



Texas A&M AgriLife Extension & Texas Tech University

Cooperative research and education programs support industry growth and improve quality

By Ted Rieger, senior feature editor

Viticulture and enology (V&E) research and extension programs in Texas have developed through a cooperative arrangement between two of the state's major universities, with support from the Texas wine industry and the Texas Department of Agriculture (TDA). V&E research and extension is centered in Lubbock, within the Texas High Plains American Viticultural Area, where Llano Estacado Winery is located, one of the state's largest and best-known wineries.

The Texas AgriLife Research and Extension Center, based in Lubbock, is one of 13 regional research stations in the state that are part of the Texas A&M University system. Just a few miles from the Lubbock AgriLife Center is Texas Tech University (TTU), the state's primary institution for V&E academic programs.

Dr. Ed Hellman came to Texas in 2000 and has played a major role in expanding V&E research and extension programs. He was the first V&E faculty member given a joint appointment as a professor of

viticulture at TTU and as viticulture extension specialist at the AgriLife Center in Lubbock, where his primary office is located.



Dr. Ed Hellman, who works jointly for Texas Tech and the AgriLife Center, is credited with expanding research and extension programs for the state of Texas.

AT A GLANCE

- Texas A&M and Texas Tech work cooperatively for viticulture and enology research, extension and educational programs.
- Research and extension programs have boosted wine industry growth and helped growers improve yields and quality.
- Grape variety research trials are focused on finding varieties for quality wine production in hot climates.
- The Texas Winegrape Network website, which provides information on research and vineyard site conditions, will expand its interactive tools.

Others with joint AgriLife/TTU appointments are Dr. Thayne Montague, associate professor of horticulture at TTU who works with Hellman on viticulture research, and Dr. Brent Trela, AgriLife extension enology specialist and assistant professor of enology at TTU.

Texas' post-Prohibition wine industry has been growing since the 1970s, and Texas ranks among the largest wine production states in the United States with an estimated 3,400 acres of grapes planted, and more than 200 commercial wineries. It ranks fourth in the country in total wine consumption.

As a result of legislation in 2006 (SB 1370), ongo-

ing funding of \$2 million annually is appropriated from a portion of sales and excise taxes collected from wine sales in the state, to use for grape and wine research, education and promotion. Most of these funds are administered by the TDA. Funds have enabled expansion of programs and personnel additions that include enology extension program specialist Mike Sipowicz in Lubbock.

In addition, the "Viticulture Extension Team" was formed with the hiring of four AgriLife regional viticulture advisors. Dusty Timmons serves western Texas, based in Lubbock; Fran Pontasch serves northern Texas, based in Stephenville; Penny Adams serves the Hill Country (west of Austin), based in Fredericksburg, and Fritz Westover serves the Gulf Coast and is based in Houston.

The TDA also created the Texas Wine Grape Investment Grant Program to encourage expansion of vineyard acreage, because the number of wineries and wine production was increasing at a faster rate than in-state grape production. TDA also operates the Texas wine marketing and promotion program, with Robert "Bobby" Champion as statewide coordinator.

V&E extension faculty members work closely with the Texas Wine and Grape Growers Association (TWGGA) to organize and contribute to educational programs, including an annual conference. Commenting

on the state's coordinated efforts, Hellman said, "We all work closely together, and we all get along well together."

ACADEMIC AND EXTENSION PROGRAMS

TTU has offered a graduate program specialization in V&E within the Department of Plant and Soil Science for a number of years. In fall 2009, a new undergraduate program was started for careers in the wine industry through the Department of Plant and Soil Science, with new courses and a specialization within the horticulture degree program.

In 2011, TTU will offer all V&E undergraduate classes online, in addition to traditional classroom courses on campus. TTU is developing a teaching winery on campus for enology students.

Through AgriLife extension and TTU continuing education, a one-day course is offered throughout the state several times a year, "Prospective Winegrower Workshop," that provides an overview for establishing a commercial vineyard in Texas. This course is a prerequisite for application into the Texas Viticulture Certificate Program, a non-academic credit program of five online distance-learning courses and one vineyard practices field course.

Hellman said extension programs and the Viticulture Extension

Team have helped commercial growers improve their production practices, yields and quality. "Availability of viticultural and enology extension expertise and advice has been a major contributing factor to the recent rapid growth of the Texas wine industry," he said, "with much of the growth coming from inexperienced newcomers."

VARIETY RESEARCH TRIALS

A significant area of viticulture research has been variety evaluation, as Texas is still a relatively new production region. In the 1970s, growers planted Bordeaux varieties, largely because they were familiar to consumers. Hellman explained, "We've done OK with those, but we could probably do a lot better with varieties better suited to hot and warm climates."

Cabernet sauvignon still leads the state's production, but newer acreage includes warmer-climate Rhone, Spanish and Italian varieties. Hellman said more recently planted viognier, mourvedre, grenache, tempranillo, sangiovese, aglianico, vermentino and montepulciano are doing well or showing good promise. "We have a long growing season, so we can grow and ripen anything," he said. "The question is, what varieties will provide better wine quality?"

Montague and Hellman began a variety trial in 2006 in the research vineyard at the AgriLife Center in Lubbock, planting a combination of cooler-climate and traditional varieties along with warm-climate varieties, to study the physiology of grapevine adaptation to climate. The varieties include pinot noir, pinot gris, riesling, merlot, cabernet sauvignon, cabernet franc, chardonnay, malbec, barbera, syrah, counoise, marsanne, montepulciano, tempranillo, tinta cao, tinta madeira, grenache, mourvedre, zinfandel and nero d'avola.

Vine physiology parameters being measured include leaf water potential, stomatal conductance, transpiration and photosynthetic rate. An automated onsite weather



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station collects data to evaluate relationships between grapevine physiology and climatic variables.

Hellman said the experiment to date has dispelled a common belief among growers that vines shut down and no more ripening occurs when temperatures reach about 95°F. The researchers use a LI-COR 6400 Portable Photosynthesis System to take measurements of leaf temperatures ranging from 75°F to 104°F. "Vine photosynthesis increases with temperature up to a point, then it slows down at about 95 to 97 degrees," Hellman noted. "But even at a temperature of 104°F, we've measured vines still photosynthesizing at 75% of normal. If ripening is not occurring at these times, it's for some other reasons, perhaps water stress, or something else."

Another finding is that mourvedre, traditionally considered a hot-climate variety, actually had a lower photosynthetic rate at higher temperatures than cabernet sauvignon and pinot noir. The researchers speculate that mourvedre's lower photosynthetic rate may partially explain why its fruit tends to require a longer growing season to ripen, and this later ripening may enhance its fruit quality and flavor.

"Because we're studying a broad range of varieties, generally suited to a range of climates, I think we'll learn a lot more about how individual varieties perform under different climate factors," Hellman said.

Hellman and Montague also coordinate Texas' variety research trials for the national program, NE 1020: Multi-state Evaluation of Wine Grape Cultivars and Clones, with research trials in 26 states to characterize the quality potential of economically significant and emerging cultivars. The Texas trial, started in 2008, will evaluate cabernet sauvignon and merlot as the standard varieties for comparison alongside eight varieties that show promise for hot climates: aglianico, carignane, malvasia bianca, negro amaro, roussanne, souzao, touriga nacional and verdejo.

Another current project is evaluating methods to prevent and reduce grape yield losses that occur in Texas due to major weather events – spring frosts and hail storms. To avoid losses from frosts, researchers are evaluating ways to delay bud burst past the time when frosts typically occur, with methods such as double pruning, evaporative cooling, the use of growth regulators and other practices. To protect grapes from hail, netting may be an option; however, since Texas vineyards are machine-harvested, the netting must be easily or mechanically removable to be compatible with machine picking. "I'm confident netting will work to protect the grapes, but whether or not it's cost-effective for use with mechanical harvesting is the issue," Hellman said.

INFORMATION TECHNOLOGY

Hellman developed and maintains the Texas Winegrape Network (TWN), <http://winegrapes.tamu.edu>, a website that provides research-based information and communication services for producers, and averages approximately 25,000 page downloads each month.

The site maintains research



presentations from the Texas Viticulture and Enology Research Symposium held every two years, Texas Regional Viticulture newsletters, and provides links to other industry resources. A recently added feature is "Winegrowing Regions of Texas," with general information on the eight Texas AVAs, and more detailed information on climate, soils and topography as an interactive geographic information system tool to enable commercial growers to better evaluate vineyard sites for planting, variety selection and other management factors.

Hellman is developing a web-based interactive tool for diagnosing grape and vine problems (diseases, insect damage, nutritional and fungal problems) that he calls "The Grape Doctor," similar to "Web MD" for human medicine. This tool will enable viticulture experts and extension specialists throughout the country to add information and provide expertise for users.

The Grape Doctor is expected to launch in early 2011, as part of the nationwide initiative to create a



Hail damaged many Texas vineyards in 2009. Photo: Ed Hellman, Texas AgriLife Extension

website for a "Grape Community of Practice for the Extension System," being developed at Oklahoma State University through a grant from the U.S. Department of Agriculture (USDA) Specialty Crops Research Initiative, secured with help from the National Grape & Wine Initiative. A Grape Doctor smart phone application is also in the works, which will allow growers to access information while checking symptoms in the vineyard.

ENOLOGY RESEARCH

Enologist Trela's research has focused on improving wine quality through better understanding and control of oxidation processes, and evaluation of new methods of wine stabilization and fining – in particular, evaluating phytic acid (a form of phosphorous storage in plants) as a wine stabilizer. He has done research and presented findings at recent ASEV meetings on phytic acid for protein stabilization, calcium tartrate stabilization and iron stabilization.

Trela authored the research article, "Iron Stabilization with Phytic Acid in Model Wine and Wine," published in the June 2010 issue of the American Journal of Enology and Viticulture. When present in high concentrations in wine, metal cations such as iron can cause unwanted sensory properties such as metallic taste, discoloration, oxidation changes and cloudiness. Trela's research demonstrated that additions of phytic acid, and then the addition of calcium salt to aid precipitation, removed excess iron in red, white and sparkling wines



Brent Trela, AgriLife extension enology specialist and assistant professor of enology at TTU, published a research study on the removal of excess iron in red wine.

and without the problems associated with alternative methods of iron removal.

Dr. Susanne Talcott, of the Department of Nutrition and Food Science at Texas A&M, is studying the health and nutritional benefits of bioactive compounds in grapes and wine in her research lab at the main campus in College Station. A recent study evaluated the chemical properties and antioxidant capacity of 51 Texas wines. Chemical analysis showed, as expected, that red wines had higher overall antioxidant capacity and higher total soluble phenolics than white wines. Results indicated that many of the red wines possessed potential anticancer effects in colon-cancer cells.

PIERCE'S DISEASE RESEARCH

The statewide Texas Pierce's Disease (PD) Research and Education Program was started in 2005

as a multidisciplinary and interagency program with researchers from several institutions. A PD research facility opened in Fredericksburg in 2007 that includes a research/demonstration vineyard, insect rearing greenhouses and lab facilities. Jim Kamas, AgriLife extension specialist in fruits, serves as the state's PD outreach coordinator. The Texas PD program is funded in large part through the USDA Animal and Plant Health Inspection Service (APHIS).

The program holds an annual Texas PD Research Symposium and provides updates through the "Texas PD Notes" newsletter posted on the TWN website. PD is more prevalent and likely to occur nearer the Gulf Coast, but its range appears to be moving, and it has been found in far west Texas.

A best-management practice for avoiding the disease is selecting a vineyard site with a low PD risk. One of the goals of early variety trials in Texas was to find PD-resistant varieties and plant materials. Research from the PD program's vineyard insect surveys has identified more than 30 species of sharpshooters in Texas that are capable of transmitting PD.

For more information on Texas V&E research, visit the Texas Enology Network website at www.texasenology.org or see <http://winegrapes.tamu.edu>.

Ted Rieger, CSW, is a writer and photographer based in Sacramento, Calif., and has been a contributing editor for V&WM since 1990.

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