OTRF ACHIEVES RECORD RESEARCH FUNDING IN 2010

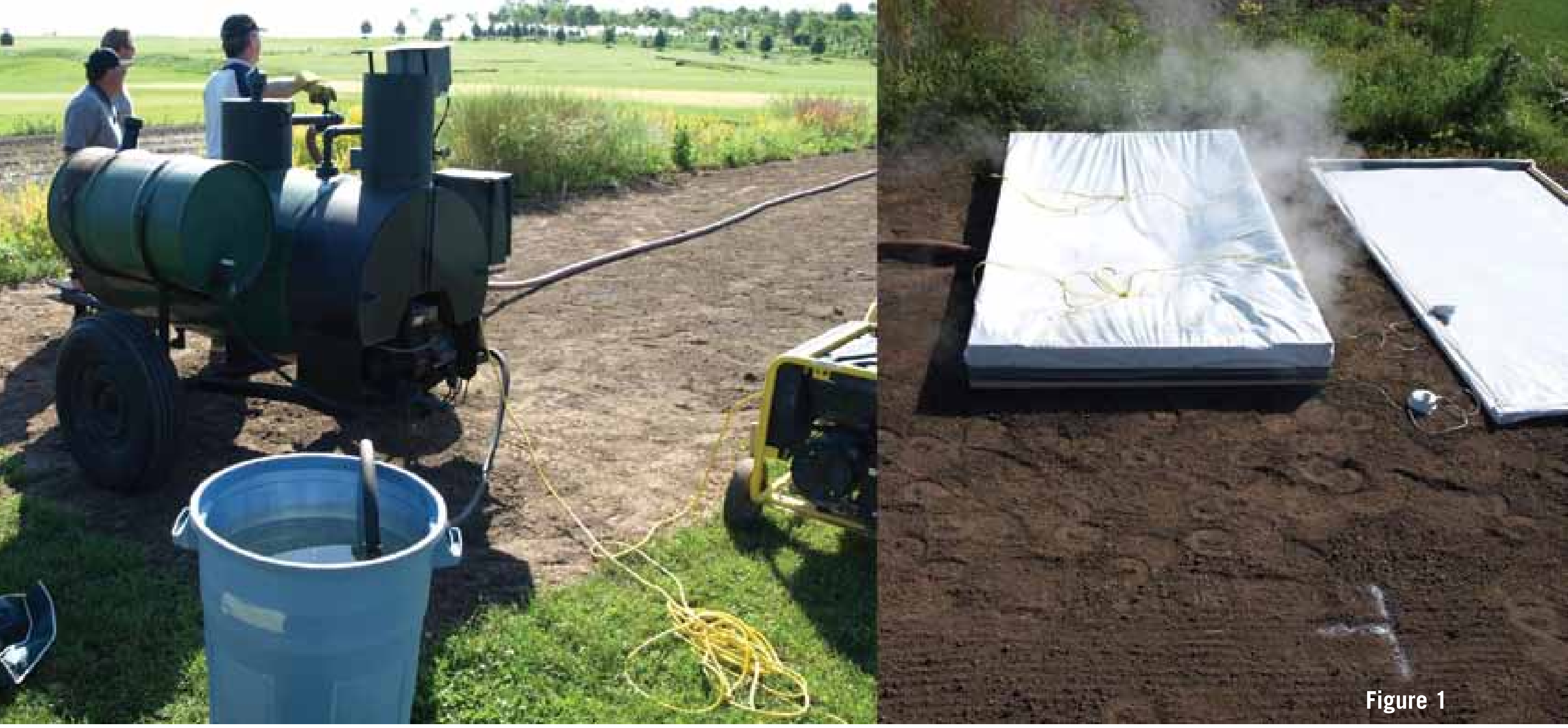
Through record fund raising and joint partnerships, the Ontario Turfgrass Research Foundation (OTRF) will support an unprecedented $175,000 allocation for turf research in 2010. This covers seven new research projects and an additional five currently underway. The latter include projects on turfgrass diseases, fertilization and irrigation methods that will assist turf managers and home owners in their grass management regime.

With respect to new funding, projects range from methodologies of controlling insect infestations and weed control to a management regime for a revived grass cultivar for use in both home lawns and athletic fields. Projects are compliant with Ontario's new pesticide ban restrictions. In conjunction with the Sports Turf Association, the OTRF is supporting a project that will study the potential risk of acute and chronic injuries based on playing surface selection (natural and synthetic). Funds will also be granted to study the long term effects of soil and nutrient loss/gain from the continuous use of commercial sod production in Ontario.

Funds for Research. Kevin Falls, Past President of the OTRF, accepts the STA's annual donation from Past President Gord Dol at the Ontario Turfgrass Symposium.

STA supports turfgrass research & sharing results through...

1) An annual per-member donation to the Ontario Turfgrass Research Foundation. 2) Enhanced funding in 2010/2011 in support of the project "Contribution of field playing surface type and quality to potential acute and chronic injury rates." 3) Association subscription to the Michigan State University Turgrass Information Centre supporting the continued expansion of the content and availability of the Center's information (see info on adjacent page).



Establishing Turfgrass Without Herbicides: Musings on the Future

Dr. Ken Carey, Department of Plant Agriculture, University of Guelph

OTS HIGHLIGHT

Continued from our front cover.

Pre-emergent herbicides, fumigants. These reduce the pressure from the weed seed bank prior to seeding/sodding.

Post-emergent selective (broadleaf) herbicides. These remove weeds from the establishing turf.

What Are Some Alternatives?

Repeated tillage. This can reduce pressure from both annual and perennial weeds, but is costly in time and labour as weed seeds must be allowed to germinate to make it effective.

Addition of weed-free rootzone material. Topsoil, sand or custom mixtures can effectively bury many problem weeds. The amount of material required will depend on the weed species, but needs to be at least 10 cm (4") to be effective. Natural source material will need to be sterile or sterilized to avoid bringing in weed seed, but this may be a simpler and cheaper process than dealing with weeds on site.

Alternative herbicides (pre- and post). These products may become more widely available, efficacious and cost effective. Materials such as acetic acid (non-selective post-emergence), corn gluten meal (non-selective pre-emergence), Sarritor, and chelated iron (selective post-emergence) are currently available or under development as Schedule 11 herbicides, but may not be adequately effective or inexpensive for large scale turf installation purposes.

Heat treatments. These have shown to be effective in some situations for non-selective and targeted control of weeds, both established and seed.

1) Steam treatments. Wet heat (hot water, steam) is many times more effective than the same temperature of dry heat (flaming). The effectiveness of steaming or hot water is dependent on the ability to contain the heat long enough to kill plants and seeds (Figure 1, Table 1). The difficulty of generating enough heat or hot water to fill reasonably sized covers or enclosures may limit the usefulness of this method, but there may be technological fixes for this. Generating hot water or steam is also very expensive in terms of fuel, and generates greenhouse gases, which is a definite drawback. There are also safety risks with both wet and dry heat methods. In some horticultural applications, relatively safe chemicals (calcium oxide, potassium hydroxide) have been added to effectively increase the temperature generated by steam through their exothermic reaction with the water.

2) Flaming. Direct flaming of vegetation and the rootzone with propane or other fuels can kill existing vegetation, but is much less effective at raising the soil temperature enough to kill weed seeds, and much less effective than wet heat. Nevertheless, research is being pursued on this alternative (Figure 2).

Figure 1. Steam treating rootzones for weed control. Steam generator requires inputs of water, diesel, and hydro. Steam containment frame is 1 x 2 m. Guelph Turfgrass Institute (GTI) 2009.

Figure 2. Plots treated with acetic acid (bleached) or propane flaming (black) to study effectiveness for weed control in renovation pre-treatments. GTI 2009.

3) Solarization. Using solar radiation to heat the soil under a plastic film has been shown to be effective in some areas to kill weed seeds prior to planting. This has the advantage over other heat methods of being environmentally benign and potentially scalable to larger areas, but remains to be tested in our climate. The promising aspect is that the time when solarization is most likely to be effective (summer and fall) is followed by the optimal time for turf seeding. This is another alternative that is being actively researched.

Turf choice and timing and method of installation. These factors will definitely have an impact on producing turfgrass with fewer weeds. They are not new options, but we may need to rethink some of the old "best choices" in light of the loss of traditional herbicides.

1) Timing. The optimal timing (fall) remains the same, but our windows for successful installation may be smaller, and requirements for backup irrigation, etc., may be more stringent.

2) Seed species, mixtures. Species such as perennial ryegrass (resistant to weed pressure because of aggressive growth, as well as producing natural allelopathic chemicals?) may play a bigger role in successful installations. Solving winter hardiness problems by breeding or management will be critical in using different choices of species or mixtures. Mixture recommendations, as well as seeding approaches that were based on availability of herbicides, will probably need to be revisited in research.

3) Hydroseeding vs. dry seeding. There are some differences in weed pressure between hydroseeding and dry seeding methods, but hydroseeding has not been investigated fully as a method to install turf while suppressing weeds. Choice of seed mixtures, rates of seeding, various types of mulches, and other aspects of the hydroseeding method could hold promise in improving weed control.

4) Sodding vs. seeding. Of course, sodding is a very effective way to shift the need for weed control to the sod producer, and sodding can produce essentially weed free turf for a long time if installed and maintained properly. Nevertheless, choices with sodding (timing, post-installation maintenance, large-roll sod to reduce seams, etc.) can reduce the likelihood of weed invasion or growth.

Prospects

The next little while (months, years?) is going to be challenging for any sports turf manager needing to install large areas of weed-free turf in Ontario. We have a few tools, and are working as fast as we can to get more, but it will be a time of experimentation, trial and error, and sharing of ideas and information. If you, as turf managers, have ideas that you think should be tested, do your best to pass them along to the turf researchers who are investigating as many options as they can.

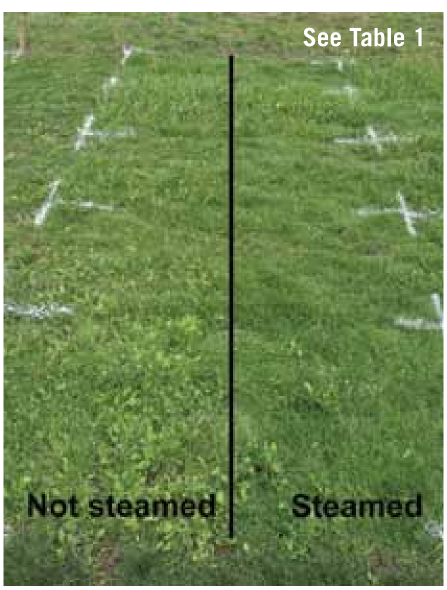
GTI Field Day

AUGUST 19, 2010

If you attend the research field day at the GTI this summer, you'll be able to see what we're doing and share your ideas. Visit www.guelphturfgrass.ca for details as they become available.

Table 1. Effect of steaming of rootzone on weed pressure in seeded turfgrass.

Treatment	Weed Presence Rating			
	07/03	07/30	08/31	09/18
Steamed	0.11 a	3.63 a	3.18 a	4.40 a
Unsteamed	0.04 b	1.30 b	1.18 b	2.84 b
lsd	0.03	0.31	0.32	0.47



See Table 1

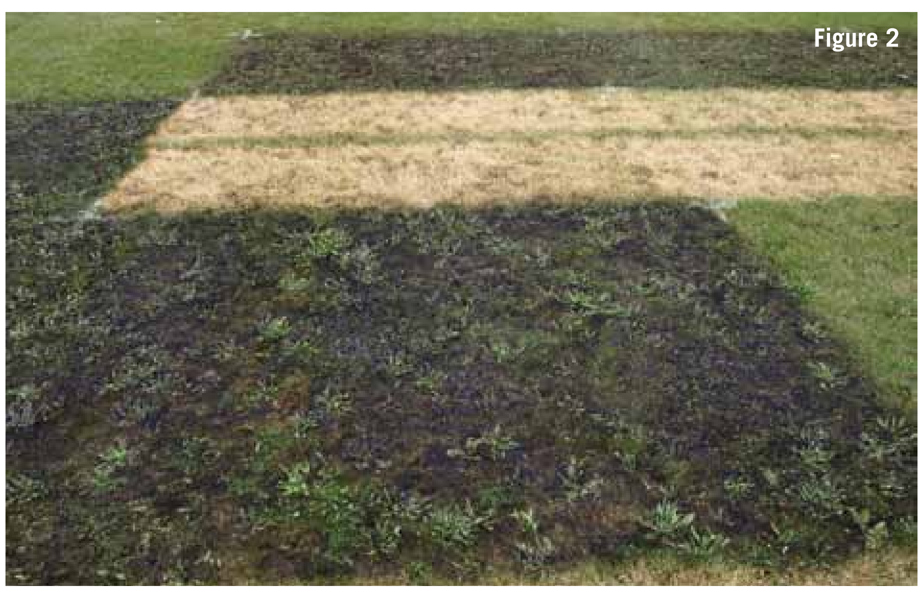
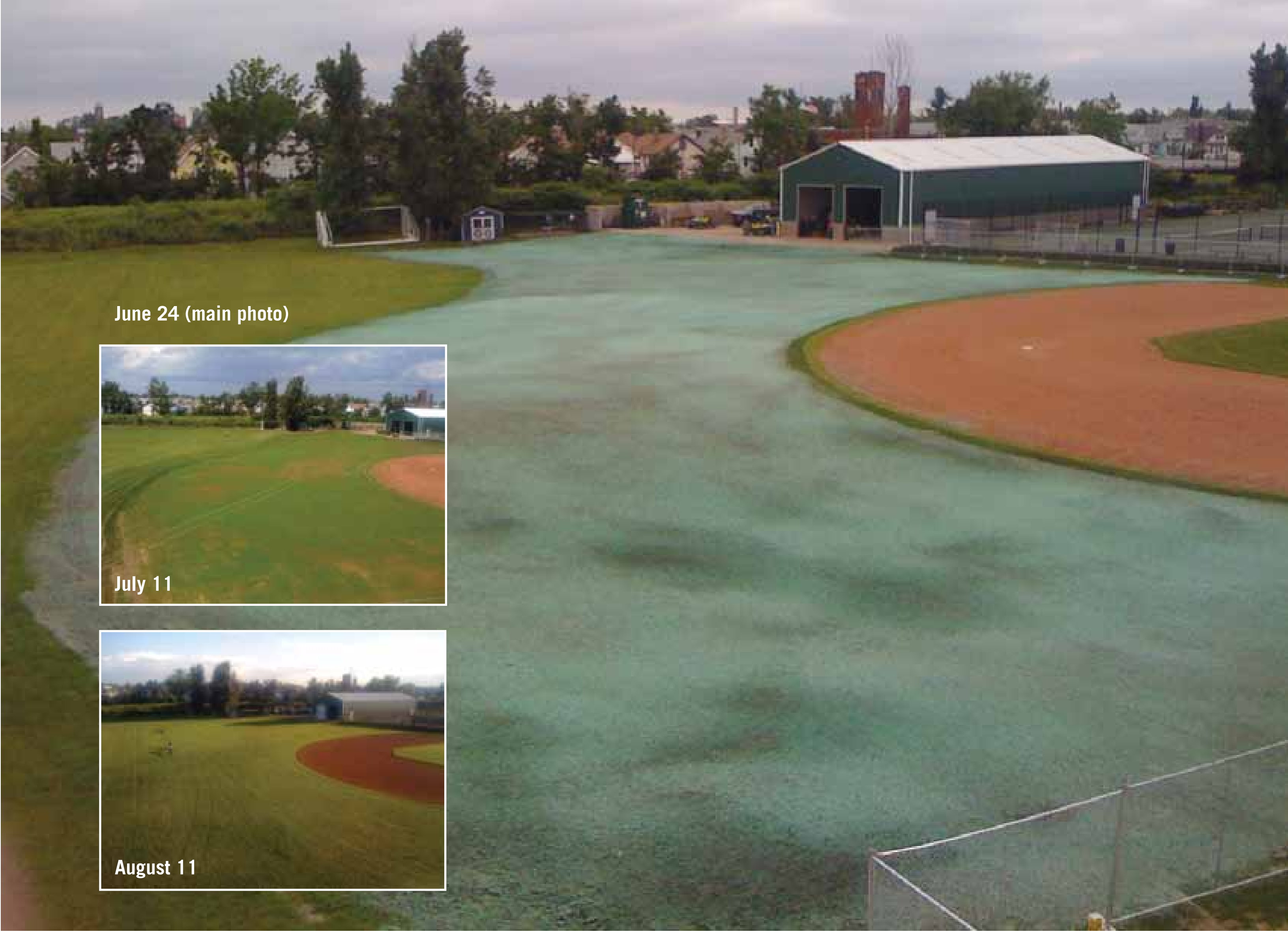


Figure 2



June 24 (main photo)

July 11

August 11

How to Get a Sports Field Ready in 70 Days

Dr. J. Tim Vanini and Dr. John N. Rogers, III

The 70-day summer window is ideal for sports fields to actively grow and repair themselves. Typically, there is less activity on sports fields during this time and the summer months usually provide optimal growing conditions for recuperation of traffic areas. That said, cultural practices can get increasingly complicated when school and park crews leave for vacation and/or inclement weather occurs. The need for strategies that are less expensive and time-consuming is evident.

A 2002 Michigan Rotational Survey reported that the two practices sports turf managers performed most consistently, regardless of maintenance level, were mowing and fertilization. Mowing is obviously a common and essential practice for any turfgrass professional. When mowing height decreases, there is an increase in shoot density, plants per unit area, and a decrease in rooting. Fertilization is paramount for proper turfgrass health and is relatively inexpensive compared to other cultural practices. Extensive research has been conducted on fertilizers and their effects on turfgrass. Although usually more expensive, slow-release fertilizers can provide potential benefits for the sports field manager, including longer turfgrass response, less nitrogen leaching, less surface run-off, less volatilization, and fewer applications for healthy turfgrass response compared to quick release fertilizers.

OTS HIGHLIGHT
Presented February in Guelph, Ontario

Typically with urea, multiple applications are needed to attain responses observed by using a single slow-release fertilizer over a long period of time. Sports field managers tend to use fertilizer products, usually urea or sulfur-coated urea (SCU), that are less expensive due to restrictive budgets. Minimal research has evaluated these products or others in neither a short re-establishment window nor the agronomic effects on the playing surface. Studies have, however, been conducted in evaluating a combination of mowing and fertility practices. As expected, these studies found more shoots were produced with a lower mowing height in conjunction with a higher rate of nitrogen; however, research did not focus on sports field management situations when time for preparation was a factor nor did the studies evaluate playing surface characteristics (traction and surface hardness).

Canaway and Krick compared perennial ryegrass (*Lolium perenne* L.) established from seed and Kentucky bluegrass (*Poa pratensis* L.) sod for soccer fields before the playing season on sand-based rootzones. Sod produced a superior playing quality surface compared to seed when evaluating playing surface characteristics. Cook et al. evaluated turfgrass establishment using hydroseeding (a mixture of primarily water, seed, fertilizer and mulch sprayed on the intended target area) and compared the results to seed and sod on a sand-based rootzone. However, simulated traffic on these studies was not initiated until 125, 365 and 140 days after treatment (DAT), respectively. Furthermore, these studies implement practices (sodding and hydroseeding) that can be expensive and labour intensive from year to year.

Table 1. Individual treatments for mowing and fertilizer study, 2002 and 2003.

Mowing Treatments

1) **1.5" Continuous** - mowed at 1.5" throughout the study.

2) **3.0"-Gradual-1.5"**† - maintained and mowed at 3.0" for 33 DAS and slowly dropped height to 1.5".

- 3 July - 15 July - 4 mowings at 3.0"
- 16 July - 24 July - 2 mowings at 2.5"
- 25 July - 30 July - 2 mowings at 2.0"
- 31 July - 3 Sept - 9 mowings at 1.5"

3) **3"-Chop-1.5"** - mowed at 3" and scalped to 1.5" 68 DAS.

Fertilizer Treatments	Total N used ‡
1) **Urea** – 1 lb. N/1000 ft^2 only on 1 July	2 lb. N/1000 ft^2
2) **Urea 2w** – 0.33 lb. N/1000 ft^2 starting on 15 June every 15 days equaling 1 lb. N/1000 ft^2	2 lb. N/1000 ft^2
3) **SCU** - 3 lb. N/1000 ft^2	4 lb. N/1000 ft^2
4) **RCU2** - 2 lb. N/1000 ft^2	3 lb. N/1000 ft^2
5) **RCU3** - 3 lb. N/1000 ft^2	4 lb. N/1000 ft^2
6) **RCUThin** – 4 lb. N/1000 ft^2	5 lb. N/1000 ft^2

† In 2002, mowing started on 25 June and was mowed at 3.0" until 15 July. Six mowings occurred until 15 July.
‡ Total N used includes starter fertilizer application (13-25-12) at 1 lb. N/1000 ft^2 plus treatments on 1 June.
• Analysis of fertilizers - Urea 46-0-0, SCU 39-0-0, RCU2 and RCU3 43-0-0 and RCUThin 44-0-0.
• Seed and starter fertilizer (13-25-12) was applied on 1 June to all treatments.
• Fertilizer treatments 3-6 were only applied on 1 June.

Our Objectives & Methodology

The objectives in our study were to clarify the impact of best management practices in regards to mowing height and fertilization on re-establishment of sports field turf during a 70-day window and quantify these effects during and after a 25-day simulated traffic period.

This study was conducted in 2002 and 2003 at the Hancock Turfgrass Research Center on the campus of Michigan State. Three mowing heights and six fertilizer treatments were evaluated (Table 1) and re-randomized in 2003 to avoid any edge effects from the first year. Plot size was 6x9 feet.

In 2002, sod cutters were used to strip out the existing sod, and in 2003, a Koro Field Topmaker was used to strip the turf from the 2002 experiment. The soil was a sand-based profile and was sterilized each year with Basamid G at 8 lbs/1000 ft^2. Seeding and fertilizer treatments began June 1 both years. A 30:70 sports grass mixture (by weight) of perennial ryegrass and Kentucky bluegrass was seeded at 4 lbs/1000 ft^2.

Lebanon Country Club 13-25-12 from Lebanon Turf Products was applied at 1 lb N/1000 ft^2 and subsequent fertilizer treatments were applied (Table 1). Fertilizer treatments applied were: Andersons urea (46-0-0) at 1 lb N/1000 ft^2 July 1 (Urea) and 0.33 lb N/1000 ft^2 every two weeks starting June 16, July 1, and July 18 (Urea 2w); Lesco Poly-Plus sulfur-coated urea (39-0-0, 12% sulfur coating) at 3 lbs N/1000 ft^2 (SCU); and Polyon resin-coated urea (RCU) [43-0-0, 6% Reactive Layer Coating (RLC)] at 2 lbs N/1000 ft^2 (RCU2), and 3 lbs N/1000 ft^2 (RCU3) and (44-0-0, 4% RLC) at 4 lbs N/1000 ft^2 (RCUThin).

Germination blankets were placed over the top of the plot and removed 15 days after seeding (DAS) in both years. Based on visual quality throughout the experiment, potassium, phosphorous and micronutrients were supplemented. Andersons 0-26-26 fertilizer and Andersons Trace Element Package were applied at 1 lb/1000 ft^2 and "normal rate," respectively, on June 27 and July 25 both years. Lebanon Country Club 18-3-18 was broadcasted to all treatments at 0.5 lb N/1000 ft^2 on August 6 and August 19 to supplement nutrients during traffic phases in 2002 and 2003. Irrigation was applied daily during re-establishment and

Table 2. Effects of mowing height and fertilization treatments on turfgrass cover percent (%) on a non-trafficked and trafficked perennial ryegrass/Kentucky bluegrass stand at the Hancock Turfgrass Research Center, East Lansing, MI., 2003.

	2002 Non-traffic					2003 Traffic		
Treatments	**2-Jul**	**5-Aug**	**7-Jul**	**4-Aug**	%	**12-Aug**	**19-Aug**	**3-Sep**
1) Mowing								
1.5” Continuous	77	84	52	77		66	49	40
3.0”-Gradual-1.5”†	72	85	57	81		69	51	41
3”-Chop-1.5”	73	80	54	73		67	46	37
LSD (0.05)	NS	4	NS	6		NS	NS	NS
2) Fertilizers†								
Urea	62	82	42	76		66	39	27
Urea 2w	72	82	43	74		60	42	34
SCU	69	78	47	68		61	43	32
RCU2	83	86	69	81		74	62	49
RCU3	88	92	76	92		84	68	66
RCUThin	70	79	49	69		61	38	28
LSD (0.05)	6	5	9	8		9	11	11
No. of passes	0	0	0	0		8	16	34

NS non-significance at the 0.05 level.
† All fertilizer strategies received 1 lb. N/1000 ft^2 of 13-25-12 on 1 June.
• Urea, urea applied at 1 lb. N/1000 ft^2 on 1 July; Urea 2w, 0.33 lb. N/1000 ft^2 urea applied every two weeks; SCU, 3 lb. N/1000 ft^2 sulfur-coated urea; RCU2, 2 lb. N/1000 ft^2 polymer-coated urea applied on 1 June; RCU3, 3 lb. N/1000 ft^2 polymer-coated urea applied on 1 June; RCUThin, has a thinner coating compared to other polymer coated-ureas and 4 lb. N/1000 ft^2 polymer-coated urea applied on 1 June.

as necessary throughout the experiment to prevent moisture stress.

Mowing began June 25, 2002 and July 3, 2003, and treatments were mowed twice per week throughout the experiment (Table 1). During the re-establishment phase, the 1.5-inch-continuous strategy was mowed with a 17-inch wide McLane mower and the 3 inch-grad-1.5-inch (mowing height lowered weekly) and 3.0 inch-chop-1.5-inch (Table 1) treatments were mowed with a Honda rotary mower (Harmony HRB216 Quadracut).

The 3.0-chop-1.5-inch treatment was scalped down with an Exmark Lazer Z HP to a height of 1.5-inch 68 DAS. From this point on, all mowing treatments were mowed at 1.5-inch height with the Exmark mower for the duration of the experiment. Clippings were returned at all times.

Traffic was applied by the Cady Traffic Simulator (CTS) uniformly to all plots. The CTS was a modified Jacobsen Aero King 30 self-propelled core cultivation machine with “rubber feet” weighing 1,496 lbs.

Data were collected during re-establishment and traffic phases. Extensive research parameters were measured in this experiment including turfgrass cover percent ratings, shear resistance, divoting resistance, peak deceleration, chlorophyll index, root pulls, and plant count. (Due to space limitations, we will only discuss turfgrass cover percent ratings and traction. You may see the full article at Applied Turfgrass Science - doi:10.1094/ATS-2008-0218-01-RS). Turfgrass cover percent ratings were estimated qualitatively. Traction values were measured by both the Eijkelkamp shear vane Type 1B for shearing resistance and Clegg Turf Shear Tester for divoting resistance with a plate depth of approximately 1.6 inch.

Results: Turfgrass Cover Percent

Mowing height only detected differences at the end of the 70-day trial, August 5, 2002 and August 4, 2003 for turfgrass cover percent (Table 2). These dates represented the last turfgrass cover percent ratings observed before simulated traffic was ini-

Table 3. Effects of mowing height and fertilization treatments on shear resistance and turf shear tester (TST) on a non-trafficked and trafficked perennial ryegrass/Kentucky bluegrass stand at Hancock Turfgrass Research Center, East Lansing, MI, 2003.

	2002		2003 Shear Resistance					2003 TST	
	Non-traffic	Traffic	Non-traffic	Traffic				Traffic	Non-traffic
Treatments	15-Aug	4-Sep	7-Aug	13-Aug	21-Aug	28-Aug	3-Sep	3-Sep	3-Sep
					Nm				
1) Mowing									
1.5" Continuous	16	11	14	15	12	10	8	49	113
3.0"-Gradual-1.5"†	16	11	15	15	12	11	8	53	108
3"-Chop-1.5"	15	11	14	14	12	9	7	51	106
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
2) Fertilizers†									
Urea	16	11	13	13	11	9	5	39	97
Urea 2w	16	10	15	14	11	10	7	47	109
SCU	15	10	13	14	11	7	7	48	112
RCU2	18	12	16	17	14	13	11	61	112
RCU3	17	12	18	17	15	13	12	70	118
RCUThin	14	11	12	12	11	8	4	39	106
LSD (0.05)	2	1	2	2	2	3	3	11	NS
No. of passes	8	30	0	6	18	26	34	34	0

NS - non-significance at the 0.05 level.
† All fertilizer strategies received 1 lb. N/1000 ft^2 of 13-25-12 on 1 June.
• Urea, urea applied at 1 lb. N/1000 ft^2 on 1 July; Urea 2w, 0.33 lb. N/1000 ft^2 urea applied every two weeks; SCU, 3 lb. N/1000 ft^2 sulfur-coated urea; RCU2, 2 lb. N/1000 ft^2 polymer-coated urea applied on 1 June; RCU3, 3 lb. N/1000 ft^2 polymer-coated urea applied on 1 June; RCUThin, has a thinner coating compared to other polymer coated-ureas and 4 lb. N/1000 ft^2 polymer-coated urea applied on 1 June.

tiated. There were differences among fertilizers for every date regardless of traffic and non-traffic areas in both years. RCU3 was in the highest statistical category for every measuring date.

SCU and RCU3 had the second highest amount of nitrogen, but these two products responded differently. SCU releases nitrogen once water comes in contact with the urea prill via cracks and imperfections in the sulfur coating. RCUs combine irrigation/rainfall and high temperature (> 80 degrees F) to slowly release nitrogen. The process is initiated when the RCU prill uptakes water, expands with heat and then slowly releases nitrogen via expanded pores in the coating at a steady rate. Consequently, due to a more controlled release from RCU3, it rated higher in turfgrass cover percent (and others).

Mowing treatments (started June 25, 2002 and July 3, 2003, respectively) had approximately a 35-day window compared to fertilizer treatments applied at the beginning of the 70-day re-establishment window. Even though more than one-third of the plant was being removed from the 3.0-chop-1.5-inch treatment 68 DAS, differences were not observed among mowing treatments for turfgrass cover percent.

There were no significant differences among Urea, Urea 2w, SCU and RCUThin for five of seven measurement dates for both years combined. RCU3 was 14% and 18% higher compared to SCU August 5, 2002 and August 4, 2003, respectively, before traffic commenced. Turfgrass cover percent loss after traffic revealed a 53% loss with SCU, but only a 28% loss with RCU3 between August 4 and September 3, 2003.

Soil temperatures in the month of June 2002, averaged from 77 to 82 degrees F from 1200 to 1800 h. In June 2003, average soil temperatures ranged from 67 to 77 degrees F from 1200 to 1800 h. This might explain why turfgrass percent cover was higher in 2002 compared to 2003.

Results: Shear Resistance & Turf Shear Tester (TST)

Shear resistance and TST values are quantitative measures that clearly ascertained differences in strength of the surface after the 70-day reestablishment window, and during and at the end of the 25-day traffic regime (see Table 3).

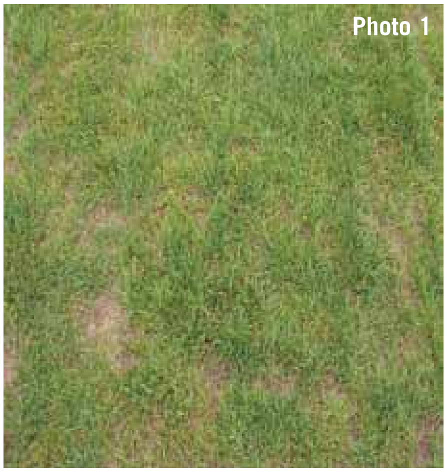
At the end of the 25-day traffic regime in 2003, only RCU2 and RCU3 had shear vane values above 10 Nm. It should also be noted that RCU2 values were significantly higher than SCU and RCUThin for all dates except September 3 TST non-traffic values. RCU2 nitrogen amount was less than SCU and RCUThin. Type of coating and coating thickness were possible factors in releasing of nitrogen from the RCU2 fertilizer compared to SCU and RCUThin.

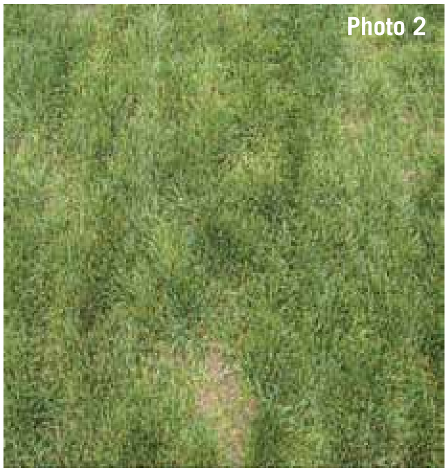
Results presented may be due to a more accelerated wear compared to other data in the literature using different traffic simulators. The CTS is a more aggressive machine compared to traditional wear machines to date.

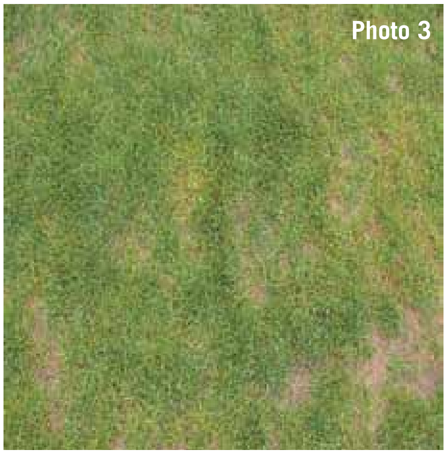
Take Home Message

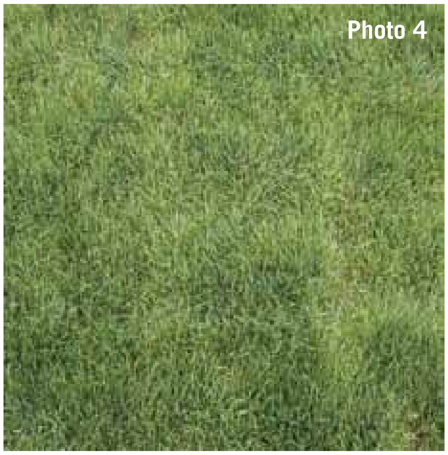
The fertilizer strategy was more important than the mowing strategy for a 70-day window in the summer. First, there may not have been a wide enough difference among mowing strategies. Second, the fertilizer strategy was implemented for the full 70-day window while the mowing strategy was not implemented until halfway into the experiment because young seedlings were too immature to mow. An effective fertilizer strategy (product and rate) is paramount in a re-establishment growing window.

By implementing a mowing and fertilizer strategy, a sports field manager could reduce labour costs, and/or redirect labour to other projects, while also producing a better quality and safer surface for the upcoming playing season.









Photos 1 & 2: On July 28, 2003, SCU (1) and RCU3 (2) both mowed at the 7.6 – Grad. – 3.8 cm mowing height before traffic. **Photos 3 & 4:** On July 28, 2003, SCU (3) and RCU3 (4) both mowed at the 7.6 – Chop – 3.8 cm mowing height before traffic.

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