WSU's Voice of the Vine- Wine Science Center, Viticulture vs. Winemaking, Tannins

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Construction Starts on WSU's Wine Science Center

The Cougar flags blowing majestically in the breeze were ideal for the site of the Wine Science Center at Washington State University Tri-Cities, noted Washington Gov. Jay Inslee.

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"Red and white are the colors of the best wine we

make in Washington State," he quipped to the audience of 200 community, university and grape and wine industry members at the Sept. 26 groundbreaking ceremony in Richland. "We believe in wine and we believe in science. We are marrying those two things today," Inslee said. "The Wine Science Center symbolizes the power of partnerships."

highlights from the groundbreaking earlier last month. Video by Matt Haugen/WSU News.

A creative collaboration with the Port of Benton, which owns the land, and the City of Richland, which provides administrative support, resulted in formation of the Wine Science Center Development Authority.

Construction is to start immediately on the 39,300-square-foot, LEED silver facility at the corner of George Washington Way and University Drive. Employing up to 75 construction workers, the building is expected to be complete in early 2015.

The conceptual design by Lydig Construction Inc. and ALSC Architects, both of Spokane, includes a research and teaching winery, state-of-the-art research laboratories, classrooms, conference rooms and a 3,500-bottle wine library. A dramatic central lobby will provide interior views of the research winery floor and exterior views of the Columbia River and the WSU Tri-Cities campus.

The $23 million project is designed to attract world-class researchers and students who will focus their efforts on the challenges and opportunities faced by Pacific Northwest grape growers and winemakers. More details on the project and its unique partnerships are at http://www.tricity.wsu.edu/wsc.

Steve Warner, president of the Washington State Wine Commission, explained how the grape and wine industry has experienced explosive growth since it started 30 years ago. Now with nearly 800 licensed wineries and an economic impact of $8.6 billion, Washington wines consistently outperform wines from other regions of the world, he said.

"If we're this good in 30 years, how great can we be in the future?" Warner said. "The Wine Science Center will take us to new heights."

Fundraising efforts for the Wine Science Center are in the final stretch, with $2 million needed to complete construction and $2 million needed to fully equip the building. A total of $19 million has been raised since the campaign started about three years ago.

WSU has been involved in wine-related research since the 1930s and is the only university in the Pacific Northwest offering bachelor's and graduate

degrees in viticulture and enology, plus a wine business management program and a distance education program to earn professional certificates.

Thomas Henick-Kling joined WSU in 2009 as director of the viticulture and enology program (V&E), which has about 33 faculty members in the Tri-Cities, Prosser and Pullman.

"This is much-needed space for researchers and students," Henick-Kling said, noting that the V&E program enrolls about 50 undergraduate, 29 graduate and 70 certificate program students. "The Wine Science Center will allow us to expand our research capacity to address the challenges and opportunities for industry growth."

Learn more about the WSU Wine Center at wine.wsu.edu/campaign.

-Melissa O'Neil Purdue

What Matters More: Viticulture or Winemaking?

It's been said that a great wine is made in the vineyard, but when it comes to mouth feel and color, Jim Harbertson and some of his colleagues at WSU now believe that it's also made in the winery.

Winemakers often desire small grape berries because most of the pigment and flavor compounds, including tannins, are stored in the skins. Photo courtesy Jim Harbertson/WSU.

Wine scientists Harbertson, Markus Keller, and recent WSU PhD graduate Federico Casassa, and their industry collaborators, Chateau Ste. Michelle's Russ Smithyman and Bill Riley, came to their conclusion after essentially parching several plots in Chateau Ste. Michelle's Cabernet Sauvignon vineyards in southeast Washington State. Using a watering strategy called regulated deficit irrigation, they stop watering the grapevines after flowering, which stunts vine growth and produces a smaller grape. Then they water again – but just enough to funnel the plant's energy into fruit ripening.

"We said, 'What if we go to the extremes?' Apply a lot of water or almost nothing at all, and see if we can influence the wine style in the vineyard," Keller explains. Specifically, they wanted to look for a change in shape and size of molecules that make up tannins, the large polymers made of smaller monomers (simple phenolic 'building blocks') in grapes, which can cause bitterness and the dry mouth feel (astringency) in wines. They also wanted to

evaluate the impact of the irrigation strategy on the grape pigments– a class of compounds known as anthocyanins.

Winemakers often desire small grape berries because most of the pigment and flavor compounds, including tannins, are stored in the skins. With a smaller berry there is more skin relative to the rest of the grape. The downside to smaller berry size is that seeds that contain astringent tannins and bitter catechins (monomer flavanoids) are also increased relative to the berry size. In analyzing the grapes watered at four decreasing rates, the team found no difference in the shape and size of the tannin polymers or catechins, but the smaller berries clearly led to more polymers and monomers in the wine and also more anthocyanin. Then the team took the process one step further.

From the Field to the Lab

Using fruit donated by Chateau St. Michelle, they made wine using the basic and ancient Roman winemaking technique called extended maceration at the Prosser IAREC research winery. Extended maceration leaves the skins and seeds of crushed grapes sitting in their own juices for longer than the usual five to six days, extending the contact period to 30 days. They made another wine using a more typical maceration length and looked for differences in the chemical agents that underlie the dark color and astringency in wine.

"The treatment in the vineyard didn't change the polymers' shape or size at all," said Harbertson. "[But] when you compare the control with the extended maceration you can see almost immediately there is a really big difference between them."

A Change in Tannins

The sensory analysis on the wines showed that the tannins in the extended maceration wines were all more astringent and more bitter than those wine grapes that were processed with regular maceration. Extended maceration extracted more seed tannins, which made the wine more astringent, but also extracted more smaller tannin polymers and more monomers, which made the wines significantly more bitter.

"So there are two things going on here," explained Harbertson. "An increase in concentration (of tannins), which causes an overall increase in astringency. The second effect is to alter the bitterness which is caused by differences in the size of the polymers."

"In this case when you are looking at tannin composition, even though you did

terrible things to the fruit, winemaking matters more than the changes in the vineyard. However, you cannot ignore the fact that it is easier to extract more seed tannins and anthocyanins from smaller berries so the irrigation played its part as well," Harbertson said.

This information is based upon the recent journal article, Sensory Impact of Extended Maceration and Regulated Deficit Irrigation in Washington State Cabernet Sauvignon Wines by L. Federico Casassa, Richard C. Larsen, Christopher W. Beaver, Maria S. Mireles, Markus Keller, William R. Riley, Russell Smithyman, and James F. Harbertson, published in the American Journal of Enology and Viticulture. 2013. doi:10.5344/ajev.2013.13068.

Learn more about research opportunities and education in wine science at wine.wsu.edu.

-Rachel Webber

Free Online Training Shows How to Detect Tannin Levels

Hard cider is one of the fastest growing segments of the alcoholic beverage market, and as with any industry experiencing rapid growth, producers need solid information to ensure product quality and consistency. *How to Test Tannin Levels in Apple Juice Using Lowenthal Permanganate Titration,* a new online training module from Washington State University, teaches cider producers how to analyze their raw materials to provide a consistent mouth feel in their finished product.

Tannin provides astringency — a sensation of dryness in the mouth. Tannin levels in apple juice, though, are anything but consistent. Not only do tannin levels vary among varieties of apples, but tannin concentrations will even differ in apples picked from the same trees in different years. To be sure to produce ciders with consistent tannin levels, cider producers should test each batch of juice.

*How to Test Tannin Level*s takes the guesswork out of determining tannin levels by demonstrating the relatively simple Lowenthal Permanganate Titration technique. This training module, featuring video and photography, includes segments on equipment and materials, setup, safety, and performing

the laboratory procedure. This technique could also be used to test tannin levels in grape juice, tea, and other beverages.

How to Test Tannin Levels in Apple Juice Using Lowenthal Permanganate Titration was produced with the expertise of D. Scott Mattinson and John Fellman of the WSU Department of Horticulture, Fruit Physiology and Biochemistry Laboratory.

Interested people can register for the free training at http://breeze.wsu.edu/tannin/event/registration.html.

-Bob Hoffmann

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