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New Distributor Announcement:

- The Tessman Company now offers Milliken Turf Products!



Press Release:

Milliken Turf Products has announced that it has reached an agreement with **The Tessman Company** to distribute its Emerald Isle line of True Foliar nutrition products and biostimulants, including CPR.

The Tessman Company has been serving the green industry in since 1950 and has locations in St. Paul (main warehouse), Fargo and Sioux Falls. Tessman is a distributor of products to the commercial turf, landscape, golf, greenhouse and nursery markets.

Milliken Turf Products is a division of Milliken Chemical Company, based in Spartanburg, SC. For more than 25 years, Milliken Turf has manufactured and distributed innovative products for golf course maintenance and turf management.

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Phosphorus Runoff from Turfgrass - Research Update

By *Brian Horgan, Carl Rosen, Andrew Holman and Matt McNearney*
Department of Horticultural Science and Department of Soil, Water, & Climate
University of Minnesota

Even though statewide restrictions on applying phosphorus fertilizer to turfgrass went into effect in 2005, there is still interest over the impact that this legislation has on water quality and turfgrass health. In order to determine the agronomic and environmental effects of restricting phosphorus in turfgrass fertilizer, a dedicated research facility was established at the Turfgrass Research, Outreach and Education (TROE) Center on the St. Paul Campus at the University of Minnesota during the 2004 growing season. The objectives of this ongoing study are to:

- (1) Determine the extent of P runoff following fertilization of turfgrass;
- (2) Evaluate the effects of clipping management on P runoff;
- (3) Assess the effects of various management practices on turf health;
- (4) Identify best management practices to minimize the potential movement of P from turfgrass.

Methods

Plots for this study were constructed in 2003 and treatments were initiated in fall 2004 following sodding of the TROE site with Kentucky bluegrass. Eight treatments are being evaluated: 4 fertilizer treatments with and without clippings removed. Fertilizer treatments include: control (no fertilizer), N + K, N + K + low P, and N + K + high P. Fertilizer was applied in the spring, early fall and mid-fall in three equal applications. Nitrogen was applied at 3 lb N/1000 sq. ft.-yr and K was applied at 1.4 lb K₂O/a-yr. From fall 2004 to summer 2005, low P was 1 lb P₂O₅/1000 sq. ft.-yr and high P was 3 lb P₂O₅/1000 sq. ft.-yr. In fall 2005, the P application rates were reduced to one-third of the first year rates to reflect recommendations for an established lawn.

The 8'x24' plots are equipped with a stainless steel gutter at the lower end, which collects runoff and delivers it to a

35-gallon bucket with a 5-gallon insert. Runoff volume in the 5-gallon bucket is measured by weighing; larger flows are pumped to the 35-gallon bucket via a metered pump. This allows complete collection of runoff. This study is unique in that runoff has been collected throughout the year, including during winter melt events. Sample collection started in the fall of 2004 and has continued through 2007. Total P and soluble P have been quantified using standard laboratory procedures.

Results

Total P and soluble P in runoff increased at the highest P application rate in 2005 (Figures 1 and 2 and Table 1). Throughout the year, soluble P comprised 58% to 79% of total P (Table 1). A striking result was that about 80% of P runoff occurred during winter melt events,

(Continued on Page 14)

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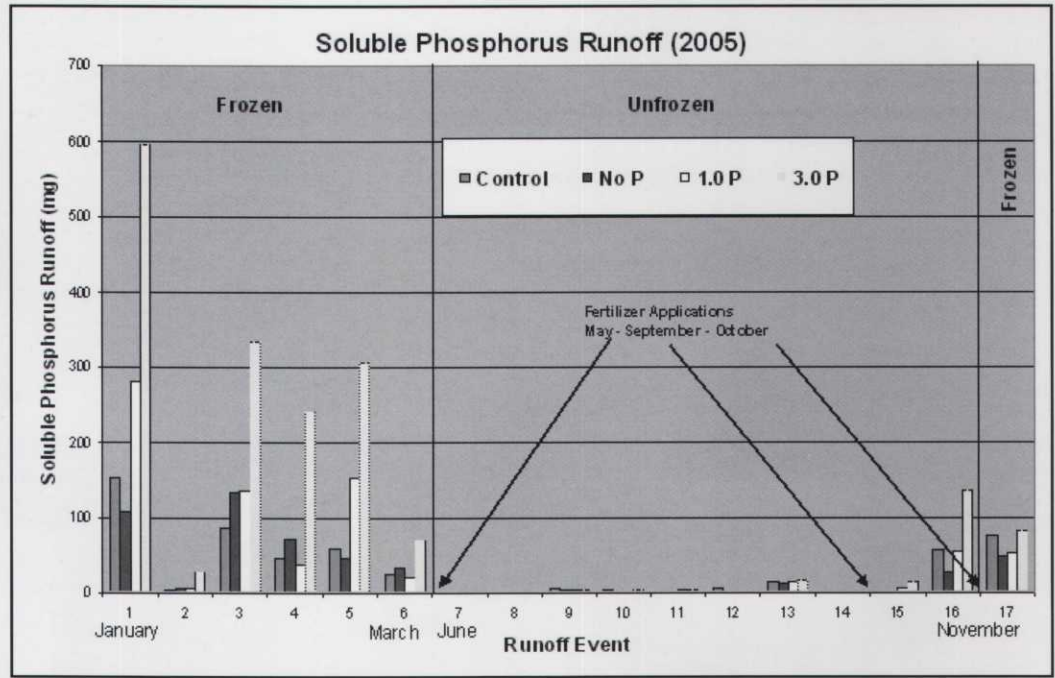


Phosphorus Runoff-

(Continued from Page 12)

which have not previously been measured in lawn and turf runoff studies, may be a very important part of annual nutrient export. In 2006, when P rates were reduced to reflect more realistic levels for established turfgrass, soluble P runoff tended to be highest when no fertilizer was applied followed by the treatments receiving P fertilizer (Figures 3 and 4). Lowest soluble P runoff was found when N and K fertilizer was applied with no P fertilizer (Table 2 and Figure 4). As in the previous year, soluble P comprised a high percentage of the total P runoff ranging from 57% to 76% (Table 2 and Figure 4). Surprisingly, highest total P runoff in 2006 was in plots receiving not receiving any fertilizer. The relatively high runoff in the 0 fertilizer treatment is likely due to poor turf health, resulting in losses of soluble P from dead tissue (Figure 5). Clipping management did not significantly affect P fertilizer not significantly affect P fertilizer runoff over the 2-year time-frame of this study (data not presented).

Figure 1



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Table 1. Total and soluble P from frozen and unfrozen soil - 2005.

Treatment	Total P				Soluble P			
	Frozen	Unfrozen	Total	% of P Fertilizer Applied	Frozen	Unfrozen	Total	% of P Fertilizer Applied
	----- lbs P/A -----				----- lbs P/A -----			
Control	0.327	0.102	0.43	NA	0.234	0.049	0.28	NA
No P	0.377	0.068	0.45	NA	0.234	0.028	0.26	NA
1.0 P	0.459	0.092	0.55	2.88	0.356	0.045	0.40	2.09
3.0 P	1.078	0.146	1.22	2.13	0.864	0.093	0.96	1.66

Table 2. Total and soluble P from frozen and unfrozen soil - 2006.

Treatment	Total P				Soluble P			
	Frozen	Unfrozen	Total	% of P Fertilizer Applied	Frozen	Unfrozen	Total	% of P Fertilizer Applied
	----- lbs P/A -----				----- lbs P/A -----			
Control	0.088	0.125	0.21	NA	0.052	0.110	0.16	NA
No P	0.037	0.036	0.07	NA	0.017	0.023	0.04	NA
0.3 P	0.092	0.052	0.14	2.26	0.051	0.040	0.09	1.44
1.0 P	0.088	0.054	0.14	0.74	0.058	0.043	0.10	0.53

Summary

Most of the P runoff from turf occurred when the soils were frozen. Initially, P runoff increased with increasing P rate. By the second year, however, the unfertilized plots had similar P runoff. (Continued on Page 15)

Phosphorus Runoff-

(Continued from Page 14)

runoff amounts as plots receiving the highest P fertilizer rate. Fertilizers applied in late fall should not contain P fertilizer.

This research is being continued to determine long-term effects of P fertilizer and clipping management on P runoff as well and turf health and soil P levels over a wide range of weather conditions and scenarios.

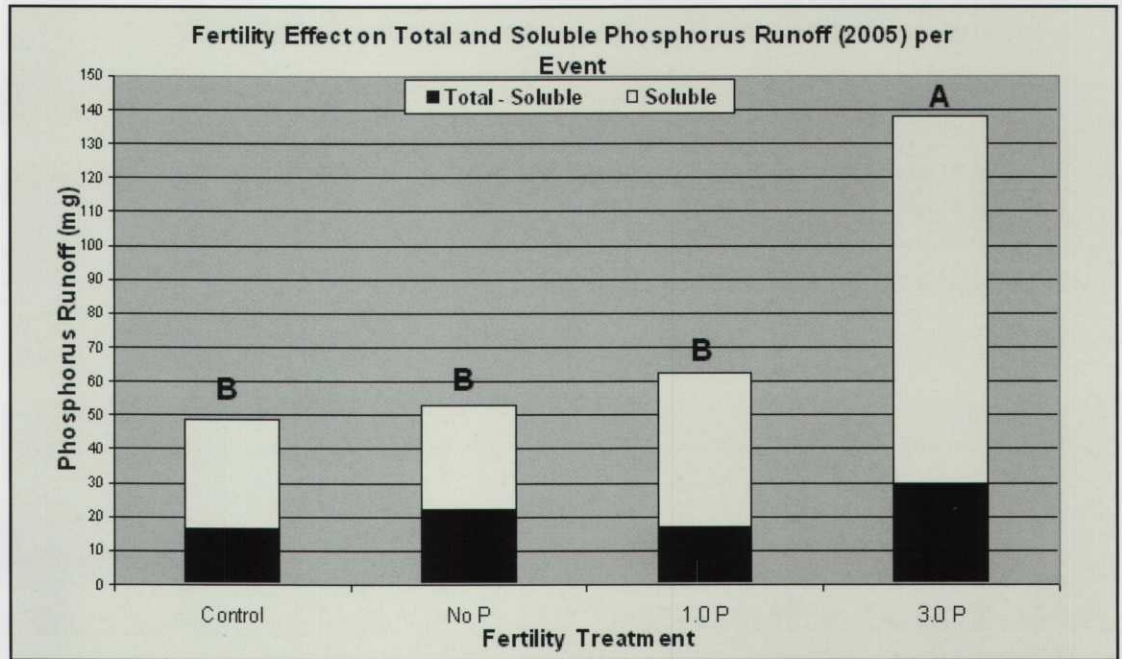


Figure 3

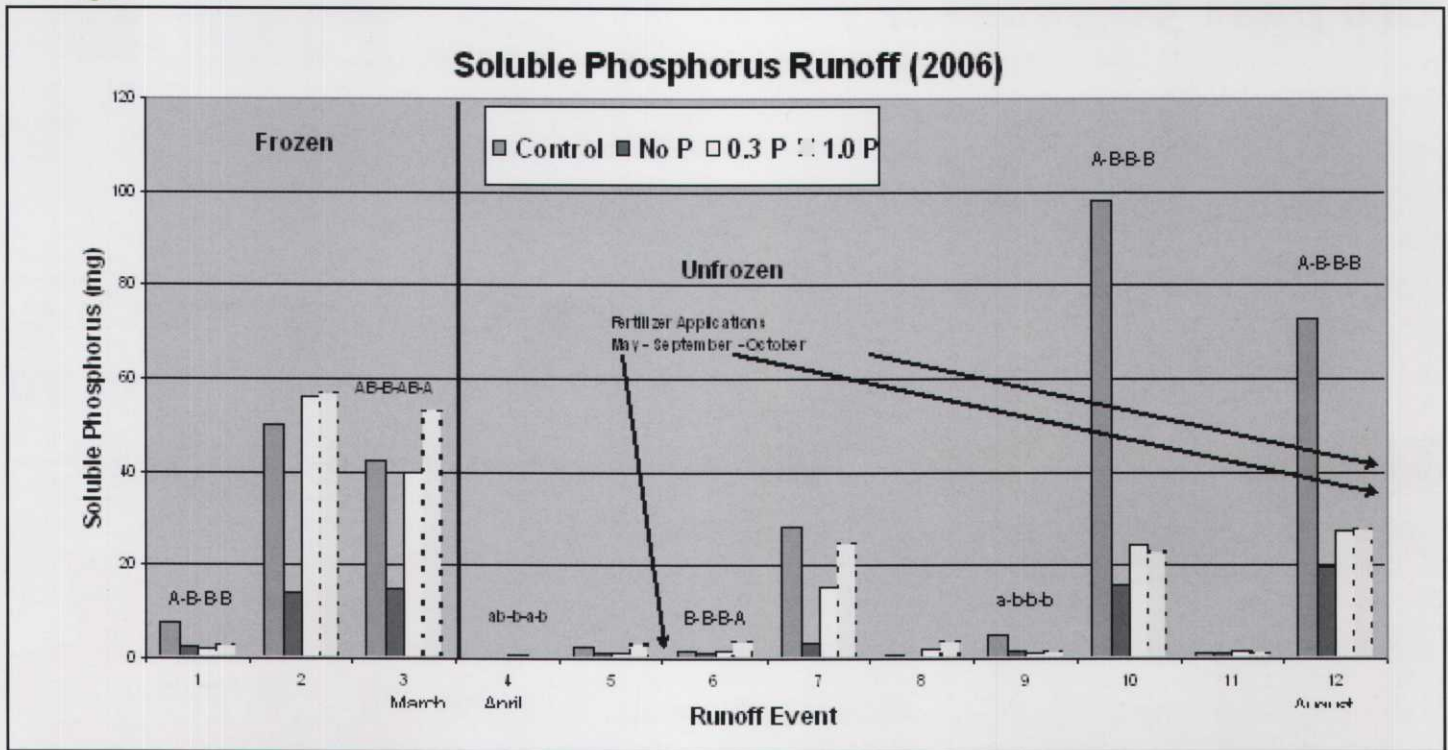


Figure 4

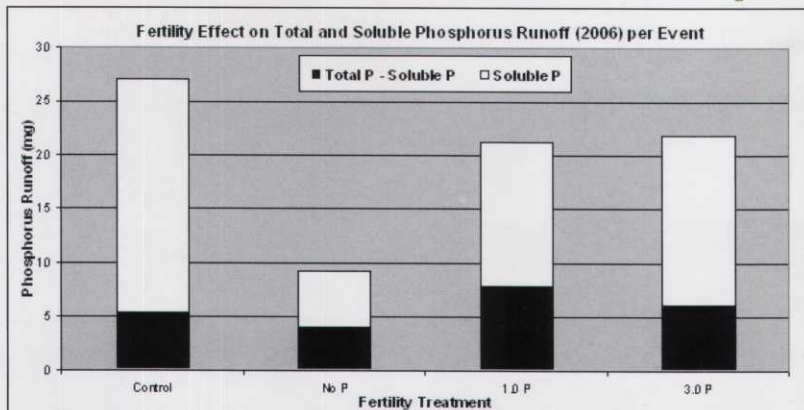
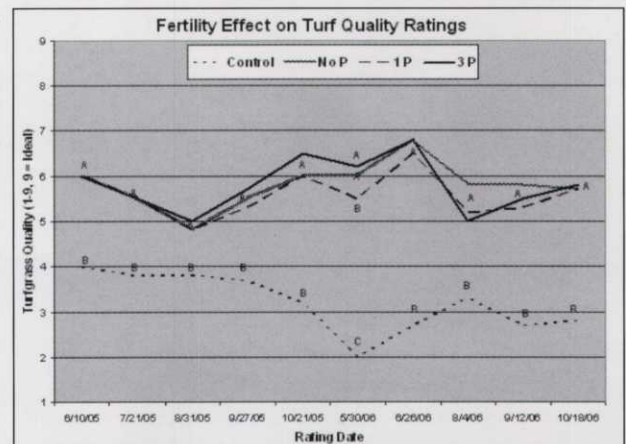


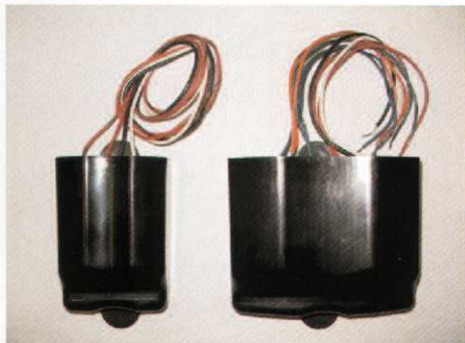
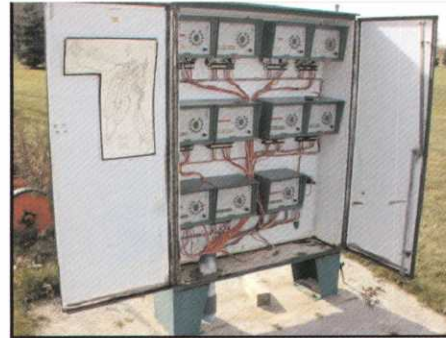
Figure 5 >





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Horses for Courses

By Randy Witt, CGCS
Senior Superintendent of Courses
Hong Kong Golf Club

Spending my early years on a farm in central Wisconsin, I came into contact with horses on a regular basis. In my dad's early days of farming, horses were used to work the fields on a regular basis. As a child, I can still recall the pride my dad had when he was able to buy his first new tractor. What a tremendous improvement in increasing efficiency and productivity for the farmer. Even with the move to modern equipment, my dad always had a special fondness for horses and kept horses around on the farm. Although many of my personal experiences with horses were positive, I had on a few occasions to get injured. I learned the hard way that getting on a young colt was a recipe for getting thrown off and kicked in the head. I

also came to learn that an electric fence and a pony were not a good match. I learned that with horses, there definitely was a school of hard knocks. Upon leaving the farm, I thought I was through with horses. As I grew older and moved on in my turf management career, I once again came into contact with horses. Upon being named Golf Course Superintendent of Oneida Golf and Riding Club in Green Bay, I once again came into contact with horses. Oneida provided horse boarding and riding facilities for the members along with a limited amount of non-member boarding facilities. Initially, I had very little contact with the operation of the horse stables. After a succession of bad stable managers and mismanagement, I was glo-

riously given the added responsibility of managing the stable operations. After a few years, it was becoming apparent to all that the stable operation was a tremendous expense for the Club when compared to the actual number of club members using and boarding horses. The final straw that broke the horses back was the requested expenditure of one million dollars to upgrade the stable facilities. This was quickly voted down along with the decision to end the stable operation. The house, barn and riding arena were soon demolished, the driving range extended, and a new club entrance

developed. I personally shed no tears with the ending of the stable operation, and was certain that my life's contact with horses was over with. Little did I know that this would not be the end of my involvement with horses?

As I've mentioned in previous articles, The Hong Kong Golf Club will serve as the site for some of the equestrian events for the 2008 Olympics in Beijing, China. The Equestrian route covers approximately 7 kilometers and 27 different jump areas as it winds its way throughout the three golf courses. The spring and summer of 2006 saw the construction of the equestrian route and the 27 jump areas. Each jump area is approximately 20,000 sq. ft. in size, and built to specifications that remind me of the construction of a USGA green. Excavation, drainage, sand, and a pre-determined turf sod were part of the construction process. As with most construction, surprises were pretty much a daily occurrence. Having a Chinese construction contractor that had no idea what a golf course was about was a recipe for disaster. Damaging the irrigation system seemed to be a daily occurrence. Dust, noise, traffic and course damage were constant companions to be tolerated and endured by the golfing membership. For most of the golfing membership, the construction event was not a pleasant experience. I quickly developed the attitude that patience and calmness was a virtue, and all would eventually be repaired and heal over. By the beginning of golf season in late September, the courses were pretty much back to normal. That was the case until the sand slitting works process began in early February. Sand slitting is a process whereby a narrow trench 4 inches in width and 16 inches deep was excavated out and back filled with coarse sand. These slits were spaced one meter apart across the thirty-meter wide track. These slits were directed into the main center drain line, which was initially installed in the first construction stage and runs

(Continued on Page 19)

163 Yard Par 3 eighth hole at the Refuge Golf Club in Oak Grove, Minnesota.



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An Adventure in Life-

(Continued from Page 18)

throughout the length of the seven-kilometer track equestrian track. The sand slitting operation was added after the project was completed, as the track designer was concerned about drainage in the event of wet weather. Summers can be very wet in Hong Kong. During the summer of 2006, each month of June, July, and August we received in excess of thirty inches of rainfall per month. A contractor from Australia that specializes in drainage was hired to perform the sand slitting process, which covered just less than eight weeks in duration. So for eight weeks, once again the golfing membership faced a maze of construction on the golf courses. Construction finally was completed by early April, just as the normal golf season was coming to a close. Although the golf courses are open year round, the main golf season is from September 15th through April 15th. Due to the warm, humid, wet conditions of summer, many of our European members return to Europe to take advantage of the cooler weather. The Asian club members that live in Asia year round play most of the



summer golf.

As part of the preparation for the 2008 Olympics, an Equestrian Test Event was held on August 12th. For this event, forty horses and riders from throughout the world were brought in to test a portion of

the Equestrian Track covering 15 jumps and 4 kilometers. The purpose of the Event was to not only test a portion of the track itself, but also test all the logistics that go along with holding an Olympic



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An Adventure in Life-

(Continued from Page 19)

event. Lock-down security, security tents, viewing marques, refreshment stands, on course security, veterinary facilities, etc. were all located and assembled as needed or required. Set-up prior to the event covered three weeks, and ten days were needed to take down all the structures, clean up, repair damaged golf course areas and return the courses back to playability. The event itself was closely monitored by and critiqued by members and officials of the Olympics staff. Recommendations and proposed changes will soon be forthcoming for track changes, maintenance, jump locations, logistics, etc. We were even fortunate to be able to check the performance of the track in wet weather as we received two inches of rainfall in the early morning hours just prior to the start of the event. For the most part, the Test Event was a success and the track received positive reviews from the participants and the Olympic Committee. Now begins the process of instituting any changes or modifications, and preparing the track and the jumps for next year's Olympic events.

So, from just a child growing up on a farm in central Wisconsin to maintaining

golf courses in Hong Kong, I have been and continue to be involved with and in contact with horses. I never intended or planned to be involved with horses

throughout my life, but life is full of surprises and at times unexpected events and happenings. For me, that has been a part of the Adventure in Life.



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