Wisconsin Horticulture Update Summary, July 18, 2014

Table of Contents

WI WEATHER REVIEW

An unusually strong cold front settled over the Great Lakes Region early in the week. Daytime high temperatures were 5-17°F below-normal and remained unseasonably cool in the upper 50s to lower 70s. Record low maximum temperatures were set on July 14-15 at numerous locations, including Eau Claire, which reported only 67°F on July 14, breaking the previous record of 68°F set in 1994 and 1952. Rain showers and locally severe storms accompanied the cooling trend, and in the Sevastopol area of Door County, an intense hailstorm decimated crops and left hail accumulations of 3-4 inches which required snow plows to clear. The mid-July cold spell slowed development of summer crops and increased concerns about developmental delays for late-planted corn and soybeans. Reports from the USDA NASS depict generally favorable crop conditions, though an extended period of warmer, drier weather will be critical as crops advance through reproduction. (Wisconsin Pest Bulletin, Vol. 59, No. 11, July 17, 2014)

Growing Degree Days (GDD)

Growing degree days is an accumulation of maximum and minimum temperatures as directly related to insect and plant development. As of July 9, in Wisconsin, the GDDmod 50 ranged from 625 to 1292: Appleton-976; Bayfield-625; Beloit-1292; Big Flats-1100; Crandon-790; Crivitz-837; Cumberland-919; Eau Claire-1074; Green Bay-889; Hancock-1100; Hartford-999; Juneau-1079; LaCrosse-1222; Lone Rock-1243; Madison-1189 Medford-876; Milwaukee-943; Port Edwards-1057; Racine-941; Sullivan-999; Waukesha-999; Wausau-908 (WI Pest Bulletin Volume 59 Number 10 July 10 2014). To determine the Degree Days of any city in Wisconsin, use the Degree Day calculator at

http://agwx.soils.wisc.edu/uwex_agwx/thermal_models/many_degree_days_for_date

The following phenological information gives a perspective on how GDD accumulation relates to some plant and insect development (http://bygl.osu.edu/ and http://www.entomology.umn.edu/cues/Web/049DegreeDays.pdf): 621; multiflora rose, full bloom, 643; northern catalpa, first bloom, 675; black vine weevil, first leaf notching due to adult feeding, 677; Washington hawthorn, full bloom, 731; calico scale, egg hatch, 748; greater peach tree borer, adult emergence, 775; rhododendron borer, adult emergence, 815; northern catalpa, full bloom, 816; mountain laurel, full bloom, 822; dogwood borer, adult emergence, 830; oakleaf hydrangea, first bloom, 835; cottony maple scale, egg hatch, 851; panicle hydrangea, first bloom, 856; fall webworm, egg hatch (first generation), 867; mimosa webworm, egg hatch (first generation), 874; fuzzy deutzia, full bloom, 884; winged euonymus scale, egg hatch, 892; spruce budscale, egg hatch, 894; winterberry holly, full bloom, 897; squash vine borer adult emergence, 900; panicled goldenraintree, first bloom, 924; June bride littleleaf linden, first bloom, 953; azalea bark scale, egg hatch, 957; Japanese beetle, adult emergence, 970; rosebay rhododendron, first bloom, 1,010; June bride littleleaf linden, full bloom, 1,115; bottlebrush buckeye, first bloom, 1,158; Ural falsespirea, first bloom, 1,170; panicled goldenraintree, first bloom, 1251; Rose-of-Sharon first bloom, 1347; pine needle scale egg hatch-2nd generation, 1349.

INTRODUCTION

Today's WHU host was Waukesha County Horticulture educator Kristin Krokowski. Specialist was PDDC director Brian Hudelson. The special guest this week was Dr. Laura Jull, Woody Ornamental Specialist in the UW Dept. of Horticulture. Discussion participants were representatives of the following counties: Brown (Vijai); Kenosha (Barb); Milwaukee (Sharon); Portage (Walt); Jackson (Trisha); Winnebago (Kim); Columbia (George); Pierce (Diana).

HORTS' SHORTS

This week, county agents reported a mixed bag of issues.

Brown County: The landscape is drying out and people are in their yards watering plants. Japanese beetles are out and host plants are showing significant damage. Wild parsnip is blooming, but there is some confusion of that plant with giant hogweed. People are asking about ant control in lawns. There are still lingering problems with collapsed trees.

Portage County: We are seeing tomato blossom end rot and tomato wilt, purple leaf plum winter damage, ash tree flower gall, and a raspberry with some white spots on the fruit which is a suspected bacterial pathogen. Japanese beetles are causing damage. People are still calling with winter damage questions.

Kenosha County: We had a call about scattered dieback on Japanese maple, which had poor growth for the last three years. We attributed it to cultural care. Someone reported seeing insects on raspberries that we identified as EAB, but not causing any damage. We also heard from someone who had worms in their raspberries, which could be SWD. A large commercial grower and a community gardener reported Septoria leaf spot on tomatoes.

Waukesha County: We have been getting regular rain, but it is a few inches at a time. We are hearing about mushrooms in lawns and people ask about eating them. We strongly discourage eating unidentified mushrooms. There were lots of questions about ants in the house. Japanese beetles are going gangbusters. We had calls about creative container methods for growing tomatoes, even without soil which may lead to nutrient deficiencies. Also, we had a call about poplar or willow borer taking down a good size pussy willow and it appeared to be riddled with holes.

Columbia County: We had weed/plant ID questions, as well as tree decline issues. The weather has been very good for lush lawn growth. There was some interest in crazy worms due to the media coverage in Madison.

Winnebago County: It has been very wet and peppers are not thriving. Wild parsnip is in bloom. We had a question about apple decline in a sample where no biotic problem could be identified. We also sent in cole crops sample to the PDDC for suspected crown gall.

St. Croix County: Not much that is new. We had one zucchini fruit set problem which the grower finally figured out himself. It turns out that they had fewer bees this year so the plants had poor pollination. The problem was resolved with hand pollination of the flowers. They were actually calling to find out where to get bees. We had questions about carpenter ants and an unusual ID of a horsehair worm. These worms are about 5 inches long, about the thickness of a thick thread and usually live in water. I saw them twice, once in an aquaponic situation and once in a strawberry bucket. We also had questions about tomatoes not thriving with poor fruit set and ripening.

Pierce County: It has been cool and rainy with some nutrient deficiencies such as nitrogen loss due to the rain as well as slow growth due to the cooler weather. We are seeing leaf spot diseases and leaf galls are going crazy; four different kinds were found in one spot. We are getting questions about tree decline and death from winter injury and Dutch elm disease was found.

SPECIALIST REPORT: Insect Diagnostic Lab Update

Presented by P. J. Liesch, Interim Assistant Faculty Associate, UW-Madison Department of Entomology, and Interim Manager of the UW-Extension Insect Diagnostic Lab pliesch@wisc.edu

There was no IDL update this week.

SPECIALIST REPORT: Plant Diagnostic Disease Clinic

Presented by Brian Hudelson, Sr. Outreach Specialist, UW-Plant Pathology, and Director of the UW-Extension Plant Disease Diagnostics Clinic (PDDC) bdh@plantpath.wisc.edu

The PDDC updates for July 12-18 are attached to the end of this summary.

It has been crazy busy this week. We are still receiving woody samples with dieback. We are finding canker organisms in the branches, but not as the primary pathogens. We did see bacterial canker on cherry and fire blight on apple, but we are attributing most of the dieback to the environmental stresses from the last few years.

We received many diseased vegetable samples this week, including ones we have seen before such as downy mildew on basil, pythium on broccoli, fusarium on garlic basal plate, and bacterial rot on tomato. We saw Diplodia shoot blight on Austrian pine.

Virus on Currant

A currant sample was submitted with symptoms consistent with a viral infection such as beautiful variegation on the leaves. We don't do much viral diagnoses in currants, so we did not get a specific ID on the virus.

Pseudomonas on Dogwood

Dogwood had angular leaf spots and we isolated a Pseudomonas species. There is a documented bacterial leaf spot disease on this host due to Pseudomonas bacteria.

Gnomonia on Strawberries

Leather rot was the suspected organism, but we couldn't isolate a phytophthora pathogen. We did isolate nearly pure cultures of Gnomonia, which causes stem end rot on strawberry fruits. Our cultures yielded the sexual fruiting structures which are spherical and have huge long beaks. By matching up the structures with photos on the internet we could match up the sporulation for definitive diagnosis.

Garlic Stem/Bulb Nematode

We isolated fusarium but think that the nematode Ditylenchus initiated the problem This nematode is an increasing problem in the state or at least it is getting more attention. It burrows into the bulb and causes a dry rot which then allowed the fusarium and soft rot to colonize. This resulted in a really malodorous garlic bulb.

White Rust and Black Rot on Mustard Greens

We had two different submissions of diseased mustard greens. One had white rust, which technically is not a true rust but a water mold related to downy mildew, phytophthera and pythium. A white powdery substance on the leaves is symptomatic of this disease.

We also saw black rot on mustard greens, a bacterial disease we have seen before on this host.

Phytophthora on Squash

This sample had massive crown rot, and we identified Phytophthora capcisi as the pathogen. This disease can also infect fruits if they are laying on the ground.

Cucumber Mosaic Virus on Lobelia

Unexpectedly, we were able to use our dipstick virus diagnostic test and identified cucumber mosaic virus. This virus is aphid-transmitted and has a broad host range.

Questions/Comments

No questions this week.

SPECIAL TOPIC: Woody Plant Propagation

Presented by Dr. Laura Jull*, Woody Plant Specialist*

This talk was accompanied by a powerpoint presentation.

General Comments about Winter Injury

Dr. Jull began by asking if everyone received the information on winter burn. She encouraged comments and edits before it is published as a fact sheet.

Winter burn damage was not completely evident in May, but as the growing season progressed it was much more obvious. Some of the hardest hit this year were junipers, which normally don't winterburn. Atypically, some of the two-needled pines such as Scots pine were very damaged, whereas five-needled pines which are normally susceptible, fared well. Weigela and Japanese maple also showed lots of dieback. The patterns of dieback may have to do with the tree's location.

Educational Opportunities

Plant propagation is a very broad topic and this talk will only encompass very general information in the limited time. Dr. Jull teaches a class on plant propagation in the spring with lectures Monday/Wednesday at 12 pm, with the labs on Tuesday/Wednesday. All manner of techniques are practiced in the labs.

Asexual vs. Sexual Plant Propagation

The reason for plant propagation is to conserve the properties of a desirable plant for human use. Techniques fall into two broad categories of asexual and sexual propagation.

Sexual reproduction includes seed germination. The most important concept to remember is that progeny is not identical to the parent plant. The seed is produced via fertilization undergoes both meiosis and mitosis, so the chromosomes are rearranged. Many people are unaware that they will not get the same plant; a purple leaf plant may produce plants with purple or green, bronze or a mixture of colored leaves.

Asexual propagation includes budding, grafting, cuttings, layering, micropropagation such as tissue culture or cloning.

Background on Plant Propagation

Humans have been practicing plant propagation for approximately 10,000 years. The techniques were driven by the need to provide a consistent food supply for a growing population, as well as ensure building materials and medicines, animal forage, pharmaceuticals and ornamentals.

Plant propagation now is focused on breeding for increased growth, drought, heat, and insect resistance, more ornamental and better fruit quality. Plant breeders are collecting plant material from its native habitat for their breeding programs. There has also been a push to breed for less invasive characteristics, including sterile seed.

Appropriate plant material is found in areas that have similar climates to ours. For instance, if the US map is superimposed on different areas of the planet, we find that above the 45th parallel is in line with Wisconsin. So, Manchuria, North Korea, Russia, Norway, Sweden, Northern Turkey, the northern island of Japan and some inland pockets in Europe which correspond to Zone 5, have been historic reservoirs of suitable material. In fact, many of our exotic species are from Manchuria in China or the northern island of Japan. Many of the hardy bulbs we plant, as well as some woody plants, are from the mountainous parts of northern Turkey.

Sexual Propagation

Advantages:

- Most inexpensive way to propagate
- Seeds are easy to handle, store, and ship
- Juvenile characteristics may be desirable
- Genetic variability may be desirable
- Production of virus free crops for fruit and ornamentals
- Conservation of germplasm

Disadvantages:

- There may be germination issues, such as dormancy issues for woody plants
- Plants may not produce viable seeds such as Manchurian or Paperbark maples
- Genetic variability may be undesirable
- Don’t get the same plant
- Triploids are sterile
- It takes longer for reproductive maturity, up to decades, to flower or fruit especially for woodies and evergreens
- It takes longer to get a bigger plant

Seed Structure

A seed is the mature ripened ovule located inside of a fruit that contains the storage structures of the plant. The seed consists of the seed coat, the embryo which is the union of the male and female gametes and the cotyledons which are the seed leaves. The cotyledons are the first to emerge during germination, but they are not true leaves. Cotyledons eventually fall off. Monocots, like the grasses, have one cotyledon. Dicots have two or more cotyledons, although gymnosperms can produce up to 15 cotyledons. Most landscape and vegetable crops are dicotyledons.

Seed Viability

For a seed to germinate, it must be viable. There are several ways to determine viability. One option is to break open a seed and look for the white embryo. If it is not white, it is usually not viable.

Another option that is not usually done by a homeowner, is a tetrazolium test.

On the fifth floor of the horticulture building is Wisconsin Crop Improvement Program and they can test for viability for a fee. This may be a good option if you want to test a large crop of seed before selling it.

Seed Starting Requirements

Growth Media: For seed starting, you want a well-drained lighter media because saturated media can contribute to fungal diseases or rot. Well washed sand, vermiculite, peat moss, and sphagnum moss are all possible media.

Containers: Drainage is critical to prevent saturation.

Humidity/Media Moisture: Humidity and moisture must be consistent to prevent the seeds from drying out which may impede or stop germination. There should be no free water

Light: Bright indirect light is better, unless the seeds are field-planted. Some seeds require light for germination and some require darkness. The information is on the seed packet or further research may be done if the seed is from a plant in your yard

Pathogen free seed

Fertilizer: Fertilizer is not needed as the seeds do not have any roots to take up the nutrients.

Dormancy: requirements must be met and overcome for seed to germinate.

Seed Scarification

Woody legumes such as honeylocust, redbud, and Kentucky coffeetree, have very hard seedcoats which must be scarified before they can imbibe water and initiate germination. Scarification may be accomplished by physical abrasion, chemical or high temperature treatments.

For physical abrasion, a file or sandpaper may be used to remove just enough of the seed coat to see the white interior so that water can penetrate. Physical abrasion is not successful for all seeds.

Concentrated sulfuric acid can be used which allows the seed coat to gradually break down; 45 minutes is usually sufficient for honeylocust, but some species may require up to 6 hours. After this time, the seeds are drained and washed with water for 10 minutes to completely remove any residual sulfuric acid. Protective gear and a fume hood are necessary. This technique is not usually used by homeowners, but is very common for commercial growers.

Heat treatments consist of immersing the seeds in 35^0 C moist or dry sand or very hot water, but may take up to 24 hours. It is not usually effective for legumes, but may work for other species.

In the natural environment, alternate freeze/thaw cycles, fire, microorganisms or passing through the digestive system of animals serve for breaking down the seed coat.

Seed Stratification

Seed stratification may be necessary to break internal dormancy and may require several cycles of moist chilling/warmth. Plants are quite variable in their stratification requirements, however all seeds must be fully imbibed for 24 hours before they can germinate, or you are simply storing the seeds. The temperature should be between 33-45^0 F so the refrigerator is used. You don't want to use the freezer. Some tropical and temperate plants require moist warmth at higher than 77^0 F.

Double Dormancy: Moist chilling followed by moist warmth.
Triple Dormancy (as for Burning Bush): Moist chilling satisfies radicle growth dormancy, followed by moist warmth to initiate embryo growth, followed by moist chilling to initiate cotyledon growth.

Well washed sand, vermiculite, peat moss, and sphagnum moss are all possible media. The media should be moist, but should not drip with water. Mix in a proportion of 1/3 seed/media volume.

Seed stratification is species dependent, but usually takes 1-4 months.

Some references: Dirr, Woody Plant Propagation
Hartmann and Kester, Plant Propagation

Asexual Propagation

Genetic material is conserved so the same exact plant is produced. This method induces the growth of replacement parts: for root cuttings, shoots and buds are replaced; for leaf or stem cuttings, roots are replaced; and for leaf cuttings, both stem and roots are replaced.

Grafting and budding: joining together of two different plants so they grow as one.

Layering: induction of root tissue growth while still attached to the parent plant

Division: specialized roots and stems

Tissue culture or micropropagation: need special equipment

Grafting and Budding

An example is "shrub on a stick" where side veneer graft of juniper is done on Eastern red cedar or Chinese juniper as understock. Grafting is one of the oldest techniques and dates back 3000 years and was started in China on olive, fruit, nut trees and grapes. It is the primary method for clonal shade, fruit trees and conifers which are difficult to root from cuttings.

Grafting and budding is the process of joining a scion and a rootstock. The scion contains one or more buds and some stem. The rootstock is from a seedling that is not a cultivar. It may also consist of the trunk of a whole tree (common in fruit tree production).

In grafting, the scion contains several buds with a portion of stem. The graft union is where the scion and rootstock are joined and the cambium of both must be lined up such that the callous from the wound response allows both the xylem and phloem to function. It requires skill to line up the cambial layers and is critical to success of the union.

In budding, the scion is reduced in size and contains only one bud and a small sliver of stem. T-budding involves making a t-shaped cut into which the bud is inserted and it is tied or waxed over to ensure contact. This process is common with hybrid tea roses and is done when the bark is slipping.

Another kind of budding is chip budding which is used for shade and fruit trees, but the cut is different. This is also called fall budding, although it is usually done in the summer from July to September. This is normally done with latent buds and actively growing rootstock.

Some advantages of budding over grafting is that it is faster and easier, the graft union may be stronger. The success rate can be very high.

Tissue Culture

Tissue culture consists of taking a very small piece, sometimes only one cell, of the parent plant. This technique allows a grower to quickly increase stock of a rare or new cultivar. Many woody and herbaceous plants, like daylilies and hosta, are propagated this way. It is not a technique for homeowners as specialized equipment and training are needed. A laminar flow hood to maintain sterile environment for the leaves and shoots is necessary.

Cuttings

Cuttings, beside seeds, are the most common way for homeowners and growers to propagate plants and is widely used. The advantages to cuttings are that no special skill or equipment is needed, it can be used for woody or herbaceous plants, there is no incompatibility between plants, there is less variation than there is with seeds, and it doesn't require a lot of space and the exact plant is produced each time.
One of the factors in successful propagation using cuttings is timing the harvest of cuttings. Cuttings may be semi-hardwood, hardwood, softwood or succulent. Some plants may root from cuttings taken at different times, but others, like yews may only root from particular wood. Yews only root from hardwood cuttings.

Hardwood: dormant, mature wood taken is taken in late fall, winter or early spring
Semi-hardwood: after new growth starts after dormancy, usually in June
Softwood: taken from succulent growth just before hardening

Cuttings also encompass different parts of the plants. Stem cuttings contain the shoots and buds and have some stored carbohydrates, but need the roots. Leaf cuttings are harder in that both stems and roots must be replaced. Root cuttings, as are taken with sweet potatoes, need both shoots and root tissue replaced. Suckering woodies, such as raspberries, can be propagated from roots. In all of these, adventitious (or appearing where it doesn't normally grow) tissues, are induced to grow. For example, roots on stems or stems on roots are adventitious. To induce adventitious roots, wounding the stem is necessary. This can be done by cutting one or two shallow vertical slits in the bark, out of which the roots grow.

In woody plants, the phase state of the plant is also important; that is whether the tissue is juvenile or adult. Juvenile tissue normally roots easier. Some people think this means the end of the stem at the top of the tree, but the juvenile tissue is actually found lower on the trunk and contains the auxins necessary.

The time of the year that cuttings are taken (i.e. hardwood or softwood) is an important factor to success.

To induce adventitious roots, wounding the stem is necessary. This can be done by stripping the leaves off the base of the stem or cutting one or two shallow equally spaced vertical slits that don't penetrate the xylem in the bark. The wounding response induces a callous to form from which the roots grow.

Rooting hormone: cuttings root much better if they are treated with rooting hormone. Indole-3-butyric acid, potassium salt (K-IBA) or naphthalene acetic acid (NAA) are synthetic rooting hormones, and indoleacetic acid (IAA)is a natural hormone. The wound produces natural auxins, but supplementing with a synthetic hormone speeds up the formation of roots and increases the number and quality of roots to get the cutting off to a healthy start for planting outside or in the container.

Questions/Comments

Do tissue cultured interspecific peony hybrids have a different growth habit than those produced by division? Some on-line forums have been discussing this phenomenon since tissue-cultured plants are much cheaper. They are complaining because they aren't getting the same growth structure as those produced by division.
That is very interesting. Peonies should not have a different growth habit. With Echinacea, this has been a real issue for tissue-cultured plants where they don't grow as well. With tissue culture, you can have mutations or poor growth when planted outdoors. Intersectionals are more expensive since divisions are taken for cuttings and the plants aren't that big.

For lisianthus, it is very difficult to get the seeds to grow because you need high temperature for months. Can cuttings be taken?
I don't know since that is herbaceous. I would like to mention that the American Horticultural Society has a really wonderful book on plant propagation that is highly recommended for the novice plant propagator. It has nice detail and pictures. It doesn't cover tissue culture, but it does cover woody and herbaceous plants, vegetables and fruit.

ANNOUNCEMENTS

Walt in Portage County: This weekend is the Amherst Fair. Come on out.

The International Arboriculture Conference is in two weeks on the first weekend in August in Milwaukee. It has traveled all over the world and is in Milwaukee this year. It is also the 50th anniversary of the Wisconsin Arborists Association.

July 22: Small Fruits Field Walk near River Falls with Drs. Brian Smith, Christelle Guédot, and Patti McManus.
July 22: Vineyard walk at Trout Brook Vineyard in Hudson. Heidi and Kevin are coordinating the event.

FINAL NOTES

The next meeting is July 25. Christy Marsden from Rock County will be hosting and Amanda Gevens and Russ Groves will be presenting Vegetable Disease and Pest Update

The full audio podcast of today's and archived WHU conferences can be found at http://fyi.uwex.edu/wihortupdate/

UW LINKS

Wisconsin Horticulture webpage http://hort.uwex.edu

UW Plant Disease Diagnostics webpage http://labs.russell.wisc.edu/pddc/

UW Insect Diagnostic Lab http://www.entomology.wisc.edu/diaglab/

UW Turfgrass Diagnostic Lab http://labs.russell.wisc.edu/tdl/

UW Vegetable Pathology Webpage http://www.plantpath.wisc.edu/wivegdis/

UW Vegetable Entomology Webpage http://www.entomology.wisc.edu/vegento/people/groves.html#

UW-Extension Weed Science https://fyi.uwex.edu/weedsci/

UW-Extension Learning Store http://learningstore.uwex.edu

UW Garden Facts http://labs.russell.wisc.edu/pddc/fact-sheet-listing/

WHU "OFF THE AIR"

During this past week specialists have commented on these issues off the air:

VEGETABLE CROP UPDATE

Vegetable Crop Update Newsletter #14 isavailable at http://www.plantpath.wisc.edu/wivegdis/

Topics covered in the issue #14 include:

Late blight updates
Blitecast and P-Days for late blight and early blight management
Cucurbit downy mildew update
Basil downy mildew
Cucurbit powdery mildew
Plant Disease Diagnostic Clinic updates
Spotted Wing Drosophila updates

PDDC UPDATE

UW-Extension/Madison Plant Disease Diagnostic Clinic (PDDC) Update
Brian Hudelson, Ann Joy, Joyce Wu, Tom Hinsenkamp, and Catherine Wendt, Plant Disease Diagnostics Clinic

The PDDC receives samples of many plant and soil samples from around the state. The following diseases/disorders have been identified at the PDDC from July 12, 2014 through July 18, 2014.

PLANT/SAMPLE TYPE	DISEASE/DISORDER	PATHOGEN	COUNTY
BROAD-LEAVED WOODY ORNAMENTALS			
Beech	Phomopsis Canker	*Phomopsis* sp.	Waukesha
Cherry	Bacterial Canker	*Pseudomonas syringae*	Dane
	Root Rot	*Pythium* sp., *Fusarium* sp.	Dane
	Winter Injury	None	Dane
Daphne	Phomopsis Canker	*Phomopsis* sp.	Waukesha
Maple (Unspecified)	Cytospora Canker	*Cytospora* sp.	La Crosse, Shawano
Oak (Unidentified)	Chlorosis	None	Dane
	Oak Wilt	*Ceratocystis fagacearum*	Milwaukee
Spirea	Root Rot	*Calonectria* sp./ *Cylindrocladium* sp.	Jefferson
FRUIT CROPS			
Apple	Fire Blight	*Erwinia amylovora*	Marinette
	Sphaeropsis Canker	*Sphaeropsis* sp.	Vernon
	Winter Injury	None	Dane, Dunn, Vernon
Currant	Unidentified Viral Disease	Unidentified virus	Dane
Dogwood	Bacterial Leaf Spot	*Pseudomonas syringae*	Dane
Strawberry	Stem End Rot	*Gnomonia* sp.	Waushara
HERBACEOUS ORNAMENTALS			
Lobelia	Cucumber Mosaic	Cucumber mosaic virus	Dane
NEEDLED WOODY ORNAMENTALS			

Pine (Austrian)	Black Spot	*Septoria* sp.	Racine
	Diplodia Shoot Blight and Canker	*Diplodia pinea*	Racine
	Dothistroma Needle Blight	*Dothistroma pini*	Racine
Spruce (Blue)	Rhizosphaera Needle Cast	*Rhizosphaera kalkhoffii*	La Crosse

VEGETABLES			
Basil	Downy Mildew	*Peronospora belbahrii*	Dane
Broccoli	Root/Crown Rot	*Pythium* sp.	Vernon
Cucumber	Anthracnose	*Colletotrichum orbiculare*	Rock
Garlic	Fusarium Basal Plate Rot	*Fusarium* spp.	Waukesha
	Soft Rot	*Pectobacterium carotovorum*	Waukesha
	Stem and Bulb/Bloat Nematode	*Ditylenchus* sp.	Waukesha
Mustard Greens	Black Rot	*Xanthomonas campestris*	Racine
	White Rust	*Albugo candida*	Racine
Squash	Phytophthora Crown/Root Rot	*Phytophthora capsici*	Green Lake
Tomato	Bacterial Canker	*Clavibacter michiganensis* subsp. *michiganensis*	Portage

For additional information on plant diseases and their control, visit the PDDC website at pddc.wisc.edu.