SPORTS TURF MANAGER

... for safe, natural sports turf

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ONTARIO TURFGRASS SYMPOSIUM, JANUARY 19-21

What's new for 2004?

Exciting New Location. Sheraton on the Falls is Niagara's foremost four diamond resort hotel located only minutes from most of the area's top attractions.

More Dedicated Trade Show Hours. In response to exhibitor feedback, we now have a full morning of trade show only – 8:00 am until 1:00 pm on Jan. 20th with no competition from educational sessions. An added bonus is the complimentary breakfast from 8:00 to 9:00 am.

Voluntary IPM Accreditation CECs. See inside on page 4 for details.

New Facility Management Program. A new session will feature presentations on hosting world class sporting and entertainment events.

Using Compost on Turfgrass

Pam Charbonneau

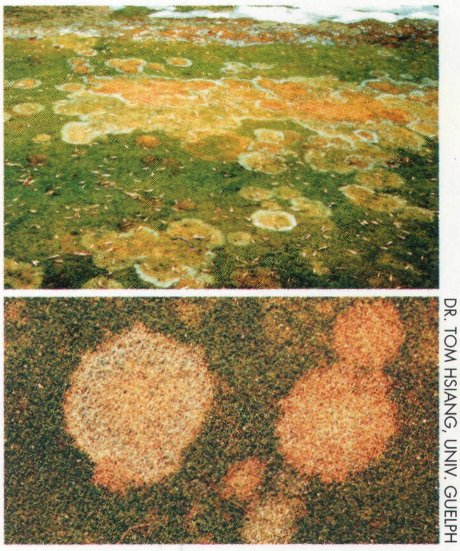
APPLICATIONS HAVE REDUCED PINK AND GREY SNOW MOULD

Snow mould diseases such as typhula blight (*Typhula ishikariensis, Typhula incarnata*) and fusarium patch (*Microdochium nivale*) are turfgrass diseases that can damage sports fields. Fungicides are not commonly used on sports fields because of the cost and general trend toward pesticide reduction in the municipal arena. An alternative to snow mould management is the development and use of organic amendments such as composts, organic fertilizers, and sewage sludges. The use of composts and other organic amendments for disease suppression represents an exciting alternative for sports fields.

To date, applications of compost to turfgrass have been shown to reduce thatch, provide a rapid spring green-up, increase turf density, provide nutrients, increase earthworm activity and enhance soil microbial activity.

Composts are known to suppress plant diseases through a combination of physiochemical and biological characteristics. Physiochemical characteristics include any physical or chemical aspects of composts which reduce disease severity by directly or indirectly affecting the pathogen or host capacity for growth. Some of these factors are nutrition of pathogen or host, soil organic matter, soil moisture, soil pH, turf colour, and fertilizer effects, to name a few.

Biological disease control could be a result of microbial populations of composts which are competing for nutrients with pathogens, producing antibiotics and enzymes. Microbes can also parasitize plant diseases or feed on them (see Table 1 on page 6 for a summary of microbial characteristics influencing disease suppression with composts).



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Top: A mix of grey and pink snow moulds on creeping bentgrass and Kentucky bluegrass (background). **Above:** Grey snow mould, with sclerotia, on the left. Pink snow mould (slightly smaller) on the right.

Compost is considered a beneficial material because the high... ➟ page 6

Using Compost on Turfgrass • *Cover Story Continued...*

APPLICATIONS HAVE REDUCED PINK AND GREY SNOW MOULD. RESULTS FROM THE GUELPH TURGRASS INSTITUTE

proportion of organic matter may prove beneficial in a high sand content rootzone by increasing soil microbial populations and providing cation exchange sites. High levels of microbial activity in composts have been postulated as the primary mechanism of disease control by a number of researchers.

Disease suppressive composts can be used as a replacement for peat or any other organic materials used in a regular sports field topdressing mixture which generally contains 80% sand and a 20% organic source such as peat or topsoil. Another way that they can be used, particularly for snow mould control, is a once per season application of compost alone just prior to snow fall.

Although the use of compost may not control turfgrass diseases to the degree that fungicides can, their integration into current disease management practices may result in a significant reduction in disease problems on sports fields. An additional benefit derived from using compost in a fall and/or winter application is the potential for increasing spring green-up, which in turn can speed recovery from snow mould disease and winter injury.

Studies at Guelph Turfgrass Institute

Field plots were established at the Guelph Turfgrass Institute, Guelph, ON, to evaluate the ability of composts to suppress grey and pink snow mould. Research was carried out at two locations, one on a creeping bentgrass green maintained in summer at 4 mm height (green height), and one on a creeping bentgrass range maintained in summer at a 25 mm height (fairway height).

Two composts (batches A and B) were applied on December 1, 1998 at two rates of application: 48.7 and 97.6 kg (dry weight)/100 m^2 (100 lb, and 200 lb/1000 ft^2) onto turfgrass.

To increase the level of disease, research plots (1 x 2m) were inoculated with the fungal pathogens responsible for pink and grey snow mould, *M. nivale* and *T. ishikariensis* respectively. Quintozene was applied on control plots according to the manufacturers' recommended rates (318 g/100 m^2).

To get a better understanding of the role nitrogen in compost has on snow mould and spring green up, a control of sulphur coated urea (25-0-0), applied at 33.3 g/m^2 (equivalent to the amount of nitrogen in the compost batches when applied at the 48.7 kg/100 m^2 (dry wt.) rate) was included. This was equivalent to the nitrogen content in compost A (1.83 N-2.00 P-0.96 K) which was higher than the nitrogen content of compost B (1.71 N-1.29 P-0.81 K).

Plots were rated visually once a week for *M. nivale* and *T. ishikariensis* on April 14 until May 4, for green-up (recovery from winter dormancy) and rated for disease severity on April 14 and 21.

Results

The two composts, along with the fungicide control, were similar in their ability to suppress snow mould diseases. In addition, fertilizer treatments generally had higher disease severity compared to compost treatments on the creeping bentgrass green and on the creeping bentgrass range. A single application of 97.4 kg/100m^2 gave the same level of control as the fungicide quintozene.

This study also determined the ability of fall compost applications to speed the green-up process of turfgrass in the spring. Although the two experiments were located in distinct areas of turf management, the assessments of green-up were similar.

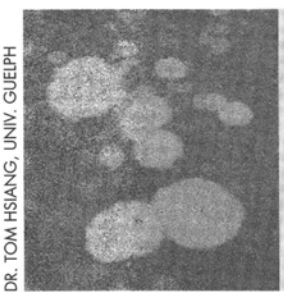
There were significant increases in green-up in compost treated plots compared to the fungicide control. These

Mechanism of Suppression	Description
Nutrient competition	Microbial activity out-competes pathogens for nutrients, preventing their growth and germination
Antibiosis	Organisms are inhibited by metabolites of micro-organisms; may be a survival or competition mechanism
Lytic and other extracellular enzymes	Enzymatic compounds are produced by a variety of microorganisms to decrease growth and survival of others; often done to decrease competition for nutrients, space and other factors
Parasitism and predation	Mycoparasites can reduce the concentration of inoculum of a pathogen by enhancing degradation of dormant propagules, interfering with their formation or inhibiting their germination
Host-mediated induction of resistance	Micro-organisms or other chemical or physical factors in organic amendments can promote plant growth or induce plants to produce certain enzymes related to defense mechanisms

Table 1: Microbial characteristics influencing disease suppression with composts.

improved differences in green-up among treatments diminished over the four week rating period, after which the controls approached or were the same as the compost treated plots.

One interesting result of this experimentation was that fertilizer treatments displayed a lower level of green-up when compared to compost treatments. Another interesting discovery was that the higher compost rate showed a significantly higher level of green-up compared to the lower application rate on the creeping bentgrass green, although this effect was not observed at the creeping bentgrass range location.



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One interesting result of this experiment was that fertilizer treatments displayed a lower level of green-up when compared to compost treatments. Furthermore, fall applications of compost were effective as a supressant to pink and grey snow moulds.

Discussion

In summary, field research was effective in identifying fall applications of compost as a suppressant to pink and grey snow moulds. In addition, turf that received compost applications displayed a more rapid rate of spring green-up than turf which was treated with fertilizer or fungicide.

The higher rate of compost (97.4 kg/100 m^2) generally had a greater ability to suppress disease compared to the lower rate (48.7 kg/100 m^2). This may have been a result of a combination of increased nutrient availability, increased antagonistic or competitive interactions among microorganism populations or their metabolites, or the darker colour density of the higher compost application rate may have increased ground heating and promoted more rapid recovery of turf.

Other than fertilizer effects, nitrogen is known to increase fungal and bacterial populations in turf and play a major role in microbial population dynamics (Liu *et al*. 1995). It is essential for the production of many compounds involved in host resistance including phenolics, phytoalexins, growth hormones, cellulose and carbohydrates. However, for composts with higher levels of nitrogen and other available nutrients, disease suppression may also have been a result of enhanced turfgrass nutrition allowing for more rapid recovery from disease (Craft and Nelson 1996).

The ability of selected composts to suppress disease in turfgrass has been reported. For example, an 80-90% reduction in disease was obtained with a late spring application of yard trimmings compost (Block 1997). Other researchers have reported that although compost did not prevent the occurrence of snow mould, it increased the recovery of grasses from the disease (Block 1997). It was postulated that the dark colour of the composted material increased radiant heat absorption, increased nutrient levels and stimulated growth (Block 1997).

Most research on snow moulds has focused on biological control of *Typhula* spp. with antagonistic microorganisms. However, physiochemical factors, including colour, fertilizer effects and other factors, are often implicated in control. Researchers have generally supported the proposal that microbial populations in compost provide nutrients and other chemical compounds to competing microorganisms and plant hosts through continual breakdown of composted material. There are also a number of examples where nutrient competition has been a factor in suppression of plant pathogens.

On the creeping bentgrass green, compost applications increased the rate of green-up and playability more quickly than fertilizer applications. As a result, nutrients are not postulated to have played a significant role in green-up. However, turf height and in-creased available water on the green surface may have encouraged

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Acknowledgements

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microbial activity compared to the fairway area, allowing for breakdown and release of nutrients and other antagonistic compounds.

Other than fertility, the darker colour of the compost may have had an impact on spring soil warming, increasing turfgrass growth rate or stimulating microorganism growth and activity. A heating effect may have stimulated earlier activity of mycorrhizae, thus increasing nutrient availability to turf. In addition, the heavy compost layer may have held more water than the lighter rate, increasing water availability to turf.

Compost is becoming a more established and accepted means of suppressing plant diseases.

On fairway height creeping bentgrass, fertilizer treatments were not significantly different from compost treatments in their ability to promote early spring green-up on most rating dates. In this case, the effect of compost on green-up may have been more of a nutrient effect. A heating effect may have been less of a factor as compost may have been more rapidly incorporated into thatch, falling deeper into the stand (25 mm), which may have shaded it from early spring sunlight. Compared to the green location, the fairway height was exposed to winds and also developed increased ice cover, which may have increased desiccation and lessened microbial competitive capabilities.

Summary

Compost is becoming a more established and accepted means of suppressing plant diseases, including pink and grey snow mould in turfgrass. With the added benefit of promoting early spring green-up, use of compost seems like a win-win situation for sports turf managers. ♦

Adapted by Pam Charbonneau, Turfgrass Specialist, Ontario Mininstry of Agriculture and Food, from an article written by Jeanine Boulter, Univ. of Guelph, Laboratory Services Division, for *Greenmaster Magazine*, Vol. 37, No. 2, April/02. Boulter is currently working as a microbiologist at the Univ. of Guelph.

Study Looks at Injuries with Artificial Turfgrass

TYPES AND CAUSES OF INJURIES IN CANADIAN FOOTBALL PLAYERS

NEW YORK (Reuters Health), June, 2003. A five-year study of Canadian university football players suggests that playing on an artificial surface rather than natural grass may increase a football player's risk of injury.

Artificial turf is often preferred over grass because of its durability and lower maintenance costs. Also, unlike grass, the surface does not vary according to environmental conditions, while grass can be wet or dry, hard or soft or even frozen depending on the weather.

In the current study, however, the risk of injury was as much as two times higher when the game was played or practiced on artificial turf rather than natural grass, study author Dr. Willem H. Meeuwisse and his colleagues report.

Future studies should take into consideration factors such as the players' shoe type and position, history of injury and the environmental temperature, according to Meeuwisse and his colleagues.

But the type of playing surface was not the only thing that contributed to the football player's risk of injury, the researchers report in the *American Journal of Epidemiology.*

Players injured in the past were more likely to experience an injury in the future. In fact, those with a prior neck injury were five times more likely to experience a subsequent injury, the report indicates.

In light of this finding, Meeuwisse, of the University of Calgary in Alberta, Canada, told Reuters Health that it is important that injuries be treated and players be fully rehabilitated to reduce their risk of future injury.

The players' injury risk also increased with every year of participation in the sport. Men who were approaching their fifth year of playing football, for example, were more likely to be injured than less experienced players. This was true even when the authors accounted for the players' history of injury, the report indicates.

The reason for the increased injury risk among veteran players is unknown.

The athletes, in general, were 10 times more likely to be injured during games than during practice.

Overall, the injury risk factors identified in the current study may not be generalizable to different age groups and play levels since the study participants represented "survivors" who did not experience any career-ending injuries, the researchers note.

The study was conducted from 1993 to 1997 among varsity men's football players in the Canada West Universities Athletic Association. ♦

— American Journal of Epidemiology 2003;157:825833 (reported by Charnica E. Huggins)