

Greenhouse Diseases Control Starts Early

Jon A. Appel, State Plant Pathologist

Greenhouses will soon be filling up with the spring plants. What can you do now or think about doing as a grower and supplier of plants to keep plant diseases and associated insect vectors minimized? Remember Kansas has Plant Pest Freedom Standards that are enforced for greenhouse plants.

Reflect upon last years' production problems and take action to avoid those issues early on. Proactive management plans can be established to avoid common greenhouse problems that can repeat each year. Proactive management can prevent the need for high cost pesticide treatments and discarding plants.

The four general components contributing to a disease cycle are as follows: first, organism or pest is present; second, susceptible hosts, usually in a weakened condition; third, suitable environment conditions and fourth, time for the disease to manifest itself and increase in magnitude. Limiting or addressing one or two of these conditions can bring a successful growing season.

Three major groups of diseases in greenhouse production are damping off, viruses and leaf spots and mildew. Below is a description of each disease and some proactive measures to fend off these diseases.

Damping off: This is a disease complex is caused by two fungal genera, *Pythium* and *Phytophthora*, called water molds. This disease is the most common problem in greenhouse production and in retail locations. Symptoms include poor germination, rotted seedlings, poor growth, chlorosis and occasionally death of grown plants. Contributing factors are wet, cool soils (mixes) and slow growth. Spores rest in the soil and plant debris and can also come into a location through cuttings and on rooted plants.

Proactive measures: 1) raise benches off the ground and properly space to provide good air circulation, 2) plant high germination seed with a fungicide treatment, 3) create physical barriers such as gravel or ground cloths to separate plants from touching cold wet soils, 4) provide new pots or flats, 5) limit watering to mornings and early afternoons, 6) apply preventative fungicide treatments to susceptible plants such as vinca and geraniums, 7) control

fungus gnats whose larvae feed on and wound the roots, 8) raise the temperature in germination rooms and 9) maintain good fertilization to promote rapid growth.

Kansas Plant Pest Freedom Standards: Less than 5% infection.

Viruses: Several viral diseases can get into greenhouse production sites and infected plants can exhibit necrotic line patterns or ring spots, mosaics, tissue distortion or malformation, color breaking and/or stunting. Symptoms are not always present or can fade out even though the virus is present making sanitation extremely important.



A POTY virus infection of Lantana from a cutting source. Symptoms include distorted growth, mosaic, and stunting.

Insects such as thrips, whitefly and aphids can transmit viruses from plant to plant and across different plant species. Viruses can be exposed to an operation by infected cuttings or plants and be spread by propagation or pruning practices from infected sap. Viruses overwinter in plants that are kept alive from a previous year or with weeds that grow inside (remember symptoms may not be apparent). Hobby plants and weeds serve as a reservoir for virus and insects. In addition, pesticides will not control virus infections directly.

Proactive measures: 1) proper sanitation - control weeds in and around the greenhouse and dispose of overwintered plants to reduce the reservoir of potential disease, 2) purchase high quality cuttings, 3) insect control to limit spread of viruses insects, 4) establish a disinfecting program for propagative tools so sap transmission of disease is negated, and 5) inspect new plant arrivals for viral and insect issues. If you had an inspection by the Kansas Department of Agriculture there was probably a report issued. Please review that report and if a virus was listed contact our staff person for additional help with the situation.

Kansas Plant Pest Freedom Standards: 0% infection.

Leaf spots and mildews: Leaf spots and mildews are diseases caused by either a fungi or bacteria. Leaf spots

and mildews are associated with extended leaf wetness which allows the fungus or bacteria to grow. Spores of the fungus or bacteria are spread by air currents or splashing water. Fungicides can work well for these diseases when applied preventatively or early in the disease cycle. However, bacterial diseases do not respond well to pesticide applications. Spots, or blights, are usually scab like or are defined dead areas of leaf tissue and will increase over time. Mildews are powdery white growths on the upper and lower surface or downy white growths only on the lower surface.

Proactive measures: 1) resistant cultivars, 2) good air circulation, 3) limit leaf wetness by watering in the morning and early afternoon, 4) apply preventative fungicides, 5) proper spacing, 6) dispose of overwintered plants or plants with moderate infection, and 7) inspect plants when they arrive.

Kansas Plant Pest Freedom Standards: Less than 15% of the plants with less than 10% leaf severity.

Kansas Department of Agriculture hosts “Multi-State Inspector Training”
Bob Buhler, Western Kansas Plant Protection Specialist



Strike team in action

The Plant Protection Program and the Central Chapter of the Horticulture Inspection Society (HIS) hosted a multi-state inspector training in Ottawa, Kansas on August 19-21.

Attendees came from North and South Dakota, Wisconsin, Nebraska, Missouri, Kansas and California. They received training in Systems Approach to Nursery Certification (SANC) from the National Plant Board and plant diseases and scale insects from Drs. Megan Kennelly and Raymond Cloyd of Kansas State University. They also participated in a mock emergency exercise

for a nursery pest that was managed using the Incident Command System (ICS).



Group picture of ICS exercise

The goal of the SANC program and the multi-state inspector trainings are to foster a more uniform approach to nursery certification across the nation and to broaden the skills of the nursery inspector.

Hydrilla; a Weed to Watch for
Scott S. Marsh, State Weeds Specialist

Invasive species are not limited to range and pasture, or even to farms and yards. They are also found in aquatic environments. I am sure you have all heard about quagga and zebra mussels taking over the country’s lakes and rivers, but plants can also have a devastating impact on the same water bodies.



Hydrilla infestation, Whitehouse Bay, Florida. Photo by Brian Nelson. Copyright 2017 Inland Florida Water Management District

Hydrilla (*Hydrilla verticillata*) was initially introduced into Florida in the late 1950s from Asia. It has become such a problem that it has been added to the Federal



Photo courtesy of Jon Rodgers.

Noxious Weed List. It was, and still is, used as an ornamental aquarium plant. Its introduction into the wild was probably the result of an irresponsible aquarium owner dumping the contents of his or her aquarium into a lake or stream, allowing the plant to become established and start spreading. Since then,

it has become established from coast to coast and from Maine to Arizona. It was first reported in Kansas in 2009 in a pond in Black Bob Park in Olathe.

Hydrilla is a submersed plant, which means the entire plant grows underwater, with long stems that branch apart and spread just under the surface. These stems can reach 25 feet in length and the plant can spread until it has grown across the entire surface. The leaves of the plant are strap-like with pointed tips and saw-toothed edges. They grow in whorls or groups of leaves growing around the stem, in groups of 4 to 8 and are joined directly to the stem. The space between the whorls can range from 1/8 inch to 2 inches.

Because it is adapted to grow in a wide variety of water quality conditions including both high and low nutrient, salt and light levels, and the fact that it can reproduce by re-rooting stem fragments, axillary buds on the stem and underground tubers, it becomes a serious problem to recreational and commercial boating, slows water flow and clogs irrigation canals and, most importantly, out competes and shades-out important native species of plants. If a large infestation were to die out suddenly, its decomposition would remove most of the oxygen in the lake, causing the resident fish to die as well.

One of the most critical aspects of controlling Hydrilla is preventing its spread into new waters. This is an issue mainly because a single, small piece of a plant, carried

inadvertently from one water body to another on a boat propeller, a fishing net or the tongue of a boat trailer can take root in the next lake visited, resulting in a new population and a new problem. Another, related method of spread for Hydrilla is the dumping of aquariums into lakes, ponds, rivers or ditches. The plants that were merely decorative in an aquarium in the house can become overwhelming problems in nature.



Once it has become established control is very difficult. Mechanical control is not recommended because it will usually result in plant fragments that can easily increase the distribution of

the plant. Biological control, while available in some areas is not permitted in Kansas and its success has been fairly limited. This leaves chemical control. Imazamox, flurodone, endothol and copper sulfate offer differing levels of control and application restrictions. The city of Olathe has been using flurodone on the infestation in Black Bob Park and has seen the population decrease.

With any application of pesticides you are required by law to follow the label directions. Because Hydrilla is not a designated noxious weed in Kansas, you will not be able to use cost-share chemicals to treat it.

While much harder to find than it used to be, Hydrilla is still available for purchase in some markets and online as an aquarium plant. Please be conscientious about the plants you purchase for your aquariums, better yet use artificial plants, and never dump your aquarium into an outdoor water body, even if you are sure none of your plants are invasive. They could be carrying insects or bacteria that are.

If you find Hydrilla growing in Kansas, do what you can to control it and also call the Kansas Department of Agriculture at (785) 862-2180 to report it.

Going Digital to Identify Emerald Ash Borer *Greg Chrislip, State Entomologist*



Kansas and Massachusetts received a farmbill grant to work with Dr. Amy Roda (USDA-APHIS-PPQ-CPHST) to collaborate on a new approach to identify emerald ash borer (EAB) in the field.

This was a pilot project using handheld digital microscopes.

Currently when a suspect EAB is located in a new county, the specimen is collected and mailed to a USDA identifier. The microscope project is being developed to identify EAB specimens in the field to eliminate look-a-like species of beetles. Pictures taken with the microscopes allow the images, while in the field, to be immediately sent to an identifier.

If the specimen is determined by the identifier to be a potential new county record, the specimen is collected and sent to the identifier for further confirmation. Non-target beetles are left on the trap or discarded. The hope is to quickly identify EAB in the field, and eliminate collecting beetles that do not fit the EAB criteria.



Field Application of the Digital Microscope: Greg Chrislip, State Entomologist PPWC and Amy Roda, PhD, Supervisory Entomologist USDA APHIS PPQ CPHST

Kansas has also used the camera to identify pests of grapes, unknown Lepidoptera and unknown foliar feeding beetles. These images were sent to other labs such as K-State and identification occurred usually within hours of submission.

Trapping and Survey Programs

The national trapping survey for emerald ash borer in 2013 consisted of setting 375 traps throughout Kansas. Of these, 65 were set by the KDA and 310 were set by USDA-APHIS-PPQ. The state trapped Butler, Jewell, Leavenworth, Neosho, Osborne, Pottawatomie, Russell, Smith and Shawnee counties. The traps were to be put up in USDA pre-planned areas. If those areas were not suitable, then the traps were moved to campground sites or other high risk locations. The traps were up from March until August. Emerald ash borer was found in three traps in Wyandotte and one trap in Johnson County. These traps were placed and monitored by USDA-APHIS-PPQ. For information on the emerald ash borer, visit:

www.emeraldashborer.info

Farmbill funding was acquired for surveys to trap for khapra beetle, walnut twig beetle and a grape pest survey.

The khapra beetle survey trapping occurred in August and September; two traps at 35 international stores and 4 commercial storage facilities in Manhattan, Topeka, Lawrence, Salina, Junction City, Kansas City and Wichita were set. All traps were negative.

Trapping for the walnut twig beetle consisted of finishing up the survey that started in the fall of 2012 which occurred in 30 northeastern counties in 117 locations with

216 traps set. The survey for 2013 occurred in the southeastern part of the state at 35 sites in 12 counties. Both of these surveys took place simultaneously from June to August. All traps were negative.

The grape commodity survey started at the end of May and all traps were removed by the first week in December. Six traps each were set at 53 vineyards. Pests trapped for were the summer fruit tortrix, silver Y moth, European grape berry moth, European grape vine moth, Egyptian cottonworm and cotton cutworm. Pierce's Disease and

Australian grapevine yellows were also surveyed for in August and September. Results from this survey were all negative. Phylloxera and Black Rot were most commonly found during our survey.

We always appreciate the live plant dealers and land owners who let us put traps on their property. This type of work is of great importance in protecting Kansas. Early detection will improve the odds of eradication and containment success if the pests are found.

* **New website:** agriculture.ks.gov/divisions-programs/plant-protect-weed-control

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