

Know the Genetics of Your Next Bentgrass Variety

During my junior year at SIU, I enrolled in a genetics course. The course material was different from the rest of the turfgrass curriculum. We learned about the structure of the DNA molecule and how the cells use this information for vital plant functions. Genes were described as the unit of heredity passed on to later generations. Mendel's Laws of Inheritance formed the basic rules to begin the science of genetics. After learning these fundamentals, the exciting uses became apparent—the ability to develop a new plant with superior performance and quality.

Plant breeding is defined as, “the art and science of improving the heredity of plants for the benefit of humankind” (Poehlman and Sleper, 1995). This combination of art and science has been going on for thousands of years in food crops, but has only just begun in turfgrass. Farmers of annual crops choose their genetics every year. Professionals in our field don’t always get to choose the genetics of their turf. Many times we are managing a turf that was seeded before we arrived or perhaps before we were alive. For those who do have the opportunity to buy seed or sod, the choice is an important one that can affect management for years to come.

The Chicago District Golf Association (CDGA) has its roots in variety selection and continues to study new releases in the turfgrass industry. In the 1980s a turfgrass disease specific to the bentgrass cultivar ‘Toronto’ was responsible for the beginning of the turfgrass program at the CDGA. Since then, Dr. Randy Kane has established multiple variety trials on Sunshine Course. These trials are evaluated not only through statistical analysis and written reports, but also through the rigorous examinations of turfgrass managers. Variety trials are open to all; they can be examined up close and personal.

In 2002, variety trials were placed in roughs, fairways, and putting greens on Sunshine. The two original National Turfgrass Evaluation Program (NTEP) trials have been replaced as required by protocol, but new trials have been started. A total of six replicated variety trials are currently in place on Sunshine. The recent additions include a tall fescue trial at lawn or rough height, a Kentucky bluegrass at fairway height, and bentgrass trials at both putting green and fairway height. These are being

studied closely using a system of monthly ratings. Some additional turfgrass species are available for view on Sunshine. Dr. Ken Diesburg from Southern Illinois University has his own tall fescue variety, different Zoysia grasses, and a type of Bermuda grass planted on Sunshine. In addition, Supina bluegrass and colonial bentgrass have been used on Sunshine. We have also installed a putting green trial at Shoreacres in Lake Bluff, Illinois. This will allow us to study variety performance in the microclimate adjoining Lake Michigan. Cool lake breezes and delayed greenup are aspects of that environment that differ from Lemont. This could affect which varieties perform best.



Figure 1. Putting green varieties are evaluated for their thatch production before recommendations of seeding are made. July 23, 2009.

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CDGA Bentgrass Studies

Creeping bentgrass varieties can have a large impact on the inputs of a golf course. The genetics of bentgrass turf will have an impact on cultural and chemical practices. What are the benefits of eliminating one fungicide application on your fairways each year? Some varieties can save you an application while others will not. In fact, some new varieties may be able to save you even more money and time than just one fungicide application! However, a comprehensive evaluation of bentgrass varieties gets complicated. In the early years of improving bentgrass, breeders were able to select for finer texture and greater density, both of which are easy to see. Thatch production is important also, but harder to see and select. It takes more time to cut into the turf and measure, and often the thatch of a variety is not known. This is an excellent example of how the variety trials on Sunshine are used to aid in your decision of selecting a variety.

Bentgrass trials on Sunshine began with a NTEP fairway study conducted by Dr. Kane, Dr. Tom Voigt, and Dr. Derek Settle from 2003 to 2008. Twenty-eight bentgrass varieties as well as 7 colonial bentgrass entries were evaluated for visual quality, dollar spot susceptibility (Figure 2), brown patch occurrence, and other turf quality traits. While most NTEP trials across the nation are repeatedly sprayed to control disease, dollar spot was allowed to develop in these varieties in order to better evaluate the resistance of each variety. As expected we found that colonial bents have much better dollar spot resistance but are lacking in brown patch resistance (Figure 3). Colonial bents lack

spreading ability as well. In our study, creeping bents became a weed within colonial plots. This ruined the data from colonial plots later in the study. It also taught us that variety trials of this species and other bents should be conducted separately. In separate trials, management can be suited to their needs so that invasive creeping bents would be excluded.

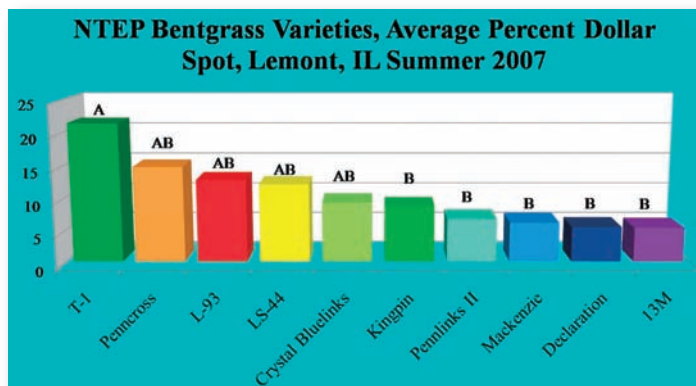


Figure 2. Average percent dollar spot during the summer of 2007 in a NTEP trial on Sunshine Course. Means not followed by the same letter are significantly different ($p < 0.05$) by Fisher's LSD.



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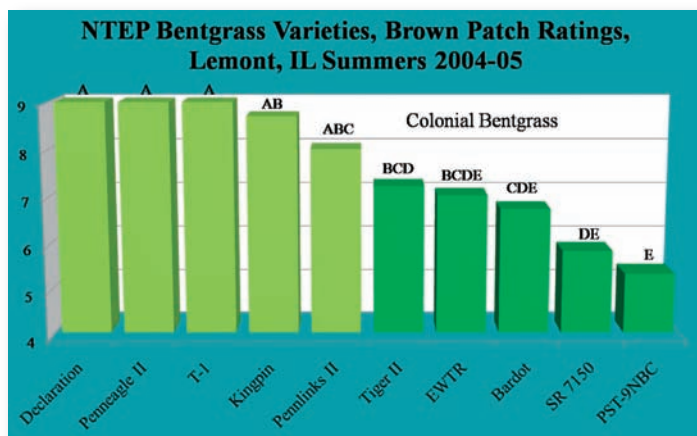


Figure 3. Brown patch comparisons between creeping bentgrass varieties (left) and colonial bentgrass varieties (right). Means not followed by the same letter are significantly different ($p < 0.05$) by Fisher's LSD.

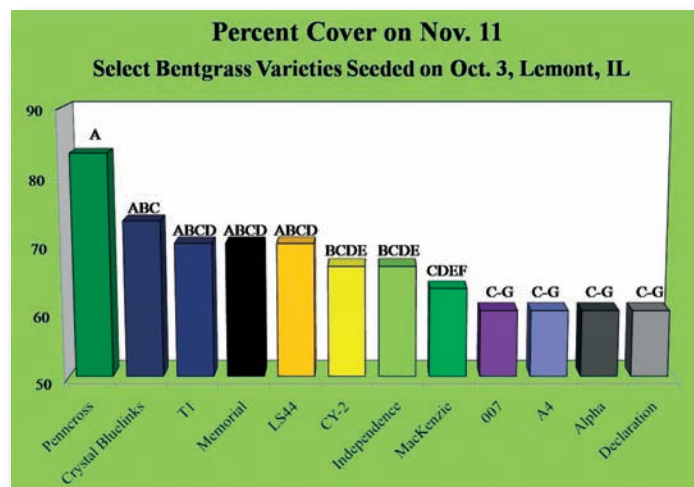


Figure 4. Percent cover of Bentgrass varieties in 2008 from our NCERA fairway trial. Means not followed by the same letter are significantly different ($p < 0.05$) by Fisher's LSD.

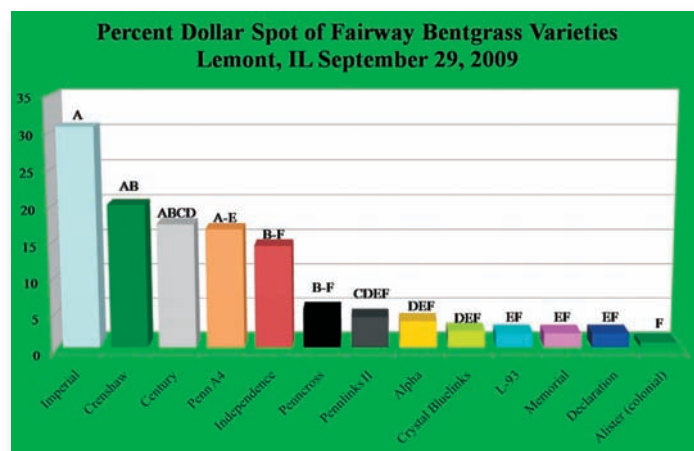


Figure 5. Dollar spot within Sunshine's NCERA fairway study. Means not followed by the same letter are significantly different ($p < 0.05$) by Fisher's LSD.

As the NTEP study expired in 2008, a new kind of variety testing trial made its entrance at Sunshine. This time a group of turfgrass scientists from 11 regional universities called the North Central Extension and Research Association (NCERA) designed an experiment to thoroughly test bentgrass varieties for dollar spot resistance. The design of this study is aimed at finding the varieties that perform the best with fewer inputs, which includes fungicides. The trial is not a beauty contest; it focuses on the primary problem of bentgrass turf: dollar spot. Bentgrass fairways in and around Chicago require multiple applications of fungicide to control this disease. The best control is in the genetics of the bentgrass variety. This new variety testing will help us select the varieties with the best genetics.

The NCERA trials include 25 bentgrass varieties at fairway and putting green height. Our fairway trial was seeded in the fall of 2008. After a month, we were able to see differences in the establishment of varieties (Figure 4). Although these trials should be repeated, it seems as if the old industry standard 'Penncross' has the vigor to grow in and cover the surface faster than other varieties. After lowering the mowing height and allowing plots to fill in, we obtained some dollar spot data last fall. The results show the varieties 'Declaration,' 'Memorial,' 'L-93,' and 'Crystal Bluelinks' provided the best resistance to dollar spot (Figure 5). Our materials and methods within this trial include splitting each variety plot; one side receives no fungicides while the other side receives applications based on the most resistant varieties. We expect the results to lead us to a handful of varieties that can perform well, while the majority of the varieties tested will be loaded with dollar spot. Each trial will have its first full year of data collection this summer. The results will help us determine which varieties perform best under fewer inputs. We are excited to have this study on Sunshine this year and in the many years to come. The information from this collaborative effort will be important for anyone looking to seed bentgrass.

Not all studies are conducted on Sunshine course. Multiple locations are important in order to replicate results across our region. Dollar spot data is plentiful in CDGA research. When Dan Dinelli, CGCS at North Shore Country Club requested we rate his own tee box varieties we jumped at the opportunity. In 2008 we rated dollar spot several times. Each time we noticed a few varieties with resistance to this persistent disease (Figure 6). 'Benchmark DSR' stood out because it was a variety that we had not yet heard of and because of its improved resistance (Figures 6 and 7). Another trial was seeded away from Lemont in the fall of 2009. As mentioned earlier, this new variety trial was installed at Shoreacres in order to evaluate performance in the environment near the lake and to evaluate spring greenup specifically. Twenty-five varieties were seeded. After this spring the varieties will have filled in and will provide plenty of quality and color data. In this study we are using normalized difference vegetative index (NDVI) as a tool to measure the light reflectance and estimate the color of the turfgrass. These measurements will give us unbiased data on color and complement our visual ratings.

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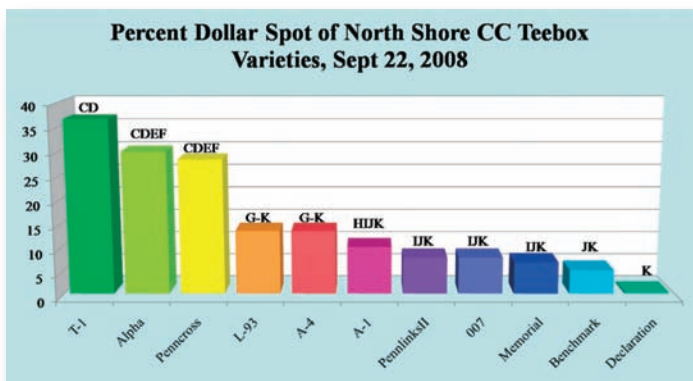


Figure 6. Percent dollar spot of bentgrass varieties managed on a tee box. 'Crenshaw' had the most disease at 63% dollar spot. Means not followed by the same letter are significantly different ($p < 0.05$) by Fisher's LSD.

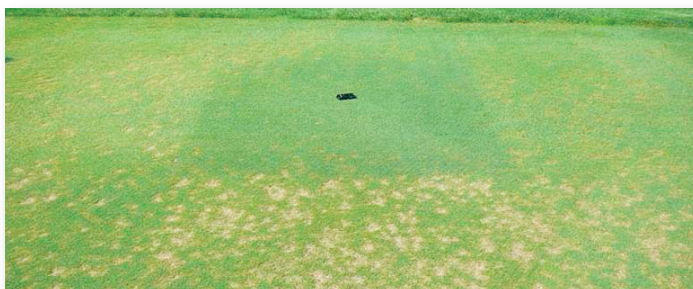


Figure 7. New varieties must be tested to show characteristics like dollar spot resistance in 'Benchmark DSR,' September 22, 2008.

In summary, the bentgrass dollar spot data in our variety trials show 'Declaration,' 'Memorial,' and 'Benchmark DSR' provide excellent dollar spot resistance. 'L-93' was the industry standard for dollar spot resistance up to ten years ago, but today we have more varieties with the same or better resistance. When keeping thatch levels in mind, 'Pennlinks II' still provides a good level of dollar spot resistance and less thatch development. We hope that more variety trials will address the issue of thatch in the future. Just as 'Benchmark DSR' surprised us in 2008, we were also learning more about new varieties called 'Crystal Bluelinks,' '007,' and 'CY-2.' New varieties are released every year, and testing must be continued to determine the performance across our region. As I prepared for our latest establishment I heard new names such as 'Pin-up' and 'V8.' Some companies even stated that the economy was delaying the release of new varieties. Some entries don't have market names yet and may be a couple years from being released. For example, we have two varieties in our Shoreacres plot that are still experimental. The current NTEP putting green trial at North Shore Country Club has eight experimental entries. Research is ongoing in bentgrass genetics. Scientific articles from university programs shed light on new ideas and methods being tested. Our varieties will continue to improve, and CDGA testing will show the uses and savings these varieties can provide.

Literature Cited

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