains of Pierce's disease. Some strains of *X. fastidiosa* can cause disease on grapes, almonds and alfalfa, while others attack citrus, coffee and oleander specifically. *Xylella* is a specialized pathogen, growing only in the plant xylem and insect mouthparts. Strategies to prevent disease include techniques to prevent establishment of *Xylella* in the sharpshooter mouthparts and the use of harmless, naturally occurring endophytic bacteria to compete with *Xylella* for colonization of grapevines.

Damage to grapevines in the Napa and Sonoma valleys tends to be concentrated at the edges of vineyards, UC Berkeley entomologist Alexander Purcell told the workshop. With the introduction of GWSS, there could be transmission from vine to vine, and the possibility of an exponential growth in numbers of infected plants.

Sponsors of the conference included UC agricultural departments and centers, UC Cooperative Extension, the North Coast Pierce's Disease Task Force, and a variety of vintners and agricultural suppliers.

— Michael Barnes

Central Valley growers pulling grapevines

Faced with a grape glut and depressed prices, grape growers in the Central Valley have pulled out more than 50,000 acres of vines since 1999.

"Whenever there's a glut, the Central Valley always gets hit the hardest," UC viticulture advisor Stephen Vasquez says, "because it has more uncontracted acreage and its climate is not conducive to higher-end grapes."

The 8-county region's total grape acreage peaked at nearly 600,000 acres in 1999. The removed acreage, taken out between 1999 and April 2003, represents more than 400,000 tons of production, says industry analyst Tony Correia.

The estimates are based on permits approved by the Regional Air Quality Control Board, which bans the burning of treated wood used for vineyard stakes and requires the careful separation of removed vines and stakes. With subsequent removal costs running about \$400 per acre, some growers are simply abandoning their vines, Correia says. "If it

was easier and cheaper, we would be seeing even more removals."

Nearly three-quarters of the acreage uprooted is in Fresno, Kern and Tulare counties, primarily old vineyards or those without grape contracts, Correia reported at the May 30 Vineyard Economics Seminar in Napa. The varieties being pulled are mostly wine varieties, plus older Thompson Seedless raisins and table grapes.

"Many of the growers are converting to citrus or almonds," Vasquez notes.

Behind dairy, grapes are the state's second largest agricultural sector, worth \$2.6 billion in 2002. According to a March 2003 California Department of Food and Agriculture report, California crushed 3.8 million tons of grapes (including wine, raisins and table grapes) in 2002, up 12.5% from 2001, while growers received average prices 17% lower than the previous year. Growers without contracts for their grapes faced the lowest spot-market prices in decades.

The wine industry has been hit by overplanting and reduced consumption due to a weakened economy. In addition, there has been an influx of inexpensive imports from Chile, Australia and South Africa. As a result, the industry has fragmented into distinct price and quality sectors, from ultrapremium to jug wines (see page 71). Indeed, Napa Valley growers earned nearly \$3,000 per ton for their high-value grapes in 2002, while Fresno-area growers took in \$136 per ton for lesser-quality varieties, CDFA reported.

Despite recent turmoil, the industry appears to have turned a corner, says David Freed of the Universal Capital Corporation (UCC) Group, which conducts an annual economics survey of the wine industry. Freed says that the outlook for "workhorse" varieties such as Chardonnay is improving. "People tend to talk red and drink white," Freed says.

UC viticulture advisor Ed Weber said that a silver lining of recent wine industry trends — for consumers, at least — may be the success of popular, very low-priced wines such as Charles Shaw, which is flying off the shelves for \$1.99 per bottle at Trader Joe's.

The overwhelming success of so-called "two-buck Chuck" — which has sold an unprecedented 5 to 6 million cases since its introduction in early 2001 — demonstrates the ability of the wine industry to develop new markets for lower-quality fruit, Weber says.

Furthermore, Vasquez says, "This is an opportunity for people who didn't drink wine before to try it, and possibly look into higher-priced wines."

The Wine Institute



Grape production was up 12.5% in 2002, but prices received by growers were 17% lower.