the BeeLine

Summer 2017

Newsletter of the Western Cascade Fruit Society

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The BeeLine is a quarterly publication of Western Cascade Fruit Society, a non-profit 501(c)3 corporation in the State of Washington.

City Fruit announces: 2017 Orchard & Harvest Tour--
September 9th,10:00am to 3:00pm

Join us on September 9th 2017 for the 3rd Annual Orchard & Harvest Tour with new events, exciting activities and opportunities to learn more about the fruit growing in your neighborhood backyard. info@cityfruit.org
(360) 602-1778, 500 Aurora Ave N. , Suite 204, Seattle, WA 98109

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WCFS Fall Board Meeting

Sunday, Sept. 24, 10:30-1:30.
OOS will host the next quarterly WCFS board meeting at Tri-Area Community Center, 10 West Valley Road, Chimacum. Lunch will be provided.

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WCFS Fruit Research Proposals are Due!

Dear Fruit Researcher:

The Western Cascade Fruit Society (WCFS) is asking for fruit research grant proposals, to be submitted by July 15, 2017. WCFS is committed to research that benefits backyard and hobby growers of fruit trees and small fruits in western Washington.

The WCFS has two funding cycles per year. The next one will be January 15, 2018. Please note this on your calendar for future reference.

The guidelines and application can be found at www.WCFS.org

Please direct any questions you may have to our email address and we will be happy to assist you. WesternCascadeFruitResearch@gmail.com. You will receive a confirmation email upon receipt of your application.

The WCFS Fruit Research Committee

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Olympic Orchard Society Blossom Blast Pilot study 2017 – Information letter to Participants

This year Blossom Blast (BB) has typically been a serious problem in some home orchards and not in others. You have expressed interest and many already provided data toward a study to survey the incidence and study the effect of nutrition (specifically boron) and location and incidence of Pseudomonas syringae. The pilot study protocol is attached for your information.

The plan is to complete the collection of data on varieties of pears and plums and the incidence of BB. It may be more appropriate to follow up and gather harvest data later in the season. Half of the participants apparently do not have BB and will serve as controls. The study will involve a tissue test for 15 nutrient levels with special interest in Boron and possibly a bacterial culture for Pseudomonas syringae from a few selected samples. All testing costs would be covered by OOS unless the participant would like to donate money toward the tests. (Tissue nutrient test = $36; Pathology cost to be determined estimated at $50).

The full lab reports will be copied to you and the processed information gained could be shared with OOS members, Western Cascade Fruit Society members and possibly published in local newsletters.

I will arrange for collecting and submitting the leaf samples and possibly the bacterial cultures and provide that schedule when available.

Thank you for your participation.

Jim House, President OOS

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A Pilot Study of Blossom Blast in the North Olympic Peninsula in 2017

Sponsored by the Olympic Orchard Society

Coordinator: Jim House (jahouse100@gmail.com; 360-775-1869)

Background

Blossom blast (BB) is the term used to describe the death of the blossom and/or adjacent tissues of a fruit or nut tree. Many variables can play a role in the occurrence and severity of BB: weather, nutrition, fruit variety, location (the specific microclimate) and other concurrent diseases. Regardless of the cause, the result of BB is a lack of fruit set and no or diminished crops. Among the fruit tree species effected are pears (the most commonly effected species), plums, apples, and cherries. The most commonly described cause of BB is the bacterium *Pseudomonas syringae syringae,* ubiquitous in rain water. Prolonged cold, damp conditions such as those during La Nina predispose to Pseudomonas infections.

Boron (B) deficiency can also cause BB. Several nutrients [Boron (B), Iron (Fe) Manganese (Mn) and Copper (Cu)] may be "tied up" in the soil by various chemical conditions and not able to be absorbed by plants. Soil tests cannot distinguish between bound and free nutrients, so a plant tissue test better represents the nutritional status of plants.

This year, possibly aggravated by the cool, damp weather, there are numerous reports of poor fruit set and diagnostic signs of BB in the North Olympic Peninsula. The variables that we can study in a meaningful manner are nutrition and fruit variety. We are proposing to survey the fruit varieties affected, the intensity of the symptoms, and the plant tissue B levels in 4 home orchards that experienced BB and 4 home orchards that did not experience BB.

Procedures

Varieties: Develop a list of the varieties of pears and plums in as many home orchards as possible, and the degree to which BB was observed in each. From this list, select potential participating orchards for further sampling and testing.

Disease Incidence: Report if BB is present or not. If BB is present, rate the intensity of BB, including the lack of fruit set for each variety. The rating scale is subjective; please rank the severity from 1(apparently resistant) to 5 (estimated large reduction in fruit set) to 9 (severely affected, no fruit set).

Sampling: If you have affected pear trees collect the leaves from 3 of them; if none of your trees are affected collect from 3 normal trees. Collect a total of **2 cups of leaves from 3 pear trees**. Refrigerate in a paper bag **immediately** after collection. Leaf samples should be delivered to Jim House within 2 days of collection.

Boron Levels: The samples will be submitted to the Clallam County Extension service for testing. The test will include 15 minerals and give advice to remedy deficiencies. Jim will send a copy of the full report to each participant. (checking to see if OOS will pay for the whole test $36).

Pseudomonas syringae cultures: This is being investigated with the WSU Puyallup Laboratory. It may be possible for cultures to be done and the cost would be covered by OOS.

Pear Blossom Blast

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The 18th Annual Salt Spring Island Apple Festival—Sunday, October 1

Harry Burton, 110 Heidi Place
Salt Spring Island, BC V8K-1W5
250-653-2007

http://saltspringmarket.com/salt-spring-island-apple-festival/

Getting to Salt Spring Island
http://saltspringmarket.com/about-salt-spring-island/getting-to-salt-spring-island/

Growing over 500 apple varieties ORGANICALLY. We displayed 430 varieties at Apple Fest 2016.

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Washington Apple Growers Sink Their Teeth Into The New Cosmic Crisp By Dan Charles

Get ready for a new kind of apple. It's called Cosmic Crisp, and farmers in Washington state, who grow 70 percent of the country's apples, are planting these trees by the millions. The apples themselves, dark red in color with tiny yellow freckles, will start showing up in stores in the fall of 2019.
Scott McDougall is one of the farmers who's making a big bet on Cosmic Crisp. Planting has begun at one of his company's orchards near the city of Wenatchee.
Trees are planted, one tree every three feet. These are among the first of about 400,000 Cosmic Crisp trees that McDougall and Sons expects to plant over the next few years. Across the state, 12 million of the trees have been ordered. That first wave of plantings will deliver about 5 million 40-pound boxes of Cosmic Crisp apples to grocery stores. The tree is vigorous and produces lots of fruit.

http://www.npr.org/sections/thesalt/2017/05/03/525421226/washington-apple-growers-sink-their-teeth-into-the-new-cosmic-crisp

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2017 NAFEX/NNGA JOINT CONFERENCE University of Georgia, Tifton Conference Center, Tifton, Georgia, August 13-16, 2017. The 108th Annual Conference of the Northern Nut Growers Association (NNGA) will be held jointly with the annual meeting of the North American Fruit Explorers (NAFEX). This conference is open to all people with an interest in nuts and fruits. Registration and payments will be through the NAFEX/NNGA. The cost for participants is $77 for current members of the North American Fruit Explorers or the Northern Nut Growers Association. The fee for non-members is $87. You can register online or obtain a printed registration form at www.nutgrowing.org.

http://www.nafex.org/members/pomona/sum2017/sum2017.pdf

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Does Your Chapter Maintain a Library for its Members?

One of the benefits of belonging to OOS is the wealth of information to be found in our Library collection. OOS Librarians **Susan Savage and Bob Blush** are the custodians of more than 66 volumes and numerous DVD/CDs. Topics include Fruit, Berries and Nuts; Cider Making; Disease and Insects; Landscaping; Propagation; Pruning; Vegetables and Herbs; and, General Information. OOS budgets for newly published works of horticultural interest to Members.

Marilyn Couture, OOS

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Attention WCFS Members

Want to know instantly what's happening in the organization? Subscribe to the WCFS Forum. It's a benefit of membership. The Forum is private and closed to the public. It keeps us together and on top of what's happening in our chapters. Click on this link and follow the prompts:
http://lists.ibiblio.org/mailman/listinfo/wcfs
Judi Stewart, Forum Administrator

The Summer 2017 BeeLine was produced by Gathering Editor Marilyn Couture, with input from membership.
Please contribute your articles for our next Fall issue!

Issue Deadlines:
Winter December 15;
Spring February 15;
Summer May 15;
Fall August 30

Email your articles to: **couture222@msn.com**
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Tips to improve your soil

Good Fruit Grower, April 28, 2016

Although the study of soil microbiology is barely out of the starting gate, U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) research microbiologist Michael Lehman said growers can already take steps to reduce and even reverse soil degradation:

—Disturb the soil as minimally as possible. One of the main consequences of disturbance is the destruction of the soil structure, which disrupts soil habitats for valuable microbes and removes organic carbon from the soil faster than it is naturally replenished.

—Keep something growing on the soil all year round. "Plants will take about 25 percent of what they fix as carbon from their photosynthesis and inject it into the soil," Lehman said. "By doing that, they're providing an organic source for the organisms that live near the plant and therefore maintain the biomass of microbes, their activities and also their diversity."

—Maintain diversity where possible. For fruit growers, this could mean growing a diversity of plants as cover crop between tree rows or in adjacent plots. Research has linked the diversity of plants to increased nitrogen and carbon retention provided by soil microbes. A mix of perennials could be a good option, because they have deep roots that stabilize soil, access nutrients and water from deeper in the profile, and stimulate microbes through a greater cross-section of soil.

—Avoid heavy inorganic-fertilizer use. "There's plenty of literature out there and more research still coming out, that suggests that if you add high levels of inorganic phosphorus and nitrogen, you can suppress certain populations of microbes that would otherwise be beneficial to the plants," Lehman said. He acknowledged that firm guidelines are not yet available for fertilizer use, and may not be forthcoming anytime soon. "Today's fertility recommendations were made under a standard set of conditions that did not optimize soil biology," he said, adding that the recommendations are for "average" conditions so they may not apply well to every orchard or vineyard. "To translate the new understanding of soil biology into recommendations is going to take a long time."

—Use compost and manure. Organic compost and manure trump inorganic fertilizers, he said. "They increase the health of soil by adding carbon in the organic form that stimulates biological activity in a way that inorganic doesn't. With inorganics, you're putting out a pool for plants to uptake. With organic forms, you're stimulating the biological cycle so it can provide the nutrients to the plant."

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Homemade Applesauce Cake

Variation of Betty Crocker 1978 ed. P 235

This delicious Applesauce Cake was recently served at an OOS meeting. The baker was **Susan Savage,** new OOS member. Susan and husband **Bob Blush** are OOS Librarians.

1 ½ cup unbleached flour
1 cup whole wheat pastry flour
1 ¼ cup sugar
1 ½ teas. baking soda
1 ½ teas. salt
1 teas. ground cinnamon
½ teas. ground cloves
½ teas. ground allspice
1 ½ cup homemade jarred applesauce (chunky preferred)
½ c water
½ c vegetable oil
2 eggs
1 cup raisins
½ c chopped pecans or walnuts

Preheat oven to 350°F. Grease and flour oblong pan 13 x 9 x 2". Beat all ingredients except raisins and nuts, in a large mixer bowl on low speed, scraping bowl constantly, 30 sec. Beat on high speed, scraping bowl occasionally 3 min. Add nuts and raisins, stir to combine. Pour into prepared pan.

Bake until wooden pick inserted in center comes clean, 50 – 60 min; cool. Frost with Cream Cheese Frosting.

Cream Cheese Frosting:
3 Tabl. Butter (softened)
3 oz. Neufchatel or cream cheese (softened)
½ teas. vanilla
½ # powdered sugar

Beat butter and cream cheese until fluffy. Add vanilla and powdered sugar and beat until smooth.

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Vascular Decline/Blue Stain Disease: A Review by Ron Powell, PhD

Over the last several years, I have fielded several inquiries regarding the vascular decline or Blue Stain Disease, BSD, as it has become known. I have spoken with Dr. Joseph Postman of Corvallis, Oregon, at length since he was one of the original researchers of the problem in the Oregon Pawpaw Regional Variety Trial. He graciously shared the pictures he had of the vascular decline, along with his current thoughts regarding vascular decline. I have included a recent picture of BSD that I took of possible stress or injury. The reference for this article is, "Vascular Decline in the Oregon Pawpaw Regional variety Trial," by Joseph D. Postman, Kim E. Hummer, and Kirk W. Pomper (HortTechnology, July-September 2003 13(3), pp. 418-420,) and a personal communication with Dr. Joseph Postman. The North American (NA) pawpaw planting at the National Clonal germplasm Repository (NCCR) in Corvallis, OR was a joint venture with the USDA, Agriculture Research Service and the Pawpaw Foundation (PPF) to test commercially-available NA pawpaw cultivars and PPF advanced selections in Oregon. Oregon is outside of the native range of the NA pawpaw. A Pawpaw Regional Variety Trial (PRVT) was established at the NCCR, Corvallis, OR in the autumn of 1995. The planting was a replicated planting of 10 commercially available cultivars that were available at the time. Several of the included cultivars are difficult to find or not available in the trade today. And 18 PPF advanced selections, from PPF Orchards at the University of Maryland Experiment Stations at Queenstown and Keedyville, MD. There were 8 replicate trees of each cultivar or selection that were grafted onto seedling rootstocks and planted in a randomized block design for a total of 224 grafted NA pawpaw trees and 76 seedling guard plants. The guard plants or NA pawpaw seedling trees were planted around the field as a one tree wide border. Two years after planting, 32 grafted pawpaw trees had either failed to establish or had died after an initial healthy start. Additional pawpaw trees were observed to decline in each succeeding year. Pathogens that cause wilting diseases invade the vascular tissue and cause the xylem to fail to transport water to the foliage. This is what causes wilting of leaves. In addition to these vascular wilt-like symptoms, they may also include curling leaves, wilting, yellow or reddening leaves, stunting, chlorosis or yellowing of leaves, branches may defoliate or die back, sudden symptoms on one side of the plant and even may die that become apparent each spring after trees leaf out and discolored areas in the xylem tissue might be visible when the stem is cut. As the transpiration demand increases with warmer and drier weather, the severely affected NA pawpaw trees collapsed (wilted and defoliated) and died. Moderately affected NA pawpaw trees became chlorotic with stunted new growth. The vascular discolored areas of blue and black were observed beneath the bark of declining trees along the lower parts of the main stem, especially at and above the graft unions. This symptom has been described as blue stain. A canker-like bark splitting was observed near the base of many of the declining trees, with smaller cankers on upper scaffold branches. No evidence of fungal tissue was found on the wood or bark samples from stem cankers on declining NA pawpaw samples, including bluestained wood from what appears to be an infection front. Blue discoloration beneath the bark of the NA pawpaw trees seems to be a common response of the NA pawpaw to injury and may be associated with more than one disease or disorder. It is not known whether the scions of the diseased selections may have been diseased when they were originally grafted, or they were more susceptible to this disease than other selections in the planting. The Pawpaw Regional Variety Trial at Corvallis, OR, was removed in October, 2002 due to the decline and death of NA pawpaw trees. The mortality rate after six years was 75% for 8 cultivars; 9-58 and Wilson had the highest survival rate. Efforts to identify the pathogen(s) associated with the decline symptoms in Oregon have been unsuccessful. Dr. Postman believes that the organism responsible for BSD is *Pseudomonas* blight but no positive identification has been made. He suggests that the problem is caused by cool and wet conditions, and recommends not removing lower branches. Another possible cause mentioned by other pawpaw growers is injury/stress. Symptoms are yellowish young leaves, plants leafing out early, distorted and stunted leaves, and rough areas on the bark and yellow fruit. Making a visual inspection of your pawpaw plants is necessary to detect BSD and other possible concerns early, so that control is possible.

BSD
Blue Stain Disease

Cherries — A Potent Super Food

By Dr. Joseph Mercola

Cherries are a favorite summer treat with a number of health benefits. Harvest season runs from May through July, and with high susceptibility to disease and a short shelf life, cherry season is a short one.

Tart versus Sweet Cherries

Conventional cherries can be divided into two primary categories: sweet and tart (sour). Sweet varieties such as Bing cherries are typically eaten fresh, while Montmorency tart cherries are typically sold dried, frozen or as juice. Tart cherries develop a fuller flavor when they're used in cooking, which is why they're often used in baked desserts. As noted by the Cherry Marketing Institute:

"When it comes to nutritional science and cherries, most studies involve tart Montmorency cherries. In fact, more than 50 studies have examined the potential health benefits of Montmorency tart cherries, and the research is continuing.

This research strongly supports the anti-inflammatory qualities of Montmorency tart cherries, as well as the benefits of muscle recovery and pain relief from conditions like arthritis. Studies have also found that Montmorency tart cherries contain melatonin, a naturally occurring substance that helps regulate sleep patterns."

One 8-ounce glass of tart cherry juice will give you:

- 62 percent of your recommended daily intake (RDI) of vitamin A (about 20 times more vitamin A than sweet cherries)
- 40 percent of your RDI of vitamin C
- 14 percent of your RDI of manganese
- 12 percent of your RDI of potassium and copper

7 percent of your RDI for vitamin K

Sweet cherries are a great source of potassium, which is important for maintaining normal blood pressure. It plays an important role in your fluid balance, and helps offset the hypertensive effects of sodium. Sweet cherries also contain a number of potent anticancer agents, including:

Beta carotene, which converts into vitamin A (retinol), important for healthy vision as well

• **Vitamin C**, the "grandfather" of the traditional antioxidants, the health benefits of which have been clearly established. It's a powerful antioxidant, which helps neutralize cell-damaging free radicals

- **Anthocyanins, including quercetin**. Sweet cherries have three times the amount of anthocyanins than tart cherries, and those with deep purple pigments (opposed to red) have the highest amounts.

Quercetin is among the most potent in terms of antioxidant activity and has a wide range of other health-promoting properties as well. As a group, anthocyanins have been shown to promote cell cycle arrest and apoptosis of mutated cells, thereby reducing your cancer risk .

Cyanidin, an organic pigment compound with powerful antioxidant activity. By promoting cellular differentiation, it reduces the risk of healthy cells transforming into cancer cells.

One study found cyanidin isolated from tart cherries was superior to that of vitamin E and comparable to commercially available antioxidant products

• **Ellagic acid**, this polyphenol **"**prevents the binding of carcinogens to DNA and strengthens connective tissue," thereby preventing the spread of cancer cells. It also inhibits DNA mutations and inhibits cancer by triggering apoptosis (cell death) in cancer cells

Mind Your Portions

Just beware that cherries, both sweet and tart, are relatively high in fructose. You don't need to eat much more than a handful to get good amounts of antioxidants.

Tart Cherries — A Natural Endurance-Boosting Super Food

In one recent study, Montmorency tart cherries, taken in the form of a juice concentrate, were found to improve athletic performance and recovery among semiprofessional soccer players, decreasing post-exercise inflammation and muscle soreness.

Similarly, athletes consuming tart cherry juice prior to long-distance running experienced less pain than those who did not. Other research has confirmed tart cherry juice is a valuable endurance sports drink.

Cherries Are Potent Anti-Inflammatories

Tart cherries contain two powerful compounds, anthocyanins and bioflavonoids. Both slow down the enzymes cyclooxyygenase-1 and -2, which helps to relieve and prevent arthritis and gout. Gout occurs when the metabolic processes that control the amount of uric acid in your blood fail to do their job effectively.

By reducing inflammation, the anthocyanins and bioflavonoids in cherries may also help reduce:

Migraine headaches. These compounds are actually known to have similar activity to aspirin and ibuprofen

Pain from inflammatory osteoarthritis. The researchers noted that tart cherries have the "highest anti-inflammatory content of any food".

Cherries Support Healthy Sleep

Interestingly, cherries contain natural melatonin, a powerful antioxidant and free radical scavenger that helps "cool down" excess inflammation and associated oxidative stress. It also plays a vital role in sleep, cancer prevention and general regeneration.

Other Health Benefits of Cherries

Tart and sweet cherries also have a number of other important health benefits. For example, they've been found to: Improve risk factors associated with **diabetes** and **heart disease**; reduce your risk of **stroke;** lower your risk of **dementia;** and lower your risk of **colon cancer**.

Storage and Washing

To retain the best flavor, consume fresh cherries within two days if kept at room temperature, or store in the refrigerator for longer shelf life. Avoid washing them before storing, as this accelerates deterioration. Instead, wash them immediately before eating.

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Spotted Wing Drosophila by Judi Stewart

During the month of June, my home-made traps captured hundreds of fruit flies but no SWD thus far. The traps that captured the highest number of flies had 40% apple cider vinegar, 60% red wine, and a yellow sticky card. The container was a 24-ounce clear dome-lidded plastic cup encircled with two 2" pieces of red tape. Ten holes with a diameter of 3/16" were drilled about a half inch from the top of the container and only on one side in order to be able to pour out the liquid. Other traps not as successful were combinations of cider and vinegar or sugar water and yeast, with and without sticky cards. All traps used the same container. Traps were hung in cherry trees and attached to wooden stakes surrounding wild blackberries and placed in the shadiest areas. Please let us know if you're trapping for SWD and any results. Designing Effective Baits for Spotted Wing Drosophila is No Easy Task.
https://entomologytoday.org/2017/06/20/designing-effective-baits-for-spotted-wing-drosophila-is-no-easy-task/

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Judi Stewart further comments on SWD:
The SWD problem came up many years ago. Two professors drove down from WSU Mt. Vernon. We visited several berry farms in Chimacum and found SWD. Last year in Port Townsend, I found SWD in cherry trees. Earlier this year, several Port Townsend backyard cherry growers said they're afraid to eat their fruit. I happened to be in Henery's Garden Center talking with the manager about fruit fly traps when a local couple came in asking for help. Last year their raspberries had SWD they were worried about this year's berries. I believe SWD is everywhere.
The question remains; what do you do? My choice is a combination of beneficial nematodes, an assortment of SWD traps and lures and a 'soft' microbial insecticide such as Beauveria bassiana.
https://en.wikipedia.org/wiki/Beauveria_bassiana High brix levels might be another solution.
Control information from OSU**: http://spottedwing.org/content/control-information-spotted-wing-drosophila**
I don't think there's enough discussion about SWD in our area plus local garden stores don't have SWD information.

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From Harley Oien, OOS:
The study attached is but one of many and gives a good outline of efforts to control this "new" pest. Note that it is found in cherries and berries.

https://academic.oup.com/ee/article-lookup/doi/10.1093/ee/nvx079

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SWD Management Strategies

The *Spotted Wing Drosophila* (SWD), *Drosophila suzukii* is a vinegar fly of East Asian origin that can cause damage to many fruit crops.
For growers of blueberries, strawberries, raspberries, blackberries, grapes, cherries, peaches, plums, currants, cranberries, and any other soft-skinned fruit, there are several workable strategies in order to monitor, lure and trap SWD. There doesn't seem to be a 'one-size-fits-all' solution. The answer is to find one or more combinations of DIY or purchased lures and traps that work in your particular situation.
A management strategy is the first step. Some of the methods that were successful a few years ago have been updated and improved. But it remains up to you to discover the best means to handle this pest.
SWD is more wide-spread than before and our wild berries contribute to its spread. Consider using traps in wild berry areas in and around your property. Will it be clear, yellow or red colors in vertical traps or dome cups? Will you use sugar, ACV, yeast, wine, antifreeze, natural predators, exclusion netting, essential oils or insecticides? Most important is learning to identify SWD. You may need a scope or hand lens.
Read the articles and recipes. Then decide on your management strategy. Involve your neighborhood. The following links are but a small sample of what's available online and on social media. Some information might be repetitive but each contains bits of unique information.
Video showing SWD in raspberries: https://www.youtube.com/watch?v=t-AQCdK_dF8

SWD Identification: http://spottedwing.org/content/identification-swd

Drosophila is here to stay: **http://www.goodfruit.com/drosophila-is-here-to-stay/**

Trapping spotted wing drosophila: https://naldc.nal.usda.gov/download/54426/PDF

NC Small Fruit IPM: http://docplayer.net/user/41667089/

Monitoring Spotted Wing Drosophila with Traps [see bait recipes at the end]: https://extension.unh.edu/Spotted-Wing-Drosophila-SWD/Monitoring-Spotted-Wing-Drosophila-Traps

Video from California Research Review: https://www.youtube.com/watch?v=nYbNRTL1FXA

Purdue trap construction video: https://www.youtube.com/watch?v=Q_bVidJwAiM

MSU trap construction: http://www.ipm.msu.edu/uploads/files/SWD/SWD_2013-Trap_Making_and_Placement-6-20-2013-Online_Version.pdf

Management Reminders: http://treefruit.wsu.edu/news/spotted-wing-drosophila-management-reminders/ cont. p. 8

SWD Management cont. from p. 7

*PHI = *Pre-Harvest Interval*

Environmental Entomology article – researchers tinker with four chemicals from wine and vinegar: https://entomologytoday.org/2017/05/24/new-formula-doubles-performance-of-spotted-wing-drosophila-lure/

https://academic.oup.com/ee/article-lookup/doi/10.1093/ee/nvx079

Pub Med summaries: https://www.ncbi.nlm.nih.gov/pubmed/?term=spotted+wing+drosophila

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Lost and Heritage Apples of the Palouse

CAHNRS Department of Horticulture, Genomics Lab

Heritage preservation meets germplasm preservation Early settlers in the eastern Washington Palouse area planted many apple varieties for different uses such as fresh eating, cider making, livestock feed, drying, and canning. Many of these varieties eventually fell out of use as apple production shifted from home growing to commercial production. Qualities for market, storage, and shipping were emphasized in selecting varieties for commercial production. Of the more than 10,000 apple varieties available in the US in the 1800's many are now believed to be 'lost', that is, locations of surviving trees are unknown or there may be no survivors.

"The Apple Detective" WSU alum David Benscoter, became interested in heritage apples and began investigating potential locations of heritage apples throughout the Palouse. His work and discovery of apple varieties formerly thought to be lost have earned him the nickname of 'The Apple Detective'. One of the areas Mr. Benscoter has surveyed is Steptoe Butte, located north of Pullman. Remnants of orchards planted in the late 1800's by Robert Burns and James 'Cashup' Davis on the slopes of Steptoe Butte have survived the Palouse elements untended for over 100 years.

Partnering with the WSU Genomics and Biotechnology Lab The lab contacted Benscoter to see how they could support David's efforts. Amit Dhingra recognized the potential of these tough, field-tested trees for traits which may be useful in breeding apple varieties able to withstand harsher climate conditions. Utilizing the lab's highly efficient micropropagation and horticultural practices, several of the previously 'lost' and Palouse heritage apples identified by David have been resurrected and multiplied in the lab. This is a public outreach project in the Dhingra lab and is made possible by generous public donations. If you would like to share your story about a 'lost' or Heritage apple and support this project please contact Amit Dhingra (adhingra@wsu.edu).

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Hunting Down the Lost Apples of the Pacific Northwest

By KIRK JOHNSON, MAY 29, 2017

https://www.nytimes.com/2017/05/29/us/apple-varieties-pacific-northwest.html

STEPTOE, Wash. — David Benscoter honed his craft as an investigator for the F.B.I. and the United States Treasury, cornering corrupt politicians and tax evaders. The lost apple trees that he hunts down now are really not so different. People and things, he said, tend to hide in plain sight if you know how and where to look.

"It's like a crime scene," Mr. Benscoter, 62, said as he hiked down a slope toward a long-abandoned apple orchard planted in the late 1800s. "You have to establish that the trees existed, and hope that there's a paper trail to follow."

Small family farms were long anchored by an orchard, but most apple trees died along with the farms around them as industrial-scale agriculture conquered American life a century ago.

Some old varieties have become available again through small specialty nurseries and through university agricultural programs. But, they are not economically viable; "land costs money." Old varieties are hard to grow. They either bruise easily, don't store well or don't produce enough apples per tree.

Benscoter rediscovered the Dickinson apple and a Nero tree. Pullman wheat farmers are growing grafted shoots of these varieties in their garage.

Benscoter relies upon library archives or county records to show what was grown and available, which helps him identify old trees. A woman recently sent him a catalog from 1912 she had found in her attic. It listed more than 140 apple varieties then available in Washington. Documents from county fairs — what apples were offered for judging and won the blue ribbon — have provided another critical piece of evidence.

According to Plant scientists, old varieties might have something to teach us about evolution or climate, in looking at the qualities that kept a particular tree going despite the odds.

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The Olympic Orchard Society (OOS) Heritage Tree Project

Jim House, Paul Gleeson, Ken Gaine, Erik Simpson, Lori Brakken, Dick Gritman, Roy Morris, Marilyn Couture, et al

Background: The OOS is interested in locating and evaluating heritage tree varieties in the ONP and surrounding Olympic Peninsula areas. Of particular interest is the preservation of rare and locally adapted varieties of fruit. For this project, heritage trees are fruit trees that were brought from the East Coast area and have survived for many decades in the Pacific Northwest and likely carry genes that make them suited to our area. The OOS began a Heritage Tree Project in 2010 with scion from trees located at the Sweet's Farm in the ONP. All but two (one cherry and one probably a plum) trees from that site have now been successfully grafted. The majority of the grafted trees have been donated to Friends of Hoko River State Park and a site prepared at Ken Gaine's property. Ken Gaine has built an enclosed orchard which includes many heritage trees. The project scope was expanded and now encompasses heritage trees from local sites outside the ONP as well. Most recently, a heritage pear, *Vicar of Winkfield*, has been successfully grafted and several more historic apple tree varieties have been identified to preserve in 2017.

Constraints on the Project: To date the project materials and time have been provided by the OOS through volunteer donations. The major problems confronted have been the care of trees after grafting, location of successfully grafted trees prior to permanent placement, and permanent placement of the grafted trees in a safe predator proof place. As noted above we have resolved the issue temporarily but future placements offer a severe challenge, indeed it is the issue that will stop the project.

This document serves as a basis to further develop our cooperation with the ONP on the heritage tree project.

Addendum

To Date the following apple varieties have been successfully saved as a result of our Heritage Tree Project since 2010:

Jefferis, Newtown Pippen, Buncombe, Ortley, Pewaukee, Rosemary's Inn of Crescent Lodge, Fameuse, Huntsman's Favorite, Marty's Discovery;

also, Vicar of Winkfield pear and *Black Diamond Peach.*

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The Townsend, a Native American & Quaker Apple

Max Paschall max.paschall@gmail.com

Once considered among the best summer apples, generally ripening in August, the Townsend apple was widely planted in North America throughout the18th and 19th centuries. Today, however, it is lost. In 1682, Richard Townsend arrived with William Penn in southeastern Pennsylvania. In Bucks County, just north of Philadelphia, he first encountered what came to be called the Townsend apple being grown by the local Lenape Indians. According to his grandson in the 1700s, Townsend "had been informed by the Indians, that back in the country was a great apple tree, where abundance of Indians collected in the season to live on apples - that with Indian guides he undertook the journey through the wilderness to pay them a religious visit. When he came there, he was surprised to see so many Indians. There was a spring of good water near by, and an apple tree in an Indian clearing, vastly larger than any he had ever seen in England, heavy loaded with larger and better apples than he had ever seen before - that his ideas were to take up a tract of land there for his descendants, provided the Indians would sell him what was called their good will, or claim to their clearings, which was then customary to give, to support their friendship; to that they agreed but no consideration would purchase their apple tree. That they strictly reserved to be as free as sunshine to all or any who wanted apples. That part of the contract, the Townsend family ever faithfully observed; and grandson Stephen Townsend did more, he supported a strong fence round it to keep cattle from the falling apples, and used to haul and throw his buck-wheat straw under the tree, to keep such as fell from high from splitting." Also, a man born in Bucks county in the mid-1700's, recalled that by around 1770, the original Townsend apple tree was "upwards of four feet in diameter; the quantity of apples it bore, was enormous; it stood on a high airy situation, and in a light poor stony soil; which I consider most favourable to the longevity of the apple tree: the size and colour of the apples nearly resemble the Vandever; they are neither sweet nor sour, but of a most delicious rich taste and high flavour; easy to bake or cook; they ripen in a peculiar manner, some very early, and then drop off; while others succeed them, and at my father's, we have kept some of the later growth until apples came again, the next summer." The Townsend is the only named variety of a Native American apple known north of the Mason-Dixon line, and is of unique cultural value for growers of heirloom apples. The Townsend is described as being medium to large, roundish to oblate, slightly conical; skin pale yellow, striped with dull red, often with a white bloom; stem rather long (~1 inch) and slender in a mediumsized, russeted cavity; basin moderately deep; flesh yellowish white, aromatic, subacid. Ripens over a few weeks from August to early September. Watercolor paintings of the apple can be seen at: https://commons.wikimedia.org/wiki/Category:Townsend_(apple). If you have info on the Townsend, please contact max.paschall@gmail.com.

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Planting Natives in the Garden

Mike Barnes, Master Gardener and
OOS Board Member

Native plants are the foundation for sustainable landscaping and an essential part of good wildlife habitat. There are many advantages to using native plants in landscaping. Perhaps chief among them is the fact that these plants are adapted to the local growing conditions, including climate, soils and pests. Also important is the fact that our native wildlife evolved with the native vegetation.

While these listed Native Shrubs and Trees are common to Clallam County and the North Olympic Peninsula, you may find them locally in Western Washington. Check with your local nurseries or Conservation District for workshops and plant sales. Be aware of the preferred habitat: full sun or partial shade; dry to moist; drought tolerant; and, well-drained, saturated soil, or sandy loam.

Shrubs and Vines

Blackcap or Black Raspberry, Salmonberry, Thimbleberry, Trailing Blackberry.
Black Twinberry, *Lonicera involucrate;* Red-Flowering Currant, *Ribes sanguinium;* Wild Currant, *Ribes divaricatum;* Gooseberry, *Ribes lobbii;* Elderberry – Blue, *Sambucus cerulean;* Elderberry – Red, *Sambucus racemosa;* Hazelnut, *Corylus cornuta;* Honeysuckle, *Lonicera ciliosa;* Huckleberry – Evergreen, *Vaccinium ovatum;* Huckleberry – Red, *Vaccinium parvifolium;* Indian Plum or Oso Berry, *Oemleria cerasiformis;* Mock-Orange, *Philadelphus lewisii;* Ninebark – Pacific, *Physocarpus capitatus;* Oceanspray, *Holodiscus discolor;* Oregon Boxwood, *Pachistima myrsnites;* Tall Oregon Grape, *Mahonia aquifolium;* Low Oregon Grape, *Mahonia nervosa;* Red-Osier Dogwood, *Cornus sericea;* Rose – Baldhip, *Rosa gymnocarpa;* Rose – Nootka, *Rosa nutkana;* Salal, *Gaultheria shallon;* Snowberry, *Symphoricarpos albus;* Douglas Spirea, *Spiraea douglasii.*

Evergreen Trees

Douglas Fir, *Pseudotsuga menziesii;* Grand Fir, *Abies grandis;* Madrona, *Arbutus menziesii;* Pacific Yew, *Taxus brevifolia;* Shore Pine, *Pinus contorta;* Sitka Spruce, *Picea sitchensis;* Western Hemlock, *Tsuga heterophylla;* Western Redcedar, *Thuja plicata.*.

Deciduous Trees

Maple – Bigleaf, *Acer macrophyllum*; Maple – Douglas or Rocky Mtn., *Acer glabrum*; Maple – Vine, *Acer circinatum*; Bitter Cherry, *Prunus emarginata*; Black Cottonwood, *Populus balsamifera spp. Trichocarpa*; Black Hawthorn, *Crataegus douglasii;* Pacific Crabapple, *Malus fusca;* Pacific Dogwood, *Cornus nuttallii;* Red Alder, *Alnus rubra;* Serviceberry, *Amelanchier alnifolia*; Willow – Pacific, *Salix lucida ssp. Lasiandra;* Willow – Scouler, *S. scouleriana;* Willow – Sitka, *S. sitchensis;* Willow – Hooker, *S. hookeriana.*

References:

Plants of the Pacific Northwest Coast, Jim Pojar and Andy Mackinnon, Lone Pine Publishing, B.C., 2004.

Gardening with Native Plants of the Pacific Northwest, Arthur R. Kruckeberg, 2nd Edition, 1996.

Grow Your Own Native Landscape, Michael Leigh, WSU, MISCO273.

Websites:

https://green2.kingcounty.gov/gonative/index.aspx
http://www.pnwflowers.com/
http://www.nwplants.com/

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Quarterly Report

Adara Interstem Compatibility Study

Vashon Island Fruit Club, June 6, 2017

Dr. Robert A. Norton—Principal Investigator and Anne Woodward—Research Assistant

Progress:

- Dr. Bob and I measured the growth on each tree in early March.
- Chip buds grafted last summer (July 2016) are growing.
- Numerous trees have been staked with a sturdy stake due to strong winds at the site. More staking will be done on additional trees this year.
- Mason bees are now housed at the Sunrise Ridge Orchard site.
- Last summer we observed and recorded any fruit that developed on the trees. Not all, but some peach, cherry and plum fruiting were observed on 2-3 year old grafts. No almond or apricot fruit was observed.
- Dr. Bob purchased apricot pollen this spring and puffed the apricot blossoms for better pollination. I have observed a few apricot fruits.
- However, due to the cold wet spring, fruit set overall is not as good as last year, which is unfortunate, but growth and vigor are also important data points in the study.

Anne Woodward Research Assistant wanne1@comcast.net

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Keep an Eye out for Peach Leaf Curl

Kari A. Peter, Ph.D. Asst. Prof., Tree Fruit Pathology,
Penn State Fruit Research and Extension Center

Once peach Leaf Curl symptoms are seen, it's too late to do anything. It is caused by the fungus *Taphrina deformans* and occurs wherever peaches are grown. The fungus causes the growing cells at the leaf margins to multiply quickly and randomly, which results in the puckered, curled, distorted appearance. Often, the color of the leaves varies from shades of green and yellow to pink, orange, and purple. Spores are produced on the surface of the leaf as the leaf matures, giving it a dusty appearance. Fruit can be infected and will either drop prematurely or form distortions on the surface.

The spores overwinter in bark crevices and around the buds. Primary infection occurs from bud swell until the first leaves fully emerge. Rains wash the spores into the buds and long periods of cool (50°F to 70°F), wet (>95% humidity) weather are ideal for infection; little infection occurs below 45°F. If warm temperatures follow bud swell and leaf development is rapid, infections are rarely established, even if rains occur.

If I see symptoms, can I still treat for the disease?

Treating the disease after symptom development is not effective since the leaves are protecting the spores around the buds. You will have to wait until the end of the season to manage the disease. If leaf curl is severe this season, it is important to maintain tree vigor by thinning more fruit than normal, irrigate to reduce drought stress, and apply extra nitrogen fertilizer.

I applied a fungicide spray during dormancy. Why am I still seeing leaf curl? For folks who are really suffering, I would recommend a fungicide spray in the late fall *and* late winter/early spring to be able to effectively manage the disease. Growers must wait until at least 90% of the leaves have fallen in the fall or in the spring before bud swell for controlling the disease. During this time, applying a fungicide (chlorothalonil) or copper spray is appropriate.

For future seasons, growers will have to monitor the temperatures closely in February. If above average temperatures are in the forecast, it would behoove folks to apply their late winter/early spring dormant fungicide spray *prior* to those warm temperatures to effectively control the fungus hanging around the buds.

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D'Anjou Pear production, Coulee City, 1910

Marilyn Couture, OOS

While researching genealogy records for a friend, Cina Gibbs, I discovered that her grandfather was a renowned fruit grower in Washington State. Clifton Ham, after graduating from Harvard in 1902, worked as a publisher. This led to a position as editor of Farm Life. A trip on the road two years before had given him a bad case of "western fever." An opportunity in real estate led him to successful people in Washington in developing and subdividing a large tract of irrigated fruit land.

In 1905 the snow pack was heavy and provided a great amount of surface moisture in the spring of 1906. This encouraged Clifton Ham and Archie Tucker to start planting orchards northeast of Coulee City. The soil in this area had a high gravel content and was suitable for fruit production. Water for irrigation was obtained from springs, ponds, and shallow wells. The trees were planted in a definite pattern, with soft fruits, such as peaches, cherries and plums, alternating with apples and pears. By 1910 these two men had over 300 acres of orchard in production. The Ham orchard contained 200 acres of trees and the Tucker orchard, 100 acres. Both operations had packing sheds located on the home places and near the railroad depot. Peak employment reached 200 workers in the harvest season. In 1910, 90 railroad cars loads of peaches, pears and apples were shipped to points east. Shortly after this time the Ham orchard was listed as the largest D'Anjou pear producing orchard in Washington.

Coulee City no longer bears a strong resemblance to the town as it first appeared in 1890. Gone are the farms and grazing areas that once bordered the town on the north. This land is now under the waters of Banks Lake, which provides water to irrigate over one million acres in the Columbia Basin area. Banks Lake was formed by the construction of Grand Coulee Dam.

From Big Bend Railroad History, June 4, 2008.

Marilyn Couture, Gathering Editor

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US Patent and Trademark Office

Grant of a patent for a plant precludes others from asexually reproducing or selling or using the patented plant. A plant patent is regarded as limited to one plant, or genome. A plant patent expires 20 years from the filing date of the patent application. As with utility applications, when the plant patent expires, the subject matter of the patent becomes public domain.

The owner of the patent has the exclusive right to permit or prohibit propagation or distribution of a patented plant, and may choose to exercise that right in order to be the sole producer and distributor of the variety. Alternatively, the patent owner may be interested in permitting others to grow the variety under license in return for a payment of royalties.

Is it legal to breed from a plant protected by a Plant Patent? It appears that this question has not been definitively resolved in law. Some practitioners maintain that the original patent holder has the right to exclude others from using parts (including seed, pollen) of a patented variety in a deliberate breeding program. However, other practitioners have held that no such right or control exists after the patented plant has been purchased in open sale and the royalty has been paid. In effect, the original breeder's rights have been exhausted, thereby rendering the variety free and clear.

What is the difference between a trademark and a patent? Whereas (USPTO) "Patents protect inventions… Trademarks include any word, name, symbol, or device…used in commerce to identify and distinguish the goods of one manufacturer or seller from goods manufactured or sold by others and to indicate the source of the goods". Only a patent has the ability to control (permit or exclude) propagation of a plant variety. A trademark does not provide this protection.

What does TM mean, and what is meant by registration of a trademark? It is common to find the TM designation applied to goods or services, including plant names. This designation is used to put others on notice that trademark rights are being claimed in those goods or services. The TM designation does not carry the endorsement of having secured federal registration, which is denoted by use of the symbol ®.

Trademarks are good value: for a modest outlay, and with consistent and proper promotion and marketing, the owner will find that the trademark acquires over time significant value or brand equity which will be increasingly effective in maintaining differentiation in the marketplace.

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Ambrosia Apple Patent Opens Up

Ross Courtney, Good Fruit Grower, June 2017

The U.S. patent on the Ambrosia apple, the popular Canadian variety known for its sweet flavor and blush color, expires this month, meaning nurseries will start propagating it for all growers later this summer.

The expiration means all licensed nurseries will be allowed to produce budwood for planting or grafting by growers in spring 2019. The nurseries will likely start propagation this August. Growers have already started preparing ground in places.

The variety, developed by a Canadian orchard family from a chance seedling, is managed by Summerland Varieties Corporation of Summerland, British Columbia.

Since 2005, McDougall & Sons of Wenatchee, Washington, has held the exclusive U.S. license to produce Ambrosias,

Ambrosia, like any variety, has some unique growing quirks. The sweet midseason apple with cream yellow ground and blush over-color has a narrow harvest window

Ambrosia is a bicolored apple and it can be very challenging to get color, especially in warm sites.

New growers may not produce the same quality right out of the gate and risk hurting the variety's reputation in the marketplace.

Since 2015 it has been Washington State's tenth most popular apple; It's British Columbia's second most common apple.

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Stone Fruit Pollination

W.P. Stephen, D. M. Burgett, J. Capizzi, Oregon State University

Cherries, prunes, plums, and peaches make up the common stone fruits in the Pacific Northwest. All varieties of sweet cherries, most Japanese and European varieties of plums, and some peach varieties are self-unfruitful – that is, they are unable to set and mature a commercial crop when self-pollinated. Italian prunes and most peach varieties are self-fruitful – they will set a commercial crop when self-pollinated.

Optimal pollination depends on several factors, including preparation of the orchard prior to the introduction of pollinators, good bee management practices, and favorable weather conditions during bloom period.

Orchard management for self-unfruitful varieties

Pollinizer requirements. Adequate numbers of compatible pollinizer trees must be interspersed with the variety to be pollinized. A pollen-collecting honey bee will usually visit only two or three adjacent tre4es during a single foraging trip. Therefore, if pollen is to be efficiently transferred from the pollinizer variety to the blossoms of the variety to be pollinized, different varieties must be closely spaced.

Competing bloom. Many weeds common to orchard floors, such as dandelion and chickweed, are often more attractive to bees than is the orchard bloom. Honey bees may become readily conditioned to a weed such as dandelion, and few bees will change to fruit even when dandelion flowers cease yielding at midday. Mowing or disking an orchard floor immediately prior to the introduction of bees is a recommended practice.

Insecticides. Most pesticides applied for control of orchard pests are highly toxic to honeybees. Every precaution should be taken to protect pollinators during the pollination period. Check with your county Extension agents.

Weather and bee activity.

Honey bees are temperature and light sensitive and rarely will fly if the temperature is below 55°F and the wind is more than 15 to 20 mph. The stronger the colony, however, the lower the temperature at which the bees may initiate flight. Both nectar and pollen collectors are most active between the hours of 9 a.m. and 1 p.m. Of the two types of bees, the pollen collectors are the most efficient.

Number of colonies required. There has been a general rule of thumb established that one good colony of honeybees per acre is satisfactory for tree fruit pollination. However, some consideration must be given to tree size, pollinizer placement, competition both within the orchard and without, as well as to weather conditions normally experienced during the bloom period.

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What did WA. State Spring Fair, 2017 have to offer?

Our WCFS was 1 of 50 vendors with a display booth in the flower & garden section of the Showplex.
Attendees strolled through a winding path and soaked in the atmosphere of water gardens, bee keepers, Master Gardeners, and landscape artists. The sweet smell of spring was in the air!! We watched a steady flow of people admire mood enhancing flower arrangements. We all cheered as Ciscoe Morris appeared and offered a Q & A session for the delighted guests. Everyone seemed to excited about a long-awaited spring season. So just what did the Fair offer us?
Clearly something for everyone, but most importantly, the reassurance that finally "Spring has Sprung."

-Chuck Polance
Tahoma Chapter

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WA STATE FAIR, 2017

LOOK TO THE FALL—Sept. 1-24.

Bill Horn of Tahoma announced that the Washington State Fair will be closed on Tuesdays.
Notify Bill to volunteer for a shift or two in the WCFS booth. Passes and parking available.

Bill Horn
hornbill66@msn.com

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WCFS NEW MEMBERS

PFC	OOS
Patricia (Trish) Morrell	**Ted Lund** **Karen Toth**

Carlyn Syvanen, WCFS Secretary and OOS Member, picking King Apples.

WCFS OFFICERS AND BOARD MEMBERS

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Tahoma	Terry Tomlinson terryatmarys@comcast.net
Vashon Island	Charon Scott-Goldman Charon@centurytel.net

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Links
Here is a list of sites on the web that may be of interest to you.

Related Organizations
Backyard Fruit Growers
www.sas.upenn.edu/~dailey/byfg.html
California Rare Fruit Growers
www.crfg.org
East of England Apples and Orchards Project
www.applesandorchards.org.uk
Indiana Nut Growers Association
www.nutgrowers.org
Midwest Fruit Explorers
www.midfex.org
North American Fruit Explorers
www.nafex.org
Northern Nut Growers Association
www.northernnutgrowers.org
Oregon Sustainable Agriculture Land Trust
www.osalt.org
Western Cascade Fruit Society
www.wcfs.org
Western Washington Fruit Research Foundation
www.wwfrf.org
Home Orchard Society
www.homeorchardsociety.org/
Seattle Tree Fruit Society
www.seattletreefruitsociety.com/
Seattle Tree Fruit Society—Apple ID program
www.seattletreefruitsociety.com/appleid.php

Fruit Research
National Clonal Germplasm Repository
www.ars-grin.gov/cor
Tree Fruit Research and Extension Center, Washington State.
www.tfrec.wsu.edu
Northwest Berry and Grape Infonet.
berrygrape.oregonstate.edu
Pedigree: A Genetic Resource Inventory System
www.pgris.com

Oregon Department of Agriculture
www.oda.state.or.us

Goverment Sites
US Dept. of Agriculture
www.usda.gov
USDA Agricultural Research Service
www.ars.usda.gov

Helpful Sites
Orange Pippin
www.orangepippin.com
Kiyokawa Family Orchards
www.mthoodfruit.com
Red Pig Tools
www.redpigtools.com
Friends of Trees
www.friendsoftrees.org
Cornell Gardening Resources
www.gardening.cornell.edu
http://www.fruit.cornell.edu/tree_fruit/GPGeneral.html
The National Arbor Day Foundation
www.arborday.org
UBC Botanical Garden
www.ubcbotanicalgarden.org
The Reckless Gardener
www.recklessgardener.co.uk
Farm & Garden
www.farm-garden.com
SeeMeGarden.com
www.seemegarden.com
GardenGuides.com
www.gardenguides.com
VitiSearch: Helpful Resources about Grapes
www.vitisearch.com
Avant-Gardening: Creative Organic Gardening
www.avant-gardening.com
The Hardy Plant Society of Oregon
www.hardyplantsociety.org
Ask the Berry Man
www.asktheberryman.com
BackyardGardener.com
www.backyardgardener.com
Tom Brown's website
www.applesearch.org

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