Missouri Environment & Garden

December 2012 Volume 18, Number 12

2012: Lessons Learned

The philosopher William James once remarked, "When you're through with learning, you're really through". Indeed, life is a learning experience and, since gardening is a part of life, it (too) should be a learning experience. Each and every year new problems arise or situations occur that cause us to pause and ask: "why" or "how" did that happen? Frankly, the challenge of the unexpected is one of the aspects that make working with plants so interesting. As the calendar year draws to a close it is appropriate that we pause to consider the past growing season and contemplate the lessons we have learned.

The summer of 2012 will live in infamy for decades to come for those involved with growing plants, be the latter for commercial or for recreational purposes. The combination of prolonged high temperatures and lack of nearly any precipitation is sure to make this past summer one that will be used as a benchmark for weather austerity in years to come. The result of this deadly combination was the loss of innumerable plants (including many woody species) that might have been able to withstand either of the two separately, but not both together. Let's explore the reason for this.

The concept of a lack of one environmental factor exacerbating the effect of another is termed "synergism". Looking at this concept in mathematical terms, it is an established fact that two plus three equals five. If synergism were involved between the numbers two and three, the sum might be something like six, seven or more. In short, this past summer plants suffered from a synergistic affect between high temperatures and drought stress.

We all know that plants take up water via their root system in an attempt to keep their leaves turgid and stomata open. The latter are minute pores on the surface of leaves which, when open, allow for the entry of carbon dioxide-laden air into the interior of the leaf. Carbon dioxide is one of the basic, raw ingredients needed in the photosynthetic process and critical for plant growth and productivity. However, open stomata also allow water vapor to escape from the leaf in a process called transpiration.

Although transpiration can lead to a water deficit in plants, it does serve several useful purposes. For example, transpiration is necessary to translocate dissolved minerals from the soil to other parts of the plant, to move sugars and other plant products within the plant, to maintain cell turgidity, and (importantly) to help cool leaf and stem tissues. The rate of transpiration is dependent

Continued on page 68

In This Issue

Missouri Environment & Garden newsletter is published by the MU IPM Program of the Division of Plant Sciences Extension. Current and back issues are available on the Web at **http://ipm.missouri.edu/meg/**. Mention of any trademark, proprietary product or vendor is not intended as an endorsement by University of Missouri Extension; other products or vendors may also be suitable. Editor: Kate Riley (rileyka@missouri.edu)

2012: Lessons Learned

…continued from page 67

on several environmental factors, the most important being leaf temperature as influenced by the radiant energy of the sun. As the temperature of the leaf increases, so does the rate of transpiration (or water loss from the plant).

Plants are in a constant state of water flux. When the rate of transpiration exceeds the rate of water uptake, wilting occurs. Recovery from wilting happens when the rate of water uptake exceeds that of transpiration. Often the latter occurs after the sun goes down and leaf temperatures cool. Permanent wilting (followed by death) occurs when there is insufficient soil moisture to reverse the wilting that occurred during the day.

On a hot day, transpirational cooling is sufficient to keep leaf temperatures near or slightly above the temperature of surrounding air, depending upon the amount of radiant energy received and wind speed. Research has demonstrated that temperatures of rapidly-transpiring leaves, on the average, were 2-4 °C cooler than those of non-transpiring leaves. When this cooling effect is reduced or stopped altogether because of a lack of moisture, leaf temperatures can rise to levels significantly above the ambient air temperature.

Heat stress in plants occurs when temperatures are of sufficient magnitude and duration to cause damage to plant function. Perhaps the most common form of heat stress is starvation injury. The latter occurs when the rate of respiration exceeds the rate of photosynthesis. At higher temperatures heat stress results in more dire, irreversible consequences. For example, for many woody species a temperature death threshold is reached when plant tissue temperature reaches approximately 115°F, according to one authority. Temperature death threshold depends on factors such as the duration of hot temperatures, the maximum temperature reached, the age and hydration of plant tissue, and the ability of the plant to adjust to temperature changes.

Suffice to say, then, there is a synergistic affect between temperature and water. The hotter the temperature, the greater is the rate of water loss via transpiration. Under periods of drought stress, when adequate soil moisture is not available, the matter is aggravated by a lack of transpirational cooling which, in turn, leads to higher leaf temperatures. This tends to lead to a downward spiral of plant function and (ultimately) the death of the plant.

Mark Twain once remarked, “Everyone talks about the weather but no one seems to do anything about it”. Indeed, there is not a lot we can do about hot temperatures. Shading is effecting in reducing leaf temperatures and might be practical for smaller plants but not for larger ones. Misting helps to cool leaf tissue but the beneficial effect is very short-lived.

If the summer of 2012 represented the “new normal” when it comes to temperatures in our region, then species selection probably is a gardener’s best defense against oppressively high temperatures. Gardeners long have had a tendency of trying to coax plants out of their “comfort zone” when it comes to temperature preference. Those species more content in cooler climates are the first to display heat stress here in the Midwest. In the future, if non-native species are planted, the attempt probably should be made to identify species more adapted to warm summers.

Water is an environmental parameter serious gardeners should be able to control. Many people pay adequate attention to the water needs of their herbaceous plants by supplying supplemental water during periods of high temperatures and drought stress. Most herbaceous plants require between one and two inches of water per week. Drip irrigation systems are excellent in that they tend to distribute the water where it is needed while keeping the foliage of the plants dry.

Woody species, however, often tend to suffer from neglect during periods of hot, dry weather since we consider them to be more self-sufficient. Often, supplemental irrigation is delayed until after symptoms of severe water stress such as leaf scorch appears. “Rescue irrigation” is better than nothing but frequently results in too little, too

Continued on page 69

2012: Lessons Learned

...continued from page 68

late from the standpoint of plant health. Prevention always is the best cure and this holds true for water (heat) stress as well. Again, applying between one and two inches of water per week is a "best management practice" for landscape plant maintenance. Some species might require more; others may to able to get by with less.

Gardeners tend to be optimists. Who else would plant a tulip bulb in October with the full expectation of seeing a beautiful flower in April? As discouraging as this past summer might have been to our gardening efforts, giving up is not an option. Hopefully, the summer of 2013 will be more conducive to plant production. If not, at least we now can say "we have been through this before" and (consequently) will be better able to deal with it.

David Trinklein,
Associate Professor
Division of Plant Sciences
TrinkleinD@missouri.edu

January Gardening Calendar

Houseplants

- Weeks 1-4: To clean heavily encrusted clay pots, scrub them with a steel wool pad after they have soaked overnight in a solution consisting of one gallon of water, and one cup each of white vinegar and household bleach.
- Weeks 1-4: Some plants are sensitive to the fluorine and chlorine in tap water. Water containers should stand overnight to allow these gases to dissipate before using on plants.
- Weeks 1-4: Wash the dust off of houseplant leaves on a regular basis. This allows the leaves to gather light more efficiently and will result in better growth.
- Weeks 1-4: Set the pots of humidity-loving houseplants on trays filled with pebbles and water. Pots should sit on the pebbles, not in the water.
- Weeks 1-4: Allow tap water to warm to room temperature before using on houseplants.
- Weeks 1-4: Hairspray works well to keep seed heads and dried flowers intact on wreaths and arrangements.
- Weeks 1-4: Fluffy, white mealy bugs on houseplants are easily killed by touching them with a cotton swab soaked in rubbing alcohol.
- Weeks 1-4: Insecticidal soap sprays can be safely applied to most houseplants for the control of many insect pests.
- Weeks 1-2: Quarantine new gift plants to be sure they do not harbor any insect pests.
- Weeks 2-4: Amaryllis aftercare: Remove spent flower after blooming. Set the plant in a bright sunny window to allow the leaves to fully develop. Keep the soil evenly moist, not soggy. Fertilize occasionally with a general purpose houseplant formulation.

Ornamentals

- Week 1-4: Gently brush off heavy snows from tree and shrub branches.
- Week 1-4: Limbs damaged by ice or snow should be pruned off promptly to prevent bark from tearing.
- Week 1-4: Check stored summer bulbs such as dahlias, cannas and gladioli to be sure they are not rotting or drying out.
- Week 1-4: To reduce injury, allow ice to melt naturally from plants. Attempting to remove ice may damage plants further.
- Week 1-4: Use sand, bird seed, sawdust or vermiculite to gain traction on icy paths. Avoid salt or ice melters as these may injure plants.
- Week 1-4: Make an inventory of the plants in your home landscape. Note their location and past performance. Plan changes on paper now.
- Week 2-4: Sow pansy seeds indoors now.

Continued on page 71

January Gardening Calendar

...continued from page 70

Miscellaneous

- Week 1-4: Avoid foot traffic on frozen lawns as this may injure turf grasses.
- Week 1-4: Make a resolution to keep records of your garden this year.
- Week 1-4: Store wood ashes in sealed, fireproof containers. Apply a dusting around lilacs, baby's breath, asters, lilies and roses in spring. Do not apply to acid-loving plants. Excess ashes may be composted.
- Week 1-4: Check all fruit trees for evidence of rodent injury to bark. Use baits or traps where necessary.
- Week 1-4: Cakes of suet hung in trees will attract insect-hunting woodpeckers to your garden.
- Week 1-4: Brightly colored paints applied to the handles of tools will make them easier to locate in the garden.
- Week 1-2: Seed and nursery catalogs arrive. While reviewing garden catalogs, look for plants with improved insect, disease and drought-tolerance.
- Week 1-2: Old Christmas trees can be recycled outdoors as a feeding station for birds. String garlands of peanuts, popcorn, cranberries, fruits and suet through their boughs.
- Week 1: Christmas tree boughs can be used to mulch garden perennials.
- Week 1: If you didn't get your bulbs planted before the ground froze, plant them immediately in individual peat pots and place the pots in flats. Set them outside where it is cold and bury the bulbs under thick blankets of leaves. Transplant them into the garden any time weather permits.
- Week 2-4: Try sprouting a test sample of left over seeds before ordering new seeds for spring. (Roll up 10 seeds in a damp paper towel. Keep moist and warm. Check for germination in a week. If fewer than half sprout, order fresh seed.)
- Week 4: Swap seeds and plant information with your gardening friends.
- Week 2-4: Sow pansy seeds indoors now.

Gardening Calendar supplied by the staff of the William T. Kemper Center for Home Gardening located at the Missouri Botanical Garden in St. Louis, Missouri. (www.GardeningHelp.org)

View MEG Publications on the web

http://ipm.missouri.edu/newsletters/megindex.htm