SPORTS TURF MANAGER

... for better, safer Sports Turf

MARCH 1999

SportGrass™

The New Playing Surface for the Future

As a sportsfield designer for the past 20 years, I am always on the lookout for new products that I can introduce to my clients. I have worked extensively with sand-based athletic fields and their drainage systems and am aware of both the pros and cons of these types of fields. Sand-based fields offer many positive features including better aeration in the root zone and rapid water movement. Unfortunately, all too often these same field types are overused and wear out fairly quickly creating an unsafe playing surface. About five years ago, when people were coming to me with stories of fields that were unsafe after 10-15 games, I investigated SportGrass™. I researched the product, contacted the company representative in Seattle, Washington, and proceeded to educate myself on what SportGrass™ is and how it works.

So, what exactly is SportGrass™? It can be used for most sports. It is the first turf product that has combined the toughness and wear resistance of synthetic turf while still allowing play on a natural grass field. The SportGrass™ system makes use of a 100% natural grass playing surface on a layer of amended sand. Within that layer are polypropylene grass blades tufted into a woven backing. Because the grass roots grow through both the synthetic blades and the woven backing, the crown and root system of the grass plant are protected. Even if the natural grass is worn away temporarily, stability of the field is retained and play can continue. Tests have shown that SportGrass™ playing fields can withstand more than five times the intensity of play than fields of natural grass. A well maintained SportGrass™ facility will practically eliminate ruts, divots, and bare spots, thus reducing the need not only for costly repairs and renovation, but also the potential for injury to athletes.

There has been a movement in the USA over the last several years at the collegiate and professional level to remove synthetic turf and replace it with natural grass. The overwhelming majority of athletes surveyed prefer a natural grass surface as more forgiving and believe synthetic turf is responsible for causing more injuries. In a recent survey of 935 NFL players, 85% preferred natural grass, and 93% said synthetic turf was a contributor to injuries. In addition, 70% of free agents said grass playing surfaces were an important factor in their choice of the team for whom they would play. Until the introduction of SportGrass™, many grass fields were deficient under adverse weather conditions based on playability, wear resistance, and durability. SportGrass™ improved on all of these factors and when tested, players did not even realize they were playing on a synthetic surface. ♦

— Dan Almond (summarized by M. Bladon)

For general guidelines on how to install SportsGrass™ and more highlights from the 1999 OTS, please see pages 6-10.

In This Issue

Firming up Your Spring Schedule?

Check out "Coming Events" on page 16 of this issue of Sports Turf Manager.

Guest Editorial

Accidents Happen

I always welcome reader feedback. I rely on your calls, letters, and e-mail messages to bring me up to speed on the industry's most current issues.

I recently received an e-mail message from a Canadian reader who wanted to draw attention to facility liability. Stan Szwajkowski writes:

"We all need to do a better job at communicating liability issues, whether it's up here in Canada or in the USA. The latest one that I've heard about is the injury to a football player on a high school site.

It is common practice where I'm from to utilize the football post as soccer nets. Most multi-use posts have tabs or rings welded to the top bar and support posts to tie the soccer nets to.

A football player, after scoring a touchdown, jumped up and attempted to slam-dunk the football over the up-rights on the goal posts. The palm of his hand caught on one of the rings or tabs used to tie down the soccer nets. The result was that he tore off the palm of his hand.

This resulted in a large settlement through the courts. Please advise your readers of this concern. After inspecting our schools and parks, I've found more than 10 sets of posts with this type of hazard present."

Stan Szwajkowski
Supervisor of Sportsfields
City of Kitchener, Ontario, Canada

General consensus designates safety and playability of sports facilities as the first priority of a sports turf manager. Idealistically, this goal would stem exclusively from a desire to protect the health and well-being of field users, but get a couple of lawyers involved and you've got an entirely different scenario.

Apparently, accidents don't happen anymore. The courts seem to have decided that people can no longer be held responsible for their own actions. Somebody else is always to blame, and that somebody is usually the one with the deepest pockets.

You have to cover your back these days. Accidents can happen any time, and you never know when you're going to find yourself staring down the barrel of a pointed finger.

Working in the schools is, by nature, a risky business. Parents trust you to keep their children safe, and you're going to take the heat if something goes wrong.

I'm sure this kid's parents gave him permission to play football, and they probably came to cheer at every game. However, this zeal gets thrown out the window the second their son gets hurt.

It doesn't even matter that the school never intended the goal post be used as a basketball hoop, or that the boy's actions didn't officially have anything to do with the game. A big scar and permanent damage are difficult things to argue against.

— Steve Berens, Editor, Sports Turf

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Female Tiger on the Ground

Grand Rapids, Michigan. Groundbreaking achievement is nothing new for the first woman ever named head groundskeeper for a major league baseball team.

The Detroit Tigers said Tuesday that Heather Nabozny will direct grooming at Tiger Stadium starting March 1, 1999. She replaces Frank Feneck, who is retiring after more than 35 years on the job. At age 28, she's among the youngest head groundskeeper in the majors.

For Nabozny, who spent five years as head groundskeeper for the West Michigan Whitecaps, a minor-league affiliate of the Tigers, the position is a chance to hone what she calls her "passion for perfection." The child of a lawn-care company owner, she fell in love with grass long before she earned a degree in turf management.

— Associated Press, The Record, January 20, 1999

"Nobody can make you feel inferior without your consent."
— Eleanor Roosevelt

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G.C. Duke Acquires Jacobsen Franchise

On January 5, 1999, G.C. Duke Equipment of Burlington, Ontario, completed the purchase of the Jacobsen franchise for most of the Province of Ontario from Ontario Turf Equipment.

The late 1997 purchase of Ransomes, Cushman, and Ryan by Textron, which is the parent company of Jacobsen, meant that there would be major changes and consolidations in distributorships across North America and the rest of the world. The new Textron Company, encompassing Jacobsen, Ransomes, Cushman, and Ryan, was named Textron Turf Care and Specialty Products. As a result, the management of G.C. Duke Equipment entered into discussions with OTEC and reached an agreement on the purchase of the Jacobsen franchise.

G.C. Duke Equipment celebrated its 50th year of operation in 1998. The firm was founded by Clinton Duke and was operated out of a small facility on Plains Road in Burlington. As the business grew, the facility was gradually expanded to its present size of 100,000 square feet on five acres of land.

Immediate plans by G.C. Duke are to open satellite service facilities in London as well as eastern Ontario. Duke has already hired additional sales, service, and parts staff to ensure customers receive a high level of service. Duke is also in the process of installing a new computer system with customized software.

Duke customers can expect an increased level of service from their sales representatives as we will now have six employees focusing strictly on Textron Turf Care Products such as Jacobsen, Cushman, Ransomes, and Ryan and an additional two representatives who will specialize in allied products such as Lastec, Foley, National, and Smithco. The company also has two representatives concentrating strictly on professional lawn care equipment for the commercial mowing market.

ATTENTION ADVERTISERS

If you are looking for a specific market for your products, advertise in *Sports Turf Manager*. Published four times a year, this newsletter has a national and international distribution with the majority of its membership residing in Ontario. 1999 advertising rates (per issue) are as follows:

- business card size $40.00
- 1/4 page ad $80.00
- 1/2 page ad $160.00
- 1/4 and 1/2 page ads are available in either a vertical or horizontal page placement.

For more information, contact Lee Huether at the STA office, (519) 763-9431, or Joy Black at New Paradigm Communications, (519) 371-6818.

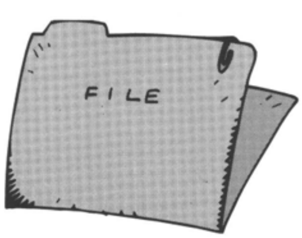
Content deadline for the June issue of Sports Turf Manager
April 15, 1999

Meet New Board Member Roy Forfar

Roy has been involved in the landscape industry for the past 20 years and holds a diploma in horticulture. He is currently working for the York Region District School Board maintaining the grounds at 44 schools. Roy is very interested in sports turf and is looking forward to serving as a Director in order to provide better, safer sports turf. Roy is married with two sons and enjoys fishing.

Board Meeting Minutes

Minutes of meetings of the Board of Directors are now available on a *by request* basis. If you would like to be added to the distribution list, please advise Lee Huether, our Executive Manager, indicating whether you wish to receive them by mail or e-mail.



PLEASE NOTE

The opinions expressed in articles published in *Sports Turf Manager* are those of the author and not necessarily those of the Sports Turf Association, unless otherwise indicated.

CHRISTOPHER MARK

The President's Desk

Hello to all members. Now that most of winter has passed us by (hopefully, I'm not being too optimistic!), we can turn our thoughts and attention to spring and get moving on all those plans that have been developed during the off-season.

I hope many of you had an opportunity to attend the OTS in early January at the Regal Constellation. Congratulations to Pam Charbonneau and the OTS Executive Committee (Dr. Bob Sheard is our committee representative) on another superb conference. I understand the speakers and sessions were better than ever, and once again our industry suppliers demonstrated their usual excellent support. Unfortunately, I was recuperating from a bad back and was unable to attend neither the OTS nor the STA Annual General Meeting. My thanks to our vice-president, Jane Arnett-Rivers, for chairing the AGM and filling in for me.

At the AGM, a membership fee increase was approved for 1999. Fees have remained unchanged since 1993 and as noted in my letter to all members last fall, due to the increased cost of running the Association, the Board deemed it necessary to increase dues. Please remember that the initial member rate is now $125, each additional member is $30, and the student rate remains unchanged at $25.

I understand that renewals on advertising in the *Sports Turf Manager* are proceeding at a brisk pace. I extend sincere thanks once again to all our industry suppliers who support the Sports Turf Association through their membership, sponsorship, and kind words about our Association in their day-to-day activities. They are too numerous to name, and many have been with us from day one and continue to back us in every way possible.

It is with sincere pleasure that I welcome Roy Forfar back to the Board of Directors. You may recall Roy was with us a couple of years ago and we are very pleased to have him once again volunteer his time and serve on the Board. I am pleased to announce that Michael Bladon, Bob Sheard, and Andrew Gaydon have committed to the Board for another term. To these gentlemen, I extend a hearty thank-you.

I recently read a great letter in the US magazine *Sports Turf* from STA member Stan Szwajkowski (Supervisor of Sportsfields, City of Kitchener) concerning the danger, liability, and potential for injury associated with hooks on goalposts. Stan's letter, reprinted with permission on page 2 in this edition of the *Sports Turf Manager,* clearly outlines the real danger of allowing hooks on goalposts. They are a liability waiting to happen—I urge every athletic field manager or facility operator to inspect their goalposts prior to the beginning of the upcoming season.

Mark August 18, 1999, on your calendars and plan to attend our 12th Annual Field Day at the Guelph Turfgrass Institute. Morning seminars, followed by afternoon equipment demonstrations at a local sod farm, will highlight the day. At a price of $25 for members and $30 for potential members (which includes a grab bag lunch), it will be the bargain of the summer. Come out and join us for a fun and informative day.

Wishing you better, safer sports turf. ♦

— Christopher Mark

The Shark Supplies Sod for Superbowl XXXIII

Top golfer Greg Norman's sod company laid the grass in Pro Player Stadium (Florida) at the Superbowl this year at a cost of US $300,000. GN-1 is a Bermuda grass developed by Australian Hugh Whiting. It was overseeded with perennial ryegrass and grown in a mesh for greater stability. The grass will be removed before baseball season and replanted with GN-1 again after. ♦

Our Condolences

The STA extends condolences to both Oseco Inc. and the family of Bill Carnochan. Bill passed away February 15. He was not only an excellent salesman and highly respected in the industry, but a kind friend to many.

The Service Department

Preparing Motorized Equipment for the Coming Season

We welcome Allan Gray as a contributing editor. He will be discussing equipment and its maintenance. Allan is recently retired from the University of Guelph after 15 years as a mechanic. He spent 23 years with General Motors and taught courses in mechanics at Conestoga College for 7 years.

Some of these suggestions should have been done when the machines were put in storage at the end of last season; however due to the timing of this article, we will start as if they were not performed.

1. Begin with a circle check of your machine to see if anything is missing, bent, or out-of-order.

2. Next comes the most important matter in restoring the machine to proper operating condition. Wash and clean the top and underneath thoroughly. The more you clean, the more you will save in maintenance costs. Improper cleaning can lead to a snowballing of negative effects. When grass, weeds, and mixtures of soil are left on parts close to shafts and bearings, the sooner rust will appear. When this rust is left near bearing seals, it will probably progress past the seal and into the bearing. When the seal is ruined, moisture and air will dry up the lubricant in the bearing causing it to seize up and create a great deal of noise and vibration. This could cause things to go out of alignment. Consequently, the machine will not perform properly.

After equipment has been washed, it should have a light spray of oil, especially under cutting areas. This is especially important when the equipment will not used for a long time. A light spray of oil will keep your lawn equipment, etc. looking like new. Greasing after washing will force water from bearings which will prevent rust.

3. Test the battery for water and charged condition. Remove negative battery cable (-) first. Then remove the positive cable (+). This will reduce the chance of shorting out cables and causing fire or injury. Clean battery terminals and cables with the proper tool or course sandpaper. After this is accomplished, install cables on battery, starting with positive (+) and then the negative (-) cable. This would be a good time to charge the battery. It should be charged slowly for half an hour to prevent sulfating (going bad). It is now ready to be used again when needed.

4. Next on your list should be to change the oil in the crankcase of the engine. It is preferable to change the oil when the engine is warm. You should also change all filters, including the oil, gas, and hydraulic filters, as well as the water filters, if water and antifreeze are used for cooling. The hydraulic oil doesn't need to be changed, but the filters must be changed at proper intervals (check your service manual). Install proper engine oil and filter (check service manual). Do not overfill.

5. Check air filters and replace if light cannot be seen through them. Use a trouble light to check for plugged conditions. Clean or replace spark plugs if it is a gasoline or propane engine. A diesel engine uses no plugs, but filters and fuel must be kept extremely clean and free from moisture.

6. Check and test drive belts. If drive surface is shiny, hard, and brittle, replace belts.

7. After sitting for long periods, particularly over winter, fuels should be changed, including mixed gases. Gas fuel can be drained in the autumn. Run the engine to use the last gas in the system. Fill with a medium gas which has a higher octane and will mean less pulling to start in the spring.

8. Finally, test all brakes and safety switches for proper operation and you are on the way to another satisfying season working outdoors. ♦

OTS Conference Highlights

♦ SportGrass™ by Dan Almond (featured on the front cover) ♦ Sportsfield Drainage: Learning From Mistakes (Case 1) by Dr. Bob Sheard ♦ The Use of Effluent Water for Sports Turf Irrigation by Alex Campbell ♦ Botany of a Grass Plant by Dr. Jack Alex

The Ontario Turfgrass Symposium was held in Toronto at the Regal Constellation Hotel from January 5-7 and was again a very worthwhile learning experience. Exhibit space was sold-out with a waiting list and a large vote of thanks goes to Peggy Nagle for her work in this area. Another group of excellent speakers were on hand to deliver information on a wide variety of grass and management topics of interest to the supporting associations. Thanks to Pam Charbonneau of OMAFRA for the enormous amount of work she put in to recruiting speakers. Lastly, on behalf of the Association, our thanks to Rhod Trainor and his committee for another successful symposium and a job well done. We also thank the exhibitors in attendance for their support of the Sports Turf Association, not only at the show, but throughout the year. It is much appreciated. For those of you who were unable to attend, we will be featuring highlights of some of the talks in this and future issues of the Sports Turf Manager.

Sportsfield Drainage: Learning from Mistakes (Case 1)

Dr. Bob Sheard, P.Ag., Agronomist, Guelph Turfgrass Institute

An east-central Ontario city Parks Department engaged the services of a prominent sports facility architect to design a new Category One soccer field—that is one which would have a sand-based root zone. Soil engineering studies reported that soils at the site were lacustrine clay loams overlying a flat limestone bedrock at a depth of one metre.

The architect's design called for the removal of the clay loam material down to the bedrock and backfilling the first 45 cm with pit run sand. The final 45 cm was scheduled to be a selected sand. A running track was constructed around the soccer field on the clay loam subgrade. A single drain line was planned beneath the track to prevent frost heaving and cracking of the rubberized surface (Figure 1).

The design was accepted by city authorities and the field was constructed according to plan with an in-ground irrigation system. The field was prepared for seeding, which took place in late August. In early September, the remnants of a hurricane moved across the region dumping several centimetres of rain. As the storm moved away, the field was left inundated with water. The water stood and did not drain for five days after the storm had passed. In fact, the watertable did not drop below the 30 cm level for two weeks following the rain. The establishment of the new seeding was erratic.

What Went Wrong?

The design. Sand surrounded by highly impervious clay loam is analogous to a cereal bowl of cheerios filled with milk. The bowl became full and ran over.

At the time the hurricane passed through, it can be assumed that the sand was at field capacity and the only storage space available to accommodate the rain was the air-filled porosity, which was measured to be 19.8%. Thus in a metre depth of sand, 19.8 cm of rain could be absorbed before the sand became saturated. One can also assume that the lower 30 cm of the profile was close to saturation because the underlying bedrock would not permit complete drainage of rain which may have fallen since construction started. Therefore, it is easily conceivable that the five inches of rain received in early September filled the bowl with water.

One may ask: "Would the tile line under the running track not drain the water out of the sand"? Not likely. Why? Because of the low permeability of the clay loam soil in which the drain was laid. Furthermore, even at a hydraulic conductivity of 56 cm per hour, it would take a minimum of 2.5 days for the standing water at centre field to flow to the side lines. It might also be assumed that lateral flow of water without the force of gravity may be less than 50% of the vertical flow.

Fixing the Problem

The solution to the problem was to install four drainage lines running the length of the field using a tile machine which plowed in the drains to minimize surface disturbance and prevent mixing of the pit run sand with the selected sand. Unfortunately, the already installed irrigation lines ran perpendicular to the drains which meant they all had to be cut before the drain plow went through. With a good outlet in place, the field drained as it should.

Another important reason to correct the design was that failure to drain the field would mean that every winter the sand would have filled with water to the surface because there would have been no active evapotranspiration to remove the water. All

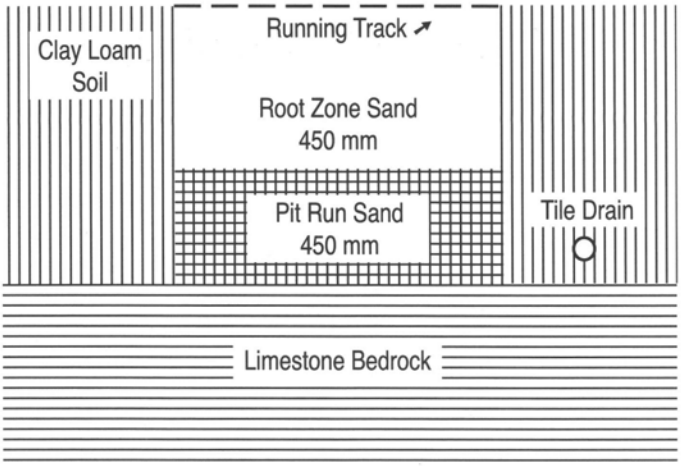


Figure 1: A schematic drawing of the design of the sportsfield.

the pore space would then contain ice, which is not a good condition for over-wintering grass roots.

Although sand root zones may have high water conductivity values and good porosity, the drainage characteristics of the system are controlled by the drainage characteristics of the soils which surround the space where the sportsfield or golf green is constructed. Therefore, these specialized root zones must have a drainage system equal to, or superior to, that which should be used for the surrounding soil. In a nutshell, never, never build a sand-based root zone without an adequate drainage system ♦

SportGrass ™ General Guidelines
Continued from page 1 ... Dan Almond

In order to increase soil porosity, a good base is required. In the profile, a minimum of 6 inches of sand base and as much as 10-12 inches is desired to drain up to 3-5 inches of rain per hour. Typically, we also want 5-15% organic matter depending on the sand we use. We then follow USGA specifications for the selection of both the sand and gravel. All of the fields we do have automatic irrigation systems installed. The foundation is 3-5 inches of gravel, then the sand base, then bluegrass sod. It is imperative that the field is graded correctly. Exhaustive testing is done to make sure we get the correct sand. There are several ways you can lay down SportGrass™. Rolls of the material are 12 feet wide,150 feet long, and weigh 2,000 pounds. After laying, we topdress with about an inch of sand. SportGrass™ is about 1-1/4 inches in height. Next we seed the grasses into the sand layer. In about 6-8 weeks, the roots are down far enough that play may begin. Standard maintenance practices are followed as far as mowing, fertility, solid tine aerating, and watering. Aerification is recommended on SportGrass™ but care must be taken that the correct size tine is used to avoid damage to the synthetic backing. Cost of a SportGrass™ field in US dollars is approximately $10.00/square foot.

The Use of Effluent Water for Sports Turf Irrigation

Alex Campbell, On-Site Waste Management Specialist

Over the past five years, there has been a growing number of stories in the news relating the woes of towns, villages, and cities throughout Ontario, Canada, and North America undergoing water shortages. For Ontarians, it is often difficult to understand how a water shortage can result when much of the population lies within a one hour drive of Lake Ontario. In fact, Ontario has one of the largest freshwater supplies in the world when all its lakes are considered. The problem is not a source of raw water, but an ability to convert sufficient quantities of this water to drinking water quality. For many years, arid and semi-arid climatic areas have responded to a decreasing water supply by increasing the use of more non-potable water for irrigation. These waters include stormwater runoff, graywater discharge, and treated sewage effluent, which is often referred to as reclaimed water. In some states it is required that turfgrass facilities over a given size, usually 10 acres, must use treated sewage effluent for at least 50% of their irrigation needs. It is also estimated that by the year 2000, up to 75% of all golf courses will use non-potable water supplies for irrigation. While that may be optimistic, there is a growing number of golf courses utilizing stormwater and sewage effluent for irrigation, even in areas that do not have a potable water shortage.

The use of sewage effluent for irrigation brings mixed reactions. There is a general popular movement to support the use of sewage effluent by the public and approval authorities. But, there is also a reluctance on the part of approval authorities to allow effluent reuse without stringent controls and conditions. This is due to their concern over risks, perceived or real, to public health and the environment. Yet, as with many things, this too is changing. Approval authorities are not the only ones holding out. Some turfgrass facility designers and managers still prefer treated freshwater for use on their turf mainly because they can rely on a given quality of water being available with little fluctuation. The use of sewage effluent inherently requires more effort on the part of the manager to check the incoming water quality.

Sewage Treatment

Everyone has heard the term sewage treatment, but what does it really mean? How is sewage treated? Essentially, sewage treatment is a collection of physical, biological, and chemical processes which when grouped together in a given manner will produce a given quality of effluent. How the different processes are grouped is dependent on the level of treatment required. How environmentally sensitive an area is and where the sewage effluent will be discharged governs the level of treatment required. For example, a discharge of sewage effluent high in phosphorous would not be permitted into a cold water fishery because the high levels of phosphorous would ultimately be detrimental to fish habitat.

There are three levels of sewage treatment used throughout the world. These are primary, secondary, and tertiary or polished secondary. Primary sewage treatment is the removal of coarse solid material through screening, sedimentation, or a combination of these. Secondary treatment is a biological process through which complex organic compounds are broken down. Secondary treatment may follow primary treatment or the facility may combine the processes together. Tertiary treatment is a biological, chemical, or filter process in which a very high quality effluent is produced. After this process, the quality of the effluent is equal to drinking water. Normally, for use on turfgrass, the effluent must be of secondary quality, which means that the five day biological oxygen demand (BOD_5) and the total suspended solids (TSS) concentrations must be less than 20 ppm with an *E. coli* count of 200 MPN/100 ml, which is body contact disinfection for a public swimming area. Over the past 10 years, a number of innovative technologies for sewage treatment have emerged which utilize a variety of filtering media. These include sand filters, sphagnum peat filters, sponge foam media, geotextile media, micro-filtration units, as well as aerated media units (i.e. Nibbler™). The advantage of these units is that a very high quality of effluent can be obtained on a consistent basis without the need for high operational and maintenance requirements. Thus, sewage treatment for many facilities is very affordable.

In some states it is required that turfgrass facilities over a given size, usually 10 acres, must use treated sewage effluent for at least 50% of their irrigation needs. It is also estimated that by the year 2000, up to 75% of all golf courses will use non-potable water supplies for irrigation.

Why Use Reclaimed Water?

There are many benefits to using reclaimed water—not the least of which is that it conserves freshwater supplies and does not place a heavy demand on water treatment plants. For the sports turf manager, the first benefit is that turfgrass has the capability to absorb large amounts of nitrogen and phosphorous, the two major nutrients in sewage effluent. Removal of these nutrients prior to discharge can result in large capital costs to the sewage treatment plant. Thus, applying reclaimed water to turfgrass facilities "treats" the sewage effluent by filtering out and absorbing the nutrients within the wastewater before it enters the natural environment. Turfgrasses also require various amounts of micronutrients which are often abundant in sewage effluent depending on the source. Thus, fertilization costs can be reduced when using reclaimed water.

In rural areas, the disposal of effluent onto turfgrass areas can significantly minimize the impact on nearby surface water. Thus, creation of a "sewage treatment plant" could be made possible where it otherwise would not be. In all areas, the use of reclaimed water means an almost infinite supply of irrigation water even in drought periods. This is because wastewater is continuously produced in all municipal centres; thus, the sewage treatment plant always has an effluent stream which can be used. Furthermore, at the current time, most municipalities do not charge for effluent; thus, it is not only a continuous source of water, but it is a free or at least a low cost source of water.

It Sounds Great. What's the Catch?

There is no real catch, but there are some cautions which should be considered when using reclaimed water. First and foremost, remember that it was sewage when you started and by definition it still is when you're finished. The Ontario Water Resources Act defines sewage as all dirty water—since you cannot drink the effluent, it is still sewage. Also, while the sewage treatment plant would disinfect the effluent before delivery, it is not to drinking water standards and still carries a significant number of biological vectors. Where the wastewater is applied to the turf through the use of spray irrigation, airborne transmission of pathogens may be of concern, especially if near a residential facility. Second, the reclaimed water quality is a function of the sewage that has moved through the sewage treatment facility, the level of treatment received, and a number of other factors, all of which affect the concentrations of its constituents. Thus, more frequent analysis of the incoming water is required to ensure that fertilization requirements are met and that the incoming water does not contain contaminants that would be detrimental to turf quality.

The main problem with the use of reclaimed water on turfgrass is the potential to increase soil salinity. Wastewater effluent is typically high in sodium and other salts. In heavy soils, these salts may accumulate in the root zone and have a negative effect on turf quality. Flushing of the areas with freshwater may alleviate this problem but careful monitoring of the incoming water is more of a preventative measure. Reduced permeability, which is often related to the salt content of the reclaimed water, is often also a problem. This is especially true of wastewater high in sodium, carbonate, or bicarbonate. Finally, reclaimed water from a sewage treatment plant with a high industrial wastewater component may contain large concentrations of toxic contaminants which may be directly toxic to the turf or may accumulate to toxic levels. Thus, water quality sampling is required. Ironically, some substances which are found in wastewater and are problematic to the environment, are very beneficial to turfgrass. Trace elements such as copper and boron are often found in quantities beneficial to the turf to which they are applied.

Cost is also a factor when considering the use of reclaimed water. While the water itself may be available free or at a fraction of the cost of freshwater, the costs associated with sampling the water quality, additional sewage treatment (if necessary), or additional soil amendments to overcome salinity problems can outweigh the benefits. Delivery of irrigation water can also be costly. For example, in some areas where spray irrigation is used, nozzles which minimize aerosol production have to be employed. An alternative is drip irrigation technology, which is ideally suited for turfgrass application as it delivers the water directly to the root zone, but it may not be cost effective in cooler climatic areas. Drip irrigation also minimizes the potential for pathogenic bacteria contact with persons using the turfgrass facility.

Summary

It is clear that the future will bring more restrictive conditions for non-residential uses of freshwater. A greater reliance on reclamation and reuse of wastewater will result. At present, sewage effluent can be obtained very cheaply. However, in the future, it is likely that the cost of the resource will increase as more users attempt to obtain it. The most important benefits of using reclaimed water are that it preserves our freshwater reserves and minimizes demand on treatment plants. It is constantly available, even during drought periods, and has the potential to reduce fertilizer costs. Thus, it is highly recommended that turfgrass managers consider the use of reclaimed water for irrigation purposes for existing and new facilities. ♦

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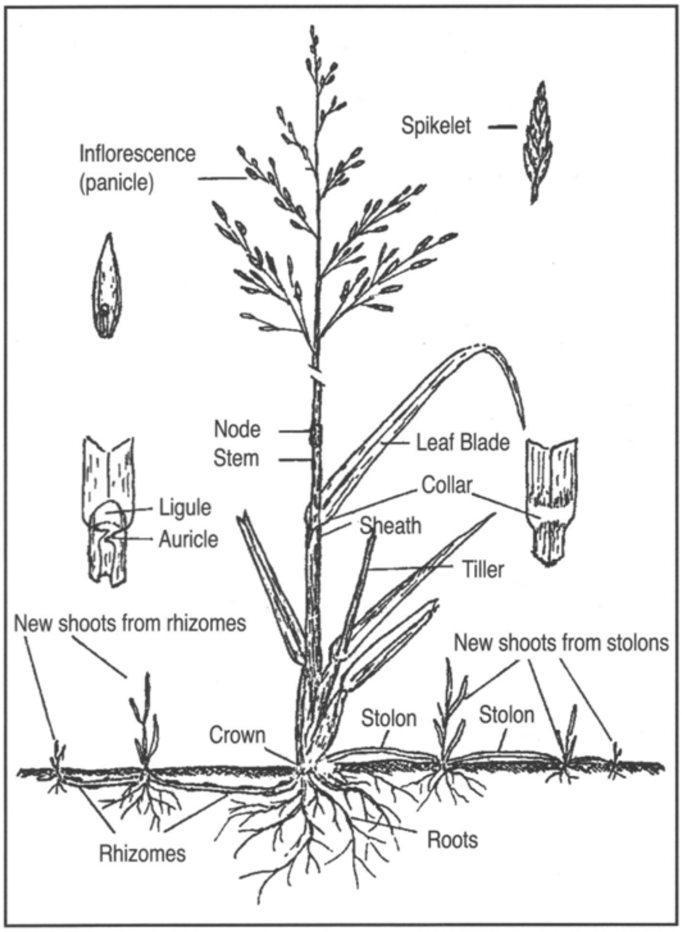
Botany of a Grass Plant

Dr. Jack Alex, University of Guelph (Retired)

There are two major categories of grasses. The Festucoideae or cool season grasses include the fescues, bluegrasses, brome, and quack grass, all of which utilize C3 photosynthesis. These are found in the northern part of the continent at higher elevations. The other is the Panicoideae or warm season grasses (C4 photosynthesis), relatively rare in the northern part of the continent and rare at higher elevations. They dominant warmer, hotter areas of North America and the Third World. Included in this family are corn, sugarcane, sorghum, rice, and crabgrass. In this article, I will outline the major features of typical grass plants.



The Baby Plant

What is a seed? A baby plant with a lunch bucket! The baby plant or embryo consists of a root portion or radicle, a stem portion or epicotyl, and a single cotyledon called the scutellum. At germination, the cotyledon absorbs nutrients from the endosperm (its lunch bucket), the radicle expands downward to become the short-lived primary root, and the epicotyl with its apical meristem (the growing point for stem and leaves) which is protected inside the coleoptile or sheath, grows upward, and the first true leaf emerges. Adventitious roots are soon produced as the seedling establishes itself from the first few nodes at the base of the stem to become the fibrous root system that characterizes all grasses.

Root Growth

Root growth is affected by soil moisture, temperature, structure, depth, fertility, and chemical reaction (whether it grows in a basic or acidic soil), as well as by genetic and cultural factors. A minimum of moisture is required for growth as roots will not enter dry soil "in search of water"— a common belief shared by many people! Depth of root penetration is roughly correlated with the height of top growth which is calculated as 2 feet for short grasses, 4-5 ft. for intermediate, and 7-9 ft. for tall grasses. Almost as much of the grass plant lives in the soil as above ground. In an acre of bluegrass sod, there may be over 3 tons of roots, of which 2% consists of nitrogen. Some 23% to 57% of the root mass of a perennial grass dies and must be replaced with new growth each year. This means that they become important builders of soil and reservoirs of nutrients—that is why grasses contribute so much to soil fertility.

The amount of annual root growth is subject to the same soil, genetic, and cultural factors that were mentioned earlier. A cultural factor one must consider is the amount of mowing that occurs. For example, in moderately growing grass, removal of 50% of the top growth of leaves and stems has little or no effect on root growth, but removal of 70% may cause 50% of the roots to stop growth for 17 days. With the removal of 90% of the top growth, *all* root growth may cease for 17 days. Often a surprise to many people are the root to shoot ratios, which by weight range from 0.7:1 to as high as 4:1. This means that for every 1 lb of shoot material (stems and leaves), there could be from 0.7 to 4 lb of roots.

The Stem, Leaf, and Inflorescence

If we look at the stem or culm of a grass plant, it consists of a series of nodes (usually solid and swollen) and internodes (usually hollow). A leaf is produced at the node that comes off the sheath and forms a blade. At the tip of the embryonic stem in the embryo is an apical meristem whose continued growth produces stem, leaves, and an inflorescence (the flowering part of a plant).

Intercalary meristems just above each node may produce additional lengthwise growth of stems. Branches arise from axilliary buds at nodes just between the leaf sheath and stem. Stolons are stems that spread horizontally along the ground, whereas rhizomes (stems complete with nodes, internodes, and scale-like leaves) grow more or less horizontally beneath the soil surface. Stolons and rhizomes both root at nodes and produce additional upright shoots from those nodes.

Leaves produced at the nodes mentioned earlier typically consist of three parts, a leaf sheath that pretty well surrounds the stem, a leaf blade that extends away from the stem, and a collar at the junction of the blade and sheath. The leaf base, the junction of the leaf sheath and the leaf blade, is a very important portion of the grass leaf.

The ligule is a little portion of tissue that arises from the inside of the leaf sheath and is present in all grasses as an upward extension of tissue (either as a membrane or a row of hairs from the inner surface of the sheath). All of the stomata, which allow for gas exchange and moisture release, are located on the inside of the leaf, not on the outer surface. The reason being that in a drought situation, certain cells shrink, the leaf closes up, and there is practically no moisture loss from the inside of the leaf. Auricles are present in some grasses as small hook-like structures that extend from the lowermost edges of the leaf blade and clasp the stem and collar. Features of the leaf base are very important in the identification of grasses in the vegetative stage.

Identification and Classification

Technical identification and classification of grasses are almost exclusively based on features of the inflorescence. The basic unit is a spikelet. These are arranged in branching panicles, in spike-like panicles, or in spikes. Each spikelet contains one or more flowers (3 stamens and a pistil) enclosed by tiny bracts called glumes and lemmas. ♦

Drain Envelopes: To Use or Not to Use

Dr. R.W. Sheard, P.Ag., Agronomist, Guelph Turfgrass Institute

Tile systems have been known to fail when sediment enters the pipe through the crack between abutting clay tile or through the slots in the more common corrugated plastic tube. Many architects design a system which has a geotextile cloth envelope or covering on the tile to prevent the infiltration of sediment into the tile. In many cases, the use of the envelope not only increases the cost of the system, but may lead to the very clogging of the system for which it was intended to prevent.

In most soils, the wide distribution of particle sizes from clay through sands and small gravel form natural bridges of particles over the entry points of water into the tile. Soils, however, which are of a relatively uniform particle size, are unable to form these natural bridges and are considered to be unstable when saturated with water; the condition which exists when water is about to flow into the tile line. These soils have been identified as very fine sands, loamy fine sands, fine sands, and silts. Clays would be expected to cause even greater problems, however, because of the plate-like nature of clay particles. Due to strong cohesive forces between the particles, clays react similar to bridging soils.

Certainly an envelope should never be used in a drainage system for USGA design of a sports field. The fine material that will wash out of the sand root zone will, with time, clog the pores in the envelope. It is wiser to ensure that the tile lines have sufficient grade so that they are self-flushing, which will ensure the fines are washed out of the system when a flush of water runs through the line after a heavy rain. A grade of greater that 0.5% on a four inch tube should ensure self-flushing.

The use of an envelope in conditions where it is not required, particularly in clay soils, will result in the clay forming a film over the geotextile material and clogging the pores in the envelope. The film of clay over the envelope in turn reduces the drainage efficiency of the pipe. If the envelope were not used, the clay particles not trapped in the bridging effect would move the slits in the tube and be flushed out during the next full flow period.

How does one determine whether an envelope is required? The recommended procedure is to have a uniformity analysis done on the soil materials which are to overlay the tile system. A uniformity analysis requires a particle size analysis for the various sand sizes, silt, and clay. The results are plotted as a graph of percent particles equal to or less than the sieve size versus the particle diameter. From this graph, the size of particles above which 60% of the particles lie and the particle size below which 10% of the particles lie is determined. The uniformity ratio or coefficient is calculated as D_{60}/D_{10}. Where the ratio is less than five, an envelope should be considered. If the ratio is greater than five, there is no need for an envelope.

Figure 1 is an illustration of the particle size distribution curve for several soils. Soil 1 represents a silt soil where the particles fall primarily in the silt and very fine sand categories resulting in a uniformity index of 3.9. The drain pipe used in this soil *should* have an envelope. Soil 2 is a sandy loam which has a wide distribution of sand, silt, and clay size particles to give a uniformity index of 12. The wide spectrum of particle sizes will provide the natural bridging effect and *will not* require an envelope. Soil 3, with a uniformity index of 9.3, is a sand used for the sand root zone of a soccer field and *will not* require an envelope.

There is a rough approximation test which can be performed on site to determine whether a soil is unstable and requires an envelope. The test requires three 105 x 175 mm juice cans. The tops are removed from all three cans. The bottom is removed from one. The second can has only the centre of the bottom removed to leave a 10 mm wide retaining ring at the edge. These two cans are soldered together to form a tube. A 95 mm diameter piece of wire screen which has 2 to 3 mm openings is placed on the retaining lip in the tube. The third can is marked at the 165 mm depth and used for a measuring device.

The moist soil in question is placed on the screen and packed to a 25 mm depth by tamping to give a compaction similar to that in the native condition. The third can is filled to the 165 mm depth with water and it is gently poured on the soil surface. Placing a long drinking straw across the mouth of the can and pouring the water down the side of the straw will introduce the water onto the soil with minimal disturbance.

If the soil does not wash out the bottom after standing undisturbed for 15 minutes, the drained pipe probably does not require a filter envelope. It must be realized, however, that the procedure is a quick test and highly subject to how the soil is packed on the screen. A uniformity coefficient derived from a particle size distribution analysis is the preferred procedure.

When drains are initially installed, the discharge water may be seen to carry a significant amount of sediment. Do not panic. With time, the amount of sediment will decline because the natural bridging of soil particles across the slits in the drain is taking place and within a year or so the water, should run clear.

A few dollars spent on a soil analysis, followed by the interpretation of the results, will save you money for an unnecessary cost addition to the tile system and the potential for reduced performance in the future. ♦

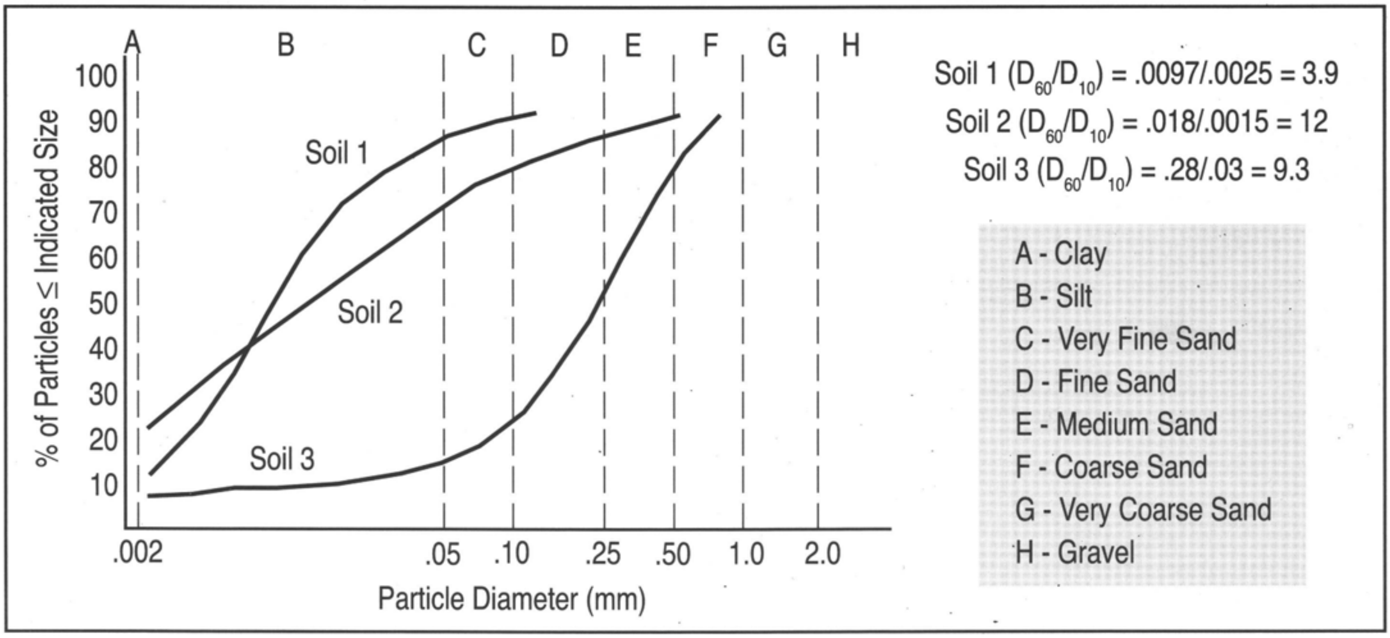


Figure 1: The particle size distribution curves for three soil samples having different uniformity indexes and envelope requirements. Please note that for interpretative purposes, the data must be plotted on a logarithmic scale.

"People of character don't allow the environment to dictate their style." — Lucille Kallen

Grass Seeds

Available From Major Seed Companies in Ontario

The Sports Turf Association strongly recommends to athletic field managers that they use only improved cultivars that have been tested and found superior under local conditions.

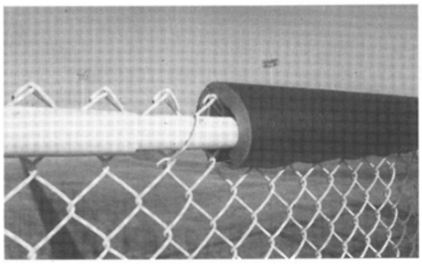
SPECIES	SUPPLIER					
	Bishop	**Ontario**	**Oseco**	**Pickseed**	**Rothwell**	**Speare**
Kentucky Blue	Baron Barzan Goldrush Liberty Minnfine Rambo Regent Rugby II Shamrock	Argyle Baron Classic Eclipse Liberty Limousine Nustar Regent	Arcadia Award Baron Baronie Chateau Gnome Haga Jefferson Midnight Nublue Nugget Nuglade Nustar Regent Sydsport	Alpine America Banff Bronco Crest Indigo Limousine Marquis Quantum Leap Touchdown	Adelphi Apollo Argyle Award Classic Eclipse Georgetown Glade Kenblue Midnight Nuggett Nuglade Nustar Preakness Princeton 105 Raven Regent Sebring Washington Welcome 1757 DW-184 Creeping	Ascott Baron Cobalt Dellwood Eclipse Freedom II Georgetown Goldrush Liberator Liberty Limousine Lofts 1757 Minnfine Nassau Ram I Regent Shamrock
Ryegrass	Competitor Elf Envy Omega II Palmer II Seville Spectacular	Calypso Envy Nighthawk Palmer II Repell Riviera Seville Top Gun Yorktown III	Affinity Gettysberg Pinnacle Secretariat Stallion Select Wizard	Cutter Edge Express Fiesta II Futura 3000 Lowgrow	Ice Imagine Palmer III Pegasus Prelude III	Academy Archer Competitor Elf Envy Monteray Omega II Palmer II Prizm Saturn Seville Sovereign Yorktown III
Fescue: Creeping Red	Franklin	Fenway Franklin Jasper Vista	Eugene Herald	Boreal Jasper Perneille	Cindy Franklin	Franklin Vista
Fescue: Chewings	Jamestown Southport Treazure	Cascade Jamestown II Koket Southport Victory	Banner Bridgeport Centre Rudax Wilma	Victory II	Dignity	Jamestown K2 Koket Southport Treazure
Fescue: Hard	Serra Nordic	Nordic Reliant Serra	Vernon	Spartan	Saxon	Brigade Nordic Reliant Serra
Fescue: Sheeps	MX86	MX86	MX86 Quatro		Azure	MX86 Azure
Fescue: Tall	Jaguar II Rebel II Shenandoah	Excalibur Jaguar II Williamette	Bonsal Lexus Vegas Watersaver	Crossfire Mini Mustang Mustang II Shortstop II Team Jr.	Minx Palisade Rebel Jr.	Emperor Jaguar II Rebel Jr. Shenandoah Tribute
Bentgrass: Colonial	Highland			Exeter Highland	Highland	Highland
Bentgrass: Creeping	Penn G-6 Penncross Pennlink Pennway Southshore 18th Green	Cato National Penn A-4 Penn G-6 Penncross Penneagle Pennlink Providence SR 1020 Seaside Southshore 18th Green	Cobra L93 Penncross Penneagle Pennlink Putter	Aggressor Cato Mariner National Penncross Penneagle Pennlinks Pennway	L-93 Penn A-4 Penn A-6 Penn G-6 Penncross Penneagle Pennlink Pennway	Crenshaw DC-P G6 Penncross Penneagle Pennlink Pennway Southshore 18th Green
Poa trivialis	Sabre	Laser Sabre Snowbird	Cypress Polder	Colt	Sabre	Sabre Sunup
Poa supina			Supranova			
Poa compressa	Canada Blue	Canada Blue Reubens			Canada Blue Talon Canada Blue	Canada Bluegrass
Weeping alkali	Fults	Salty	Fults		Salty	Salty

New Product Releases

SoftRail™: A Fence and Rail Padding That Works!

A premium quality rail and fence padding called SoftRail™ is available by Covermaster Inc., a leading supplier of protective sports surface covers in North America. The product is better than anything else on the market today. SoftRail™ is designed specifically to reduce the possibility of serious injury around ballparks and sportsfields when a player attempts to make a running catch over a chain link fence or guard rail.

SoftRail™ consists of a core of dense foam laminated to heavy gauge vinyl covering. Quick-fasten, self-locking nylon ties, spaced every four inches, hold the padding securely in place. SoftRail™ is a well made product intended for long-term use. It is also surprisingly affordable. You can order SoftRail™ in any length and colour that suits your needs.



For samples, literature, and complete information on SoftRail™, call Covermaster Inc. toll free at 1-800-387-5808. You can also fax your request to 416-74-COVER (742-6837) or visit www.covermaster.net. ♦

OSECO: The Turfseed Specialists

Oseco Inc. is pleased to announce the release of eight *Blue Chip* golf course/sport mixtures for 1999 deliveries. *Blue Chip* mixtures contain premium cultivars of Kentucky bluegrass, fine fescue, and turf-type perennial ryegrass varieties. These certified varieties are thoroughly tested and exhibit enhanced resistance to disease, insects, and winter hardiness. Oseco's *Blue Chip* golf course/sport mixtures include: *Blue Chip Intensive Use Mix; Blue Chip Bluegrass Fairway Mix; Blue Chip Rough Mix; Blue Chip Renovation Mix; Blue Chip Sportsfield - New Seeding Mix; Blue Chip Overseeding Mix with Endophyte; Blue Chip Park Mix;* and *Blue Chip Heavy Traffic Mix.*

When you use Oseco *Blue Chip* brand mixtures containing 100% certified seed, the *Blue Chip* name is your assurance of quality. Please contact Oseco Inc. At 1-800-668-5080 for more information. ♦

News Brief

Giant Steps Forward in Portable Grass

Although groundskeepers at New Jersey's Giants Stadium have temporarily converted their artificial turf playing surface to natural turfgrass at times in the past, this year they opted for a portable system. Clark Company of Delhi, New York perfected this technology and completed the first ITM installation in May 1997 when a natural turfgrass surface was required for soccer.

The ITM system is constructed of a series of sixteen-square-foot plastic modules with folding sides. The modules are filled with a root-zone mix and have turfgrass sod growing on top. To construct the playing field, the module sides are folded down and forklifts place the modules over corner locator footplates.

This installation is the first modular playing field used since the concept was originated for 1994 World Cup Soccer at the Silverdome in Pontiac, Michigan. ♦

— Manderley Report, Spring 1998

WELCOME NEW MEMBERS

• Rick Brouwer
York Region District School Board
• Barry Swanson
City of Edmonton
• Dave McCaffrey
Town of Caledon
• Dwayne McAllister
Town of Oakville
• Bill Slute
City of Oshawa
• Leo Stafford
City of Oshawa
• Robert S. Broughton
Professor Emeritus, McGill University

1999 Membership Fees

• $125 Initial Member
• $30 Each Additional Member
• $25 Student Member

Please note:
Invoices will be mailed in early April.

ATTENTION!

These two key publications are a must for any sports turf manager:

• "Athletic Field Managers' Guide for Construction & Maintenance"
$8.00 for members (mailing & taxes included), $12.00 for potential members

• "Constructing the Sports Field" a pamphlet jam packed with info for sand-based fields.

Contact the STA today to order!

COMING EVENTS

Canada Blooms
A Gardener's Getaway
March 10-14, Metro Toronto Convention Centre, Toronto, Ontario
Contact (416) 593-0223, 1-800-730-1020

Turfecs Seminar Series
MOE Landscape Category Licence Preparation Courses
March 6 & 7, London, Ontario
March 11 & 12, Toronto, Ontario
March 17 & 18, Kingston, Ontario
March 20 & 21, Guelph, Ontario
March 25 & 26, Orillia, Ontario
April 22 & 23, Guelph, Ontario
Turf & Pest Identification Clinics
April 1, Toronto, Ontario
April 15, Guelph, Ontario
Register Early! Limited Enrollment!
Contact TURFECS toll-free at 1-888-TURFECS or (519) 767-1611

Ontario Parks Association 43rd Annual Educational Seminar and Trade Show, March 24-25
International Plaza Hotel, Toronto, Ontario
Contact (416) 426-7157

Ontario Amateur Softball Association Annual Convention, April 9-11
Niagara Falls, Ontario
Contact (519) 824-8061
Ms. Bea Weber, Secretary, OASA

Sports Turf Association 12th Annual Field Day
August 18
Guelph, Ontario
Contact (519) 763-9431

GTI Research Field Day & Summer Turf Workshops
Contact (519) 767-5009
e-mail: info@gti.uoguelph.ca

National Institute on Park and Grounds Management 29th Annual Educational Conference, November 7-10
Hyatt Regency Crown Center
Kansas City, MO
Contact (920) 733-2301

Contact the STA to post coming events in the Sports Turf Manager.

MIDGET BOYS FASTPITCH

Canadian Title Will Be On The Line

PLANS ARE starting to take shape for the 1999 Canadian midget boys fastpitch championships to be held August 8-15 at the Blockline Sports Complex in Kitchener, Ontario.

The championship brings together 16 of the top teams from across the country including a host team. Kitchener Fastball Promotions was instrumental in landing the event through Softball Canada.

One of the concerns the organizing committee had was the status of Blockline Park. While still in its infancy, the park lacks a major building for food and beverage service and washrooms.

Original plans called for the building to be constructed in 2000, but a recent meeting of city council advanced that to next year.

A creek separates Blockline from an area which can be used to park 200 cars. Work on a bridge over the creek is expected to start shortly.

Blockline has four diamonds, three of which are in a cluster. City officials are busy putting the final touches on the building plans. It will be a tiered structure, which will afford fans the opportunity to watch games on three diamonds. ♦

— The Record, December 1998

SPORTS STA TURF ASSOCIATION