Urban Trees and Climate Change
(Lindsey Purcell, lapurcel@purdue.edu)

Urban Trees and Climate Change... what’s going on and what is expected?

It’s time to really pay closer attention to the impacts of changing climate on our urban forests. Generally speaking, changes will vary across the Midwest and will be challenging to determine exactly what can be done to protect our trees. Also, the once simple task of selecting what will be considered a sustainable tree species in the midst of these extreme changes in weather will be equally challenging. The current urban and suburban environments are tough for growing trees and our changing climate is going to make it even tougher.

The greenhouse effect is the warming that results when the atmosphere traps heat radiating from Earth toward space. Scientists attribute global warming and climate change to this greenhouse effect. In addition, human expansion has increased carbon emissions and has become one of the major contributors to our ongoing climate change issues which impacts every tree on the planet. Climate change will continue to bring warmer, and more wet winters and warmer, drier summers; consequently, insect disturbances are expected to increase. Additionally, climate change is further aggravated by existing urban stressors such as air pollution, soil compaction and heat island effects. Since it is unlikely that these issues can be prevented in and around the places we live; it is essential that adaptive strategies be identified and implemented by urban forest managers before these impacts take an even larger toll on our city trees. Climate change will present both threats and opportunities, and it is not too early to begin planning for both.

The increasing levels of carbon dioxide is found everywhere on the planet. As of this past year, we have surpassed our all-time high of 412 ppm in the Earth’s atmosphere. In some instances, this has found to be favored by certain tree species, especially the older, mature trees. Since trees rely on carbon for energy, this “vitamin-like” increase in carbon resources gives the tree a little boost. However, the evidence so far suggest that it will be temporary and actually have negative long-term consequences. Additionally, with the increasing levels of CO₂ we have seen major increases in pest outbreaks, higher levels of reproduction and reduced mortality. Also, exotic insects may be able to flourish where once were not adaptable. That carbon concentration increase in the trees also increases insect feeding activity, making insect outbreaks much worse.

In 2018, CO2 levels surpassed 408 ppm for the first time in recorded history. One of the major concerns from past years and looking forward will be drought. Water is the most important factor in tree growth.
and sustainability. Increases in CO$_2$ levels increases temperatures and drought severity. Regardless of the amount of snow and rain, higher temperatures will result in increased levels of evaporation and transpiration which reduces soil moisture and increase the likelihood of moisture deficits. According to the US Drought Monitor, the past two years have been relatively normal. However, trends from the past thirty years indicate the potential for increase drought potential similar to what we experience in 2011-2013. It is imperative we follow and fund research which explores drought tolerant species and less water-demanding biology in trees.

As the year begins, tree owners and managers should place more consideration into managing the impacts of these increasing environmental stressors. Tree selection is critical and right tree, right place even more important. We may not be able to just pick any tree and it will work in the design. It is more of a selection strategy considering available maintenance inputs, water requirements and exposure. Adaptive management will require a realistic look at our future. Does policy and budget make it possible for urban forest managers to make informed decisions and implement them into a resilient, adaptive forest for our future? Also, on a private level, commercial landscapes and residential tree plantings all contribute to the overall urban forest. Responsible tree selection and realistic management inputs are vital to a flexible and resilient tree canopy which contributes locally, regionally and globally to our health and quality of life.

Trees are vital to improving our environmental conditions. They are the perfect biological machine which provides valuable functional services which can save tree owners and communities millions of dollars in energy costs, storm-water management and air quality. However, these trees have to mature and survive before they can provide these important ecosystem services. Planting trees is part of the solution, but not the answer. We can’t just keep planting trees; we have to start growing and sustaining existing trees.

For more information on urban tree care, visit the Purdue Education Store for tree care tips and suggestions.

Mother Nature Gives Spring Bulbs the Heave-Ho!

(Rosie Lerner, rosie@purdue.edu)
Daffodil bulbs emerge December 2019.

Photo Credit: Tom Creswell, Purdue Extension

An additional problem that may especially be an issue this year is frost heaving. Repeated cycles of alternate freezing and thawing causes water in soil to expand and contract, which can lead to bulbs and herbaceous perennials being pushed up to the surface of the soil. Most susceptible are shallow-rooted plants or those planted in late fall that didn’t have a chance to establish a deep root system before soil freezing. Waterlogged or poorly drained soils will be most affected due to high moisture content.

Frost-heaved plants may have exposed roots that will be further damaged by winter weather. If the ground is not frozen, you could gently tamp the plants back into the soil. Then cover with several inches of mulch such as straw or shredded bark. To prevent frost heaving in the future, mulch susceptible plants after the ground freezes to help lessen fluctuations in soil temperatures. But in a winter like this one, mulch may not be enough to stop the heaving.

A Look Back at a Challenging 2019 Season
(Kyle Daniel, daniel38@purdue.edu)

The 2019 season provided challenges that were unexpected to the Green Industry, which included an abundance of rainfall followed by drought-like conditions, new invasive pests, concerns about glyphosate use, and many others. The Purdue Landscape Report focuses on timely articles that help Green Industry professionals make decisions for their business and keep abreast of looming issues. As we begin the 2020 season, we can take a look back at some of the top stories from 2019. Hopefully this season will be a little less challenging, but be sure we’ll be there with relevant, timely information in 2020. Thanks for following along!
Terrestrial invasive species rule signed by Indiana Governor
https://www.purdueandscapereport.org/article/terrestrial-invasive-species-rule-signed-by-indiana-governor/

What nurseries need to know about the invasive species regulation

Beyond Roundup

Feast or famine: precipitation extremes
https://www.purdueandscapereport.org/article/feast-or-famine-landscape-plants-are-struggling-due-to-precipitation-extremes/

Winter Injury Update to Michigan Trees and Shrubs
Early frost injury to Canaan fir. Photo by Dull’s Tree Farm.

It is the policy of the Purdue University that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as a veteran. Purdue is an Affirmative Action Institution. This material may be available in alternative formats. 1-888-EXT-INFO

Disclaimer: Reference to products in this publication is not intended to be an endorsement to the exclusion of others which may have similar uses. Any person using products listed in this publication assumes full responsibility for their use in accordance with current directions of the manufacturer.