WASHINGTON STATE UNIVERSITY
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# Newsletter

July 2016

## Announcements

**AUGUST**

**5 Walla Walla Fair Entries Due**
2016 Fair entry forms are available at the Walla Walla Fairgrounds, WSU Extension office and online at http://www.wallawallafairgrounds.com/exhibits. The fair book is available for viewing on the fair's website as well. No booklets will be printed this year.

**6-7 Walla Walla YMCA Peach Basket Classic,** downtown Walla Walla, Main Street. YMCA Peach Basket Classic 3-on-3 basketball tournament. For more information, call 525-8863 or visit www.peachbasketclassic.com.

**25 Still-Life Exhibits Due, Walla Walla Frontier Days,** 11 a.m.– 7 p.m.

**25-28 Walla Walla Pre-Fair Events.** Refer to page 5 in the 4-H section for a detailed listing.

**31– September 4 Walla Walla Frontier Days**

**SEPTEMBER**

**10 Walla Walla Community Hospice Pond & Garden Tour**, 9 a.m.— 4 p.m. A self-guided tour of ten beautiful gardens in the area. Benefiting Walla Walla Community Hospice. For more information, visit www.wwhospice.org or call 509-525-5561.

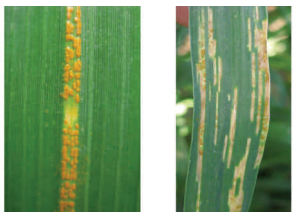
## Updates

**Stripe Rust Update, June 17th, 2016**
Adapted from Xianming Chen

Based on field survey in Adams and Whitman counties of Washington yesterday, wheat crops have been progressing fast since the last update on May 26. Winter wheat ranged from Feekes 10.5.4 (milk) to Feekes 11.3 (almost ripen). Spring wheat ranged from Feekes 5 (early jointing) to Feekes 10.5.3 (flowering completed), and spring barley ranged from Feekes 10 (boot) to Feekes 10.5.3 (flowering completed). The hot weather from June 4 to June 8 pushed crops growing and maturing faster. Winter wheat harvesting is expected at least two weeks earlier than normal.

The hot period slowed stripe rust little bit, but did not completely stop the disease. As the winter crop is maturing, the rust season on winter wheat in most of the Pacific Northwest is over. The disease is pretty much under control. However, stripe rust is developing on spring wheat. As the weather has been much cooler with some moisture since June 8, new and active stripe rust pustules were seen in several commercial fields of spring wheat although incidence and severity were generally low. In our experimental fields at Lind (Adams County), wheat plants were at the flowering to milk stages, susceptible spring wheat varieties had up to 80% severity. Such severe rust is not common for this dryland location. In our nurseries at Pullman (Whitman County), spring wheat plants were at early jointing (Feekes 5) to late jointing (Feekes 8) stages, and stripe rust was very severe on susceptible varieties with 100% incidence and more than 80% severity on lower leaves.

**Stripe Rust of Barley**
Stripe rust was found on spring barley in commercial and experimental fields. In our experimental field at Lind, stripe rust up to 30% severity was observed on susceptible varieties. In two commercial barley fields of heading stage, stripe rust was found at less than 1% severity or incidence. Up to 5% incidence was found in our experimental fields near Pullman. Early this week, a sample of barley plants received by the Disease Diagnostic Lab had 10 to 30% severity. Compared to wheat stripe rust, barley stripe rust pressure is relatively low, and fungicide application is generally not needed. However, fields of highly susceptible barley varieties under irrigation or in areas that have had significantly high moisture, stripe rust can develop to significant levels. Please check your fields, if rust incidence reaches 5%, consider fungicide application.



Active pustules (*left*) of susceptible reaction in comparison with moderate level of resistance (*right*) of wheat to stripe rust.

# Farming & Livestock

**IN SEARCH OF THE PERFECT STEAK**
**Adapted from Seth Treuscott, WSU**

Imagine taking your first bite of a $40 rib-eye steak—only to chew on beef that's as tough as shoe leather. Talk about disappointment! "A tough steak is not a pleasant experience," says Frank Hendrix, a WSU Extension Educator and animal scientist.

Frank Hendrix

Hendrix sympathizes with anyone who's ever gnawed a stringy steak, and is doing his part to make leathery beef a thing of the past.

In a 10-year project to build the perfect beefsteak, Hendrix teamed with fellow researchers in the WSU Department of Animal Sciences to select and breed cattle for extra tenderness using DNA markers.

"American beef is a wonderful product, but its tenderness can be improved," said Hendrix.

To help, he set out to learn if DNA tools could help selectively breed beef cattle with more tender meat.

Current technology allows breeders to pluck a hair from a cow, look for DNA markers linked to meat tenderness, then assign a tenderness rank. Hendrix bred cows with a top tenderness-ranked bull named "Heritage", raising the calves under identical conditions on irrigated pasture in Central Washington.

He checked the meat from the animals for tenderness using an instrument which measures the force it takes to slice a piece of steak.

The results showed a significant difference in tenderness between typical beef and steaks from Hendrix' specially-bred cattle, revealing that tenderness is an inherited trait.

Hendrix has presented his research, "In Search of the Perfect Steak" at research conferences over the past three years, most recently at WSU's spring 2016 Academic Showcase.

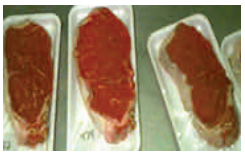
"It's remarkable that there was such a strong correlation," said Mark Nelson, Associate Professor in the Department of Animal Sciences, who worked with Hendrix on analyzing results from the shear-force test.

Mark Nelson

Nelson, who specializes in animal nutrition, is interested in making beef a more functional food, with less saturated, or 'bad' fat and more unsaturated 'good' fat and antioxidants. Hendrix' project helps do that, he says.

Cattle that are naturally tender are worth more to the farmer, more to the finisher, and more to the customer.

"It's better beef," says Hendrix. "The risk of buying a steak that's way too chewy just won't be there anymore."



WSU researchers tested steaks to find that beef tenderness is an inherited quality.

**REDUCING WASTE WHILE IMPROVING SNACK NUTRITION**
**Adapted from Scott Weybright**

Your favorite puffed snack food may soon contain more fiber and nutrition, thanks to research from Washington State University food scientists.

Girish Ganjyal and some of his graduate students have discovered how to add carrot pomace – the pulpy leftover from juicing the veggies – to cornstarch, increasing the "puffiness" of snack foods.

WSU professor Girish Ganjyal holds the snack puffs he and his students made with added carrot pomace.

"That's great – we didn't know what we would find," said Ganjyal, a WSU/University of Idaho School of Food Science assistant professor and WSU Extension food processing specialist. "We hope to continue researching and see just how the starch and fiber are interacting at the molecular level. Hopefully, we can include even more pomace in the recipe."

The results are published as "Carrot pomace enhances the expansion and nutritional quality of corn starch extrudates," in the May edition of the journal LWT-Food Science and Technology. It can be found at http://www.sciencedirect.com/science/article/pii/S002364381530373X.

The research team experimented with concentrations of 5, 10 and 15 percent carrot pomace.

"At five percent, it was great," Ganjyal said. "But at the higher concentrations, the end product got more dense and didn't puff nearly as much."

Pomace doesn't affect the taste of snack foods, he said. In addition to adding fiber and some important nutrients to foods, the research creates a use for a wasted byproduct. Pomace is a leftover after industrial juicing of fruits and vegetables including apples, cherries, blueberries, grapes and carrots.

Pomace comes from a variety of fruits and vegetables used in making juices. The pomace is first dried, shown piled at left. Then the researchers grind it into fine powder, in the jars, for their experiments.

Ganjyal said he talked with juice industry professionals and farmers who want to do something with the residue. With juice production increasing, there is more pomace byproduct.

“If we can find a real use for this, and add something positive to snack foods without affecting the taste or texture, it’s a real win-win,” he said.

The initial research was funded by the New Faculty Seed Grant through the WSU Office of Grant and Research Development.

## Master Gardeners

### PLANT CLINICS & FARMER’S MARKET


Visit the Walla Walla Extension office on Tuesdays and Thursdays from 9:00 to11:00 a.m. and 2:00 to 4:00 p.m. Bring in your home garden or lawn questions or problems and speak to a Master Gardener. Problem plant samples may be left at any time during office hours and a Master Gardener will look at the specimen during clinic hours and contact the home owner with recommendations.

Master Gardeners will also have a booth at the Downtown Farmer’s Market on Saturdays through September. Visit with our Master Gardeners and pick up free tip sheets on a variety of gardening topics.

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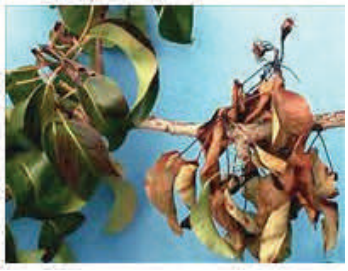
## Home & Garden

### FIRE BLIGHT



WSU Hortsense

Fire blight is a bacterial infection which typically attacks via wounds or blossoms. Initially, twigs and flowers appear water-soaked. Infected tissues quickly turn brown to black and die, appearing scorched. Cankers can develop on twigs and branches, sometimes girdling the limb and causing dieback. Bacterial ooze occurs on infected tissues during humid weather. Fire blight symptoms can sometimes be found around the graft union in apples. Water-soaked purplish cankers may occur near the base of the tree. Reddish-brown streaking beneath the bark in the cankered area may be observed. Some apple trees may collapse and die without showing any characteristic blight symptoms in the canopy. These deaths may be confused with other disease problems such as root rots. Fire blight is not a proven problem in western Washington.

- Plant resistant varieties such as 'Northern Spy', 'Red Delicious', and 'Stayman Winesap'. 'Liberty', 'Prima', and 'Redfree' are also resistant but are less commonly planted.
- Avoid use of very susceptible rootstocks including M9, M26, M27, Mark, and Ottawa 3.
- Prune out and destroy infected tissues as soon as they are noticed. Make cuts at least 6" below infected areas and sterilize pruning tools between cuts. Do not perform blight removal during regular pruning.
- Provide proper culture to minimize succulent shoot growth and reduce injuries, including winter injury.
- Avoid wounding plants.

**Insect control**

Control of insects before and after bloom can reduce wounding from the insects and the transfer and inoculation of the fire blight bacteria. Avoid using insecticide during bloom to prevent harm to pollinating insects.

**Mechanical injury**

Limit mechanical injury to plants when possible. Rubbing branches and hail injury may increase risk of fire blight.

# Technology

## GREEN BLACKTOP FIGHTS POLLUTED WATER RUNOFF

**Adapted from Linda Weiford, WSU News**

WSU environmental toxicologist John Stark stands on the rebuilt parking lot that, in essence, drinks polluted rain runoff. The wetland is behind him.

PUYALLUP, Wash. – To save paradise, John Stark paved a parking lot. Next he hopes to do it to a highway.

An environmental toxicologist who oversees Washington State University's Puyallup Research and Extension Center, Stark studies ways to make blacktop green.

Stormwater runoff – or polluted rainwater, as he likes to call it – is a sinister byproduct of our urban life. Whether in the Pacific Northwest or the Eastern Seaboard, rain that beats down onto conventional roads and parking lots picks up contaminants as it is channeled into creeks, rivers, lakes and oceans. Roughly 85 percent of the water pollution in the United States is caused by this kind of runoff, according to the U.S. Environmental Protection Agency.

A parking lot located at the WSU research center south of Seattle once produced this toxic brew. Whenever it rained, water would slide off the pavement, picking up oil, road grime and heavy metals as it flowed downhill into a nearby wetland.

Under the long shadow of Mount Rainier along timbered knolls and tall grasses, it was not a pretty picture.

"The wetland would flood and the overflow would go into a nearby creek that feeds into the Puyallup River. From there, the runoff would spill into Puget Sound," recalled Stark. "Here we were, publicizing the importance of managing stormwater runoff and we were contributing to the very problem."

### A concrete solution

So Stark and his colleagues went to work. Using grant money issued by the Washington Department of Ecology to the City of Puyallup, in 2010 they installed a new parking lot that, in essence, drinks water. Made of permeable concrete and asphalt, the sponge-like surface prevents rainwater from dispersing and picking up pollutants as it goes.

"The water trickles through the pavement to a gravel base below. Over time, the water seeps into the ground where many of the impurities are filtered out," Stark explained. "We've been closely monitoring the data. It's 100 percent effective at filtrating water and stopping runoff."

If a parking lot can be paved with good intentions, it's this one. Besides providing a space for people to leave their vehicles and corralling polluted runoff, it also serves as a full-scale laboratory for collecting data to help cities and counties nationwide.

"There's a big demand for 'green' solutions for stormwater runoff, but there are also big gaps in research on what works and what doesn't," said Stark. "We're trying to fill those gaps so science-based decisions can be made."

### Fortified by jet wings

Though permeable paving is effective in parking lots and side roads, it's generally not strong enough for heavily-traveled highways. So Stark is collaborating with Boeing and engineers from WSU's Composite Materials and Engineering Center to see if adding the same material found in the wings' outer surface of the 787 Dreamliner will make the grade.

Light-weight carbon fibers reduce the airplane's weight while adding durability. By incorporating these black strand-like fibers into porous asphalt and concrete, WSU scientists are seeing if permeable pavement can be made more durable. They're also validating that the composite material doesn't leach contaminants.

Boeing donates scrap carbon fibers for the research and provided a $212,000 grant to get it started. Though still in the experimental phase, "preliminary results look promising in terms of increasing the strength of the pavement and reducing the toxicity of pollutants," said Stark.

Working with WSU engineering, his next phase of research will evaluate the durability of the modified pavements on experimental stretches of asphalt exposed to vehicle traffic. Researchers will examine whether the addition of carbon fibers increases pollution filtering and how long the filtering process lasts with wear and tear on the asphalt.

Carbon fibers appear as singular black strands inside the asphalt. (Photos by Linda Weiford, WSU News)

**RESEARCHERS IMPROVE BIOSENSORS TO DETECT E. COLI**

**Adapted from Erik Gomez, Voiland College of Engineering & Architecture intern**

PULLMAN, Wash. – Washington State University researchers have developed a portable biosensor that makes it easier to detect harmful bacteria.

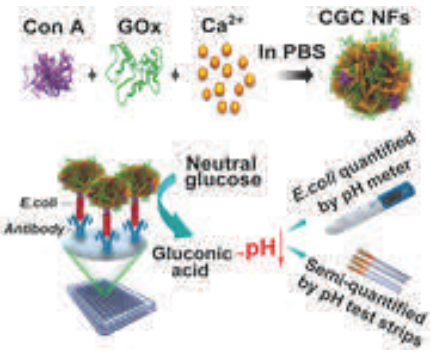
The research team, led by Yuehe Lin, professor in the School of Mechanical and Materials Engineering, recently published the work in the journal, Small (http://onlinelibrary.wiley.com/doi/10.1002/smll.201600273/full).


As in the case of several recent food recalls, harmful pathogens are most often only discovered when people start getting sick. Researchers have been working to develop better biosensors that could quickly, accurately and automatically detect everything from cancer biomarkers in the blood to harmful bacteria in the environment. Even tiny amounts of pathogens can create serious health risks, but the available sensors are unable to quickly and easily detect these quantities.

The WSU research team created a simple sensor that is able to detect and amplify the signal of the food pathogen Escherichia coli (E. coli) 0157:H7, which can cause severe diarrhea and kidney damage in people.

The key to a better sensor is maintaining a large amount of enzyme activity for detecting antigens in a sample. To address this issue, the researchers developed a particle at the nanoscale that includes organic and inorganic components and looks like a tiny flower. Smaller than a speck of dust and made up of a group of molecules, the nano-sized flower and petals provide a large surface area for immobilizing the highly active enzymes that are needed to detect the bacteria at low levels.

The nanoflower is able to recognize the bacteria and amplify its signal so that it can be seen with a simple handheld pH meter or pH indicator paper strip.



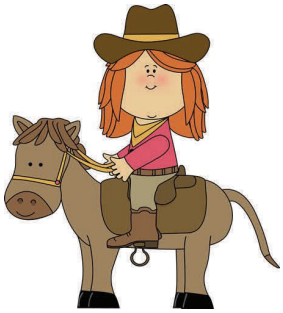

"We want to take these nanoflowers and create a simple-to-use, handheld device that anyone can use anywhere," said Lin. "It'll be as simple as using a pregnancy test strip or a glucose meter."

The researchers have filed a patent for the handheld device concept and are working to switch out components of the nanoflower to detect disease markers as well as other pathogens such as salmonella.

The team includes Lin and his group at the WSU Voiland College of Engineering and Architecture and his collaborator, associate professor Meijun Zhu from WSU's School of Food Science. The work was supported by the U.S. Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health.

The research is in keeping with WSU's Grand Challenges, a suite of research initiatives aimed at large societal issues. It is particularly relevant to the challenge of Sustaining Health and its theme of changing the course of disease.

## 4-H



Challenger Horse Camp was a success this year with 17 participants and numerous volunteers. Youth with disabilities were able to ride horses in various patterns for two nights and the third night were treated with miniature horse cart rides and a petting zoo.

**Schedule of Pre-Fair Events:**

August 25th

- 5 p.m. 4-H/FFA Pre-Fair Horse Fitting and Showmanship (Rodeo Arena)
- 6:30 p.m. 4-H/FFA Pre-Fair Horse Western Games (Rodeo Arena)

August 26th

- 4 p.m. 4-H/FFA Pre-Fair Colt Fitting and Showmanship

August 27th

- 9 a.m. 4-H Dog Agility Trial Classes
- 7:30 p.m. 4-H Public Fashion Revue

August 28th

- 4 p.m. 4-H & Open Cat Show

# Family Living

**PRESERVING THE SUMMER BERRIES**
**WSU Food Safety Bulletin**

The berry season is upon us. First the strawberries, then raspberries, blueberries, blackberries and many kinds of wild berries such as Oregon grapes, gooseberries and huckleberries. This is such a glorious time of year for the small sweet berries and the products you can make with them. The berries are so wonderful fresh, but if you are like me you want to preserve some of that summer taste for those cooler winter months.

Purchase or harvest berries in the morning. Keep them refrigerated until you are ready to eat them or preserve them. Berries that are warm are softer and will spoil more quickly.

All berries freeze pretty well. If you plan to freeze the berries, do so as soon after picking as possible. Wash them well in cool running water and then dry and drain well. Get as much of the water droplets off the berries as possible. The extra water will form large ice crystals and soften the berries even more.

Freeze whole berries by placing them on a cookie sheet and placing the cookie sheet in the freezer. As soon as they have frozen solid, package them in freezer bags or containers. Do not use plastic storage bags or containers. They are not air or moisture tight and will not protect the flavor or prevent freezer burn.

Blueberries, elderberries and huckleberries have a skin on them that can become tough when frozen. You may want to consider steaming these berries for 1 minute and then cooled in ice water immediately. This will tenderize the skin and make a better favored product. When freezing them then, just barely cover them with medium syrup (3 cups sugar to 4 cups water).

If you plan to sweeten the berries before freezing place cleaned berries in a shallow baking pan. Sprinkle sugar on them and gently mix. The shallow pan allows the berries to lie in single or double layers and prevents them from getting crushed in the mixing process. Then place sugared berries in the freezer bags or containers and freeze.

For crushed or pureed berries, sort, wash and drain. Crush berries and add sugar to taste. Stir gently until the sugar is dissolved, pack into containers, seal and freeze.

**Jams and Jellies**

Outside of freezing the most popular preserved products to make with berries are jams and jellies. To make successful jellied products you need the correct proportions of sugar, acid and pectin. When these ingredients are used in the correct proportions they form a gel that holds the fruit pieces, puree or juice into a thicken jam or jelly. Because the proportions are so crucial you should never double a recipe for jams or jellies. It takes a lot of sugar to form a gel. If you use less, you will end up with syrup or a very soft gel. If you use too much, sugar may not dissolve. These crystals will leave a sandy or gritty feel in the mouth.

Do not double a recipe either. It takes too much cooking time, which breaks down the pectin resulting in soft and runny fruit spreads. Boiling longer only makes the problem worse and may change the flavor and darken the color.

If you want to make a low sugar jam or jelly, be sure to use a pectin product for low sugar or sugarless jams and jellies. The pectin is designed to gel the fruit without the use of sugar or as much sugar. Many of them are formulated to use with artificial sugar products as well.

Jams and Jellies are most successful if you use commercial pectin and a mixture of overripe and under ripe berries. The under ripe berries provide more of the natural pectin and the overripe berries provide added flavor. Also berries, especially strawberries have more natural pectin in the early berries versus those from plants that are a little older. So jams and jellies that are made later in the season may need a little more pectin or more under ripe berries to set up.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Debbie M. Williams
County Extension Director