# Green is Beautiful

The Official Publication of Ontario Golf Superintendents Association

*IMPORTANT DATES:*

- **Border Cities Tournament**
  **Country Club of Detroit**
  **Monday April 27th, 1998**

- **Pro/Super Tournament**
  **Glen Abbey Golf Club**
  **Tuesday May 12th, 1998**

Oshawa Golf & Country Club

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# Green is Beautiful

The Official Publication of Ontario Golf Superintendents Association

## contents

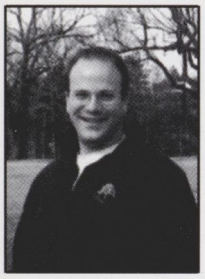
APRIL EDITION 1998

### what's inside



### advertisers

# editor's comments



It's hard to believe April is here and by now most of us have our courses open. We are fortunate to have Barry Endicott, Gord Witteveen, Peter Kinch and Doug Breen as contributing editors to Green is Beautiful. Barry Endicott is our historian and we bring us up to date with the past, Gord Witteveen will share his experiences, Peter Kinch will give us a look from Club Links perspective and Doug Breen will remind us how humorous our profession really is. We hope to have everyone submitting articles for the June issue.

In this issue of Green is Beautiful, meet our new office manager, preview our Pro/Super and Border Cities events, OTS review, educate ourselves on seed establishment and learn about the Heritage Award Scholarship the O.G.S.A. has established.

Mark Piccolo
Newsletter Editor





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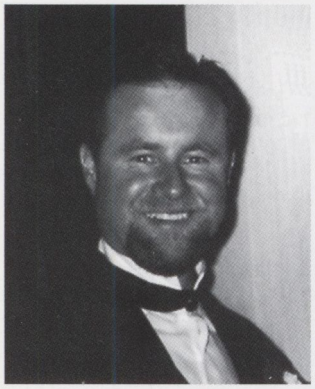
## president's message

# Investing in your Future



The Ontario Golf Superintendent's Association was founded in 1924, by golf course superintendents wanting to invest in their futures.
The benefits of belonging to an association are as broad as they are numerous. Green is Beautiful, our Associations magazine is our most visible benefit to our membership. The unseen benefits, however, are those that help and position our Association within our industry. Networking, an invaluable tool in today's world, allows us the opportunity to exchange information. Enabling us to better understand our profession and the role we play within our industry. The associations participation in the Ontario Turfgrass Symposium strengthens our position within the industry. The OTS gives our associations membership a voice and credibility, by being part of our province's premier Turfgrass Educational Venue. Our chapter affiliation with the GCSAA, allies our Association with our memberships profession by having access to information and educational opportunities that might otherwise not be available to us. Professional Image, is a clear benefit of having membership within an association. Our Association is guided by a Mission Statement and united under a code of Ethics, making our voice in the golfing industry respected.

**O.G.S.A. President**
*Ian Bowen*

### WOGSA DATES FOR 1998

| | | |
|---|---|---|
| May 7th | Brock Golfland | James Heppner |
| June | TBA | |
| July 20th | Craigowan GC | Jerry Richard |
| August 10th | Roling Meadows GC | Ted Bishop |
| September 28th | Whirlpool GC | Bill Glasham (Taylor Barnes Event) |

## new office manager

Hello, Dorothy's my name....
Administration's my game....

I've just joined the O.G.S.A. team as Office Administator. I live in the small town of Erin on the Credit River with my husband, three children, black lab and orange attack cat. I'm used to drive to Guelph as I worked at the University of Guelph for seven years in the capacity of Administrative Assistant at the Institute of Ichthyology. I look forward to the challenge of keeping the O.G.S.A. office up to par and serving our members. My office is in the Guelph Turfgrass Institute, 328 Victoria Road, South, Guelph. Don't hesitate to drop in to say hello, or give me a call at (519) 824-6742.

**Dorothy Hill**
*Office Administer*

## border cities tournament

The O.G.S.A. Tournament schedule starts with an international flavor of the Border Cities Tournament. This long time annual event will be held once again in the United States hosted by the Greater Detroit Chapter of the GCSAA. The tournament will be held at the Country Club of Detroit on Monday, April 27th, 1998. The shot gun will start at 12:00pm. The host Golf Course Superintendent is Mr. Mark Jackson. This traditional golf club has most recently renovated the greens to A4 bentrgrass.
This very popular event is a great opportunity to meet superintendents from across the border and the day will be capped off with a brief presentation by a dermatologist on the dangers of skin cancer.
This event is a soft spike event and golf carts will not be available. Caddies will be available but you need to register by April 17th in order to reserve a caddy. The field will be limited to 120 participants so if you have not received a registration form please contact the O.G.S.A. office. Finally, arrive early in order to enjoy your walk out to your starting hole. I have a feeling all our courses in Southern Ontario will be open so please register and enjoy a great day.

Keith Bartlett
Golf and Meetings Director
Thornhill Country Club

# OTS report

## Ontario Turfgrass Symposium Report
## by Rob Witherspoon

Early attendance reports indicate that the 1998 edition of the Ontario Turfgrass Symposium was the most successful yet. Good travel conditions prior to the symposium, coupled with a great list of speakers and social activities brought superintendents and their staff from all regions of Ontario and beyond.

The trade show opened the festivities on day one. Over the next two days, the show floor was packed as delegates checked out the latest equipment, products and services. The opening ceremonies kicked off with a welcoming message from Rhod Trainor, Chair of the OTS Executive Committee. The annual report of activities from the Guelph Turfgrass Institute was presented by Rob Witherspoon highlighting events over the past year as well as providing an overview of how GTI research and industry services are funded. GTI Advisory Board Chair Thom Charters took to the podium with a call for increased industry support for the GTI to help offset current and future government cutbacks.

Dr. David Posen gave the keynote address on stress management. Part of his key message was that most of our stress is self inflicted and we have the tools to take control. He used the sports metaphor, and title of his best selling book, Always Change a Losing Game, to provide the audience with strategies and techniques to build a winning personal game plan that minimizes stress and maximizes your potential. Dr. Posen gave a first hand demonstration of dealing with stress as most of his talk was disrupted by ringing fire alarm bells - the product of a leaky hotel roof and torrential rains.

The golf course sessions over the next three days provided plenty of food for thought. Steve Johnston from the accounting firm KPMG provided some interesting information on the future of golf clubs in Ontario. One key point in his presentation was the future challenge of managing courses with an increasingly retired membership which mean more rounds per member with little growth in resources available for maintenance. Leslie MacDonald brought a British Columbia perspective on managing fusarium patch and pythium root rot. Dr. Tom Hsiang provided the latest on the quest for a biological control for grey snow mould, Dr. Steve Bowley gave a status report on his work to genetically transform bentgrass and perennial ryegrass and Peter Johnston-Berresford provided a research update from eastern Ontario. Other speakers included Jim Moore covering USGA greens construction and management, Dr. Bill Meyer on bentgrass varieties and Dr. Terry Gillespie on irrigation scheduling.

The morning workshops were well attended. Charles Vander Kooi provided one of the most entertaining presentations in his Estimating and Bidding workshop. Dr. Jack Eggens problem solving workshop was popular and Dr. Jim Beard drew a large crowd for his seminar on turf stress management. The other workshops also received positive reviews. One of the greatest challenges for OTS delegates is selecting a workshop to attend from the many choices available each morning.

The Thursday afternoon golf course session had been anxiously awaited by many since OTS '97. The second Superintendents Challenge was scheduled and the audience was abuzz with anticipation. Dean Baker opened the session with insight into the team approach that he has successfully managed at Glen Abbey to create a positive and productive work atmosphere. Scott Heron took the audience for a walk in the shoes of the assistant superintendent at Westmount from spring clean-up to leave removal and laying down the covers for another year. Some great tips on management techniques and tricks of the trade were provided by Dean and Scott.

Then came the moment of truth, or true and false, given that Jack Eggens was again the quizmaster for the Superintendents Challenge. Defending champions Seneca College took on University of Guelph teams from the Diploma and Short Course programs. The crowd broke into cheering sections for each of the teams and the match was on. Seneca took an early lead and held a slight edge going into the final round. Once again the outcome was decided by a calibration question but this time Seneca's calculator misfired as the U of G Diploma program team of newly elected OGSA President Ian Bowen, Jerry Richard, and Mark

## OTS report

Schneider under Coach Almack came from behind to score a narrow victory over the Short Course team followed by the Senecans. All of the teams should be commended for a courageous and entertaining effort. There have been rumours that the Nittany Lions from Penn State are re-organizing their team for a challenge in '99.

As usual, the OTS provided a great opportunity to catch up with colleagues from near and far. The new and improved Tuesday night social event was a tremendous success. The OGSA held a President's Reception on Wednesday night that provided a great opportunity for members to meet and mingle following the Annual General Meeting.

If you have ideas for speakers for next year, or if you would like to be a speaker yourself, contact either the OGSA representative on the OTS Executive Committee (Jeff Burgess) or OMAFRA Turfgrass Advisor Pam Charbonneau. Your comments and suggestions are always welcome.



## low pressure heads

### Sprinkle while they play with Low Pressure Heads
by Terry Buchen

WICHITA, Kansas, USA - Trying to keep a quality turfgrass surface on a driving range teeing ground has always been difficult, especially with a warm-season turfgrass that is over-seeded with perennial ryegrass.

Brett Conrad, long-time superintendent at Wichita Country Club here has a unique concept to quickly grow in the new grass where once there were ugly divot scars: low-pressure sprinklers that do not disturb golfers.

"Our low to medium humidity and many days with a big blue sky throughout the year cause our driving range tee surface to dry out during the day." Conrad said. "We fill in our divots daily with fresh topsoil and perennial ryegrass seed and feed these areas with a starter fertilizer once a week to speed up recovery."

The tee surface used to have the traditional large overhead sprinkler system, and Conrad could not water the area during the day when golfers were present. Because the practice tee is used frequently, Conrad met with first assistant superintendent Nancy Turner and second assistant and irrigation technician Dave Hogan to discuss how to modify the system so it could be watered anytime.

They rotate the tees, using bag racks as tee markers and roping off the areas that need watering. They move the ropes and bag racks toward the rear of the tee surface, so that divots will land on the areas s\that have already been used.

Hogan installed individual rows of Rainbird #1804 PRS sprinkler heads, operating them on individual station timers.

"These sprinklers operate on a consistent pressure of 30 PSI," Conrad said, "and we are able to water anytime during the day while the golfers are practicing with no interference to them. So our grass seed germinates much faster. Our climate dictates that we must water throughout the day, or the seed will dry out and die."

He said the golfers hardly notice the small spray heads when they are being used and "our turnaround time is three weeks before each tee area can be used again."

Reprinted courtesy of Golf Course News International, Volume 6, No. 1

# turfgrass seedling establishment

## Turfgrass Seedling Establishment
## by Frank S. Rossi

Establishing turfgrass from seed as part of a new installation or renovation represents the most important stage in the life of the stand. Mistakes made during establishment evolve into chronic problems that often require additional inputs of water, fertilizer or pesticides to maintain an adequate stand. Many times, the mistakes made at establishment are a result of less than ideal conditions.

A clear understanding of the logistical considerations involved in establishing a healthy stand of turf is vital, such as: assessing site conditions, timing, soil preparation, selecting an adapted species or cultivar, seed rate, mulching, interval to traffic, etc. Optimizing each consideration to maximize establishment success, however, is often constrained as a result of construction, economic, scheduling issues, or environmental concerns associated with erodable soils. Each constraint then moves the manager further from the ideal. Without additional resources, will result in a less healthy stand more reliant on energy intensive inputs.

The establishment of a turfgrass stand from seed involves a myriad of decisions rooted in the basic principles of soil science, seed physiology, ecology, and pathology. Utilizing information based on these disciplines will lead to a healthier stand.

### Soil Test and Preparation

Improper soil preparation is a common reason for establishment failure. Soil preparation includes physical and chemical characteristics. Traditionally, soil nutrient testing has been recommended to ensure success, with particular emphasis on pH and phosphorus (P) levels. The soil reaction or pH is vital for determining nutrient availability and adequate P levels necessary for the energetic processes required during germination (see Hull, Turfgrass Trends Vol. 6 No. 5).

Recently, with the increasing use of modified rootzones, soil physical testing is becoming a standard practice. The increasing costs of modified rootzones and the well publicized failures have led to the establishment of an accreditation program organized by the United States Golf Association (USGA) and implemented by the American Association for Laboratory Accreditation (A2LA). Soil physical testing provides valuable insights on the particle size distribution and functional performance. This information should be used to ensure an adequate balance between water holding and drainage. Obviously, water holding is essential for successful seedling establishment. However, excessive moisture can limit oxygen as well as increase the potential for seed rot.

### Amending Problem Soils

The process of amending a soil to enhance its physical or chemical attributes has been an important aspect of successful establishment for many years. For example, organic amendments have been the cornerstone of the modified rootzone mixtures for putting greens over the last 30 years. Still, inorganic amendments such as calcined clay, diatomaceous earth, fly ash, and natural zeolites are gaining in popularity. In each case, amendments are incorporated to enhance the nutrient and hydrologic properties of the growing medium.

In the last few years, investigations have been conducted on the use of organic composts for amending heavy clay soils. These studies, as well as one conducted at Penn State University have identified key characteristics of composts such as C/N ratio, particle size, pH, metals and soluble salt content that could determine their benefit. Results indicated that seedling establishment was significantly enhanced on compost amended soils compared to topsoil and no amendment. In addition, infiltration on the heavy clay soils was increased ten fold in some plots. Not only does this serve a valuable purpose in soil preparation, it contributes to the sustainability of the turf system.

### Seed Germination

Understanding the process of seed germination is basic to the development of a successful establishment program. A seed contains the genetic material, inherited from parents within a miniature plant (embryo), and an adjacent food supply (endosperm). The process of germination is triggered by the

imbibition of water that sets in motion a chain FO events that enables the plant to transition from heterotrophic (requiring complex organic compounds for energy) to autotrophic (produces its own energy) as it emerges from the soil to begin photosynthesis. If a seed is planted too deep in the soil, it may deplete its endosperm (food supply) and die before it can become autotrophic.

Interestingly, the transition from heterotrophic and autotrophic is the stage at which some preemergence herbicides limit competition from weed seedlings. As a weed seedling germinates and the radicle continues to swell in a club shape it depletes the energy in the seed before the radicle can emerge from the soil similar to planting the seed too deep.

**Seed Priming**

Germination time varies depending on turfgrass species. Cool season grasses such as perennial ryegrass, tall fescue and creeping bentgrass can germinate and establish within a few weeks, while Kentucky bluegrass and some fine leaf fescues may require up to six to eight weeks to establish. To reduce the establishment time in the field, techniques that enhance emergence under less than ideal conditions have been developed. One of the more popular is seed priming. Seed priming is the process by which the hydration status of the seed is manipulated so that the seed imbibes water at a regulated rate, initiates germination, but does not allow for radical emergence. Seed priming can be accomplished using an osmoticum such as salt or polyethylene glycol (PEG) or through solid matrix priming (SMP) with compounds that have a high water holding capacity such as soft coal, leonardite, or sphagnum moss. Experiments were conducted at Penn State University to investigate the viability of SMP as a means of enhancing cool season turfgrass (bluegrass, ryegrass and tall fescue) establishment.

Field experiments indicated that success of SMP treatment was dependent on species and cultivars with some cultivars of Kentucky bluegrass such as Glade, Gnome and Marquis showing substantial benefits. Perennial ryegrass cultivars were not substantially different, while tall fescue cultivars Guardian and TF300 were only slightly enhanced. Still, the researchers concluded that SMP seed could be desirable under cool periods when seedling emergence would be reduced or for quick establishment. In a separate experiment conducted on Kentucky bluegrass, SMP seed did not directly increase seedling growth rate, however, seedlings were larger. Again, this could be desirable for enhanced establishment under suboptimal conditions.

**Pre-germinated Seed**

Golf turf and sports turf managers who manage intensively disrupted sites or experience a catastrophic loss of turf have been using a system that applies germinated seedlings to the turf area. Pre-germination is generally accomplished over several days through a meticulous series of hydration regimes with various temperatures. Once the radicle has emerged, the seedling is applied to the turf area. This is a very sensitive time in the life of the seedling where it is most susceptible to desiccation as a result of the leaf surface area and the lack of adequate rooting.

The use of pre-germinated seed has been shown to be successful under early spring conditions in northern climates when used with turf covers to increase soil warming. Still, while many species can be pre-germinated, slow to establish species such as Kentucky bluegrass will still require several weeks for adequate tillering and subsequent increase in surface density. Field observations using pre-germinated cropping bentgrass seed on a heavily damaged putting green in the early spring in Wisconsin indicated that annual bluegrass was able to recolonize the damaged area. This is primarily a result of the vigorous seedling growth of annual bluegrass under cooler temperatures, out-competing the bentgrass. Systems of re-establishment that utilize a turf cover to enhance soil warming often result in higher populations of creeping bentgrass.

**Seed Rates and Carrying Capacity**

Seed rate is primarily a function of see size. However, it also depends on the turfgrass species, pure live seed (purity & germination) in a seed lot, environmental conditions at establishment, seed cost, growth habit (upright vs. prostrate) and establishment rate desired. Most cool-season turfgrasses are seeded at a rate that results in approximately 10 to 25 seeds per square inch, except for the bentgrasses. There are between 6 and 8 million seeds in one pound of creeping

bentgrass, while a pound of Kentucky bluegrass has between 1 and 2 million seeds and a pound of perennial ryegrass only 200,000 to 300,000 seeds. Subsequently, bentgrass seed rates were designed to deliver 30 to 60 seeds per square inch, typically achieved by sowing 0.5 to 1.0 lb per 1000 square feet (M).

Madison conducted a study to determine the optimum seed rate of turfgrasses. This work, like many other studies conducted by Madison, provided the base line information that to this day is still relied upon. There were several interesting results including the observation that Penncross creeping bentgrass seeded at 0.5 lb rate had the same visual cover rating at 1 month after establishment, as the 5 lb rate.

Madison monitored Kentucky bluegrass seedling density over a six month period. At establishment, high seed rate plots had up to 10 times more seedlings than the lower seeding rates. However, during the succeeding months seedling populations in the plots converged so that at the end of six months, all plots had similar shoot densities. Finally, Madison reported increased disease incidence associated with higher seeding rates. It was concluded that a fine textured dense turf can be achieved more rapidly at higher seeding rates, however, there will be increased seeding mortality and disease incidence as the interspecific competition for resources limits intensifies.

The convergence of the number of seedlings following different seeding rates is an example of an ecological principle known as, carrying capacity. The carrying capacity is defined as the amount of life that can be supported (or carried) by a habitat. Theoretically, a lower seeding rate would result in fewer "strong" plants and high seeding rate more "weaker" plants. Eventually both systems reach the carrying capacity of the habitat and further population growth is subject to severe competition resulting in plant death. Ecologically, the loss of an individual plant is more than compensated for by the extended growth of the surviving plants. As stands mature, a balance is achieved between number of individuals and the size (tillering) of the individuals. This balance is explained by the self-thinning principle described in Danneberger.

Studies conducted using high seed rates for creeping bentgrass indicated that seedling survival is increased when the seed is pretreated with a fungicide. In fact, the number of shoots per unit area continues to be significantly greater in these plots one year after establishment. The period of self-thinning appears to be extended through the reduction of seed bed diseases. It has been noted that certain organisms can, for periods of time, overshoot the carrying capacity, however, plants are not known to be one of these organisms. plants have the ability to "sense" each other by picking up radiation reflected by nearby leaves and changing their growth characteristics well before their resources are reduced. Still, the data reveal as the stand matures and interspecific competition for resources continues, the long term consequences of thinning and plant death can be severe.

### Interspecific Competition

Rapid establishment of a dense cover is one of the desirable characteristics of turfgrass. As mentioned earlier, the grasses differ in the time required to germinate and establish a dense cover. The lack of parity among the grasses in this area can have a substantial effect on the resultant stand population, especially when planting a mixture of several species. The interspecific competition for resources will result in a stand population that does not reflect the actual number of individual seeds sown.

It is recommended that perennial ryegrass not exceed 20 percent by weight of a mixture with Kentucky bluegrass because of the rapid seedling growth of ryegrass. The ryegrass becomes established and utilizes resources such as light, water and nutrients before a bluegrass is germinated. This results in a stand made up of mostly perennial ryegrass.

A useful technique that could limit the competitive edge of the ryegrass is immediate close mowing. This has been shown to substantially reduce ryegrass populations in the resultant stand, while utilizing the benefits of a rapid cover. Turfgrass species competition with annual bluegrass is of critical importance to turfgrass managers. Brede and Dunfield conducted studies on variable seed rates of Kentucky bluegrass as a means of limiting annual bluegrass invasion where a seed bank was present.

They found that increasing seed rates of certain aggressive cultivars can reduce annual bluegrass invasion in the seed bed. However, these high seed rates tended to have greater seedling disease incidence. Using rated seed enhanced seedling survival and maintained a high shoot density that was more reliant on pesticides to remain healthy.

The competitive ability of creeping bentgrasses with annual bluegrass would be an important selection standard, however, very little information exists on the new bentgrass cultivars. Harivandi and Hagen conducted a study with new cultivars seeded at the 0.5 lb rate and collected data in the second year on annual bluegrass populations. The results indicated that there were differences from 10 to 50 percent depending on cultivar. Additional research is currently underway at Rutgers University.

### Seed Rate and Growth Habit

How about lower than recommended seeding rates? Studies have indicated that grasses with a lateral growth habit from stolons and rhizomes form a more dense and mature turf more rapidly at lower seeding rates. For example, sod growers will typically seed Kentucky bluegrass at 0.25 to 0.75 lb/M (recommended rate is 2lb/M) to promote rhizome development that intertwines the sod and allows it to be harvested sooner.

Higher seeding rates to delay stand development is the logic behind the use of cool-season grasses to overseed warm-season turf. Initial establishment is dense and, because of space competition, the plants remain in a juvenile state and are able to tolerate lower heights of cut. Ultimately, the managers do not want an aggressive stand of coo-season grasses to persist, therefore, the lack of individual plant and overall stand vigour is viewed as an advantage. Why else would a sane person seed perennial ryegrass at 30 lb/M (5 times the recommended rate)?

Morphologically, many of the new bentgrass cultivars were developed for more upright growth that would provide a more superior putting surface. In fact, higher seeding rates for the cultivars tested in our trials that were developed for upright growth (Putter, Crenshaw and SR1020) provided a dense turf sooner at slightly above the recommended rates. Penncross ratings from our study were consistent with those reported by Madison (1966). Seeded at the 0.5 lb rate, the cultivar had the same visual cover rating as the 5 lb rate. The moderately upright Providence provides 95% cover at six weeks when seeded between 0.85 and 1.15 lb rates while the upright Crenshaw seemed to require about 2 lb. Any recommendations based on these results should be made with consideration for the cultivar regarding disease susceptibility as well as time to full cover.

### Seed Rate and Leaf Texture

As seed rate increases the number of individuals per unit area increases and they tend to be more upright and narrow blade (fine texture). This is a common technique for enhancing the fine texture of tall fescue stands that typically have a coarse textured blade. In addition, golf architects have been known to specify excessively high seed rates for Penncross creeping bentgrass to produce a finer textured blade. However, the introduction of new bentgrass cultivars has raised some concerns regarding the establishment and management of cultivars other than Penncross.

Clearly, from a leaf texture perspective Penncross benefits from higher seeding rates that result in a finer texture. However, our studies have indicated that these benefits are not as clear for cultivars such as Putter, SR1020, Crenshaw and Providence that were developed for their fine texture. Only at the 4 lb rate does Penncross leaf texture approach the same texture as the newer cultivars. We are currently conducting studies to investigate the response of the Penn A and G series of bentgrasses known for their fine texture and high shoot density.

### Pathology

This discussion has primarily addressed plant to soil and plant to plant interactions. A critical aspect of the seed bed that exerts a strong influence on seedling establishment is the interaction between plants and microbes. To many turfgrass managers, this is most evident when the seedling becomes infected, symptoms are visible, and stand population is reduced as part of the self thinning rule. Researchers have determined that the interaction between plants and microbes begins as the seed imbibes water and commences germination.

Ruttledge and Nelson have identified how the process of seed germination actually can stimulate the germination of Pythium spp. in the soil known to cause damping off diseases. During germination, fatty acid compounds released from the seed stimulate germination of spores in the soil. These spores eventually lead to infection. The more seed present, the more fatty acid released and the greater the potential for damping off problems. This has been increasingly evident as more turfgrass managers use higher seed rates to accelerate establishment. The result is increased disease problems. We are currently collaborating with Dr. Nelson's lab to investigate the fatty acid release patterns of creeping bentgrass cultivars and their influence on subsequent Pythium infection.

Still, the avoidance of the damping off pathogens in the seed bed that leads to higher shoot densities as described in Brede and Dunfield, will also result in long term disease problems. In our studies, cultivars seeded at high seed rates such as Crenshaw had significantly more incidence of snow mold evident in the spring following establishment. Furthermore, dollar spot-susceptible cultivars, Crenshaw and SR1020, were severely infested with dollar spot up to two years following initial establishment.

The data suggests that the dollar spot evident in the years following establishment is related to the higher seed rates used in concert with fungicide seed treatment. High shoot densities maintain intense interspecific competition for resources such as nitrogen that is known to be involved in severe dollar spot infection. To maintain the high shoot density, a turfgrass manager would need to apply significantly more nitrogen and fungicide, an approach not recognized as sustainable.

### Summary

The pressure to reduce energy intensive inputs for turfgrass management and become more resource efficient is most easily addressed at establishment. For example, it is much easier to amend a soil when it is not vegetated than to attempt long term amending using core cultivation.

Ecological and pathological principles at work in the seed bed and throughout seedling growth must be observed to limit the amount of plant loss during establishment. Finally, the logistical aspects of seedling establishment are well documented and many have been researched for their effectiveness. It makes more sense to employ knowledge based decisions founded on sound scientific principles than to rely on magazine

advertisements and sales pitches. Simply put, a well adapted species sown on a healthy adequately drained soil will be a more resource efficient stand over time.

### References

**Brede, A.D. and J. Dunfield.** 1988. Seeding rate: It's effect on disease and weed encroachment. Proc. 42nd Northwest TurfConf. 42:90-7

**Danneberger, T.K. 1993.** Turfgrass Ecology and Management. GIE Publishers, Cleveland, OH.

**Gentilucci, G. and J.A. Murphy, 1966.** Amending soil with compost influences establishment of Kentucky bluegrass. Agron. Abstracts 49:102.

**Harivandi, A.H. and W. Hagen. 1995.** All bentgrasses are not created equal. Golf Course Management 63:61-64.

## FIELD TRIPS

### Soil

1. Proper soil preparation is essential for successful establishment. Soil testing should be conducted for chemical and physical analysis. Contact your local Cooperative Extension office and the USGA for testing information.

2. Amending heavy soils with organic compost should be done in accordance with specifications outlined in Penn State Cooperative Extension Bulletin regarding organic matter content, C/N ration, metals and soluble slats present.

### Seed

1. Select a well adapted cultivar for your use and maintenance level and keep in mind the appropriate percentages when seeding mixtures. If using high percentages of ryegrass, consider close mowing to reduce competitive advantage.

2. Be sure to seed at recommended rates to ensure minimum interspecific competition. If high seed rates are used, be sure to compensate for additional plants by increasing inputs to maintain high density.

3. Primed and pre-germinated seed are viable options for seeding under less than ideal conditions but are species and cultivar dependent.

# pro/super golf day

**Ontario Golf Superintendents Association**
**Pro/Superintendent Golf Day Glen Abbey Golf Club**
**Tuesday May 12th, 1998**

On behalf of the Ontario Golf Superintendents Association and Glen Abbey Golf Club, I would like to invite O.G.S.A. Superintendents and their respective Head Golf Professionals to the annual Pro/Superintendent Golf Day at Glen Abbey Golf Club. Glen Abbey is proud to host this event for the third consecutive year on Tuesday May 12th, 1998.
The O.G.S.A. Pro/Superintendent Golf Day has been an annual event within the Association for the last 23 years. An integral part of its success is the unique opportunity of brining two of the largest golf professions within the industry together for a great day of golf. This opportunity to play with fellow Superintendents and Head Professionals has helped to strengthen the bond between the bond between the two professions with the common goal of seeing the industry grow and prosper.

Glen Abbey, as the home of the R.C.G.A.'s National Championship, The Bell Canadian Open, offers the ultimate golfing challenge in playing the Jack Nicklaus designed championship course. The course will allow you to match your golf game with that of the worlds best golfers on the P.G.A. Tour. Glen Abbey as a public golf facility, hosts over 220 golf tournaments and corporate outings per year. As part of the day, the use of all the golf course amenities from the driving range & locker room, to the golf shop & restaurant facility, are at your disposal. They are committed to making your day at Glen Abbey as enjoyable as possible.
With the luck of good weather, the O.G.S.A. looks forward to a great day.

Dean Baker
Ontario Golf Superintendents Assoc. (Committee)
Glen Abbey Golf Club (Course Superintendent)

## Experiments Explore Penncross Bentgrass Conversion

RESEARCH - If cost and lack of information keep you from converting your Penncross bentgrass putting green, you will want to keep track of a current reasearch project in North Carolina.

Dan Bowman, Ph.D., professor at North Carolina State University, hopes to offer superintendents information on how to convert without having to close the course. Bowman and his research team are evaluating methods for converting an existing Penncross bentgrass putting green to L93 and A4 bentgrass.

"We are hoping to offer superintendents guidelines that will enable them to slowly convert," Bowman says. "Hopefully, they won't have to take the greens out of play and won't experience a loss of profit."

The experiment will evaluate the following fall treatments for their effect on bentgrass conversion:

- control, no overseeding
- broadcast overseeding
- cultivation with Job Saver tines plus broadcast overseeding
- verticutting plus broadcast overseeding
- Primo plus Job Saver cultivation plus overseeding
- Primo plus verticutting plus broadcast overseeding

Based on the results, the most successful conversion practice will be used in comparing the competitive strength of the new bentgrasses.

The research team is starting the second year of the project. The field plot is located at the Sandhills Field Research Station in Jackson Springs, N.C. All laboratory work is conducted at NCSU in Raleigh. They have interseeded two times and plan on taking second year samples in April or May and again in September. So far, most treatments were not effective.

"After the first year of interseeding, we accomplished 20 percent conversion. The initial treatment was with Primo followed three days later by Job Savers," Bowman says. "We were more aggressive this year."

The mowing height was also changed. "We changed to a more realistic height," Bowman says. Now it is at 5/32 of an inch. The verticut treatments saw a lot of seedlings in the cut surface. Whether they will survive is the question.

The second phase of the project involves ranking several new bentgrasses as to their competitive ability for conversion, enabling the superintendent to make informed choices about variety selection.

"We are hoping to offer superintendents guidelines that will enable them to convert. We hope to offer them a better cultivar and one that will prevent them from taking the greens out of play," Bowman says.

GCSAA is contributing $7,000 per year for three years of the four-year project. John K. Williams, CGCS at Keith Hills Country Club and president of Carolinas GCSA, helped coordinate the project. Carolinas GCSA has committed $7,000 per year for four years. The Turf Council of North Carolina and USGA helped fund the first year of the project.

GCSAA Newsline - February 1998 Volume 3 No.2

# turf or consequences

## Turf or Consequences

*Summer Staff Species*

*By Doug Breen, Superintendent*

The time is spring. The sun warms, the birds begin to sing. The last of the winter's snow melts from the pile in the corner of the parking lot to expose the mitts that you were never quite sure what you did with. Many miles away, the Golf Pro cautiously pokes his head out of his Floridian condo to see his shadow and scurries back inside for six more weeks of "winter planning"(teaching lessons for cash) before the long migration north to his home course.

The reels are ground and ready; the ball washers and tee blocks glisten with their fourteenth coat of paint. The general manager begins to hint that maybe its time to start working weekends again, and the members are calling daily to point out that the course down the road(which incidentally drains like a window screen), is open and that it's not fair that they should have to pay green fees to another course while their memberships are in our bank account.

Everything is perfect. The turf begins to stir and reach for the sky, the mowers are lined up like runners on their mark, awaiting the marathon to come. You can smell the anticipation; touch the tension. Through the winter you've experienced that odd paradox of tranquillity and loneliness usually reserved for the night watchmen and forest rangers, but today it will all change, because today - the summer staff returns.

Now for about a dozen years, I've witnessed the annual migration of the various species of golf course employees from their winter homes underneath the tables of various drinking establishments, at some of the finest institutions of higher learning in the country. I've observed this annual rite of spring with more than a passing interest, and for those who have not invested the time that I have studying the habits anc characteristics of these fascinating creatures, I present the following compendium of summer staff species.

The Beer Bellied Barhopper: This cheery fellow is easily recognizable by the fact that his eyes have no discernible pupils and are red where the whites ought to be. Characterized by his aversion to bright light and loud noises, he prefers to avoid hangovers by never actually sobering up. Traditional habitats include local night spots and his diet is made up mostly of nachos and cold pizza. You'd fire him, but he's never late, and he's the hardest working guy you've got. The Thick-as-a-brick Club President's Nephew: Characterized by his slack jawed, wide eyed stare, this fellow is usually employed at the request of his uncle. He has no interest in this (or any other) work, and you were asked to "show him the ropes because he can't seem to hold a job doing anything else". He is often found sitting in the shop staring blankly at the wall, or torturing small animals.

The Pasty-faced Birdie-girl-armed Owner's Son: Can easily be identified by the pale complexion which comes from not setting foot outside the house since his twelfth birthday. This surprisingly weak creature usually exhibits curled and useless hands from countless hours of Nintendo. His function on the golf course can best be described as "parrot" , since he will repeat everything that is said or done to his father at the supper table. Other species resent and despise him.

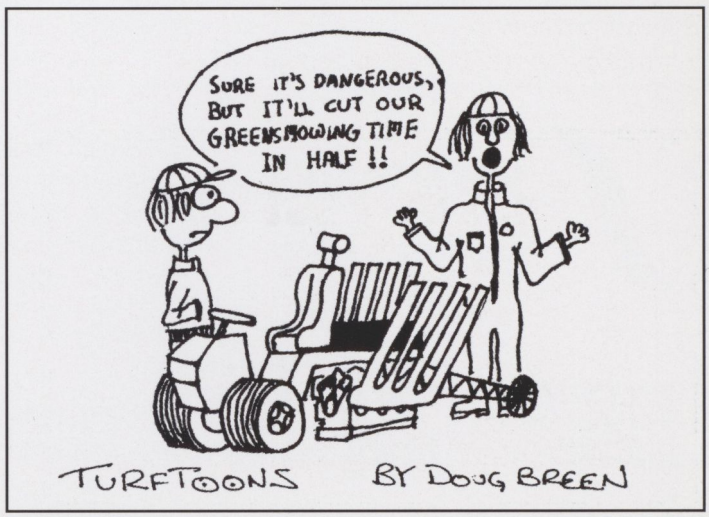
The Ruby-lipped I Don't Think Those Shorts Quite Meet Dress Code Requirements Half Way House Attendant: Easily the most attractive species of all summer staff, she is always surrounded by a large group of both golfers and groundscrew. One interesting side effect of her presence, is that her work area is always impeccably weeded, trimmed, and the weedeater seems to be more active here than on any other place on the course.

The I'd Rather Be Working On My Chevy Nova Super Sport Mechanic: Has the technical expertise to build a nuclear reactor out of old National parts, but is only truly excited by big engines, big stereos, and big tires. This is the staff member most likely to involve you in a sexual harassment suit lodged by the half way house attendant.

The Sleepy-eyed Greensmower: Through clever camouflage, this crafty fellow can disguise himself during a job interview as a motivated, useful human being. However, after a few days on the job, his true colors begin to show. This species is primarily nocturnal in his habits and has not been well rested since the mid-eighties. He will be five minutes late for work everyday, and ten minutes late on weekends (except for those occasions where he chooses too sleep in his car in the parking lot.) He is easily recognizable by his bobbing head motion from constant dozing off, and he leaves a clear trail of scalped aprons and hydraulic leaks in his wake. Life expectancy is about two weeks.

The I'm After Your Job And I Don't Care If You Know It Assistant: This is one of the more dangerous species of summer staff, which can usually be found skulking behind you waiting to stab you in the back. After hours, this weasel-like creature can usually be found in the lounge telling members that you have a drinking problem. This species is often killed for sport and is fortunately now nearing extinction.

For more information on these, and other species, which will soon be migrating to your course, a complete guide is available from your local Canada Employment Centre. Best of luck with this years hunt.



## new trends

As the number of golfers increases on your course, so do the maintenance activities needed to accommodate the additional traffic. Issue: Tee surfaces receive more abuse than any other part of the golf course. Solution: When tees don't have enough cover on them they need to provide more service to golfers, renovation is necessary.

Key: Use modern construction standards to provide ideal teeing surfaces and minimize future maintenance efforts and expenses.

Guidelines: Before starting, consider some simple rules:

1. Tee size: Tee areas should be based on the amount of play. Par 4 and 5 holes should have 150 square feet of playing surface every thousand rounds of golf played annually. Par 3 holes should have 200 square feet of playing surface for every thousand rounds.
Example: A par 3 hole that plays 40,000 rounds should have 8,000 square feet of tee area.
2. Number of tees: Five sets of tees are becoming the industry norm. Example: A professional set of tees may be placed at 7,000 total course yards, advanced amateur tees at 6,700 yards, normal amateur tees at 6,300 yards, intermediate tees at 5,700 yards and novice tees at 5,000 total course yards, respectively. Tees should be sized proportional to the amount of play they receive.
3. Angle of play: The strategy of a golf hole is determined by the angle of play. By changing the tees angle of play designers can make the strategy of an ordinary hole spectacular.
4. Maintenance: Golf course architects also work with the superintendent to ensure appropriate, long-term maintenance needs are planed and met.

Important: When renovating tees, remember serious safety problems can result from moving tees. Also, golf course owners, superintendents and architects need to be concerned about the environmental impact of any golf course construction or renovation project.

*Source: Michael J. Hurdzan, Ph. D., Hurdzan Golf Course Design, Columbus, Ohio.*

## twenty years ago today

**by Barry Endicott**
**Nobleton Lakes Golf Club**

The Ontario Golf Superintendents Association executive for 1978 was Paul Scenna (pres.), Stew Mills (vice.), Paul White (sec.), Ken Nelson (tres.), AI Beeney (past pres.), Bill Bowen, Blake McMaster, John Smith, Rusty Warkman, Bill Hynd and Paul Dermott.

The Eighth Annual Turf Management Symposium was held at the Hamilton Golf Club hosted by Stew Mills. Paul Scenna opened the Symposium, which was chaired by Norm McCallum and AI Beeney. The speakers for the day were Terry Dwyer, meteorological officer Mount Hope Airport, George Cumming, Royal Botanical Gardens, Dr. Jack Eggens, University of Guelph, Ken Nelson, Steve Miller, Jim Wyllie, Rusty Warkman, Doug Suter and John Smith. Paul White was the symposium chairman and over 70 superintendents, assistants and associates attended.

Monthly meetings were held during the off-season at Glendale Golf Club, Paul White, Bayview Golf Club, Ed Ortleib and Essex Golf Club, Bill Fach. The Canadian Golf Superintendents Association Conference was held on March 5th-8th at the Hotel Toronto. The President/Greens Chairman/Superintendent Tournament was held at the Hamilton Golf Club on July 28th. The team of Harry Ritson, pres., Frank Pope, greens chairman, and Bob Heron, superintendent, won first prize. Bill Hynd hosted the ladies Peter Jackson Classic. Dennis Pellrene hosted the Canadian Open and Bob Brewster hosted the Ontario Amateur. Paul Scenna hosted another great Galt Field Day on June 8th. Low superintendents were Bill Bowen (76), Bill Glashan (77), Jack Fairhurst (78) and Graham Sholdice (78). After golf, everyone went over to the Cambridge Turf Plots. Gord Witteveen hosted a meeting on August 16th at the Board of Trade Country Club. It was a rain delayed round and the low gross winners were Bill Bowen (76), Bill Glashan (77) and Barry Endicott (78). The theme was "America Day" and U.S. guests included Dr. Jim Watson, Ted Smith, Ned Brinkman, Bob Moore, Jim Latham, Andy Bertoni, Norman Leising and Mel Lucas. Mel Lucas, director of the GCSAA, gave a demonstration of the new speed stick, which was developed by the USGA to measure putting speed on greens. The McClumpha tournament was held at Glendale Golf Club. Genstar Chemicals hosted superintendents at Glen Abbey and the CGSA held their Fall Field Day at Lachute Golf Club, which was won by George Garner with a 78.

The Pro-Superintendent Tournament was held at Dalewood and George Garner (79) and Pro Dave Clayton (71) won top prize. Thom Charters won low superintendent prize with a 78. Kimmo Solonen won the Taylor Barnes trophy at Cherry Hill Country Club.

James H. Roberts passed away on January 1st. Mr. Roberts retired in 1972 following 20 years as superintendent at Sunningdale Golf Club. Henry Guertin accepted the job at Beachgrove in Windsor and Barry Endicott moved to Chinguacousy Country Club from Glen Shields Golf Club. Stew Picken moved on as superintendent at Glen Shields Golf Club. AI Draper accepted the job at Greenhills Golf Club. Doug Heron of Scotts became regional manager for Ontario, Quebec, Ohio, Michigan and parts of New York and Dave Dick, formerly from Sleepy Hollow took over the Toronto territory. Ron Craig became manager of the Rexdale branch for Spraymotor. Hugh Kirkpatrick moved from Dalewood Golf Club to Westmount County Club in Kitchener. Clay Switzer, Dean of O.A.C. was made Honorary Member of the OGSA.

## OGSA curlerama

The curling day that has become an established event indicating the arrival of spring was held on Wednesday, March 18, 1998 at North Halton Golf Club. Our host Al Beeney who has hosted this day for a number of years once again did a great job. It is an excellent opportunity to try a sport many of us do not play on a regular basis. More importantly, it is an opportunity to exchange information on the spring conditions of our courses and other breaking news within the industry.

Thirty six participants enjoyed two, four-end "fun" games with some needing the final rock to determine the winner. Following the games soup and sandwiches were enjoyed while the winners received their prizes. Turf Care and the O.G.S.A. generously donated prizes to the "winning" team Dean Baker-skip, Bernd Von Cube, Paul White and Nigel Rennie.

The O.G.S.A. appreciates Al's commitment to host this event next March with even more participants enjoying a great day.

Keith Bartlett
Golf and Meetings

# 1998 turf managers' short course

## A Students Perspective
## by Brian Taylor

After finishing my final exam, I sat in my chair with thoughts of regret. Looking around this room and seeing the faces of people of which I have spent the last four weeks with. From that first mornings introduction, a Welcome Reception at the GTI, the Annual Turf Managers' Banquet (a few of us will not forget that one), and all the time spent between Squirrel Tooth Alice's and the Shakespeare Arms, a certain comradery was achieved. This experience for me was irreplaceable. I am sure that anyone, who has ever taken the Turf Managers' Short Course, will understand when I say; the instructors of this course made it a pleasure to learn more about our turf management. The enthusiasm and dedication of Norm McCollum and Dr. Jack Eggens is a reflection of the role that the University of Guelph, and the Guelph Turfgrass Institute has on our industry.

Before I registered for this course, three people, that were a very big part in my decision to change careers (whether they know it or not), John Parker, Dean Baker, and Jim Sara all expressed that the short course would be very beneficial to my career in turf management. They were right! But not only for career development, the contacts, and the friendships made are now for a lifetime. Together we have helped each other physically and mentally get through this past month of lectures, exams, and social gatherings. This alone was credit to that friendship.

Whenever possible I also, will now encourage people to take the Turf Managers' Short Course. It was an experience for a lifetime, and to quote a line from Norm McCollum's speech at the turf managers' banquet, "The University of Guelph's Turf Managers' Short Course will not be second to any other short course available". I believe this to be true. The instructors that have taken time out of their busy schedules to share their knowledge and experience with us, is unbelievable. For this, I thank everyone who made the 29th Annual Turf Managers' Short Course a possibility.

It is with all of this in mind, I very much regret the fact that this exam brings an end to a four-week period in my life that I will never forget.

Congratulations to all my classmates, and good luck in your future endeavors.

# OGSA HERITAGE AWARD

The OGSA has developed this scholarship to recognize the scholastic accomplishments of students who are the children or grand children of members of the OGSA (open to All members), and are studying a curriculum unrelated to Turfgrass Management.

### Funding:

Funding is available to Diploma or Degree students, and also students who have successfully completed High School, and have been accepted into a University or College program, prior to submitting an application.

### Selection:

Selection will be based on Academic accomplishments, educational plans as they relate to your career intention, and the content of the completed application.

### Deadline for Applications:

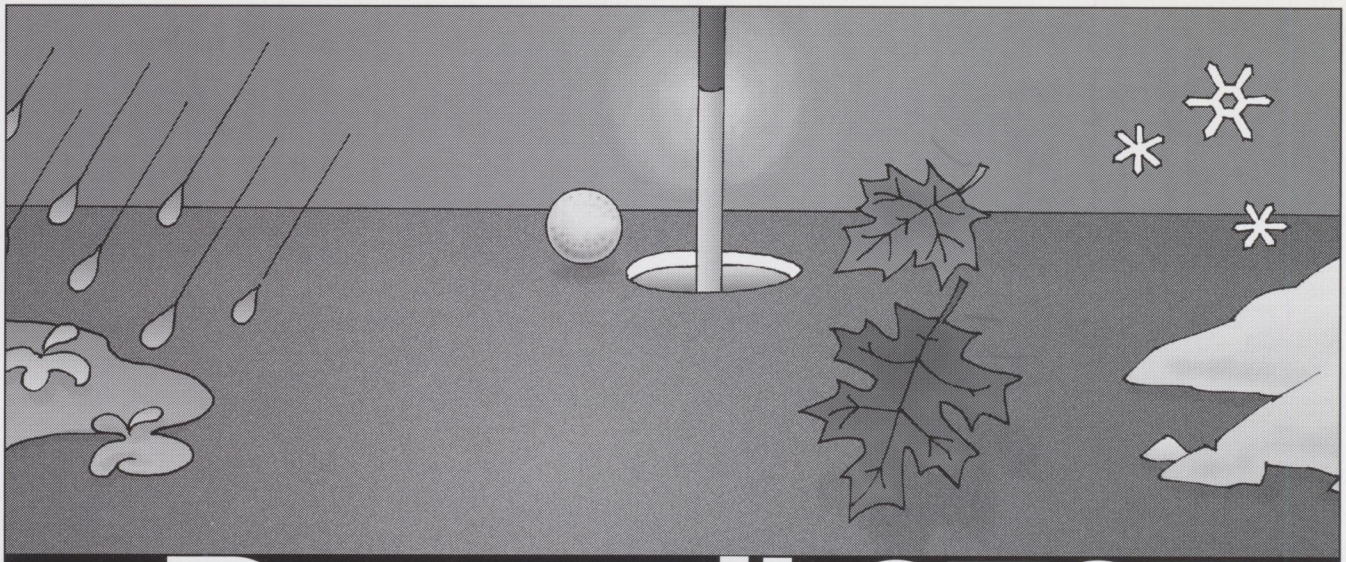
Applications will be made available an June 1st, 1998 and must be received by July 31st, 1998.

### To Qualify:

1. The applicant must be enrolled in a post secondary institution on a full time basis in the fall of the current year. Applicants chosen field of study must be unrelated to Turfgrass Management.
2. High School graduates who have been accepted into a University or College program prior to the application deadline.
3. The applicant must be a child or grandchild of a member of the Ontario Golf Superintendents Association.
4. The applicant must list his/her parent or grandparent on the application and current academic advisor, both of whom may be contacted by the committee.

**Applications will be made available June 1st, 1998**
**and are to be returned no later than July 31st, 1998 to:**

Ontario Golf Superintendents Association
Scholarship Chairman
Guelph Turfgrass Institute
328 Victoria Road, South
Guelph, Ontario N1H H8



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# ETHICAL STANDARDS OF ONTARIO GOLF SUPERINTENDENTS' ASSOCIATION

- *To ensure that respect is accorded our profession, our Association and our individual members, these ethical standards are to be observed and practised..*
- *Maintain courteous relation with your employer, employees and fellow superintendents, while practising sound business and turf management.*
- *Continue to broaden your knowledge through formal education channels and by exchanging experiences and ideas with fellow members.*
- *Endorse products or practises only when completely satisfied through personal experience..*
- *Refrain from corresponding either verbally or in writing, with a Director, member or official of another club, regarding its affairs, without the prior knowledge of that club's superintendent.*
- *Apply only for a position that is vacant, and, if possible, talk to the person who held the job last or other local superintendents.*
- *Offer employment to another club's employee only after advising that club's superintendent.*
- *Notify the superintendent of the club you are visiting directly, and, whenever possible, do so in advance.*
- *Misrepresenting the Association and yourself by lending your membership card will not be condoned..*
- *It is the responsibility of each member to abide by these standards and to report any violations to the Board of Directors, in writing.*

# TURF CARE

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