Sports Turf Manager

for better, safer sports turf

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Sand-Capped Fields

See pages 13-17 for an in-depth look at how to use drain tile installation and sand topdressing to develop a built-up sand-capped system over time. Michigan State U investigates this alternative to complete field renovation.

Irrigation & Overseeding of Pesticide-Free Soccer Fields

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A 2009 OTS Highlight Article. Soccer, also known as the "beautiful game," is the most popular sport in the world. It is estimated that 3.5 billion people worldwide either play or watch the sport. Almost 3 million people play soccer in Canada, making it the second most popular sport after ice hockey. Eighty four percent of these players are under the age of eighteen, with the number of soccer-playing kids growing every year. High quality, safe, natural playing surfaces are needed to keep up with the demands of this fast growing sport. With the introduction of Ontario's Cosmetic Pesticide Ban, high quality, weed-free fields will be even more of a challenge to maintain.

In 2008, the Guelph Turfgrass Institute (GTI) joined in the soccer craze by establishing two fields at the research station. Kids and adults from Guelph Soccer, the city's soccer association, enjoyed the fields on a daily basis while we conducted research. This article will outline how our soccer fields came into being, our partnership with Guelph Soccer, and the research we are conducting on these in-use fields.

Bringing Soccer to the GTI

Sports fields have always been part of the vision for the Guelph Turfgrass Institute. Our Long Term Site Plan, written in 1994, stresses that we are "capable of supporting a complex of sporting and park facilities for more active forms of recreation." In the winter of 2008, the idea resurfaced during a discussion of several turf industry professionals, spearheaded by David DeCorso, a local... ➟ page 7

IRRIGATION & OVERSEEDING OF PESTICIDE-FREE SOCCER FIELDS

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Continued From the Front Cover. ... golf course superintendent. They believed that it was time to bring some publicity to the Guelph Turfgrass Institute by including public use of the site, as well as providing in-use fields for research.

It seemed natural to then talk with Guelph Soccer, since they have been promoting and developing soccer in Guelph since the early 1960s. Guelph Soccer has close to 5,000 members and is growing rapidly; they were very happy at the prospect of having several more fields at their disposal. In the spring of 2008, aided by several members of Guelph Soccer, we found a suitable section of turf at the GTI and mapped out the area for our two "mini fields" (each about 37 m x 63 m). The turf was thin, weedy and had significant winter injury – a perfect scenario for our upcoming research.

The fields were used extensively by Guelph Soccer's "Under 10" rep teams and by their Centre of Excellence Player Development Program, starting in early May and running until early October. On weekends, adult recreation league teams and house league tournaments were commonly found at the GTI. The partnership with Guelph Soccer was excellent. Allan Gould, Executive Director, was easy to work with and always accommodating. The association and its members respected the station and the research plots and we could conduct research on in-use fields. It was a win-win situation.

Adding the Research Element

One focus of our research was to examine irrigation and water-use efficiency. Irrigating efficiently is essential in light of municipal watering restrictions and bans. As Dr. Bob Sheard once wrote, "Water is money. Use it wisely. Excessive use is damaging to the environment. Insufficient use is damaging to the grass."

In this experiment, we irrigated each field with a different protocol. One field was irrigated three times each week with 10 mm of water delivered at each irrigation. This "conventional" method simulated a field irrigated using an automatic timer set to turn on at regular intervals. Often turf managers will use this method to simplify their maintenance practices.

TABLE 1. ESTIMATORS FOR PAN EVAPORATION BASED ON OBSERVED WEATHER CONDITIONS (TAKEN AT 1:00 PM)

Sun	Temperature	Humidity*	Wind**	Estimated Pan ET (mm)
Full	>23° C	Low	High	8.0
			Low	7.5
Full		High	High	7.0
			Low	6.5
Full	<23° C	Low	High	6.5
			Low	6.0
Full		High	High	5.5
			Low	5.0
Cloudy	>23° C	Low	High	5.0
			Low	4.5
Cloudy		High	High	4.0
			Low	3.5
Cloudy	<23° C	Low	High	3.5
			Low	3.0
Cloudy		High	High	2.5
			Low	2.0

* Low humidity = clear sky, unlimited visibility; High humidity = smog, haze, fog
** Low wind = leaves and small branches moving; High wind = tree tops moving

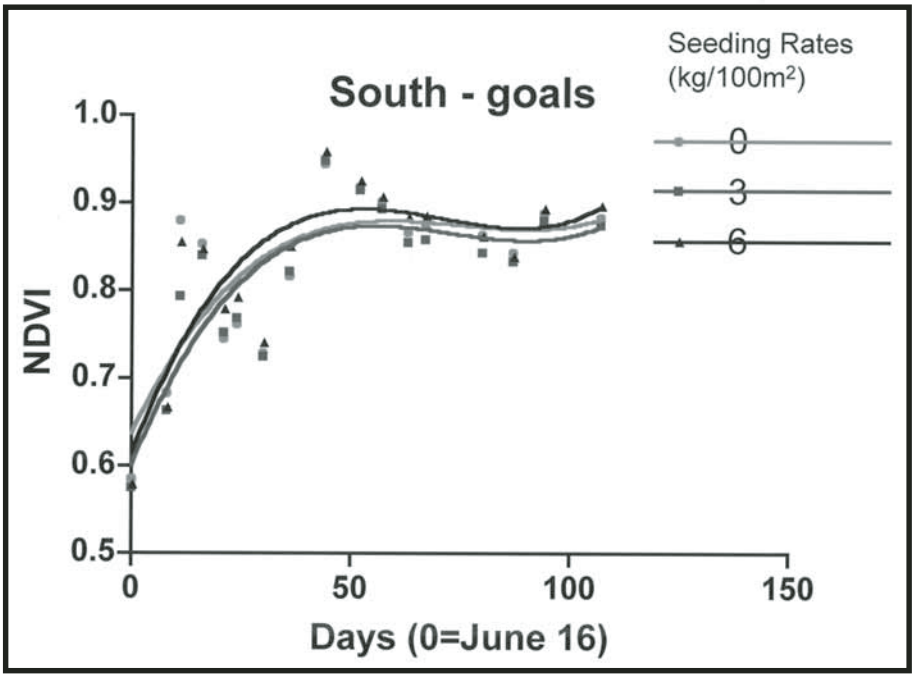

FIGURE 1. Greenseeker data for the south soccer field goal mouth area. NDVI stands for Normalized Difference Vegetation Index and is an indication of the quality and density of the turf stand.

The second field was irrigated according to a model developed by Terry Gillespie from the University of Guelph with modifications by Bob Sheard. This model is based on evapotranspiration (ET), which is the combination of water lost through transpiration from the leaf surface and lost through evaporation from the soil surface. Water is applied according to plant need and not on a set schedule. To estimate ET, daily weather readings are taken (Table 1) and the ET values entered into a water budget spreadsheet (Table 2). You can then determine when to irrigate and for how many minutes based on the estimated moisture capacity of the soil. It is generally accepted that watering should occur when 50% of the water available to the turf is lost through ET.

Unfortunately, 2008 was not an ideal year to conduct irrigation research. In fact, it was a year of record-breaking rainfall in most of Ontario.

Unfortunately, 2008 was not an ideal year to conduct irrigation research. As you may recall, last summer was very wet and rainy. In fact, it was a year of record breaking rainfall in most of Ontario. We did, however, get some data during a dry period in late June and early July (Table 2). In this 19 day period, we irrigated seven times and applied 70 mm of water when the schedule was predetermined and only twice with 40 mm of water using the evapotranspiration model. Despite using almost half the water when using the evapotranspiration model, there were no differences in turf density and quality between the two irrigation protocols. Even during this short period, there was considerable water savings using ET with no decline in turf quality.

As mentioned earlier, the turf on our fields was initially thin and sparse with extensive winter injury. Therefore it was only natural that a second research focus was to examine the effects of overseeding on turf density and quality. Overseeding is the practice of seeding a

TABLE 2. WATER BUDGET FROM THE GUELPH TURFGRASS INSTITUTE BETWEEN JUNE 23 & JULY 11, 2008

Date	Sun/ Cloud	Temp.	Humidity	Wind	Estimated ET	Rain (mm)	Irrigation (min)	Irrigation (mm)	Soil Moist. Capacity(%)	Conv. Irrig. (mm)
23/06/2008	cloudy	LT23	high	calm	2	53	-	-	100.0	10
24/06/2008	sun	LT23	high	calm	5	0	-	-	93.8	-
25/06/2008	sun	GT23	high	high	7	0	-	-	85.1	10
26/06/2008	cloudy	GT23	high	high	7	0	-	-	76.5	-
27/06/2008	cloudy	GT23	high	calm	7.5	3	-	-	72.9	Rain - 0
28/06/2008	sun	GT23	low	calm	7.5	0	-	-	63.6	-
29/06/2008	cloudy	GT23	high	high	7	17	-	-	87.3	-
30/06/2008	sun	GT23	low	calm	7.5	0	-	-	78.0	10
01/07/2008	sun	GT23	low	high	8	0	-	-	66.6	-
02/07/2008	sun	GT23	low	high	8	0	-	-	55.2	10
03/07/2008	cloudy	LT23	high	high	7.5	6	-	-	55.9	-
04/07/2008	sun	GT23	low	calm	7.5	0	120	20	80.9	10
05/07/2008	sun	GT23	low	calm	7.5	0	-	-	70.2	-
06/07/2008	sun	GT23	low	high	8	0	-	-	58.8	10
07/07/2008	cloudy	GT23	high	high	3.5	3	-	-	59.5	-
08/07/2008	sun	GT23	low	high	8	0	-	-	48.1	10
09/07/2008	sun	GT23	low	high	8	0	-	-	36.6	-
10/07/2008	sun	GT23	low	high	8	0	120	20	60.9	Rain - 0
11/07/2008	cloudy	GT23	high	calm	3.5	25	-	-	100.0	-
							TOTAL: 40			**TOTAL: 70**

desirable turf species into established turf to thicken the stand and fill in bare spots.

On each field, 12 plots were established (each 2 m x 14 m) located in the high traffic areas just outside the goal mouths and in the centre of the field. We applied three overseeding treatments on three dates (June 16, July 16 and September 11, 2008). The treatments were: 1) no overseeding; 2) overseeding at 3 kg/100 m^2 each date (for a seasonal total of 9 kg/100 m^2); and 3) overseeding at 6 kg/100 m^2 each date (for a seasonal total of 18 kg/100 m^2). We overseeded with perennial ryegrass (*Lolium perenne* L. 'Fiesta 3') using a drop spreader. Prior to overseeding, the fields were core aerated and the cores were drag-matted to break them apart.

Fields were fertilized with a seasonal total of 200 kg N/ha (Agromart 24-4-10) and mowed at a height of 5 cm, three times per week. Weed counts were taken regularly throughout the season. We also measured turfgrass density and quality using a device called the Greenseeker. This device detects reflection of light at a wavelength of 660 nm (where chlorophyll absorbs) and at 770 nm (a reference wavelength), to produce an index which is correlated with chlorophyll content, photosynthetic activity, canopy cover and other parameters of turf health.

The Greenseeker data (Figure 1) shows that turfgrass density and quality generally increased throughout the season. At times, the highest rate of overseeding tended to produce the best quality turf although the results were not consistent. It is likely that there was limited stress on the turf due to the wet season and therefore all the grass, regardless of treatment, grew well.

Of interest to all soccer players (and their parents!) is the hardness or softness of the playing surface. We measured field hardness using a device called a Clegg

Hammer. This simple yet effective device consists of a weight which is dropped down a vertical guide tube. The digital readout gives an indication of the hardness or softness of the field. There was little difference in Clegg Hammer readings between treatments and fields. Both fields were generally soft and spongy, mainly due to the rainy weather.

The results of our preliminary irrigation and overseeding research were less promising than we had hoped due the effects of the wet season, therefore we plan to continue studies on the soccer fields in 2009. This season we will modify the evapotranspiration model to reduce water usage even more. We will also add slit seeding at the three different seeding rates to determine which method is best at providing a thick turf stand all season long.

Above: Measuring surface hardness with a Clegg Hammer.

As this is being written, soccer nets and corner flags are being set in place and field boundary lines repainted. We look forward to another year of enthusiastic kids playing soccer at the Guelph Turfgrass Institute coupled with more exciting research. ♦