Science Societies

The science behind managing turfgrass

A look at the O.J. Noer Research Station at the University of Wisconsin–Madison

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The science behind managing turfgrass: A look at the O.J. Noer Research Station at UW-Madison

The grass beneath your feet is doing more than you think. A new video and article explain how University of Wisconsin researchers are uncovering new ways to make lawns, parks, and golf courses healthier, more sustainable, and more resilient to disease.

This is part of our Down to Earth series, which breaks down and explains food, farming, and environmental sciences for readers of all backgrounds, including those without formal scientific training.

Picture this: You're in the middle of a park, having a picnic with your closest friends. In the middle of the good food, yard games, and laughter, you take a second to pause, soaking up your surroundings. The flowers smell sweet, the trees provide needed shade, and the grass beneath your feet is soft. You look a little closer at each individual blade of grass beneath you: They're all a perfect, deep green, and they're cool to the touch. This picnic—this park—wouldn't be the same without this plot of grass, and yet, do you ever actively think about the stuff that's growing right under your toes?

West of Madison, WI, sits the O.J. Noer Turfgrass Research and Education Facility. The site studies the stuff that "touches the lives—or rather the feet—of virtually everyone in the state [of Wisconsin]." Wisconsin itself has over 300,000 acres of turfgrass, "covering yards, parks, roadsides, golf courses, athletic fields, and sod farms," making it the state's fifth biggest crop by acreage. And these residential lawns, golf courses, and urban greenspaces wouldn't be able to exist in the way that they do without these kinds of research facilities.

The O.J. Noer facility was named after Oyvind Juul (O.J.) Noer (1890–1966), a University of Wisconsin–Madison graduate and man designated "Mr. Turf" by the Golf Course Superintendents Association of America. The facility studies how to best manage turfgrass fields. This can take shape in many ways: the site's researchers, like Drs. Paul Koch and Doug Soldat, investigate all kinds of questions about pest management, soil properties, fertilization requirements, even the best height to mow your grass.

The root of the matter

Doug Soldat, Professor in the Department of Soil and Environmental Sciences, leads a team of graduate students and research technicians who are interested in the soil

science behind turfgrass management. He says that his team is interested in challenges like nutrient management, soil compaction, irrigation, and soil organic matter.

Soil moisture sensor. Monitoring soil moisture is an important step of the research process—areas just a few feet apart can have drastically different soil moisture levels, which can influence research results. Photo by Heidi Falk.

Soil organic matter is an important component of any field, including turfgrass fields. Organic matter from decomposing plant, animal, and microbial material helps maintain important aspects of the soil, like structure and fertility. One of the most common ways to estimate soil organic matter is to measure the amount of organic carbon in the soil—more carbon means that the soil can better do its job supporting plants. In addition, those interested in making turfgrass systems more sustainable want to ensure that these fields are carbon sinks, taking up more carbon than they emit. That's why Soldat's team is comparing different types of turfgrass to see which grasses store carbon more efficiently than others. That's also why they're evaluating different turfgrass management strategies, to see how these fields can become more effective at long-term carbon storage.

Another important metric Soldat's group is actively researching is soil potassium. Potassium, an important plant nutrient, is thought to keep turf tolerant to environmental stressors like excess cold and drought. However, the element has a hard

time binding to the sandy soils that are often used in golf courses. Despite this, Soldat's group has found that turfgrasses grown in sandy soils don't seem to run out of potassium. Pete Bier, Soldat's graduate student, has been leading the investigation to find out why that is. Basically, he's found that bentgrass roots, like tiny keys, are unlocking a long-overlooked source of the nutrient within the sand's minerals, accessing a form of potassium typically thought of as not plant-available. *How* this system can access this source of potassium is still a mystery and is actively being studied.

Paul Koch is leading an international research project investigating the utility of autonomous lawn mowers in deterring dollar spot. Photo by Heidi Falk.

Keeping the [golf] ball rolling

Paul Koch, Professor in the Department of Plant Pathology, is a turfgrass disease specialist. He and his lab are taking steps to make sure golf courses are uniform, and more importantly, playable.

Koch started working in turf because he wanted to become a golf course superintendent. “I got more advanced in my career. I really enjoyed the interaction of the microbes with the plants, and also the microbes with the fungicides,” he says. “I thought that chemistry was really fascinating and decided to go and get a master's in it. And I'm still fascinated by that process—and [I’m] still here.”

One of the primary turf diseases in Wisconsin right now, says Koch, is dollar spot, a fungal disease that blights grass leaves, creating small brown patches of diseased grass. The pathogen can create depressions in the field that impact golf play. To control dollar spot, Koch and his team are looking into chemical methods that increase the pH of turfgrass leaf surfaces, reducing the growth of the fungus. They’re also trying to figure out how to stop the fungus before it even gets a chance to grow by utilizing autonomous lawn mowers that can cut the grass at night, preventing the dew buildup in grass fields that fungi love.

Whether they’re deterring diseases or restoring soils, the scientists and staff at the O.J. Noer are ensuring that greenspaces look, play, and function well. The guidelines developed from their research are eventually spread throughout Wisconsin, helping growers across the whole state: “Our goal is to provide accurate, new, cutting-edge information to help professionally managed turfgrass areas be environmentally sustainable, economically profitable, and then enjoyable and safe for people,” says Soldat.

Turf troubles

Those with existing turf problems can contact the Koch lab for help. This part of Koch’s team is the Turfgrass Diagnostic Lab—one of the “few diagnostic labs in the

country dedicated solely to turfgrass." Manned by Kurt Hockemeyer, Turfgrass Outreach Specialist, the lab tells growers what might be causing discoloration or damage in their grasses. The problem—which kind of disease the sample has, if it has any nutrient deficiencies, what kind of pest damaged the turf—can be diagnosed either via submitted photos or mailed-in specimens.

Turf samples under a microscope at the O.J. Noer Turfgrass Diagnostic Lab. Photo by Heidi Falk.

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