EDITORIAL

The first Annual Turfgrass Symposium was an outstanding success. The facilities were good, many people moved through the exhibit area and suppliers and distributors were well pleased with the numbers. Lastly - an excellent group of speakers.

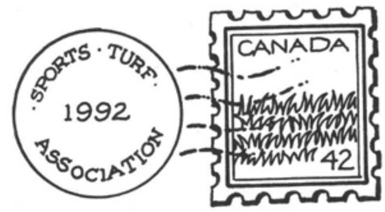
Some of these speakers came from quite a distance and I for one would like to see less speakers, talk longer. In 30 minutes you do not get to say very much about sportsfield construction, drainage etc. Another idea worth looking at might be an all day work shop on construction of sports fields from the idea through to looking after the maintenance.

It is nice to see that the Sports Turf Managers Association in the USA is back on track again with chapters being a large part of that organization.

It would be useful for you the member to write and let us know what you think about chapters east\west of Ontario to better serve the needs of the area. The idea of perhaps meeting a few times a year and having a field day convenient to all. We have quite a few members in the west and several in the east. Write and give us your ideas and together we will make it work.

- Michael Bladon

WE GET LETTERS



Mike Bladon
Grounds Department
University of Guelph

Dear Mike:
Good to have a visit at the recent University of Guelph Turfgrass Symposium. You all sure put on quite a show! Trade show was excellent and sessions covered so many key topics that I simply couldn't get to all the places I wanted to. I had intended to sit in on your Sports Turf sessions and especially the annual meeting. Never got there! Part of the problem was spending too much time talking to folks wherever I was. There seemed to be a lot of interest in the topics I was assigned. Anyway, it was great to be with you and I look forward to keeping in touch.

Sincerely,
Eliot C. Roberts
Executive Director
The Lawn Institute
County Line Road, P.O. Box 108
Pleasant Hill, Tennessee

February 20, 1992.
Sports Turf Association,
82 Rodney Blvd.,
Guelph. On.
N1G 2H3

Dear Sir:
In reviewing my past collection of newsletters I noticed in a January, 1989, article submitted by Mr. Michael J. Bladon, "Trends in Sports Turf", that a natural fungus which kills dandelions was developed by Mr. Lee Burpee of the University of Guelph.
To my knowledge no following articles have been either published in this newsletter or other "trade"' magazines. Consequently, I would ask for an update on this research if such is available.

Thank you,
Arthur N. Solvason
Community Services,
Parks & Recreation,
City of Regina.

Dear Art:
In response to your request for further information on the work that Dr. Lee Burpee was doing on fungal control of dandelions, I have to report that Dr. Burpee has left the University of Guelph to return to his native land at the University of Georgia. As a result the work in this area has diminished.
Prior to leaving Lee had done selections of fungi to find a superior strain. Making the selections, however, is just the beginning of the work to develop a biological control system. Work on the multiplication of the fungus, procedures for mass production with a suitable carrier and efficacy in the field have to be developed and measured. Then, as is the case with all chemical materials for weed control, the final product must be approved by the federal and provincial agencies. It must be proven that spreading the fungus will only kill dandelions and create no harmful conditions for other living organisms.
These are expensive and time consuming operations, so don't expect to see a product on the market for another 5 to 10 years. The time factor will depend on whether Dr. Burpee and others can convince a commercial company to invest the dollars required for testing and licensing. They, of course, must be able to project a 'good' return on their dollars. The processes in biotechnology are no faster or cheaper than chemo-technology. Thank you for your interest in this research.

R. W. Sheard, P.Ag.
Executive Secretary

PRESIDENT'S MESSAGE

1992 has already started with a good omen.

The successful start was the Turf Grass Symposium at the University of Guelph on January 7, 8 and 9. It was well supported by all the members of the participating associations. The seminars of the Sports Turf Association had the highest participation throughout the two days. It showed how everyone is in need of new information to make their work place more effective and efficient. It is especially important in the times of economic restraint to share information, establish goals and objectives and to work smarter instead of harder.

A new executive was elected in January. All directors are looking forward to serving you the members of our Association.

Many thanks go out to all past directors for their work and time spent to help the organization grow. A lot of work is still ahead of us. The goals of the new directors are:

1. To enlarge the newsletter, bring more information out to you.
2. Recruit new members, not only in Ontario, but throughout Canada.
3. Have a second field day in eastern Ontario - somewhere near Kempville.
4. Be more easily accessible through our Executive Secretary, Bob Sheard, who already does a fabulous job.

However, the directors need help in bringing these goals into reality. If everyone helps in his or her own capacity, we will continue to have an exciting year.

The annual field day is planned for June 17, 1992 and will be hosted by Western University in London, Ontario. The program is completed with Dr. Eggens as key speaker. We hope to see all of you there.

Even in the economic restaint we are facing, we should look to a brighter and more exciting future because only we can change the future, so let's work together.

-Peter Kleschnitzki

Turfgrass Trivia

Can grass help cool the environment? Just ask the residents of Palm Springs, California.

While surrounding areas are experiencing rising temperatures, the average temperatures in Palm Springs have dropped two to three degrees over the last 15 years. Arizona State's Laboratory of Climatology Director Robert Balling says the temperature reversal coincides with a surge of golf course construction!

Solar energy, which otherwise would have been absorbed by concrete, asphalt and houses, is used by the golf courses grass plants and they in turn set a cooling trend into motion. □

ATHLETIC TURF

Rebuilding and resodding

Vicnor Farms of Connoquenessing, Pa. uses an innovative method of installing athletic fields.

The company strips off existing vegetation, tills, and adds lime, fertilizer and soil amendments. Fields are graded and sodded with a bluegrass blend.

Vicnor says the soil amendments loosen tight soils, reducing future soil compaction. Another amendment reduces the frequency of irrigation. According to Vicnor, amending the existing soil rather than using a sand base reduces divots caused by athletic cleats. Fields are playable in four to six weeks.

Vicnor Farms, which will consult with schools in maintaining rebuilt fields, is located at Box 227, Connoquenessing, PA 16027. Its phone number is (412)789-7811. □

Brochure is offered

Dr. Bruce Augustin and **Art Wick** of Lesco, Inc. have authored a new brochure entitled "Athletic Field Turf Maintenance Handbook." The 12-page brochure gives specifications for a variety of athletic fields. To receive a copy, call the Sports Turf Managers Association at (702)739-8052 or Lesco at (800)825-3726.

TURFGRASS PESTICIDES:

Their positive role in our environment

Each spring, just as millions of Americans are looking forward to a return to their outdoor lives after spending the winter as virtual shut-ins, a whole host of voices rise up in a chorus proclaiming that turfgrass pesticides are dangerous to our health. They cite wide-ranging, yet impressive statistics on the amount of these chemicals used each year:

"Americans spent $6.4 billion last year on lawn-care products, up 13% from 1989".

-Time Magazine, June 3, 1991.

"With spring in full bloom, millions of Americans are applying millions of pounds of chemicals to their lawns to kill weeds and bugs and make the grass grow thicker and greener. An estimated 51 million homeowners do the work themselves. More than 8 million will hire professional lawn care companies to do the job. The sale of lawn care products and services has developed into a multi-billion-dollar business."

-Senator Joseph I. Lieberman, May 9, 1991.

While some non-scientific commentors would lead us to believe that all of this turfgrass pesticide is killing us, the truth is that the life-threatening potential of pesticides is no greater than food coloring and preservatives, prescription antibiotics and spray cans! Less than 10 people a year are killed by any of these causes!

Although even a single death is one tragedy too many, the hype and hysteria being whipped up about turfgrass pesticides by the medica, self-appointed watch-dog groups and even legislators grossly overstate and misrepresent the

facts. These chemical critics fail to report that since 1956, there has been a steady decline in the number of lethal pesticide-related accidents each year (from all causes, not just turfgrass chemicals). In 1956, there were 152 such deaths; however, by 1984, there were only 27 and the number continues to decline. In fact, far more children have died from accidental overdoses of aspirin than from pesticides, by a sizable margin. Bicycle accidents, by comparison, kill 100 times more people each year and swimming accidents kill nearly 400 times more people.

As the volume of pesticide used annually has expanded and the number of pesticide-related deaths has declined, the overall lifespan of Americans has increased. Just since 1920, before the wide-spread use of any pesticides, lifespans in the U.S. have increased from 54 to 75 years. While many factors in addition to pesticide use have contributed to this increase, it should be obvious that if increased pesticide use was highly fatal, both the number of directly related deaths and the overall lifespan would not have made such significant changes to the good.

Turfgrass is a way of life to most people. If we don't have a lawn of our own, we cherish even more the public parks and playgrounds with their large grassy areas that provide us a relaxing, enjoyable and refreshing part of our lives. The Lawn Institute estimates that there are some 25 to 30 million acres of turfgrass in the U.S. with over 20-million of those acres being home lawns.

In addition to providing people with an outdoor area to enjoy life, an aesthetic benefit, grasses also provide a vast array of functional environmental benefits, many of which are not immediately considered by the public. These include:

1. Water purification
2. Pollution absorption
3. Particulate entrapment
4. Oxygen generation
5. Temperature modification
6. Erosion control
7. Noise abatement
8. Glare reduction
9. Allergy control
10. Fire retardation
11. Groundwater replenishment
12. Safe play/sport areas

While people enjoy the mere presence of a lawn, turfgrasses are better able to provide their environmental benefits when they are made stronger through the proper use of chemicals. Without the use of pesticides lawns can quickly weaken, becoming thin and unable to perform their environmental role.

Fortunately, turfgrasses and pesticide usage can be very successfully combined, to achieve a highly functional environmental advantage, while naturally providing spaces of beauty and places to play and relax.

Practicing these common sense guidelines will help assure that everyone benefits from turfgrass pesticide use, and no one is harmed:

1. Accurately determine the "target" pest.

In lawns, fungi can create symptoms almost identical to damage caused by insects. Know what the real problem is before you treat an area and use only the proper chemical.

2. Know the size of the area to be treated.

Step-off or carefully measure large areas to know how many square-feet of space require treatment. This will help you calculate the amount of chemical to purchase, mix and use.

3. Carefully read all label directions.

The label will instruct you on the specific use of the chemical, including the proportions to use to control a particular pest. It will also provide cautionary advice regarding the chemical's use around non-target items such as other plants, animals and people. While the print is often-times very small and seemingly involved, its careful reading is worth the extra minute or two it may take.

4. Be familiar with the operation of your sprayer or other application device.

Test the unit with plain water to determine how much volume is used in normal applications. If you're treating a lawn with a hose-connected sprayer, fill the unit with water and by trial and error determine how fast you need to walk and wave the sprayer to apply the proper quantities.

5. Mix and use only the amount of chemical required to treat the smallest area needed.

Combining the knowledge you have of the size of the area to be treated, the amount of chemical required by the label and the capacity of your application unit, prepare only the minimum amounts of chemical. "More is better" does not apply to chemical use.

You should also consider whether a "spot treatment" will suffice to control the problem you've identified. Question whether you really need to apply chemicals to a large area when the problem itself is rather limited.

6. Thoroughly wash all items used in the chemical application procedure.

If you've used a sprayer, partially fill it with water and spray the area you just treated, or other nearby similar area. Repeat this two or three times. Do not just dump any extra chemicals into the sewer or onto the street. Although it may not be highly toxic, it could have a negative impact on the environment or a non-target.

7. Use common sense whenever you're using chemicals.

Window washing solutions and anti-freeze are more toxic than yard chemicals a homeowner will use, so all chemicals should be treated with care and respect. Eating or smoking should be totally avoided until you have thoroughly washed with soap and water. If any chemicals are sprayed or splashed on you during their use, remove the garments and wash them separately from other clothing. When using chemicals out-side, be sure that any toys (used by children or animals) are removed from the area to be treated so they won't be hit by the spray or drift.

8. Be a good neighbour by knowing special sensitivities of people, plants and pets.

Paracelsus, the Swiss physician and alchemist who lived during 1493-1541 noted, "What is there that is not a poison? Only the dose makes a substance not a poison." Chlorine can kill or it can clean. Aspirin can relieve pain or cause death. For a very, very few people, sunlight can cause an allergic reaction that results in death. It's not the substance, but the dose that can harm.

Turfgrass pesticides are effective because they have been developed for use against a specific target. Herbicides kill weeds, fungicides control diseases and insecticides eliminate insects. A herbicide will have no real effect on an insect simply because the chemicals used in herbicides aren't poisonous to bugs.

People, plants and pets may have particular sensitivities to any number of products, including pesticides. Being aware of these sensitivities when using turfgrass chemicals is being a good neighbor. This would include letting your ultra-sensitive neighbor know you'll be spraying a particular product on your property, avoid using herbicides around sensitive plants that could be stunted or killed by accident, or suggesting that your neighbor keep their pets off of your yard to avoid any potential problems.

In answer to those who criticize or question the use of pesticides on lawns, it should be noted that the environmental and aesthetic benefits of lawns are dramatically increased when the grasses are healthy and growing vigorously. While pseudo-scientists and scare mongers are able to sensationalize an issue through the manipulation of information, practicing scientists have shown that the benefits of turfgrasses can be substantially increased through the proper use of pesticides and fertilizers, without a significant risk to man or his environment.

Know what the real problem is before you treat an area, use only the proper chemical and only treat when the occurrence warrants its use (utilizing IPM practices). Also consider alternative pest control methods. □

Understanding Turf Management

The fourth in a series by
R.W. Sheard, PhD., P.Ag.

SOIL AIR AND WATER

In previous articles we have talked about soil porosity and the relation between water and air in the soil pores. As the soil dries, more and more of the soil porosity becomes filled with air, whereas when the soil is wetted by rain or irrigation the air is forced out of the pores as they refill with water.

SOIL AIR

During the process of wetting and drying there is an exchange of the air between the soil and the atmosphere. In addition there is a continued exchange of air due to a second process called diffusion; a much slower but continuous process. Furthermore the air may move in and out of the soil due to expansion from the heating of the soil during the day.

In an inactive soil without plants the concentration of gases in the soil is the same as that in the atmosphere we breath; 21.0% oxygen, 0.03% carbon dioxide, 78.9% nitrogen and the remainder a mixture of other gases. When grass roots grow in the soil or the microbial population is active, a process takes place within all living cells, called respiration. During respiration oxygen is consumed and carbon dioxide is produced. Without continued exchange of gasses between the soil pores and the atmosphere, a level of oxygen will be reached, generally less than 10%, where respiration will cease and the roots will die.

When a soil is close to saturation with water the time required for the soil to become depleted in oxygen is reduced to a few days. The soil is now know as 'anaerobic' (lacks oxygen) in contrast to an 'aerobic' (normal) soil. Thus good drainage is essential to maintain an 'aerobic' soil. Compaction, which tends to destroy macro pores, also results in low oxygen levels in the soil.

When the oxygen in the soil is depleted by respiration the carbon dioxide level is increased. When the carbon dioxide level approaches 3 to 5% it becomes toxic to the root system of grasses. To further intensify the harmful effects of low oxygen on grass roots in an anaerobic soil, microbes which do not require oxygen multiply and in their respiration process produce gasses such as ethylene which are toxic to plant growth at very low levels, levels measured in parts per million.

An additional adverse effect of decreasing oxygen supply in the soil is a change in the oxidation state or physical chemistry of the soil. Anaerobic soils develop what is called 'reducing' conditions which increases the iron and manganese concentration in the soil solution to a level which may be toxic to root development. Furthermore, nitrogen may be lost as a gas to the atmosphere by a process called denitrification.

SOIL WATER

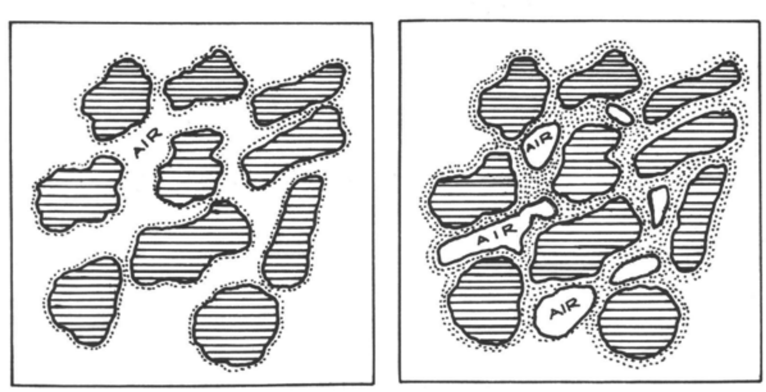
While excessive water in the soil may be harmful, an adequate supply of water in the soil pores is essential at all times for grass growth. There are three basic functions of the water in the soil;

(1) to replace the water lost through evapotranspiration from soil and leaf surfaces,

(2) to act as a solvent in which all plant nutrients must dissolve before they are absorbed by the grass roots, and

(3) to act as a moderator of soil and leaf temperatures. The moderating effect is because it takes at least five times more energy to raise the temperature of water one degree Celsius than soil or leaf tissue.

Figure 1: A schematic representation of soil water, air and particles. On the left is a dry soil at the permanent wilt point. On the right is a wet soil where air only remains as small pockets between the particles. Some of this water may drain out of the soil, drawing fresh air into the pores.



Water, even in the driest soil, exists as a layer over the surface of all soil particles. This layer increases in thickness as the soil becomes more moist. Eventually, as the water content increases further, the smallest pores become filled with water first, followed by larger and larger pores (Fig. 1).

Water is held in the soil by physical forces of adhesion and cohesion. These forces create a tension or 'pull' on the water so that energy is required to remove the water or counteract the tension. The thinner the layer of water on the soil particles the greater the energy that must be exerted to remove the water. Hence a point is reached where the grass root cannot exert enough energy to extract water and the plant wilts. Conversely, as the soil becomes more moist the energy the root needs to exert to obtain its water requirement decreases.

Soil scientists have developed a system of defining the energy required to remove the water from the soil. They have established reproducible laboratory procedures which relate the moisture content of the soil to the energy or tension by which the soil retains water. The procedure generates what is called a moisture retention curve (Fig. 2). These curves illustrate two things. First a sandy soil contains less water at any given energy level than a clay and secondly the amount of water held between two energy levels is less in the sand than in the clay. The difference between sands and clays is due to the finer particles in clay soils and the greater surface area associated with the finer particles.

Certain points on the curve are related to plant growth and realistic field conditions and are used to describe the moisture content of the soil. There are three points which are of significance in plant growth. They are the maximum water retention capacity, field capacity and the permanent wilt point.

The maximum water retention capacity is the moisture level at which all soil pores are filled with water. Essentially the soil is saturated and contains little air. Some of the water is held with so little energy that it will flow out of the soil due to the pull of gravity. It is often referred to as gravitational water or drainage water and will flow out of a well drained soil in 48 hours or less. This water is of only temporary value to the grass; in fact it may be argued it is harmful water as it is excluding air from the pores.

Field capacity is the moisture content of the soil when all downward movement of water

Figure 2: The relationship between the tension exerted on soil water by the soil particles and the moisture content of a sand and a clay soil.

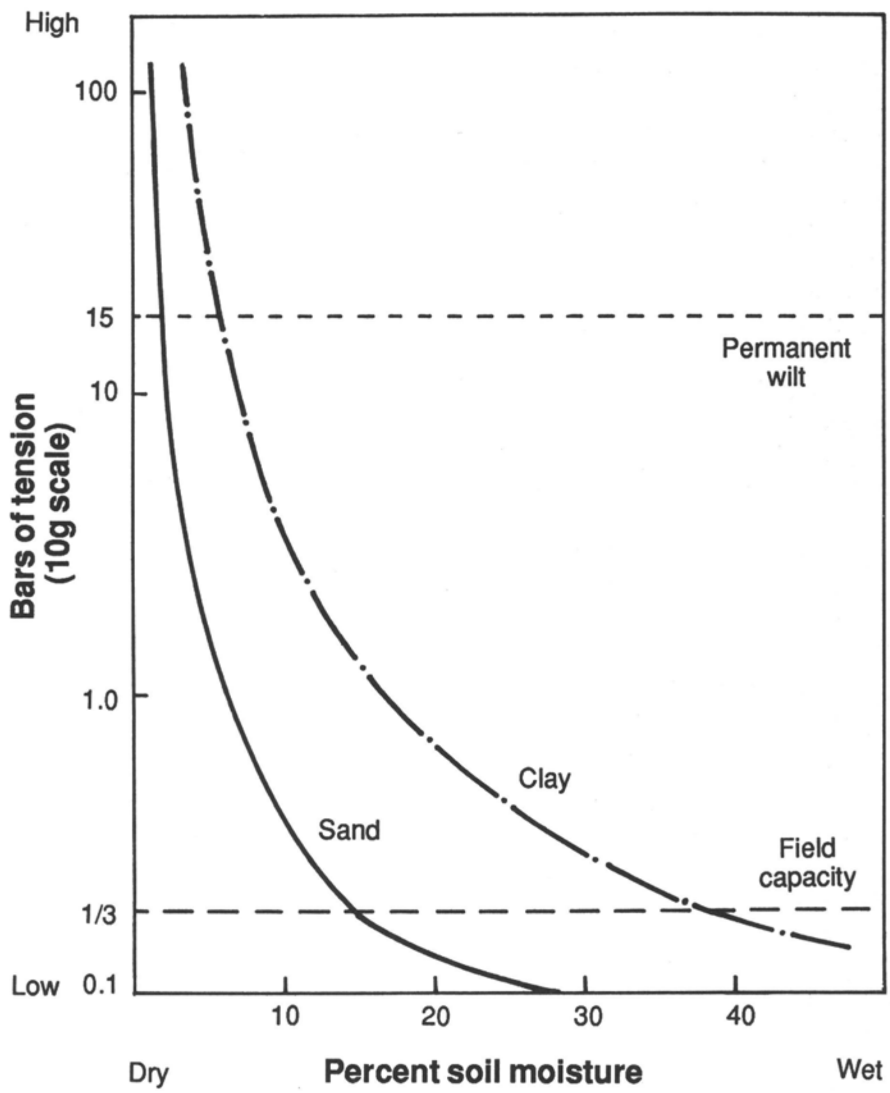


Table 1: Some values for the moisture content of soils of different textures, at three moisture constants and the amount of plant available water.

	Water content at the Moisture Constants of:			
Texture	**Retention Capacity**	**Field Capacity**	**Permanent Wilt**	**Plant Available**
		(% by Weight)		
Dune Sand	32.4	6.2	2.2	4.0
Loam	46.8	28.0	14.6	13.4
Silt	47.2	30.8	9.7	21.1
Clay	58.4	40.2	29.2	11.0

due to the pull of gravity has ceased. It is often called capillary water. At this moisture content only the micro pores are filled with water and the macro pores are filled with air. It is the ideal moisture content of the soil and the grass must exert a minimum amount of energy to absorb water. This moisture content will exist in a sports field during the first 24 hours after a rain or irrigation which thoroughly wets the top six inches. Evapotranspiration, however, causes the moisture content to continually decrease.

The permanent wilt point, as the name suggests, is the moisture content at which the grass permanently wilts and will not recover if the soil is rewetted. Actually this moisture level was initially established before modern techniques of soil physics, using sunflower seedlings which do not have the recuperative ability of turf grasses. At this point all but the very finest pores are filled with air. The grass can no longer exert sufficient energy to withdraw water from the soil; so it wilts.

These three special points on the moisture retention curve are called soil moisture constants because they are reproducible values which can be determined in the lab for any soil sample. Each soil sample, however, will have a its own specific curve so the value for the three constants will differ between samples. They are often referred to by other terms related to the energy required to extract the water. The common term in use today is bars of tension on the water. The higher the bar reading the drier the soil. Thus the maximum water retention capacity , having no tension, has a bar reading of zero. Field capacity has a bar reading of one/third and the permanent wilt point has a bar reading of fifteen.

The difference in moisture content between field capacity and the permanent wilt point is know as the plant available water. Water remaining in the soil at the permanent wilt point obviously is unavailable to the grass. Water in excess of field capacity is removed rapidly under good drainage so is of little value. As the soil becomes drier the energy required to extract water by the grass increases so it is a good practice to irrigate when the soil moisture is 1/3 or more of field capacity.

Generally it is desirable to have a soil with a high percentage of plant available water (Table 1). Sands always contain less plant available water than clays. It is interesting to note that silts contain more plant available or capillary water than loams although the water retained at field capacity is not greatly different. The spherical nature of silt particles, however, create a lower water content at 15 bar tension making the difference between the values for the two moisture constants greater. The combination of spherical shape and greater amount of easily held water contribute to the engineering problems with silt soils.

However, there are other factors which may require a sacrifice of some of the plant available water that a silt or clay will retain when choosing a soil for sports field construction. Among these is aeration. A sand will rapidly lose gravitational water and will seldom become anaerobic. □

BASEBALL DIAMOND CLINIC

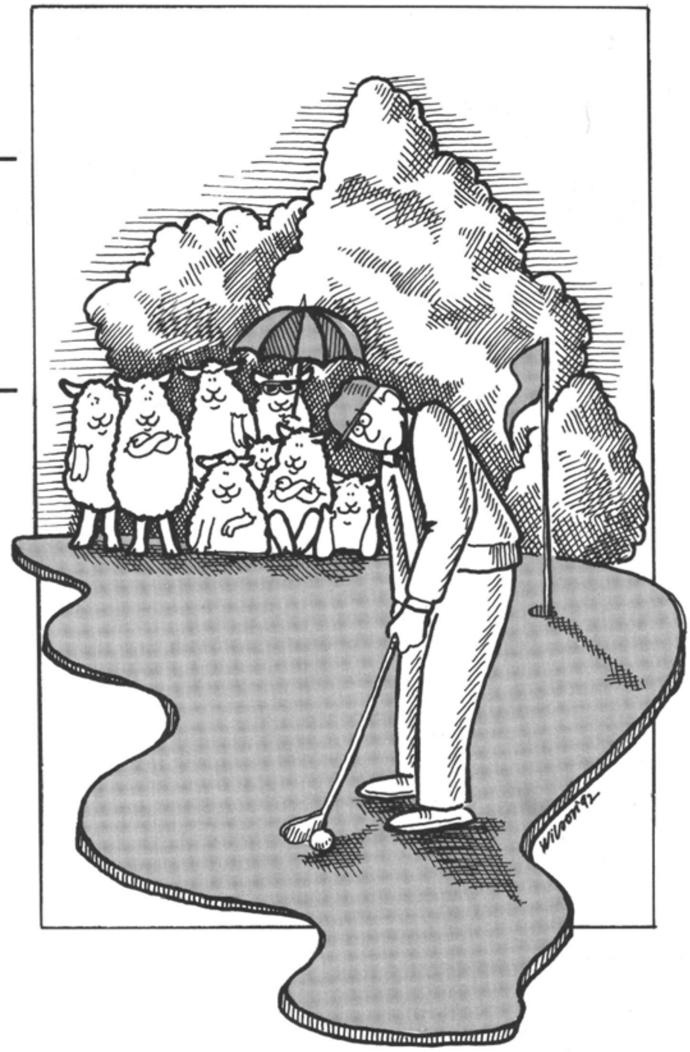
Chingacousy Park, Central Parkway and Queen Street, E., Brampton, will be the venue for a baseball diamond clinic on Wednesday, April 29th, from 10 a.m. to 3 p.m. The event is being sponsored by Plant Products Co. Ltd. The clinic will consist of a discussion of diamond maintenance and the installation of Turface on a baseball diamond under the supervision of Ed Miller, retired Yankee Stadium groundskeeper.
Lunch will be served at no charge, ensuring that all attendees will be as rich in nutrients as they will be in baseball diamond maintenance knowledge.

Please R.S.V.P. to:
Plant Products Co. Ltd.,
c/o Jean Foord,
314 Orenda Road,
Brampton, Ontario L6T 1G1.

[This announcement does not constitute endorsement of the products by the Sports Turf Association.]

The History
of
Mechanical Grazing:

THE LAWN MOWER



Early history of golf often cites the clipping of the greens by nature's grazer, the sheep. In fact, within the past 20 years the practice was observed by your Executive Secretary in New Zealand and Scotland. Obviously uniformity of cut, control of the mowers and cleanliness of the 'machines' leaves something to be desired. Why and where did our modern machines develop?

Edwin Budding, a foreman at a Gloucester, England textile mill, developed the reellawn mower in the 1820s; he intended to use it to cut nap off cotton cloth. By some accounts, workers resisted the labour-saving idea and Mr. Budding turned his attention to mowing lawns. In 1832, he advertised the mechanical mower as a 'dry' cutter (when scything, grass must be dampened to give it body) and said 'country gentlemen will find using my machine an amusing, useful and healthful exercise.' Judging by sales, they didn't.

The early mowers were large and heavy: Gardeners in the 1860s experimented with horse-drawn models to manicure lawns, but hoof marks and manure detracted from the desired effect. (As recently as 1907, a "Willing Worker" mower was being made that 'would take an elephant to shift' the Guardian said in its account of the world's first lawn mower museum, which opened last week in Southport, England).

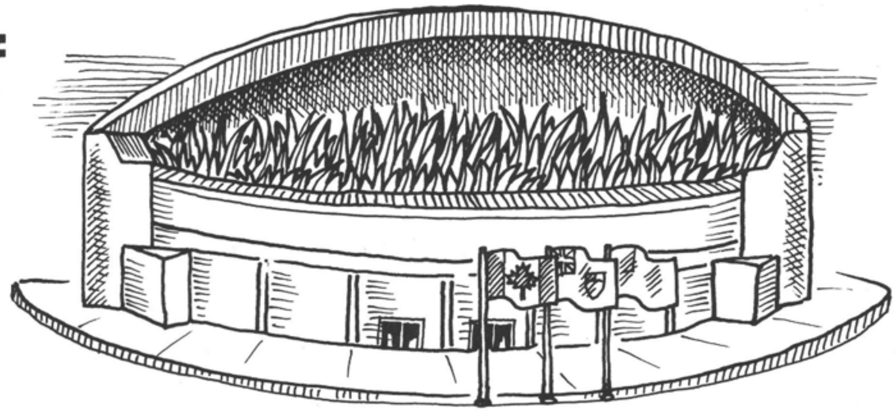
By the 1880s, the cost and weight of hand-pushed mowers dropped sufficiently that they became popular in Britain and North America. The manual machine beat out a rival technology, the steam-driven lawn mower.

In 1919, Edwin George, a U.S. Army colonel, took the motor from his wife's washing machine to produce the first gasoline-powered lawn mower. It helped create the middle-class vogue for manicured lawns.

In 1955, the British government decided against requiring driving licences for lawn mowers. In North America, people have been charged with operating mowers while impaired. In 1975, New York cops were using unmarked lawn mowers as roadside radar traps. □

(Gleaned from the Globe & Mail)

Research proves turf can grow in dome stadiums



Research funded by three U.S. dome stadiums showed that natural grass can grow well enough under a dome to support world-class soccer play. Two dome stadiums remain in the race for a chance to hold preliminary 1994 World Cup soccer matches.

Dr. James B. Beard, a turfgrass scientist at Texas A&M University, was a member of the three-man research team that tested the ability of turfgrass to grow in a dome stadium. According to international rules, World Cup soccer matches must be played on natural grass. In order to bid on a preliminary soccer match in the World Cup tournament, dome stadiums had to prove to the World Cup U.S.A. Committee that they could provide an acceptable natural grass surface.

"The bottom line was that we demonstrated it could be done and it was a very acceptable playing surface," Beard said.

The Houston Astrodome, the Louisiana Superdome and the Pontiac Silverdome jointly sponsored the research. Dr. C.H.M. Van Bavel, an environmental physicist and Professor Emeritus from Texas A&M University, and Arthur Milberger of Milberger Turf Farms were on the research team with Beard.

The researchers conducted the tests at the Louisiana Superdome in early July 1991, the same time of year the soccer matches would be held. They tested a variety of warm season and cool season turfgrass sods on several different rootzone systems. They also studied the lighting levels from the existing building lighting to substantial supplemental lighting of varying duration.

To best emulate the conditions the groundskeeper actually would be under, the researchers were allowed just six days to establish the field - two days for installation and four for grow-in. They then tried to maintain the surface for at least 22 days, the amount of time necessary to play two or three games at one stadium.

Beard said they tested the turf for quality, ball bounce, density, turf rooting, and stability. They also had world-class soccer players play on the field and evaluate it.

The specific results will be made available later, Beard said. However, he said both the test results and the soccer players gave certain grass and lighting combinations full approval. This opens the door for dome stadiums to consider natural grass events.

"It's one of the few tests that has been conducted in dome stadiums. It confirms to the sports world the feasibility of growing natural grass indoors. Modern turfgrass research has developed techniques and cultural systems that could usher in a new era of natural indoor sports turf maintenance," Beard said. □

REAL OR ARTIFICIAL?

KANSAS CITY, Mo. - Did you know that dirt tends to accumulate in artificial turf?

George Toma decided to sow some Ph.D. ryegrass into the mat and dust it lightly with sand. The pre-germinated seed sprouted within four days and is nourished with Bov-A-Mura organic fertilizer and Ferromec liquid iron. The real grass/turf mat can be playable within a couple weeks, after which a high pressure hose can be used to blast the grass out, says Toma. This novel grass-growing approach is one of several possibilities for returfing artificial surfaces to meet the World Cup Soccer standards.