Chemicals and turf water use

Various chemicals, such as pesticides and plant growth regulators (PGRs), are used in turfgrass management. Since they influence turfgrass growth, leaf area, rooting and canopy resistance, they also influence water use.

Anti-transpirants are not routinely used in turf culture but have received some attention since they have the potential to reduce ET. They reduce water use by inducing stomatal closure or by covering the stomata with a film.

Anti-transpirants may cause a detrimental effect on photosynthesis and evapotranspirational cooling. Manipulation of turfgrass morphology or canopy offers a greater potential for reducing ET than does regulation of stomatal functions by anti-transpirants.

Wetting agents have received limited testing in terms of water conservation. They do offer the advantage of increasing water infiltration rate on compacted soils, thatchy turf and hydrophobic sands.

Moving water into the soil faster may or may not effect ET. But it will make scheduling irrigation easier and reduce the chance for wasteful water runoff. Wetting agents used on steep slopes or mounded areas can reduce the need to over-irrigate or hand water contoured areas to maintain adequate soil moisture.

Pesticides are often needed in higher maintenance situations to provide a specific turfgrass function—generally improved appearance and density. In choosing a pesticide, more attention is given to efficacy. Little attention is given to what effect a product will have on the WUR, and more importantly the need for supplemental irrigation.

Herbicides, insecticides or fungicides are often applied alone or in combination with another. The information concerning the effect of pesticides on the WUR of turfgrass is limited.

At this time, we know that some pre-emergence herbicides cause reduced rooting. In high maintenance situations, reduced rooting may not evoke a visual response in turf appearance, since increased fertility and irrigation offset a decline in turf appearance.

As less water is available for turfgrass, additional injury from some pesticides may occur. Turf managers interested in conserving water

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manager an extra edge in managing turf exposed to drought stress. So far, research conducted in this area has shown improved turf performance under dry conditions, but no reports have documented the potential size for water conservation programs.

Potassium and iron have been reported to increase root growth which may account for their role in reducing wilt and improving drought avoidance. Reduced levels of nitrogen combined with iron can result in turf greening similar to normal rates of nitrogen. The implication here is that applications of iron plus nitrogen, especially in the spring, will result in a lower rate of vertical leaf growth and reduced WUR.

Irrigation

Current irrigation practices have probably evolved partly as a result of the equipment available for irrigation rather than a complete understanding of turfgrass water needs. Manual sprinkler systems, such as quick couplers, moveable pipe and traveling sprinklers required a lot of labor for a single irrigation. With these systems, it was desirable to provide as much water as possible during a single irri-

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should avoid pesticides that have a history of causing slight phytotoxicity, reduced root growth or both. With or without visual symptoms of phytotoxicity some turfgrasses may be stunted by pesticides.

This can alter the turf canopy by making it more resistant to water loss. Turf leaves are less likely to expand into the upper boundary layer where air movement and water loss occurs more rapidly.

Thus, pesticides that reduce growth may also reduce water use. But the net result of reducing the need for irrigation may be negligible, especially where root systems are decreased.

Some chemicals are selective herbicides at one rate and plant growth regulators at another. Chlorflurenol is now used as a broadleaf herbicide, but was previously used as a plant growth regulator.

Plant growth regulators are used to reduce the need for mowing and to inhibit seed head development. Since they influence plant height and leaf extension rate, they also influence canopy resistance and transpiration rate.

A 30 percent reduction in turfgrass evapotranspiration has been reported with products such as EL-500, PP-333 and Embark. Some experimental PGRs have shown improved summer performance during periods of solid drought. It is possible that spring-applied PGRs cause a reduced growth rate that conserves soil moisture and also provides a better carbohydrate balance for summer growth.

Whatever the cause, PGRs offer a promising area of research to investigate turfgrass water conservation and improved summer performance. At this time, some caution should be used when water conservation is your main goal. It is likely that some PGRs will cause reduced root growth associated with less leaf growth.This may impair any drought avoidance mechanism inherent in a grass species. Also, some PGRs cause a flush of growth after the chemical wears off.

This additional growth may rapidly deplete stored soil water and negate any overall water conservation during the summer. It appears that PGRs which do not reduce root growth or cause a flush of growth may offer a means of water conservation.

—David Minner, University of Missouri

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gation. That reduced the number of times irrigation was needed. Water application by this method is very similar to the standard recommendation: irrigate as deeply and infrequently as possible to promote an extensive root system.

This recommendation is ambiguous, since it does not provide a basis for actual amount or frequency of water application.

The main purpose for irrigating deep (to the bottom of the effective root zone) and infrequently is to develop an extensive root system that continually expands into regions of available soil moisture. This prepares the plant to avoid soil drought.

The main disadvantage of irrigating too frequently has been cited as a shallow root system that becomes dependent on continued frequent irrigation.

Research in Colorado has indicated that turf appearance was best when water lost by ET was supplied by irrigation every two days. In fact, Kentucky bluegrass maintained an acceptable turf quality with 25 percent less water by irrigating every two days compared to 4.7 and 14 days.

This may sound like a contradic-

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