EVALUATING MOWING AND FERTILIZER PRACTICES FOR RE-ESTABLISHMENT OF SPORTS FIELDS IN A 70-DAY GROWING WINDOW

J.T. Vanini and John N. Rogers, III
Michigan State University

Introduction

Figure. 1. A soccer field with minimal turfgrass cover.

If a sports field manager has only 70 days to get a sports field ready, what is the quickest way to re-establish these high traffic areas if there is minimal to zero turfgrass cover? Sports field managers, with limited budgets and limited time, can be overwhelmed with this challenge.

Research completed at Michigan State University showed that an increase in inputs, during the playing season, will result in approximate 20% increase in the number of games (5 or 6 extra games) which can be played on that particular sports field (Calhoun, et al 2002, Lundberg, 2002). The sports field manager must mow twice per week and fertilize twice per month at a 0.5 lbs. N/1000ft^2 rate each application in order to increase turfgrass health, vigor and the number of plants for as long as possible. More specifically, light and frequent fertilizer applications will consistently aid in increasing biomass on the surface of the sports field, which will improve the playability (traction and surface hardness). However, a limited budget can prohibit light and frequent fertilizer applications due to an increase in the number of man-hours for these frequent applications and/or lack of applicator expertise available on-site.

The aforementioned concept can be applied to young seedlings, too. With a constant feeding supplied to young seedlings, there is a better chance to increase biomass or to maintain biomass on the surface which will improve the consistency of the playing surface for as long as possible. These results are encouraging due to less overall damage to high wear areas, enhancing recovery and reducing the need to re-establishment at the end of the year. This allows the sports field manager to dedicate fewer inputs (and perhaps less time) with sound and effective management practices during the playing season.

Therefore, based on this mowing (mowing height evaluated versus mowing frequency for this study) and fertilizing premise during the season, research was initiated in 2002, and repeated in 2003, to study turfgrass responses during and after a 70-day summer re-establishment window. Could we show a difference in “plant fitness” by investigating mowing heights and/or fertilizing treatments before the season started? (Plant fitness refers to the strength of the plants acting together.) Surface measurements revealed a slow release fertilizer (Polyon) and gradual reducing of the mowing height (3” – 1.5”), during the re-establishment window and up to the playing season, could strengthen the turf plants or improve “plant fitness” versus traditional management practices (seed, fertilize and mow once/week) (Vanini and Rogers, 2003). If a fertilizer source could be identified that was capable of providing the nutritional needs for the turfgrass plant during the entire 70-day establishment period, savings from man-hour inputs due to fertilizer applications would be significant.

Objectives

The objective of this study was to evaluate mowing heights and fertility regimes for re-establishment of sports fields in a short growing window during the summer for a second year.

Materials & Methods

The experiment was a two-factor study with three replications (Table 1). Different mowing heights and fertility treatments were evaluated. This study was conducted at the Hancock Turfgrass Research Center (HTRC) on the campus of Michigan State University in East Lansing, MI. To stay consistent with the first year protocol, Basamid was used to sterilize the soil. Seeding and fertilizer treatments commenced on 1 June. A 30:70 sports grass mixture of perennial ryegrass (Lolium perenne var. SR4400, SR4500 and Manhattan III) and Kentucky bluegrass (Poa pratensis var. Champagne and Rugby II) was seeded at a 4#/1000ft^2 rate. Starter fertilizer (13-25-12) 1# N/1000ft^2 rate was applied as well as subsequent fertilizer treatments (Table 1). Germination blankets were placed over the top of the seeded and fertilized treatments on 1 June and removed after 15 days. During the 70-day establishment phase, all other nutrients (except N) were supplemented to adequate levels. A three-week traffic regime commenced 11 August to 3 September. An 18-9-18 fertilizer at 0.5# N/1000ft^2 rate was applied on 6 August and 19 August to boost nutrient supplies during the traffic phase. Data was collected during and after the re-establishment window. Measurements included percent turfgrass cover ratings, plant counts, root pulls, shear resistance (rotational traction), and shear/clegg (vertical traction) values. Data was analyzed using Agricultural Research Manager (ARM) (Gylling Data Management, Inc. 2000). Treatment means were separated using Fisher's Protected LSD values at the 0.05 level.

Figure 2. Mowing and Fertility plots 30 DAS.

Table 1. Individual treatments for the mowing and fertilizer study.

***Factor A - Mowing* – (2x/week)**

1) **Low** – Mowed at 1.5" throughout the study
2) **Gradual Reduction** – Mowed at 3.0" for 32 DAS and slowly dropped the height to 1.5"
   - 3 July – 17 July – 4 mowing at 3"
   - 18 July – 24 July – 2 mowing at 2.5"
   - 25 July – 30 July – 2 mowing at 2"
   - 31 July – 3 September – 9 mowing at 1.5"
3) **Chop Down** – Mowed at 3.0" and chopped to 1.5"on day 68 DAS
   - 3" Chop Mowing – August 7

***Factor B - Fertilizer* –**

1) **Urea** - 46-0-0 – 1 July @ 1 lbs. N/1000ft^2
2) **Urea 2w** - 46-0-0 – 0.33 lbs. N/1000ft^2 every 2 weeks – 16 June, 1 Jul and 15 July
3) **SCU** - 39-0-0 – SCU @ 3 lbs. N/1000ft^2 on
4) **Poly 2 -** 43-0-0 – Polyon @ 2 lbs. N/1000ft^2 (projected 0.1lbs. N/M/wk)
5) **Poly 3 -** 43-0-0 – Polyon @ 3 lbs. N/1000ft^2 (projected 0.2lbs. N/M/wk)
6) **Poly Thin** - 44-0-0 – Polyon @ 4 lbs. N/1000ft^2 (projected 0.4lbs. N/M/wk)

*** Fertilizer treatments 3-6 were applied the day of re-establishment only.**

Table 2. Effects of mowing height and fertility treatments on percent turfgrass cover ratings (%) on a trafficked perennial ryegrass/Kentucky bluegrass stand at the HTRC, 2003.

	Non Traffic			Traffic		
	20-Jun	7-Jul	4-Aug	12-Aug	27-Aug	3-Sep
	---- % Cover ----					
Mowing						
Low	9	52	77	66	65	40
Gradual	11	57	81	69	62	41
Chop	10	54	73	67	58	37
LSD (0.05)	NS	NS	6	NS	NS	NS
Fertility						
Urea	7	42	76	66	52	27
Urea 2w	9	43	74	60	58	34
SCU	12	47	68	61	57	32
Poly2	16	69	81	74	68	49
Poly3	13	76	92	84	77	66
Poly Thin	5	49	69	61	59	28
LSD (0.05)	4	9	8	9	11	11
Games Simulated	0	0	0	4	14	17

Table 3. Effects of mowing height and fertility treatments on a non trafficked and trafficked perennial ryegrass/Kentucky bluegrass stand for cover ratings (%), root pulls (N), shear resistance (Nm) shear/clegg (Nm) and plant counts, 2003.

	6-Aug		3-Sep			
	Cover %	Root Pull N	Cover %	Shear Nm	SH/CL Nm	Pl. Counts plants/100cm ^{2}
Mowing						
Low	77	324	40	8	49	172
Gradual	81	368	41	8	53	166
Chop	73	357	37	7	51	157
LSD (0.05)	6	NS	NS	NS	NS	NS
Fertility						
Urea	76	330	27	5	38	139
Urea 2w	74	383	34	7	47	163
SCU	68	305	32	7	48	172
Poly2	81	405	49	11	61	167
Poly3	92	397	66	12	70	203
Poly Thin	69	278	28	4	39	145
LSD (0.05)	8	89	11	3	11	35
Games Simulated	0	0	17	17	17	17

Results and Discussion

Percent turfgrass cover ratings are listed in Table 2. There were no significant dates for mowing height except on 4 August. All dates for fertility treatments were significant for both non-traffic and traffic dates throughout the experiment. The "Gradual" mowing had significantly higher turfgrass cover than the "Chop" mowing but not the "Low" mowing. For both years (2002 data not shown), percent turfgrass cover ratings for the Poly 3 treatment was significantly higher at the end of the re-establishment window and at the end of the traffic season.

Percent cover ratings and root pulls for non-traffic dates and percent cover, shearing values and plant counts for traffic dates are listed in Table 3. There were no significant differences among mowing height treatments except for percent cover on 6 Aug. All the measurement dates were significant for fertility treatments in both non-traffic and traffic dates. It is the hope of the authors to allow the reader to see how the data comes together at a specific point in time, three weeks into the traffic season. Once doing this, it is easy to see the importance of a slow-release fertilizer in the establishment window as well as the importance of mowing height in order to peak plant fitness for the playing season.

Take Home Message

All the fertilizers were put down the same day as the seed except for the urea treatments. Poly 2 and Poly 3 were consistently higher in all measurements throughout the re-establishment and traffic phases of the experiment for both years. With this in mind, not all slow-release fertilizer will respond the same. It was evident that Poly Thin released too quickly, and SCU was unpredictable from one year to the next. Both urea treatments provide quick nitrogen releases, but nutrition for the plant vacillated thus providing inconsistent growth. Even though the up front cost of the bags will be higher, the turfgrass manger does not have to re-apply or can minimize fertilizer applications during this re-establishment phase. Other nutrients were supplemented, but technology provides the opportunity to make many more nutrients slow release as well. At the end of the re-establishment window, mowing height was significant among treatments for both years.

References

Calhoun, R., L. Sorochan, J.N. Rogers, III and J.R. Crum. 2002. Optimizing cultural practices to improve athletic field performance. Michigan State University Extension. Bulletin E18TURF. www.turf.msu.edu

Gylling Data Management, Inc. 2000. Agricultural Research Manager (ARM). 4th edition. Brookings, S.D.

Lundberg, L. 2002. Quantification of the effects of cultural practices on turfgrass wear tolerance on sand based and native soil athletic fields. M.S thesis. Michigan State University.