

TIMELY INFORMATION

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IRRIGATION AND ITS IMPACT ON TURFGRASS DISEASES

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Water plays a pivotal role in not only the development but also the control of many turfgrass diseases. Plant pathogenic fungi and other turf hosts require a steady supply of water for their growth and reproduction. Supplemental irrigation is needed to consistently meet the water needs of greens, tees, fairways, lawns, and other intensively-managed turfgrasses. Also, fungicide performance is greatly influenced by rainfall and irrigation patterns.

Spores and hyphae of plant pathogenic fungi are readily spread through the turf canopy by splashing or flowing water. Often, a film of free water is needed for plant pathogenic fungi to colonize leaves and leaf sheaths of turf plants. In addition, nutrients leaching into dew or free water on leaf surfaces serve as an important pre-infection food-base for these fungi. Humid air trapped in the turf canopy can supply enough moisture for some fungal pathogens, most notably the causal fungus of dollarspot, *Sclerotinia homoeocarpa*, to colonize leaf tissues.

In Alabama, turfgrass diseases typically are more prevalent during periods of wet rather than dry weather. Outbreaks of Pythium blight and brown patch on bentgrass greens and tees as well as latter disease on St. Augustinegrass, centipedegrass, and zoysiagrass lawns are often triggered by one to several days of overcast, wet weather. Stationary fronts with associated evening fogs and rain showers provide conditions very favorable to the development of both these and many other turfgrass diseases. When moisture conditions are right, temperatures that favor pathogen activity over turf growth also accelerate the development and damage caused by many turfgrass diseases.

Irrigation is often cited as a contributing factor to the development of many turfgrass diseases. In particular, irrigation timing and volume, as is the case with rainfall, certainly can have a significant impact on the onset and severity of some turfgrass diseases. Rain, heavy dews, and persistent fogs, however, probably play a bigger role in the development of turfgrass diseases than does irrigation.

Overwatering can ignite a turfgrass disease outbreak. Excessive irrigation, particularly during humid or wet weather patterns, may favor the development of diseases such as dollar spot, brown patch, gray leaf spot, leaf rust, and Pythium blight on both warm and cool season turfgrasses. In addition, water-saturated soils predispose both established and overseeded cool-season turfgrasses to Pythium root rot as well as to take-all and related *Gaeumannomyces graminis* var. *graminis*-incited disease on bentgrass, bermudagrass, and possibly other warm-season turfgrasses.

A lack of water can be just as critical to the development of turfgrass diseases as too much water. Stress attributed to low soil moisture or drought has been shown to increase the severity of leaf rust on Kentucky bluegrass, dollar spot on several warm-season turfgrasses, melting-out/leaf spot diseases on cool and possibly warm-season turfgrasses, and root-feeding nematodes on bermudagrass greens, tees, and fairways. Using irrigation to maintain adequate soil moisture for good turf growth will negate such stress; thereby minimizing the impact of these diseases and nematodes on turf playability and quality.

Irrigation timing can be used as a tool to manage turfgrass diseases. Watering from around midnight to 2:00 AM, which is about the time dew forms, until just before sunrise will not lengthen duration of leaf wetness in the turf canopy into the critical range required for leaf infection and colonization by fungi. Rapid drying of the turf canopy in the hours after sunrise will kill most of the fungal hyphae and newly germinated spores before leaf infections occur. A post-midnight to predawn irrigation cycle also maximizes water use efficiency. Finally, predawn watering will wash the nutrient rich dew/guttation fluid off of the leaves; thereby eliminating an often critical pre-infection nutrient source for disease-causing fungi. On golf courses, greens, and tees, which are at greatest risk from damaging diseases, should get scheduling priority for predawn watering over fairways and roughs. To minimize the duration of leaf wetting, water greens, tees and lawns on protected sites with poor air circulation shortly before dawn.

From the standpoint of disease management, watering around mid-day is nearly as effective as predawn irrigation. As long as the water on the foliage dries before sunset, pathogen activity in the turf canopy will not increase. Interference with play, increased traffic-related compaction, and lower water use efficiency are good arguments against a mid-day irrigation cycle on most golf courses and other turf areas. The main exceptions to this rule would include watering in fertilizers or pesticides, and the syringing of heat-stressed bentgrass greens and tees or newly transplanted sod.

Watering between early evening hours to midnight and again around mid-morning may encourage disease outbreaks. At ideal temperatures, continuous leaf wetness of only 8 to 12 hours is needed for spore germination and/or leaf infection by fungal pathogens. The longer the turf canopy remains continuously wet, the more extensive the leaf colonization by these fungal pathogens and ultimately more severe the symptoms. If a lawn or other turf is irrigated around dusk, the leaf canopy will remain wet from that time until mid-morning or possibly later in shaded or protected areas the next day. Watering in the early to mid-morning will delay evaporation of water in the turf canopy by several hours. That 12- to 15-hour leaf wetness period gives the causal fungi of dollar spot, Pythium blight, leaf rust, leaf spot/melting out, or brown patch plenty of time to damage a green, tee, lawn, or other turf.

The amount of water applied to greens and tees may influence the development of some turfgrass diseases. Infrequent but deep watering is the preferred method of irrigating a green, lawn or other turf without encouraging fungal pathogen activity in the turf canopy. Thoroughly wetting the root zone also promotes the development of a deep root system. Maintaining optimum soil moisture levels for turf growth may, however, actually increase the populations of some plant parasitic nematodes in the root zone but its impact on damage is not known. The actual amount of water applied to a green, tee, fairway, or lawn will vary according to rooting depth, soil mix composition, and percolation rate as well as recent rainfall and temperature patterns.

Frequent, light watering will often promote development of foliar diseases and a shallow root system. Although this practice has sometimes been mentioned as control strategy for a handful of disease and nematode pests, shallow watering of any turf should be avoided.

Fungicides, which are an integral part of the disease management program of nearly all golf courses, are used to primarily to maintain the beauty and playability of bentgrass and bermudagrass greens and tees. Damaging nematode populations may be suppressed and turf quality on greens, tees, and fairways improved with timely nematicide treatments. The combination of high product costs along with lower quality standards and reduced disease pressure on most golf courses should greatly limit the need for fungicides and nematicides on fairways and lawns. Watering practices often have a direct impact on the selection and timing of fungicide and to a lesser extent nematicide applications to golf course greens, tees, and fairways.

Fungicides fall into two broad categories: contact and systemic. Both contact and systemic fungicides are active on the surface of the leaves and leaf sheaths but only the systemic fungicides are taken up by the plant and translocated to the foliage or roots. Frequent re-applications of contact fungicides are needed every 3- to 14-days because fungicide deposits on leaf surfaces are degraded by sunlight, mowing, and water, and the new leaves need protection. On the other hand, the most systemic fungicides are usually applied on a 14- to 30-day schedule. Of course, fungicide selection, application rate, target disease, use site, pathogen status, and weather conditions will also affect the application frequency of a contact or systemic fungicide.

Rainfall and sprinkler irrigation make a significant impact on the performance of foliar-applied contact and systemic fungicides. Contact fungicides tend to be more sensitive to wash-off than the systemic fungicides. Free water in the form of a heavy dew or light shower may actually improve fungicide effectiveness by redistributing the fungicide over leaf surfaces. On the other hand, frequent watering or heavy rains will rapidly erode fungicide residues on leaf surfaces; thereby leaving them vulnerable to attack by plant pathogenic fungi. As a result, spray schedules on an irrigated turf, especially during periods of frequent showers, must often be shortened to offset the rapid loss of fungicide residues on the leaves.

Wet spray deposits on leaf surfaces are much more vulnerable to wash-off than those that have dried. Ideally, fungicides should be applied after a scheduled irrigation. If a turf is scheduled to be watered after applying a fungicide, give the fungicide spray deposits several hours to dry first. Also, if a day or more of overcast, rainy weather is forecast and 7 to 10 days

has passed since the last application, apply a fungicide at least 3- to 4-hours before the rain showers arrive. When dealing with Pythium blight and brown patch, it's better to have some protection on the foliage than none at all.

As always, there are exceptions to every rule. If a soilborne disease, particularly take-all on bentgrass or bermudagrass decline as well as fairy ring, is the target, light watering immediately after application may be needed to move the fungicide down to the area of the rhizomes, stolons, and roots. Increasing the spray volume to 5 or more gallons of water per 1000 square feet (200 gallons per acre) may be as effective as light watering in getting the fungicide down to the target area. Refer to the product label to determine whether watering-in is required for optimum disease control. Otherwise, post-application watering will only hurt fungicide performance. On the other hand, granular and liquid nematicides must be watered in with a minimum of ½ of water immediately after application. Failure to promptly water these produces in the thatch and soil will result in a fish and bird kill.

Superintendents and landscape managers must insure that their irrigation program does not enhance the activity of destructive turfgrass pathogens. Careful timing can largely negate the added risk of disease outbreaks on irrigated turf.