Story by Leslie Lee

TURF IN TEXAS: still sustainable

Researchers test management practices and tout landscapes' benefits

A Texas A&M AgriLife Research turfgrass project examines root growth rates. Photo courtesy of AgriLife Research.

Turfgrass researchers at Texas A&M University are scientists, not fortune tellers.

But they say you don't need a crystal ball to spot two likely future challenges facing landscapes and turf in drought-prone Texas: more widespread watering restrictions for landscapes and mandated or incentivized use of alternative water sources for irrigation.

For researchers, preparing for these changes means finding the best turfgrass management practices for conditions involving lower-irrigation levels and lower quality water, said Dr. Ben Wherley, assistant professor in the Texas A&M University Department of Soil and Crop Sciences, and turfgrass physiology and ecology scientist for Texas A&M AgriLife Research.

"All of our projects relate to water. Whether it's a fertilizer study or a stress study, it always involves water — because of the nature of turfgrass, and because we know that we're going to have to cut back on the amount of water used on landscapes," Wherley said. "We recognize that municipal water restrictions and moving to alternative, lower-quality water sources are going to become the norm, so a lot of our irrigation research — well, all of it — is done with that in mind."

Dr. Richard White, professor in the same department and turfgrass management scientist for AgriLife Research, also focuses his research and teaching on practical problems facing landscapes. Both researchers study ways to keep turfgrass sustainable in Texas' urban areas. They research stress and drought resistance in grasses, turfgrass establishment, irrigation water management, and fertilizer and water interactions that affect plant growth.

Greenscapes benefit communities

Research on turfgrass management is worthwhile because landscapes provide innumerable benefits, Wherley said.

"Something that Dr. Chalmers always said is 'turf is a resource,'" Wherley said, of Dr. David Chalmers, professor emeritus in the soil and crop sciences department. "And just like any other resource, it's not simply there for people to look at and say 'wow, that looks beautiful;' it actually serves very important functions." ⇨

Turfgrass stabilizes soil and dust, acts as a biological filter, cools land and buildings, makes safe recreational spaces possible, and provides sociological benefits to communities.

"As we have such larger and larger urban sectors, landscapes have such enormous benefits for the urban environment," Wherley said. "Oftentimes people take green spaces for granted."

Preparing for the inevitable

In the future, maintaining such beneficial urban green spaces while also conserving water supplies will inevitably involve using nontraditional water supplies such as reclaimed and brackish water, White said. These alternative water sources are already used in many Texas cities but can pose challenges for turfgrass.

"We have to look at our management practices and turf varieties and find those that really work under those scenarios," Wherley said.

One of Wherley's research projects involves testing turfgrass varieties' drought and salinity tolerance in field and greenhouse trials. The four-year study began in 2011, is funded by the U.S. Department of Agriculture, and is co-led by Dr. Ambika Chandra, associate professor for AgriLife Research in Dallas. The project occupies about one-fourth of the turfgrass research facility in College Station and several plots at the AgriLife Research and Extension Center at Dallas, Wherley said. Five turf breeding programs at institutions around the country contribute their best materials to the collaborative project, he said.

Each year the project observes how various experimental species of grasses fare under normal to minimal irrigation, deprives the plants of irrigation through "field dry-downs," in which the irrigation water is completely turned off, and chooses five varieties that performed best and longest under those dry conditions. These "winners" are then put through salinity stress screenings to see if they can tolerate salty water, and mowing and traffic studies to test their real-world performance, Wherley said.

"Not only is drought tolerance key, but salinity tolerance is a major concern because most irrigated turf in the future will not be irrigated by high-quality drinking water; it'll be irrigated by recycled water, which tends to be higher in soluble salts," Wherley said.

Management makes a difference

Turfgrass management starts with variety selection, soil preparation and the plants' proper establishment, White said, followed by appropriate fertilization, irrigation and mowing practices.

One irrigation strategy White recommends is cycle-soak scheduling, which entails setting an irrigation controller to the following schedule: run for five minutes, turn off for an hour to let the water soak into the soil, run for another five minutes, then turn off to let the water soak in again.

This watering practice gives water time to enter the soil and be redistributed within the soil profile, and it also helps prevent runoff. In a typical 20-minute watering cycle on a home irrigation system, up to 40 percent of the water runs off the lawn, White said.

One station at the Texas A&M AgriLife Research turfgrass facility shows how water runs off after an irrigation system has run for less than 20 minutes. Photo by Kay Ledbetter, AgriLife Research.

"If homeowners would apply water using this method to their home landscapes, they would use water more efficiently, they would capture more water in the soil and they would produce better turf and landscape plants," he said.

White, Wherley and other AgriLife Research scientists test the effects of various management practices on runoff at their research facility on F&B Road near the Texas A&M campus. It includes 24 turf plots, each with separate irrigation systems, flow meters to measure the quantities of water applied and running off the plots, and automated samplers that collect runoff water.

Golf course research can help homeowners, too

The researchers' work isn't limited to home lawn studies, Wherley said. Turfgrass researchers in their department and AgriLife Research partner with industry groups and companies to test new products and technologies that may make more efficient use of irrigation water for golf courses and athletic field turf.

One current study, funded by the Golf Course Superintendents Association of America's Environmental Institute for Golf and the Lone Star (Texas) Chapter of Golf Course Superintendents, attempts to determine the minimal amounts of irrigation needed to sustain adequate quality and playability in Bermuda grass fairways across a growing season. In addition, the team is determining how these irrigation requirements are affected by mowing heights and golfer traffic, White said. The study is targeted to the golf industry, he said, but has applications for recreational managers and homeowners.

"Mowing is so important — doing it at the proper height and the proper frequency — and it does impact the health of the turf and water conservation," he said.

Mowing grass at the highest recommended height helps increase rooting depth, Wherley said. In another study, which examined establishment of St. Augustine grass sod during a 35-day period, root growth increased four-fold when mowing was withheld and turf was allowed to grow freely for the first few weeks after planting, he said.

"That plant is then going to be able to better withstand watering restrictions, such as only watering once every two weeks," he said. "If you let your lawn grow taller, you provide more leaf area for photosynthesis, so basically there's more energy capture, you're removing less of that energy-capture source, and extra energy spills into root growth."

"That's why we encourage people to mow their lawn taller. It may not look quite as nice and neat, but it will be able to withstand drought and lower watering levels much better than something that's cut too short."

Turf is tougher than you think

White said that they often test turf in extreme conditions, pushing it to its limits. Oftentimes, even zero irrigation can't kill warm-season turfgrasses. These grasses are bred for dry conditions.

"From a water perspective, it really takes an awful lot to kill warm-season grasses," White said.

A turfgrass system can look dormant and appear dead to the average observer, but with "just a little patience" and a little rain, it will return, White said.

"We've found, over the multiple years of drought that we've had here, even when things look like they're past the point of no return, by November, just with natural rainfall, we see these turf systems go from completely brown and dead — well, dead-appearing, when they are actually just dormant — to fully recovered, if they're planted on good soil," Wherley said.

He said that they've found this resilience of turf in multiple studies, including a major project with the San Antonio Water System in 2006 and 2007. The researchers tested turfgrass plots, all planted on native, nondisturbed soil, over 60 summer days with absolutely no rainfall or irrigation, Wherley said. All the tested warm-season turfgrass species recovered after irrigation resumed in the fall.

"If a turf system is planted on good soil, it can go dormant for months, and then recover," Wherley said. "So, people need to recognize that's what warm season grasses will do; that's just how they perform and behave."

"That's what makes these grasses a resource, a very functional resource, and we need to understand that sometimes our expectations of how it should look are skewed," he said. "People need to be willing to accept a brown lawn from time to time. As long as it's providing good, functional support and recreational support for its intended use, then it's all right."

"The expectations that a lot of folks have get in the way of the potential to conserve water," White said. "It doesn't always have to be jalapeño green."

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Some information taken from a Texas A&M AgriLife Today story.