Serpent Ridge Vineyard
Coiled for Success

Solar Tax Incentives
Iowa Grape Research
Millennials Talk Back
Evaluating cold-hardy cultivars in vineyard trials, identifying quality wine characteristics of these cultivars, and providing analytical services for the Iowa wine industry are major goals of viticulture and enology research and extension at Iowa State University (ISU) in Ames, Iowa. ISU is home to the Midwest Grape and Wine Industry Institute (MGWII), which includes faculty from the Department of Horticulture and the Department of Food Science and Human Nutrition.

The MGWII was established in 2006 as a cooperative effort by ISU Extension and the Iowa Wine Growers Association (IWGA). Iowa wine sales are taxed at a rate of $1.75 per gallon, with 5% of this revenue designated to fund the institute. MGWII is also supported by ISU Extension, federal research grants, IWGA and regional winery associations.

Dr. Murli Dharmadhikari, director of the MGWII, came to ISU in 2005 as the extension enologist in the Department of Food Science and Human Nutrition. He previously provided enology research and extension at Southwest Missouri State University. He has also worked in the commercial sector, helping to establish wineries in Ohio and Indiana.

Although ISU does not have specific academic programs for viticulture and enology, the MGWII has partnered with two community colleges – Des Moines Area Community College and Kirkwood Community College in Cedar Rapids – to develop and offer certificate programs in viticulture and enology.

**IOWA’S WINE INDUSTRY**

In the early 20th century, prior to Prohibition, Iowa was the sixth-largest grape production state in the United States. A modern resurgence in Iowa grape and wine production began in the 1990s, and the state’s wine industry has grown significantly in less than 15 years. Today it is home to more than 90 bonded wineries and 1,200 bearing acres of vineyards.

The Iowa Wine Industry Economic Impact Study, conducted by MKF Research of St. Helena, Calif., for 2008, calculated the value of statewide vineyard and wine production and sales activities at $234 million. The industry accounted for 1,773 jobs and $50 million in wages. Wine production in 2008 reached a total of 187,000 gallons and retail sales totaled $7.6 million. In 2008, there were 74 licensed wineries and approximately 1,000 acres of vineyards. Most Iowa
wine is consumed within the state. Production estimates for 2010 by MGWII project coordinator Craig Tordsen were 283,000 gallons of wine with sales of 231,000 gallons.

Although vineyards are distributed throughout Iowa, more acreage is planted in the southern half of the state, which tends to have slightly warmer temperatures. Dharmadhikari said the northern part of the state must primarily grow cold-hardy varieties (where winter temperatures dip as low as minus 35°F), whereas southern areas can accommodate a wider range of hybrids and Native American cultivars. One of the largest concentrations of vineyards and wineries is in Warren County, south of Des Moines.

**ENOLOGICAL SERVICES AND RESEARCH**

A major function of the MGWII is operating a wine laboratory for the Iowa wine industry, which is used by commercial wineries on a fee-for-service basis. "Part of our service is to provide basic wine analysis, both chemical and sensory, and to make recommendations to winemakers on what to do prior to bottling the wine," Dharmadhikari said. MGWII staff includes research associates Dr. Jun Dang, who manages the lab, and Jennifer Hansen, who assists with research, outreach, education and lab analysis.

On the research side, Dharmadhikari worked with colleagues in the food science department to develop a new rapid-determination method for trace analysis of trans-resveratrol in red wines, using solid-phase microextraction (SPME), with on-fiber derivitization and multidimensional gas chromatography-mass spectrometry (GC-MS). Resveratrol, found in red grapes and wine, is produced by plants in response to fungal infection, and has been shown to have human health benefits as an antioxidant.

Dharmadhikari was co-author of a paper on this new analysis in the Journal of Chromotography, published in 2009. He said he is interested in doing further analyses of cold-hardy red-grape varieties to see if there is a relationship between resveratrol levels and grape resistance to fungal diseases.

Dharmadhikari listed three major enological research areas of MGWII that address Iowa wine industry needs:

1. Imbalance in fruit chemistry: Iowa wines tend to be high in pH and acidity, particularly with malic acid. Researchers are looking at wine deacidification methods, the use of different yeast strains, and filtration technologies to reduce acidity.
2. Red-wine quality: Low tannin content and tannin stabilization are issues for red wines.

3. Flavor chemistry: The industry does not have a good understanding of the flavor profiles of new varieties being planted. Therefore, research is needed to identify flavor components and marker compounds to determine optimal harvest dates, and to improve viticultural and enological practices to enhance flavor profiles.

“We have the challenges of high acidity, a short growing season and high humidity,” Dharmadhikari said. “At the present time, aromatic white-wine varieties and sparkling wines seem to have the greatest potential for quality wine production.” He said he believes the more promising white varieties being grown include brianna, frontenac gris, La Crescent, La Crosse and St. Pepin. For reds, he listed frontenac, Marquette, sabrevois, St. Croix and Swenson red. Dharmadhikari said brianna and La Crescent have good potential for sparkling wine.

**VITICULTURE FOCUS ON COLD-CLIMATE CULTIVARS**

A significant focus of the viticulture program has been on field trials to evaluate the suitability of cold-climate cultivars for Iowa and the upper Midwest states. Cultivars that can tolerate winter freeze periods and undergo late-spring bud break to avoid spring frost damage are needed to reliably produce annual crops. In addition, successful cultivars should have good pest and disease resistance and be able to mature fruit during a short growing season.

Dr. Paul Domoto of the Department of Horticulture and the MGWII staff have been involved in cultivar research trials since 2002. ISU has four research facilities where trials are conducted: the ISU Horticulture Research Station at Ames, the ISU Armstrong Research and Demonstration Farm in Lewis, the ISU Southeast R & D Farm in Crawfordsville, and the ISU Northeast R & D Farm in Nashua. These sites represent three different climatic and four different soil conditions. Trials are also conducted in cooperation with Tabor Home Vineyards and Winery near Baldwin.

Trials are conducted in various locations with different soil and climatic conditions. This trial block at Tabor Home Vineyards and Winery near Baldwin is planted to MN-1220.

A cultivar trial was established in 2002 at the Ames and Armstrong Farm stations, with a grant from the Leopold Center of Sustainable Agriculture, to study grape cultivars by management system. Ten are being evaluated: marechal foch, frontenac, Norton, St. Croix, cham
bourcin, seyval blanc, La Crosse, vignoles, traminette and edelweiss.

Results and data from the 2010 growing season showed differing effects of the 2009-2010 winter that had significant freeze periods in December and January (down to minus 21°F) and a spring frost in May 2010, down to 29°F. At both sites, injury was greatest to the cultivars classified as “slightly” or “moderately” cold hardy, while those classified as “very” cold hardy had the least bud injury. At the Ames site, chambourcin, traminette and vignoles failed to produce a crop and were among the lowest-producing cultivars at Armstrong Farm.

The highest-yielding cultivars at each site were frontenac and La Crosse; St. Croix, marechal foch, seyval blanc and edelweiss also produced a usable crop. Among the red varieties, frontenac and marechal foch showed better overall fruit chemistry in terms of percent of soluble solids and pH. Seyval blanc and La Crosse showed better among the white varieties.

As part of the Northeast regional research project, NE 1020 “Multistate Evaluation of Wine Grape Cultivars and Clones,” Domoto and Dr. Gail Nonnecke of the Department of Horticulture began ISU trials in 2008 at the Ames station and at Tabor Home Vineyards on cold-hardy grape cultivars. These include several from the University of Minnesota Cold-Hardy Grape Breeding Program: La Crescent, Marquette, MN-1189, MN-1200, MN-1220, MN-1235, MN-1258 and petite amie, in addition to corot noir and NY 95-0301-01 developed at Cornell University. Frontenac and St. Croix are planted as controls.

Some initial information was gathered following the 2010 season that put the young vines to the test with winter freezes and a May 2010 frost. MN-1189 broke bud later than the other Minnesota selections, and MN-1200, MN-1235 and Marquette showed some tolerance to spring frost. Few vines carried any crop at the Ames station, and vines at Tabor Home were allowed to carry one or two clusters to observe fruit characteristics. Marquette and MN-1220 showed susceptibility to anthracnose. Frontenac, MN-1200 and MN-1235 show susceptibility to black rot.

A list of more than 70 cold-climate cultivars with links to more information on each can be found at http://viticulture.hort.iastate.edu/cultivars/cultivars.html

V&I EXTENSION

Proper site selection is being promoted through extension programs and publications designed to match cultivars to vineyard sites. The coldest temperatures occur under radiation freeze conditions when there is little air movement and cold air settles in low-lying areas. It is recommended that vineyards be planted in locations that are 50 feet or more above a valley floor. It is also recommended that soils be tested before planting. The ISU Soil and Plant Analysis Laboratory provides such testing to growers to assist with vineyard design and cultivar selection.

Viticulture extension field specialist Mike White publishes a free newsletter called the “Wine Grower News,” which includes updates during the growing season. White listed several areas of focus for the future: canopy management and fruit loads for optimum quality and yields, vineyard mechanization, and better methods for controlling anthracnose, black rot, downy mildew, phomopsis and powdery mildew.

MGWII staff members have written several publications and short guides for grapegrowing and winemaking operations, which are posted on the Institute’s website. The MGWII also conducts educational workshops and field days for the industry and is involved with the IWGA annual conference.

IOWA VINTNERS QUALITY ALLIANCE

Since 2008, the MGWII has been working with the IWGA to establish an Iowa Vintners Quality Alliance (IVQA) program similar to VQA programs that exist in Canada. This would be a voluntary, fee-based
certification and labeling program for wineries to submit samples to the MWGII lab for chemical and sensory testing, using standards established by the industry. Dharmadhikari said the Alcohol and Tobacco Tax and Trade Bureau has been contacted about the program and sample certification seals have been designed. Two are planned: “Iowa Quality Wine,” for wines certified under the program made from 100% Iowa-grown grapes; and “Quality Wine,” for wines produced in Iowa that may have wine blended in from grapes grown outside the state.

Dharmadhikari is optimistic the program can be launched in the near future with a consumer information campaign. He said about 20 IWGA winery members, representing most of the state’s larger wineries and a significant percentage of total production, have expressed interest in participating in the IVQA program. Most of the state’s wineries do well with direct sales in their tasting rooms; the IVQA seal is expected to help Iowa wines gain better acceptance and place more wines in Iowa restaurants, and eventually help expand sales beyond the state’s borders.

**FUTURE DIRECTIONS**

For future projects, Dharmadhikari said he hopes to test “flash dentente” technology (featured in the September-October issue of V&WM) on red-grape varieties during the 2012 crush to assist with under-ripeness issues. “If this is a good technology that can reduce grassy and herbaceous notes in red wines and enhance fruit components, it’s something we should be using,” he said.

Noting that grape genetics are a focus of research in Minnesota and South Dakota, Dharmadhikari said he wants to see more research to determine how genes express traits and flavor characteristics in cold-hardy cultivars. “People are interested in looking at grape and wine quality from a genetic standpoint. For example, identifying the genes and mechanisms that cause the expression or non-expression of malic acid in cultivars grown here would be of great interest,” he said.

For more information, see the ISU Department of Horticulture website at http://viticulture.hort.iastate.edu, or the MGWII website at www.extension.iastate.edu/wine.

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

Comments? Please e-mail us at feedback@vwm-online.com.