Virginia Cooperative Extension
Virginia Tech • Virginia State University
www.ext.vt.edu

# Hurricane Preparedness and Recovery Tips for Turfgrass Managers

*Authored by Mike Goatley, Jr., Professor and Extension Turfgrass Specialist; Shawn Askew, Professor and Extension Turfgrass Weed Specialist, Jeff Derr, Professor of Ornamental Weed Science and Director of Hampton Roads Agriculture Research and Extension Center; David McCall, Assistant Professor and Turfgrass Pathologist, and Adam Nichols, HRAREC Turfgrass Research Manager, School of Plant and Environmental Sciences, Virginia Tech*

## Introduction

The power of Mother Nature is revisited annually across Virginia and the mid-Atlantic through numerous tropical systems that result in obvious personal and property storm impacts for coastal areas, but that also spawn storms that impact inland areas hundreds of miles away from the coast. Virginia Cooperative Extension offers a wide variety of very detailed emergency preparedness publications for natural disasters at http://pubs.ext.vt.edu/tags.resource.html/pubs_ext_vt_edu:emergency-preparedness. Much of this information is obviously far more critical than that presented here discussing turfgrasses because many of the publications at this website detail preparedness and safety tips from the standpoint of life, limb, and property. This article specifically focuses on the concerns to turfgrass systems from anticipated hurricane or tropical storm impacts, some ways you might address these issues in preparation for the storm through adjustments in your chemical and cultural programs, and general recovery tips after the storm has passed.

## Concerns from storm surges/saltwater intrusion

The primary concern to turfgrasses in areas of direct hurricane impact is very often saltwater intrusion, whether it is delivered directly to the soil by tidal surges, or is accumulated in irrigation ponds for future applications to the turf and landscape. Salts in the soil affect turfgrasses in three ways:

1. Physiological drought. The salt levels are so high in the soil solution that water uptake is prevented by osmotic inhibition (i.e., even in the presence of water, there is no water uptake by roots because salt concentrations are so high in the soil.) Physiological drought is not uncommon from excessive fertilizer applications and is one reason that many soil tests include measurements for soluble salts in their testing procedures.
2. Potential toxicity from certain ions in the saline media that may either directly affect the plant or cause an imbalance in the uptake of other nutrients
3. A combination of the above.

Bermudagrass, zoysiagrass, creeping bentgrass and St. Augustinegrass all have excellent salinity tolerance, tall fescue and perennial ryegrass are considered moderate, and fine fescue and Kentucky bluegrass are relatively poor. Soil salt levels are determined by measuring Electrical Conductivity (EC), where higher values (reported in units of dS $m^{-1}$) mean higher salt concentrations. Growth of most turfgrasses is not affected by salt levels up to 2-3 dS $m^{-1}$. These values near the soil surface are possible following applications of many water soluble fertilizers used on turf. A thorough irrigation event with potable water is usually sufficient to adequately dilute these concentrations. At levels of 3-6 dS $m^{-1}$, the least tolerant grasses begin to show signs of stress, and by 6-10 dS $m^{-1}$, the growth of most turfgrasses frequently grown in Virginia begins to be affected by the salt levels in the soil.

Salt levels must also be considered in combination with sodium (Na) concentrations as well. Our Virginia soils generally do not have problems with Na, so this problem is usually only going to be of concern in conjunction with salt accumulation due to tidal surges and seawater intrusion. Additional tests

such as a Sodium Adsorption Ratio [a term reflecting the relative proportion of Na to calcium (Ca) and magnesium (Mg)] and pH determination are often conducted in conjunction with $EC_e$ Sodium by itself is not a potential toxin to turfgrasses, but at sufficient (and persistent) concentrations its deleterious effects on soil structure and water infiltration/percolation rates are of concern.

# Preparing for the storm and its aftermath

Locations on the coast will have direct concerns with tidal surge and the impacts it will have on water quality. However, away from the coast the sheer amounts of rainfall and accumulations of debris and silt etc. on the turfed sites will likely be more problematic than the effects of the seawater. Add wind into the scenario and downed trees will be blocking access and taking down power lines, so having chain saws at the ready for the storm aftermath is logical. Be sure that all involved in immediate recovery efforts respect the possible dangers associated with downed power lines etc. either directly or indirectly encountered in the recovery efforts, and that someone knows know how to turn off power sources at any facilities under your direction. How much 'elevation' is possible for equipment and/or products etc. stored on the floor that might be prone to floodwaters?

After the event, any debris deposited on the turf from flooding should be removed as quickly as possible in order to restore the grasses' photosynthetic capacity. Removing silt and clay that is deposited by flooding is a painstaking process, but one that is essential to prevent contamination of existing soils (particularly modified, sand-based soils). Aerating these soils as soon as feasible after the storm is another important activity to restore soil oxygen levels that promote healthy root and microbial activity. One positive piece of news regarding a typical turf recovery situation for our state is that with the amounts of rainfall that Virginia receives annually, the effects of tidal surges on soil salinity and sodic properties is usually minimal and short duration. Turfgrasses are some of the most forgiving plants in the landscape, and though there might be some yellowing and slowing of growth associated with temporarily high salt levels, the grasses rebound quickly following flushing of the soil with potable irrigation or a rainfall event. For those rare times when salt/Na levels persist, gypsum (calcium sulfate) can be applied according to soil test results.

The University of Florida's Institute of Food and Agricultural Services provides a very thorough discussion of managing hurricane-caused problems in a publication called "Promoting Turf Recovery after Hurricanes" at http://disaster.ifas.ufl.edu/PDFS/CHAP06/D06-20.PDF. While developed primarily for golf turf management, the strategies apply to just about any turfgrass situation.

Probably the biggest concern with salt water for Virginia will be its potential accumulation into irrigation holding ponds, etc. from storm surges. Repeated irrigation with water containing more than 1200 ppm soluble salts will begin to show early signs of stress (yellowing, reduced growth rate, etc.) within 5-7 days of use. Again, the saving grace is that a 1/4 to 1/2" rainfall event can flush away most of the soluble salts in the soil IF it occurs soon enough. The Florida Turf Recovery publication suggests pumping out contaminated irrigation lakes and refilling with fresh water where possible. It is hopeful that salt concentrations in Virginia might be sufficiently diluted by rainfall events, but this is something to consider for long-term irrigation programs.

Another question related to storm damage is the duration that turfgrasses can withstand submersion from flooding. There has not been a lot of research done on this problem, but what has been completed indicates that most turfgrasses are remarkably resilient in surviving submersion. Factors such as water temperature (cooler water causes less damage) and water movement (moving water is less damaging) are important, as well as the turfgrass species. For instance, work in Louisiana in the late 1980s by Dr. Jack Fry indicated bermudagrass, zoysiagrass, and centipedegrass could survive up to 55 days of submersion. Similar work with cool-season turfgrasses reported surprising tolerance to several days of water submersion. If plants are not completely submerged (i.e. leaf tips are exposed to the air), survival chances are even greater.

## Adjustments in chemical and cultural programs as storm preparation

Golf superintendents and sports field managers that have lived in Virginia's coastal regions already know the ins and outs of having additional equipment, generators, etc. on hand, as well as making special considerations for their maintenance facilities, fueling facilities, and chemical storage rooms. When storms track inland, flooding rains and power outages are a concern for everyone and not just coastal locales. Storms that result in the loss of power regularly remind us of the importance of alternative power sources in running irrigation pumps. In the face of almost certain significant impacts of these storms, some common sense should be applied regarding fertilizer, chemical, and seeding applications. The calendar might say it is time for an application, but what sense does it make to apply any chemical or seed with forecast rainfall totals in the multiple inches to even feet predicted? With the prospect of many inches of rain soon to arrive, consider how the response and longevity of a chemical application will be affected by an extreme weather event, especially one anticipated to deliver inches of rainfall. Similarly, while the fall is an ideal time to seed cool-season turfgrasses, it makes no sense to apply seed prior to flooding rain events. For all of these cases, ignore the calendar and your schedule and do what is right in terms of delaying the chemical and seed applications. It will be a waste of time, money, and is environmentally irresponsible.

However, there are a few chemical application strategies that are warranted with the approach of a hurricane/tropical storm. VT Turfgrass Pathologist Dr. David McCall in particular warns that the combination of excessive moisture and persistently warm temperatures will result in very high pressure from Pythium root rot on putting greens and Pythium blight on other turfed areas. If you have the budget, he suggests golf superintendents in particular get a Pythium Root Rot treatment out as soon as possible, and if the turf use situation (and budget) warrant, consider a preventative fungicide application for Pythium blight as well. Dr. McCall says there are many fungicides that can help combat Pythium but if he had to make a specific product recommendation his first choice for an active ingredient would by cyazofamid (a common trade name is Segway). For those whose budgets simply don't support the expense of that type of fungicide application, consider a phosphite application in Pythium management; it won't be as complete of protection as the cyazofamid application can provide, but it certainly will help. Dr. McCall suggests that other fungicide treatments for diseases such as leaf spot, brown patch, etc. are probably not warranted at this time because the impacts of the disease are not likely going to be catastrophic as they can be with Pythium since that disease is promoted by persistently wet conditions. Consult the appropriate VCE Pest Management Guide for complete recommendations on pesticides and appropriate timing of applications and their rates.

One supplemental chemical approach that generally fits very well into preparing for storms where standard turfgrass maintenance activities (in most cases, mowing) simply might not be an option for several days would be to apply a plant growth regulator (PGR) a few days prior to an approaching storm. These are products already being widely used in the regular management programs of both cool and warm-season turfgrasses in golf and sports turf management. Regulating the growth prior to storm arrival can make a big difference in restoring the turfgrass to optimal quality and playability after the storm passes. And where any turfgrass (cool or warm-season) is very actively growing, a PGR application might be very important in ensuring the turfgrass growth does not get away from the manager when the waters recede and the soil dries enough to put mowers on the turf. Of course, if no PGR can be applied, it makes sense to mow the grass before the storm hits IF you can justify the time to cut turf with all the other hurricane preparedness activities you might face.

Another thought to consider in preparation for a hurricane is the possibility of making the soil surface more receptive to the water. Of course, no level of surface treatment is going to handle sustained, torrential rain events, but if time permits and you were planning on an aeration event, it is our opinion that will help the soil be more receptive to water. Of course, the benefit of this strategy is dependent on the volume of water received.

# Summary

Since it's not a matter of 'if' tropical systems will impact your facility in this region, but 'when' they will occur, some basic preparation and recovery planning will allow you to more readily manage the challenges presented by the storm. Investing the time and effort to prepare can help protect your turfgrass and landscape systems, as well as protect you and your employees as well.

In search of further information about environmentally responsible turfgrass management strategies? Consult the Lawn and Garden tab on the Virginia Cooperative Extension resources website.

Visit Virginia Cooperative Extension: ext.vt.edu



2021 SPES-340NP