Pest e-alerts

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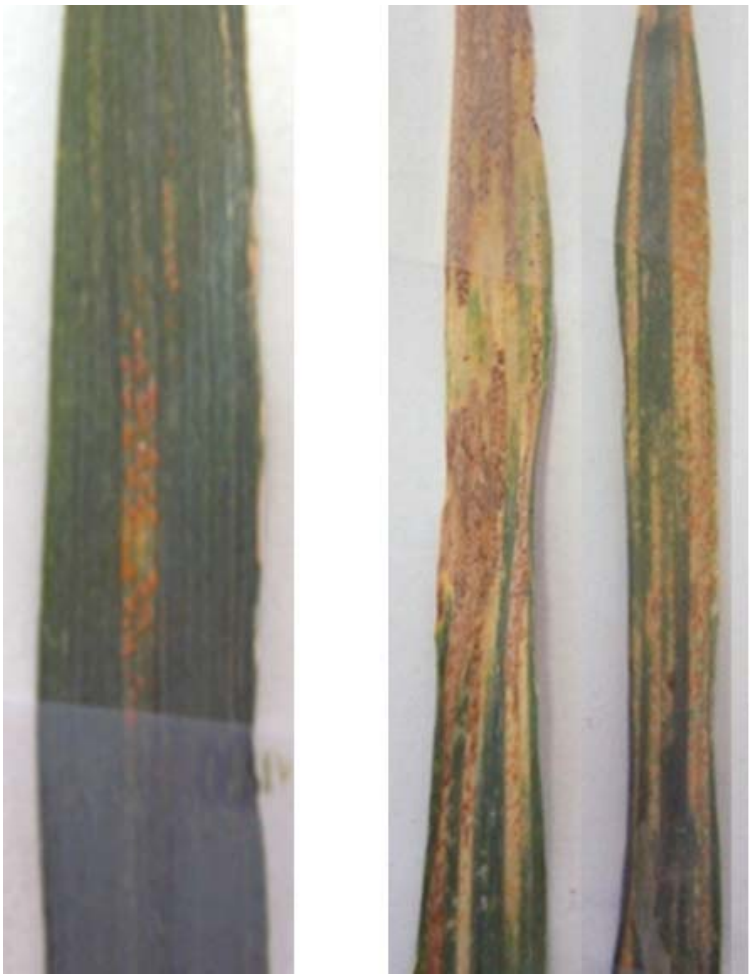
Wheat Disease Update

Bob Hunger, Extension Wheat Pathologist

I had limited trips outside of Stillwater this past week, and only was able to contact one County Educator before writing this today. Wheat around Stillwater is mostly at various stages of head emergence. I did see a few anthers on scattered heads, but not many. By contrast, Aaron Henson (Extension Educator; Tillman Co. in south-central OK) indicated wheat in his area is mostly at flowering.

During this past week, I had several calls about spraying wheat with a fungicide. Although rust (stripe and leaf rust) didn't appear to increase this past week, conditions reverted to being more favorable for stripe rust development with rainfall, increased dews, and favorable temperature. With more rains and cool temps in the forecast, stripe rust could "reactivate" again, and leaf rust will start to come into the picture. Wheat is now at the point where it will quickly move past the stage (the start of flowering) where it can be sprayed with most fungicides. As far as I know, all wheat foliar fungicides (with the exception of Prosaro) must be applied prior to the start of flowering (Feekes' growth stage 10.5). Prosaro can be applied through growth stage 10.5.1, which is when flowering is just starting (anthers emerged mostly from the middle of heads). Be sure to read all labels regarding a fungicides use on wheat. There also are varying pre-harvest intervals (PHIs) required for the various fungicides, and often the length of time from heading to harvest can be short in Oklahoma. So, be aware of these PHIs, and spray accordingly.

Active sporulation of stripe rust still can be found around Stillwater and the surrounding area. Stan Fimple (Extension Educator, Pawnee Co. just to the northeast of Stillwater) sent me the following photos showing active stripe rust. The photo on the left shows an actively sporulating "stripe" of strip rust (yellowish-orange in color), whereas in the photo on the right in the "stripes" you can see dark, blackish specks (teliospores) starting to appear.



Active (left) and survival (right) spore stages of stripe rust – Stan Fimple; Pawnee Co. Extension Educator.

Other than this, I have seen scattered leaf rust pustules on lower leaves around Stillwater, and powdery mildew also has become more apparent around Stillwater and at Lahoma as reported by Dr. Brett Carver (OSU Wheat Breeder). However, both of these diseases are at low levels on lower leaves but with coming rain and cool temperatures both (especially leaf rust) could continue to increase on the upper canopy. Around Stillwater, barley yellow dwarf spots continue to be observed but the aphids are now gone or at least in much lower in frequency. If heavy rains come over the next 3 or so days, I would imagine aphid populations will be mostly eliminated.

Finally, I want to raise awareness once again to Fusarium head blight (scab) of wheat. When wheat flowers it is susceptible to infection by the Fusarium fungus that causes scab. That time is quickly approaching. Occasionally Oklahoma has problems with this disease, typically more so in eastern/northeastern Oklahoma than through the central and western parts of the state. However, scab was severe across the state for a couple years around 2010 and there also was some reported last year. For more information on scab, please see fact sheets PSS-2145 *Fusarium Head Blight (Head Scab) of Wheat: Questions and Answers* and PSS-2136 *Considerations when Rotating Wheat Behind Corn* that can be found at: http://pods.dasnr.okstate.edu. Once at that page, type the identifiers (PSS-2145/PSS-2136) into the "search box" located in the upper right area of the screen. An additional resource is the Fusarium Head Blight Prediction Center at http://www.wheatscab.psu.edu/. At this site you can read commentaries submitted by specialists from each state but more importantly see if weather conditions in your area have been conducive to development of FHB. The site is easy to use and especially may be beneficial in helping make fungicide application decisions.

Louisiana: Dr. Stephen Harrison, (Wheat & Oat Breeder, Louisiana State University); Apr 15, 2016: My research associate (Kelly Arceneaux) is at the Rice Research Station in Crowley (Southwest) Louisiana rating plots today. We plant a double-headrow set of a number of nurseries every year for disease screening at this location in collaboration with Don Growth (rice pathologist). This site is inoculated with scabby corn but is not misted due to the abundance of humidity and free moisture at this site. Nurseries include: Statewide Variety Trial, Uniform Southern Soft Red Winter Wheat Nursery, Uniform Southern Scab Nursery, Sunwheat, GAWN. Kelly reports that stem rust is heavy and widespread at this site. Leaf rust is moderate and scab is at an intermediate level, which is good for distinguishing lines. The earliest plots are starting to mature, probably just past soft dough, while the latest lines are just past heading or not vernalized and not going to head. We only received about 50% of our normal vernalization hours this winter and quite a few lines in the statewide variety trials will not be harvested due to vernalization issues.

Nebraska: Dr. Stephen Wegulo, (Extension Plant Pathologist, University of Nebraska); April 14, 2016: "On Friday April 8, Jenny Rees, UNL Extension Educator, found trace amounts of stripe rust in a wheat field in Nuckolls County in south central Nebraska. Earlier this week, samples from several wheat fields in Banner County submitted to the lab of Dr. Bob Harveson (Extension Plant Pathologist) at UNL's Panhandle Research and Extension Center in Scottsbluff were positive for stripe rust and leaf rust. This week on April 12 and 13 I surveyed wheat fields in the southernmost tier of counties in southeast, south central, and west central Nebraska. Dry weather which has prevailed over the last two weeks or so stopped rust development. I did not find rust in any of the fields I visited in the southernmost tier of counties. Several fields showed symptoms of stress from lack of moisture. Today I looked at research plots at Havelock Farm here in Lincoln (Lancaster County) and at the Agricultural Research and Development Center (ARDC) near Mead (Saunders County, about 35 miles north of Lincoln). I found a few hot spots of stripe rust at Mead (see first attachment), mostly on the lower leaves. I also found trace levels of leaf rust at Mead (second attachment). Powdery mildew was the predominant disease at Lincoln and Mead, but I also saw significant levels of Septoria tritici blotch in one research field at Mead. Wheat growth stage across the state ranges from Feekes 5 and 6 (most fields) to Feekes 7 in some irrigated fields."

South Dakota: Dr. Emmanuel Byamukama, (Extension Plant Pathologist, South Dakota State University); Apr 13, 2016: "Several winter wheat fields in central South Dakota were scouted yesterday for stripe rust. One field originally found with stripe rust last week was the only one we found with stripe rust. Stripe rust was found on old/dying leaves and some of the leaves had teliospores, indicating the source of this rust would have been from overwintered stripe rust in South Dakota."

Common Leafhoppers of Horticultural Importance

Eric J. Rebek, State Extension Specialist for Horticultural Insects

Leafhoppers are a diverse group of sucking insects that belong to the family Cicadellidae. More than 2,500 species occur in North America and feed on a wide array of host plants. Leafhoppers use their piercing-sucking mouthparts to remove plant sap from leaves and stems of woody and herbaceous plants. Feeding by some leafhoppers results in stunting at the growing points or stippling of leaves (i.e., white flecking wounds), which inhibits photosynthesis and can result in leaf abscission. Some species in the genus *Empoasca* cause damage to vascular tissues of the host plant, resulting in a condition known as hopperburn. Another group of leafhoppers, called sharpshooters, feed exclusively on xylem fluids. Sharpshooters and many other leafhopper species are capable of transmitting plant pathogens such as bacteria, viruses, and phytoplasmas. Leafhoppers also produce honeydew, a sticky waste product that can serve as a medium for the black sooty mold fungus.

The following is a description of some common leafhopper pests found in Oklahoma horticultural landscapes and recommendations for their control.

Beet leafhopper, *Neoaliturus tenellus* (Baker)

Description: Adults of beet leafhopper are small, wedge-shaped insects measuring approximately 1/8 inch in length. Their bodies are pale green to yellow with darker blotches. Adults have long, slender rear legs and will jump or fly away when disturbed. Adults move into fields in early spring to feed, often moving when suitable host plants are not located.

Photo: A.C. Magyarosy, Bugwood.org

Life cycle: Adults move into fields in early spring and lay eggs on suitable hosts. Eggs hatch and nymphs develop to adults in two to three months. There may be multiple generations in Oklahoma.

Hosts: Adults may land and probe-feed on many different plants, but generally prefer to lay eggs on beets, tomatoes, and various weeds.

Damage: When adults and nymphs are abundant, feeding can result in shriveled and burned leaves, which is generally referred to as hopperburn. However, the primary damage caused by the leafhopper is from a pathogen transmitted by adults, curly top virus, which is spread from plant to plant. This virus causes leaves of tomato and potato plants to turn yellow and curl, and

often turns leaf veins and stems a purplish hue. Infected plants cease growing and remain stunted, and stems become stiff. Generally, fruits ripen prematurely and are deformed.

Inspection and Control: Plants should be visually inspected for presence of adult leafhoppers. An insect net can be swept through vegetation surrounding the garden or field to monitor adult movement into the area. However, there are currently no effective management strategies that can be used to prevent adult beet leafhoppers from probing and feeding on plants prior to transmission of the virus. Infected plants should be removed, and growers may be able to plant a sequential and second planting for later fruit production.

Potato leafhopper, *Empoasca fabae* (Harris)

Description: Adults are small, green, wedge-shaped, and measure about 1/8 inch in length. There are a number of small, pale yellow or white spots on the body. The hind legs are long and enable the insect to jump a considerable distance. Nymphs are pale green and similar in shape to the adults, but they lack wings.

Life Cycle: This insect overwinters in the Gulf Coast states and migrates into Oklahoma in spring or early summer. Large numbers of flying adults often appear suddenly in fields soon after host plants begin growing. Beginning three to ten days after mating, females use their sharp ovipositors to insert eggs into the main veins or petioles of leaves. Each female lives a month or more and produces 2 or 3 eggs per day. Eggs hatch in about ten days and nymphs mature in about two weeks. Nymphs usually mature on the leaves where they hatched. Mating occurs about 48 hours after maturation and the life cycle is repeated. There are three or four generations per year in Oklahoma.

Hosts: Potato leafhoppers feed on more than 200 cultivated and wild plants. In addition to fruit trees and forage crops, vegetables such as beans, potatoes, eggplant, and rhubarb can be infested.

Damage: Both nymphs and adults feed on the underside of leaves. By extracting sap, they cause stunting of plants, curling of leaf margins, and crinkling of the upper surface of leaves. While feeding, leafhoppers also inject a toxic substance into plants which, in most vegetable hosts, causes hopperburn. This condition is characterized by a yellowing of the tissue at tips and margins of leaves, increasing until the leaves die. Hopperburn is sometimes confused with drought stress.

Inspection and Control: Insecticide applications may be necessary to control potato leafhoppers, especially on beans and potatoes. Spray when damage is noted and leafhoppers are present. Specific recommendations can be found in the OSU Extension Agents Handbook of

Insect, Plant Disease and Weed Control (publication E-832) and OSU Extension Fact Sheet EPP-7313.

Eastern grape leafhopper, *Erythroneura comes* (Say)

Description: Adult grape leafhoppers are pale yellow, with red markings on the wings. These markings can give this leafhopper a somewhat mottled appearance. They are about 1/8 of an inch in length and somewhat wedge shaped. Immature forms are pale green or greenish white and lack the markings and wings of the adult. This insect first becomes active about the time that grape leaves are half extended. Eggs are inserted into leaf tissue by the adult female, which can deposit about 100 eggs during her lifetime.

Life Cycle: Grape leafhopper overwinters as an adult in leaf litter, grasses, or wherever they can find shelter near the vineyard. Upon emerging in the spring, adults feed for about two weeks, mate, and females begin laying eggs. Eggs generally hatch in about ten to twenty days, depending on temperature. Nymphs reach maturity in three to five weeks, also depending on temperature. There are three generations per year in Oklahoma.

Hosts: All life stages of this insect feed on grape, virginia creeper, apple, and several other plants.

Damage: Feeding by grape leafhopper causes the leaves and fruit to appear stippled with very tiny white spots. Eventually, these spots turn brown and may cause the leaves and fruit to shrivel. Affected leaves may become pale yellow and assume a very sickly appearance. Nymphs and flying adults may be noticeable on the underside of leaves.

Inspection and Control: If the problem with leafhoppers is caught early, then treatment can be focused on young nymphs before they become highly mobile adults. Therefore, regular scouting for grape leafhoppers within the vineyard is very important. Inspect a minimum of 50 leaves from randomly selected vines throughout the vineyard and count the number of nymphs encountered. Treatment is recommended when populations exceed an average of 5 nymphs per leaf before August 1 and 10 nymphs per leaf thereafter. Insecticide treatments should be directed at the underside of leaves and high volumes of liquid should be used to ensure adequate coverage, particularly when treating a cultivar with dense foliage. Thorough sanitation around the vineyard will provide for elimination of overwintering sites for adult leafhoppers and thereby help reduce reliance on chemical control. Insecticide

recommendations for leafhoppers affecting grapes can be found in OSU Extension Fact Sheet EPP-7091.

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Aster leafhopper, *Macrosteles quadrillineatus* Forbes

Description: The adult aster leafhopper is similar in shape to the potato leafhopper. However, it can be distinguished by six dark spots between the compound eyes. This leafhopper species measures approximately 1/8 inch in length and has a light green to yellow color.

Life Cycle: This leafhopper overwinters in the southern U.S. as eggs and adults. The latter migrate by wind into the northern states in the spring. During warmer months, aster leafhoppers can be found throughout North America surviving on a variety of vegetation. The lifespan of adults ranges from one to two months. The female has been reported to lay up to 200 eggs in its lifetime and the eggs can develop into adults in 24 days. There are five instars. The first instar has brownish coloration and is less than 1/16 inch in length. Later instars are yellow. There are up to six generations per year.

Hosts: Aster leafhoppers feed on over 180 plant species. Hosts include vegetables (carrot, lettuce, onion, potatoes), herbaceous plants (celery, parsley, dill, composites), fruits (tomatoes), and wild plants (perennials, annuals).

Damage: Nymphs tend to feed on the underside of leaves, causing leaf chlorosis. Adults are capable of transmitting North American aster yellows, a disease caused by a phytoplasma. Aster yellows symptoms include an initial yellowing of the leaf veins followed by chlorosis of new leaves. Finally, stunting and irregular growth occur and symptoms vary according to plant species.

Inspection and Control: Plants should be monitored for presence of aster leafhopper and aster yellows symptoms. Once plants are infected with aster yellows, there is no remedy and infected plants should be destroyed to prevent further spread of the disease. Specific recommendations can be found in the OSU Extension Agents Handbook of Insect, Plant Disease and Weed Control (publication E-832).

Sharpshooters

Description: Sharpshooters are similar in appearance to aster leafhopper and potato leafhopper in having a wedge-shaped body. However, sharpshooters are larger, ranging in size from 3/16 to 1/2 inch. Further, they can easily be identified by their enlarged clypeus, or "forehead". Some are ornate and very colorful. For instance, *Graphocephala coccinea* Forster (left) is red with blue venation. The broad-headed sharpshooter, *Oncometopia orbona* (Fabr.) (right), is nearly 1/2 inch long and has an orange head and blue markings on the wings and pronotum. Other species are black, green, or blue-green.

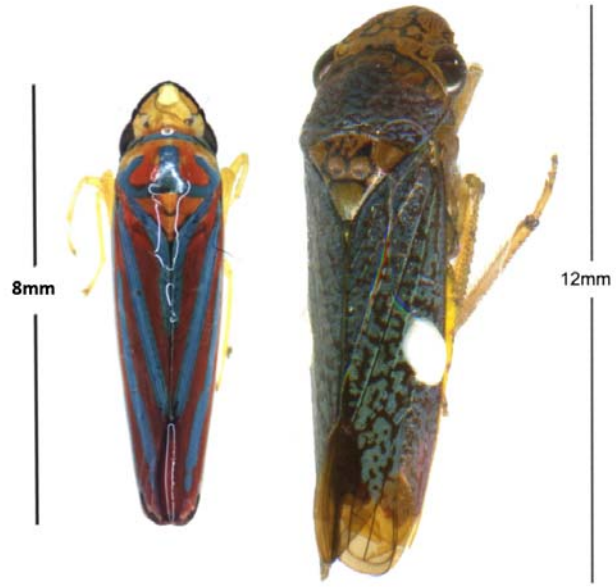


Photo: Lisa Overall, Oklahoma State University

Life Cycle: Adults overwinter in wooded landscapes and then move to ornamentals, perennials, and fruit trees in the spring. Females lay eggs singly or in groups and insert eggs into the surface of plant stems. Eggs hatch in 10 to 30 days, depending on temperature and species. Sharpshooters generally pass through five instars before reaching adulthood. Adult longevity can vary from 50 to 80 days, again depending on temperature and species. Sharpshooters have two to four generations per year depending on species.

Hosts: Broad-headed sharpshooter has been observed feeding on almost 50 plant species and laying eggs on approximately 20 species. This sharpshooter favors okra, sunflower, lambsquarter, ash, oak, crapemyrtle, and peach. The versute sharpshooter, *Graphocephala versuta* Say (right), feeds on 30 plant species including both woody and non-woody plants. In general, sharpshooters feed and lay eggs on a wide variety of host plants.

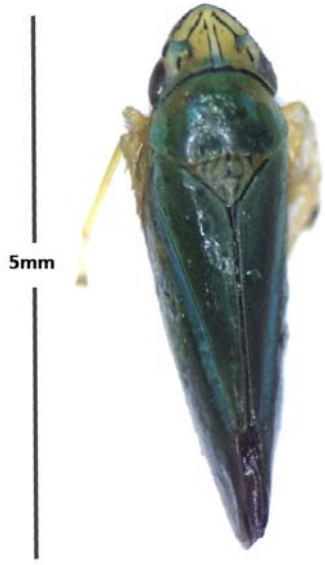


Photo: Lisa Overall, Oklahoma State University

Damage: Sharpshooters inflict little damage through their feeding; however, large numbers of sharpshooters have been observed feeding on apple trees in northeastern Oklahoma, causing significant plant wilting. Economically important sharpshooters are vectors of phytopathogens, in particular, *Xylella fastidiosa* Wells *et al*., the causative agent of many plant diseases including Pierce's disease of grape and bacterial

leaf scorch of many shade tree species. Symptoms of leaf scorch include cell death beginning at the margins of the leaf with a chlorotic band separating the dead tissue from the healthy. Trees affected with *X. fastidiosa* commonly show symptoms from year to year and will eventually die. It should be noted that these symptoms are similar to that seen with nutrient imbalances, other pathogens, or root problems.

Inspection and Control: There are no effective treatments for diseases caused by X. fastidiosa. Preventing spread of the pathogen is possible by removing symptomatic shoots or entire plants. The use of healthy or resistant plants, and/or control of the insect vectors are options. Specific recommendations for control of versute sharpshooter and other vectors of *X. fastidiosa* can be found in the OSU Extension Agents Handbook of Insect, Plant Disease and Weed Control (publication E-832) and OSU Fact Sheet EPP-7091.

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