

Plant Health Care Report

Scouting Report of The Morton Arboretum

June 16, 2023

Growing Degree Day/Weather issue/Special Watering issue

Special watering issue: Included in this week’s growing degree day/weather issue is information on watering. With the droughty conditions we are experiencing right now, it is a good time to talk about what water does for our plants. It is also a good time to talk about proper watering. There are a lot of different tools we can use to water, but we have to use them right. At the end of this issue, we are reprinting several watering articles from 2021 and 2022, about water. These articles are being reprinted in their entirety with no edits.

What indicator plant is in bloom at the Arboretum?

Catalpa (Catalpa species) is in full flower (fig. 1)



Accumulated Growing Degree Days (Base 50): 639.5 (as of June 15)

Figure 1 Catalpa (photo: John Hagstrom)

Degree Days and rainfall

As of June 15, we have 639.5 base 50 growing degree days (GDD) at The Morton Arboretum. The historical average (1937-2022) for this date is 645 GDD₅₀.

Location	GDD as of 6/15/2023	GDD as of 6/16/2022	GDD as of 6/15/2017	GDD as of 6/16/2016
Carbondale, IL*	1217	1349	1460	1347
Champaign, IL*	994	1056	1150	1107
Chicago Botanic Garden**	No report	No report	664 (6/13)	609
Glencoe*	334	464	No report	No report
Chicago O'Hare*	822	867	837	893
Kankakee, IL*	836	884	948	934
Lisle, IL*	837	884	869	921
The Morton Arboretum	639.5	818.5	718.5	743
Quincy, IL*	1053	1114	1226	1226
Rockford, IL*	762	754	776	779
Springfield, IL*	1012	1090	1188	1171
Waukegan, IL* (60087)	651	706	645	713
Waukegan, IL* (60085)	717	766	No report	No report

*We obtain most of our degree day information from the GDD Tracker from Michigan State University web site. For additional locations and daily degree days, go to <https://gddtracker.msu.edu/>. **Thank you to Chris Henning, Chicago Botanic Garden, for supplying us with this information.

Seasonal precipitation (rain and melted snow) in inches.			
	2023	2022	Historical average (1937-2022)
Jan	2.85	1	1.935
Feb	4.88	2.61	1.775
Mar	2.29	3.88	2.536
April	2.23	3.88	3.667
May	.79 (thru May)	6.1	4.206
June	.41 (thru 6/15)	2.51 (whole month)	4.198
Year to date	13.45 (thru 6/15)	19.98 (thru June)	18.32 (thru June)

Examples of insects that may emerge soon in northern Illinois (based on growing degree days)			
GDD (base 50)	insect	Life stage present at this GDD	Type of damage
700-800	Bagworm	Caterpillars emerging	Chewing foliage
900-1200	Japanese beetle	adults	Chewing foliage; mating and laying eggs
1200-1800	Fall webworm	Caterpillars feeding, but webbing not seen yet	Chewing on leaves

Soil temperatures around Illinois (from Illinois State Water Survey)

This information will be provided all season. For data from other reporting stations, go to <https://www.isws.illinois.edu/warm/soil/> (you will need to set up an account to access data.)

Max. Soil temps For June 15, 2023*	St. Charles reporting station (north)	Champaign reporting station (central)	Carbondale reporting station (south)
2-inch, bare soil	83.1	97.6	93.2
4-inch, bare soil	81.8	85.9	86.2
4-inch, under sod	75.2	81.7	80.5
8-inch, under sod	69.1	74.5	76.1

* This is the maximum soil temperature recorded the day prior to publication of PHCR.

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Special Watering Issue

What happens when we water? ([reprinted from issue 2021.13, Sept. 24, 2021](#))

The obvious answer to that question is that we keep our plants alive. But we need to dive deeper here. We don't just want our plants to survive, we want them to thrive. Water is essential to all life forms, and the plants need water just like everybody else does. They need it to live and to grow (make new plant parts) and to reproduce (flower and produce seeds). When we turn on the garden hose or lawn sprinkler, we tend to have one eye on the water meter. This is wise, but instead of denying our plants water, we should make sure that every drop is used well by watering properly ([see issue 6, June 11, 2021](#) for a long article on watering properly).

I am not a researcher and this is not intended to be a scientific paper on plant physiology, but we are going to dig one layer deeper than most of us generally do. So, what does water do for our plants? Obviously, on a hot, dry day, watering the plant gives it water to take up so it does not wilt. But water is important to plants in so many other ways.

Water plays an essential role in photosynthesis, the process by which plants make their own food. This is not the 'food' we give plants when we fertilize (nitrogen, phosphorus and potassium). If there was suddenly a fertilizer shortage, the plants would carry on without it. Through photosynthesis, plants make carbohydrates that they burn for energy so they can complete various biological processes. Water helps the plant produce chlorophyll, the green pigment that is necessary for photosynthesis. Plants need to make new chlorophyll every day. If water is in short supply, chlorophyll is not formed and leaves turn yellow. Water is also involved in the photosynthetic process itself. Remember that formula for photosynthesis that the science teacher showed you in biology class? Don't stop reading, I won't show it to you here. Instead, I will tell you what it means: carbon dioxide molecules and water molecules, in the presence of light energy captured by chlorophyll are converted into sugar (carbohydrates) and oxygen molecules. So, no water, no carbs, no food (and also less oxygen for us to breathe).

Water also plays an important role in growth, partly because of its role in photosynthesis, but also because it is needed to help with the development and expansion of new plant parts. Trees form their leaf buds for next year in the current summer. If there is a lack of water during summer, bud formation will be affected, so that fewer buds may be formed and those that are formed may be smaller than normal. So, watering your tree in the summer not only keeps it from wilting, it also helps with bud production for next summer. Watering is an investment in the future growth of that tree.

I mentioned in the article about the weather, that in a dry season, roots are at risk for damage. Roots that have been cut during construction have been damaged. A tree that is dug from a

nursery field and planted in a new location has suffered root damage. In all these cases, the tree will need to produce new roots. Usually, the first question people ask in these situations is “Should I fertilize?” The answer is “No”. Water is the essential ingredient for root growth. We should tend to that need first and foremost. Water is needed so the remaining roots can keep supplying water to the tree, but it is also needed for the tree to develop new roots and expand its root system. The carbohydrates made through photosynthesis (remember that takes water too!) help with new root growth. We can consider if fertilizer is appropriate at a later date.

Water is also important in flowering and reproduction. Water is essential for the development of leaf buds, and it is equally important for the development of flower buds. Water also plays important roles in the development of fruits and seeds. When a fruit starts to grow, plants start to send lots of carbohydrates to that fruit. Fruit production is a high priority on the list of plant parts that need carbohydrates. If water is lacking and carbohydrate production (photosynthesis) is decreased, fruits and seeds may fail to develop or may develop poorly. Also, fruits that are juicy, need water to make them so. You can’t get a good watermelon without water.

So, when we water our plants, we are doing so much more than just getting them through a dry spell. We are helping them carry out their day-to-day biological functions and helping them to grow and develop for the future. Watering your tree today is an investment for tomorrow.

Insects, diseases and stress ([reprinted from issue 2021.13, Sept. 24, 2021](#))

Even though we are looking at PHC in a broader scope in this issue, we can’t forget about the insects and the diseases. We need to take a broader view of these problems as well. Stress, environment and level of care can make these problems worse or can minimize some of them. Back in 2012, when we were having that unusually hot, dry year, entomologist Dr. Fredric Miller told me to expect increases in the populations of scale insects and wood-boring insects. He was right! In the years following that stressful year, scale populations exploded. Borers have been more prevalent since then as well. Why is that?

It turns out that stressed plants become more favorable targets for some insects, and more beneficial to some of them as well. A tree that is in drought stress has less water in its tissues. That increases the concentration of sugars and nitrogen in the tree’s cells. This more concentrated food source is beneficial to scale insects, enabling them to reproduce and develop at a faster rate, leading to a larger population in a shorter time.

Many wood-boring insects are attracted to trees that are stressed. There are exceptions to this, like the emerald ash borer, which can attack very healthy trees, as well as those in decline. So why do so many borers attack stressed trees? Trees can naturally produce chemicals that help to deter attack by borers. Trees under drought stress have a decreased capacity to do this

and as a result they become more susceptible to borer attack. In addition to that, drought stressed trees also produce volatile chemicals that actually attract borers. The borers can detect these chemicals and use them to find stressed trees.

When we see a tree attacked by scale or borers or bark beetles, we need to take a few minutes and think about why these insects are there and what we might be able to do to lessen their impact. Even better, let's be proactive and try to prevent some of these problems before they happen. If you took the time to read the really long article above about watering, you will realize that watering can help prevent or at least minimize some of these problems. A properly watered tree will have sap with a lower concentration of carbohydrates and nitrogen, making it less beneficial to scale. A properly watered tree will be able to produce the chemicals that help deter borer attack and will keep the tree from producing the volatile chemicals that will attract borers.

It is important to realize that an insect may not always be the only problem a tree has. Again, we want to take a more holistic look and see what else is impacting the tree. The same could be said for many diseases. There are a number of diseases that have been around for a long time that have really become more prevalent in the last few years. A couple of examples of this: *Diplodia* tip blight on Austrian pine and *Cytospora* canker on blue spruce. These diseases have become more prevalent due in part to environmental stress weakening the host trees and making them more susceptible to infection. We are seeing large numbers of blue spruce declining from *Cytospora*. Blue spruce comes from a native habitat that is cooler and that has good drainage. Our hot, humid weather and poorly drained clay soils put it into stress. The up and down weather we have been experiencing has added to this stress. A third factor adding to the situation is that we have planted a lot of blue spruces in our landscapes. Having a lot of any one plant sets the banquet table for diseases and insects (think Dutch elm disease, emerald ash borer). As part of the holistic look at PHC we need to consider selecting trees (and other plants) that are well adapted to our environment, and we need to diversify our plantings with a variety of different species.

Proper watering: irrigation bags ([reprinted from issue 2022.8, July 8, 2022](#))

When it comes to caring for trees (or really any part of the landscape), we often talk about the importance of watering. Water is a very precious commodity, and so we want to use it wisely. This is the first in a series about watering properly and trying to strike a balance between giving our trees what they need and doing so with as little waste as possible. This article will deal with some basics and with the use of irrigation bags for new trees. Future articles will look at proper use of other watering devices.

The general guideline for watering is to give any plant about an inch of water per week (between you and the rain). The question that usually follows this statement is "How do I know

when I have an inch?” In a clay soil, one inch of water should go down about 5 to 6 inches deep. After you finish watering, with whatever device you use, you can dig a small hole and see how far down the water has gone. For those of you who don’t enjoy digging small holes, focus on the concept that we want to water deeply and infrequently. Many people who talk to us at Plant Clinic indicate that they are watering their plants every day, and often for a very short period of time. If you need to water your plants every day, then you are not watering deeply enough when you do water and your plant is not receiving enough water at any time. The only plants that need to be watered every day are those in containers (which often dry out quickly due to small soil volume), or possibly small seedlings that have very small root systems. Get to know your watering device, how it delivers water and, most importantly, how quickly does it deliver that water.



Figure 2 Irrigation bag (photo: S. Yiesla)

Since our priority for watering is focused on newly planted trees and shrubs, let’s look at irrigation bags (fig. 2). There are different types available. Many are 2 to 3 feet tall and often green in color. Others have a very low profile and look somewhat like a big donut. The latter type is good for low-branched shrubs. The bag gets filled with water and then the water is delivered slowly out of the perforated bottom of the bag. These bags have benefits. You know exactly how many gallons of water you are delivering to the tree (bags vary in their capacity). The bag sits on the root ball of the tree and the water goes slowly and directly down into that root ball where it is needed the most, instead of rolling out into the lawn or gutter.

One common complaint is that the bag seems to always be empty. The bag gets filled and the water is delivered to the tree and usually empties out within a few hours. That is how it is supposed to work. The bag is not meant to be full all the time. The only thing to figure out is how often the bag should be filled. In times when temperatures are moderate and we are getting some rain fall, once a week may do the trick. In times of extreme heat, like we have been having lately, the bag may need to be filled every 3 to 5 days. When in doubt, lift the bag up and feel the soil under it. If the soil is still moist, all is well. If it is dry an inch down, it may be time to refill.

Proper watering: Soaker hoses and root feeders ([reprinted from issue 2022.9, July 22, 2022](#))

In our last full issue, we started a series of articles about watering. We do want to water our plants, but water is a very precious commodity, so we want to use it wisely. This is the second article in our series about watering properly and trying to strike a balance between giving our trees what they need, and doing so with as little waste as possible. This article will deal with the use of soaker hoses and root feeders. Future articles will look at proper use of other watering devices. Remember that we want to focus on watering deeply and infrequently. This is important, no matter which watering device we use. Get to know the watering device, how it delivers water and, most importantly, how quickly it delivers that water.

Let's take a look first at soaker hoses. There are a lot of benefits to soaker hoses. They can be turned on and the gardener can go do some other gardening while the hoses are watering the plants. The water goes directly onto the soil, so the leaves stay dry. This helps to minimize the possibility of fungal diseases. The water is delivered slowly, so wasteful runoff of water is often minimized.

That slow delivery of water can be a problem, as well. Too often, we underestimate just how slow that delivery is. Looking at the hose in action reveals that it just weeps water out in small droplets. This means that it could take a while to do a deep, thorough watering of the garden. Many people who report dissatisfaction with soaker hoses simply have not let them run long enough. It is not easy to know exactly how long to let them run, because the delivery of water can depend on a number of factors. These factors may include the type and age of the hose, the water pressure available at the site and the type of soil being watered.

To get a feel for how quickly the hose delivers water, run a test. It is common for home gardeners to run a soaker hose for about 15 to 30 minutes. That is not likely to be sufficient to meet the guideline of an inch of water at a time. An inch of water should penetrate into a clay soil about 5 to 6 inches deep. Lay out the soaker hose and let it run for an hour. Turn it off and dig a small hole to see how far the water went down. If it only went down two inches, it may be necessary to double or triple the time the hose runs. After this test is done once, it should not have to be repeated.



Figure 3 Root feeder (photo: S. Yiesla)



Figure 4 Tip of root feeder (Photo: S. Yiesla)

Let's look now at root feeders. These devices are really marketed as a fertilizing tool, but they are often used to deliver just water to trees and shrubs. The root feeder has a handle at the top which connects the feeder to a garden hose. The lower part of the feeder is a long metal tube with a pointed end. Sizes vary by brand, but the tube is often 2 feet long or longer (fig. 3). There are usually two or three holes at the bottom of the tube (fig. 4) that deliver water into the soil.

A common mistake is to attempt to push the root feeder as deep into the soil as possible. That could put the tip of the root feeder, and thus the actual flow of water, too deep into the soil. Most trees have their roots in the top 18 to 24 inches, so putting the tube in too deep means that we may not be getting water to some of the roots in the top few inches of soil. Watering can be more efficient by putting the tube end in just a few inches and letting the water percolate down by gravity. That will deliver water to more of the root system.

Another concern is turning the water pressure on too high. The water is coming out relatively small holes, into a soil that may not be able to absorb it quickly. If water starts to bubble up at the soil surface, the soil may not be absorbing the water and the pressure should be adjusted. The root feeder will also need to be moved around the perimeter of the root system to deliver water evenly over as much of the root system as possible.

Proper watering: sprinklers and watering by hand ([reprinted from Issue 2022.10, Aug 5, 2022](#))

This is the third article in our series about watering. We do want to water our plants, but water is a very precious commodity, so we want to use it wisely. We want to be watering properly and trying to strike a balance between giving our trees what they need, and doing so with as little waste as possible. This article will deal with the use of sprinklers and hand watering. Remember that we want to focus on watering deeply and infrequently. This is important, no matter which watering device we use. Get to know the watering device, how it delivers water and, most importantly, how quickly it delivers that water.

Let's talk about sprinklers first. This includes lawn sprinklers that can be placed in different locations on the lawn or in the garden, as well as permanent in-ground sprinkler systems. Both can be useful tools for watering, but they do have to be used correctly. Since sprinkler systems throw water up into the air, there is potential loss of water to evaporation. In some situations (high winds and/or day air), this can be a substantial loss. If water pressure is high, water may be delivered faster than the soil can accept it. That can lead to runoff and loss of water into storm drains. Improper placement of sprinkler heads can send water off-target, landing on driveways and streets, instead of planted areas.

To combat these problems, be sure that the sprinklers are placed so that they water the landscape and lawn. Avoid turning the water pressure up too much. Observing the sprinkler system while it is running can help evaluate if the water is going where it should. Use the sprinkler when winds speeds are lower, to reduce loss to evaporation. When using a system that is on a timer, turn it off on days when rain is falling and water is not needed.

In addition to turning the system off on rainy days, also take the time to have the timer set properly. A number of Plant Clinic clients indicate that their systems run about 15 minutes per zone, every second or third day. That is not going to provide the deep watering our plants need and may actually be wasting water. Having the sprinkler run for 15 minutes may not wet the soil deeply at all and certainly will not provide the suggested one inch on water. The old-fashioned method of putting a can out to collect water still works. One of our Plant Clinic volunteers put this method to use a few years ago. She put cans out on the lawn while the sprinkler ran. She reported that it took nearly three hours to get an inch of water in the cans. Set the sprinkler system to run less often (maybe every 5 to 7 days, depending on weather) and for a longer period of time. Using the cans once can give you an idea of how long to run the system at your house. When using a sprinkler of any kind, avoid watering late in the day. Sprinklers provide overhead watering and it does wet the foliage. Foliage that stays wet longer is more at risk for fungal disease.

Now let's turn to watering by hand. Watering by hand can be tedious in large gardens, but it may be exactly right for small gardens or for gardens with a lot of containers. The problem with hand watering is that it can be difficult to know when you have enough. You can't really tell if you have applied an inch of water or not. To get a deep watering in a smaller garden, water the area once, and then go back and water a second time. The first round moistens the soil and will make it easier for water from the second round to really penetrate deeper into the soil. Using a water wand (fig. 5) on the end of the hose allows application of the water down near the base of the plants. This keeps the foliage dry and reduces the potential for fungal diseases.

Hand watering can also be efficient when we need to target certain plants, like those in containers, or plants that may need more water than others. Hand watering allows us to direct water exactly where it is needed, and avoid wasting water. This can also be applied to watering trees. A tree can be watered with an open-ended hose, delivering a stream of water about the size of a little finger. Lay the hose on the ground out at the drip line and let it run for 20 to 30



Figure 5 Water wand (Photo: S. Yiesla)

minutes. For a small tree, the hose then can be laid on the ground under the drip line on the other side of the tree and run for an additional 20 to 30 minutes. For medium or large trees, this process can be done at 3 or 4 locations along the drip line.

Watering with any type of device can be efficient. It is important to understand the device and use it properly.