ance of the facility in light of likely budget reductions. Options will be to enlist master gardeners, find more donated plant material, and use more practices to cut down on hand labor.
- Find funding to convert our copy room into a reference library.

4. Professional Development
   - Read more text and periodical information on turf culture.
   - Do more information retrieval of turfgrass subjects on the Internet.
   - Learn more about Microsoft Office as it pertains to editing newsletters, planning turf organization functions, and keeping records for the facility.
   - Attend as many turfgrass conferences and meetings as time/ budget allow.

5. Association Business
   - Improve activities I provide for the WTA, WGCSA, and Wisconsin Sports Turf Managers Association (WSTMA) like writing for or editing their newsletters and helping to organize educational and fundraising events.
   - Continue serving on the WSTMA executive committee.

6. Research and Demonstrations
   - Cooperate more with the professors to install many new studies on the new and existing land.
   - Add more types of ornamental grasses to the cold temperature tolerance demonstration.
   - Install several new and informative studies for our 2003 bi-annual Homeowner Turf Day.

These are more goals than I'll be able to accomplish. It's good to put them on paper anyway and chip away as time and priorities allow. In other words it's good to have a plan. I don't know if you do annual reviews at your place. If you can find time, it would be a good way to document all your past year's accomplishments and set goals for the next year. I had to use the better part of a Sunday that I could have been spending with the family, to find time to write this article about my annual review. But at least I'll make it home in time to watch the Packers thrash the Vikings tonight.

Why Take-All Patch and Anthracnose Are the Most Commonly Diagnosed Diseases at the TDL?

By Dr. Geunhwa Jung, *Department of Plant Pathology, University of Wisconsin-Madison*

At this time of the year, I like to think back to what has been accomplished in the Wisconsin turfgrass pathology program. One of the activities of the lab has been to serve clientele such as golf course superintendents, sod producers, homeowners as well as chemical, seed, and equipment suppliers through the Turfgrass Diagnosis Lab (TDL). I want to express deepest gratitude to those people and associations that have helped with the University of Wisconsin turfgrass pathology research and extension efforts. They include superintendents, the Wisconsin Turfgrass Association, the Wisconsin Golf Course Superintendent Association, the Northern Great Lake Golf Course Superintendent Association, the Wisconsin Sod Producer Association, Olds Seed Company, Spring Valley, graduate students, and the staff at the TDL. My appreciation also extends organizations and individuals that were not listed here.

Do you know which turfgrass diseases are most commonly diagnosed each year at the TDL? Is this because of the prevailing occurrence of the disease or because of its difficulty and confusing diagnosis by the superintendent? Here I attempt to answer the question by presenting a summary of turfgrass disease samples diagnosed over the last three years.

On right, each individual figure represents each year's turfgrass samples received from golf courses only and diagnosed at the TDL (Fig. 1). Hopefully the information will broaden your perspective on what is happening in terms of disease activity outside your own golf course. Most importantly, you will equip yourself with more knowledge. In fact, it was an eye-opening experience for me to learn that several turfgrass diseases stand out consistently.

I am sure that there will be a certain degree of confusion and difficulty in diagnosis by superintendents. However, it is more likely that those diseases have severe consequences so that superintendents want to have positive identification of it before any curative applications. Regardless of what causes some pathogens to be the higher number of samples diagnosed, you have utilized the TDL this year and will use it next year. That is the primary reason for the existence of the TDL in Wisconsin.

Here are a few facts drawn from the samples diagnosed over the past three years.

1. Take-all patch caused by *Gaeumannomyces graminis* var. *avenae* was the most frequently diagnosed disease at the TDL every year. The reason is probably due to several factors: slow attack of root invading fungus, difficulty of diagnosing with the initial appearance only being vague symptoms, and fast loss of turfgrass under warm and dry weather conditions. It is most likely due to the difficulty of controlling the disease. Just for your information, this soil borne pathogen is most prominent on 2 to 5 year-old-creeping bentgrass greens with a high sand content and a pH above 6.5. It attacks the roots and crowns of grass. The way of diagnosing the pathogen is low shoot density of grasses with the

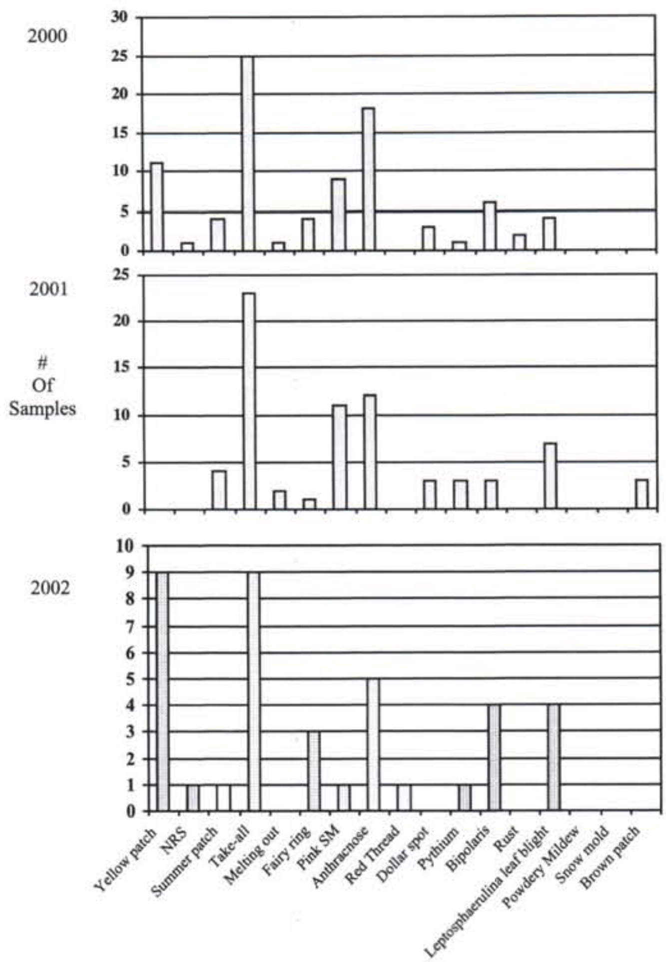


Figure 1. Frequency distribution of the number of samples from golf courses which were diagnosed for turfgrass diseases at the Wisconsin turfgrass diagnosis lab during the past three years 2000, 2001, and 2002. Note: NRS (necrotic ring spot) and SM (snow mold).

leaves turning yellow, then bronze at the tip and progressing downward. Using a low-power magnifying glass (50x), it can be diagnosed by its black or dark-brown ectotrophic mycelium on the lower leaf sheaths, crowns, and roots of grasses. The best recommendation would be the use of fungicides for reducing symptom severity. These should be used on preventive basis in late fall and early spring. This should also be followed with careful irrigation management of the disease. Frequent shallow irrigation has shown to reduce disease symptoms throughout the summer.

2. Anthracnose caused by *Colletotrichum graminicolar* was another commonly diagnosed disease in Wisconsin. This pathogen attacks the shoots and roots of grasses, primarily *Poa annua* and occasionally creeping bentgrass. It is becoming a very serious pathogen at times. This disease is not hard for superintendents to diagnose, but the damaging impact is so severe that they want to reconfirm it via the TDL before curative application of fungicides. Please find more information on fungicide efficacy from an article titled "Why has it been so hard to control anthracnose these past few years?" in 2002's Nov./Dec. issue of The Grass Roots. Most of samples came in during July and August, but some samples from areas such as Milwaukee and Sheboygan were submitted in June and even May.

3. Yellow patch and Leptosphaerulina leaf blight are the other diseases commonly diagnosed. Leptosphaerulina leaf blight occurs on bentgrass, ryegrass, and *Poa*. The disease symptoms may easily be confused with dollar spot. This pathogen attacks the leaves of the grass usually under some sort of stress (moisture, herbicide, traffic, and etc.). Abundant ascospores (muriform with 2-6 transverse septa and 0-3 longitudinal septa) can be easily diagnosed microscopically. Most samples came into the lab between July and September depending on environmental conditions each year. On the other hand, all yellow patch samples came into the lab between April and May.

Celebration of a 35-year Career

By Bev Quest, *DHD Products*

November 12, 2002: One hundred fifteen colleagues, friends, and family gathered at Pine Hills Country Club in Sheboygan to recognize Wayne Otto's 35 years as superintendent at Ozaukee Country Club. Dignitaries from across the country were present: Steve Mona, Executive Director of GCSAA; Stan Zontek, USGA; Phil Trailies, and President and CEO, Club Car, to name a few. Dan Nelson, a past green chairman and long-time friend of Wayne's, served as Master of Ceremony for Wayne's retirement party.

The evening began with a cocktail hour where old acquaintances got together to talk about the good old days. Lon Kamp, Wayne's friend from Nebraska was present. Yes, Wayne started his career in Lincoln after graduating from Penn State turfgrass program.

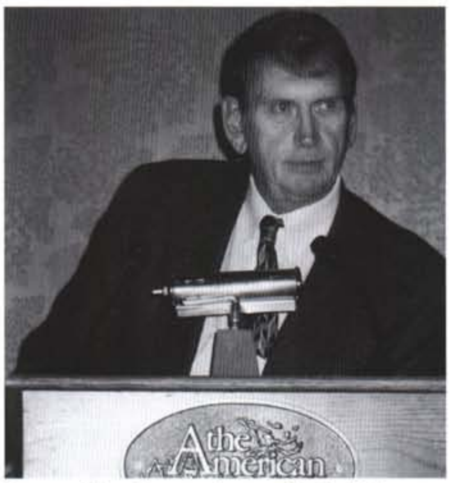
After dinner, the microphone was offered to anyone willing to comment on the celebrant's history. JoAnn, Wayne's wife, sat on the edge of her chair hoping to hear stories she hadn't heard before.

Stan Zontek travelled from the East Coast to participate in Wayne's retirement celebration.

Steve Mona noted that any superintendent who stayed at one golf club for 35 years was a rarity. Steve pointed out that Wayne was one of the first superintendents in the country to be certified. Steve concluded by stating that Wayne's model career was a living example of what being a golf course superintendent was all about.

Wayne's last day at Ozaukee was on November 6, at which time he turned the reins over to Gordy Waddington. Wayne will be available to all through "Turfgrass Support Services", his own consulting service and as a representative for Brookside Labs. Wayne can be reached at wdotto@msn.com.

The following morning, Monroe S. Miller, on behalf of the Wisconsin Golf Course Superintendents Association, presented Wayne with the association's Distinguished Service Award. This award has only been presented 12 times since the conception of the WGCSA.



Dan and Bev Quast, along with Rod Johnson, planned the Otto retirement event.

Rod Johnson had many insights to offer about Wayne Otto on the occasion of the WGCSA Distinguished Service Award Presentation.

Does the Ploidy Level of Kentucky Bluegrass Cultivars Affect Resistance to Black Cutworm?

By Tyler Eaton, Dr. R. Chris Williamson, Department of Entomology, University of Wisconsin—Madison, and Dr. Geunhwa Jung, Department of Plant Pathology, University of Wisconsin—Madison

Black cutworm (*Agrotis ipsilon*) is a severe pest of turfgrass. In fact, it has been called the most severe pest on golf course putting greens. Subsequently, much research has been dedicated to finding effective means of controlling black cutworm. Recent studies suggest that Kentucky bluegrass (*Poa pratensis L.*) is resistant to black cutworm. Our lab has been conducting studies to determine the potential mechanisms of that resistance. One possible factor that we wanted to investigate was the effect of polyploidy on resistance. It has been suggested that plants with higher ploidy levels will have a higher level of resistance to pests, while plants with lower ploidy levels will have a lower level of resistance (Levin, 1983). Kentucky bluegrass is known to have wide variations in ploidy level within and among cultivars. Research has demonstrated that chromosome numbers for Kentucky bluegrass can be as low as 28 or as high as 126. Therefore, any differences in resistance between cultivars might be attributed to differences in ploidy level.

In order to determine the effect of ploidy level on resistance, it was necessary to determine the ploidy level in each of many different Kentucky bluegrass cultivars. Counting chromosomes would have been a laborious process. Instead, we decided to use a much more simple technique called flow cytometry. Flow cytometry is an analytical technique that has many applications to research. For instance, information obtained from a flow cytometer can be used to study the evolution and physiology of plant species. Recently, flow cytometry has been applied to the field of turfgrass research. A flow cytometer has a number of useful functions that include the ability to sort chromosomes and to quantify the amount of DNA in cells. Our intent was to quantify the nuclear DNA content of Kentucky bluegrass cultivars and then correlate DNA content with ploidy level. It would then be possible to calculate ploidy level based on DNA content.

There are several hundred commercial Kentucky bluegrass cultivars out on the market. We chose the cultivars for our flow cytometry study based on two factors. The first factor was morphology. A classification system was recently developed in which many Kentucky bluegrass cultivars were sorted into twelve types based on morphological traits (Bonos et al, 2000). We took advantage of this system by using it as our source for morphological data and selected at least two cultivars from each of the twelve types. The second factor that we wanted to consider was genetic diversity. We wanted the cultivars in the study to represent a wide range of genetic diversity. To this end, we utilized a map of genetic distance that had been generated with RAPD molecular marker data. The cultivars that we chose were widely distributed across the map thus ensuring genetic diversity. Based on the two factors described above, we selected thirty cultivars of Kentucky bluegrass for our study. We selected one plant to represent each cultivar. We then isolated intact nuclei from the leaf tissue of each plant and ran the nuclei through a flow cytometer in order to determine nuclear DNA content (Arumuganathan and Earle, 1991). In order to find the correlation between DNA content and chromosome number, it was necessary to count chromosomes for some of the plants. The same plants were used to generate the RAPD molecular marker data, the flow cytometry data, and the ploidy level data.

The various quantities for DNA content can be seen in Table 1. Our results conclude that it is possible to find a correlation between DNA content and chromosome number in Kentucky bluegrass. This correlation can be represented by an equation:

DNA content = 0.2273*(Chromosome Number) - 5.771.

Due to variations between flow cytometers, this equation may not be accurate for everyone. However, researchers could generate their own equation based on data from their flow cytometer. To date, we have conducted several feeding assays with the objective of correlating ploidy level with resistance to black cutworm. However, our results suggest that it is unlikely that ploidy level has an effect on resistance of Kentucky bluegrass to black cutworm.

Literature cited

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Bonos, S. A., W. A. Meyer, J. A. Murphy, (2000). Kentucky bluegrasses make comeback on fairways, roughs. Golf Course Management. pp. 59-64.

Levin, D. A. (1983). Polyploidy and novelty in flowering plants. The American Naturalist. Vol 122. pp. 1-25.

Type	Cultivar	DNA Content (pg)	St Dev
Compact	Alpine	11.63	0.12
Compact	Blackstone	7.45	0.07
Compact	Glade	11.14	0.06
Midnight	Award	8.67	0.06
Midnight	RugbyII	8.89	0.08
America	Brilliant	6.79	0.03
America	Unique	7.08	0.04
Julia	Caliber	12.94	0.32
Julia	Julia	8.19	0.16
MidAtlantic	Monopoly	10.27	0.28
MidAtlantic	SR2000	12.61	0.17
MidAtlantic	Voyager	7.17	0.11
Bellevue	Classic	8.29	0.07
Bellevue	Suffolk	10.74	0.09
Aggressive	NorthStar	11.78	0.16
Aggressive	Touchdown	11.36	0.30
CELA	Challenger	12.44	0.21
CELA	Eclipse	5.32	0.16
Other	Ascot	12.23	0.17
Other	Coventry	9.92	0.24
Other	Washington	10.60	0.23
BVMG	Abbey	11.43	0.08
BVMG	Baron	10.83	0.10
BVMG	Crest	11.23	0.19
BVMG	Victa	10.84	0.17
BVMG	Viva	11.53	0.06
Shamrock	Shamrock	17.84	0.55
Shamrock	SR2100	11.80	0.17
Common	Kenblue	7.16	0.14
Common	South Dakota	9.36	0.02

Table 1. DNA contents of thirty cultivars of Kentucky bluegrass. All twelve morphological types are represented. Each sample was run through the flow cytometer four times for an accurate estimate of DNA content. Standard deviation for each sample was calculated.

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