This is the 4th 2015 edition of the Buckeye Yard and Garden Line (BYGL). BYGL is developed from a Tuesday morning conference call of Extension Educators, Specialists, and other contributors in Ohio.

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Plants of The Week

**Annual - Pansies (Viola spp.)**

These harbingers of spring are showing their pretty little faces all over Ohio landscapes and loving this recent stretch of cool weather. Pansies and violas prefer cooler temperatures and tend to get a little straggly once the weather warms up. They are in full glory right now in most Ohio gardens and garden centers and you can't help but be attracted to their colorful faces and in some varieties, the wonderful fragrance.

There are numerous cultivars on the market with a wide variety of flower colors and color combinations. The primary colors are purple, yellow, burgundy, white, pink and mixes of colors. The flowers (and leaves) of these plants are edible and high in Vitamin A and C. They make a colorful addition to a salad or on top of a frosted cupcake or cake. Pansies and violas take full sun as well as tolerate shade. However, keep in mind that they will last a bit longer in the shade due to cooler temperatures. Plant them in the spring or when they become available again in the fall. Depending on the winter weather and the variety, they may come back with an even earlier blast of late winter, early spring color.

These plants do quite well in a container garden. If they start to look a little straggly in the container and have hit the end of their flowering season, dig them out of the container and plant them in the flower beds. They may perk up in the fall, they may reseed, or they might just overwinter, giving you more than one year of display.

For More Information:

- Missouri Botanical Garden information on pansies

- Utah State University Cooperative Extension information on Growing Pansies

**Perennial - Fringed Bleeding Heart (Dicentra eximia)**
This beautiful perennial is not as well-known as *Dicentra spectabilis* or bleeding heart but is equally as cool in terms of its flowers. The species is an eastern U.S. native plant with foliage that is a little bit more silver-gray and fern-like, height a little shorter and flowers appearing a bit later than bleeding heart.

This non-aggressive, deer resistant plant can be grown in part to full shade in well-drained soil. If it has sun, be sure to keep it watered as it doesn't like to dry out. It gets around 1 - 2' tall with a spread of around 1 - 1 1/2'. It blooms late spring with a red, white or pink dainty, heart-shaped flower that is held on upright stalks as opposed to the arching habit of the bleeding heart flowers. It's great in the shade garden or in a natural or wildflower type of planting.

For More Information:
- Cornell University Growing Guide on Fringed bleeding heart
  [http://www.gardening.cornell.edu/homegardening/scene81c6.html](http://www.gardening.cornell.edu/homegardening/scene81c6.html)
- Lady Bird Johnson Wildflower Center information on Dicentra eximia
  [http://web126.cc.utexas.edu/plants/result.php](http://web126.cc.utexas.edu/plants/result.php)

**Woody - Pawpaw (Asimina triloba)**

Pawpaw is our largest native fruit tree, although a small tree growing only to about 25' at maturity, and is becoming a more popular landscape plant. Though thriving in natural areas as an understory tree in shaded sites, it does well in more open sites as a pyramidal tree in landscapes. Leaves are large, almost like small banana leaves, with a blue-green color. The flowers in the famed words of Michael Dirr in his "Manual of Woody Landscape Plants" are: "Lurid purple, 1 - 2" across; early to mid-May in Zone 5; borne singly; there are six petals, the outer three much longer than the inner three; flowers before or as leaves are developing on thick, often recurved, downy, 1/2 - 3/4" long pedicels; not particularly showy but interesting...seldom seen by the uninitiated..."

The development of these flowers, which are now out this year throughout Ohio in various stages, is a sight to see from furry teddy-bear brown buds, to emerald-hued teardrop-shaped pendant-like buds, to emergence of those "lurid" purple and green blossoms. The plant is in the Annonaceae family, along with that darling of the California Rare Fruit Society, the cherimoya, and is largely self-incompatible, so always plant a few trees from different clones. Oblong, greenish turning to yellowish fruits have a somewhat sickly sweet tropical fruit taste, but are made into all sorts of delicacies. If you do not believe it, check out the 17th Annual Ohio Pawpaw Festival in Albany, Ohio, September 11 - 13, 2015.

**Contestant winners in 2014 submitted the following eats and drinks:**

1st place: Dry Pawpaw Wine , John C. Maxson
2nd place: Sweet Pawpaw Wine, John C. Maxson
3rd place: Pawpaw Wine, Richard Dean

**Sauces/Condiments**

1st place: Pawpaw Mustard , Charles Richmond
2nd place: Pawpaw Cock Sauce, Lisa Trocchia
3rd place: Pawpaw Hot Mustard, Kim Hobbs

**Savories**

1st place: Pawpaw Chipotle Tamales, Michelle Ajamian
2nd place: Pawpaw Pepper Mustard Dip, Kim Hobbs
3rd place: Pawpaw Sweet Potato Patty, Carole Schloss

**Desserts**

1st place: Pawpaw Custard Streusel Pie, Jestie Moore
2nd place: Perfect Pawpaw Sorbet & Cookie, George Hale
3rd place: Tamal Dulce del Appalachia, Lisa Trocchia

**Professional Category**

1st place: Pawpaw Mousse, Chelsea's Real Food
2nd place: Pawpaw White Chocolate Macadamia Delight, Dogs Gone Wild
3rd place: Pawpaw Habanero Sauce, Dogs Gone Wild
Wow. So come on down to the Festival (http://www.ohiopawpawfest.com). Learn of our official Ohio native fruit, of which Meriwether Lewis wrote in his journals:

"September 15, 1806 - we landed one time only to let the men gather Pawpaws or the custard apple of which this country abounds, and the men are very fond of..."

And of which, James A. Little in "The Pawpaw" wrote in 1905:

"We can never realize what a great blessing the pawpaw was to the first settlers while they were clearing the great natural forest and preparing to build cabins. Planting fruit trees was rather an experiment for a number of years. The pawpaws, and a few other wild fruits of less value, were all their dependence so far as fruit is concerned. Well do I remember sixty or more years ago my father would take his gun and basket to go to the woods and return in the evening loaded with pawpaws, young squirrels and sometimes mushrooms of which he was very fond. But there will never be a recurrence of those days which were the happiest of my life."

Vegetable - Lettuce (Lactuca sativa)

Lettuce is a cool-season crop that grows best when temperatures are between 45 - 65F. Due to Ohio's high summer temperatures, lettuce is best grown in early spring and fall. Seeds are generally sown in the spring as soon as the ground can be worked and in late August to early September for a fall crop.

Lettuce is available in an unbelievable array of shapes, textures and colors. Oakleaf types have deeply cut leaves; bibb lettuce have longer, generally thick leaves; butterheads produce loose heads full of sweet leaves; leaf lettuces grow a continuous supply of individual leaves arising from a single crown. Colors of lettuce range from red and burgundy to yellow, and deep or light green. The seed is inexpensive and can be sown in the garden as soon as the danger of heavy frost is over. Low tunnels or cold frames can be used for an earlier crop or to provide fresh greens from a fall planting well into early winter.

Lettuce can be grown in a variety of soils but having a soil that is well-drained with high organic matter is best for a successful lettuce crop. Seed should be sown in single rows or broadcast for wide-row planting. Cover the seeds with no more than a 1/2" of soil. Thin seedlings when plants are large enough to handle. Plants should have 4 - 6" between plants. Butterhead and romaine should be thinned 6 - 10" between plants while crisphead transplants should be spaced 10 - 12" apart in the row.

All lettuce types should be harvested when full size but young and tender. Over-mature lettuce is bitter and woody. Leaf lettuce is harvested by removing individual outer leaves so that the center leaves can continue to grow. Butterhead or romaine types can be harvested by removing the outer leaves, digging up the whole plant or cutting the plant about an inch above the soil surface. A second harvest is often possible this way. Crisphead lettuce is picked when the center is firm.

Most varieties of lettuce will go to flower once hot weather arrives. If you don't have lettuce now, sow lettuce seed again in late summer for a fall crop.

For More Information:
Ohio State University Extension
http://ohioline.osu.edu/hyg-fact/1000/1610.html
Cornell University
http://www.gardening.cornell.edu/homegardening/scene9aa6.html

Weed - Wild Onion and Garlic (Allium canadense and A. vineale)

Wild onion and garlic have been a complaint for homeowners in southern Ohio this week. Wild onion and garlic present a strong odor after it has been cut. Many people describe onion as having a garlic smell and garlic having the onion smell, further confusing the plants if not looking at some of the other distinguishing factors. These plants not only are problems in turf but can be problems in pastures, hay fields and wheat fields. Both plants have classic narrow leaves that look similar to their garden grown cousins. Although, with a closer look at these plants, wild garlic will have 2 to 4 leaves where as wild onion is described as having more than 2. Wild onion's leaves are somewhat flat above, slightly convex below and not hollow. Wild garlic, on the other hand, has hollow leaves.

Controlling these plants can be difficult in the lawn but the most important practice to keep many weeds from entering the lawn is to maintain a healthy stand of turf. This is done by mowing high and fertilizing according to soil test results. Hand
pulling or digging, while difficult, is an option. When trying to control with a chemical it is important to always read the label and follow the application instructions. A post emergent broadleaf herbicide (2, 4-D, MCPP, dicamba, etc.) should be applied during early to mid-spring. Mowing these plants immediately before treating can also help the uptake of the chemical thus having a better rate of control.

For More Information:
Clemson Cooperative Extension
http://www.clemson.edu/extension/hgic/pests/pdf/hgic2311.pdf
Purdue University
http://www.ppdl.purdue.edu/PPDL/weeklypics/3-10-03.html

**Hort Shorts »**

**Rarely Seen by the Uninitiated**

It’s a most wonderful time of the year. The finery of nature is on display, from the almost prehistoric look of buckeye leaves emerging to tiny unfurling beech leaves in flight. Pawpaw flowers are popping, robin redbreasts are nesting and dogwoods, striped maples, and larches are leafing - oh my! Take advantage of this once-a-year window to participate in the awakening.

Michael Dirr, speaking of the flowers of pawpaw, famously wrote in his *Manual of Woody Landscape Plants*, that their "lurid purple flowers" were "rarely seen by the uninitiated." This is an apt turn of phrase for springtime as the riots of spring bring major changes in plant daily. Magnolia flowers open and of course sometimes are blasted by frost the next day. Chartreuse-yellow Norway maple flowers and intense reds of red maple flowers and developing helicopter-like fruits are stunning but often many "uninitiated" question whether maples even have flowers.

Ultimately we are all uninitiated and ignorant of far more than that which we know. Shakespeare said, "In Nature's infinite book of secrecy, a little I can see." And Marcel Proust gloried in the thrill of discovery of that which we have seen but not registered when he said, "The true voyage of discovery lies not in finding new landscapes, but in having new eyes." So, when you do finally observe the flowers of katsuratree, showy in detail for perhaps a few days each spring if we are lucky, take it in amidst our busy nurture of nature days. And take a look at the accompanying image of the leaf buds with elaborate scales and the leaves then emerging on three-flowered maple (*Acer triflorum*). Who would have thought?

**Where Has All the Bark Gone?**

A trip along the Maumee River may have people wondering, what has happened to all the trees? The bark of trees on the banks and beyond of the Maumee River near Side Cut Metropark has gone missing. Large pieces have simply disappeared.

A close inspection of the trees today could be puzzling to many. A search for answers may have some turning to the web searching for the cause. Whether it was the local media, the national news, or a local posting their own videos or photos, a massive ice jam caused problems along the river near the 475/23 bridge several weeks ago. A cemetery, Side Cut Metropark, a private property along the river was inundated with large pieces of ice. Ice chunks that began move down the river when all of sudden it began to stack up - small mountains of ice in and along the river. While it took weeks for the ice to melt, the damage to trees, fences, grave stones, and buildings remain. The road that runs along the northside of the river is still closed in the area that sustained the brunt of the damage caused by the ice.

So next time when you see something unusual be sure to seek out the history of the site when determining the cause. If you aren't from NW Ohio, but are passing through, you might want to stop and take a look. It is pretty amazing and will definitely be something to watch and see how the trees respond over the next few years. Will they ever recover? Stay tuned for updates in BYGL.

**Tree School**
On Saturday, April 18, 2015, the 2nd Annual Tree School was held on the OSU Mansfield Campus as part of the OSU Woodland Stewards Program. This combination of indoor and outdoor sessions included eleven educational opportunities that participants could choose from throughout the day. Workshop presenters included: Jim Chatfield (OSUE), Mark Dilley (MAD Scientists Associates), Erik Draper (OSUE), Patrick Failor (First Energy), Denise Johnson (OSUE), Dianne Kahal-Berman (Ohio Department of Transportation), Kathy Smith (OSUE), Amy Stone (OSUE), Marne Titchenell (OSUE) and Curtis Young (OSUE).

If you like trees, this workshop is for you. Past participants have included: homeowners, woodland owners, Master Gardener Volunteers, Ohio Certified Volunteer Naturalists, and students.

Tree School was modeled after a larger and established program held at the other OSU – Oregon State University. If you missed this spring's program – be sure to plan on attending in 2016. Program information, including next year's date, will be included in fall issues of the BYGL.

**Bug Bytes »**

**Allegheny Mound Ants on the Rise**

The literature generally lists the native range for Alleghany mound ants (*Formica exsectoides*) as being from Nova Scotia south to Georgia, and from the Atlantic coast to the western side of the Appalachian Mountains. However, in recent years, there have been an increasing number of reports of this native ant occurring much further to the west including positive identifications of this ant in Indiana, Illinois and Iowa. So, it's not surprising that mounds are being consistently reported in southwest Ohio.

Allegheny mound ants are relatively large often measuring over 1/4" in length; they rival the size of BLACK CARPENTER ANTS (*Camponotus pennsylvanicus*). Their head, thorax, and legs are reddish-brown and their abdomens are shiny-black. As their common name implies, these are true mound-builders. Their conical mounds are constructed of loose bits of soil brought to the surface from tunnels excavated as deep as 3' below the mound. Most mounds range in height from 1 - 2' and are about 2 - 3' in diameter; however, some mounds may grow to a dizzying height (for ants) of 4' with a diameter of over 5'. The colonies have multiple queens and the mound acts as a solar collector to provide warmth to incubate their immature progeny.

There are a number of large ground-nesting ants that are sometimes mistaken for mound ants including FIELD ANTS (*Formica* spp.). These ants live below ground, but construct low-level mounds of loose soil. They may nest in un-mowed grass, wooded areas, or beneath landscape plants. The ants use plant material such as plant stems as scaffolding to stabilize excavated soil and their low mounds may cover an expanse of 2 - 3'; however, the height of their mounds seldom exceed the height of un-mowed grass. Also, these ants do not cause damage to plants.

Alleghany mound ants kill any plant that shades their mounds. They can cause significant damage to small trees and shrubs and are sometimes a serious pest in Christmas tree plantations. The ants use their powerful mandibles to wound the offending plant, and then they inject formic acid into the wounds. Thousands of wounds can produce rapid results with plants wilting and dying in a few days.

Appropriately labeled ant control products for use outdoors can eliminate mound ant colonies. Applications should be made to partially excavated mounds to allow the insecticide to penetrate into the colony. An alternative approach is to continually destroy the mound; eventually the ants will get the idea they are not wanted and move their colony elsewhere. Of course, there is always the risk that the ants will take up residence in another less-preferred location requiring another round of ant mound annihilation. A word of caution: these ants can deliver a painful, pinching bite! Anti-ant agitators should wear long pants tucked into socks and use a shovel rather than a well-aimed foot for mound de-construction.

For More Information:

OSU Extension Entomology "Bug Doc" Fact Sheet
[http://entomology.osu.edu/~bugdoc/Shetlar/factsheet/christmasstree/allegheny_mound_ants.htm](http://entomology.osu.edu/~bugdoc/Shetlar/factsheet/christmasstree/allegheny_mound_ants.htm)
Firewood Beetle Flare-up

This is the time of the year when a number of beetles can emerge from firewood stored in or around homes ... to the surprise and consternation of homeowners! BYGLers reported receiving phone calls and e-mail messages concerning BANDED ASH BORERS (*Neoclytus caprea*) and PAINTED HICKORY BORERS (*Megacyllene caryae*) emerging from firewood. Both beetles are native to North America and belong to the beetle family Cerambycidae. Members of this family are referred to as "longhorned beetles" because of their unusually long antennae; however, the antennae of banded ash borer and painted hickory borer are not particularly long.

Both beetles have tapering, cylindrical, 3/4 - 1" long black bodies covered by yellow to light-yellow or cream-colored markings. The wing covers (elytra) on the banded ash borer have two distinct white circles at the front, which look like shoulder-pads, followed by two thin, white transverse bands. The band closest to the circles looks like a flattened "M." The underside of the abdomen sports yellow and black bands, thus the common name.

The painted hickory borer has rows of horizontal yellow bands on the upper surfaces of the head and thorax. The first marking from front-to-back on the elytra is also a yellow horizontal band; however, the second marking appears as a distinct "W" that is light yellow to cream-colored. The remaining markings are yellow and appear as broken W-shaped bands. The beetles look very similar to LOCUST BORERS (*M. robiniae*); however, painted hickory borers emerge from cut wood in the spring and locust borers emerge from live trees in late summer to early fall.

Despite their common names, both beetles infest a wide range of hardwoods. Banded ash borers target ash, hickory, elm, and occasionally white oak. Painted hickory borer infests hickory as well as ash, black locust, hackberry, honeylocust, oak, Osage-orange, walnut and butternut. Fortunately, painted hickory borers only infest dead wood that has been cut for less than one year and banded ash borers infest dying or recently dead trees. In fact, both beetles are considered forest products pests since they often target fresh-cut logs to be used for lumber or firewood. The beetles will not infest older dead wood; they will not infest wood that has been dried or processed into home furnishings, or used as structural wood. So, beetles that emerge from infested firewood in or around a home are only nuisance pests.

For More Information:
Utah State University Fact Sheet
Purdue Extension, Department of Entomology Fact Sheet

Windshield Wipes

BYGLers also ran into a number of other insect pests this week including:

* Curtis Young reported observing HAWTHORN LEAFMINER (*Fraenusa canadensis*) adults resting or sheltering in newly expanding COCKSPUR HAWTHORN (*Crataegus crus-galli*) leaf clusters. The leaves of the hawthorn were about 1" long or shorter and still fairly tightly clustered from emerging from the buds. Temperatures at the time were cool (low 40F). Upon rolling back several of the leaves, Curtis discovered the sawfly adults down in the clusters of leaves. These sawflies will be laying their eggs in the leaves in the near future which will hatch into the larvae that produce the unsightly blotch mines in the tips of the leaves. There is only one generation per year, but the mines produced by the offsprings will linger into the summer months.

* Another leafminer that Curtis Young observed on Monday (4/27/2015) was the EUROPEAN ELM FLEA WEEVIL (*Orchestes alni*). This non-native pest attacks all species of elms including AMERICAN ELM (*Ulmus americana*); however, SIBERIAN ELMS (*Ulmus pumila*) and elm hybrids with Siberian elm as one of the parent species are particularly
susceptible. The young, expanding leaves of an elm hybrid used as a street tree in Ada, Ohio were already riddled with shotholes from the adult feeding activity of the elm flea weevil. Soon the evidence of the leafmining stage of this insect will be showing up on these expanding leaves of the elms. This recently-arrived, elm pest appears to be well-distributed throughout Ohio and many other mid-western states.

*Curtis Young reported on the hatching of EUROPEAN PINE SAWFLIES (EPS) (*Neodiprion sertifer*) in NW Ohio. Curtis was checking the progression of the blooming of EASTERN REDBUDS (*Cercis canadensis*) in a park in Lima, Ohio. The redbuds were showing an abundance of pink coloration from the developing blooms, but the blossoms had not begun to open. Adjacent to the redbuds is a group of SCOTTS (SCOTCH) PINES (*Pinus sylvestris*) that are perennial hosts to EPS. As cool as temperatures have been, Curtis was not expecting to see much on the pines, but as the saying goes, "timing is everything," he discovered multiple newly-hatched, aggregations of EPS larvae. According to the OARDC Growing Degree Day (GDD) accumulation and Phenology table, EPS is expected to hatch around a GDD accumulation of 144. The GDD for Lima, Ohio on Monday April 27, 2015 was 138...very close to the predicted average hatch time for EPS. Redbud first bloom is not expected until GDD accumulation of 191. Based on the very limited feeding injury and the fact that the larvae were still on the needles from which they had hatched, the larvae were probably less than 24 hours old. Thus, for the northern half of Ohio, look for newly-hatched EPS larvae on their favorite hosts such as mugo and Scots pines. These tiny sawfly larvae can be easily dispatched by a quick pruning snip or a tiny spot spray with an insecticide such as carbaryl (i.e. Sevin).

Disease Digest »

Infectious Plant Disease Cycles

As we move into the season, it is important for understanding plant diseases to understand disease cycles. For example, how does the pathogenic inoculum survive from one growing season to the next growing season? When for example, does inoculum such as fungal spores and fungal mycelium infect plants? This is essential, since for example fungicides mostly protect from inoculum infecting the plant rather than getting rid of the fungus once it is in the plant, making timing to match the disease cycle essential.

Cycles are important ways to understand nature, from the nitrogen and carbon cycles, to the hydrologic and weather cycles, to circadian rhythms and even the tides driven by cycles of the moon. Cycles are also critical in plant pest and disease management, from the life cycles of insects to the cycles of plant and pest growth in response to environmental events (phenology). Let us focus now, though, on plant disease cycles, what the American Phytopathological Society defines as the: "Succession of all events and interactions among the host, parasite and environment that occur in a disease, from initial infection of the plant by a causal agent, through pathogenesis, to over-seasoning, until another infection occurs."

Disease cycles are important to arborists and other horticulturists because understanding this unique succession of events for each infectious plant disease is the key to development of effective management strategies for each disease. How does the fungal or bacterial pathogen survive between growing seasons? How does the pathogen move about? Do insects play a role in the dispersal of pathogens? When do infections occur? Does the infecting stage of the pathogen (the inoculum) have an Energizer Bunny aspect (it just keeps going and going and going...)? What is the latent period and what are latent infections? Answers to these questions have practical applications.

Let's start with the term *inoculum*, what Gail Schumann and Cleora D'Arcy define in their excellent book *"Essential Plant Pathology"* as "the structure or part of the pathogen that initiates disease". Inoculum can be microscopic spores or threadlike mycelia of fungi, microscopic bacterial cells, microscopic parasitic eelworms known as plant parasitic nematodes, or submicroscopic particles of viruses or phytoplasmas, so small even regular light microscopes cannot detect this inoculum. One of the reasons that determining disease cycles was mysterious for so long and why disease management is complicated is that the inoculum of the pathogen is so small. It is invisible to the naked eye upon arrival to the plant, penetration of plant tissue, and infection of the plant occurs.

It is important to consider how that inoculum, for example fungal spores, got to the plant. How and where the pathogen survives between seasons, how it overwinters, is crucial for disease management. The vascular wilt *Verticillium* fungus overwinters in the soil and in the plant, the *Sphaeropsis sapinea* fungus that causes tip blight on pines overwinters on cones and on infected needles, and as latent infections in stems. The apple scab fungus, *Venturia inaequalis* and the rose black spot fungus, *Diplocarpon rosae*, overwinter on infested, fallen leaves and on plant parts such as apple and crabapple fruits (apple scab) and on rose canes (rose black spot). This part of the disease cycle matters because, for example, cleaning up those black-spotted leaves during the growing season, after the growing season and before the next growing season is an important sanitation practice for managing the disease by removing the pathogen from the planting.

How the inoculum of the pathogen is dispersed is also critical, and can include through the air, water, tools, insect vectors,
and through propagation by seed or asexually. Remember that inoculum is microscopic in size, meaning that it is easily moved by the slightest wind and in splashed soil. Bacterial wilt of geraniums, caused by *Xanthomonas pelargonii* is a serious problem for greenhouse growers, with a prominent mode of dispersal for the inoculum being the use of knives used for taking cuttings when sanitation is not adequate. One of the frustrations again of disease management is that you cannot see the inoculum as it is dispersed.

A critical question with inoculum and disease cycles is whether a disease is monocyclic or polycyclic. This relates to whether a plant produces both primary and secondary inoculum. A good example of a polycyclic disease is apple scab, a disease of apple and crabapple (*Malus*). The *Venturia inaequalis* pathogen overwinters mostly in infested fallen scabby leaves from the previous growing season. The fungus developed a host-parasite relationship in those leaves, between the cuticle and epidermis, resulting in the typical olive to gray to brown spots and scabby lesions, leave yellowing, and leaf drop. The fungus then lives saprophytically on dead leaf tissue in the fall and winter.

The fungus is not idle over the winter, with two strains of the fungus combining in sexual reproduction over the winter and early spring, producing tiny pimple-like fruiting bodies with sexual spores. Synchronous with developing *Malus* leaves and flowers in the spring, and splashing water and wind dispersal, the pathogen arrives on the plant, followed by infection and disease development. These sexual spores of *Venturia*, classified as ascospores, are the primary inoculum each spring, starting the disease. Preventing these primary inoculations from these ascospores that developed over winter is critical for disease control using fungicides (though use of resistant taxa of *Malus* is a more preventive way to go).

To recap, the successful primary inoculum arrives at the plant, recognizes this is its host (food source), overcomes other host plant defenses and penetrates host tissue, and develops a host-parasite infection in the plant. The pathogen then colonizes this host tissue, but development of symptoms in the plant is delayed for a period of time, known as the incubation period. This is another frustrating aspect of plant disease management. Fungicides work to prevent penetration and infections or if fungicides with more systemic action are used, to arrest early infections within a few days of penetration. However, if fungicides are not fully effective, not only can plant managers not see penetration and infection, there are not even symptoms from the infection for a week, a month or longer, making us uncertain whether infections occurred or not.

With polycyclic disease like apple scab, though, the story continues yet further. The primary inoculum penetrates and infects crabapple leaves, establishing the host-parasite relationship within the plant. Then the fungus continues to colonize leaf tissue, and after the incubation period produces symptoms, then in the scab lesions on the leaves, the fungus develops a new set of spores. This new set of spores is not the product of two strains of the fungus that underwent sexual reproduction in the overwintering period, but rather is a new set of asexual spores, known as conidia. These conidia are what is known as secondary inoculum, which constitutes the repeating cycle of the fungus that keeps going and going, again and again, through much of the growing season, infecting apple and crabapple leaves anew.

This repeating cycle obviously has great implications for disease control strategies relative to fungicide use. It means, since fungicides do not last the entire season and since control of primary inoculum is never completely controlled, that re-applications should be considered with such polycyclic diseases. Since the fungus may continue to re-infect through this secondary inoculum, protection with additional fungicide sprays may be warranted.

Every disease cycle is unique in some way, but for example, black spot of roses is another polycyclic disease, with both primary and secondary inoculum, and similar fungicide strategies are warranted in terms of the importance of controlling primary infections and yet the need to also prevent secondary infections. On the other hand, the ultimate in complication, rust diseases, have up to five spore types. Fungicide control of cedar rusts, for example, is complicated by the fact that the pathogen actually cycles between certain junipers (Eastern red cedar) and a rosaceous host (crabapple, hawthorn, quince). Nevertheless, understanding the simple pattern of the disease cycle helps remove the complications.

This is because the cedar rust fungi do not have a repeating cycle on the rosaceous host. You can prevent primary infections with fungicides on that crabapple or hawthorn in the spring when spores are being dispersed from the juniper, but due to the unique nature of this disease, there will be no secondary inoculum or secondary infections on that rosaceous host. Spores eventually produced on the rosaceous hosts during the growing season will only infect the juniper hosts. The disease cycle tells all.

There are monocyclic disease such as Verticillium wilt and Dutch elm disease and Sphaeropsis blight of pine, but as ever, nature is messy. An example is Sphaeropsis tip blight of pine. Though the *Sphaeropsis* fungus typically infects susceptible pines with primary inoculum only in the spring, when new candles develop and not with a repeating cycle of secondary infections throughout the summer, John Hartman and his graduate students at the University of Kentucky have shown that something called latent infections complicates matters.
Sometimes the plant arrests the infection and a periderm layer develops, walling off the infection, with the result that, though the fungus does not die, colonization does not result to the point where symptoms occur. This incubation period can go on for months and years, only to end when stress or injury, for example potentially by a hailstorm, results in further colonization of plant tissue by the fungus, and then symptoms. Of course, until symptoms of tip blight and branch dieback occur, plant managers do not even know about these latent infections. Not fair!

It is ever so with nature, nurture, and horticulture. Over one hundred years ago, the plant pathologist Anton Woronin declared: "The only cure for cabbage hernia is fire!". The disease of which he spoke is now known as club root of cabbage, there are now some other control practices available, but notice that he was relating to the disease cycle. The *Plasmodiophora brassicae* pathogen that causes the disease survives the winter in infected plant debris. Burning the residue was a way of breaking the disease cycle by controlling the primary inoculum from overwintering until the next growing season.

### Turf Tips »

**Excellent Turf Resource**

Another excellent timely resource for turfphiles is found on the "all turf- all the time" Buckeye Turf website. This site is loaded with turfgrass-oriented videos, photos, growing tips and even educational opportunities. One can browse the Buckeye Turf Videos, searching for topics applicable to this time of year. Most of these videos are done by Todd Hicks and Joe Rimelspach from Ohio State's Department of Plant Pathology. Whether trying to determine if the problem is a diseases or struggling to diagnose strange turfgrass growth patterns, all of these maladies can be discovered here at this site. Check out the website at [http://buckeyeturf.osu.edu](http://buckeyeturf.osu.edu)

### Industry Insight »

**The Awesomeness of Lightning**

A lightning strike is an awe inspiring natural phenomenon. The flash, the shapes, the suddenness, and the accompanying crash of thunder takes one's breath away. Then when one considers the massive amount of energy contained in that lightning bolt and the potential destructiveness of it, it becomes quite frightening.

Lightning strikes the earth somewhere around the globe about 100 times every second. Many of these strikes hit the ground directly, while other strikes move through objects such as buildings, trees and people. The taller an object is and the more isolated it is, the greater the potential is for it to be struck by lightning. Lightning is a transient, high-current, electric discharge. The total current involved in a lightning strike is between 20,000 and 50,000 amps at about 100,000 volts, and lasts for 0.1 - 0.2 seconds. The release of all that energy can generate temperatures as high as 54,000F which is around 5 times hotter than temperatures on the sun. Thus, the potential destructive force release on an object, living or non-living is huge!

When a tree is struck by lightning, it could be curtains for the tree in an instant. The tree could totally blown to pieces and set afire by the strike. In these cases, there is no question that the tree is a total loss and all that remains is clean-up to dispose of the devastated tree. However, it is not always so clear cut as to the fate of a tree that has been struck by lightning.

When some trees are struck by lightning, there will be obvious external signs that it has been hit. These signs include, but are not limited to: broken branches; wilted and singed leaves; strips of bark blown off of the surface of the tree, grooves in the exposed wood; and burned area around the base of the tree. These physical injuries are produced when the energy of the lightning instantaneously boils the sap/water within the tree's tissues. The boiling converts the liquid to steam. The sudden conversion of liquid to steam and the rapid expansion of the steam explodes the tissues. This is why chunks and strips of bark and wood can be found many feet away from the damaged tree. Other struck trees may not show any initial external symptoms of the strike, but may suddenly die a few days to weeks after the damage due to extensive underground damage to the root system of the tree.

Once a tree has been struck and has not been totally devastated, then the question becomes what to do with the tree. Try to save it? Or remove it? Not easy questions to answer. Trying to save and repair a lightning struck tree could be very expensive, and after all one's best efforts, the tree may still die. So what is a person to do?
Recommendations for dealing with a lightning struck tree include:

- Initial remove obviously damaged parts of the tree (i.e. crack, torn and broken limbs and branches)
- Remove flaps of damaged bark.
- Do not use sealants, tree paints or tars over the exposed wood surfaces.
- Then wait a full growing season to determine the extent of damage caused by a lightning strike.
- During the waiting period, water as needed, and protect the tree from insect infestation as feasible.

If the tree survives, reevaluate the tree for the extent of the damage and the value of the tree as a landscape item. If the damage is not greater than what was initially observed and the tree has not lost critical structural roots that are necessary to keep it upright, then one might invest more money in major repairs and/or fertilization. One should be very conservative when dealing with damaged trees. The risks and liabilities associated with damaged trees can be great and should be taken into consideration during the reevaluation of the tree.

Ohio Department of Agriculture to Begin Gypsy Moth Treatments in Southern Ohio

The Ohio Department of Agriculture (ODA) will soon begin aerial treatments designed to control the gypsy moth population in Ohio. Treatments will begin being made in southern Ohio and will continue as the crew moves in a northern direction. Two thousand acres in Athens, Hocking, Pickaway, Ross and Vinton Counties will be treated in early May, as larva and leaf development reaches the optimal threshold for treatment.

Treatments will be applied by using a low-flying aircraft that flies just above tree tops. High humidity, low temperature and minimal wind are crucial for a successful application and will be monitored very closely. Treatment will most likely take place during early morning hours when conditions are usually more favorable.

ODA will use Foray (Btk), a naturally occurring bacterium found in the soil that interferes with the caterpillars' feeding cycles and Gyppher (NPV), a virus that affects only the gypsy moth caterpillars and has no effect on beneficial insects. These treatments are not toxic to humans, pets, birds or fish.

Ohioans can view maps of treatment blocks online at [www.agri.ohio.gov](http://www.agri.ohio.gov]. Daily updates on treatment progress across the state are available by calling 614-387-0907 or 1-800-282-1955, ext. 37, any time after 5 p.m.

Gypsy moths are invasive insects that defoliate over 300 species of trees and shrubs. In its caterpillar stage, the moth feeds on the leaves of trees and shrubs and is especially fond of oak. A healthy tree can usually withstand only two years of defoliation before it is permanently damaged or dies. In Ohio, 51 counties are currently under gypsy moth quarantine regulations.

ODA uses three programs to manage the gypsy moth population in Ohio. The suppression program is used in counties where the pest is already established, but landowners voluntarily request treatment to help suppress populations. The second program, slow-the-spread, occurs in counties in front of the larger, advancing gypsy moth population. The third program is the eradication program, used in counties where isolated populations develop ahead of advancing moth populations due to human movement of the moth. Officials work to detect and control isolated populations to slow the overall advancement of the gypsy moth infestation.

In total for the state, 3,779 acres in 14 counties will receive treatment. For more information about the gypsy moth quarantine or for specific treatment locations, visit [www.agri.ohio.gov](http://www.agri.ohio.gov)

For More Information:
ODA Website
[http://www.agri.ohio.gov](http://www.agri.ohio.gov)

WeatherWatch »

Weather Update
The following weather information summarizes data collected at various Ohio Agricultural Research Development Center (OARDC) Weather Stations spanning the dates from April 1 - 29, 2015, with the exception of the soil temperatures which are readings from Wednesday, April 29, 2015 at 11:10 p.m.

Last week, cold temperatures were experienced across Ohio. Joe Boggs, Cindy Meyer and Pam Bennett reported frosts last week. Joe and Cindy didn't seem to think there was a lot of injury in SW Ohio. Pam Bennett did mention that there was some injury in Clark County. It was more than frosts in north. Amy Stone reported breaking a 100+ year record when the thermometer dropped to 27F last Tuesday, April 21 in the Toledo area. Erik Draper mentioned the four letter word in his report - SNOW!

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For More Information:
OARDC Weather Stations
http://www.oardc.ohio-state.edu/centernet/weather.htm

**Growing Degree Days (GDD)**

GDD is a measure of the daily maximum and minimum temperature and directly relates to growth and development of plants and insects. The GDD of any zip code location in Ohio is estimated using the GDD of ten OARDC weather stations and available on the web at: [http://www.oardc.ohio-state.edu/gdd/](http://www.oardc.ohio-state.edu/gdd/).

The range of GDD accumulations in Ohio from north to south is 111 to 261. Following is a report of GDD for several locations around Ohio as of end of the day of April 29, 2015: Painesville, 111; Cleveland, 123; Toledo, 128; Canfield, 129; Findlay, 128; Van Wert, 135; Wooster, 144; Coshocton, 190; Columbus, 220; Springfield, 203; Dayton, 208; Cincinnati, 244; Ironton, 260; Portsmouth, 261; and Piketon, 251.

To put these GDD accumulations into perspective, the following is an abbreviated listing of plant and insect species with their respective phenological event and average GDD accumulations at which these events occur. Due to variations in weather, temperature, humidity, etc., these events may occur a few days earlier or later than predicted by the average GDD. By looking at a city, town, or village nearby on the above list, or visiting the above web site, one can see what is approximately taking place in the landscape.

**Eastern tent caterpillar, egg hatch, 92**; Manchur cherry, first bloom, 93; northern lights forsythia, full bloom, 94; Norway maple, first bloom, 116; border forsythia, full bloom, 116; chinticleer callery pear, first bloom, 123; sargent cherry, first bloom, 127; **larch casebearer, egg hatch, 128**; Japanese pieris, full bloom, 129; saucer magnolia, first bloom, 133; common flowering quince, first bloom, 137; Bradford callery pear, first bloom, 142; **European pine sawfly, egg hatch, 144**; weeping Higan cherry, first bloom, 145; P.J.M. rhododendron, first bloom, 147; chinticleer callery pear, full bloom, 149; Norway maple, full bloom, 149; **inkberry leafminer, adult emergence, 150**; sargent cherry, full bloom, 151; star magnolia, full bloom, 151; Allegheny serviceberry, first bloom, 153; Manchur cherry, full bloom, 155; spring snow crabapple, first bloom, 155; apple serviceberry, first bloom, 159; **spruce spider mite, egg hatch, 162**; Bradford callery pear, full bloom, 164; Allegheny serviceberry, full bloom, 169; saucer magnolia, full bloom, 174; P.J.M. rhododendron, full bloom, 178; **boxwood psyllid, egg hatch, 179**; weeping Higan cherry, full bloom, 179; Koreanspice viburnum, first bloom, 185; regent serviceberry, first bloom, 186; Japanese flowering crabapple, first bloom, 189; eastern redbud, first bloom, 191; **gypsy moth, egg hatch, 192**; Koreanspice viburnum, full bloom, 205; **azalea lace bug, egg hatch, 206**; 'Spring Snow'
crabapple, full bloom, 209; common flowering quince, full bloom, 214; birch leafminer, adult emergence, 215; 'Coralburst' crabapple, first bloom, 217; elm leafminer, adult emergence, 219; common chokecherry, full bloom, 221; alder leafminer, adult emergence, 224; honeylocust plant bug, egg hatch, 230; sargent crabapple, first bloom, 230; common lilac, first bloom, 234; Ohio buckeye, first bloom, 245; common horsechestnut, first bloom, 251; hawthorn lace bug, adult emergence, 253; hawthorn leafminer, adult emergence, 260; flowering dogwood, first bloom, 263; red buckeye, first bloom, 265; blackhaw viburnum, first bloom, 269; imported willow leaf beetle, adult emergence, 274; and Sargent crabapple, full bloom, 298.

For More Information:
Growing Degree Days and Phenology for Ohio
http://www.oardc.ohio-state.edu/gdd/
Understanding and Using Degree-Days
http://ohioline.osu.edu/sc165/sc165_14.html

**Coming Attractions**

**Pond School - May 27, 2015**

Pond School is a 3-hour workshop on pond care and management. There will be 8 different presentations to choose from taking place across 3 concurrent tracks of 1-hour sessions. There will be lectures, hands-on, and outdoor sessions on a variety of aquatic topics including algae control, aggressive vegetation, managing wildlife around the pond, fish management, aerating, water testing and more. Pre-registration is required and space is limited. The event is May 27, 2015 at Wolf Creek Environmental Center, 6100 Ridge Rd., Sharon Center, OH in Medina County. Program starts at 5:30 p.m. and goes to 8:30 p.m. Registration Deadline is May 11, 2015. For more information visit: http://go.osu.edu/pond

**Buckeye Lady Beetle Blitz & Good Garden Bugs Workshop**

The Ag-Urban Landscape Ecology Lab is hosting three sessions of a workshop this year in May to kick off The Buckeye Lady Beetle Blitz 2015! This workshop will focus on training for our Buckeye Lady Beetle Blitz citizen science project. We will provide a review of lady beetle identification and sampling procedures, and distribute the 2015 toolkits. Dr. Mary Gardiner will also cover information from her new book, "Good Garden Bugs", due out this May. Participants will learn about the diversity of beneficial arthropods that inhabit their garden. A flyer is attached with additional information, and even more can found on our website: http://www.ladybeetles.osu.edu. Please direct any questions towards Chelsea Smith smith.7231@osu.edu or call 330-202-3555 x2583.

We have three locations for this workshop:
- WOOSTER: May 14, 2015 at OARDC's Fisher Auditorium, 1680 Madison Ave, Wooster, OH;
- CLEVELAND: May 21, 2015 at the OSU Cuyahoga County Extension Office, 5320 Stanard Ave., Cleveland, OH;
- DAYTON: May 27, 2015 at the Montgomery County Fairgrounds, 1001 South Main Street, Dayton, OH.

Registration: PRE-REGISTRATION IS REQUIRED. The cost for the workshop is $20.00. Checks should be written out to "Ohio State University". Lunch will NOT be provided. Participants can bring a brown bag lunch or visit a local restaurant (a list of local options will be provided). The registration fee includes workshop attendance, beverages, and BLBB sampling kits. Follow this link for a registration form: http://ale.cfaes.ohio-state.edu/sites/gardinerlab/files/imce/Events/2015%20registration%20form_workshop_ALL-fillable_0.pdf and send it by email* to Chelsea Smith smith.7231@osu.edu or US mail to:

Chelsea Smith
1680 Madison Ave
Thorne Hall
Wooster, OH 44691

Please send your registration form in at least 3 days before the workshop you are attending. For more information please contact: Chelsea Smith ( smith.7231@osu.edu or call 330-202-3555 x2583). Learn more by visiting http://www.ladybeetles.osu.edu.

* If you are emailing the form in please follow these steps: 1) Fill out the PDF 2) Save the PDF as a file on your
The OSU GreenIndustry Short Course, The Ohio Turfgrass Foundation Conference and Trade Show, and Trees on Tap Programs

Mark your calendars now, as these shows will be here sooner than you think. The event will be moving back to the Columbus Convention Center in 2015 and will be held on December 8 - 10, 2015, with the addition of a special tree program on Monday, December 7, 2015. Details on over 100 educational programs and a wide array of certification credits will be coming throughout the BYGL season. We are happy to acknowledge the robust support of the Ohio Turfgrass Foundation for their financial and other aid of the educational efforts of the OSU Extension Nursery Landscape and Turf (ENLT) Team, a group of Extension Educators and OSU Specialists that brings to you a range of programs including field diagnostic walkabouts (such as BYGLive! in southwest Ohio) and diagnostic workshops as well as help with horticulture problem troubleshooting, numerous publications, and of course, the BYGL.

A key speaker for both the Trees on Tap program and the tree care track of the Green Industry Short Course will be Dr. Ed Gilman of the University of Florida Environmental Horticulture program. Ed is Professor of Urban Trees and Landscape Plants and his research and educational efforts focus on tree care practices such as the effect of tree pruning on tree biology, production practices and landscape establishment, root pruning, and irrigation and fertilization practices. He is reason enough alone to attend the conference.

Byglosophy

"I used to think that the brain was the most wonderful organ in my body. Then I realized who was telling me this." - Emo Phillips

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