SPORTS TURF *Newsletter*

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...for better, safer Sports Turf

COMING EVENTS

March 31, 1994
Integrated Pest Management for Parks
Venue: GTI Centre
Contact: Pam Charbonneau,
GTI
328 Victoria Road, S.,
Guelph, ON. N1H 6H8
519-824-4120 Ext. 2597

May 1 - May 6, 1994
39th Annual Staff Training & Management Program
University of Guelph
Contact: John Milton,
Ont. Recreation Facilities Assoc.,
1220 Sheppard Avenue E.,
North York, ON. M2K 2X1
1-800-661-6732

June 22, 1994
Sports Turf Assoc. Field Day,
Venue: Guelph Turfgrass Institute,
Contact: R.W. Sheard,
Sports Turf Association,
328 Victoria Road S., (RR#2)
Guelph, ON. N1H 6H8
519-763-9431

Whence Came Bentgrass

A story is told of how colonial bentgrass, which is not an indigenous species, arrived in North America.

In the fall dried bentgrass is curly and soft and excellent for stuffing mattresses. When the settlers in New England and Canada shook out their old bedding they planted colonial bentgrass. Colonial bent was quickly naturalized along the coast of Nova Scotia, Prince Edward Island and Rhode Island.

Some settlers from Nova Scotia emigrated to New Zealand. Soon after they changed the stuffing in their bedding, thus colonial bentgrass became a "native" around the bays and along the coasts of New Zealand where it became known as New Zealand browntop.

The urge to resettle brought colonists from Rhode Island across the Oregon trail, accompanied by colonial bent. One might say that the grass industry in Oregon got its start from a hitchhiker on the Oregon trail. The more likely source of the bents which have become "native" to Oregon are south German bents which were imported as seed and planted. Creeping bentgrass comprised only 15% of the south German seed, however, it was soon recognized as a superior amenity grass and selected out of the original south German bent.

[Abstracted from John H. Madison, *Practical Turfgrass Management*]

IN THIS ISSUE:

FOCUS ON SAFETY

FLOODLIGHTS & FENCING

A recent Ontario Hydro bulletin described the circumstances of an electrical contact fatality which occurred earlier this year. On May 23, 1993, a five year old female was electrocuted when she touched a snow fence in a sports park. The snow fence became energized when the light standard it was fastened to shorted out as a result of a faulty fixture and poor grounding of the conductor. The factors that contributed to the fatality included the fastening of the snow fence to the conduit on the pole, corrosion of a buried ground clamp, moisture in the floodlight, and a crack in the floodlight case.

Ontario Hydro recommends that municipalities check all pole-mounted floodlight installations in sports parks - particularly any installation where metal conduit or other electrically grounded metal rod is situated within 8 feet of the ground.

The following actions are recommended to reduce the probability of such an occurrence being repeated in your municipality.

1. Remove all conducting fences or other conducting non-electrical material attached to or conducting metal conduits on poles supporting floodlights.
2. Ensure that any metal within 8 feet of the ground and forming part of the electrical installation is properly grounded. Where grounding the conduit is accomplished by a local grounding rod, corroded grounding clamps should be replaced with ground clamps certified to meet the requirements of CIA Standard C22.2 NO.41. Special attention should be given to buried clamps. Replacement clamps must be certified for direct burial.

The maintenance of sports field lighting is usually the responsibility of the municipality and while the actual work may be done by the local utility, it should be noted that only the Electrical Inspection Department of Ontario Hydro is qualified and authorized to insect customer owned facilities and determine if a particular installation is safe and in compliance with the Electrical Safety Code of Ontario.

[Reprinted with permission from *Facility Forum*, Vol.4, Issue 3, Jan. 1994.]

FOCUS ON SAFETY

SAFETY RECOMMENDATIONS in the DESIGN of

ATHLETIC and SPORT FIELDS

by Arthur H. Mittelstaedt, Jr.
Past President
Recreational Safety Institute, Ronkonkoma, N.Y.

Athletic and sports fields are facilities which have undergone years of scrutiny and change. There can be no question that rules of the game, regulations for play, criteria for development and maintenance, and a host of other recommendations abound for such field areas. It is not the intent of the author to repeat what is known about design and ultimate construction and operation of such field areas, but to highlight those elements that affect the safety of the players and spectators. As a result of the wealth of knowledge compiled to date and our unending quest for further information, personal injuries are becoming less attributed to the care of the owner or operator and more to the recklessness of the players or spectators.

However, when an injury occurs, the victim looks to others to pinpoint the blame. That, plus an aggressive litigation environment and an array of books, criteria, handbooks, and other documents, plus numerous court decisions and theories of negligence, enables specialized experts to have their own "field day". A sympathetic jury makes the final decision, usually in favour of the injured party, which means that the owner/operator cannot afford to make mistakes. It is imperative that the owner/operator of any type of athletic or sports field recognize that he cannot designate an alternate for the responsibility but must face it squarely. He must ensure and assure that every reasonable effort is and has been made to reduce his exposure. Diligence, not negligence, is the byword.

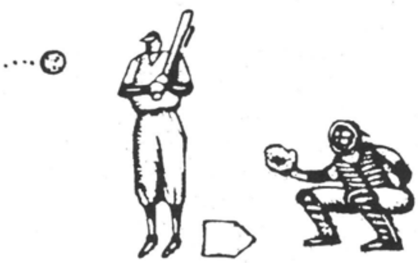
The focus of the operation of a field is predicated on its design and construction, an integral but yet separate responsibility, and subject to subsequent liability. There is no such thing as a sports field facility that is not designed. Any forethought given to the use of a piece of land, whether it is already flat or has been graded, is considered design. Although every state has licensed professional engineers and landscape architects who have licenses to practice the design of such fields and certify their correctness, very few fields are certifiable. Only 2% of the sports fields now in existence have been designed with the advice of such professionals. Most have been designed by the owner's bulldozer operator, landscape contractor, athletic administrator, athletic trainer, manufacturer, turf grower, grounds keeper, or other such person. When an accident happens, the "discovery process" ultimately proves negligence, because nobody was charged with the responsibility, or assumed the responsibility, for the care of the fields. Those lay persons usually involved in the design were probably not aware of the state of the art in sports field design and construction. Thus, an accident happens, and, ultimately, a judgement or settlement results in favour of the injured party

What can be considered exposure today as it relates to athletic field liability? Virtually every aspect of sports field development and management is vulnerable.

This paper addresses concerns related to the design and subsequent construction of athletic and sports field facilities. In order to put into perspective the guidelines as set forth, it is critical that a difference be made between those fields used by amateurs for play and those used by professionals for play. These guidelines address fields used for amateur play, although there is no distinguishing difference between spectators of both amateur and professional play; thus, the guidelines cover safety for spectators of both amateur and professional teams. It must also be noted that if such guidelines are appropriate for professional play, the U.S. Occupational Safety and Health Administration would be responsible for advancing these safety concerns.

Facility Hazards

The athletic and sports field for amateur play contains a multitude of hazards to the players. These guidelines will address different aspects of the field as it relates to ball fields, that is, softball and hardball and then to football-related sports, that is, soccer, field hockey, lacrosse, and others.



BALL FIELDS

Ball fields consist of the following components: infield, outfield, and sidelines: each will be addressed separately.

Infield

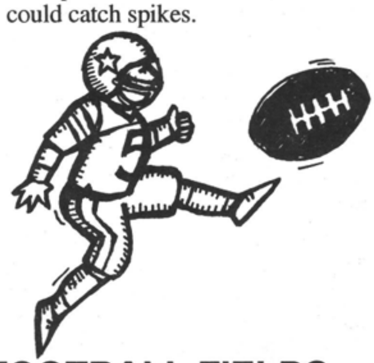
1. The surface, which may consist of clay and turf or synthetic material, must be free of large grains, pebbles, rocks, debris, and other foreign objects. (Although various opinions have been expressed regarding the resiliency of clay-turf or synthetic materials and its effect in preventing injury, other papers will address such studies.)
2. The surface must all be on a level or even grade, with no depressions, ruts, mounds, or other irregularities.
3. The pitchers mound must be a rubberized or resilient material with rounded edges.
4. The bases must be of a resilient or soft material, with a low profile or quick release capacity.
5. The baselines and batter's circle and the turf-clay edge must be straight and even, with no irregularities creating an unforseen tripping hazard.
6. The baseline and other marking material must not be toxic to the skin or by inhalation.

Outfield

1. See Infield 1.
2. The surface grade must be even and pitched in one direction, without any depressions, ridges, or other irregularities.
3. The outfield must have a fence of an even arc or radius that can be judged by a player in pursuit of a fly or ground ball, and a 4.6-m (15-ft)-wide warning track of clay or synthetic surface without irregularities.
4. The outfield fence must be at least 2.4 m (8 ft) in height to prevent an adult player, who is jumping up to catch a fly ball, from falling over the fence. Furthermore, no obstructive or protruding material,such as posts or pipe, may be on the inside of the fence.
5. The fence, if chain link material is used, must have the top and bottom of the mesh knuckled (with no barbed or protruding tops).
6. The fence, if made of plastic fabric with bendable vertical supports, must not have any protrusions.
7. The outfield fence must not have any solid wood or metal signs or plates fastened on the inside.
8. The outfield fence, if of a solid material, must have padding mounted on it.
9. The outfield must have no flagpoles, monuments, or other objects that provide impact resistance.
10. The outfield must not have any scoreboards, unless they are padded to provide impact resilience.
11. The outfield must not have any trees or landscape materials.
12. The outfield must not have any drain inlets or catch basins.
13. The outfield irrigation system must often be checked for any pop-up sprinklers that may have had ground settlement around them or that may be without caps.
14. The outfield must have no lighting standards, footings,or stanchions.
15. The outfield must have no drainage courses or structures and must not be shortened by such structures or by roads or jogging/walking paths.

Sidelines

1. The dugout or player's bench must have a protective fence or screen or have unbreakable plastic or glass in front of it.
2. The backstop must have an overhang of sufficient size to contain foul balls that would impact on other areas in use.
3. The backstop must be constructed of 25.4-mm (1-in.) mesh to prohibit climbing.
4. The backstop, where an overhang will not be effective, must have netting utilized to contain foul balls.
5. The backstop must be designed to accommodate the site's specific requirements for protection of spectators, users, and bystanders.
6. The sideline fence between the spectators and the playing field must be 2.4 m (8 ft) in height as specified by the Amateur Softball Association of America (ASA).
7. The sideline fence must extend from the backstop a minimum of 6.1 m (20 ft) beyond first and third base.
8. The outfield distance must be no shorter than that specified by the various organizational rules of the game.
9. The outfield fence, if removable for multipurpose play, must have sleeves at least 0.1 m (4 in.) below the top of the grade of the surface material.
10. The outfield turf or synthetic material must have no joints that could catch a shoe.
11. The outfield turf sod must have no burlap or other mesh materials that could catch spikes.



FOOTBALL FIELDS

Football and related field sports consist of the following components: the field, sidelines, end zone, and surrounding area. Each will be address separately.

The designing of a sports field also require consideration of a host of factors that can result in negligence if not considered.

Field

1. The field should not interfere with another facility, track, or jogging path.
2. The field should have no surface drain inlets, pop-up sprinkler heads, metal sleeves, or other obstructions unless these are rubber capped.
3. The field should be lined to the sports regulation size with a nontoxic paint or powder.

Sidelines

1. The sidelines should have no permanent markers or pylons which could cause tripping or falling and should be of a flexible material that cannot cause penetration.
2. The sidelines should have officials' tables no closer than 6.1 m (20 ft).
3. The sidelines should have players' benches no closer than 6.1 m (20 ft).
4. The sideline should have equipment, refreshment, and emergency equipment no closer than 9.1 m (30 ft).
5. The sideline positioning of officials, players, coaches, and related penalty zones or official space should be as per the rules of the game.

End Zone

1. The furthest game line of the end zone shall be no closer than 9.1 m (30 ft), or, if a closer dimension is required, a padded fence or wall shall be installed.
2. The end zone should have no lighting with fixtures directed to the field that could cause a blinding glare when played at night.
3. The end zone should have a high fence, hight net, or adequate warnings protecting the public from goals.

Surrounding Area

1. The area around the activity field should be controlled so that there is no interference from the traffic of pedestrians, buses, automobiles, service vehicles, or bikes.
2. The area around the activity field should be planned to give direct access to parking areas and should bisect or parallel play areas. Adequate fencing should be installed to separate the areas of use.
3. The area should have adequate pad and driveways providing a station for emergency vehicles and rapid ingress and egress.

General Site Hazards

The planning of a sports field requires consideration of a variety of factors that affect safety and that can result in negligence if not considered.

1. A field without fencing must not be located directly adjacent to a parking lot, park drive or road, which might cause play interference or injury.
2. A field must not have unguided or uncontrolled access to it without traffic crossing signs and markings or children playing signs.
3. A field must have access for emergency vehicles and must not be remote from emergency phones.
4. A field must have a potable water service and sanitary service.
5. A field must not be unfenced or contain natural hazards for spectators or players.
6. A field must not be near unprotected railroads or power lines.

The designing of a sports field also require consideration of a host of factors that can result in negligence if not considered.

1. A field must not be orientated so that untrained players can be momentarily blinded by the sun or lights when fly balls, line drives, wild throws or similar aspects of the game occur that can result in injury.
2. A field must not have obstacles along the sidelines, behind the plate, or in the outfield that can not be protected.
3. A field must have fencing in front of the players' benches and parts of the spectator outfield that are not protected.
4. A field must have fencing or a deterrent on top of the backstop or on top of the dugouts preventing youths from climbing them.
5. A field must not have exposed pop-up irrigation or other valves for sprinklers, exposed drainage inlets , or exposed manhole covers.
6. A field must not have exposed sharp corners or footings.
7. A field must not have steep slopes in the playing area, rutted outfields, depressed baselines, or holes in the outfield.
8. A field must not have puddles or collect water in the field or along the perimeters, which can cause mosquitos to breed and can create slippery conditions.

These are only a few of the problems that can arise in the planning and deigning/engineering stages of playing field development. It is in these stages that the input of the planner, designer/engineer, and operator, working together, can be used to avoid future problems resulting in claims for negligence. The plans and specifications, the change order or other documents, and supervision of the construction and installation are all areas in which the cause of concern can and must be addressed.

Video tapes on Turf Management

by the University of Guelph
& The Sports Turf Association

- Tape 1: Grass Selection
- Tape 2: Cultural Practices
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For further information regarding these and other tapes in horticulture and agriculture, contact:
Independent Study, University of Guelph, Guelph, Ontario N1G 2W1
(519) 767-5050, Ext. 3375
FAX (519) 824-9813

Grass clippings

Weeds are plants growing where they are not wanted. Unless chemical weed control is accompanied by a change in management programs, it will only result in replacing an easy to kill weed with a weed more difficult to control.

UNDERSTANDING TURF MANAGEMENT
The eleventh in a series by
R.W. Sheard, P. Ag.

TRACE ELEMENTS

Previous discussions in this series of articles have been about the **major elements** required for turf nutrition - nitrogen, phosphorus, and potassium. The concentrations of these elements in the turf tissue are measured in percentage points. Another group of elements essential for turf growth are the **trace elements**. These are elements whose concentrations in the plant tissue are measured in parts per million.

An often used synonymous term - **minor elements** - may result in the belief that these elements are of minor importance which is far from the truth. All of the trace elements are essential for enzyme systems in the grass, however, the amount required to make an enzyme functional is very small, hence the more acceptable term trace elements.

Since the amount required for a specific enzyme function is very small, providing an excessive amount of the same element can often be equally damaging because it may disrupt the function of another enzyme. Therefore great care must be exercise in the use of trace elements. They should never be applied without proper diagnosis, both visual and chemical, and the application rate should be carefully established. The saying "a little may do a lot; a little more may be disaster" is very important to remember in using trace elements.

Those trace elements required for turf production are molybdenum (Mo^-), copper (Cu^{++}), zinc (Zn^{++}), iron (Fe^{++}), manganese (Mn^{++}), and boron (B^-). More recent work has suggested that chloride (Cl^-), cobalt (Co^+) and sodium (Na^+) should be added to the list. From this group iron, manganese, copper and zinc are the elements most likely to be of concern in turf nutrition.

As most soils in Canada are of glacial origin and therefore have a very wide range of minerals contributing to their basic mineralogy, the possibility of a trace element deficiency occurring is rather remote. The vast majority of turf managers in Canada will never see any benefit from the use of trace elements.

Potential Problem Areas

There are situations where the probability of a deficiency must be recognized and taken into consideration if a growth problem occurs. These situations are:

- where there is an acid, sandy soil,
- on a muck soil,
- on an over-limed soil,
- on an excessively fertilized soil,
- where excessive irrigation has been used, and
- poor drainage.

Sandy soils, or more particularly sand based sports fields, are of particular concern due to the very low cation exchange capacity of sands and the low humus content of the root zone. Most of the trace elements are cations, hence are subject to retention and exchange between the exchange complex and the soil solution in the same manner as potassium. With a low exchange capacity loss through leaching becomes a real possibility.

The mineralogy of the sands may also influence the need for trace elements. High carbonate sands originated from materials deposited out of water. The deposition of the limestone rock from water provides a good distribution of all elements. Thus trace elements can be released during the weathering of the carbonate sand grains. Sands derived from igneous rock may be more limited in the distribution of trace elements in the sand grains. Furthermore the rate of weathering of the grains will be much slower.

In a previous article in this series the effect of pH on the solubility of nutrients required for plant growth was discussed. The solubility of most trace elements decreases as the pH rises. Hence one would expect trace elements such as iron, manganese, copper and zinc to become deficient where excessive limestone has been added to a soil or a alkaline sand has been used in construction of a sports field.

Although muck soils are seldom used for sports fields, soils which have been modified by adding excessive amounts of peat or sand rooting zone mixes containing 20% or more organic material may develop trace element problems. Copper deficiency is the condition most likely to occur.

While seldom a problem, excessive fertilization can contribute to trace element deficiencies. For example, excessive phosphorus and manganese have been shown to depress the uptake of iron by grass species.

Mismanagement of water, either through excessive irrigation or lack of drainage, may create conditions favourable to trace element deficiencies. Excessive irrigation contributes to the flow of water through the soil, washing out the elements required for plant growth. On the other hand, reducing conditions created by poor drainage may retard the uptake of iron.

Iron

In the group of trace elements the one most likely to show a deficiency is iron. Iron is essential for normal chlorophyll function and in a number of other enzyme functions. As expected, visual evidence of iron deficiency is a light green colour due to a loss of chlorophyll, particularly between the veins in the newly emerging leaf blade. This inter veinal chlorosis is the identifying characteristic which separates the visual symptoms of iron deficiency from nitrogen deficiency.

Normal bluegrass leaves will contain from 300 to 500 ppm iron on a dry weight basis. Iron is relatively immobile in plants, thus the deficiency symptoms will appear first on the newer leaves. The immobility of iron is aggravated by excessively high phosphorus and manganese in the tissue. Thus plants which, by chemical analysis, are considered adequate in iron, may in fact be deficient, because the iron does not move easily to new growth areas.

Iron deficiency is corrected by the foliar application of 6 kg/ha of ferrous sulphate (reduced iron or $FeSO_4.H_2O$) or a soil application of chelated iron. The material should be applied as soon as mixed if hard water is used because the iron is quickly oxidized and made unavailable to the grass.

A foliar application of ferrous sulphate can create a spectacular change in the colour of turf within a few hours. It can also illustrate the fact that an excessive application can be very detrimental because a doubling of the rate may result in blue-black turf in equally as short a time. Repeated iron applications, especially at high rates, have been known to decrease sod density and rhizome development, resulting in turf which has good colour, but thin.

Deficiency Symptoms

As previously mentioned, iron, manganese, copper and zinc are the most probable trace elements to become deficient in turf grasses. The first step in identifying a problem is the observation of a deficiency symptom. The following are some characteristics to look for:

Iron - chlorotic or light green colour between the veins of younger, actively growing leaves whereas nitrogen deficiency affects the entire leaf and appears first on the older leaves,

Manganese - chlorosis of younger leaves with yellow-green to dead spots on the older leaves and a withering of the leaf tip (Note: nitrogen deficiency can also cause the leaf to die from the tip)

Copper - the entire plant becomes stunted and yellow with abluish appearance to the tips of younger leaves.

Zinc - leaves are reduced in size and grouped together so that the grass has a stunted appearance; leaves may have a darken appearance.

It is evident from this discussion of deficiency symptoms that a clear cut visual diagnosis of a trace element deficiency is difficult. Therefore a suspected deficiency should always be confirmed by plant analysis.

The total concentration of iron in the grass leaf should exceed 50 ppm, manganese should be greater than 15 ppm, zinc greater than 10 ppm and copper greater than 3 ppm.

If the visual symptoms are verified by the chemical analysis the next corrective step is to spray a portion of the affected area with the sulphate form of the element at a rate of one or two kg of material/ha. If this corrects the problem then that trace element, and that trace element only, should be included in the fertilizer to be used on the field.

Fertilizer Materials

Trace element fertilizer materials may be obtained in two forms, as a sulphate salt or as a chelated element. The sulphate salts are all water soluble, therefore they may be applied as a foliar spray. Caution must be exercised, however, in the their use in foliar applications to avoid foliar burn.

Chelation is the formation of a stable organic complex with the trace element, resulting in a form of the element that is less prone to leaching, but may still be absorbed by the turfgrass roots. Chelated forms of trace elements, such as EDTA-Fe, are more expensive, do not give as rapid a response, but have a longer residual response in the soil than the water soluble sulphates. Other forms of chelated organic molecules are being developed to increase the availability of the trace element to grass plants under high pH conditions. Organic matter (humus) in the soil also has the ability to form natural chelates with trace elements, aiding in preventing leaching of the trace elements from the root zone.

CAUTION

In summary, do not use trace element containing fertilizers unless the appropriate evidence is available that they are needed. Even then use only the element shown to be deficient. Applying a shotgun mixture of several trace elements may create more problems than are solved because while one may be necessary, the others in the blast from the gun may disrupt the nutrition of the grass from another aspect.

LAWN BOWLING GREENS . . . Nothing but the best!

by
Gordon Witteveen

It seems lawn bowling belongs in the domain of the "golden agers". No matter how hard the sport tried to rejuvenate itself, all its efforts failed to attract youthful participants, middle aged yuppies or even early retirees.

Driving through the suburbs one catches occasional glimpses of people dressed in their mandatory whites, rolling bowls across finely manicured grass, or sitting under umbrellas sipping sloe gins and balancing teacups. They may look content but when it comes to their greens they want the best. Nothing else will do.

Lawn bowlers require a perfectly level, smooth and firm green. The ball must never bounce as it rolls across the surface. Irregularities in the turf are simply not acceptable. Thus, a bentgrass green must not have any patches of Poa annua, crabgrass or even broadleaf weeds. Differences in elevation must be eliminated by means of scalping the high areas and filling the low areas. The turf on a bowling green is close cropped and thatch is not allowed to develop.

Construction

Like modern golf greens, bowling greens are now constructed almost exclusively from a sand mix, placed on a bed of tiles and a layer of gravel. Tolerances in elevation on the actual green are less than a quarter of an inch. The top mix is frequently pure sand with only a little organic matter added. Bowling greens must be firm, almost hard and, therefore, the emphasis is on high sand content. A bowling green measures 120 feet square, but can be larger, which is desirable to spread the wear. The green is surrounded by a 10 inch wide ditch.

The all-important consideration in lawn bowling is the 'pace of the green', or its speed. On a bowling green, speed is expressed in seconds. The number of seconds for a bowl to roll 90 feet from its point of deliverance to where it comes to a rest is defined as its speed. A speed of 12 seconds is acceptable but for competitions bowlers require much faster greens. It requires greater skill and expertise to bowl on a fast green.

Soil compaction is a very common problem on the older bowling greens and aerification is the only means by which this can be corrected. After aerifying, the cores are removed and the green is topdressed with a heavy application of sand. The sand must be brushed into the holes until they are filled. A steel mat is dragged across the green to spread the sand, thus filling the holes and at the same time raising the low areas on the green. This process may have to be repeated two or three times during the growing season.

Since most of the compaction on a bowling green takes place at the outer rim, it is not always necessary to aerate the entire green. Only the first thirty feet along the outside of the green needs to be treated. Bowling greens that are built on straight sand without soil amendments require aerifying much less frequently or not at all.

. . . when it comes to their greens they want the best. Nothing else will do.

Lawn Bowling Greens
continued from page 7

On such greens the top layer needs to be punctured from time to time with a spiker or a mini-tyne aerator.

To prevent compaction the rinks must be changed frequently so that the play is spread over the entire green. Another important factor in the prevention of compaction is to make sure that most of the maintenance work is done by people rather than machines. Thus, the steel mat used to spread the sand topdressing should be pulled by hand. In fact, if at all possible, use of machines such as garden tractors should be avoided.

Mowing

The height of cut on the bowling green is all-important since it, more than any other factor, determines the speed of the green. Any height over five mm usually means slow bowling and most good bowling greens are cut at 3.5 mm or less. Lawn bowling greens keepers frequently have the bed knives filed off on their mowers to reduce the height of cut still further.

The direction of cut on a green is diagonal to the direction of play, and it is changed to the opposite diagonal with every cut.

Double cutting, to increase speed, is practised before important events. Since there are no undulations in the bowling surface, the grass may be cut with the wider Australian mower. This mower has a 30-inch cut and usually is operate electrically.

It is best to remove the dew with a whipping pole or a squeegee roller before cutting. Removing the dew is also important means of disease prevention.

It is very important to keep the mower sharp. Its height of cut as well as its ability to cut paper should be checked after every mowing. The mower should be lapped with grinding compound at least once a week.

Thatch Control

The development of thatch is anathema to the bowler. Thatch results in a slow, sluggish green and must be prevented or removed at all costs. The best method to prevent it is daily cutting at a very low height and regular topdressing.

Light topdressing with an acceptable sand every two weeks is an excellent method. After the topdressing is applied, a specially designed dragmat is used to work the sand into the turf. Again, the steel dragmat also serves as a means of levelling the green. Using a broom or dragging a piece of Astroturf across the green is not as efficient because both methods merely press the sand particles down instead of actually spreading them around.

If, in spite of frequent mowing and topdressing, thatch still develops, there is no recourse but to verticut the turf. Light verticutting can be done when the green is growing aggressively and when the turf is not under stress. After the green has been verticut it should be lightly topdressed. Never verticut or topdress a green that is under stress through lack of water or because of higher afternoon temperatures!

Irrigation

The perfection of automatic pop-up type sprinklers has made watering of bowling greens much easier. As on the golf course, many bowling greens suffer from too much water with all the accompanying side effects such as a soft, sluggish or thatchy turf infested with Poa annua.

Water should be applied only when the grass needs it and this is a matter of judgement often acquired only after many years' experience. The ability to recognize dying grass is an acquired skill learned on the job, not in the classroom. However, a tensiometer will help determine when more water should be applied. As a general rule, it is best to keep a bowling green on the dry side. It makes for a healthier green and more pleasurable bowling.

Disease and Pest Control

If a green is maintained properly and the turf is healthy, broadleafed weeds are rarely a problem. If a few dandelions or some plantain do invade, remove them with a knife rather than using a chemical. Small patches of chickweed can be removed manually using one of the Australian-made turf repair tools. For crabgrass, it is best to apply pre-emergent chemicals in the fall of the year.

The most common fungus diseases are sclerotinia dollar spot and Take-all patch in the summer and snow mold during the winter season. For the first two, wait until the first symptoms appear and then apply either a contact or a systemic fungicide at prescribed intervals. For snow mold control, a preventative spray is applied in late fall and again when a mid-winter thaw occurs.

Insects are rarely a problem, but cutworms may appear after aerifying since they like to nestle in the aerified holes. An application of Dursban will generally put an end to this pest, but it must not be watered in since cutworms feed on the surface.

It is an excellent practice to wipe the dew from the green in the morning. This helps dry off the grass, scatters any worm casts, makes the grass stand up, and facilitates a firsthand inspection of the entire green. If this is followed by a cutting, the green will then be in good condition to greet the first bowlers of the day.

Small blemishes on a green can be repaired by means of sod plugs taken with a hole cutter from a turf nursery. These plugs should be at least three inches deep so they won't dry out. They should be placed at the proper depth so that the mower will not scalp them. Nor should the plugs be allowed to settle below the surrounding surface, since the bowls will be deflected by the hollows.

Occasionally, a bowler will drop a bowl while delivering it. This results in a deep pock mark, which can be repaired by using a ball mark repair tool from the golf course and brushing some sand over the damaged area.

The objective in creating perfect bowling conditions is to have a very firm, almost hard green, cut at a low height so that it has fast pace. A green with these characteristics will tend to have a brownish hue rather than a rich green.

Bowlers are a discriminating in their wants as golfers and, for expert bowler, only the best and the fastest greens will satisfy. They are willing to travel far and wide to find the perfect green, even if it means going to Australia.

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PARK LIGHTS MAY BE HAZARDOUS

On August 9, 1993, the Ottawa-Carleton Health Department was informed about several cases of keratitas seen at a local emergency department. The patients had all attended night baseball games at a local outdoor park and suffered severely painful eyes a few hours after leaving the game. Keratitis is an inflammation of the cornea of the eye, characterized by symptoms of redness, inflammation, itchiness and light sensitivity that lasts for a few days. It can occur for a variety of reasons, a common one being exposure to ultraviolet light sources such as the light from a welding arc. The Health Department began its investigation of the event by informing the municipal works department that owned the park of the reports and inquiring into possible causes of the eye complaints. A variety of possible causes were explored before it was determined that a malfunctioning metal-halide lamp used to illuminate night ball games was the cause of the problem.

Background

There are two types of metal halide lamps commercially available: those that self-extinguish when their protective glass cover is damaged and those that do not. In the early 1980's Health and Welfare Canada recognized a problem with some types of mercury vapour and metal halide lamps used in sporting facilities (eg. arenas and gymnasiums). Over a period of two years, they received reports of eye and skin injuries to over 200 people exposed to these lights. The nature of the activities in recreational facilities make the lights particularly vulnerable to breakage. When the outer protective glass that shield the UV rays from affecting us is broken, burns to the skin and eye may result. Permanent eye damage may result in particularly serious cases.

In response to this health hazard, Health and Welfare Canada produced regulation governing the use and operation of these lights. The regulations are targeted at manufacturers, requiring them to indicate the type of bulb by marking the self-extinguishing kind with the letter 'T' and the non-self extinguishing kind with the letter 'R'. Lights marked with an 'R' should be used only in areas where people will not be exposed if the outer bulb is broken. Examples are street lights and parking areas where people do not remain for any length of time. Only bulbs marked with a "T", designed to extinguish automatically within 15 minutes when the outer glass envelope is broken, should be used in areas where fans and players are likely to be exposed.

Results

The light at the ball diamond was examined by municipal staff on the day the reports were received by the Health Department and the light removed for further examination. The bulb was not the self-extinguishing type. No further incidents of keratitis resulted after the offending bulb was removed. In total, twelve cases were reported to the Health Department, all women who had been watching night ball games on four different evenings and were seated on the observation bleachers behind the first base line. None of the people affected wore glasses to the game. At least one spectator sitting in the same area wearing glasses was not affected by the light. Children in the stands and the ball players on the field were not affected, likely due to the fact they were in continuous motion, and did not remain stationary in front of the broken lamp. Eye problems cleared up within a week in most cases.

In order to prevent a reoccurrence of such an event in the area, the Health Department has written to local municipalities informing them of the incident an the regulations governing the use of the two types of metal halide bulbs.

RECOMMENDATIONS

Managers of recreation facilities should be aware of the potential health hazard of metal halide lamps in their facilities. The warning requirement that follows is required by law to be included on the packaging of the non-extinguishing type bulbs. This caution should be reviewed and a decision made as to whether the shielding over lamps is adequate to permit the use of these bulbs or if a better shielding or self-extinguishing bulbs should be alternatively used in all areas where metal halide bulbs are used.

WARNING

"This lamp can cause serious skin burn and eye inflammation from short wave ultraviolet radiation if the outer envelope of the lamp is broken or punctured. Do not use where people will remain for more then a few minutes unless adequate shielding or other safety recautions are used. Lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available".

GTI RESEARCH HILITES

INTEGRATED PEST MANAGEMENT

The reduction in the requirement for pesticides may be achieved by promoting the factors in turf management which exploit the maximum competitiveness of the grass with the weed invaders. This process has been called Integrated Pest Management (IPM), which in reality is integrated turf management.

As a part of the program of GTI on IPM an experiment was seeded at the Ridgetown College of Agricultural Technology under the direction of Dr. Ron Pitblado and Mr. E. Hoste of Ridgetown, with assistance by Prof. Chris Hall and Mr. Norm McCollum of the GTI.

The objective of the experiment was to investigate the choice of species, cultivar and fertility program on the weed populations in turf.

The experiment was seeded on Sept. 12, 1991, at Ridgetown on a well-drained gravelly loam soil. The fall was extremely dry with no appreciable rainfall for three weeks after seeding. Six turfgrass cultivars of four turf types, Kentucky bluegrass, turf type tall fescue, fine leaf fescue, perennial ryegrass and three commercially available home lawn mixes, were seeded.

Prior to seeding 5-20-20 fertilizer was incorporated in the plot area at a rate providing 0.7 lb N/1000 ft^2. An additional application of 1.0 lb N was applied four weeks after seeding using 25-4-10 SCU. The fertilizer program for 1992 was O.5 lb N as 25-4-10 SCU in April, followed by 1.0 lb N at the end of May, August and in November.

Assessment of the weed population on August 18, 1992, was taken by identifying and counting the number of weeds in five, 8-in by 8-in squares randomly chosen within a larger 32 square string overlay. A visual assessment of the ground coverage was made using a rating of 0 to 10 where 10 was 100% ground cover.

Due to the dry conditions in the fall of 1991 creating slow emergence and relatively poor establishment, weed invasion into the plot area was high. However, favourable weather conditions for turf prevailed throughout the summer of 1992 resulting in the almost compete exclusion of weeds within the perennial ryegrass cultivars (Table 1). Many of the fine leaf fescues were also able to eliminate or reduce weed colonization, especially when the plots were fertilized. Weed pressures were much higher in the tall fescue and Kentucky bluegrass plots.

Both the tall fescues and the Kentucky bluegrass cultivars grew more slowly than the fine leaf fescues and perennial ryegrass allowing 'room' for weed activity. The tall fescues were a much more robust plant but there were many 'holes' or bare spots that did not fill in leaving room for the competitor weeds. Kentucky bluegrass was very slow growing and initially could not keep up with the more rapid growing

Table 1: Suppression of weeds and ground coverage by turfgrass cultivars and fertilizer applications.

		Weed Count**		Coverage Rating	
Type*	Cultivar	No. Fert.	Fert.	11-12-1991	10-17-1992
		(number***)		(rating: 0 to 10#)	
KB	America	4.5	3.0	6.0	7.5
KB	Touchdown	4.5	6.5	5.5	7.5
KB	Sydsport	7.0	1.0	4.0	7.5
KB	Gnome	6.5	6.5	5.3	7.5
KB	Barzan	7.0	5.0	3.0	7.5
KB	Geronimo	3.5	1.5	5.5	7.5
TF	Shortstop	4.5	1.0	7.0	7.5
TF	Mini Mustang	10.0	12.0	6.8	7.5
TF	Bonsai Dwarf	3.0	1.5	6.8	7.5
TF	Pixie	9.5	10.0	6.8	7.5
TF	Jaguar	12.5	10.5	7.0	9.0
TF	Thunderbird	4.0	12.5	6.3	7.5
FLF	Victory	1.5	1.0	7.3	10.0
FLF	Jasper	3.0	3.0	6.0	9.5
FLF	Wilma	2.5	1.0	6.5	10.0
FLF	Shademaster	6.0	2.5	3.8	8.5
FLF	Koket	4.0	2.0	6.8	10.0
FLF	Franklin	4.0	0.0	5.3	9.0
PR	Fiesta II	0.0	0.0	8.9	10.0
PR	Dasher II	0.0	0.0	8.9	10.0
PR	Dimension	0.0	0.5	8.9	10.0
PR	Pinnacle	0.0	0.0	8.9	10.0
PR	Saturn	0.0	0.5	8.9	10.0
PR	Competitor	0.0	0.5	8.9	10.0
MIX	Pro Hardware	0.0	1.0	7.0	9.0
MIX	W.G. Thompson	3.5	0.5	7.0	9.0
MIX	Canadian Tire	3.0	1.0	7.0	9.0

* KB - Kentucky Bluegrass; TF - Tall Fescue; FLF - Fine Leaf Fescue; PR - Perennial Ryegrass; MIX - Mixtures.

** Measurements made Aug. 18, 1992.

*** Total number of weeds in five, 8 in. by 8 in. squares.

\# A visual rating of ground cover on a scale of 0 = no growth, 10 =full ground coverage (approximates percentage ground cover) weeds. Weeds such as dandelion and chickweed moved rapidly into the turf plots. Henbit and shepherd's purse were also present.

The fertilizer regime improved the competitiveness of only the fine fescues, thus reducing the number of weeds found in the fescue. It appears that additional fertilizer was required in the trial as the fertilizer effect, as illustrated by the colour of the turf, was less as the season progressed.

America was the fastest emerging Kentucky bluegrass while Sydsport, Barzan and Gnome were the slowest. In general tall fescues emerged earlier than the fine leaf fescues, however, the fine leaf fescues grew faster, knitting quicker over the ground. Jaguar emerged rapidly providing the best ground cover rating throughout the summer and fall. The fine leaf fescues became established second only to perennial ryegrasses. All the Chewings fescues - Koket, Victory and Wilma - produced a ground cover faster than the creeping red fescues - Jasper, Shademaster and Franklin. Perennial ryegrass emerged very quickly, providing a uniform turfgrass cover prior to any of the other grasses. There was no difference between the six perennial ryegrass cultivars.

Grass clippings

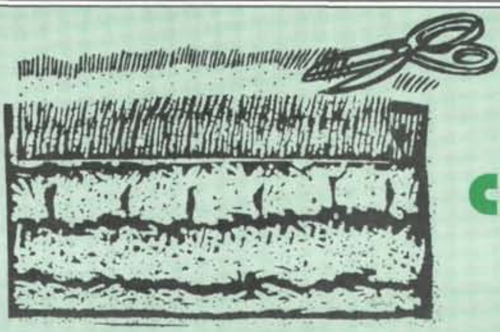
Mushrooms (commonly referred to as "toadstools") and puffballs are the fruiting structures of saprophytic, basidiomycetous fungi. Their appearance is indicative of decaying organic matter in the soil, especially buried tree stumps, dead roots, logs, boards, or thick thatch. They are most likely to develop following heavy rainfall or intensive irrigation.

NURSERY SOD BULLETIN

The Nursery Sod Growers Association of Ontario have recently published a small brochure called "Specifications, Classification & Use of Turfgrass Sod in Ontario". The Bulletin is available from

Nursery Sod Growers
Association of Ontario,
P.O. Box 235,
CARLISLE, ON.
L0R 1H0

In addition to the brochure you will receive a copy of the Association membership list which will aid you in contacting a supplier if you are in need of nursery sod.



Grass clippings

- Under good growing conditions a Kentucky bluegrass plant can produce 20 to 60 feet of rhizomes from an original shoot in the 5-month period from mid-June to mid November.

- All grasses are members of a single family of plants called the **Gramineae**. Within this family there are six subfamilies containing a total of 25 tribes, 600 genera, and 7500 species. However, only a few dozen of these species form plant communities tolerant of mowing and traffic, and therefore, adapted for use as turfgrass.

- The bluegrasses (Poa spp.) include over 200 species, however only four are important as turfgrasses. They are Kentucky bluegrass (Poa pratensis), Canada bluegrass (Poa compressa), rough bluegrass (Poa trivialis) and annual bluegrass (Poa annua).

- Mowing is not the simple act of removing excess growth as many imagine, but a process having far-reaching effects and therefore worthy of the most careful study and control.

- From the U.S. Agricultural Appropriations Act, 1901: The agricultural experiment stations are hereby authorized and directed to cooperate with the Secretary of Agriculture in establishing and maintaining experimental grass stations for determining the best native and foreign species for reclaiming overstocked ranges and pastures, for renovating worn out lands, for binding drifting sand dunes and washed lands and for **turfing lawns and pleasure grounds.** Total appropriation - $17,000.

- The world's first turf research station was established in England on the St. Ives estate at Bingley, Yorkshire, in 1929.

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