

Reflections of a Turfgrass Geneticist

March 4, 2024

I met someone the other day and they asked what I do for work. I responded with “I am a turfgrass genetics professor at UNL,” and they immediately asked, “what do you teach?” I love to teach, so it is not a bad question, but there is a certain naivety to it; as a professor, a certain percentage of our position is allocated to teaching, research, extension, service, and administration and the sum of those parts makes up 100% of our appointment. I, for example have an 80% research and 20% teaching appointment, just 1/5th of my time is to be spent on teaching.

I teach our undergraduate turfgrass science and management course where we discuss the science behind the cultural practices used in the industry. It is one course out of many required by our degree-seeking turfgrass management students. As a program, ours and similar university-led turfgrass science programs are still the industry-leading unbiased educational experiences training future turfgrass managers. At Nebraska we have a modest program, but it has consistent enrollment, is well-supported, and we continue to train graduates that secure industry jobs. A recent accomplishment that we are proud of was led by Anne Streich, a faculty member in the Agronomy and Horticulture department. She took three undergraduate teams to compete in the 2024 GCSAA Annual Collegiate Turf Bowl at the annual GCSAA Conference and Trade Show. Among the 63 competing teams, our top team finished 6th! Be sure to congratulate Anne (astreich2@unl.edu) and support our students, you might find them selling swag at NTA events. Our turfgrass science program at UNL continues to train exceptional talent for the industry. We are always looking for fresh faces and great internship and job opportunities for our students and graduates; I encourage you to send students our way and reach out to us with upcoming opportunities.

I also teach a graduate level bioinformatics course, where we use computers to analyze and interpret biological data. The field of bioinformatics is rapidly evolving, especially in the turfgrass industry; have you heard terms like AI (artificial intelligence) and “big data” in a turf context? A trend that those computers are predicting will continue?! In my class, we focus on applications of DNA sequencing technologies, an area of research that has exploded over the past two decades and is aligned with my research interests.

Currently, I am collaborating on sequencing projects to unravel the genetic blueprints of creeping bentgrass (2.8 Gbp), colonial bentgrass (3.4 Gbp), and buffalograss (0.78 Gbp) – a gigabase (Gbp) is equivalent to one billion nucleotides, the fundamental building blocks of an organism’s DNA. Many turfgrass genomes have comparable sizes to humans (3.0 Gbp). Working with billions of nucleotides, you can see why we often refer to those data sets as “big data”.

For my breeding research, I am focused on turfgrass germplasm and buffalograss cultivar development. Germplasm are plants with specific traits that contribute to breeding work, have historical significance, or that maintain genetic diversity. Imagine a bentgrass that has complete resistance to dollar spot. The utility of that line is dependent on other turf characteristics, but it is invaluable germplasm for a breeding program aimed at improved dollar spot resistance. Buffalograss cultivar development is also a priority, and now in my twelfth year at the university, it is exciting to see buffalograss lines that I developed nearing the end of the plant breeding cycle. It is rewarding to see how our crossing work done a decade ago has contributed to the new buffalograss lines.

My primary research interests focus on understanding how turfgrasses sense and respond to their environment. I use modern molecular genetics and DNA sequencing methodologies to get at those answers. If we think about our bentgrass dollar spot example, it traditionally takes several months of research to grow out the plants in controlled environments and evaluate their level of resistance. Using modern DNA techniques, we can reduce that time to just a couple of weeks, accelerating our plant breeding efforts. This general workflow is why so much time and effort is invested on molecular genetics work; it simply makes plant breeding more efficient.

I often think about how to communicate the practical side of my work to someone I just met that asks the question about what I do. The process of new turfgrass cultivar development does not translate to applied work, but I cannot think of turfgrass managers in our industry that do not manage, or prefer to manage if they had the budget, new turfgrass cultivars.

During this conversation about what I do at the University, folks are often surprised that we have a turfgrass management program. Our program is so much more than the breeding work that I do or our educational programs. In addition to the breeding and genetics research, we have numerous studies devoted to industry sponsored product testing research; optimal nutrient, irrigation, mowing frequency, traffic, and organic matter management; national cultivar and variety evaluation trials; multi-state collaborative research on disease resistance and cultivation; and optimizing athletic field performance. Our research is supported in part by donations from the NTA. In recent years, slightly less than half of the funds generated from NTA membership dues and events are generously donated to the University to support unbiased research and programming that in turn supports the Nebraska turfgrass industry. A funding model consistent with one put in place at the inception of the NTF, now the NTA.

At the University, faculty and staff complete annual self-assessment reports to reflect on how we addressed our formal job responsibilities over the previous year and set goals for the year ahead; a daunting task we dread. March is a time of excitement as I am no longer looking in the rearview mirror and instead focusing my attention on the year ahead. The national weather service predicts a 30-40% probability of more spring precipitation than normal, a dryer summer than normal, with an equal chance of being warmer or colder than normal in the spring and summer. While I am not entirely sure what that

means, we can remain confident that the region will experience temperature extremes, desiccating winds, and pest pressures, among other roadblocks to challenge our ability to maintain desirable turf; in short, a typical Nebraska growing season. Over the next month or so I know things will start ramping up for our 2024 growing season and I want to convey that we at the university are dedicated to the success of the industry, and we wish you a great season.

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