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## Virginia's Turfgrass Managers:

Cool season turfgrasses throughout Virginia are experiencing difficulties associated with summer heat stress. Heat stress results in the grass becoming weakened to the extent that it becomes much more vulnerable to both mechanical and biological stress. Summer decline is therefore a complex of individual factors that can interact to cause more summer problems than each individual stress acting alone.

Extremely high day time temperatures of over 90 degrees, night time temperatures above 70 degrees, and high humidity, have combined to place cool-season turf under significant heat stress. The fact that these conditions have relentlessly persisted for many since mid-May (especially in central and eastern Virginia) has resulted in direct heat stress injury as well as making the turf more vulnerable to damage from other summer related stresses (e.g.; excessively close mowing, traffic and wear, warm weather fungal diseases, poor water quality, poor soil drainage, poor air movement, insect damage etc.). As a result, heat related injury and the associated decline in turf quality is often a result of a complex of individual factors acting together. For this reason it is often difficult to get a handle on specific causes of summer decline. Put quite plainly, during a period of mid-summer heat stress like we had during the past month, the grass plants are more vulnerable to everything that can cause damage. During cooler times of the year these stresses are either non-existent or the grass is healthier and more tolerant. Besides air and soil temperatures, another extremely important environmental influence on the plants ability to cool itself through transpiration is the relative humidity. At high relative humidity the plant is much less able to effectively cool itself and as a result is even more prone to heat buildup and direct heat injury.

An important point to remember in measuring heat stress is that standard meteorological weather data records temperature at 5 ft. above the ground and that temperatures at the turf level may exceed the recorded high. In southside Va recently, when air temperatures were 93° F, the actual temperature at the surface canopy of a bentgrass/Poa putting green was 106° F. Note that concerns with the heat are not only limited to natural grass systems – many artificial turf fields have (or should have been) rendered unsuited for play because field surface temperatures have reached the 140 to 150° F levels during the day, temperature levels that present safety concerns to field users. In addition, high air temperatures are only part of the cause of reduced plant vigor. Prolonged heat stress significantly increases soil temperatures and soil temperatures greatly influence root growth, root health and function. Spring high temperatures are less damaging since the root is in a cooler soil environment. As summer arrives the night temperatures are less cooling on the soil and soil temperatures rise. High soil temperatures result in less root production, rapid root maturation and die back, and little production of new roots. Above ground the turf thins and individual plants become more spindly

A profile of each site and its isolated microenvironments will involve a number of "inventories" as they relate to susceptibility to prolonged heat stress. Conditions and brief

explanations of how they might influence summer decline of cool-season turf follows:

**Cutting heights:** For the summer of 2010, taller mowed turf is logically performing better than grasses being mowed at heights that are ideal only during periods of optimal growth. Cool-season lawns of 4" cutting heights have survived the heat and drought much better than those cut at 1-2 inches. Although 4" cutting heights are not suitable for sports turf use, again, taller mowed fields have performed significantly better during the summer. Some recovery in cool-season turf is already being noted following spotty rain events. However, many cool-season turfs have been invaded by heavy populations of summer annual grasses such as crabgrass, goosegrass, and foxtail. These grasses will die at first frost and will then lead to invasion by annual bluegrass and other winter annual weeds. Make plans now to initiate reseeding of these damaged areas in late August/early September in advance of the biggest window of annual bluegrass germination (after considering possible limitations from weed control programs detailed below). Choose the best grass possible by consulting the Turfgrass Variety Recommendations List from Virginia Cooperative Extension.

**Traffic Stress:** Heavily trafficked areas have logically suffered during periods of summer stress. Traffic damage will be slow to recover with reduced plant vigor. Higher mowing heights will help in this regard. Plan on reseeding these areas as described above, and where traffic continues (i.e. sports fields) continue to apply small amounts of seed throughout the playing season of the fall.

**Public Perception and Maintaining Maximum Aesthetics/Playability:** The public 'expects' green grass 12 months out of the year. That obviously is not possible even in an 'ideal' growing season in a transition zone state such as Virginia. Seasonal environmental conditions will often dictate what should and should not be done to the grass to maintain its 'aesthetics' and its 'playability'. On average, much of the climate of central and eastern Virginia is better suited to warm-season grasses than cool-season turf, so where persistent problems arise on an annual basis, consider if there is not a better species of turfgrass available for your particular area and turf uses. The fall season will provide the opportunity for significant cool-season turf recovery and the memories associated with the summer of 2010 will slowly fade. However, the problems will return during the next 'difficult' summer in our future. A turf management program should be flexible to "ebb and flow" with the vagaries of weather, especially in the mid-Atlantic transition zone environment.

**Irrigation:** As a rule of thumb, continue to irrigate deeply and frequently (using the 1" of water per week guide) IF you have been irrigating this summer. If not, apply no supplemental irrigation (i.e. hopefully allow the turf to remain dormant) and wait for more optimal growing conditions this fall. Continue to irrigate early in the morning in order to reduce leaf wetness periods (i.e. reduce disease infection periods) and ensure your system is applying water efficiently (check heads and nozzles for application pattern, ensure water is not running off the soil, etc.).

**Summer Diseases and Insect Pests:** *Rhizoctonia* Brown Patch is most active under warm day temperatures and warm nights (>70 degrees). Heat stress weakens plants and they can become more susceptible to disease activity at a time of year when the disease pressure is the greatest. Fungicides are often applied more frequently and at higher rates in an attempt to control the pathogens. Anticipate grub problems to be exacerbated on weakened turf and be prepared to address significant activity of fall armyworms and cutworms during late summer. Recommendations on disease and insect control are available in the Pest Management Guide

through Virginia Cooperative Extension.

**Weed control:** In general refrain from chemical weed control treatments during summer stress periods. The typical size and growth rate of summer annual weeds (things like crabgrass) is so significant at this time that chemical treatments will likely have little to no effect and/or damage the existing cool-season turfgrass. Applications of standard preemergent herbicides can be made this fall for the control of winter annual weeds, BUT REMEMBER THAT THESE PRODUCTS WILL ALSO CONTROL ANY GRASS APPLIED DURING RENOVATION EVENTS. If your turf is heavily infested with perennial broadleaf weeds (things like clover, dandelions, plantains, etc.), fall is an ideal time to control these pests. Choose appropriate chemicals from the Pest Management Guide and make plans to treat accordingly.

**Soil Aeration:** The soil must be well aerated for plants to function. Soils that become sealed off at the surface, from compaction, will impair root growth and function and the ability of the turf to cool itself. Tight soils will not readily absorb water and it can make efforts at irrigation difficult. Tight soils, once wet, can often stay wet too long. Plan on utilizing core aeration to improve physical soil conditions this fall, and tie the aeration event to seeding or liming (as indicated by soil testing) applications. Also, topdressing 1-2x per year with ¼ inch depth of a quality compost will improve physical and chemical soil conditions, and its application also is enhanced when done in conjunction with core aeration.

**Fertilization:** Conduct a soil test if it has not been performed for the past 3 years. There are numerous private labs that offer this service or you can work with your local VCE agent in having the Virginia Tech lab conduct the test. Fall is the ideal time to benefit from nitrogen applications on cool-season grasses, and after a stressful summer, it is an important part of the grass' recovery program. During the shorter, cooler days of fall, cool-season turfgrasses devote much of the food they produce in photosynthesis to root systems and storage for later use. Depending on the grass and the expectations/uses of the turf, up to 3 lbs N/1000 sq ft can be applied during the fall months of September, October, and November; apply no more than 1 lb of N/1000 sq ft per month. Apply no more than 1 pound of water soluble N per 1000 sq ft in a single application, and when possible, split the application of water soluble fertilizer into two 0.5 lb N increments. Use phosphate-free fertilizers (example 32-0-10) if soil tests indicate no phosphorus is needed. And be sure to keep all fertilizer off hardscapes in order to protect water quality.

In conclusion, summer heat injury is complex. However, one difference is that we notice the decline as it happens and try to respond in an appropriate manner. I hope information helps regarding the complexities of heat stress on cool-season turfs and the potential interactions involved. Feel free to share this information with anyone that might benefit in better understanding the challenges you are facing in cool-season turfgrass management in the summer of 2010.

Sincerely,



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