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Destined to become Canvasback wine, these freshly harvested grapes from Red Mountain's Jolet Vineyard wait to be picked up for processing.

PHOTO BY MELISSA HANSEN

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TJ MULLINAX/GOOD FRUIT GROWER

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Early morning machine harvesting of Merlot wine grapes at Zirkle Fruit Co.'s Four Feathers Ranch near Cold Creek, Washington.

PHOTO BY PHIL HULL,  
YAKIMA, WASHINGTON



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## FIRST BITE

O. Casey Corr, Managing Editor

# We partner to serve growers

**W**hen *Good Fruit Grower* was founded in 1946, Publisher F.W. Shields set a simple goal: "to become a clearinghouse for dollar-and-cents ideas and information for its readers — a specialized publication to fill a special need."

That commitment deepened a year later, when Shields sold the magazine to the Washington State Fruit Commission and *Good Fruit Grower* became a grower-owned publication.

Today, the amount of horticultural information we report continues to grow, as does research for both tree fruit and wine grapes. In Washington state alone, tree fruit growers are contributing \$32 million for research in partnership with Washington State University. Separately, about \$850,000 each year has gone to projects in viticulture and enology research. The growth in funding for wine research led the Washington Wine

Commission to hire Melissa Hansen as its first research and program manager. On page 22, she talks about her work to create a research structure, put research on a sustainable footing and communicate knowledge to growers.

As former associate editor at this magazine, Melissa is highly qualified for that role. I'm excited to work with her and Steve Warner, president and CEO of the Wine Commission, to help communicate educational information to growers. We've

reported on wine grape research in the past, but we at *Good Fruit Grower* want to do more with the wine commission, and I look forward to deepening our similar partnership with the Washington Tree Fruit Research Commission under its new manager, Dr. Mike Willett.

Why? For the simple reason we work for the same people. We all share the mission of providing educational information to growers to survive and thrive in a competitive market.

Each organization has its distinct focus, mission and communication needs, but one of my goals in the coming year is to provide more help to these and other grower organizations. I want to offer our expertise and information channels, not as a replacement of any organization's own channels, but as a supplement. We want to deepen existing partnerships with grower organizations and make new ones. Any organization with a need for getting horticultural information to growers should think of us.

In our popular print magazine, we have ample room for text, images and charts. But we also have a new YouTube channel and Twitter and Facebook accounts. We have an electronic newsletter sent to thousands of readers four times a month. We just launched a new app for Apple and Android devices that now provides fast access to all our Web content. With these resources, we deliver information to a large grower audience, using whatever tools best serve delivery and understanding of complex information.

*Good Fruit Grower's* single greatest partnership is with universities, especially Washington State University, an institution of incalculable value to our industry in this state and beyond. Every issue of this magazine contains in-depth interviews with scientists on topics of vital concern to growers, often supplemented with online extras, such as video. We deeply appreciate our university colleagues who share their findings and give us their time. We should do more, and we will.

Growers are thrifty people. I think they expect us to work together where it makes sense and avoid duplication of resources. Any time our magazine partners with university researchers or with staff at fruit organizations to share new information, science and ideas, growers win.

We work for the same people.

\*\*\*\*\*

**O**ur new app is a hit! Thanks to the more than 600 people who downloaded the new *Good Fruit Grower* app for Android and Apple mobile devices. We launched the app as a better means of accessing our coverage of the Annual Meeting of the Washington State Tree Fruit Association in December. Thanks to some technical wizardry, you can now use the app to access all our online content, including archived articles from the magazine.

You can find links to download the app at [www.goodfruit.com/get-the-good-fruit-grower-app](http://www.goodfruit.com/get-the-good-fruit-grower-app) or at the Android or Apple app stores. ●



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# QUICK BITES

People and industry in the news.  
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[goodfruit.com/fresh-updates](http://goodfruit.com/fresh-updates)



## PLAY

Kathy Stephenson from Pear Bureau Northwest talks about how they are helping retailers market fresh pears. Watch the video at [bit.ly/pearBureauNW](http://bit.ly/pearBureauNW)

## Pear Bureau Northwest launches new website

Pear Bureau Northwest has launched a redesigned trade website focused on the business of pears to grow pear sales.

Visitors to [www.trade.usapears.org](http://www.trade.usapears.org) will find information about pear varieties and availability, marketing trends and research, and promotion and merchandising materials. The site is also home to the new USA Pears University, which offers resources to help produce professionals improve their pear knowledge, including an online training course covering handling and merchandising. The mobile- and tablet-ready site also features instructional videos for demonstration and sampling staff.

"We hear from produce managers that training is the single most important way to improve performance and enhance the shopper's experience. Our training program helps to successfully fill this need and set up retailers for better success in the pear category," said Kevin Moffitt, Pear Bureau Northwest president and CEO.

The website also features a Marketing Tools section that includes a point-of-sale material gallery as well as links to download customizable header cards and a social media toolkit.

Pear Bureau Northwest is a nonprofit marketing organization established in 1931 to promote fresh pears grown in Washington and Oregon on behalf of nearly 1,600 growers. For more information, visit [www.usapears.org](http://www.usapears.org), or for retail trade information, visit [www.trade.usapears.org](http://www.trade.usapears.org).



Pear Bureau Northwest's redesigned website at [www.trade.usapears.org](http://www.trade.usapears.org) features information on pear varieties and marketing trends.

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## Rootstock project wins USDA award

The multidisciplinary, multistate NC-140 Regional Research Project *Improving Sustainability in Fruit Tree Production through Changes in Rootstock* has received the U.S. Department of Agriculture's 2015 Experiment Station Section Excellence in Multistate Research award.

The multistate research program allows state agricultural experiment stations to interdependently collaborate on projects that two or more states share as a priority, but that no one state could address alone. The award recognizes scientists who are conducting exemplary multistate activities and research under the program.

The NC-140 project, a partnership of more than 30 universities and organizations in the U.S., Canada and Mexico, seeks to enhance economically and environmentally sustainable practices in temperate fruit production by focusing on rootstocks. Over the past five years, NC-140 researchers have measured tree growth, size control, and pest and disease resistance in order to develop the most

sustainable rootstocks and to accelerate the process of identifying and commercializing high-performing rootstocks for growers.

Overall, the NC-140 group reported that its research and recommendations have resulted in earlier returns, greater yields and higher fruit quality, with a financial benefit to U.S. fruit tree producers of \$250 million. For instance:

—Ninety-eight percent of all New Jersey orchards now use apple, pear, peach and cherry dwarfing rootstock.

—In Indiana, grower use of rootstocks from NC-140 trials has increased by 660 percent, with an estimated crop value increase of more than \$12,000 per acre.

—Nationwide, sweet cherry acreage has increased by 10,000 acres since 1995, and planting density has increased from 100 to 415 trees per acre.

—In the apple industry, NC-140 science and outreach has increased mature orchard yields by 20 percent, enhanced fruit size by 10 percent and increased highest grade fruit by 20 percent.

NC-140 is supported in part through USDA's National Institute of Food and Agriculture and has been renewed until 2017 to continue to support the fruit tree industry and its growers.

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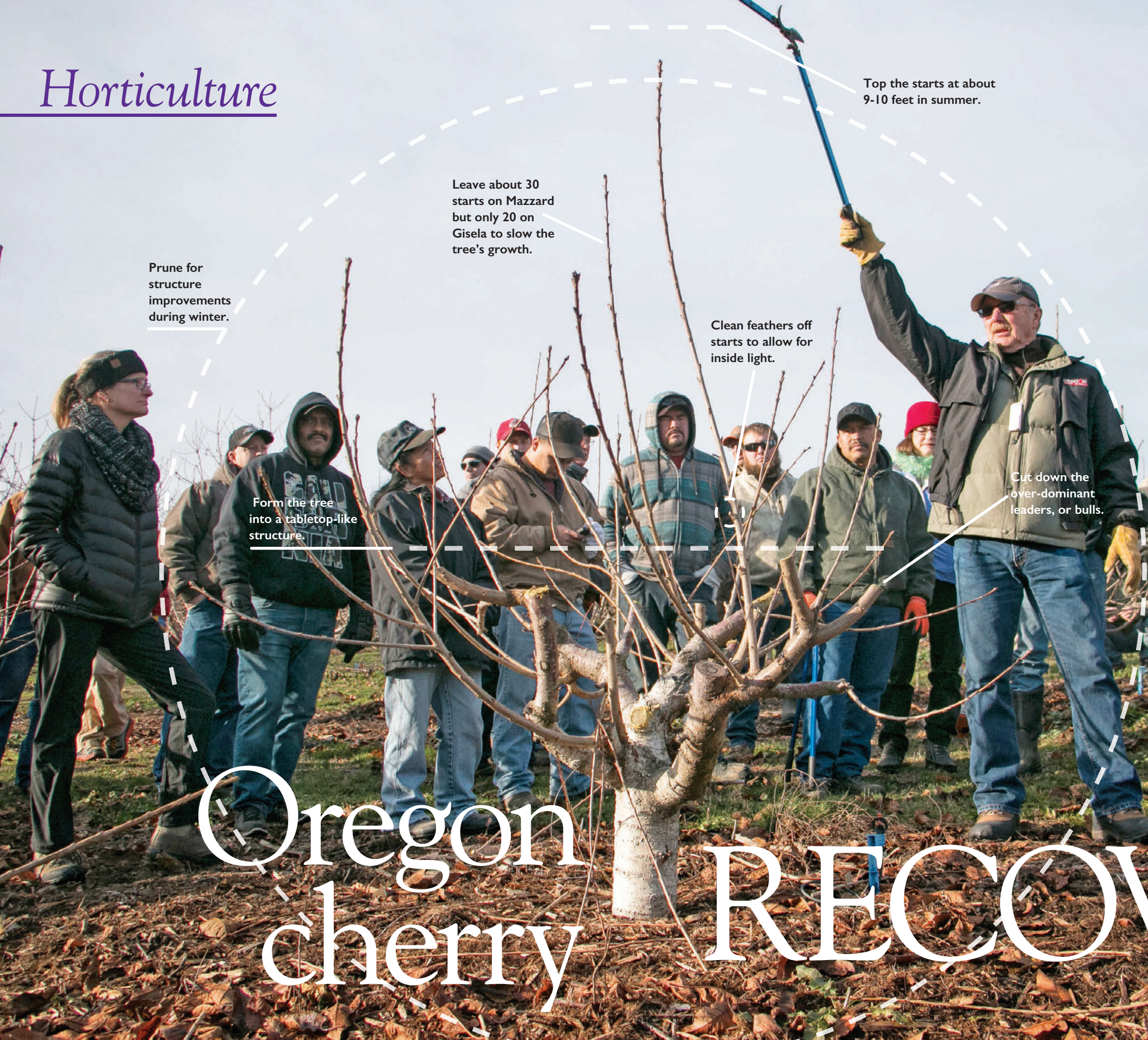
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## Columbia River Gorge growers battle back from 2014 hard freeze damage.

by Ross Courtney

Oregon cherry growers will continue to recover from a 2014 freeze by pruning to encourage healthy lower-branch structure in their orchards while balancing their need for fruit development.

"Now it's just back to managing those canopies," said Dr. Todd Einhorn, research horticulturist at Oregon State University in Hood River.

Einhorn and Gipp Redman, assistant orchard manager for Gilbert Orchards in Yakima, Washington, led a winter cherry pruning field tour through three cherry orchards near The Dalles, Oregon, in December. The annual event focused on growers' continued recovery from a November 2014 cold snap, when temperatures plummeted to as low as 12 degrees below zero, knocking some trees back to the trunks. Steven Renquist, a Douglas County extension scientist with OSU, assisted.

In the wake of the freeze, cherry growers in the areas around The Dalles and Hood River, home to roughly 12,300 of the state's 15,500 acres of sweet cherries, often had to prune trees back to the snow line to completely restart their trees.

Some farmers harvested more than half their crops even after noticing severe browning on their spurs due to winter damage, Einhorn said. In spur samples, Einhorn found new xylem and phloem cells at bloom, which helped connect spurs to the rest of the tree, allowing those spurs to support fruit. Even when half the flowers on a tree die, a grower can still produce a full crop with good fruit set.

Growers may have lost a production year, but with good branch renewal they didn't have to rip all the trees out and re-establish the block, Einhorn said.

Redman also was pleasantly surprised by the recovery. "I was once again struck by Mother Nature's ability to overcome almost total devastation and repair itself," he later told the Washington State Fruit Commission at its Dec. 16 meeting in Yakima.

### Renewal

Today, as growers plan their winter and spring pruning, they find themselves seeking a delicate balance between encouraging fruit this year and promoting overall tree growth for the future in areas where damage was substantial.

## Pruning the KGB way.

With pruning a cherry tree for the KGB system, “you raise poles, you don’t raise the branches inside,” says Gipp Redman. “To control the rate of vigor you have to have enough upright leaders. The problem with KGB is we get greedy and don’t make the cuts. You’ve gotta make these cuts to slow the tree down and get the tree thinking about producing fruit.”



TJ MULLINAX/GOOD FRUIT GROWER PHOTO ILLUSTRATION

Such weather events are unusual for the region, so growers had little history to guide them, and new varieties clouded the picture even more. Thus, a wide array of ideas and suggestions found their way to the table.

“I don’t think there’s a wrong or right answer,” Redman told the group of 60 or 70 growers huddled around Bing, Skeena and Sweetheart trees in varying stages of recovery on the Dec. 15 tour.

Overall, Redman and Einhorn advised growers to manage excessive vigor in the tops to encourage lower branches to rebuild structure, forcing the tree into a Christmas tree shape to encourage even light penetration throughout the orchard. Thinning cuts and summer pruning the tops to calm growth are critical to



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\*Patent information available upon request.



### PLAY

Watch a video of how Gipp Redman pruned in the KGB and steep leader systems at [goodfruit.com/media](http://goodfruit.com/media).



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*"We're trying to grow a tree; we're not trying to grow fruit."*

—Gipp Redman

developing the lower canopy for future fruit production.

"We're trying to grow a tree; we're not trying to grow fruit," Redman said.

He suggested growers prune sometime before bloom and in the summer, and train lower laterals horizontally, encouraging earlier fruit production. A few growers balked at the labor-intensive suggestion of training, including Marcus Morgan, who owns a nearby orchard. "Too much money," he said.

Einhorn recommended cutting branches in the tops all the way to the leader to avoid leaving stubs that will generate many new shoots and affect canopy light.

#### Touring orchards

The tour started at Anderson Fruit, one of the more extreme examples of cold damage. The freeze completely killed 5 to 10 percent of Bill Anderson's trees in his low-lying blocks, while taking the rest out of production for two years.

"At 12 below, nothing stood a chance," Anderson said.

In response, he pruned aggressively, all the way down to his three leaders, but the trees are regrowing.

Anderson said he planned to prune in the winter and in the summer to slow down growth.

"It's going to be pretty costly, but you got to do it," Anderson said.

He plans to harvest 4 to 5 tons per acre of Skeenas in 2017, ramping up to his normal 10 tons per acre in the years following.

Things were not as bad at the next tour stop, a nearby hillside Omeg Family Orchard block where most freeze damage happened below an invisible line slicing across the slope, below which cool air pooled.

Trees above the line lost some spurs but ended up producing fruit at the tops of limbs, Redman said. Below that line trees produced no fruit, prompting the orchard managers to cut all the way to the stubs to restructure.

Redman demonstrated pruning Sweetheart trees, planted in a KGB system, that stood up to his chest.

He cut back a tree to resemble a bush, leaving roughly 20 to 30 similarly sized upward shoots. He also removed some of the thickest, strongest branches, attempting to slow down tall growth and encourage a healthy, fruitful structure lower in the tree.

He recommended 30 growing points on Mazzard rootstock, 20 growing points on Gisela rootstock.

He also demonstrated how to train one of the Sweethearts, previously trained to a KGB canopy, into a steep leader system, something the Omegs were considering in the wake of the damage.



"If you're going to make a change, this is the perfect time to make a change," he said.

Sometimes, steep leaders in Sweethearts give growers more control than KGB, Redman said.

Redman also warned that the winter damage might lead to an increase in tree borers, a category of insects that seek out stressed and weakened fruit trees. He had been hearing more reports of borers, so he encouraged farmers to discuss control methods with field representatives early. ●



TJ MULLINAX/GOOD FRUIT GROWER

Jorge Cruz of Anderson Fruit cuts the tops out of Bing cherry trees that were damaged by the November 2014 freeze that hit The Dalles, Oregon. The trees were cut down to three leaders following the damage, with plans to prune again this winter and summer to slow the tree's growth.



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# Cherry CHALLENGES

**C**herry exporters likely will face a challenging 2016 as China's contracting economy drags down other Asian nations with it, though the horizon holds a few bright spots.

That's the message from Keith Hu, international marketing director for Northwest Cherry Growers, the promotional arm for cherry producers in Washington, Oregon, Idaho, Utah and Montana, based in Yakima, Washington. The outlook for next year is OK, he said — not very negative, "but there are for sure certain things we need to be cautious about."

China heralds most of the bad news.

## China's economic struggles may make for a difficult cherry export year.

by Ross Courtney

Analysts expect the economic growth in the world's most populous nation to slow to between 3 percent and 7 percent, which would hamper the economies of its major trading partners, such as South Korea.

In 2015, the two nations took in 43 percent of the Northwest's cherry exports, Hu said. China imported 1.81 million 20-pound boxes of cherries, a high volume, but didn't pay well in August for heat-damaged fruit shipped by ocean containers.

"Speaking to many, many export managers, the final return is questionable," Hu said.

Canada represented the largest cherry market at 32 percent of Northwest exports in 2015. Meanwhile, potential growth in Vietnam, Singapore and Thailand could help the industry weather China's storm, Hu said. Vietnam importers paid some of the highest prices at more than \$60 per box before adjustments in 2015.

Meanwhile, Hu expects more competition from Turkish cherries in China's markets.

"We all know they produce decent cherries," Hu said.

However, Northwest exporters have a shipping advantage over their Turkish competitors: a smoother, shorter drive to Sea-Tac Airport than Turkey's growers have to Istanbul, where the nation's closest international airport is located.

On the bright side in China, Hu's marketing programs showed a higher return on investments — \$184 dollars per \$1 of promotion spending — of anywhere in the world. South Korea was second, with Mexico third.

Also, Northwest cherries are reaching a broader geographic area in China, with exports up in China proper and down in Hong Kong, Hu said. Sea-Tac now offers two direct passenger flights to Beijing some days, opening up more cargo space.

In spite of the struggles in China, the country still represents some of the strongest potential, Hu said.

The nation will have 500 million middle class people within 15 years, Jack Ma, founder and executive chairman of online retail giant Alibaba Group, told CNBC in a November interview. Alibaba sells Northwest cherries through online orders, often at premium prices. Last year, Wapato, Washington, grower Peter Verbrugge helped ring the New York Stock Exchange bell when Alibaba sold its first public shares.

## Promise in the Philippines

Hu has a hopeful hunch about the Philippines, a nation of 101 million people with rapidly growing cities and an expanding economy.

"The Philippines have been on my radar for the past couple of years," he said.

This year, Hu plans to apply for a grant of about \$100,000 from the U.S. Department of Agriculture's Emerging Market Fund to train retailers and importers there how to handle and promote cherries.

The cherry industry shipped about 4,500 boxes to the Philippines in

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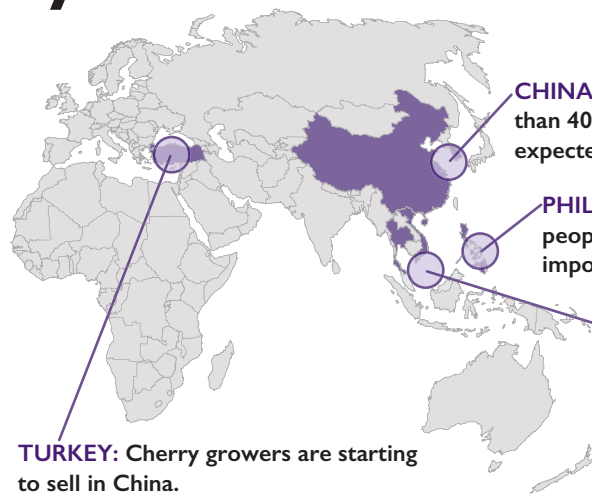
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# Dynamic future in Asian cherry markets



**CHINA AND SOUTH KOREA:** The two nations alone account for more than 40 percent of Northwest cherry exports, but China's economy is expected to contract in 2016, dragging Korea down with it.

**PHILIPPINES:** A potential new cherry market with 101 million people and growing wealth concentrated in port cities. The nation imposes a 5 percent tariff on U.S. cherries, apples and pears.

**VIETNAM, SINGAPORE AND THAILAND:** Growth in Southeast Asian markets could temper Chinese struggles.

**TURKEY:** Cherry growers are starting to sell in China.

SOURCE: NORTHWEST CHERRY GROWERS

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2015. Washington also exported 395,000 40-pound boxes of apples to the Philippines, more than to the entire European market, during the 2014-2015 crop season, but less than 500 44-pound boxes of pears. The nation currently imposes a 5 percent tariff on all three types of fruit from the United States.

However, Hu draws most of his encouragement from California table grapes, which have done relatively well, even in years when the Philippine peso was very weak compared to the U.S. dollar. Meanwhile, several Asian airlines have daily flights to Manila, giving shippers potential cargo space.

Another marketer also gave a cautious outlook.

Roger Pepperl, marketing director for Stemilt Growers in Wenatchee, said the overall global economy, with a strong U.S. dollar, will make it hard for American firms to export anything in 2016, not just cherries.

"It's tough to see right now with the dollar the way it is," he said.

Pepperl said low global fuel prices might keep shipping costs low but could mean less income for buyers in oil exporting nations. He also cautioned shippers to deliver prudent volumes to overseas markets to keep prices up.

"We have to be responsible to markets and not overfill them," he said. "Not underfill them or overfill them." ●

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## Horticulture

# How to use PEAR growth regulators

**Growth regulators can prevent drop and enhance storability of pears if used correctly.**

*by Geraldine Warner*

Several plant growth regulators are available to control preharvest drop, extend the harvest window and improve storability of pears, but the products do not have exactly the same effect, reports Dr. Yan Wang, postharvest physiologist at Oregon State University.

Postharvest drop is a significant concern both in summer and winter pear varieties. It results from the expressions of genes and activities of enzymes associated with cell wall degradation in the abscission zone, Wang explained during Washington State University's Fruit School on Apple and Pear Horticulture in November. Expression of the genes is triggered when auxin drops below a certain threshold in the abscission zone, which then becomes sensitive to the ripening hormone ethylene.

Three growth regulators are commercially available for controlling drop by maintaining the balance between auxin and ethylene:

—NAA (naphthaleneacetic acid), sold under the brand name K-Salt Fruit Fix, which is a synthetic auxin.

—AVG (aminoethoxyvinylglycine), sold as ReTain, which inhibits ethylene biosynthesis.

—1-MCP (1-methylcyclopropene), sold as Harvista, which inhibits the action of ethylene.

### NAA

Research has shown that NAA is more effective in controlling drop than either AVG or MCP, but that a combination of NAA and AVG works best, Wang reported. He stressed that this might not be the case for apples, as pears produce much less ethylene while they are on the tree.

However, if not applied at the right time or concentration, auxin-type plant growth regulators can increase ethylene production in the fruit and reduce its storability.

In a trial, pears were treated three weeks before the anticipated harvest date

with the label rate of 33 parts per million of NAA. The treatment had no effect on the amount of ethylene in pears kept for four weeks in storage at 30°F. However, NAA applied two weeks before anticipated harvest increased ethylene in the stored pears.

NAA applied at 15 ppm (less than half the label rate) two weeks before harvest had no effect on the fruit ethylene level, but the same rate applied one week before harvest increased ethylene production in the fruit, reducing its storability.

Wang said to avoid this negative effect of NAA, growers should apply a reduced rate of 20 ppm on Bosc or d'Anjou pears and 15 ppm for Bartletts and avoid applying NAA within two weeks of harvest. An NAA application will become effective within two to three days and will control drop for at least two weeks.

Applying AVG with the NAA helps to further reduce fruit drop and counteracts the negative effect of NAA on fruit storability, Wang said.

### Extending harvest

ReTain and Harvista can also be used to delay maturity and extend the harvest window. Ideally, Bartlett pears should be harvested at between 19 and 17 pounds pressure, d'Anjou at 15 to 13 pounds, Bosc at 15 to 13 pounds and Comice at 13 to 11 pounds. However, it is sometimes a challenge for growers to harvest pears at the right maturity if fruit is maturing quickly, as it did in 2015, or if they are short of labor.

In a trial, Wang applied ReTain to Bartlett pears one week before anticipated harvest when the fruit firmness was 21 to 20 pounds. ReTain did not affect fruit maturation until the fruit softened to 19 pounds. It then slowed maturation of the fruit while the pressure was between 19 and 17 pounds, extending the harvest window by about five days. It was less effective if applied two or more weeks before harvest.

Research at the University of California, Davis, showed that Harvista could also delay maturity of Bartlett pears, but results were inconsistent in fruit of different harvest maturity and from year to year.

### Postharvest

Wang has also studied the effect of growth regulators on fruit disorders in Bartlett and Starkrimson that result

in storage or export losses. Bartlett is susceptible to a number of storage disorders, including pink end, senescent scald, senescent core breakdown and yellowing. Starkrimson is prone to senescent core breakdown and disorders caused by low oxygen or high carbon dioxide levels.

A preharvest application of ReTain can inhibit the fruit's ethylene production during storage, reducing senescent disorders and extending the storage life of Bartlett pears, Wang reported. The closer to harvest it is applied, the more effective it is, but the product has a seven-day preharvest interval. He recommends applying between a half and one pouch (60 to 120 ppm) of ReTain one week before harvest and picking the pears at 19 pounds pressure. He recommends the same treatment for Starkrimson, though they should be picked at 15 to 14 pounds pressure.

Scientists at the University of California, Davis, have done trials looking at the effect of Harvista on the storability of Bartlett pears. They found that Harvista had no effect on the color of the stored pears and little effect on firmness, but it did reduce senescence disorders. However, Wang found that the postharvest formulation of 1-MCP, SmartFresh, was more effective at increasing the storability of European pears.

#### SmartFresh

SmartFresh applied after harvest at 300 parts per billion helped maintain the green color of Bartlett pears and reduced senescence disorders while also allowing the pears to recover their capacity to ripen after being stored for four months.

But results with SmartFresh were also inconsistent, Wang said. Scientists believe that the effects of SmartFresh are influenced by harvest maturity of the fruit, the elevation of the orchard, the time that elapses between harvest and treatment, and the concentration of ethylene in the storage room.

Tests with Starkrimson pears using SmartFresh at 300 ppb showed that after four months in storage at 30°F, the pears did not develop any senescence disorders and had less decay, but they failed to ripen when held for seven days at room temperature. However, they did ripen if stored for more than two months and held for 14 days at room temperature.

Tests with Bosc showed that SmartFresh-treated fruit retained firmness, sugar and acid levels and green color better than untreated fruit, and sensory panelists preferred the treated pears because of their crunchy and juicy texture. The treatment also reduced decay caused by bull's-eye rot, phacidiopycnis rot and cladosprium rot. Wang stressed that MCP is not a fungicide but increases the fruit's resistance to decay.

In d'Anjou pears, SmartFresh applied at 150 to 200 ppb shut down ethylene synthesis, controlled superficial scald and extended the storage life. The product must be applied within three weeks of harvest, otherwise it will not control scald.

Wang conducted laboratory trials in which d'Anjou pears were either treated with the antioxidant ethoxyquin or ethoxyquin plus 100 ppb of SmartFresh before being put into low-oxygen storage for eight months. Pears treated only with ethoxyquin had 6 percent scald, 6 percent speckling and pithy brown core, and 3 percent decay. Pears treated also with SmartFresh had none of those disorders. However, special steps need to be taken in order for the pears to recover their capacity to ripen after storage. The pears can be stored at a higher temperature than normal and held in controlled-atmosphere storage. Or, ethylene can be applied with the SmartFresh. Alternatively, the pears can be conditioned with ethylene after storage.

In trials in commercial packing houses in Washington and Oregon, however, SmartFresh applied at a rate of 100 ppb was not enough to control superficial scald or extend the storage life of the fruit. Results were inconsistent, with perfect control of scald in some lots and no response in others.

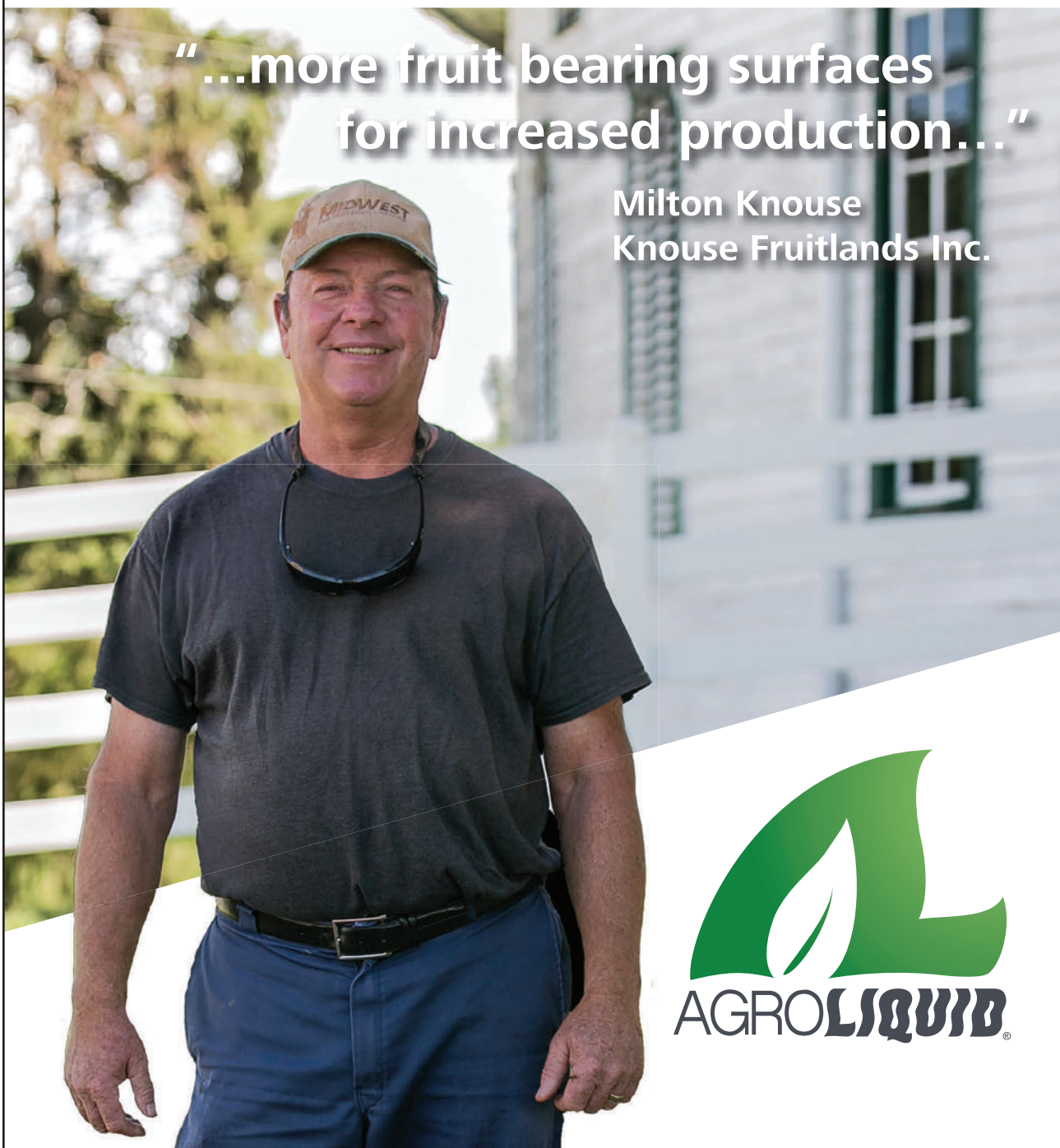
"A hundred parts per billion works well in the lab, but in big CA storage rooms it's not high enough," Wang told the Fruit School. ●

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# Digging into the ROOTS of a vineyard

**M**anaging irrigation and nutrients for grapes can be tricky anytime — even more so in a drought year like the one last year in Washington. The key to ensuring vineyards receive the necessary water and nutrients lies underground at the roots.

For two years, Washington State University soil scientist Joan Davenport and a research team sampled Concord roots on 42-year-old vines at different points in the growing season to better understand when roots are working most actively to support the vine. While Davenport focused on Concord grapes for the study, the findings relate to wine grapes as well.

by Shannon Dininny

## Volume of fine and coarse roots varies during season.

The takeaway: Growers must remember their roots are distributed over a much wider area than they probably think, which affects how and when they apply nutrients and water, Davenport told growers at the Washington State Grape Society annual meeting in November.

### Types of roots

Grapevines have a lot of different roots. The big roots, called coarse roots, help serve as the sturdy backbone of the plant, while the finer roots are the feeder roots that take up the majority of water and nutrients. Overall, root distribution decreases as they grow farther from the trunk at deeper depths, but that growth is influenced by water.

To better understand how those roots develop during the season,

Davenport and her research team dug up an average of four Concord vines from a furrow-irrigated vineyard at different points in the season: in winter, at bud break in early spring, when vines showed three to four leaves in late April, at bloom, at veraison, at harvest (in about mid-September) and at postharvest, before the vines had gone dormant. They excavated the entire root ball, measured the length of roots and weighed coarse roots. They also collected soil samples, in a radial pattern out from the trunk, for fine and some coarse roots and separated them from the soil.

Davenport said she expected to find fine roots in the first 8 inches below the surface but was surprised to find them even beyond that. Overall, roots were found 1 yard deep. However, roots decrease farther from the trunk and deeper below the surface of the soil.

“As a general rule of thumb, the further out from the trunk you go and the deeper you go, the fewer roots you have,” she said.

### Coarse roots

The density of coarse roots was greatest at bud break, with 6 linear feet of roots in a cubic yard of soil. The second-highest density of coarse roots was found directly preceding bud break in late winter. The lowest point was at harvest.

“When we have some of that early growth, the plants are actually using a little bit of those root materials to feed the growth,” Davenport said.

The team generally found that more coarse roots were found closer to the vine trunk and diminished with greater distance from the trunk. They also decreased at greater depths.



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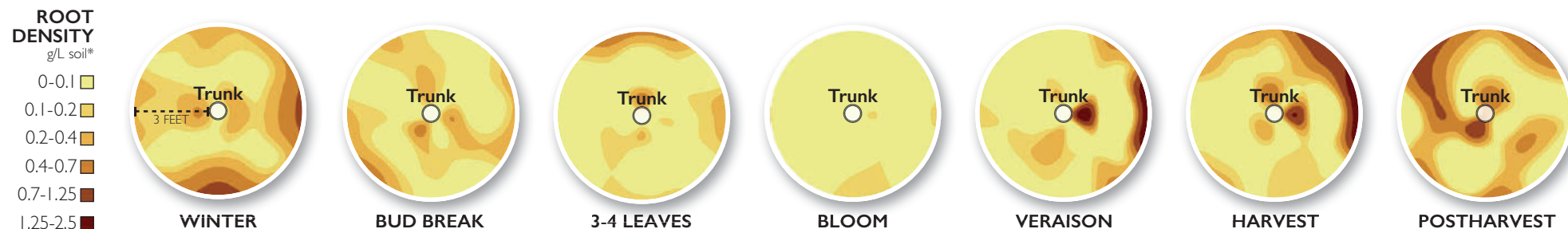
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# How grape root growth changes through the season

The density of fine roots (the feeder roots that take up most of the water and nutrients) on grape plants changes according to plant needs, with the fewest fine roots found during bloom.



Root densities were measured at a depth between 1 and 2.5 feet within a 3-foot radius from the trunk. (\*g/L soil closely approximates inches per cubic foot of soil.)

SOURCE: JOAN DAVENPORT/WSU

JARED JOHNSON/GOOD FRUIT GROWER

## Fine roots

Because fine roots are so tiny and would be destroyed or lost in the process of collecting and measuring coarse roots, the team collected soil samples in a radial pattern around the trunk to assess the distribution of fine roots. They then separated these roots from the soil. Fine roots were measured separately in the first 12 inches in depth and again at a depth of between 12 and 30 inches.

Fine roots grow and die. They decreased with depth, Davenport said, but depending on the time of year, they increased or decreased the closer or farther away they were from the trunk.

Fine roots were densest at postharvest, with the fewest found at bloom. "By the time we get to bloom, the fine root density has declined dramatically at the surface and pretty much disappeared at the deeper depth," Davenport said.

Fine root numbers then increased incrementally through veraison, harvest and postharvest, with fine roots growing at the expense of the coarse roots, she said. "This tells you how much the fruit is utilizing these resources and allows for more root growth after the fruit is harvested."

*"Because there's a time when roots are growing or developing, and when you're stressing them with less irrigation, you're actually doing more damage than you know."*

—Joan Davenport

People who manage crops tend to focus on the plants above ground and sometimes forget about the root systems, Davenport said, but they shouldn't assume that roots are growing just because they don't see them. "Know your roots," she said.

In terms of the fine, feeder roots, it would be nice to have a lot of them during blooms, but the plant is so busy funneling its resources to its buds, that it "robs Peter to pay Paul," Davenport said.

However, the exact opposite is happening at postharvest: The fruit is off the vines, and with shorter days and colder temperatures, the plant begins to send carbohydrates and nutrients to the trunk and roots to store for spring, causing a resurgence in fine root development.

"Make sure you pay attention to that root growth and development when you're developing your irrigation management strategies," Davenport said.

"Because there's a time when roots are growing or developing, and when you're stressing them with less irrigation, you're actually doing more damage than you know." ●

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# Grape seed COLOR has LITTLE EFFECT

**Study upends thinking  
that wine's taste  
depends heavily on  
color of the grape seed  
when harvested.**

*by Shannon Dininny*

**W**inemakers have long held that the changing color of a grape's seed serves as a harvest signal, that the greener the seed at harvest, the more tannin characteristics and bitter taste imparted to the wine. However, researchers at Washington State University have found that changes in seed color have less to do with wine tannins than previously thought. In fact, their results after one year's study were so different — and opposite — from what was previously thought, they completed a second year of study to confirm the results.

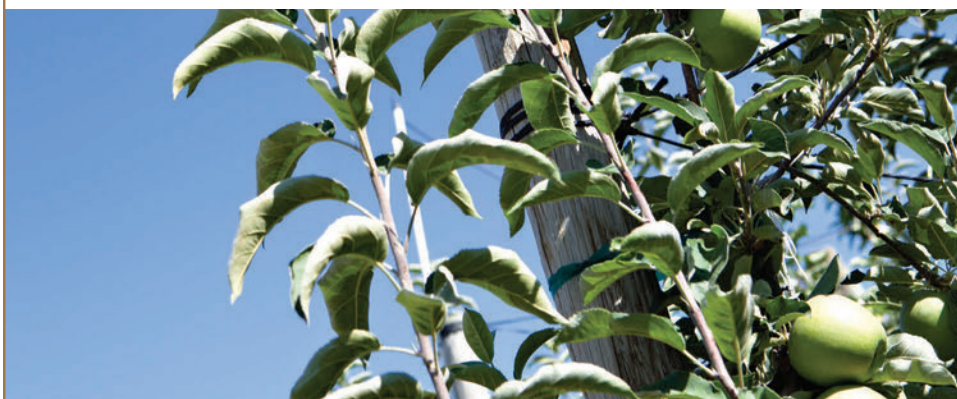
"It's an interesting one, mostly because we don't think winemakers should be paying attention to seed browning," said James Harbertson, associate professor of enology at the Chateau Ste. Michelle WSU Wine Science Center in Richland, Washington. "It just doesn't really change how much tannin gets extracted in the wine."

The project was born, Harbertson said, by an argument. He and former WSU doctoral candidate Federico Casassa of Argentina, now an assistant professor of enology at California Polytechnic State University's wine program, both believed that if winemakers have more green seeds at harvest, they'll end up with horrible, bitter-tasting wine that no one will want to drink.

The argument centered on whether the theory could be tested. "He didn't think we could actually do the study as we designed



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it. It was a debate about experimental design,” he said. “We came up with three-fourths of the parameters and had discussions about controlling for different things. It was fun, because we really got into it and eventually finished the experimental design.”

#### Embarking on the research

A previous study in Australia established a color schematic showing the development of wine grape seeds, with the color progressing from an olive green to an almost coffee-colored brown. The study, however, lacked information about tannin concentration and what happens if wine is made at each of these different color points, Harbertson said.

The researchers selected a typical cultivar in Washington, Merlot, which is one of the earlier-ripening red wine grape varieties in the region, and the Paterson Ranch of Ste. Michelle Wine Estates in Paterson, Washington. The vineyard, which was planted from 2000 to 2003 with clone 3 and row spacing of 7 feet in a north-south orientation, is drip irrigated.

The grapes first were picked relatively early, Sept. 22, 2011, at a soluble solids of 20°Brix. Few growers and winemakers would consider picking 20°Brix fruit today, Harbertson said, and the researchers figured that “if you don’t see any difference in tannin extraction and sensory profile at this level, you won’t see it at all.”

They divided the must — the freshly pressed juice that includes the stems, skins and seeds — into two lots. One served as a control lot, while sugar was added to the second lot to push it to 25°Brix and to increase alcohol levels, a process known as chaptalization. The researchers made wine from both lots twice: after a standard maceration time of 10 days and after an extended maceration time of 30 days.

Maceration is the cold-soaking process by which the grape skins, seeds and stems leach the phenolic materials of the grape — tannins, anthocyanins or pigments, flavor compounds — into the must and, ultimately, the juice. It’s where red wine receives its color.

The researchers harvested fruit again 33 days later on Oct. 25, 2011, when the fruit finally ripened to 25°Brix. They repeated the process, except this time, instead of adding sugar to one lot, they bled the juice and watered it down to reduce it to 20°Brix. This enabled them to work with more mature fruit with lower alcohol levels.

They followed the same process again in 2012, harvesting on Sept. 13 and Oct. 17.

#### The results

Wines without extended maceration had significantly higher anthocyanin content, saturation and red color component, whereas the extended maceration wines had enhanced tannin extraction from seeds, lower anthocyanin content and lower saturation. The sugar level and alcohol content showed no significant effect on tannin and anthocyanin extraction, the study found.

In terms of sensory profile of the wine, those made under extended maceration showed higher astringency, lighter and yellower color components and cooked vegetal aromas. Chaptalization of early-harvest fruit to 25°Brix shifted the sensory profile to a sweeter taste, alcoholic, floral, with chocolate/caramel attributes and higher astringency.

The later harvest date, meanwhile, had an even more positive effect on the sensory profile of the wines than maceration length and sugar and alcohol levels: Wines from the late-harvest fruit were defined by viscous mouthfeel (the wine feels heavier, thicker in the mouth), sweet taste and fruit-derived aromas.

Overall, unripe fruit and the application of extended maceration had a negative impact on the sensory profile of the wines, whereas chaptalization of unripe fruit yielded wines with an improved sensory profile.

“Seed tannin extraction didn’t really matter if you had really unripe fruit at 20°Brix versus really ripe fruit at 25°Brix, where the grapes are more likely to be picked nowadays,” he said. “We saw there was a little bit of difference between vintages, but for the most part, it was constant depending on when you picked. When we did the sensory test, we really couldn’t differentiate the astringency.”

Harbertson said some growers might be more concerned about a red variety that is picked even earlier — Pinot Noir. “Those growers say their seeds are really, really green, and the longer they ripen, the less they worry about it,” he said. “My guess is that it takes shorter time to get from 20° to 25°Brix, so you have even less to worry about.”

The research tells winemakers and growers that seed color and tannins aren’t as important a factor at harvest, Harbertson said. Instead, they should place the emphasis on those factors that weigh more heavily and are easier to measure or taste, such as fruit color, flavor and acidity. “Most of those things you can measure quite easily, and tannins are actually quite hard to measure,” he said. “The message is that you don’t have to spend all this money on analysis of tannins in the vineyard. It’s not as mission critical, especially if the vineyards are trying to do some of that themselves.”

The study was published in the *American Journal of Enology and Viticulture* in 2013. ●



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## Canopy CONTROL



**Juice grape growers can manage size of vines with pruning, irrigation and maybe some thinning.**

*by Shannon Dininny*

**W**ild grapevines want to grow into big plants, and they'll produce a lot of fruit if left to their own devices, particularly on clusters on the outsides of the canopy. Juice grape growers are advised to take advantage of this natural propensity of big vines.

Canopy management is much more complicated for wine grapes, but for juice grapes in Washington, managing vineyards with pruning, irrigation and maybe some

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TJ MULLINAX/GOOD FRUIT GROWER

For the best yields at harvest, Concord growers should not prune anything off the top of the canopy, where the fruitful canes are located. However, they should lightly prune the sides of the canopy to manage vine size and prune the bottom of the canopy as high as necessary so that the mechanical harvester can pick all of the fruit.

thinning can help to control the size of the vines and help boost berry size and cluster numbers, said Dr. Markus Keller, Washington State University viticulturist.

Ideally, growers want balanced vines, an ideal micro-climate with an open, productive canopy, high yield and high quality, low pressure from pests, and easy vineyard access for mechanization, Keller said. Proper vineyard management techniques help to determine some of those things, he said.

"It's a little like starting with a full bank account. At the very beginning of the growing season, you're starting with the yield potential, because you've already pruned your vines, and the pruning level determines how many fruitful shoots you'll have on the vines," Keller told growers at the Washington State Grape Society meeting in November. "From then on, it's all down. You can no longer add yield potential, you can only reduce it."

Pruning determines bud number and position, while irrigation determines canopy size and yield. Crop thinning determines a grower's final yield and maturity, particularly from one season to another. Berry weight is much less important to yield than are cluster and berry numbers.

"We know that the number of berries is mostly determined by the flower number, which is determined inside the bud in the previous growing season and during bud-break of the current season," he said. "So, maximizing bud numbers has the greater potential to modify the crop than anything done to the canopy during the current growing season."

Growers should machine prune to maximum bud number and only thin when absolutely necessary, Keller said. At growers' current rates of return on their crops, that thinning should largely be done by machine. "You cannot hand prune and expect to maximize yield potential year after year."

Machine prune and minimally prune, he said. Growers should not prune anything off the top of the

canopy, where the fruitful canes are located, but lightly prune the sides of the canopy to manage vine size. They should skirt the bottom of the canopy as high as necessary to contain the fruit, so that the mechanical harvester can pick all of the fruit.

Thin the crop only under extreme circumstances — in a cool season when the fruit may fail to ripen without thinning, or in a very hot season with a very heavy crop, Keller said. However, "in all other cases, I'd advise against thinning and maximize your crop potential."

Thinning at fruit set does not affect the timing of veraison, Keller said, but it can accelerate ripening after veraison has started. It appears to have no effect on cold hardiness.

—Markus Keller

#### Water ties to canopy

Overall, juice grapes carry big canopies that require between 2 feet and 2.5 feet of water per year, which comes in both rainfall and irrigation. They also drink frequently, though water needs vary during the season. Vines consume 5 to 10 percent of their water from bud break to fruit set, but they demand 30 to 60 percent of their water from fruit set to veraison — when it's hottest, Keller said.

"There can be no growth without water. Cell expansion requires water," he said. "Water determines canopy and berry size — more water equals bigger canopies and bigger berries." Shoot growth and yield are maximized at 3 to 4 percent below the field capacity of the soil, so growers should learn the field capacity of their vineyards.

Ripening berries are very powerful at attracting water, even on a plant that is wilting, Keller said. That means that irrigation management is much more important during the early part of the season than it is during ripening in the later part of the season.

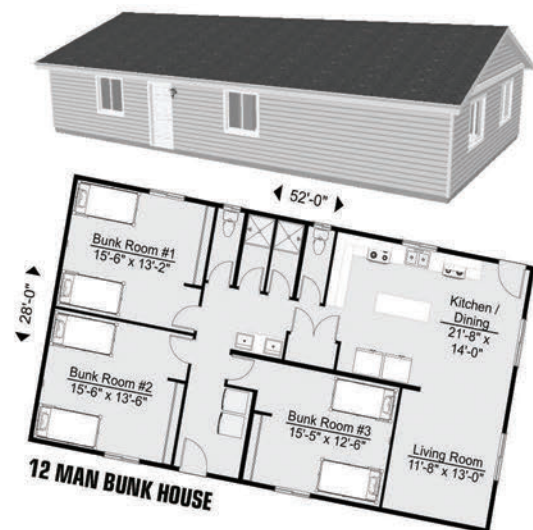
As the season progresses, water demand falls to just 10 to 30 percent from veraison to harvest and from 5 to 25 percent from harvest to leaf fall. Growers should refill the top 3 feet of soil for freeze and start-up insurance for the following season. ●

*"Maximizing bud numbers has the greater potential to modify the crop than anything done to the canopy during the current growing season."*

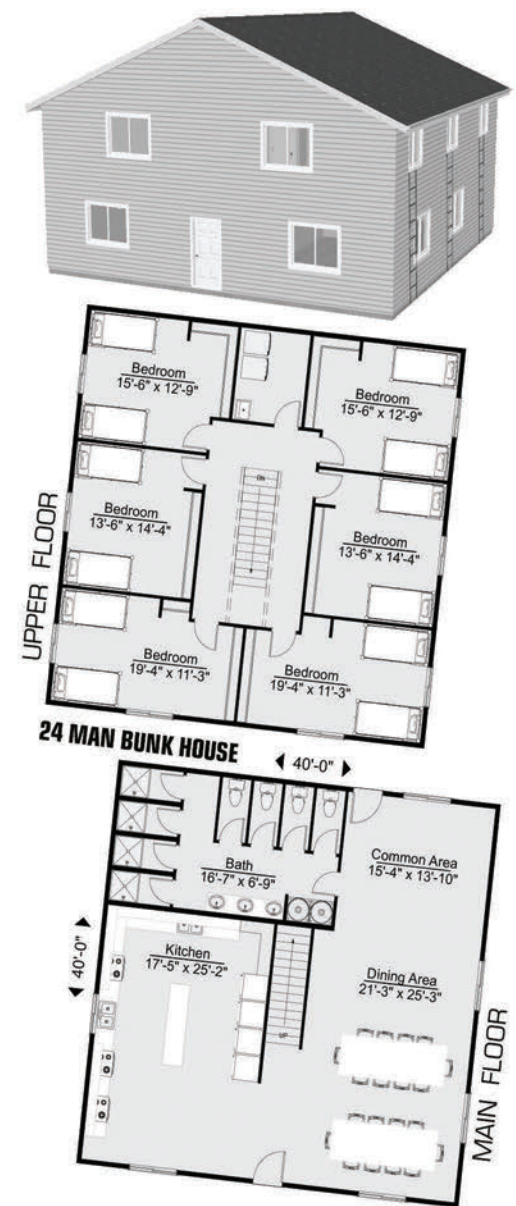
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## GOOD POINT

Melissa Hansen, Washington Wine Commission

# Building a world-class wine research program

It's a new era for viticulture and enology research in Washington.

Washington's wine industry has started the process of building a world-class research program. The industry has invested in a new wine science facility, developed a strategic plan and recently hired me, the Washington Wine Commission's first-ever research program manager.

The state's growers and wineries took a major step to support research when they pledged \$7.4 million for construction of Washington State University's Ste. Michelle Estates Wine Science Center at the Tri-Cities campus. But a successful research program is more than a shiny building with the latest technological trappings; it requires cohesive effort between industry and researchers, is guided by industry stakeholders and managed professionally, has clear priorities and is well funded and communicated.

All of these components are contained in the *Strategic Research Plan for the Washington Wine Industry*, a 53-page

document based on direct input from the industry and developed for the Wine Commission by 501 Consultants. The plan, which took many months to develop and involved a cross-section of wine industry members, serves as my roadmap to guide the Wine Commission in growing the industry's research program. Major goals of the plan are to establish the research process, define the research focus, create the research structure, sustainably fund research and share research findings.

I joined the Wine Commission last November after spending nearly 20 years writing technical grape and tree fruit stories as associate editor for *Good Fruit Grower*. Previously, I was the first research director for the California Table Grape Commission and helped build their research program. My new responsibilities are to manage the wine industry's annual research review and recommendation process and implement goals of the strategic research plan. My technical communication skills and research management background will be valuable as I implement the goals of the strategic research plan.

#### Mechanical Weeder Orchard & Vineyard

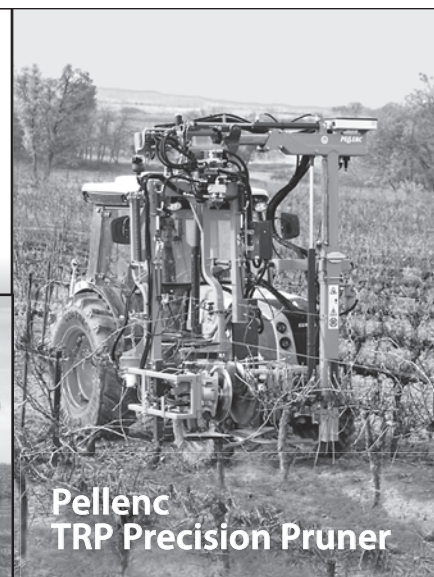


## VineTech Equipment

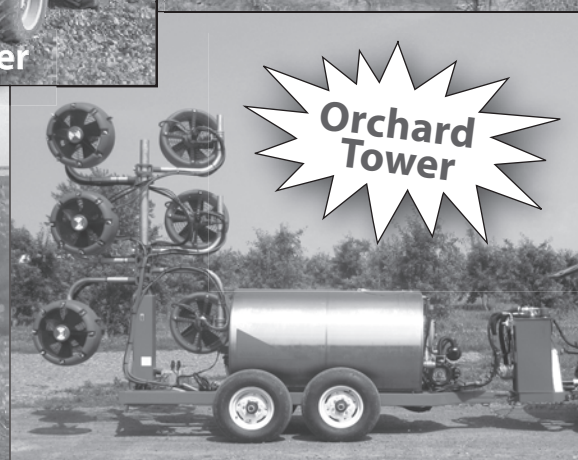
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Viticulture and enology research in Washington has a long history. At WSU, it has been funded since the early 1980s by a small portion of the state wine sales tax (1/4 cent per liter), thanks to legislation sponsored by Washington Sen. Max Benitz of Prosser. The legislation included language stipulating that an industry group guide the annual funding of the research. That group is the Wine Advisory Committee — a subcommittee of the Wine Commission comprising volunteer growers and winemakers. The Wine Advisory Committee helps set research priorities, annually reviews research project requests and makes funding recommendations to WSU via the Wine Commission.

Additionally, industry visionaries who crafted the Wine Commission's enabling legislation in 1987 included research within the organization's scope of activities.

Research projects at WSU are funded from several pots of money, including the wine sales tax, contributions from the Auction of Washington Wine, allocations from the state budget to WSU for wine research, and the Wine Commission. In recent years, about \$850,000 has been spent annually on viticulture and enology research.

The current research program has been effective. As a result of WSU viticulture and enology research, growers have used irrigation strategies to improve grape quality and learned how to assess winter and frost damage and manage vines for cold hardiness. Research has helped winemakers better understand how tannins develop in the vineyard, how to reduce wine spoilage and more.

Now it's time to elevate, expand and broaden industry involvement in the research program. Washington's wine industry has reached critical mass after experiencing rapid and significant growth in the past decade — nearly 500 new wineries and 20,000 acres were added in that time frame. Today, the state has more than 890 wineries bonded, and industry officials estimate there are more than 50,000 acres of wine grapes. New challenges from emerging pests and diseases, like brown marmorated stinkbug and red blotch disease, threaten wine quality and long-term profitability. New and inexperienced winemakers need information to help them produce premium wines.

#### Improve communication

One of the biggest opportunities identified in the strategic plan was in the area of communication and the need to improve communication about research.

The work that the Wine Advisory Committee does is an example of the need for better communication. For nearly 35 years, this hard-working volunteer group has quietly done its business and spent thousands of hours deciphering research reports. Few other than WSU's wine researchers know about this group. In the past, the committee was not supported by full-time staff at the Wine Commission, and coordination of committee activities was outsourced to 501 Consultants.

One of my immediate duties is to shine a light on the important work done by the Wine Advisory Committee and improve the process and transparency of research review process. A new research section on the Wine Commission's website ([www.washingtonwine.org](http://www.washingtonwine.org)) will include an overview of the wine industry's research program, information about the review committee, narrative stories that highlight the value of research and published research results.

I will use various formats to communicate measurable successes of Washington's research program, including trade publications like *Good Fruit Grower*, e-newsletters and social media. In July, the Wine Commission will sponsor a new event for growers and winemakers to share research called Washington Advances in Viticulture and Enology (WAVE). In the short-term, my goals are to increase awareness and demonstrate the importance of a strategic research program. If I'm successful, once the industry's Wine Science Center commitment is paid off in a few years, growers and wineries will support using those assessments to grow the research program.

I welcome your input as we grow the industry's research program into one that's envied by wine regions around the world. It's a new day for wine research in Washington.

*Melissa Hansen is research program manager for the Washington Wine Commission. She can be reached at [mhansen@washingtonwine.org](mailto:mhansen@washingtonwine.org).* ●

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# California HOME IN WA

## A blind tasting of wines brought Duckhorn Wine Company to Washington.

by Melissa Hansen

If there's a new frontier for luxury Cabernet Sauvignon grapes, the owners of California's Duckhorn Wine Company think they've found it. (Hint, it's in Washington, not Napa Valley.)

Dan and Margaret Duckhorn, founders of Duckhorn Vineyards and Duckhorn Wine Company, are known within the industry for their pioneering spirit. When they established Duckhorn Vineyards, one of the first 40 wineries in Napa Valley in the mid-1970s, they focused on making Merlot wine famous in the middle of Cabernet Sauvignon country. They launched Paraduxx Winery in 1994, the only winery at the time dedicated solely to nontraditional, non-Bordeaux style red blend wines, and, in 1996, began Goldeneye Winery to make Pinot Noir wines from California's Anderson Valley, years before the Pinot Noir boom.

"They've always been driven to go to the best place for a given variety," said Carol Reber, senior vice president and chief marketing and business development officer for Duckhorn Wine Company, which is a collection of six wineries. "That pioneering spirit is in the company's culture and DNA and is what led us to Washington state and to Red Mountain."

### Canvasback story

Reber was one of the champions behind Duckhorn's Washington project, called Canvasback Wines, and is in part responsible for bringing the California wine company to Washington. With Canvasback, Duckhorn is staking its claim on Red Mountain to make Cabernet Sauvignon wines.

Canvasback made its first Red Mountain Cabernet Sauvignon from the 2012 vintage by sourcing fruit from such acclaimed vineyards as Ciel du Cheval, Hedges, Klipsun and Kiona. Wine inventory was sold out in a

matter of months. In 2014, Canvasback planted a 20-acre estate vineyard of Cabernet Sauvignon and Merlot vines near Col Solare vineyard and winery and Force Majeure Vineyards.

East Wenatchee, Washington, native Brian Rudin joined as Canvasback winemaker in 2014. He uses the custom wine facility Artifex in Walla Walla to craft the Red Mountain wine. Since the initial Canvasback wine release of 2,000 cases, production has ramped up quickly. Rudin plans to make 18,000 cases from the 2015 vintage. And that's before the estate vineyard begins bearing fruit that should add another 4,000 to 6,000 cases to annual wine production.

The Canvasback story began during an executive, off-site meeting held on a rainy, spring day in 2011.

As Reber tells it, the company was holding an extensive tasting of Merlot, red blends and Cabernet Sauvignon wines with Washington wines mixed in. It was a blind tasting so no one knew which were company wines or competitor wines.

"When we were done with the tasting and got to the unveiled Cabernet set of wines, we were absolutely blown away by the quality of Washington Cabernet," she said to *Good Fruit Grower*. "We thought the quality of Washington was outstanding."

Duckhorn's President and CEO Alex Ryan told his winemaker to "get yourself a ticket and get up there" to learn the landscape and search for a possible vineyard location. "What we found in Washington was a concentration of a few large, successful wineries and hundreds of small, upstart wineries, many very successful in their own right," Reber said. "It was clear to us that there was a unique opportunity to launch our own project."

She adds that during Duckhorn's reconnaissance trips to Washington and discussions with some of the state's top growers and winemakers about Cabernet Sauvignon, all fingers pointed to Red Mountain AVA. Red Mountain, in lower Yakima Valley, is the state's smallest wine region, with



# winery at WASHINGTON

The view from Longwinds Vineyard on Red Mountain is stunning.

PHOTO COURTESY OF DUCKHORN WINE COMPANY

just over 4,000 acres, of which about one-third is planted. The area is home to top-notch vineyards that fetch some of the highest red grape prices in the state.

Duckhorn had its sights on several parcels that were part of a large land auction by Kennewick Irrigation District in 2013. But the Canadian Aquillini Investment Group bought all 31 parcels totaling 670 acres in one sweep for \$8.8 million. The high-stakes auction was an emotional but bonding experience for those who lost out on their dream parcels. “We were all on the losing team together,” said Reber, who likened the experience to losing a championship football game.

But the result was what she calls the “law of happy and unintended consequences.” Many people reached out to help them, and they soon bought a parcel. She credits vineyard management consultant Dick Boushey from Grandview, hired to plant and manage the vineyard, for helping Canvasback transition to vineyard owner. “Dick’s been our shepherd on the project and our safety net. He hasn’t let us make mistakes that we might have otherwise made.”

She believes local advice is important in wine grape growing because location is site specific and there are many regional differences. Ignoring sage advice from those with on-the-ground experience can be very costly.

## National reach

Duckhorn is not the first California winery to expand into Washington. E & J Gallo bought Columbia Winery in 2012 and, years before that, Chalone Wine Group had a presence in Washington under the Canoe Ridge Vineyard banner. But Duckhorn, with its national sales and marketing team, has something many boutique wineries in Washington lack: national reach and distribution. Duckhorn Wine Company, with its six wineries, annually produces around 500,000 cases of wine. About half of its annual production comes from its value Decoy wines.

Duckhorn has big plans for its Washington winery. Canvasback’s first release went to 20 states. The 2013 vintage is in the midst of going national and will be distributed to all 50 states.

The national marketing plan for Canvasback is built on market data that shows wine consumers are thirsty for affordable, luxury Cabernet wines, according to Reber. Canvasback wines retail for \$40 per bottle, which translates to being sold on-premise (in restaurants) for \$65 to \$80.

“There’s a lot of momentum for high quality Cabernet wines that sell for less than \$100 on-premise,” she said. “When you think about the price-to-quality ratio, Washington wine is very well poised.”

Reber noted that the average retail prices for Napa Valley Cabernet wines are \$75 to \$100, which translates to \$150 or more in a restaurant. It’s an expensive place to grow grapes, with vineyards fetching \$250,000 to \$350,000 per acre compared with Washington’s \$20,000 to \$50,000 per-acre cost.

Canvasback’s estate vineyard, one of the highest vineyards in elevation on Red Mountain, is called Longwinds.

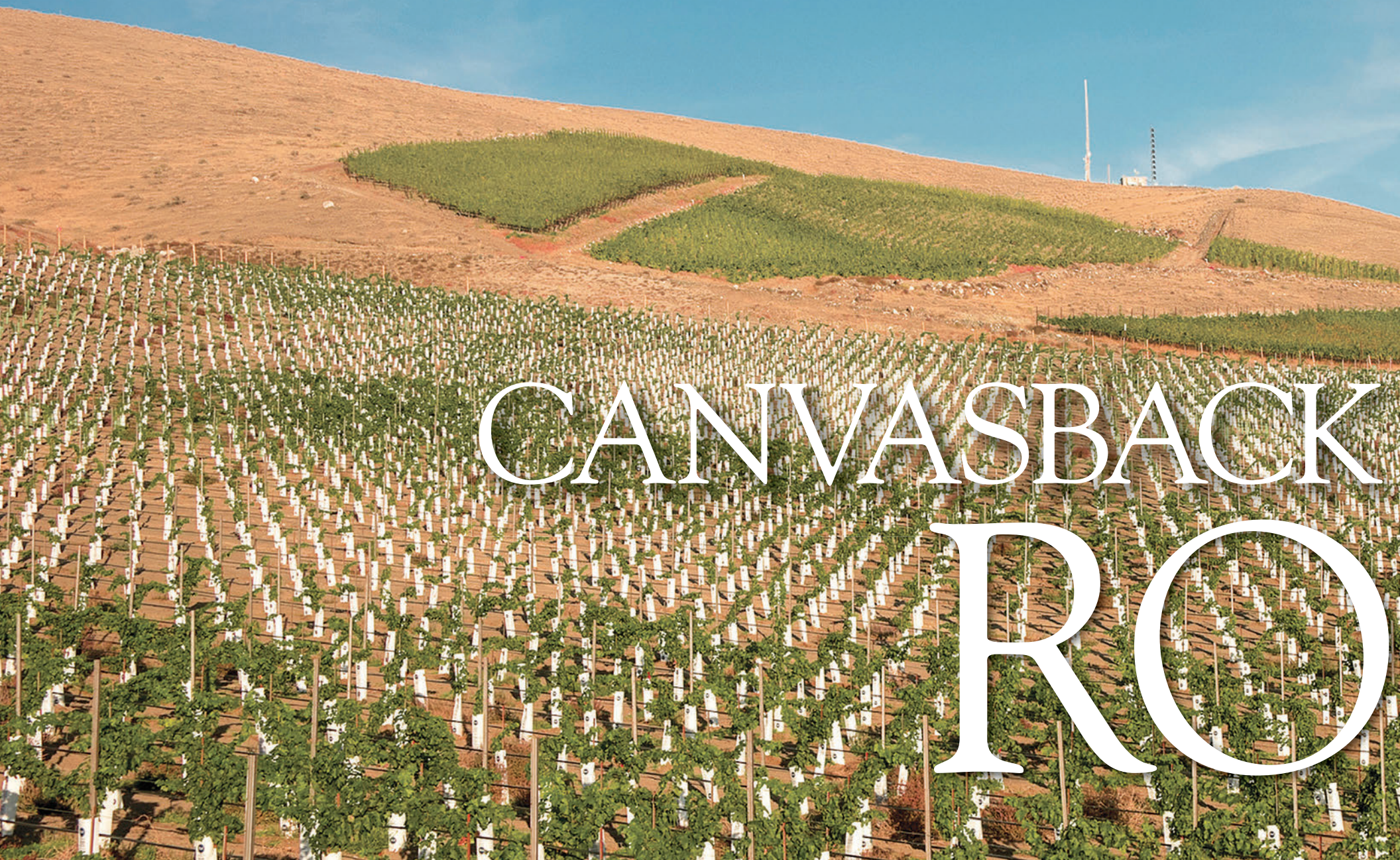
“As a high-quality brand, we’re a very dirt-focused winery,” Reber said. “That’s why we bought property on Red Mountain and planted Longwinds Vineyard and why we acquire premiere vineyards in Napa Valley.

“The vineyards come first and dictate everything,” she said. A tasting room and wine facility are not even in the planning stages.

For now, the company is concentrating on getting its Longwinds Vineyard off to a strong start, launching Canvasback in the national market and being good neighbors and stewards of Red Mountain. “We’re in it for the long haul,” she said. ●

*“We were absolutely blown away by the quality of Washington Cabernet.”*

—Carol Reber



# CANVASBACK RO



PHOTO BY MELISSA HANSEN

Winemaker Brian Rudin stands in Canvasback's estate vineyard named Longwinds. The 20-acre block, at 1,100 feet in elevation, is one of the highest vineyards on Red Mountain.

## Brian Rudin practices a vineyard-focused approach to winemaking.

by Melissa Hansen

While some winemakers might become bored making just one type of wine, Brian Rudin is grateful for the chance to focus on a single varietal.

Rudin, winemaker for Washington's Canvasback, has a purposeful winemaking mission: craft the best Cabernet Sauvignon wine from the state's Red Mountain appellation. Canvasback, owned by California's Duckhorn Wine Company, is a testament to Washington's growing wine prominence and national recognition of wine quality.

Canvasback, the sixth winery in the Duckhorn portfolio, is the only Duckhorn winery outside the Golden State. Canvasback released its first wines from the 2012 vintage and recently planted an estate vineyard on Red Mountain near Benton City.

*Good Fruit Grower* visited Rudin during the final days of harvest last October to catch him in the throes of crush. He was busy picking up grapes from Hedges Family Estates' Jolet Vineyard, destemming grapes on the crush pad, and checking

*"My goal is to figure out the sweet spots on Red Mountain and use the breadth of resources and tools I have to make wine."*

—Brian Rudin

fermentation. Although he won't have estate fruit for winemaking until the 2016 harvest, he has access to some of Red Mountain's best Cabernet Sauvignon growing sites.

Red Mountain AVA (American Viticultural Area) has some of the highest heat units in the state and is known for its bold and impactful fruit. "But within Red Mountain there's regional-ity," Rudin said. The southeast side tends to produce fruit with intense dark color, huckleberry and blackberry flavors and bright acids, while fruit on southwest facing slopes have more sarsaparilla and spice notes, softer acids and elegant textures. He also said that the bench below Sunset Road, with its alkaline soils and strong winds, produces powerful, thick-skinned fruit.

Rudin strategically blends a very small percentage — a little more than 5 percent — of Cabernet Sauvignon grapes from Walla Walla Valley AVA to help polish the edges of his wines and accent fruit from Red Mountain. Sourcing fruit from Walla Walla Valley also helps extend harvest and crush because grapes usually ripen two weeks after Red Mountain. Because Canvasback wine is labeled as Washington State Red Mountain AVA, 95 percent of the grapes must come from Washington and 85 percent from Red Mountain AVA.

The Canvasback name is in keeping with Duckhorn Wine Company's waterfowl tradition and joins its other winery names of Paraduxx, Migration, Decoy, Duckhorn Vineyards and Goldeneye. Canvasback ducks migrate along the Pacific Flyway and have breeding grounds in Washington.

### Longwinds Vineyard

Canvasback's estate vineyard, one of the highest vineyards in elevation on Red Mountain, is aptly named Longwinds. Rudin said the mountain's steady breezes provide good, quality airflows that help dry fruit after rain events and minimize disease.

The top of the vineyard is around 1,100 feet elevation, while the lowest point is around 900 feet. The steep slope helps defend

Duckhorn Wine Company has put down roots on Washington's Red Mountain. A recently planted 20-acre estate vineyard will begin bearing fruit this year.

# puts down OTS

PHOTO COURTESY OF DUCKHORN WINE COMPANY

against winter injury and provide frost protection. He noted that not a single vine was lost to the damaging temperatures experienced in November 2014, even though the vineyard had been planted that same year.

Well-known neighbors surround the 20-acre vineyard. Next door is extreme-sloping Force Majeure Vineyards, and nearby are vineyards of Col Solare and Hedges Family Estates. Varieties planted at Longwinds are Cabernet Sauvignon and Merlot; vineyard spacing is 7 feet between rows, 4 feet between vines. Rows are planted 23 degrees off north, resulting in a northeast-southwest orientation that was chosen for ease of canopy management. Rudin said that only a minimal amount of leaf cover or "flop" is needed on the west side for sunburn protection compared with the more intensive management and bigger canopies needed for north-south rows. Vines are being trained to a single and bilateral cordon and vertical-shoot-position trellis system.

Soils at Longwinds Vineyard, classified as Warden series silt loam, are relatively deep at 7 to 10 feet, but they change quickly. At the top of the vineyard on the other side of the access road, soils are fractured basalt and depth is around 2 feet.

Rudin said that having "local boots on the ground" has been very important to Canvasback's owners in California. Before Longwinds was planted, Dick Boushey, a grower from Grandview, Washington, and Duckhorn's viticulture director P.J. Alviso of Napa Valley, collaborated on layout and design. Boushey was responsible for planting and now manages the vineyard.

When Longwinds comes into production in 2016, the estate grapes will complement current vineyard sources used to make Canvasback wines. Rudin sourced fruit from 14 vineyards this past harvest.

"Longwinds is a spectacular spot on Red Mountain, and I envision making great single-vineyard wine," he said. "But I would never want to give up the great grapes we've been sourcing from neighboring vineyards. Canvasback has put together a really strong program the last three years to source some of the very best established vineyards here, and I plan to continue that."

For now, Canvasback wines are made in the custom crush and winemaking facility of Artifex Winery in Walla

Walla. Artifex, which opened in 2007, has a small client focus, with emphasis on gravity-style handling and small-lot winemaking techniques — the largest tank only holds 8 tons of grapes. Artifex is a full-service, custom-crush facility for small, boutique wineries to medium-sized brands and takes wine from crush to bottle.

## Production goals

Rudin hopes to make 15,000 cases from the 2015 vintage, a rapid increase in volume from Canvasback's initial release of 2,000 cases from the 2012 vintage. When the estate Longwinds Vineyard comes online, annual production could exceed 20,000 cases.

The East Wenatchee native is the founding winemaker for Canvasback. Rudin, with a political science degree, was working in a restaurant to earn money for law school when he changed his career course. He enrolled in Walla Walla Community College's enology and viticulture program and was mentored by pioneering viticulturist Stan Clarke. After graduating from the program in 2007, he worked for Alder Ridge Vineyard and Zefna Winery and then spent six years at Cadaretta Wines of Walla Walla before joining Canvasback. While at Cadaretta, he was involved in developing a 330-acre site on the north slope of the Walla Walla Valley.

"I've been lucky in that every single winemaking job I've had has been attached to estate vineyard acres," Rudin said. "That's kept me close to the vines and is why I put such an emphasis on the vineyard. My job starts in the vineyard each April, and that's where I spend most of my time so there are no surprises in September."

He also is fortunate to have the Duckhorn team of winemakers for support and can call the five other winemakers and winemaking teams for advice. While each of the six Duckhorn wineries is a separate unit with a different wine focus, Rudin can tap into the depth of experience of his fellow Duckhorn winemakers in California.

"My goal is to figure out the sweet spots on Red Mountain and use the breadth of resources and tools I have to make wine that best expresses Red Mountain," he said. "I'm very grateful for the ability to focus and drill down on Red Mountain Cabernet. Many other varieties work well on Red Mountain, but what really shines there is Cabernet." ●

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**Apple growers have a lot of options when it comes to selecting the best rootstock for their orchards.**

*by Shannon Dininny*

For apple growers, choosing a rootstock type can be a bit overwhelming. There are many to choose from, yet no perfect choice. Soil, climate, trellis system, irrigation type, tree spacing and scion all play a role. Factor in the grower's expectations, and the spectrum of interaction between all of those considerations makes rootstock selection all the more difficult. The best option for one grower may not be best for everyone.

More efficient rootstocks may yield two to three times more than less efficient rootstocks when planted at appropriate densities, and most growers want early yields, followed by consistent high yields — points that highlight the role rootstock selection plays in a grower's bottom line. Then, there's the pesky question of availability.

Staying abreast of the latest information on rootstocks — what's best where and why, what's available when — is essential to a successful operation. So, here's a rundown of the latest news on rootstock choices for Washington from a couple of experts: Tom Auvil, research horticulturist with the Washington Tree Fruit Research Commission in Wenatchee, Washington, and Dr. Gennaro Fazio, plant geneticist with the U.S. Department of Agriculture in Geneva, New York.

# Rootstock attributes

CULTIVAR	PROPAGATIBILITY:		COLD HARDY:	RESISTANCE TO:			
Listed by size, small to large	LINER	TREE		REPLANT DISEASE	FIRE BLIGHT	CROWN/ROOT ROTS	WOOLLY APPLE APHID
MARK	Very good	Excellent	Moderate	Low	Low	Moderate	None
B.9	Very good	Very good	Moderate	None	High	High	None
G.65	Fair	Fair	High	TBD	High	High	None
M.27	Fair	Fair	TBD	TBD	TBD	TBD	TBD
G.41	Fair	Very good	High	High	High	High	High
M.9 T-337	Good	Good	Low	Low	None	High	None
G.11	Good	Good	Moderate	Moderate	High	High	None
G.16	Good	Good	Moderate	Partial	Mod-High	High	None
M.9 Nic29	Good	Good	Low	Low	None	High	None
M.9 PAJAM2	Good	Good	Low	Low	None	High	None
M.9 EMLA	Good	Good	Low	Low	None	High	None
G.935	Good	Very good	High	High	High	High	None
G.969	Excellent	Excellent	TBD	Tolerant	High	High	High
G.214	Good	Very good	High	High	High	High	High
G.210	Very good	Very good	TBD	High	High	High	High
G.222	Very good	Very good	Low	Low	High	High	High
G.814	Very good	Very good	High	Tolerant	High	High	None
B.10	Good	Good	High	TBD	High	TBD	None
M.26	Very good	Very good	Low	None	None	None	None
G.30	Fair	Fair	High	High	High	High	None
G.890	Very good	Very good	High	High	High	High	High
G.202	Very good	Very good	High	Tolerant	High	High	High
M.7 EMLA	Very good	Very good	Moderate	Moderate	Low	Moderate	None
M.106 EMLA	Very good	Very good	Moderate	Low	Low	None	None
B.118	Very good	Very good	High	Low	Moderate	Moderate	None

SOURCES: TOM AUVIL AND DR. GENNARO FAZIO

**Mark:** The Mark rootstock starts growth uniformly and shows excellent horticultural traits in propagation, and growers who have their own nurseries have found it to be a very high-performing rootstock, Auvil said. Like other dwarf rootstocks, Mark is not drought tolerant, especially in the arid West, and tends to have more problems when planted as a finished tree when compared to bench grafts or sleeping eyes.

**Budagovsky 9:** In recent years, Bud 9 or B.9 has grown in popularity, largely due to its winter hardiness and compatibility with most cultivars. It’s shown to be more dwarfing than M.9 varieties. B.9 doesn’t like sandy soils and has not been a very reliable replant partner, but that can be overcome if more trees are planted, “as close as 18 inches,” Auvil said. B.9 is an excellent choice for scions that grow large fruit or have high vigor, but be warned: If you graft them, they will sucker.

**Geneva 65:** A cold-hardy rootstock that is very resistant to fire blight and tolerant of crown and root rot, G.65 remains under review for its susceptibility to latent viruses and replant disorders. Fazio compares G.65 to a Malling 27 as a super-dwarfing rootstock suitable largely for vigorous varieties or a pedestrian orchard, though G.65 has some disease benefits over M.27. It’s not generally available in volume.

Continued next page



# Avoiding mistakes

**Growers can find more success if they avoid some common mistakes when selecting rootstock.**

*by Tom Auvil*

**Malling 27:** M.27 is another rootstock that doesn't have large volumes of commercial availability, and it hasn't been used much in Washington. It's less advantageous for commercial production and more likely to be utilized for very special uses, Fazio said, such as a pedestrian orchard or containerized trees.

**Geneva 41:** G.41 tends to be associated with very large-caliper finished trees — it's one of the high-performing Geneva rootstocks — but half-inch trees seem to have fewer problems than 5/8-inch or larger. Why? Because G.41 has had challenges with union breakage and needs to be handled with care, more so than other cultivars. Fazio said G.41 has this problem only with certain varieties, but researchers are working to improve graft-union development. "The smaller you graft or bud the tree, the better the chance at getting homeostatic communication between the two," he said.

*Continued on page 32*

**T**he right rootstock is really the root of a grower's success, and growers can achieve far greater success if they avoid a few common mistakes. Here are three common mistakes to avoid when selecting rootstock:

## 1. Failing to plan early

Everyone wants to be first in line, but there's a waiting list for many of the newer rootstock cultivars. Planning early makes it more likely growers will get what they want — and need — when they want it.

Planning should include setting expectations for the orchard. If getting

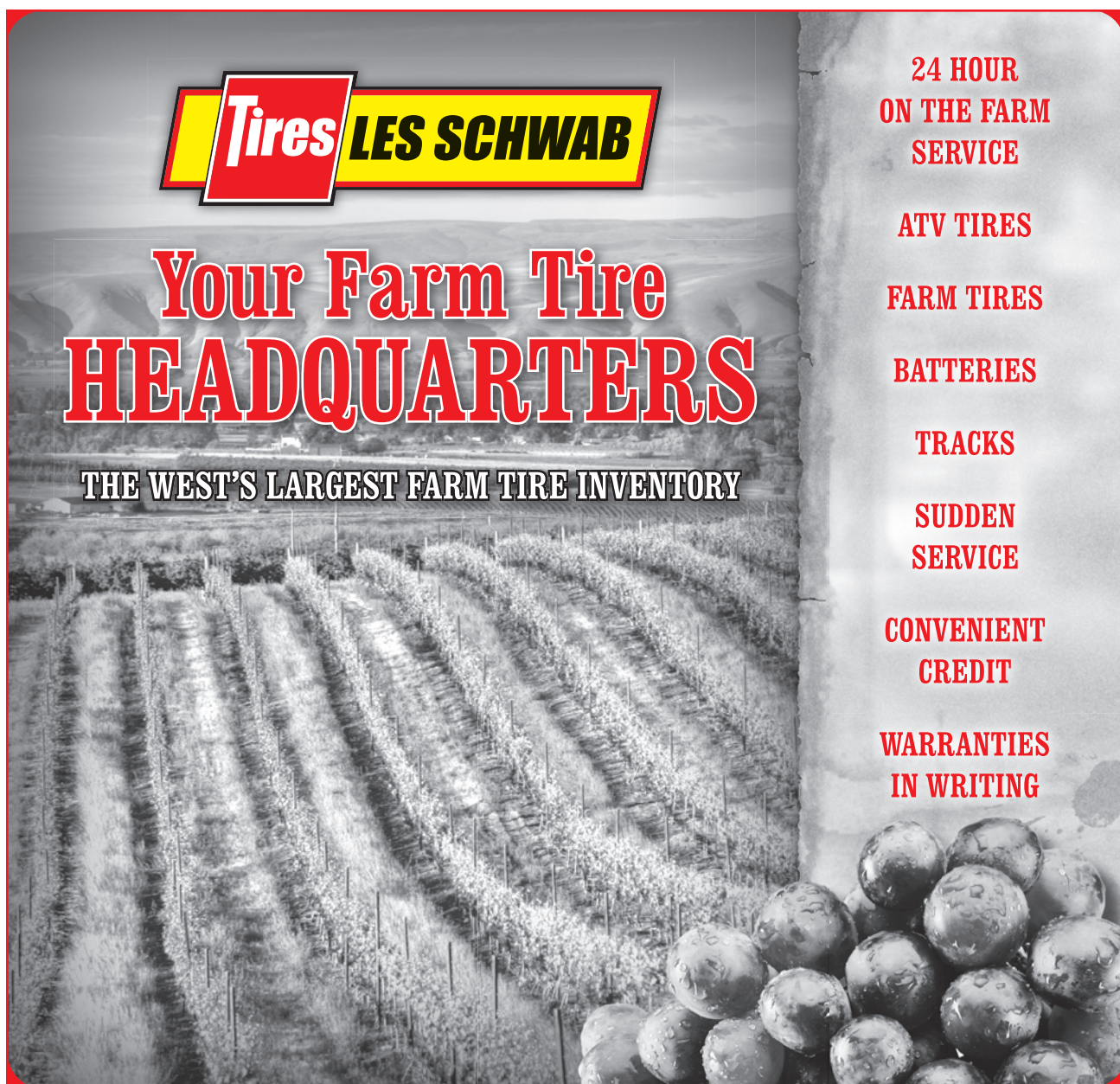
the trees grown and ready to produce is your No. 1 priority, then you want to go with rootstocks that have more horsepower. At the same time, growers need to determine how they want to manage their orchard, including trellis type, whether they will be installing shade cloth or netting and how they plan to irrigate. Early planning can save money and aggravation later.

## 2. Lack of knowledge about soil

Some folks roll their eyes when you tell them to look at their soil, but soil types in an orchard can change dramatically in just a few feet, changing irrigation needs and potentially affecting rootstock choices.

With additional planning, growers can do a better job of managing rootstock selection and water application technologies to build an easier-to-manage orchard than growers have been satisfied with in the past. For instance, the biggest challenge with drip irrigation is matching the length of the set with the soil type, but many growers don't realize where they have sand and where they have clay.

In a 600-foot row, I plan to plant three different rootstocks just because the soil texture changes so much. We have good dirt, bad dirt and OK dirt in the same row, but by reading the trees that are there currently, I can tell my needs in each spot.

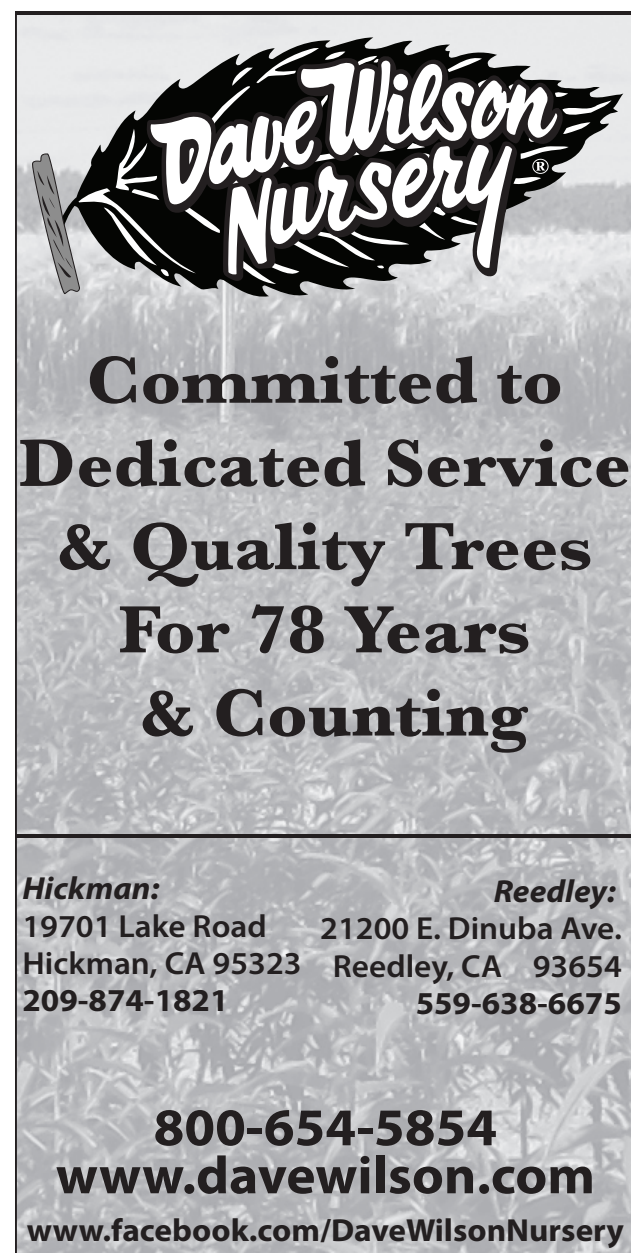


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Geneva 11 rootstock at Cameron Nursery in Eltopia, Washington.

### 3. “When your only tool is a hammer, everything looks like a nail”

Too often, growers just know they want to plant a row of trees. They buy one variety of rootstock from one nursery, and that’s it.

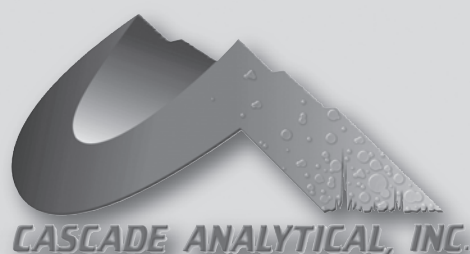
Soil type isn’t the only reason to choose different cultivars. Growers should be buying different cultivars from two or three nurseries to better manage risk as well. They also should be in regular contact with those nurseries to

ensure they’re not going to end up with the rootstock that’s left over because no one else wants it, either because the scion genetics or the rootstock genetics have advanced or the trellis system of choice has changed.

We’re all looking for this nirvana, and there isn’t one solution, with one rootstock for all varieties.

*Tom Auvil is a research horticulturist for the Washington Tree Fruit Research Commission.* ●

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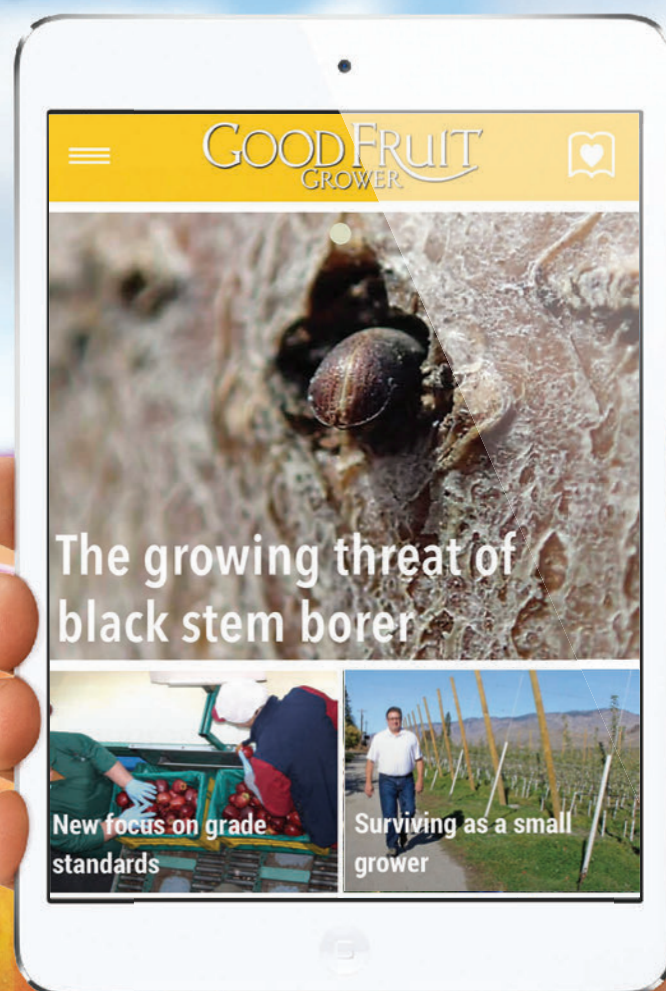
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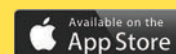
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**Malling 9 T-337:** M9.337 is the global standard for rootstock and is the most widely planted cultivar in Washington. M9.337 shows tremendous compatibility with most scions, but its susceptibility to fire blight makes it a rootstock to avoid in areas where fire blight is a concern, Auvin said. Also worth avoiding: pairing M9.337 with fire blight susceptible scions that bloom early and for a long time, such as Cripps Pink and Jazz.

**Geneva 11:** G.11 can be disappointing in its vigor, particularly in sandy or light soils. In good soils, G.11 grows very vigorously on nonbearing trees and grows large fruit. The rootstock seems to do well in nurseries, and some plantings back East have reached 25 years old and are still going strong, Fazio said. G.11 is not resistant to all the strains of fire blight, but compared to M.9, it's resistant. "You'll lose maybe a tree as opposed to a whole orchard," he said.

**Geneva 16:** Two words: virus sensitive. Even with certified wood. "We've had blocks that have had sustained tree losses over time. It's relatively slow, but even a half a percent adds up over time," Auvin said. "It can take three to four years from first symptom to final end," he said. Fazio called G.16 one of the wonders that made beautiful, productive trees in the nursery. It's still being used in the Southeast U.S. and in Minnesota's breeding program, he said, but clean wood is essential.

**Malling 9 Nic29:** This is the largest M.9 used in the West, but some nurseries have removed it from production due to its susceptibility to fire blight and replant disease. The rootstock tends to remain very vigorous, but works well with slow-growing scions. However, that vigor can create a late bloom, adding to those fire blight concerns.

**Malling 9 Pajam2:** More vigorous than M.9, Pajam2 is productive with large fruit. Replant may be a bit of a problem, and fire blight is also an issue. A clone of the original M.9, this rootstock has similar characteristics of M.9 Nic29.

**Malling 9 EMLA:** EMLA 9 tolerates most soil types, except dry, light soils in low rainfall areas. Its root systems tend to be a little more fragile, so take care when digging up or planting this cultivar, and it's susceptible to fire blight. It also has similar characteristics to M.9 Nic29, but it's been cleared of viruses.

**Geneva 935:** Another high-performing Geneva rootstock, G.935 is a good rootstock for weaker varieties, such as Honeycrisp, with good fruit production. It's tolerant of replant disease, but not woolly aphid resistant, and is commercially available.

**Geneva 969:** G.969 has not been evaluated in the Northwest, though it's the easiest to grow in a nursery of the entire Geneva family. In the East, it's rated a very large tree and a high-performing tree. G.969 is the only cultivar in the Geneva family that stands up when it grows, rather than bend over like a raspberry bush. Fazio said G.969 will make weaker varieties shine. It is commercially available in limited quantities.

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**Geneva 214:** One of the high-performing Geneva rootstocks, G.214 is the first of the Genevas known for being very replant tolerant. There have been a number of issues getting it into production — specifically, identity mistakes in propagation — but G.214 is finally headed to the stool beds. Washington trials have shown great stands with good transplant. The first group of 214 is available at some nurseries this year in limited quantity. Fazio said the new Washington variety WA 38, known as Cosmic Crisp, would do well on G.214.

**Geneva 210:** Another high-performing Geneva clone, G.210 has done the best at an unfumigated research replant site in Wapato, Washington. “It’s been an excellent performer,” Auvil said. “It’s coming out of tissue culture, stool beds are starting to show some production, and availability will dramatically increase over the next two to three years.” Some limited availability now.

**Geneva 222:** A good M.9-type cultivar that is somewhat commercially available, G.222 is a good choice in areas where fire blight is a concern. However, it’s not very replant tolerant. Fresh ground is good. There are limited quantities available.

**Geneva 814:** G.814 has been shown to be virus sensitive and must be paired with clean scion wood. In a couple of trials with Gala in Washington, the rootstock has grown a box-size bigger fruit than G.214. It’s a rootstock that has a good balance of calcium, potassium and phosphorous, Fazio said, but the causal effects of large fruit size on bitter pit with this rootstock is not yet known.

**Budagovsky 10:** A very cold hardy rootstock that is resistant to fire blight and easy to propagate with few side shoots, Bud 10 has not yet been widely used in Washington. Bud 10 is highly susceptible to replant disease, which means it doesn’t provide much improvement over bigger M.9 clones, Fazio said. It’s a rootstock researchers are still learning about in the Northwest.

**Malling 26:** M.26 produces a significantly lower crop than M.9. In some locations, M.26 has shown very high susceptibility to crown rot, has relatively high susceptibility to fire blight and is among the worst rootstocks

in terms of susceptibility to replant disease. “Don’t use it,” Fazio said. “It’s been a productive stock for certain things, but it’s done its job.”

**Geneva 30:** A very hard cultivar to propagate, G.30 production is declining. Only one or two liner nurseries are producing G.30, Auvil said, and the rootstock has not proven itself horticulturally to be an extremely productive, large fruit rootstock. “But if you were a Gala grower, you’d love to grow Gala on G.30,” he said. “It’s just very hard to get.” Watch the graft unions in the first two years.

**Geneva 890:** A commercially available rootstock that has wider distribution, G.890 will probably be competitive with G.41 in terms of tree availability and volume, Auvil said. Bitter pit is a concern, due to its high vigor, but G.890 seems to be an excellent replacement tree in difficult soils. Fazio also noted that the rootstock has shined in extremely harsh replant areas.

**Geneva 202:** G.202 is a rootstock Auvil has removed from his lists because it produces one of the biggest trees, failing to “calm down” over time, yet is among the least productive rootstocks. The cultivar has been widely planted in New Zealand and is being sold in Mexico, but is not as well adapted to the Northwest.

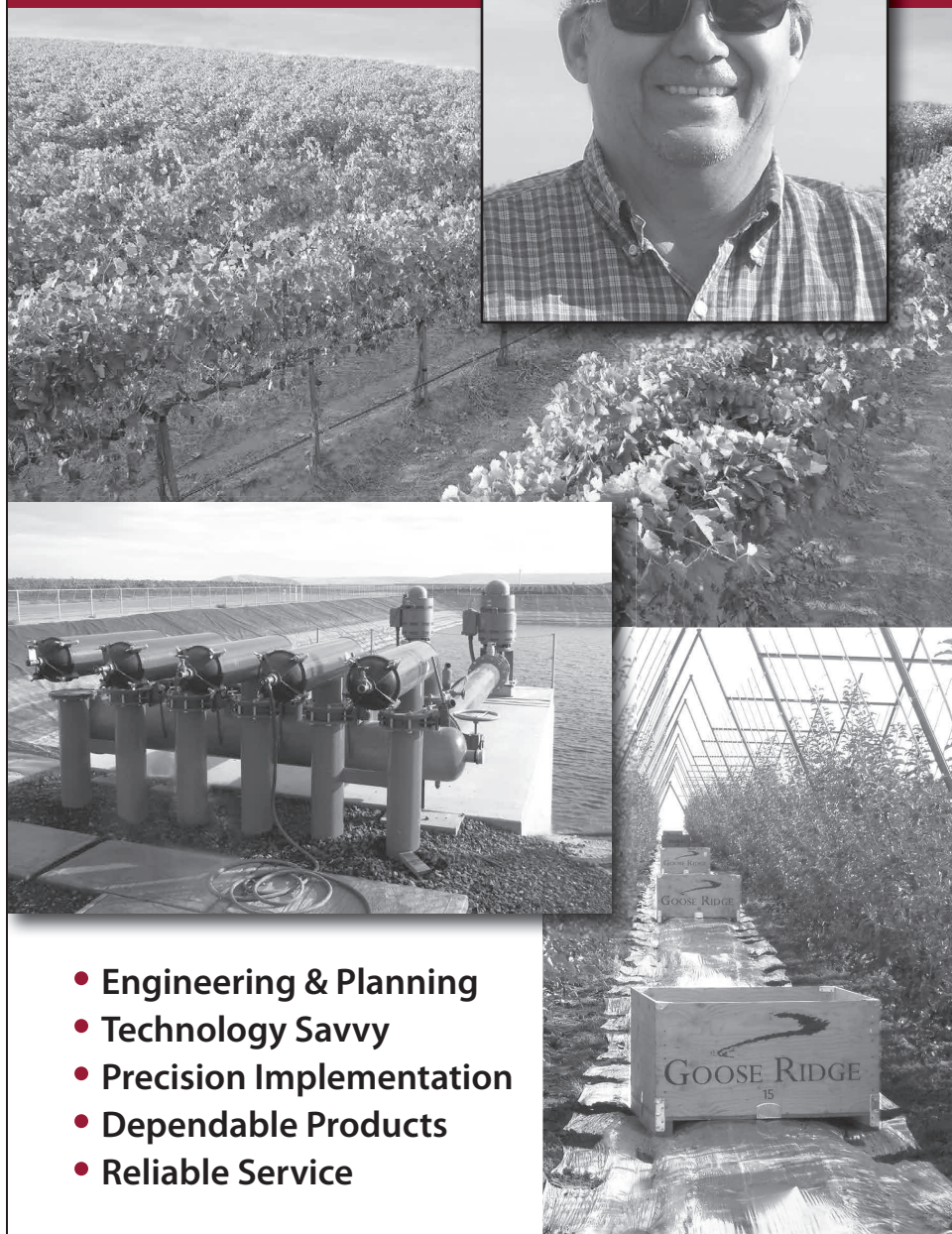
**Malling 7 EMLA:** This rootstock offers significant crop density issues, Auvil said, and blind wood is made much more severe. Fazio noted the rootstock is easy to propagate, but suckers a lot, is not fire blight resistant and not particularly productive.

**Malling 106 EMLA:** A very difficult combination with vigorous scions like Granny Smith or Fuji, M.106 EMLA can show a lack of productivity. In addition, it’s the “canary in the mine” for crown rot, Auvil said, meaning it’s highly susceptible.

**Budagovsky 118:** A very vigorous rootstock that values dry, sandy orchard sites but is adaptable to various soil types, Bud 118 is extremely winter hardy but is not replant tolerant. Productivity is an issue, as it tends to grow smaller fruit every other year and suffers annual bearing challenges, Auvil said. There also has been some bitter pit in fruit in Washington. ●

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## Horticulture

# Some like the biggest TREES

**Others like the smallest.**

by Geraldine Warner

**T**here's more than one way to plant a modern, highly productive orchard. While some growers like to plant the largest nursery trees they can find, others prefer the smallest.

Dale Goldy, assistant general manager with Stemilt Ag Services, based in Wenatchee, Washington, said he likes to plant large nursery trees — preferably knip trees — for his tall spindle plantings (see "Planting materials" at right). The tall spindle, which is popular in Europe, is an easy system to teach workers because much of the tree's development is done in the nursery before it's handed off to the orchard. It's also easy to duplicate from one orchard to the next, which allows employees to be moved around without difficulty, and the system lends itself to the use of new technologies and potentially automated harvest.

"Once you have people who are trained, it lends itself to being a very efficient system," he said. "It's not very complicated. There are three or four rules you have to adhere to, to make it work." (See "Basic rules of Stemilt's tall spindle" on page 37.)

Goldy said the people factor — human capital — plays a significant role in the system's success, and execution is 90 percent of good horticulture. "So, you can have the greatest horticulture, but if you can't make it happen, then it's not worth very much."

### Trellis first

Gala trees are planted 3 to 4 feet apart in the row and Honeycrisp 2.5 to 3 feet. Rows are 12 feet apart to accommodate platforms.

## Planting material

**Several different types of planting material can be used to establish an orchard.**  
**Bench graft:** This starts out as a rootstock, which is taken out of the nursery layer bed in November and bench grafted with scion wood between January and April. Bench grafts are delivered for planting after the last spring frost. Bench-graft trunks will be about 14 to 16 inches tall, with the top 4 inches being the scion wood. Rootstock choice must be made before they are dug, and the scion variety must be determined before the rootstocks are grafted. The short lead time gives growers more time to decide on their variety-rootstock combination, but bench grafts are the most sensitive to environmental and horticultural practices in the orchard.

**Sleeping eye:** This starts out as a rootstock planted in the nursery a year ahead of the delivery date. The rootstock is budded with the scion variety around August. At the end of the season, it is cut to the scion bud and dug up for delivery the following spring. The trunk will be about 5 to 6 inches long, with an extensive root system. Rootstock decisions must be made a year before planting, with the variety decision made several months later.

**Standard nursery tree:** This starts out the same way as a sleeping eye. The rootstock is planted in spring, budded in August, cut back, and then allowed to grow for one more year. The following November, the tree is dug up for dormant delivery in the spring. It needs to be ordered at least two years in advance of delivery.

**Knip tree:** This begins as a bench graft grown in the nursery the first year. The next spring, trees are cut back to desired height and the central leader established. It is dug that fall for delivery in late winter or early spring. Growth is better than with a standard tree because of a strong root system, thicker caliper trunk and increased branching. It needs to be ordered at least two years in advance of delivery.

**Budding in place:** Rootstocks are planted in the orchard in the spring and budded to the scion variety around August. The grower develops the trees.



*“Once you have people who are trained, (tall spindle) lends itself to being a very efficient system. It’s not very complicated. There are three or four rules you have to adhere to, to make it work.”*

—Dale Goldy

Jamie Jamison, regional manager for Stemilt Ag Services, came up with the idea of installing the trellis and irrigation system first and then planting the trees by hand, which has a number of advantages. “It’s one of those outside of the box kind of things because we’re doing it in reverse order,” Goldy said.

It’s resulted in less breakage of trees, particularly those on Geneva rootstocks where the graft union is weak, as well as lower costs for planting and for building the trellis. Trees can be clipped to the trellis as soon as they’re planted to avoid wind damage and are irrigated within 10 to 15 minutes of being planted.

It’s been said that any bend in the central leader can reduce growth by about 30 percent, so Goldy supports individual trees with bamboo stakes. The goal is for trees to reach the top wire by no later than the end of the second leaf. He stops fertilizing as early in the second leaf as possible, in order to produce high quality fruit sooner, and hopes for a robust crop in the third leaf.

Tree training is done mainly in February and March — as soon as the sap flows and the branches become flexible

enough to tie down — and is finished before the crews need to work on hand thinning or cherry harvest. The goal is to maintain uniform light distribution from the top to the bottom of the tree to achieve consistent fruit color and maturity throughout, resulting in fruit with better storing and eating quality and enabling workers to pick a higher percentage of the fruit in one pass.

### Angled system

Travis Allan, president of Yakima Valley Orchards, uses an angled system with trees 1.5 to 2 feet apart and 12 feet between rows to accommodate current equipment. His target canopy height is 11.5 to 12.5 feet. He’s switched to metal poles because of concerns about the availability and quality of wooden poles.

Unlike Goldy, he prefers to plant anything that is not a full-sized tree, whether bench grafts, sleeping eyes or rootstocks budded in place, with the trellis installed afterward.

“The full-size tree is my enemy,” said Allan, who believes it takes too much work to plant big trees and put the trellis together when a grower is planting a

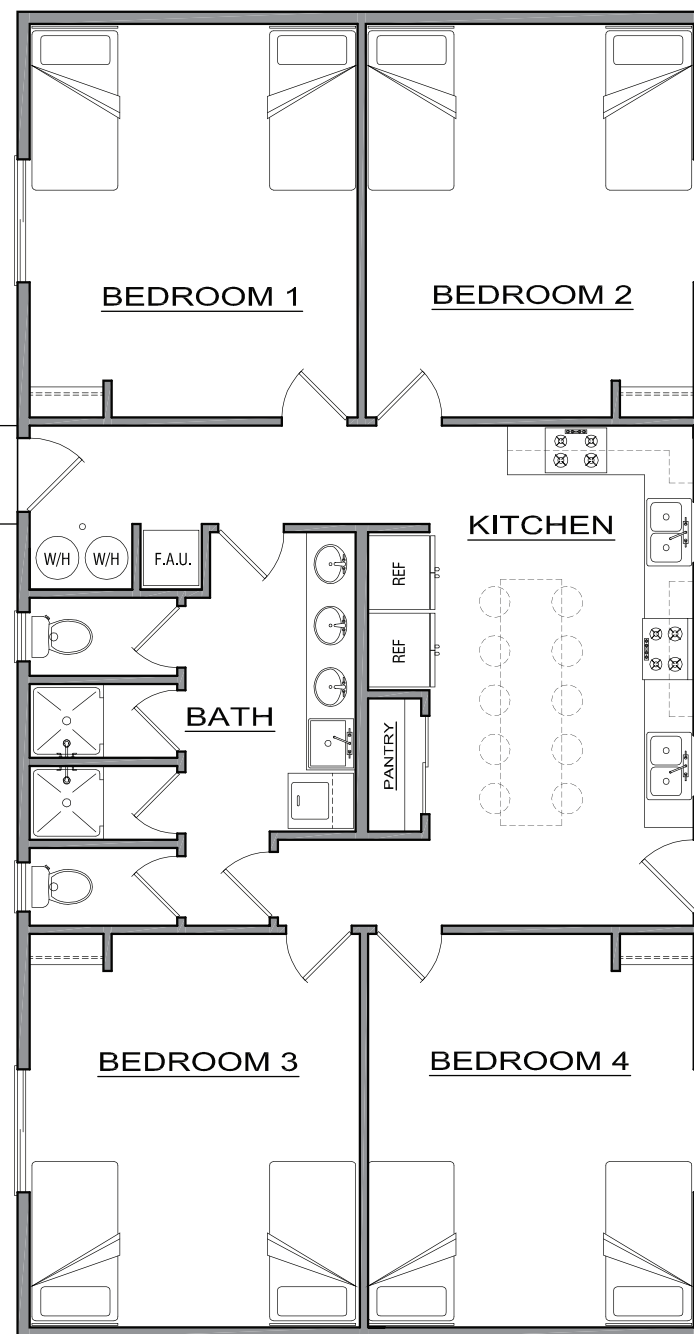
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hundred acres at a time. His goal is for the trees to grow 6 to 6.5 feet tall with four to six branches during the first year, and he expects them to be 9 to 9.5 feet tall by the second leaf. With Gala, he's been able to harvest 40 to 45 bins per acre in the third leaf.

Jason Matson, farm general manager at Matson Fruit Company in Selah, Washington, uses a steep V-trellis system with trees 1.5 feet apart and 10 feet between rows. He prefers sleeping eyes to full-size nursery trees, and not just because they're cheaper. In order to have trees with the characteristics he wants, he would cut back nursery trees at planting to almost nothing anyway, he said. Another advantage of sleeping eyes is the shorter lead time for selecting the variety.

The roots of a sleeping eye are more in balance with the top, he said, so they don't suffer transplant shock. They stay vegetative longer and grow better, in his experience.

### Honeycrisp

With Gala, Matson uses a formal limb positioning system with the goal of producing up to 100 bins per acre. However, with Honeycrisp, he's gone through a progression to find the right system.

His first Honeycrisp planting 10 years ago was on a vertical system on a 4-by-10-foot spacing. He hoped the canopy would grow 11 feet tall, but the tops of the trees didn't fill the space.

In 2008, he switched to a 4-by-9-foot vertical system, hoping they would reach 12.5 feet tall, but he had the same result.

In 2012, he planted Honeycrisp on a 1.5-by-10-foot V-trellis system, aiming for a tree height of 10 feet. "We could get there," he said, "But the tops of the trees are just these spindly little branches. Honeycrisp grows really well for the first two years, and sometimes we can keep them going into the third, but we can't get them any taller than 9 or 10 feet no matter how hard we try."

"It comes down to branching," he added. "The first 2 to 2-1/2 years we get nice healthy branches, but after that they're just little spiny things."

In 2013, he planted the same system but developed two leaders per tree, for a total of 5,508 leaders per acre. Leader placement is formal, but side branching is not. He's been stubbing back the limbs to try to keep them from setting fruit buds and to keep the trees growing upward.

"We're really hoping we will finally get 100 percent canopy development, and at that point we should be able to get 100 bins per acre," he said.

### Obstacles

Asked about obstacles to success, Matson said there never seems to be enough time for tree training and everything else that needs to be done. Establishment costs, at \$40,000 to \$50,000 per acre, are also a challenge. And it takes patience to develop a successful orchard. At first, his employees seemed to have difficulty understanding the formal training system. "It was a hair-pulling experience," he said. "But now we've gotten there, we don't want to change because now our staff understands what to do. We're so far down this path that it would be very difficult to emulate Stemilt. It's just a cultural thing, and I feel good that our staff understands the goals of the system."

Goldy warned that the "plant-in-place" systems (bench grafts, sleeping eyes and budding in place) may be less expensive than planting full-grown trees, but they only pencil out if the grower has the technical skill to bring them into production sooner.

"People look at them as a cheaper solution, but it generally delays their production over just buying a nursery-grown tree," he said. "The cost of maintaining these 'cheap trees' in the orchard for additional years while they fill their space greatly outweighs the upfront cost of a good nursery tree."

*The panel discussion took place during the Washington State Tree Fruit Association's Annual Meeting in December. ●*

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A Stemilt orchard managed by Dale Goldy is planted using a tall spindle system.

## Basic rules of Stemilt's tall spindle

—Trees are planted at densities of 1,000 to 1,500 trees per acre (typically 3 or 4 feet between trees and 11 to 12 feet between rows).

—Precocious dwarfing rootstocks are used because early cropping is essential to pay for establishment costs and help control tree vigor.

—Highly feathered nursery trees are used. Transplant shock caused by a high top-to-root ratio helps keep trees within the tight spacing and contributes to fruit bud differentiation in the year of planting.

—Minimal pruning is done at planting and is limited to removal of a few of the larger branches, generally those that are more than half the diameter of the leader.

—Upright scaffold branches are devigorated by bending.

—Scaffold limbs are removed as they become too large for the space, leaving 2-inch stubs for renewal,

—Although there are no permanent branches in the standard tall-spindle system, Dale Goldy at Stemilt believes that to get tree vigor low enough for high quality fruit production, some limbs need to be considered permanent, particularly with vigor-sensitive varieties like Honeycrisp. With low vigor, new limbs don't grow to refill the space, so it is important to establish balanced limb size early in the life of the tree when you start to think that the limbs are possibly permanent, he says. —**G. Warner**



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## GOOD TO GO

For a complete listing of upcoming events, check the Calendar at [www.goodfruit.com](http://www.goodfruit.com)

### FEBRUARY

**February 2-4:** Mid-Atlantic Fruit & Vegetable Convention, Hershey, Pennsylvania, [www.mafvc.org](http://www.mafvc.org). For information, call (717) 694-3596 or email [pvg@pvga.org](mailto:pvg@pvga.org).

**February 2-5:** CiderCon and U.S. Association of Cider Makers annual conference, Portland, Oregon, [www.ciderconference.com](http://www.ciderconference.com).

**February 3-5:** Craft Beverages Unlimited Midwest, St. Charles, Missouri, [www.midwestgrapeandwineconference.com](http://www.midwestgrapeandwineconference.com).

**February 4:** Okanogan Horticultural Association Annual Meeting, Omak, Washington. For information, email [tianna.dupont@wsu.edu](mailto:tianna.dupont@wsu.edu).

**February 4:** Technology Research Review, Washington Cattlemen's Association, Ellensburg, Washington, [www.treefruitresearch.com](http://www.treefruitresearch.com). For information call Kathy Coffey at (509) 665-8271 ext. 2 or email [kathy@treefruitresearch.com](mailto:kathy@treefruitresearch.com).

## GOOD STUFF

A selection of the latest products and services for tree fruit and grape growers

### Wilbur-Ellis launches microbial products

Wilbur-Ellis Company has launched its NUTRIO line of microbials, a new line of biochemistry products to aid in soil nutrition with a goal of improving plant health and yield potential.

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—NUTRIO Unlock, a liquid biological soil amendment containing a diverse array of beneficial soil bacteria cultured from specifically selected pure strains of microbes in an oxygen-enriched process for maximum viability.

—NUTRIO High Gear, an eco-friendly liquid biological soil amendment containing seven species of beneficial soil bacteria and liquid humic acid to promote soil and plant health and improve nutrient uptake.

—NUTRIO Powershift, a unique liquid high-orthophosphate fertilizer containing seven species of beneficial soil bacteria to elevate yields, increase plant vigor and enhance resistance to stress.

Founded in 1921, Wilbur-Ellis is a leading international marketer and distributor of agricultural products, animal feed and specialty chemicals and ingredients, with sales over \$3.1 billion. For more information, visit [www.wilburellis.com](http://www.wilburellis.com).

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The Washington Association of Wine Grape Growers Annual Meeting returns to the Three Rivers Convention Center in the Tri-Cities on Feb. 9-11.

**February 9-11:** Washington Association of Wine Grape Growers Annual Meeting and Trade Show, Kennewick, Washington, [www.wawgg.org](http://www.wawgg.org).

**February 9-11:** World Ag Expo, Tulare, California, [www.worldagexpo.com](http://www.worldagexpo.com).

**February 11-13:** Minnesota Grape Growers Association Cold Climate Grape & Wine Conference, Minneapolis, Minnesota, [www.mngrapes.org](http://www.mngrapes.org).

**February 17-18:** Northwest Pear Research Review, Confluence Technology Center, Wenatchee, Washington, [www.treefruitresearch.com](http://www.treefruitresearch.com). For information call Kathy Coffey at (509) 665-8271 ext. 2 or email [kathy@treefruitresearch.com](mailto:kathy@treefruitresearch.com).

**February 17-18:** Food Processing Expo 2016, Sacramento, California, [www.foodprocessingexpo.net](http://www.foodprocessingexpo.net).

**February 24:** BC Tree Fruit Horticultural Symposium, Kelowna, British Columbia, Canada. For information, email Kelly Berringer at [kberringer@bctree.com](mailto:kberringer@bctree.com).

## MARCH

**March 1-2:** Fruit Ripening & Ethylene Management Workshop, Davis, California, UC Davis Campus, [postharvest.ucdavis.edu/Education/fruitripening](http://postharvest.ucdavis.edu/Education/fruitripening).

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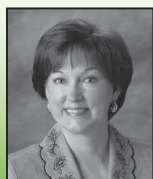
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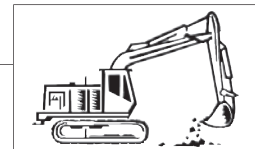
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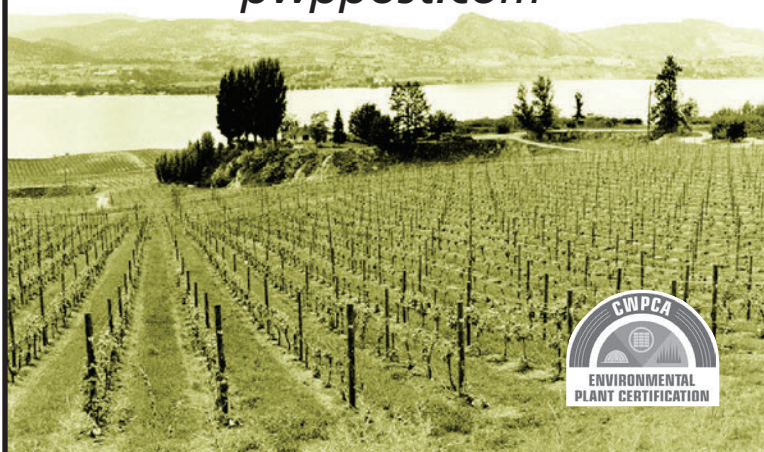
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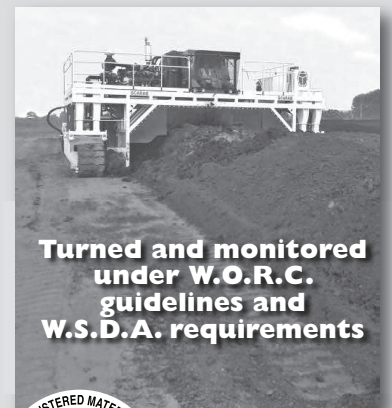
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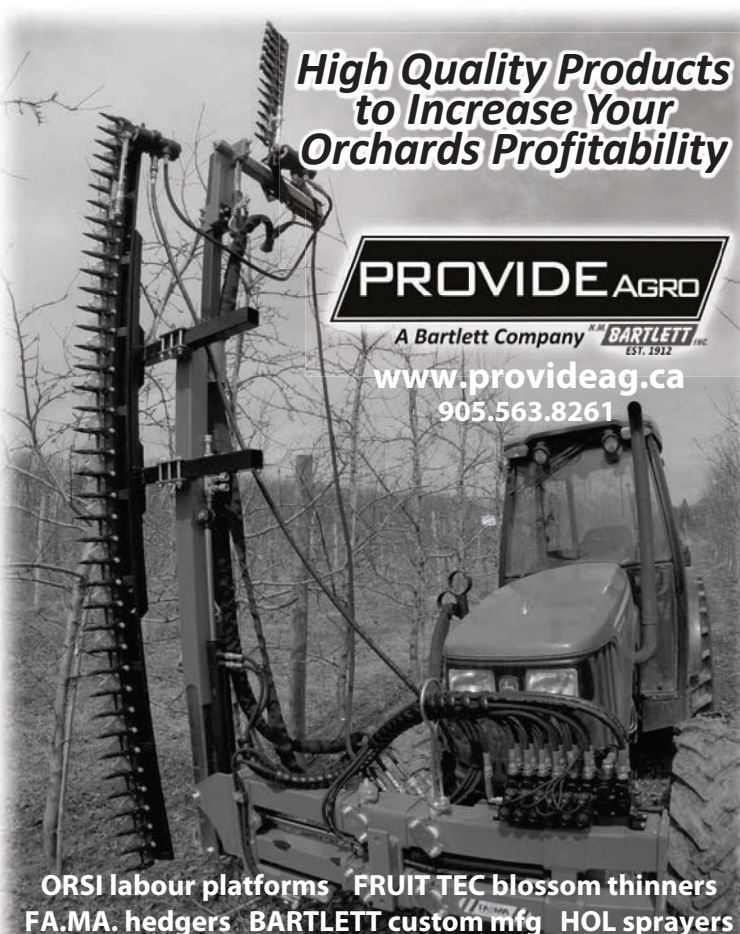
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### What was your path to farming?

“I’m just a day-one farmer. I’ve been working the farm full time the past six years. I had one of our drivers the other day say that he remembered me hanging off a bin trailer when I was 9 years old helping sort fruit. Farming is what I know, it’s what I’ve done, and I enjoy it. I love that I can get up early and work alongside my family.

### What’s your workload during the season?

“I’d say to someone getting into farming that you can’t be afraid of hard work. You’ve got to be ready to get to work and get it done. During the summertime I get up before 5 a.m. or so to change the water and make sure everything’s ready to go for the day. When everyone starts picking, I’m on the forklift till 5 p.m. or sundown. Then I go out and change water again. I’m sure down the road, I’ll get more involved with the business side of things.

### What challenges do you face in Sanger?

“I’m all in on stone fruit. I know a lot of farmers around here who aren’t. I don’t see any reason to change to a different crop. About the only concern is water availability. All of our water has been pumped for the past two years. Around here, you’ve gotta have good pumps, and farmers need to be planning to drill new wells.

### How are you approaching the future?

“My dad has always had the philosophy that you’ve got to go with the times. There’s a million old-style farming practices that people still use, and some’ll never go by the wayside. But I pay attention as technology picks up and little things advance, like spray nozzles that work better. Or if a new variety comes out and it’s good. You’ve just got to keep moving forward because things are always changing.

“They say gambling in California’s illegal, but it’s not when you’re a farmer.

by TJ Mullinax

More from this interview and other Young Growers at [goodfruit.com/yg](http://goodfruit.com/yg).

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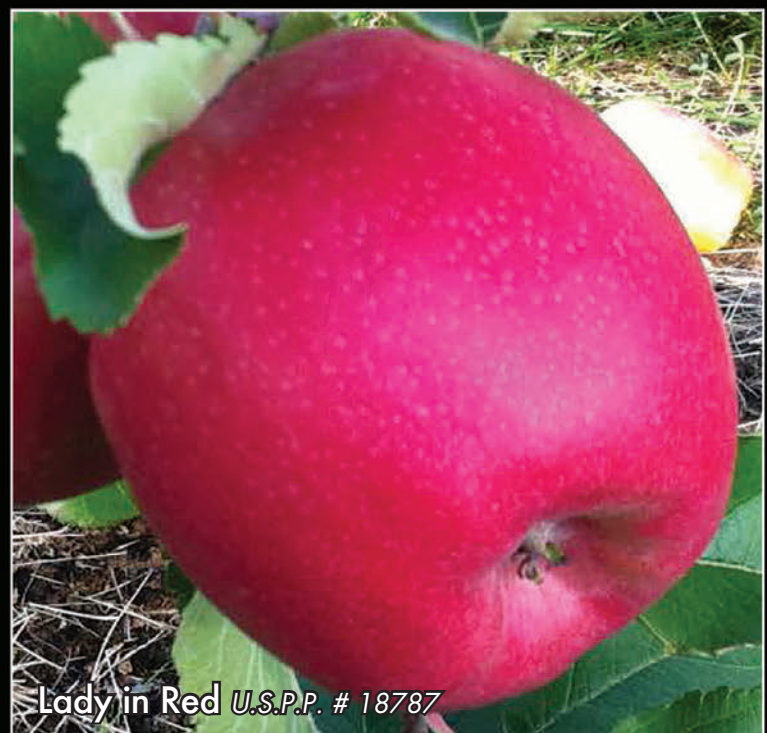
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