Science Societies

Keeping your lawn green: Putting water retention products to the test

By DJ McCauley

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All treatments were evaluated following core aerification with a spoon aerifier. Photo courtesy of Joey Young.

- A team at Texas Tech University tested two types of commercially available water retention products in a two-year study.
- Even with no irrigation beyond rainfall, water retention products improved visual quality of turfgrass.
- The researchers offer tips for homeowners to best manage their turfgrass, from avoiding overwatering to changing watering schedules and testing out turfgrass products.

More than 40 million acres of turfgrass dot the landscape of the United States. From a satellite's perspective, lawns are like maps of population density: where people live, turfgrass grows.

The USEPA estimates that homeowners use 9 billion gallons of water per day just for landscape irrigation (**https://bit.ly/332rhYE**). Overwatering and poor irrigation systems waste about half that amount.

As drought stress increases across the United States and local ordinances limit landscape water use, amendments may be a great supplemental option to help homeowners keep their grass green. Commercially available water retention products are one such option.

Consumers, however, may not be savvy in the ways of lawncare products. Advertisements tout the amount of water a homeowner can save using these amendments, but their efficacy had not been tested. This was the question that two researchers from Texas Tech University sought to answer.

“I saw this story in the news, and it was like, ‘Put this in your yard, water it, and your yard will green up!’” says Joey Young, a professor of turfgrass science. “That's the normal process for how grass grows, so at what point did this product reduce the amount of water I'd need for my yard?”

To test common water retention products, Young collaborated with his Ph.D. student, Vikram Baliga, and Mario Carrillo of Smartfield, Inc. (now defunct). The study, recently published in *Crop, Forage & Turfgrass Management*, is a component of corresponding author Baliga's dissertation (**https://doi.org/10.2134/cftm2019.07.0051**). For the study, the team took to the field. But what exactly are the products they tested?

Water Retention Products

Water retention products come in two primary types: surfactants and hydrophilic sands.

Surfactants increase the ability of water to reach root zones. They make it easier for dry, drought-stricken soils to be re-wetted. As anyone who tends to forget about their houseplants knows, totally dried-out soil repels water.

For the curious: hydrophobicity is a product of the peculiar physical properties of organic components in the soil. As organic matter breaks down, hydrocarbons create waxy coatings on soil particles, and sometimes aggregate, preventing polar water from passing through the soil surface. Sandy soils are especially susceptible to

hydrophobicity when dried and can even cause surface runoff so severe that it prevents water from getting to the root zones entirely.

Hydrophilic sands, on the other hand, are sand particles coated in super-absorbent polymers that soak up many times their weight in water. The polymers, when applied to sand, are easy to distribute over the grass surface. The theory is that normal watering will also hydrate the super-absorbent polymers on the sand and extend the time it takes for the soil to dry out as water is slowly released into the soil from the polymers.

For this study, the team used four commercially available water retention products: AquaSmart Pro (a super-absorbent polymer), MaXand (a hydrophilic sand with clay), Revive Granular (a granular surfactant), and Revive Liquid (a liquid surfactant).

The Study

For the summers of 2015 and 2016, the Texas Tech team managed plots of a hybrid bermudagrass, 'TifSport' [*Cynodon dactylon* (L.) Pers. X *Cynodon transvaalensis* Burtt-Davey]. Prevalent throughout Texas, TifSport is drought tolerant, recovers well from heavy traffic, and tolerates close mowing (**https://bit.ly/2xIOK5L**).

The team set up four treatment groups with four replicates each. They used a spoon aerifier to aerify each plot to simulate what a typical homeowner might use. Aerification is a strategy for decreasing soil compaction, increasing oxygenation, and allowing more water to get to crop root zones. Aerification involves removing cores from the soil, creating small holes that allow water and oxygen to seep into the soil and potentially allows deeper penetration of water retention products.

Each month, the team applied test products and irrigated the plots with a quarter inch of water. The two hydrophilic sand treatments were mixed with additional top-dressing sand to ensure uniform application, applied according to the manufacturer's directions, and then brushed into the grass canopy.

The team took measurements of volumetric water content, visual turfgrass quality, percentage of green cover, and canopy temperature.

After calculating the evapotranspiration rates to determine turfgrass water loss, there were only two weeks in 2015 when plots received more water from rainfall than they lost through evapotranspiration. In 2016, there was not a single week during the study in which rainfall exceeded water loss.

Even under these severe drought conditions, the team noted that three of the four products improved turfgrass quality and the percentage of green cover compared with control plots. AquaSmart Pro, MaXand, and Revive Granular showed the best responses when higher amounts of rainfall occurred shortly after application.

The team speculates that the benefits to turfgrass from the hydrophilic sand products do not come from extra water retention, but from the protection the sand provides to the crown of the plant. The crown, right at the soil surface, is the point of all growth for turfgrass. If the crown stays intact, the plant can survive adverse conditions. Likely, the sand applied at the crown provided protection from damage, especially from wind stress. When the crown is healthy, grass is more likely to show quick growth when better conditions arise.

Revive Granular had a different advantage. Made primarily from dehydrated poultry waste, the product added more supplemental nitrogen and iron compared with the

other three tested products. Sandy Texas soils are often low in iron: Young speculates that the iron in the product aided grass in “greening up” faster.

Aerification had no effect on the plots. The team thinks that the cores were both too far apart and too shallow to provide benefits to the turfgrass under the dry, hot conditions of the Lubbock County, Texas study site.

Finally, the team highlights the fact that *no* supplemental water was added during the study.

“We really wanted to push the limits of the products we tested,” Baliga says. “We really tried to see how they would do with no extra water from us. Ideally, I'd like to add two or three irrigation levels to see when we're getting optimal results. For future studies, I'd like to see where some of those break points are and where we can maintain acceptable quality with minimal water.”

Tips for Homeowners

Under drought conditions, the Texas Tech team demonstrated that amendments for water retention can help homeowners keep their lawns green. Baliga and Young offered some tips for anyone seeking better ways to keep their grass green while minimizing their water use.

“People could apply a product and water their lawn half as much as they would have, and it would be enough to keep the grass growing whether the product was there or not,” Young says.

Overwatering increases disease pressure and discourages grass from developing strong, deep root systems. In constantly damp soil conditions, fibrous grass roots only grow shallowly. When drought sets in, the lack of deep roots and their minimized surface area means that the turfgrass will struggle to find adequate water.



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Decreasing the frequency of watering can also encourage turfgrass to grow deeper, stronger root systems. Avoid daily watering. Instead, it may be prudent to combine your watering sessions for only one or two long drinks a week.

“If you're trying to put down an inch of water every week, instead of watering a fifth of an inch every day, split it into two irrigations and put down half an inch of water, twice” Baliga says. “That really pushes water down into the soil better, and your turfgrass will be much healthier.”

Young emphasizes that choosing landscape plants that are suited to your yard's peculiar environment means you, as the caretaker, will have much less difficulty keeping them healthy and aesthetically pleasing. Using a state extension website to check temperature adaptability, drought tolerance, and shade preferences, you can choose plants that will thrive.



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"Whether we're talking about a tree, or a shrub, or turfgrass, or a perennial flower, we have to put the right plant in the right place," Young says.

Finally, a simple tip: before you spend your hard-earned money on a pile of water-retention products, try out the product in a small area of your yard to see if it really does make a difference.

"Golf course superintendents do this all the time," Young says. "They put down a sheet of plywood when they're making their applications, leaving one little part untreated to see if all the activities they're doing are making a difference or not. That would be a really cool thing for people to consider trying."

To sum up, Baliga mentions that experimenting with less water or more infrequent watering is not something to be afraid of.

"Your grass is way more resilient than you think," Baliga says. "Even in exceptional drought, with just a little bit of help from a product or a little bit of irrigation, you can really maintain what you want without over-applying water."

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