Topdressing with Crumb Rubber

Turfgrass management under high traffic conditions such as overused sports fields, walk-on/walk-off areas on golf courses, and pathways through lawns or botanical gardens, creates a unique challenge. For many years, researchers have been investigating the differences in turf species for the ability to tolerate high traffic, as well as designing high sand content root zones that resist compaction. Of course, the development of cultivation equipment has assisted with alleviating compaction problems. Yet, worn areas continue to develop.

Researchers at Michigan State University have reported using ground up synthetic rubber tires (crumb rubber) as a topdressing to minimize wear injury and reduce surface hardness. They evaluated two particle sizes of crumb rubber (large, 0.3" to 0.1" and small, 0.1" to 0.002") at five application rates to depths of 0.1", 0.2", 0.4", 0.7", at three application timings in July, September and October. To quantify the true contribution of the crumb rubber to reducing surface hardness, impact readings were taken with an instrument used in assessing road hardness (the Clegg Impact Soil Tester). The plots were mowed three times per week at 1.5" and fertilized to supply 5 lbs N per 1,000 sq ft.

Results indicated little to no significant difference in surface characteristics related to particle size, however the smaller particle size rubber applied at higher rates was able to reduce hardness and improve surface playing consistency as measured by ball bounce. In addition, the smaller particles migrated more effectively into the turf canopy thereby providing protection to the base of the grass plants (crown) and reducing the abrasive force of a foot contacting a soil particle and abrading the crown. This reduced abrasiveness resulted in increased turf cover under traffic.

Finally, while some rubber treatments did result in reduced growth in the summer months, as measured by clipping weights, soil temperatures were slightly warmer at the cooler fall dates (October). This warming could enhance growth and thereby improve wear tolerance in the "shoulder months" of March, April, October, and November. The authors concluded that the greater depths of topdressing with the smaller particles provide a more effective and immediate reduction in surface abrasion thereby improving the wear tolerance of the turf.

From: Rogers, J.N., J.T. Vanini, and J.R. Crum. 1998. Simulated Traffic on Turfgrass Topdressed with Crumb Rubber. Agronomy Journal 90:215-221.

Irrigation Management and Golf Turf Problems

As we progress through the heat of the summer months and the inevitable dry period arrives, questions arise as to the "best" method of irrigating turf. When is the best time to irrigate (timing)? How often to irrigate (frequency)? How much water should be applied each time (amount)? Does irrigation influence pest problems such as diseases and weeds?

"Golf courses are publicly criticized for using water during peak summer months, accounting for 2 to 5% of water used during peak demand times," say researchers at Kansas State University. Therefore, to improve our understanding of the importance of irrigation amounts and frequencies, they conducted a study on a perennial ryegrass fairway turf maintained at 0.5" with clippings returned, receiving 3 lbs. of N per 1,000 sq ft per year. The objectives of the study were 1) to evaluate water savings by monitoring evapotranspiration (ET) and irrigating to supply 80% of the amount lost to ET 3 days per week versus daily irrigation of 0.3", 2) compare preventative versus curative fungicide programs for disease management, and 3) evaluate the effects of two irrigation regimes on perennial ryegrass quality, weed and disease invasion, and pesticide requirements.

As one might have expected, the daily irrigated plots supplied over 200% more water than that recommended based on the 80% ET mea-

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Scanning the Journals

A review of current journal articles

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Scanning the Journals

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The study of low maintenance fescue species indicated that Flyer and Jamestown II could reduce the quality of some mixtures. Furthermore, the Rebel II monostand under either mowing schedule, and the Reliant and Bighorn monostands mowed monthly provided equal to or better quality than most mixtures.

surements. There was no difference between preventative and curative fungicide use in the first year, however, in the second year, the curative program resulted in 64% less active ingredient applied.

Surprisingly, daily, morning irrigation resulted in reduced incidence of brown patch by about 5% over both years of the study. In fact, the untreated (no fungicide applied) plots had 30% less brown patch when irrigated daily at 5 AM versus ET-based irrigation also supplied at 5 AM It is suggested that the daily, morning irrigation may alter the microclimate (dew and guttation fluid that contains a food source for the brown patch organism), and may reduce midday moisture stress that could increase disease susceptibility. *However, while brown patch incidence was reduced, there were twice as many dollar spot infection centers in the daily irrigated plots*. There was no observed difference in weed invasion (crabgrass or dandelion) attributed to irrigation regime. Therefore, while this study suggests a clear influence of irrigation management on pesticide use and disease incidence, the substantial increase in water use from daily irrigation could be prohibitive.

From: Jiang, H., J. Fry, and N. Tisserat. 1998. Assessing Irrigation Management and Its Effects on Disease and Weed Levels in Perennial Ryegrass. Crop Science 38: 440-445.

Low Maintenance Performance of Fescue Species

Over the last several years, there has been renewed interest in expanding areas on golf courses (as well as school grounds, parks and the occasional home lawn) dedicated to low maintenance or reduced mowing regimes. In fact, the Spring 1993 issue of *CUTT* had an article by Jim Wilmot evaluating the performance of low maintenance mixtures.

Dr. Pete Dernoeden and other researchers at the University of Maryland have been investigating the use of fescues for low maintenance areas (no supplemental irrigation or fertilizer) for several years. Their most recent work evaluated the performance of fescue species (Flyer creeping red fescue, Jamestown II chewings fescue, Bighorn blue sheep fescue, Reliant hard fescue, and Rebel II tall fescue) as monostands and in mixtures. When mixtures of fine fescue were used, previous data suggested that improved quality could be achieved with higher amounts of Reliant and Bighorn. In addition, two mowing regimes were evaluated: 1) mowing as needed to a height of 2.5" or 2) monthly mowing to 3.5". Traditional turf establishment procedures were followed using starter fertilizer and regular irrigation, however, following establishment no further fertilizer or irrigation was supplied.

In general, mowing as needed to 2.5" provided better spring quality, while the monthly mowing at 3.5" provided higher fall quality in two of the three years under study. The monthly mowing regime resulted in a 40% reduction in mowing frequency and had substantially less crabgrass invasion.

"The basic premise for mixing species is to provide genetic diversity that could help survive stress resulting from environmental factors or pests." However, this study indicated that Flyer and Jamestown II could reduce the quality of some mixtures. Furthermore, the Rebel II monostand under either mowing schedule, and the Reliant and Bighorn monostands mowed monthly provided equal to or better quality than most mixtures. Therefore, this study suggests the importance of evaluating cultivars and species for performance and the influence of mowing schedules on the quality of the low maintenance areas, especially from a weed management perspective.

From: Dernoeden, P.H., M.A. Fidanza, and J.M. Krouse. 1998. Low Maintenance Performance of Five Festuca Species in Monostands and Mixtures. Crop Science 38:434-439.

Mercury Fungicide Residues in Golf Turf Soils and Clippings

Modern golf turf management requires significantly more precision than our predecessors could have imagined to meet increasingly high quality and performance expectations of today's player. Paramount to developing this precision is the introduction of less persistent, more active, "reduced-risk" pesticides in the last decade. Prior to this trend, environmentally persistent materials such as mercury-based fungicides (mercuric chloride (Calo-clor) and phenyl mercuric acetate (PMAS)) were widely used for disease control, especially low temperature pathogens such as the snow molds. Regulatory agencies in the prairie provinces of Canada were interested in understanding the potential residues associated with mercury use. In fact, similar to US

restrictions, concern over mercury use led to national restriction in Canada in 1993, with sales allowed until December 1997, and use until December 2000.

An extensive survey was conducted on the greens of seven golf courses from various areas of Alberta with a varied history of mercury use. Clipping samples were obtained following mowing and soil samples taken from the greens, collars and surrounds. Interestingly, there was great concern that these levels would be highly leachable, thereby requiring the green to be considered hazardous waste should it ever be renovated and removed. This did not turn out to be the case, as mercury levels found in leachate were low.

However, soil samples revealed that chronic (7 to 40+ years) mercury use resulted in levels 1 to 50 times higher than the acceptable regulatory limit in Canada (6.6mg/kg). *In fact, on one course, two greens which had not received mercury in the last 15 years still had 5 times the regulatory limit for mercury (23 to 33 mg/kg) in the top 2" and over 6 times more at the 4" to 6" depth.* In general, the older the green, the longer the mercury use, the higher the levels of mercury found in the soil. This was not the case for clippings, where a green that received only 1 mercury application had the same (below regulatory limit) amount of mercury as the greens that received many years of applications.

The authors of the study suggest that while the soils and clippings are not hazardous waste, they still must handled and disposed of in a way that reduces the risk for contaminating other soils and water bodies. This study is likely to have a substantial impact on the golf turf industry over the next few years. This could include how reduced soil mercury levels may explain higher incidence of pests such as moss, and how we might deal with clippings and soils from contaminate greens.

From: Byrtus, G. 1998. An Assessment of Mercurial Fungicide Residues in Golf Course Soils and Clippings. 1997 Annual Report from the Prairie Turfgrass Research Center, Olds, Alberta.

On one course, two greens which had not received mercury in the last 15 years still had 5 times the regulatory limit for mercury (23 to 33 mg/kg) in the top 2" and over 6 times more at the 4" to 6" depth.

Plant Disease Diagnostic Clinic

The Plant Disease Diagnostic Clinic at Cornell provides golf courses with diagnostic services. The number of turfgrass samples processed through the clinic has increased steadily over the past few years. We believe the clinic can provide golf courses with the fast, accurate, professional services they need.

The fee structure varies depending on the type of diagnoses required. Identification of pathogens of fungal and bacterial diseases is performed for a $25.00 fee. This service will provide the client with the causal agent of the disease and any control recommendations that are available. Nematode identification services are available for a $40.00 fee.

When submitting samples for analysis to the clinic, provide as much information as possible to help ensure an accurate diagnosis of the problem. Forms for submitting samples are available from the clinic.

The turfgrass sample should contain all parts of the grass. Using a cup cutter works well. Wrap the sample in a paper bag and mail it in a sturdy box as quickly as possible. If the sample can not be mailed immediately, keep it refrigerated or out of direct sunlight. Try to collect the sample prior to the application of any pesticides. Once pesticides have been applied it may be difficult to obtain an accurate diagnosis. It is helpful if the sample comes from an area that has early symptoms of the problem. Dead areas often contain a number of secondary organisms that may hinder the detection of the primary pathogen.

The collection of samples for nematode analyses varies slightly. It helps to send in an sample of healthy turf as well as problem turf to be used in the determination of the primary pathogen. The best time of year for nematode analyses is in the spring, about a month after the grass greens up, and in mid-autumn. A minimum of 6 subsamples, approximately 1" in diameter, should be collected from an area that is a 1/2 acre in size. The subsamples should be collected randomly throughout the area. The samples should be collected at a depth of around 4". The subsamples should be mixed together thoroughly. Approximately a pint of soil should be transferred to a plastic bag and shipped as soon as possible. Again, if time doesn't permit immediate shipping, keep the sample refrigerated.

Call the clinic with any questions prior to submitting a sample. The clinic strives to get you fast, accurate results and prior clarification of questions enables us to get your results on a more timely basis. Contact: Plant Disease Diagnostic Clinic, 334 Plant Science Bldg., Cornell University, Ithaca, NY 14853; (607) 255-7850.

KAREN SIROIS
CORNELL UNIVERSITY TURFGRASS TEAM

The Plant Disease Diagnostic Clinic can help golf courses identify pathogens of fungal and bacterial diseases and any control recommendations, plus nematode identification services.