

SPORTS TURF MANAGER

... for better, safer Sports Turf

JUNE 1998

GTI HILITES Problems with Over-Irrigation

During the 1995 and 1996 seasons, Mr. Steve Thurtell, a graduate student studying with Dr. Claudia Wagner-Riddle in the Department of Land Resource Science conducted a study to determine the influence of water and fertilizer management on the quality of water draining from a turf grass site. In particular they were interested in the discharge of nitrate nitrogen in the water leaving the root zone.

Ministry of the Environment guidelines suggest that water leaving the root zone should not contain more than 10 ppm of nitrogen in the form of the nitrate ion. Unfortunately, all forms of nitrogen applied to the soil will eventually be converted to nitrate, which is completely soluble in water. Hence, water percolating through the root zone will carry the nitrate with it, if the nitrate is not absorbed by the turf root system. The objective of good turf management is to minimize the concentration of nitrate ions in the soil solution while at the same time maintaining optimum turf growth.

The research site at the GTI was a reconstructed site and is comparable to what might be found on a golf fairway or a football field constructed with original soil. In this case, the root zone was 30 cm of loam topsoil overlying a sand to gravel subgrade. The turf was primarily Kentucky bluegrass.

Fertilizer was applied as ammonium nitrate to provide zero nitrogen, 1.8 kg N/100 m² and 3.6 kg N/100 m² per year. Only two-thirds of the rate was applied in 1995 due to the late start of the experiment and the yearly rate was split into three equal applications.

Irrigation was applied at a rate to provide normal rainfall, normal rainfall plus 100% of the potential evapotranspiration (PET), and 150% of PET as irrigation. PET was calculated according to a modified-Penman, computerized model which calculated PET from hourly average air temperature, relative humidity, wind speed, incoming short wave radiation, and hourly total rainfall. Irrigation was applied each time 50% of the estimated available water was consumed. From the data it was possible to compute the amount of water which had been lost through drainage.

Soil solution samplers were installed in each plot to allow the removal, on a two to three day frequency, of small samples of soil water which were analyzed for nitrate-nitrogen content.

Table 1 summarizes the total amount of nitrate nitrogen leached during the study period as it relates to the amount of nitrogen applied and the amount of water which was applied as rainfall and irrigation. Where the water inputs were low and the rate of nitrogen application did not exceed the OMAFRA recommendations for average turf production, the amount of nitrate leached to the ground water was minimal. Both nitrogen at rates in excess of those recommended and irrigation beyond that required to satisfy the evaporative demand, resulted in high loss of nitrate to the ground water.

The environmental concern for nitrate leaching to the groundwater results from the fact there is no known mechanism for the breakdown of nitrate in groundwater once the water has passed below the zone of microbial conversion of nitrate to nitrogen gases. As a result, the concentra-

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tion of nitrate will continue to increase in the groundwater, unless there is a high volume of water flowing to the groundwater to provide the necessary dilution to below

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the 10 ppm safety limit. In this study, the concentration of nitrate nitrogen often exceeded 30 ppm, particularly at the double recommended nitrogen rate.

This study demonstrates once again that while nitrogen fertilization is a vital part of turf management, excessive rates are destructive to the environment, as well as to the budget. Irrigation is also a vital part of turf management; however, incorrect water management through over-application of irrigation multiplies the effect of excessive nitrogen fertilization on the environment and further destroys the budget. ♦

— Dr. R. Sheard

Table 1. Nitrate-nitrogen leaching during the study period of July 5 to August 23, 1995 and May 12 to September 22, 1996.

Nitrogen Input	Water Input (m)				
	0.166	0.217	0.415	0.586	0.826
	(kg nitrate-N/ha)				
0 kg N/100 m ² /yr	2.93	4.83	11.76	43.72	78.85
1.8 kg N/100 m ² /yr	5.27	9.03	17.76	40.90	65.04
3.6 kg N/100 m ² /yr	9.97	11.83	64.20	81.53	102.70

"Education must have an end in view, for it is not an end in itself."

— Sybil Marshall



News Briefs

Ontario Summer Games

From August 13-16, the Ontario Summer Games will showcase 2,550 of Ontario's rising-star athletes, ages 15-17 in 19 different sporting events. Many are expected to advance to the Canada Games in 1999 and the Olympics in 2002. The games will also involve some of Ontario's premier disabled athletes in track and field competitions. Between 10,000 and 20,000 spectators are expected at the events, producing an estimated \$2-million economic impact for the City of Guelph (*Guelph Tribune*, March 1998).

Editors note: Tim Mau, Games General Manager, will be speaking at our field day in August right after the games to give us an insight as to how they are run and some of the problems encountered.

University seeks new stadium

The University of Western Ontario is the first of two universities seeking to install artificial turf (see the March issue of *Sports Turf Manager* for the article on the

University of Guelph). They will work along with the Canada Games 2001 Committee to raise \$15 million, \$10 million of which will be for the stadium and the rest will go toward the cost of the games. The new stadium, with 12,500 seats, an eight-lane track, and artificial surface, will provide the citizens of London with a world class facility (Canadian Press).

Editors note: This will be the third university in Ontario to have artificial turf. Wilfred Laurier and Waterloo campuses combined to install this type of venue several years ago.

Chatham to host seniors games

Hundreds of seniors from southwestern Ontario will take part in the Ontario Summer Games regional competition to be held in Chatham in July 1999. Approximately 500 seniors will be present to vie for 15 sports which include carpet bowling, lawn bowling, golf, and other activities such as snooker, darts, cribbage, swimming, and bridge.

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