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Whatcom Ag Monthly

Bringing Scientific Information to the Farming Community

In This Issue:

Washington Small Fruit Conference and Lynden Ag Show

December 4th & 5th, 2014

Northwest Washington Fairgrounds

Lynden, WA

Welcome to the Fourth Annual Washington Small Fruit Conference

Each year we work to improve the conference. As always, we have researchers, farmers, and policy-makers presenting topics of new research, emerging issues, and novel ideas for you to take back to your farm and business.

Topics include:

- Water Issues
- Precision Agriculture
- Fertility and Irrigation
- Organic & Fresh Market Production
- Personnel Management
- Spray Technology
- Pest Management
- Pollination
- Pesticide Safety and Handling
- State of the Industry

Again this year, we will feature a catered social hour following the program on Thursday evening. Many reasons to attend the 4th annual Washington Small Fruit Conference. Hope to see you there!

To get more information on this event:
http://whatcom.wsu.edu/ag/edu/sfc/

Washington Red Raspberries | Washington Blueberries | Washington State University Whatcom County Extension | Whatcom Farm friends

Spider Mite Uprisings

Bev Gerdeman, Lynell Tanigoshi and Hollis Spitler
Washington State University (WSU), Mount Vernon Research and Extension Center

Since the last issue of WSU EB1491, Pest management Guide for Commercial Small Fruits, our spider mite arsenal has gone from 3 to 5 registered miticides representing 4 different IRAC MoA chemistries (Table 1). Two additional miticides are pending registration: Oberon® (hexythiazox, expected 2014) and Fujimite® (fenpyroximate, expected 2016). The addition of these products, will provide an adequate arsenal of 7 miticides for domestic raspberry production, representing 6 different modes of action for resistance management through rotation. Currently, growers can apply a total of 7 miticide coversprays to protect the early season 'Meeker' through late season varieties such as 'Wakefield.'

When controlling mites intended for export, Kanemite® and Acramite® have favorable Canadian tolerances. The Asian markets, Japan, Taiwan and Korea, have a favorable MRL for Savey® but Vendex® is only favorable for Japan. Zeal® has unfavorable tolerances to the above countries, which limits its use to domestic markets. Always determine MRL levels and country of destination of your fruit before making each miticide application.

The two most economic species of spider mites on caneberries in Washington state are the twospotted spider mite and the yellow spider mite (Spider Mites on Red Raspberry 1959E). Yellow spider mites are the first species to

Table 1. Miticides registered for use in PNW caneberries.

Miticide	Active ingredient	Signal word	IRAC	Sprays per season	Spray interval days	REI hours	PHI days	Honey bees	Comments
Acramite	bifenazate	caution	un	2	30	12	1	Moderately toxic	Controls immatures & adults, Minimally ovicidal, ~ 21 days residual activity
Kanemite	acequinocyl	caution	20B	2	21	12	1	Relatively nontoxic	Controls eggs, immatures & adults, Long residual, Adjuvant prohibited
Savey	hexythiazox	caution	10A	1	NA	12	3	Relatively nontoxic	Controls eggs & immatures, Treated females lay nonviable eggs, Long residual 30-60 days
Vendex	fenbutatin-oxide	danger	12B	1	NA	48	3	Relatively nontoxic	Controls immatures & adults, Long residual activity
Zeal	etoxazole	caution	10B	1	NA	12	0	Relatively nontoxic	Translaminar control - eggs & larvae, Treated females lay nonviable eggs, Long residual activity

Fig. 1. Early season yellow spider mite damage to red raspberry floricanes.

emerge in spring and can result in severe damage to floricanes (Figs. 1 & 2). The key to successful spider mite control is early spring monitoring for the emergence of both twospotted and yellow spider mites. Both species feed on the underside of leaves, making adequate treatment difficult. Optionally, the translaminar miticide, Zeal, provides control when applied to the upper surface of the leaves. At early season, low spider mite densities, our experience indicates tank-mixing a contact compound like Acramite with a mite growth regulator, will provide long residual activity during the preharvest period. Vendex's unique molecule continues to provide excellent adult spider mite control if they exceed 20-25/leaflet, especially when field temperatures are > 70^0 F. Another mid-harvest option, if PHI is of concern, is Acramite.

Past and current research has shown that serious economic levels of these species can occur when exposed to carbamates (IRAC 1A), organophosphates (1B) and pyrethroids (3A) by stimulating reproduction through hormonal-like action. These compounds are also toxic to beneficial insects and especially to predatory phytoseiid mites (i.e. *Neoseiulus fallacis*), which assist in controlling spider mite populations. Spotted wing drosophila is primarily managed in red raspberry using pyrethroids and organophosphates, therefore potential for mite outbreaks exists. Extended dry periods experienced in 2014 in northwest Washington also promoted mite outbreaks resulting in several reports of economic injury. Growers who monitor and control mites early in the season can prevent mite outbreaks during and after harvest.

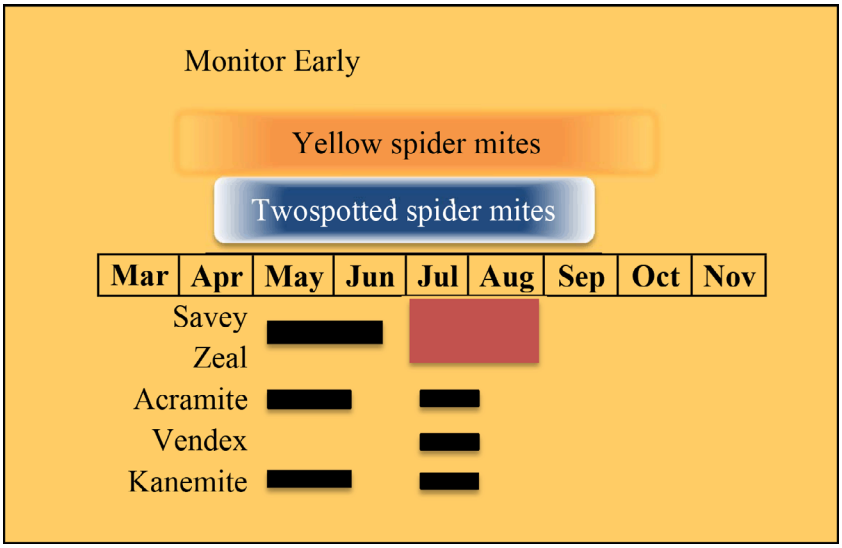

Fig. 2. Seasonality of economic spider mites and timing of miticide applications in red raspberry in the PNW. Bars represent treatment windows, not residual control periods.

2003. Tanigoshi, L.K., T.A. Murray & B.S. Gerdeman. 2003. Spider mites on red raspberry. WSU EB 1959E.

Dry bean production in northwest Washington

Kelly Ann Atterberry and Carol Miles
Department of Horticulture, Washington State University, Mount Vernon NWREC

Legume crops are popular for rotation in most crop production systems. In northwest Washington, the loss of the pea processing industry in the early 2000s leaves a gap for another legume crop to fit into production systems in this region. Dry beans can be grown with minimal inputs, such as less irrigation than other crops (Kirkpatrick et al., 2006). Dry beans benefit vegetable crop rotations by breaking disease cycles (such as Verticillium wilt; Farr et al., 1989), and providing up to 40 lb per acre of nitrogen for the following crop (Davis and Brick, 2009). Small-scale growers have been successfully growing and saving dry bean cultivars in northwest Washington for over 100 years. Grower experience suggests that these heirloom cultivars are well adapted to regional production; however, they have not been systematically compared to other heirloom or commercially available varieties. Consumer demand for locally produced food is evident through the steady increase of farmer's markets and local food sales at most major supermarkets, and has provided a market opportunity for regionally produced dry beans (USDA-NASS, 2010). Niche market dry bean cultivars (heirloom and colored, patterned dry beans, Fig. 1) are sold at local farmer's markets for $6-14 per pound (Fig. 2).

The objective of this study was to compare heirloom dry bean cultivars that have been grown in northwest Washington for 20-130 years with standard varieties (seed grown outside the region) in the same market class to determine which are best suited for production in this region in terms of yield and days to maturity. The experiment was replicated over two years at Washington State University (WSU) Northwestern Washington Research and Extension Center (NWREC) in Mount Vernon in 2013 and 2014.

The experiment utilized a randomized complete block design with four replications. Plots were

four rows wide and 10 ft long; rows were spaced 2.8 ft center-to-center. The cultivar trial consisted of heirloom dry bean cultivars that have been grown in counties surrounding Mount Vernon years 1880-1990. In 2013, 14 heirloom and 11 standard cultivars were included in the study; in 2014, 17 heirloom and 20 standard cultivars were included. The plots were not irrigated, following common practices among dry bean growers in northwest Washington.

The following results are for 2013 only as dry beans in this study have been harvested but not weighed for 2014. Yield and days to maturity differed significantly for cultivars in 2013. Northwest heirloom cultivars had an average yield of 2,330 lb/acre and an average maturity date of 109 days after seeding, compared to an average yield of 2,298 lb/acre and 114 days to maturity for standard cultivars. Highest yielding cultivars in this study were Eclipse Black (3,094 lbs/acre), Lariat Pinto (3,008 lbs/acre), and Ireland Creek Annie (2,747 lbs/acre), all standard cultivars. The following three heirloom cultivars followed closely: Youngquist Brown (2,612 lbs/acre), Bale Cranberry (2,617 lbs/acre), and Ireland Creek Annie (2,595 lbs/acre). Cultivars with the shortest days to maturity included five heirloom cultivars: Black Coco (101 days), Decker (101 days), Ireland Creek Annie (101 days), Francis Kring cranberry (104 days), and Rockwell (107 days); following shortly after was the standard cultivar Ireland Creek Annie (104 days). All of the other cultivars in this trial matured by 124 days after planting.

In conclusion, there was no difference between days to maturity or yield in 2013 for heirloom and standard cultivars in this study. Dry bean growers in northwest Washington would benefit most from cultivars that have shorter days to harvest, as the onset of rains in September and October make it difficult for beans to dry in the field. Based on these results, growers should look to local heirloom dry bean cultivars, and should select very early maturing cultivars from other regions.

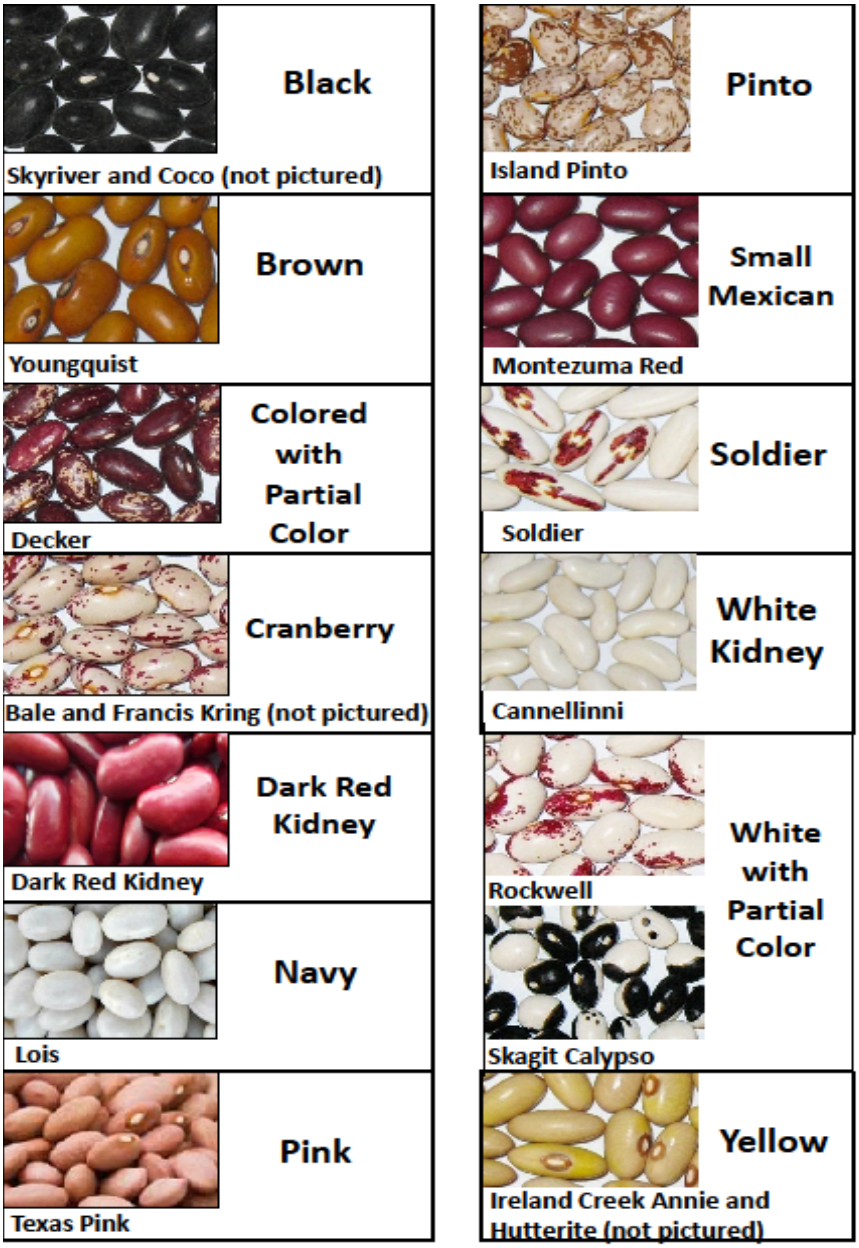

Figure 1. Northwest Washington heirloom dry bean varieties and market classes grown at Washington State University Northwestern Washington Research and Extension Center in 2013 and 2014.

Fig 2. Local farmer selling color-pattenered dry beans at Anacortes Farmer's Market at $10/lb in 2013.

Dry Bean Production in Washington

Washington State produced 1.5% (23,000 acres) of the United States dry beans in 2013 (USDA-NASS, 2013). Most of the dry beans are grown on a large-scale in eastern Washington (Columbia Basin) and include the market classes: Black, Cranberry, Great Northern, Navy, Light and Dark Red Kidney, Pinto, Pink, Small Red and Small White. Small-scale producers are located in every region in Washington and grow a wide diversity of market classes, from color-patterned to common white or pinto varieties (Miles and Sonde, 2002).

For additional resources and information regarding of dry bean research at WSU Mount Vernon NWREC, visit our website: http://vegetables.wsu.edu/NicheMarket/BeanVarieties.html.

Graduate Research

Kelly Ann Atterberry is an M.S. Candidate in the Department of Horticulture at Washington State University, studying with Dr. Carol Miles at the WSU NWREC in Mount Vernon. Research has been supported by the American Pulse Association (APA) and Northwestern Agriculture Research Foundation (NARF). To complete this project, we are seeking continued funding through the attached video, a crowd sourcing campaign called Beans, Kids, and Farmers. If you feel moved by the work we are doing, please visit our campaign page http://beankidsandfarmers.causevox.com/ to show your support.

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Don't Forget Feet

Dr. Susan Kerr
WSU NW Regional Livestock and Dairy Extension Specialist

Feet are important! Badly distorting an old adage, "for want of a hoof, the horse was lost; for want of a horse, the battle was lost." Many otherwise-healthy animals have had their careers shortened by one or more bad feet. We're coming into mud season, which can really tax hoof health. This article will focus on the bane of small ruminant producers' lives: footrot (a.k.a. hoof rot).

Figure 1 is included as a reference for foot anatomy terms. Try to envision a three-dimensional version where the hard hoof wall completely encircles the last bone of the limb (pedal bone or third phalange, like the end of your finger).

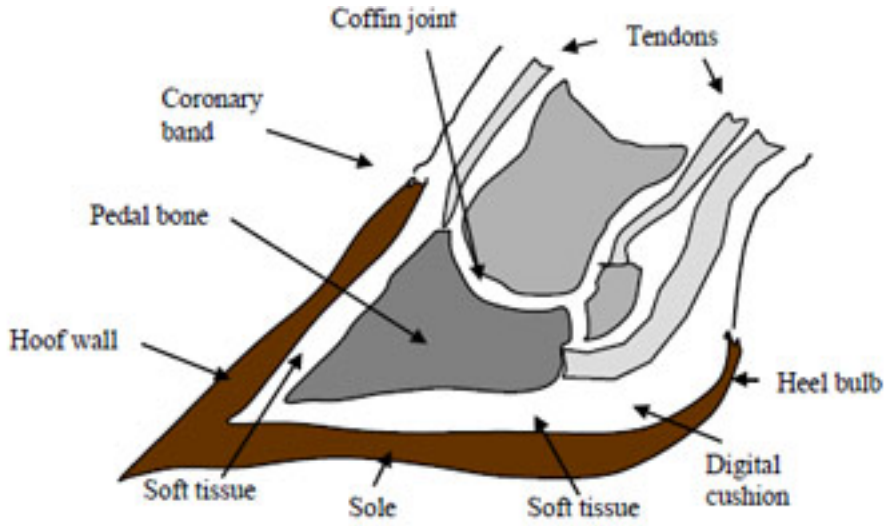


Figure 1. Schematic cross-section of hoof.
Source: www.depi.vic.gov.au.

The Agents

Footrot is caused by two anaerobic bacteria working in concert. *Fusobacterium necrophorum* is found in ruminant intestinal tracks, manure, and environments; it is very hardy in the environment. *Bacteroides nodosus* (a.k.a. *Dichelobacter nodosus*) only lives in sheep or goat hooves. It is much less hardy in the environment, only surviving about two weeks without a host hoof.

> *The organism persists in cracks and pockets of carrier animals' hooves. This is how footrot is perpetuated in a herd for prolonged periods.*

Predisposing Factors

Healthy feet are at low risk of footrot. However, hooves that are cracked, damaged or weakened by improper nutrition, abrasive surfaces, overgrowth, neglect, poor genetics, founder, and/or constant exposure to moisture/mud/manure/urine already have one strike against them. These at-risk feet can be invaded by *F. necrophorum*, particularly in the soft tissue between the toes—this is strike two. If such an affected foot comes in contact with a virulent strain of *B. nodosus*, that's strike three and footrot begins.

Evidence of Infection

Signs of footrot are hard to miss: multiple lame animals, inflamed and macerated interdigital tissue, under-running and separation of the hoof wall and sole from deeper foot structures (see Figure 2), and sometimes swelling above the hoof. There is a classic footrot smell; once experienced, it is not forgotten. It smells like rotting flesh because that is what's happening—*B. nodosus* releases enzymes that destroy hoof tissue proteins, allowing both bacterial species to travel deeper into the foot and cause more destruction.

Figure 2. Severe case of footrot in a sheep.
Source: http://archive.agric.wa.gov.au/PC_95014.html?s=1001

Diagnosis and Treatment

Diagnosis is usually based on history and physical examination, although bacterial cultures could be conducted to confirm the organisms involved.

The amount of treatment needed depends on how quickly the condition is noticed and how much tissue destruction has occurred. For mild or early cases, trimming overgrown hoof structures and paring out affected areas followed by topical treatment may be all that is needed. It is essential to pare away tracks and pockets of infection in the hoof so oxygen and medications can reach the bacteria and kill them. Cases where animals are severely lame, have a fever, have swelling above the hoof and/or do not respond to simple treatment will need antibiotics and perhaps anti-inflammatories and pain medication. Several antibiotics are particularly effective against footrot; ask your veterinarian for specifics.

Footrot Elimination Protocol

To eliminate footrot from a herd in a relatively short time, follow this protocol promoted by the University of Maine:

1. Examine and completely trim all animals' hooves. Identify animals with and without footrot.

2. Soak all hooves for 5 minutes in a foot bath with 10% zinc sulfate.

3. Separate affected and non-affected animals into two groups; consider culling affected animals at this point for most rapid progress toward a clean herd.

4. Have both groups stand on a dry surface in separate areas for at least 30 min. after the foot bath.

5. Move each group to separate pastures that have not had sheep or goats on them for at least 3 weeks.

6. One week later, repeat examination, foot bath and drying steps; trim feet as needed. Move any newly-affected animals to the affected group as needed. Consider culling affected animals for most rapid progress.

7. One week later, examine all feet, trim as needed. Move animals from one group to the other depending on resolved or new cases. Repeat foot bath, drying, and moving to new clean pastures.

8. One week later, repeat Step 6.

9. One week later, repeat examination, foot bath and drying steps; trim feet as needed. Any animals still affected are carriers and should be culled from the herd.

10. For most rapid resolution of an extensive herd problem, sell all animals, wait one month and re-stock with healthy non-carriers.

Foot Bath Hints from U. of Maine

- Use 10% zinc sulfate solution (8.5 lbs. zinc sulfate in 10 gallons of water + one cup detergent).
- Place some old wool in the bottom of the foot bath to reduce splashing and loss of zinc sulfate solution.

Prevention:

- Keep a closed herd. Herd additions can carry *B. nodosus*
- Second best is only bringing in animals from clean herds or animals treated as though they

were carriers before taking them to a new farm (see protocol above)

- Never share equipment or tools that could be contaminated with *B. nodosus*
- Trim feet regularly and do not let them get overgrown or cracked
- Keep animals' feet as dry as possible as often as possible. This might mean leaving them on a concrete pad, straw-bedded area or dry lot periodically
- Fence off wet areas of pastures
- Minimize time spent on abrasive surfaces, such as sharp gravel, mature stubble or other surfaces that could damage feet
- Disinfect hoof trimming equipment between animals
- Cull animals that do not respond to treatment
- Consider footrot vaccination in some cases. The vaccines are not always effective and can cause some problems, so consult your veterinarian about this
- After treatment has resulted in a clean herd, consider periodic use of a foot bath to maintain hoof health
- Ensure a balanced diet, with particular attention to protein and trace minerals, particularly zinc, copper, selenium and iodine. Feeding higher levels of zinc can improve hoof health through greater resistance to bacterial invasion. There are commercial zinc supplements for this purpose.

What about Cattle?

Cattle can also be afflicted with footrot, but the condition differs somewhat from that seen in sheep and goats. *F. necrophorum* is once again involved but this time plays a major role in the disease process; several other bacteria may contribute secondarily. Affected feet display interdigital redness swelling that pushes the toes apart. The condition can progress to tissue death and foul-smelling discharge. Swelling from the coronary band up to the fetlock may occur in some cases. Animals can be extremely painful and lame and have fever, go off feed, lose weight, and decrease milk production. Infection of deeper tissues can develop and these cases are difficult to resolve successfully. Predisposing factors are similar to small ruminants. Cattle producers should take every opportunity to keep their animals' feet as clean and dry as possible at all times.

Conclusion

Footrot is the scourge of many small ruminant enterprises and a recurring problem on some cattle operations. It causes significant animal suffering, decreased performance, higher culling rates, and increased labor and expenses. Knowledge of the causative agents' characteristics can help dedicated producers eliminate this problem from their herds through a short but intensive treatment program and diligent adherence to biosecurity thereafter. Be sure to put hoof tasks on your management calendar so you don't forget this often-overlooked topic and come to regret it later.

For More Information

University of Maine Extension Four-Week Footrot Elimination Protocol
http://umaine.edu/sheep/files/2010/06/protocol-5-12.doc

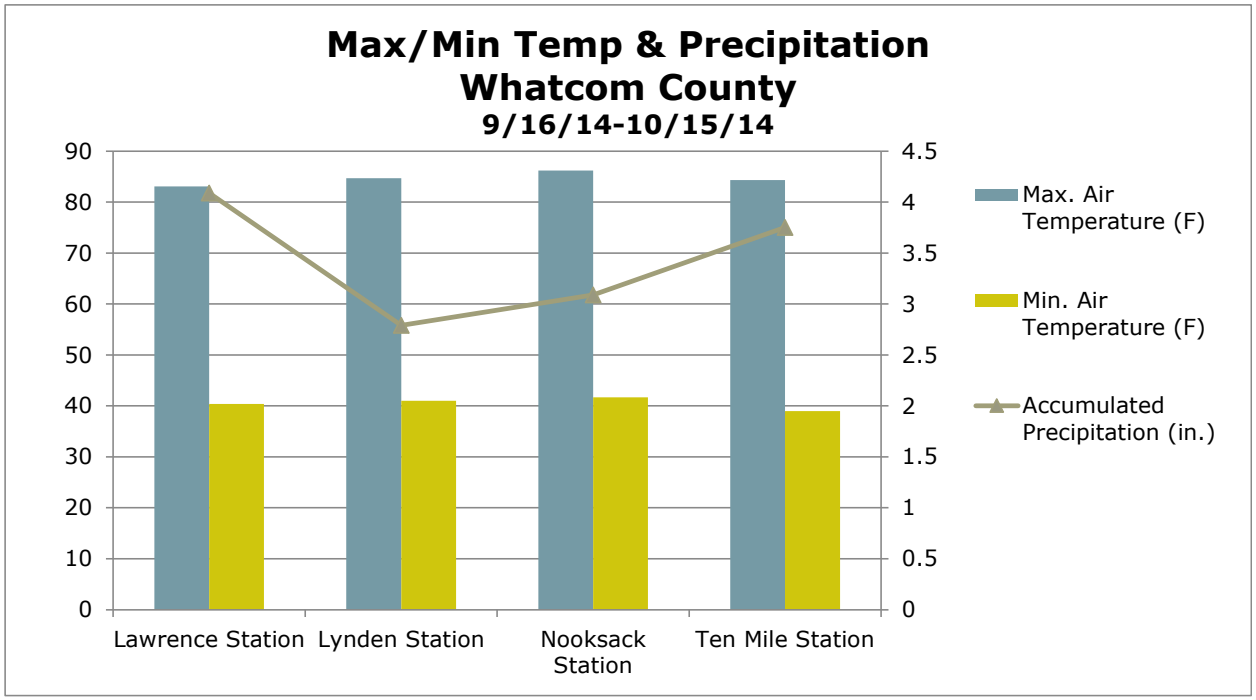
University of Maryland Small Ruminant Hoof Health Resources
http://sheepandgoat.com/footrot.html

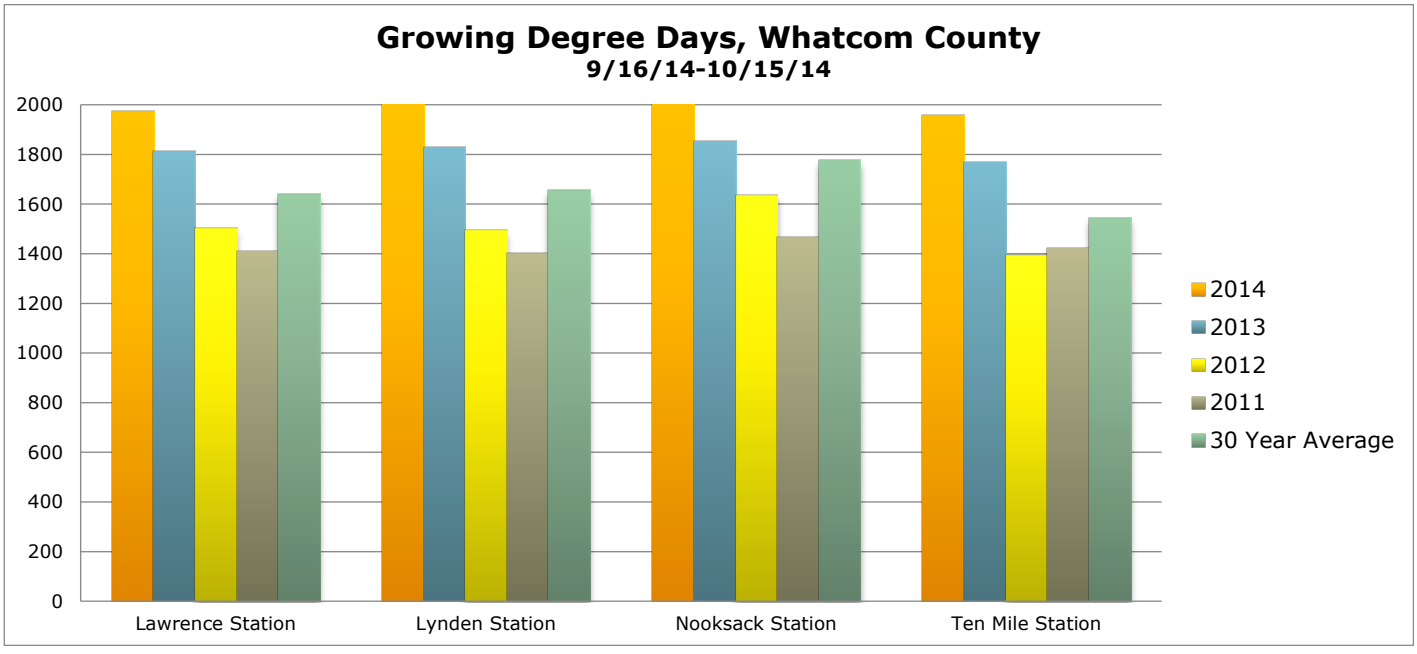
Managing Virulent Footrot
http://tinyurl.com/p8kn2wc

Footrot in Cattle
http://tinyurl.com/lahlqgb

Weather Update

All information here is derived from the four weather WSU AgWeatherNet stations (http://weather.wsu.edu/awn.php) in Whatcom County. Current weather conditions can be found at: http://what-com.wsu.edu/ag/currentdata.html. Station information can be found here.





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Cover Image:
Pruned raspberries ready for winter.

Web site:
whatcom.wsu.edu/ag

Upcoming Events

October

Whatcom Dairy Speaker Series: Minimizing the Risk of Manure Runoff this Fall/ Winter
Oct 16th
12:00 pm - 1:30 pm
Ten Mile Grange Hall
6985 Hannegan Rd, Lynden
Every Fall, water quality testing in Whatcom County shows high fecal coliforms in waterways across the County. Is it your manure applications, or something else? Come hear Dr. Embertson discuss how to minimize risk with your fall/winter manure applications and how you can protect water quality.

Food Hub Conference
Oct 25th
9:00 am - 4:30 pm
La Conner, WA
Experts in regional food systems development share their experiences, thoughts, and strategies for creating greater community access to locally produced food. Presenters will represent food hubs, supermarkets, institutional food service, farm to school initiatives, and communities-in-need programs

November

WA Tilth Producers Annual Conference: T40 Re-Imagine Agriculture
Nov 6th-7th
Vancouver WA
The Tilth Producers conference is the region's premier opportunity to join fellow farmers to learn, network, and share stories and knowledge from the season just completed while gaining insight to help make the following year even more successful.

Private Pesticide Applicator Recertification
Nov 6th
8:30 am - 3:30 pm
WSU MT. Vernon
16650 St. Rt. 536, Mt. Vernon, WA

Making Hard Cider
Nov 16th
1:00 pm - 3:30 pm
Cloud Mountain Farm Center
6906 Goodwin Rd. Everson WA
We will demonstrate the basic procedures for fermenting fresh cider into hard cider. We'll look at equipment needs, we'll discuss apple varieties and blends, yeasts and sanitation.

Why Farmers and Environmentalists Need Each Other
Nov 18
7:30 pm - 9:30 pm
Town Hall Seattle, WA
Farms of all sizes have a measurable impact on the environment and land use capabilities. According to Don Stuart (former American Farmland Trust Northwest Regional Director), the resulting disputes between farmers and environmentalists often harm both sides.

Focus on Farming Conference: Back to the Farm
Nov 20th
Evergeeen State Fairgrounds
Monroe, WA
Spend an outstanding day of learning, networking and enjoying farm fresh local products prepared by regional gourmet chefs. Learn about innovative ideas from local and national farmers.