Plant Health Care Report

The Morton Arboretum

Scouting Report of The Morton Arboretum

April 3 – April 16, 2009 **Issue 2009.02**

Our report includes up-to-date disease and insect pest reports, as well as color images, for northeastern Illinois. You'll also find a table of accumulated growing degree days throughout Illinois, precipitation, and plant phenology indicators to help predict pest emergence.

Happy Arbor Day!

Next Friday, April 24th, is our biggest holiday of the year, ARBOR DAY! To celebrate, plant a tree or two, then visit the arboretum during this year's Arbor Week that runs from April 18th to April 26th.

Arbor Day was started by J. Sterling Morton, father of Joy Morton, the founder of The Morton Arboretum. An estimated one million trees were planted on the first Arbor Day, April 10, 1872. Nationally Arbor Day is celebrated the last Friday in April.

Quick View

What Indicator Plants are in Bloom at the Arboretum?
Acer rubrum (red maple) is in full-bloom.

Accumulated Growing Degree Days (Base 50): 28
Accumulated Growing Degree Days (Base 30): 600

Insects

- Hemlock rust mite
- Woolly alder aphid
- Larch casebearer
- Spiny rose gall

Diseases

- Lophodermium
- Rhizosphaera
- Volutella stem and leaf blight
- Cytospora canker of spruce
- Black knot

Feature article:

- The Disease Triangle: An Essential Tool
  By Trica Barron, Plant Health Care Technician

Degree Days and Weather Information

As of April 16, 2009 we were at 28 growing degree days. The historical average (1937-2008) for the same date is 59. Last year we were at 18 growing degree days on April 16.

Location	Growing Degree Days through April 16	Precipitation between April 3 to April 16 in inches
The Morton Arboretum (Lisle, IL)	28	1.27
Chicago Botanic Garden (Glencoe, IL)*	N/A	N/A
Chicago O-Hare Airport*	22	0.77
Aurora, IL	14.0	
Champaign, IL	63.9	
DuPage County Airport (West Chicago, IL)	23.5	
Decatur, IL	73.4	
Moline, IL	27.5	
Peoria, IL	38.5	
Quincy, IL	65.0	
Rockford, IL	12.0	
Waukegan, IL	8.0	
Wheeling, IL	13.9	

**Thank you to Mike Brouillard, Green Living, Inc., and Chris Yooning, Chicago Botanic Garden, for supplying us with this information.*

This Week's Sightings

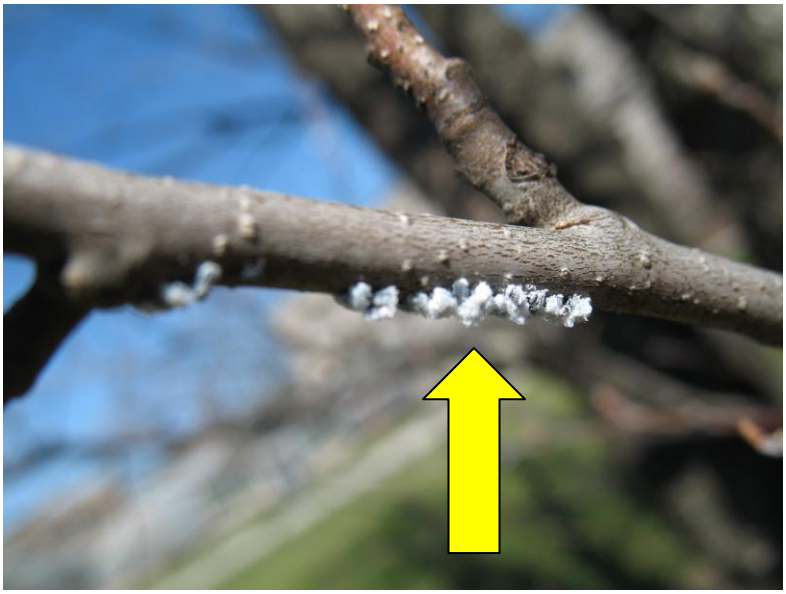
Hemlock rust mite

We've found hemlock rust mites (*Nalepella tsugifolia*), an eriophyid mite, on Eastern hemlock (*Tsuga canadensis*). Rust mites suck the juices from conifer needles, causing the infested needles to turn yellow, then brown. If the infestation is severe, mite-ridden needles will drop off the tree. The mites themselves are cigar-shaped, pale yellow, are very tiny about the size of dust, and can only be viewed using a strong hand lens or dissecting scope. These cool season mites may also attack fir, yew, and spruce.

Control: We are unaware of any cultural controls. For severe infestations, insecticidal soaps, summer oils, or miticides should be applied after eggs hatch, which is usually when saucer magnolia is in the pink bud stage. For further information on chemical controls refer to the University of Illinois *2007 Commercial Landscape & Turfgrass Pest Management Handbook* (CPM), for commercial applicators, and the *Home, Yard & Garden Pest Guide* (HYG) for homeowners.

Good website:
http://www.entomology.umn.edu/cues/Web/146HemlockRustMite.pdf

Woolly alder aphid



Several masses of woolly alder aphids have been found on the lower branches of European alder (*Alnus glutinosa)*. Aphids are small (about 1/12th of an inch long) and have sucking mouthparts, long, thin legs, long antennae, pear-shaped body, and a pair of tube-like structures (called cornicles) emerging from their abdomen. Two hosts are needed to complete their life cycle: alders and silver maples. The eggs are usually laid in fall in the bark of the maples. When the young hatch in spring, they collect on leaves and reproduce. Their offspring fly to alders and collect on the twigs where new generations develop. They are small and covered with white waxy filaments, which makes them easy to see. In fall, they will fly back to the silver maples to lay eggs. They do little damage.

Control: Aphids can be dislodged from plants using a strong jet of water from the hose (syringing). Periodic syringing will keep the aphid populations low and allow the parasites and predators to build up to effective control levels.

Good websites:
http://www.ipm.iastate.edu/ipm/hortnews/2000/7-21-2000/woollyaphid.html
http://www.entomology.umn.edu/cues/Web/223WoollyAlderAphid.pdf

Larch casebearer

Larch casebearer (*Coleophora laricella*) larvae are beginning to feed on the emerging needles of Olga Bay larch (*Larix gmelinii var. olgensis*) and larch (*Larix sp.)* throughout the Arboretum. The larvae hollow out needles, causing them to first wilt and then bleach to a light off-yellow color. The needles will soon turn reddish-brown and drop prematurely within a few weeks.

The caterpillars of this species are very small and overwinter as larvae within tiny tan-colored cases made of hollowed-out needles lined with silk. They blend in with the bark on the twigs. Larvae emerge and begin feeding in early spring as needle growth begins. They feed for several weeks, pupate on the twigs, and emerge as adult moths in late May and early June. The adults lay eggs on needles and, in a few weeks, eggs hatch (late June and July) and larvae begin to mine inside the needles. Larvae mine the needles for about two months before making their cases from hollowed-out needles. They will stay within their cases for the remainder of their larval period.
Control: Unlike most other conifers, larches can develop a second set of leaves; however, repeated defoliation can weaken trees and make them more susceptible to attack by other insects and pathogens. There are various natural controls, such as weather, predators and parasites, and needle diseases that usually keep populations in check. For severe or repeated infestations, insecticides should be applied now. According to the USDA Forest Service

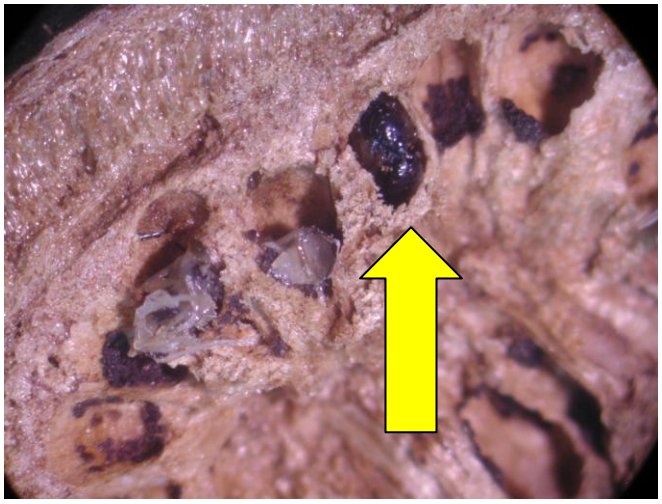
(http://na.fs.fed.us/spfo/pubs/fidls/larch/larch.htm), malathion is effective. You can also use *Bacillus thuringiensis* ssp. *kurstaki* (Btk) once feeding begins.

Good websites:
http://www.umassgreeninfo.org/fact_sheets/defoliators/larch_casebearer.html
http://na.fs.fed.us/spfo/pubs/fidls/larch/larch.htm

Spiny rose gall

We have found spiny rose gall on purple pavement roses (*Rosa* 'Purple Pavement') on our arboretum grounds. At a quick glance, these galls can be mistaken for rose hips. The galls are caused by tiny wasps belonging to the Cynipidae family. The wasps lay eggs on developing buds and shoots. The spiny rose galls are hard growths that are armed with stout, sharp spines on the exterior. Inside are caverns with developing grubs. Most gall infestations have little or no effect on the plants' health.

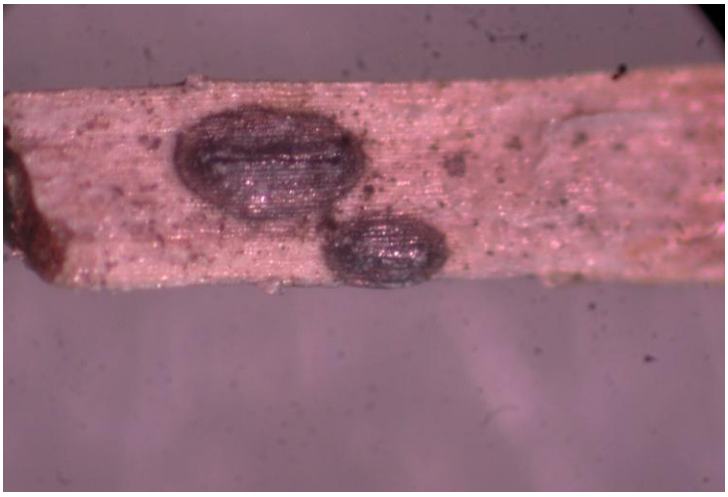
Control: Prune out and destroy all galls. There are no chemical recommendations.



Developing grubs inside the galls.

Lophodermium

A sample of lophodermium needlecast (*Lophodermium sp.*) on limber pine (*Pinus flexilis)* was brought into the plant clinic. This fungus will attack all pine species. Scotch pine (*Pinus sylvestris*) and red pine (*P. resinosa*) are more susceptible to the disease than other pines. In March and April, brown spots with yellow edges form on last year's needles. These spots will continue to grow until the entire needle turns brown and dies. The dead needles will begin to fall off the tree in early summer and continue through the growing season. In late summer, fruiting bodies develop on dead needles as raised black football-shaped structures, which contain spores of the fungus. They may be scattered along the length of the needle or in linear rows. The spores are released from late summer to mid-fall. The fungus overwinters in leaf tissue infected the previous season.



Fruiting bodies on dead needles on limber pine (*Pinus flexilis)*

Control: Buy and plant disease-free plants, avoid overcrowding when planting, rake and dispose of infected needles to reduce the source of inoculums. For further

information on chemical treatments and a suggested spray program to control needlecast diseases, refer to the University of Illinois CPM or HYG.

Good websites:
http://www.plantpath.cornell.edu/trees/LophNcst.html
http://www.ces.purdue.edu/extmedia/BP/BP-52.pdf
http://web.extension.uiuc.edu/forestry/publications/pdf/forest_health/UIUC_Needle_Blight_Cast_Pines.pdf

Rhizosphaera

The plant clinic has received several blue spruce (*Picea pungens*) branch specimens that showed symptoms of Rhizosphaera needlecast, a disease caused by the fungus *Rhizosphaera kalkhoffii*.

This fungal disease overwinters on spruce needles. Infection occurs in spring on needles of the lower branches first and gradually progresses up the tree. Symptoms become apparent in late summer as infected needles turn a mottled yellow. By late winter and early spring, the needles turn a brown to purplish-brown and fall off the tree the following summer and fall. Small dot-like fruiting bodies (pycnidia) can be seen (with a hand lens) in rows. The fruiting bodies are in rows because they erupt through the stomata (which are small pores on the needles). Although trees are not usually killed by this pathogen, branches that lose needles for three to four consecutive years may die. Colorado blue and Engelmann spruces (*Picea engelmannii*) are highly susceptible to Rhizosphaera needle cast. White spruce is moderately susceptible and Norway spruce is relatively resistant. Hosts in other genera include true firs, Douglas fir, and pines.

Control: Rake and dispose of infected needles to reduce the source of inoculum. Prune off lower branches, provide adequate spacing between trees, control weeds, and remove unwanted shrubs to improve air movement. Chemical controls are most effective if the disease is detected early. Fungicides should be applied when needles are half-grown (as soon as bud caps fall off) and again when fully elongated. Two years of applications are usually required. For further information on chemical controls, refer to the CPM or HYG. Rhizosphaera is a disease common in plants grown outside their native ranges; it is inconsequential in natural forests. The best control for the future is to plant resistant native species.

Good websites:
http://ohioline.osu.edu/hyg-fact/3000/3059.html
http://www.extension.umn.edu/yardandgarden/ygbriefs/p435rhizosphaera.html

Volutella stem and leaf blight

Volutella stem and leaf blight was diagnosed on Japanese pachysandra (*Pachysandra terminalis*), an ornamental ground cover on our grounds. This is a serious, destructive stem and leaf blight. Volutella blight, caused by the fungus *Volutella pachysandricola*, will cause leaf blight and stem cankers on most pachysandra species. Symptoms that we are seeing now are first noticed in early spring as brown to tan leaf spots and can be confused with winter desiccation. The spots will enlarge and may eventually cover the entire leaf. Concentric circles form within the spots and are diagnostic for this disease. Leaves eventually turn yellow and fall off the plant. Stems turn dark and die. During extended wet periods, orangish-pink fungal spore masses may be visible. Eventually, large patches of the ground cover may become infected and die.

Volutella can infect a plant any time during the growing season but is more common during periods of rainy weather. Infections tend to diminish as the weather becomes drier in the summer, but the high humidity created by densely planted and heavily mulched beds can promote the blight. Stress from overcrowding, too much sun, winter injury, and shearing may increase susceptibility to stem blight. Older and injured plant parts of Japanese pachysandra are more susceptible to the disease than young succulent tissue. Make sure you consider whether the site is one in which pachysandra can thrive.

Control:

- Purchase healthy plants that are free of disease. The native Allegheny pachysandra (*Pachysandra procumbens*) is reported to be more tolerant.
- Pachysandra prefers filtered sun or full shade more than full sun conditions, and will be stressed by the latter and more susceptible to blight.
- Plants should be watered during dry periods by using drip irrigation and/or by watering early in the day to allow foliage to dry out.
- Avoid working with plants when they are wet to prevent the spread of disease.
- Remove and discard diseased leaves and plants as soon as symptoms are visible to limit spread to healthy plants.
- Clean up fallen leaves and other debris that may have accumulated on top of ground covers.
- Thin out, prune and divide overcrowded plants in early spring, when the weather is dry, to improve air circulation.
- Avoid over-fertilization, which causes dense foliage that encourages infection.

For chemical recommendations, refer to the University of Illinois CPM or HYG.

Good websites:
http://www.umassgreeninfo.org/fact_sheets/diseases/vollutella_blight.pdf
http://counties.cce.cornell.edu/suffolk/HortFactSheets/factsheets/Leaf%20Blight%20of%20Pachysandra.pdf

Cytospora canker of spruce

Infections caused by Cytospora canker (*Leucostoma kunzei*) were seen on common dwarf white spruce (*Picea glauca* 'Gracilis'). This is a common fungal disease of stressed Colorado and Norway spruces that can be easily spotted. It also attacks Douglas fir, hemlocks, larches, and balsam fir. Cytospora canker rarely affects trees that are younger than 15 to 20 years old or that are less than 20 feet tall. The disease usually starts on the lower branches of the tree and progresses upwards. Needles first turn purple, then brown, and finally drop, leaving dry, brittle twigs and branches. The fungus enters the tree through wounds and creates cankers within the bark. A thin coating of white resin is often found on infected twigs and trunks.

Another problem that can be confused with Cytospora canker is too much shade. Spruces need full sun, so when the bottom branches get shaded out by other plants, those bottom branches die. But an older spruce in full sun that has the lower branches die is most likely a victim of Cytospora canker.

Control: Cytospora canker is a stress-related disease. Trees should be kept mulched and watered well during dry periods. Remove infected branches promptly during dry weather to reduce the spread of the disease. It is imperative to disinfect pruning tools between cuts. Give spruces adequate

space when planting because dense planting is another common predisposing stress factor. There is no effective chemical control.

Good websites:
http://ohioline.osu.edu/hyg-fact/3000/3033.html
http://ipm.uiuc.edu/diseases/series600/rpd604/index.html
http://plantclinic.cornell.edu/FactSheets/cytospora/cytotwig/cytotwig.htm

Black knot

Black knot (*Dibotryon morbosum*) samples have been brought into the Plant Clinic. It is a serious and widespread problem of trees in the genus *Prunus*, especially plums and cherry trees. Right now we're seeing the abnormal swellings on branches of European bird-cherry (*Prunus padus)*, and wild black cherry (*Prunus serotina)*, both of which are extremely susceptible to this disease. The fungus overwinters in the hard, brittle, rough, black "knots" on twigs and branches of infected trees. In the spring, the fungus produces spores within tiny fruiting bodies on the surface of these knots. The spores are ejected into the air after rainy periods and infect succulent green twigs of the current season's growth. The newly infected twigs and branches swell. The hypertrophied growth of bark and wood is a response to hormones and produces the swellings that we are now seeing. Frequently these swellings are not noticed the first year. The swellings become dormant in winter. In the following spring, velvety, green fungal growth will appear on the swelling. The swellings darken and elongate during summer and, by fall, turn hard, brittle, rough, and black. The black knots enlarge and can girdle the twig or branch, eventually killing it.

Control: This is a difficult disease to control. Prune and discard, burn, or chip and compost all infected wood during late winter or early spring before growth starts and when new swellings appear. Pruning cuts should be made at least four to eight inches below any swellings or knots. Some recommend painting wounds greater than two inches in diameter with shellac and covering with wound dressing. This may prevent infections but may also impede wound healing. It is better to prevent larger limbs from developing knots. Chemical recommendations include a dormant fungicide spray. Perhaps consider this next year if you can't get the disease under control through sanitation. Refer to the University of Illinois CPM or HYG.

Good websites:
http://plantclinic.cornell.edu/FactSheets/black_knot/blacknot.htm
http://www.ces.ncsu.edu/depts/pp/notes/oldnotes/fd4.htm
http://www.uwex.edu/CES/wihort/gardenfacts/X1056.pdf

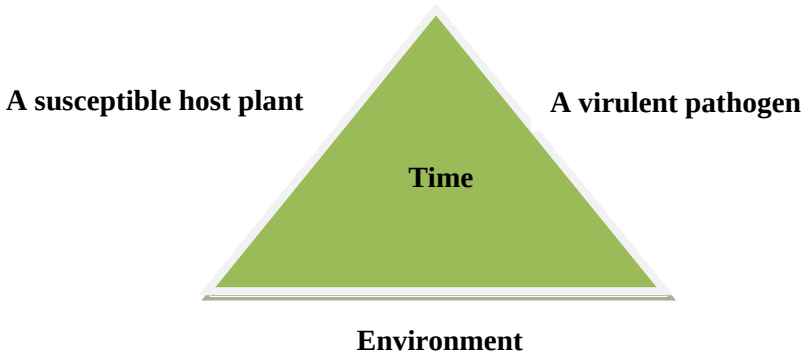
What to Look for in the Next Two Weeks

We will be looking for Arborvitae leafminer, apple scab, and seasonal needle drop.

Feature article:

The Disease Triangle: An Essential Tool
By Trica Barron
Plant Health Care Technician

The plant disease triangle is a visual diagram used to explain the development of plant disease, and can be used as a tool in disease management. Plant diseases are defined as any abnormal alterations of the physiological (internal function) and/or morphological (external structure) of a plant. For any disease to occur, there are three elements that must exist for a prescribed amount of time. These are a susceptible host, a virulent pathogen (a disease causing organism), and an environment favorable for disease development. A plant disease can be prevented by eliminating any one of these three components. By looking at each individual component of the disease triangle, we can identify some feature that can be used to help reduce or prevent the incidence of disease from occurring by making a few simple modifications. For example, the disease apple scab is a fungus (*Venturia inaequalis*) that affects the leaves and fruit of non-resistant crabapple trees (*Malus* spp.). Infection occurs in temperatures between 37º-78˚F and around three to six hours after a spring rain. The temperature range lets us know that a flowering crabapple tree can be infected with the fungus as soon as its buds begin to open. Information like this is vital when applying a chemical spray. It is also helpful to know where the pathogen overwinters. In the case of the apple scab, the dead leaves that had fallen from an infected tree contain the overwintering fungal spores. Using proper cultural practices and cleaning up fallen leaves in the fall can reduce the inoculum.



- **A susceptible host plant**

For a plant to succumb to disease, it must be susceptible. Diseases are host-specific. For example, a disease that infects a rose will not infect a pine tree. Stress is one way that a plant may become vulnerable. Proper cultural practices that avoid plant stress will greatly reduce the risk of an infection. Here are some common cultural practices that should be avoided: overhead irrigation, watering at night, excess fertilization, planting plants too deeply or too shallow, too much mulch, and mechanical injury (weed whackers, lawn mowers). Good sanitation practices such as removal of diseased plants and plant parts, buying disease-free plants, and properly cleaning garden tools will also help in managing a disease. You can remove the susceptible host from the disease triangle by planting disease-resistant cultivars. Plants labeled as disease-resistant are resistant only to a particular disease. But disease resistant does not mean that the plant will not become infected by the disease to which they are supposed to have resistance to. It refers to the plant's ability to overcome the effects of the pathogen (nothing is full proof).

- **A virulent pathogen**

Pathogens are microorganisms that cause the disease. They can be fungi, bacteria, viruses, phytoplasmas, or nematodes. Each has a different life cycle and an infectious stage. For an infection to occur, the pathogen must be in an infective state, and the host plant in a receptive stage. Just the presence of a fungal spore or bacterial cell does not mean that infection will occur. Most pathogens, like diseases, are host-specific. For example, the disease blackspot of rose (*Diplocarpon rosae*) will not attack a lilac (*Syringa* ssp.).

The one area the disease triangle fails to account for is a vector. A vector is an agent that carries and transmits a disease. Some examples of vectors are leafhoppers, which spread aster yellows and the elm bark beetles, which spreads Dutch elm disease (*Ophiostoma novo-ulmi*). Vectors are important in the infection cycle of many viruses, and some are essential for the dispersal of many types of bacteria and fungi. An understanding of the vectors' behavior and the interactions between the vector, host plant, pathogen, and environment is needed to analyze the disease.

- **Environment**

Environmental conditions affect the growth and spread of disease pathogens. Drought or wet weather affects how diseases thrive.

Moisture in the forms of rain, high relative humidity, floods, irrigation, mists, fogs, etc., plays an essential role in the infection, spread, and disease processes. Familiar diseases that require moisture to spread and infect host plants include black spot, fireblight, and apple scab. Make sure you have good drainage to provide a healthy growing environment for plants.

Temperature directly affects how rapidly disease pathogens multiply and infect the host. Each pathogen has a specific temperature range for growth and activity. For the fungal disease black spot on rose, the most favorable temperatures for infection are 68º-75ºF. The severity of the disease peaks in late summer as the temperatures increase and the pathogen multiplies. Temperature also affects the amount of inoculum available. For example, cold winters interrupt the disease cycle by killing or reducing the number of pathogens or vectors. Any temperature extreme can cause stress in plants which will increase their susceptibility.

Wind and sun affects how quickly plant surfaces dry. Many pathogens can be dispersed by wind, which enables pathogens to move from infected plants to healthy plants. Wind can also injure host plants, providing an entry point for infection and/or increasing the plants susceptibility. Sunlight is very important to a plant's health. Plants that do not receive the proper amount of light to meet their cultural requirements become stressed, making them more susceptible to infection. For example, Pachysandra prefers filtered sun or full shade more than full sun conditions. If you plant this groundcover in full sun, it will be stressed in drought conditions and become more susceptible to serious stem and leaf blight caused by a type of fungus called *Volutella pachysandricola*.

Soil type not only affects plant growth but also the development of some pathogens. For example, in waterlogged heavy clay soils, you may have a problem with damping-off disease. Damping-off disease is a fungus that kills seedlings before they germinate. The soil temperature is also critical for this and other diseases. Cool wet soils tend to promote fungal root diseases.

Fertilization affects a plant's growth rate and ability to defend itself against disease. Too much or too little fertilization can cause problems. For example, an excess of nitrogen causes the formation of succulent plant tissue and delays maturity. The succulent growth makes the plant weak and more attractive to insects and diseases. On the other hand, a nitrogen deficiency causes limited growth (stunting), which also causes plants to be more susceptible to diseases.

An important factor that has been added to the disease triangle is time. The time over which a disease develops can vary from days to months and is a characteristic of the specific disease involved. Every pathogen has a latent period and an infectious period. A latent period is when a plant has been infected but has no symptoms and the disease will not be observable. It is only a matter of time before the disease erupts (the infectious period) and begins to spread. If we look again at apple scab disease, the fungal spores are in a latent period in the winter on fallen dead leaves. The infectious period is in the spring around three to six hours after it rains with temperatures between 37-78˚F. The disease begins to spread as the crabapple trees begin to break bud. If we manipulate one or more of the components of the disease triangle, we can reduce or prevent disease.

Quote of the week: "In the spring I have counted one hundred and thirty-six different kinds of weather, inside of four and twenty hours." - Mark Twain

The Plant Health Care Report is prepared by Trica Barron, Plant Health Care Technician, and edited by Donna Danielson, Plant Clinic Assistant; Fredric Miller, PhD, research entomologist at The Morton Arboretum and professor at Joliet Junior College; Doris Taylor, Plant Information Specialist, and by Carol Belshaw, Plant Clinic volunteer. The information presented is believed to be accurate, but the authors provide no guarantee and will not be held liable for consequences of actions taken based on the information.

The *2007 Commercial Landscape & Turfgrass Pest Management Handbook* (CPM), for commercial applicators, and the *Home, Yard & Garden Pest Guide* (HYG) for homeowners from the University of Illinois, are available by calling (800-345-6087). You may also purchase them online at https://pubsplus.uiuc.edu/ICLT-07.html (commercial handbook) and https://pubsplus.uiuc.edu/C1391.html (homeowners' guide). One further source is your local county extension office.

This report is available on-line at The Morton Arboretum website at http://www.mortonarboretumphc.org/.

For pest and disease questions, please contact the Plant Clinic at (630) 719-2424 between 10:00 and 4:00 Mondays through Saturdays or email **plantclinic@mortonarb.org.** Inquiries or comments about the PHC reports should be directed to Trica Barron at tbarron@mortonarb.org.