Feature Article

Syringing and Hand Watering Greens in Summer for Drought, Disease and Hydrophobic Soils

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Many regions of the United States are experiencing a severe drought. **Perhaps the only good attribute of dry weather is that disease pressure generally is less severe. This is particularly true for foliar diseases including brown patch (*Rhizoctonia solani*) and Pythium blight (*Pythium* spp.). Conversely, root diseases that are initiated in the autumn or spring when soil moisture is more plentiful (such as take-all [*Gaeumannomyces graminis* var. *avenae*]) become more destructive as rising temperatures coincide with dry conditions.** Similarly, **fairy rings and localized dry spots are more severe and destructive during hot and dry periods.** In the case of the latter two maladies, keeping soil moist is the most practical approach to reducing the potential for turf loss. Deep and infrequent irrigation is generally recommended for improving stress tolerance, to promote rooting, and for reducing potential algae, moss, black layer and many disease problems. Syringing and hand watering (also known as manual watering), however, are essential cultural practices for managing golf and bowling green areas prone to wilt as well as localized dry spots and fairy rings. Syringing and hand watering are very different practices and the nature of these differences will now be discussed.

Syringing. Turf under drought stress develops a bluish-purple color and is subjected to foot printing. This common stress of greens is alleviated during daytime hours by syringing. **The purpose of syringing is to alleviate wilt and or/ high temperature stress without creating or exacerbating an existing wet soil or thatch condition on hot summer days.** Greens are most often syringed to alleviate wilt rather than to abate high temperature stress in the canopy. Syringing involves applying a thin film of water on leaves without delivering so much water that the underlying thatch, mat and soil become wet. The evaporation of water cools leaves, allowing stomates (i.e., pores on the leaf surface) to open. Assuming adequate soil moisture, the opening of stomates induces the natural movement of water from soil into roots, through the plant via the transpiration stream, and water vapor emerges from stomates thereby cooling the plant. The wilting of turf in the presence of adequate soil moisture is referred to as "wet wilt" and generally occurs on windy days when relative humidity is low. In drier soils, syringing allows turf to survive that day or until morning when appropriate (i.e, deep) irrigation programs can be scheduled. **During periods of high temperature and low relative humidity, and particularly on windy days, syringing may be required three or more times daily.** The critical periods generally are between 11 a.m. (11:00 hours) and 4 p.m.(16:00 hours). Syringing, however, is less effective during periods of high humidity when water cannot evaporate. Regardless, it is prudent to lightly syringe wilting greens during periods of high humidity. Greens, however, should not be syringed repeatedly until all of the water has evaporated and the leaves are dry. **Syringing is best performed by hand, however, if this is impractical the overhead irrigation system can be used.** Generally, a full rotation of the irrigation heads (1-2 minutes) is enough to supply a light film of water to the canopy. For hand syringing, the nozzle should be kept horizontal (i.e., not directed downward) and the operation should take less than three minutes to cover an average sized green. In many situations it only may be necessary to syringe localized wilted areas (i.e., "hot spots") rather than the entire surface of greens. It is important not to wet the thatch, mat, and underlying soil during periods of high temperature stress. Excessive water in the thatch, mat, and soil on hot and sunny days can lead to supraoptimal (i.e., high) temperature stress around stems and roots, which may cause yellowing, loss of vigor, and possibly scald.

Hand Watering. The advantage of hand watering is that it allows the manager to place water where it is needed without overwatering areas that contain sufficient soil moisture. Hand watering involves applying enough water to re-wet dry soil areas to root zone depth. These areas normally occur in chronic "hot spots" such as mounds, high spots, south facing slopes, or in collars at the interface between the sand rootzone and adjacent native soil. This is normally accomplished by applying light and frequent applications of water. **Water is applied using a shower-head nozzle in a back-and-forth pattern until the turf surface begins to appear "glassy".** It is important not to "fire hose" the area causing water to run-off and puddle in low areas. Once an area has become glassy, the applicator should move onto another area of the green to allow water in the glassy areas to completely penetrate the turf canopy. Applying repeated, small amounts of water will eventually provide sufficient hydraulic head to move water out of the thatch and into the underlying soil. **Do not just wet the thatch, but instead probe the soil frequently to ensure that the rootzone also becomes sufficiently hydrated.** By just wetting the thatch, the turf becomes prone to scalping and creates an environment that promotes supraoptimal heating, algae, moss, disease, and other problems. The ability of a given rootzone soil to be wetted will depend on its physical properties (i.e., texture, compaction, infiltration and percolation rates, and organic matter levels). Turf grown on sand-based rootzones generally requires more frequent hand watering than native soil (i.e., push-up). It is best to hand water in the evening as air temperature are falling, however, this may be impractical. The next best time for hand watering is early in the morning prior to mowing so that excess water has time to drain before the heat-of-the-day.

Where soils are rendered hydrophobic by fairy rings and localized dry spots, the affected areas will require spiking to create openings for water to move into the soil. For localized

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Drought and Climate Change Accentuate Insect Problems in Irrigated Turf

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Drought conditions were especially severe during the first half of 2002 along the entire Atlantic coast from Florida north to Maine, from the Gulf states across Texas, and in the Plains, Southwest, and Rocky Mountain states. Non-irrigated lawns, golf roughs, and surrounding fields and pastures have been brown or dormant for much of the summer. **Such conditions often magnify insect problems on irrigated lawns and golf courses.** Winged adults of many pest insects concentrate their egg-laying in moist areas. Some, especially ones with mobile immature stages (e.g., armyworms, mole crickets), may emigrate from dry border areas to feed on lush turf.

Soil moisture is the most important factor determining the distribution and abundance of turf insects. Consider white grubs, the larvae of masked chafers, Japanese beetles, European chafer, black turfgrass ataenius, and other species. All of these beetles lay eggs in moist soil, typically 1 to 2 in. deep (2.5–5 cm) under turf. Small and oval when first laid, the eggs swell by absorbing water from surrounding soil, hatching in 2 to 3 weeks. Eggs won't survive if soil moisture is below about 10%. The tiny, newly-hatched grubs also are unlikely to survive in very dry soils.

Not surprisingly, adult behavior is affected by rainfall and irrigation. If drought occurs during the weeks before adults normally appear, the newly-mature beetles may remain underground until rain softens the ground. The first heavy downpour triggers intense flight, mating, and egg-laying activity. **Some species (e.g., Japanese beetle) may fly a half mile (0.8 km) or more in search of suitable egg-laying sites. My research has shown that egg-laden females are attracted to irrigated lawns and golf turf, particularly when surrounding areas are dry.** I have seen 6-fold increases in grub densities in irrigated lawns compared to adjacent dormant ones. On golf courses where fairways and tees are protected by preventive insecticides, this often translates into the highest grub densities being in moist green and tee banks, and irrigated rough. Mole crickets display similar behavior on southern golf courses, seeking more moist turf areas when overall conditions are dry.

Drought also tends to concentrate surface-feeding pests in irrigated turf. In Kentucky, drought-related watering restrictions in recent summers were followed by increased damage to fairways and putting greens from the bluegrass webworm (*Parapediasia teterella*), a ubiquitous species that normally is more abundant in higher-mowed lawns and roughs. Like most turf caterpillars, it completes several generations per growing season. By late summer, non-irrigated roughs and nearby residential turf had become so dry that they were unsuitable as larval food, and the moths focused their egg-laying on whatever green turf they could find. Larval populations became increasingly concentrated on fairways, tees, and putting greens. Cutworms probably behave similarly.

Recent plague-like outbreaks of armyworms (*Pseudaletia unipuncta*) on cool-season lawns, golf courses, and athletic fields also seem to be climate-related. **Armyworms normally favor corn and small grains, but larvae may migrate *en masse* from parched pastures or agricultural fields into adjacent moist turf.** Annual infestations originate from moths that are carried north on frontal systems and deposited in downdrafts associated with storms. **In 1999–2001, armyworm arrivals coincided with severe spring droughts affecting portions of the Midwest and Northeast. Corn had not yet germinated because the soils were so dry. The moths evidently sought an alternative for egg-laying, and the resulting larval populations wreaked havoc on turf.**

Drought can aggravate outbreaks of some pests by suppressing naturally-occurring insect pathogens, especially nematodes and fungi. Hairy chinch bugs, for example, thrive in hot dry conditions, whereas a lethal fungus, *Beauveria*, often suppresses their populations when rainfall is abundant. **Drought-stressed turf is less able to tolerate and recover from damage from root-feeders or other insects.**

Insects are cold-blooded so their growth rate is temperature-dependent. **Inordinately warm weather may allow pests with multiple broods (e.g., turf caterpillars, chinch bugs, ants) to complete extra generation(s) and reach higher densities by the end of a growing season.** A prolonged autumn allows grubs to feed and grow longer before hibernating, likely enhancing their overwintering survival.

Turf managers should keep an especially close watch on irrigated areas, where insect pests tend to concentrate, when surrounding non-irrigated areas become very dry.

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dry spots, most water repellency occurs in the top 1 to 2 inches (2.5-5.0 cm) of soil, but the problem can be as deep as 6 inches (15 cm) (Karnok and Tucker, 2002). Hence, **wetting agents often are required to assist with water penetration through the hydrophobic zone of repellency. The same is true for alleviating drought damage caused by fairy rings.** Powered water injection devices also are useful for wetting hydrophobic soils. For more information on managing localized dry spots and fairy rings see **TurFax** articles published in 1999 and 2002, respectively.

References

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