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Issue 21, July 3, 2017

Arkansas Plant Health Clinic Newsletter

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Pecan

Bunch Disease

Phytoplasmas are obligate bacterial parasites of plants and of the insect vectors that are involved in their plant-to-plant transmission. They belong to a group of bacteria, which are bound by a triple-layered membrane, rather than a cell wall. Phytoplasmas cause disease in several crops, including Pecan (Pecan Bunch Disease). Symptoms on pecan are witch's brooms at terminals or on suckers. Infected trees have excessive lateral stems with shortened space between stems and compacted growth of leaves on these stems. One characteristic of the disease is affected limbs will begin to develop shoot growth well before healthy limbs in the spring. Therefore, Bunch Disease is easily diagnosed in early spring when leaves emerge on the witch's broom 7-10 days before they emerge on healthy parts of the tree. Only a few limbs on a tree may have the symptoms or the entire tree may be affected. Spread of the disease within a tree and within an orchard is usually inconsistent. Symptoms may be confined to an individual limb or tree for several years, and then begin to spread rapidly throughout the orchard. The pathogen can be transmitted through grafts, and possibly by leafhoppers or other insects. The unfortunate consequence of Bunch Disease is that affected terminals do not produce nuts. There are no control recommendations for Pecan Bunch Disease. Although pruning and removal of trees with the disease has been recommended, such procedures are not always effective in preventing spread of the disease within trees or to other trees in an orchard. Regular orchard maintenance including fertilizer and pesticide applications seems to slow the spread of the disease into orchards. Bunch Disease may be confused with zinc deficiency (Rosette) which can also cause witch's broom. However, leaflets of bunch-diseased trees do not become yellow between the veins nor extremely crinkled like those affected with zinc deficiency.

Pecan Bunch Disease-Phytoplasma sp./spp. 16SrIII

Photo by Randy Forst, University of Arkansas Cooperative Extension

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Pecan Bunch Disease-Phytoplasma sp./spp. 16SrIII

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Mineral Deficiencies

Mineral deficiencies of pecan trees can be caused by factors such as sandy soils, pH, inadequate soil moisture, poor drainage and aeration, unfavorable temperatures, and root diseases. Soil analysis, leaf tissue analysis, and visual observations are the methods used to diagnose mineral deficiencies. Amounts of nutrients needed cannot be known without soil and tissue analysis. Most nutritional problems may be avoided by starting an orchard plan with a soil analysis before planting your trees. Collect leaflets for foliar analysis in mid-July to mid-August. For foliar analysis, select the middle pair of leaflets located on the middle leaf of the current season's growth. To sample an area, take two pairs of leaflets from each of 25 trees selected at random. Remove leaves with a downward or backward pull so that the leaf stem remains attached to the leaf. Choose leaves from shoots on different sides of the trees. Do not collect from suckers, water sprouts, or limbs that do not receive sunlight. Avoid leaves with insect, disease, or other injury. Collect 50 pairs of leaflets per sample. Rinse leaves briefly in tap water to remove any pesticide residues. Allow to air dry out of the sun and submit in a clean paper bag to:

Agricultural Diagnostic Laboratory
1366 W. Altheimer Dr, Fayetteville, AR 72704-6804
(479)575-3908 agrilab@uark.edu

The submission form for the Agricultural Diagnostic laboratory is A.G.R.I. 423

Do not submit to the Plant Health Clinic for tissue analysis.

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Pecan Leaf sampling diagram

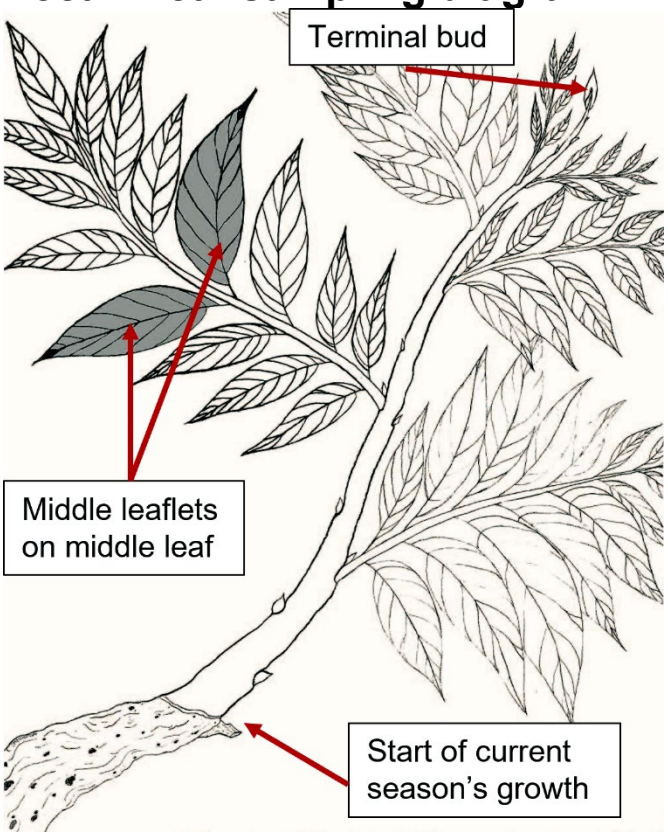

Illustration by Corey Shemroske, Arizona Cooperative Extension, University of Arizona College of Agriculture and Life Sciences

Potato

Common Scab

Common Scab of potato, caused by a bacterium, *Streptomyces scabies*, is found in most potato production areas of the world. Other common names for this disease are "Russett scab", "Erumpent scab", and "Pitted scab". Symptoms are usually confined to the tubers. Young tubers are infected through lenticels and stomata. Lesions are circular to irregular in shape and often coalesce into large areas on the surface of the tuber. As the tuber matures, the lesions become rough, cracked, and tan to dark brown. Superficial lesions are called Russet scab, slightly raised (Erumpnt scab), and sunken (Pitted scab). The type of lesion is dependent on potato cultivar, agressiveness of the streptomyces strain, and the environmnet. Control of Common scab is difficult. The most critical control measure is planting only scab free seed tubers. A crop rotation of 3 to 4 years is helpful. High soil moisture should be maintained for 4 to 6 weeks after swelling of stolon tips. Soil pH is important in scab control. Potatoes are commonly grown in soils with a pH of 5.0 to 5.2 for control of common scab. Avoid alkaline organic fertilizers such as ashes, poultry/fresh farmyard manure. Most important, there are cultivars with some resistance. **None, however, are immune**. Accent, Anna, Anya, Arran Pilot, Avondale, Balmoral, Banba, Camelot, Cara, Carlingford, Carnaval, Challenger, Chaski, Chopin, Claret, Cosmos, Courlan Druid, Electra, Ellie, Galactica, Golden Wonder, Habibi, Inca Bella, Inca dawn, Jester, King Edward, La Strada, Lady Christl, Lanorma, Lulu, Malin, Manhattan, Mayan Gold, Mayan Queen, Mayan Twilight, Melody, Mimi, Morene, Nadine, Orchestra, Paru, Pentland Crown, Picasso, Piccolo Star, Pink Gypsy, Pizazz, Russet Burbank, Saturna, and Savanna have been identified as having resistance.

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Potato Common Scab-*Streptomyces scabies*

Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Potato Common Scab-*Streptomyces scabies*

Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Powdery Scab

Powdery scab of potato is another common disease of potato, and is caused by a completely different pathogen, *Spongospora subterranean* f. sp. *Subterranean.* Powdery scab is also found in most of the potato growing regions of the world. The pathogen proliferates under soil conditions found at planting time in the spring when soil temperatures are less than 68°F. Poorly drained soils are ideal for the swimming zoospores. The most favorable infection conditions are soil temperatures of 55 to 65°F with soil moisture over 15 percent. The pathogen is tolerant of a pH range from 4.7 to 7.6. High soil moisture early in the season, which is common in Arkansas, encourages the development of the disease. Potatoes are susceptible one week before tuber set when more than 50 percent of the stolons have tips swollen to at least 3/16 inch in diameter. Symptoms are limited to the underground parts of the plant: roots, stolons, young shoots, and tubers. Infections on roots and stolons begin as small necrotic spots. These lesions develop into milky white to tan galls, which turn brown, and rupture, releasing the sandy masses of resting spores. The resting spores germinate, releasing zoospores. Severe infections can cause wilting and death of the plant, although that is uncommon. On the potato tuber, initial infections are manifest as purplish brown lesions, which may be sunken. The lesions become tan, pimple or wart-like swellings that eventually enlarge, breaking the periderm, and exposing powdery, sandy looking, tan to brown masses of spores. Other symptoms may include a russet-like scurfing, and lesions that

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remain sunken instead of the typical raised pimples or warts. The biggest problem with Powdery scab is that it causes infected potatoes to dry out and shrivel in storage. Control of Powdery scab is not easy. Clean disease-free seed should be used. Never use tubers for propagation that have scab. Don't plant in contaminated, poorly drained fields. Practice a 3-to-10-year crop rotation out of infested fields, as the resting spores can survive in the soil for longer than six years. Do not use tomato as a crop in rotation with potato. Control solanaceous weeds such as nightshade. Avoid using manure that came from animals that consumed contaminated tubers, as the spores survive through the animal's intestinal tract. Choose resistant cultivars. In general, russet varieties are more resistant than yellow, red, or white varieties.

Potato Powdery scab- *Spongospora subterranean* f. sp. *Subterranean*

Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Potato Viruses

Potatoes are susceptible to many viral diseases. For this reason, formal seed production systems were developed to minimize losses due to viruses. Viruses seldom kill potato plants but can reduce plant health and yield. The viruses most damaging to potato are transmitted via infected tubers from generation to generation. Viruses can also be transmitted by insects, nematodes, beetles, leafhoppers, whiteflies, and sap transmission. It is not uncommon to have more than one virus present in the same plant. The potato sample pictured below tested positive for both Potato Virus S (PVS) and Potato Virus Y (PVY). PVS and PVY are found worldwide. PVS is a *Carlavirus*. Seed cuttings, mechanical injury to foliage during cultivation, and leaf-to-leaf contact transmit it. Studies have shown that aphids can also transmit PVS. Symptoms include slight deepening of veins, rugosity of leaves, stunting, mottling, bronzing, and necrotic spots. Some plants with the virus will not have any visual symptoms. Potato Virus Y (PVY) is one of the most important viruses affecting potato production. It is a *Potyvirus* and is spread by aphids and sap inoculation. The severity of symptoms depends on the virus strain, the cultivar, and whether another virus is also present. Symptoms include necrosis, mottling, yellowing, leaf dropping, and death. Plants may be stunted with severely mottled and crinkled leaves. Ringed necrotic areas often develop on the tubers. Control consists of using seed potatoes certified to have low infection rates. Seed cutting equipment should be sanitized between lots. Mechanical damage

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to plants should be minimized during cultivation and spraying. Insecticides do not kill the aphids fast enough to avoid transmission of the virus. Mineral oil sprays may be applied to new foliage weekly to help control aphid transmission. All symptomatic plants should be removed from the field and destroyed. There are cultivars with some resistance available.

Potato Virus S (PVS)-*Carlavirus* and Potato Virus Y (PVY)-*Potyvirus*

Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Potato Phytoplasmas

Phytoplasmas are gram-positive bacteria in the class Mollicutes that lack the classic bacterial cell wall. They have an enormous host range of over 300 plant species from 98 families. They cause diseases broadly known as Aster Yellows. In potato, the common names of phytoplasma diseases are 'Potato Witches' Broom', 'Potato Stolbur', 'Potato Purple Top Wilt', 'Potato Marginal Flavescence, 'Purple Top Roll', and 'Potato Phyllody'. Symptoms include stunting and bunching of apical growth, rolling of leaflets, aerial tubers, swollen stems, and bud proliferation. Leaflets may be yellow or purple in color. Tubers from infected plants may give rise to both normal and diseased plants and tubers. There is no cure for potatoes infected with phytoplasmas. Leafhopper insects' vector Phytoplasma diseases in the United States. Insect control is considered the main control method. Insecticides containing permethrins or spinosad are recommended for commercial growers. Sevin or M-Trak is recommended for homeowners. Practice good weed control to eliminate weed hosts for leafhoppers.

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Potato Stolbur (Aster Yellows)-Phytoplasma

Photo by Sherrie Smith, University of Arkansas Cooperative Extension

This bulletin from the Cooperative Extension Plant Health Clinic (Plant Disease Clinic) is an electronic update about diseases and other problems observed in our lab each month. Input from everybody interested in plants is welcome and appreciated.

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