

# Sports Field Recovery from Unplanned Suspension of Maintenance Activities

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Athletic field managers inevitably will face periods of unplanned suspension from maintenance activities, this can be due to a variety of reasons including pandemics seen recently with COVID-19. When turf managers return, turf height of cut (HOC) can be much higher than desired. Reducing HOC can be stressful for the plant and turf managers alike, and information is lacking for the most efficient and effective way to reduce turf HOC. The objective of this research is to determine the best management regime to reduce height of cut, and provide a surface that is uniform, aesthetically pleasing, and safe for athletes. This is the second year of a two-year study.

## Materials and Methods

Research was conducted at the Iowa State University Horticulture Research Station on Moonlight Kentucky bluegrass (*Poa Pratensis* 'Moonlight') established on native soil. Maintenance activities were withheld from the start of the spring through the end of May. Experimental variables include height of cut reduction method, rate of nitrogen fertilizer and the usage of Trinexapac-ethyl, a widely used plant growth regulator (Table 1). Experimental design is a randomized split-block design with four replications. All traffic treatments are subjected to simulated fall athletic traffic with a modified Baldree Traffic Simulator (BTS), half of each plot not trafficked. Simulated traffic (STE) began in mid-August to align with the start of the high school football season. Three games of traffic are applied per week for 25 games. Athletic field performance and safety was tested every five games. Safety is quantified by measurements of percent green cover with digital image analysis, surface hardness with a 2.25 kg Clegg Impact Surface Tester (CIST), and soil shear strength with a TurfTec Shear Tester (a device used by the National Football League for testing surface stability) (data not shown). Volumetric water content of the soil was tested with every CIST reading using a FieldScout TDR, (data not shown). Soil physical properties including bulk density and total porosity were evaluated to investigate any changes in the soil after 25 simulated traffic events (data not shown).

**Table 1. Kentucky bluegrass athletic field height of cut (HOC) reduction, nitrogen rate, and plant growth regulator regimes tested for turfgrass tolerance to fall simulated athletic field traffic during 2021.**

Regime #	HOC Reduction Strategy <sup>1</sup>	Amount of Fertilizer <sup>5</sup>	PGR <sup>6</sup>
1	1/3 rule <sup>1</sup>	36.6 kg ha <sup>-1</sup>	No
2	1/3 rule	36.6 kg ha <sup>-1</sup>	Yes
3	Scalp <sup>3</sup>	36.6 kg ha <sup>-1</sup>	No
4	Scalp	73.2 kg ha <sup>-1</sup>	No
5	Cut in half, then 1/3 rule <sup>2</sup>	36.6 kg ha <sup>-1</sup>	Yes
6	Cut in half, then 1/3 rule	36.6 kg ha <sup>-1</sup>	No
7	Cut in half, then 1/3 rule	73.2 kg ha <sup>-1</sup>	Yes
8	Cut in half, then 1/3 rule	73.2 kg ha <sup>-1</sup>	No
9	1/3 rule	73.2 kg ha <sup>-1</sup>	No
10	1/3 rule	73.2 kg ha <sup>-1</sup>	Yes

<sup>1</sup>1/3 rule- never removed more than 1/3 of the plant material in a single mowing to get to desired HOC.

<sup>2</sup>Cut in half, then 1/3 rule, removed half of the vertical height with the first mowing, and every subsequent mowing would only remove 1/3 of the remaining leaf tissue until the desired HOC.

<sup>3</sup>Scalp - removed all leaf tissue to the desired HOC in one mowing event.

<sup>4</sup>All HOC maintained with a Honda HRN 216 22 in. rotary mower (Honda HRN216VKA. Motor Co., Tokyo, Japan).

<sup>5</sup>Fertility was supplied with a 28-0-3 (N-P-K) fertilizer (Lesco Inc., Cleveland, Ohio) applied monthly following the start of maintenance at rates of either 36.6 kg ha<sup>-1</sup> or 73.2 kg ha<sup>-1</sup> during the growing season (Jun 1-Nov 1).

<sup>6</sup>Trinexapac-ethyl (PGR) (Primo Maxx®, 584.6 ml ha<sup>-1</sup>, Syngenta, Basel, Switzerland), was either applied or not as part of the maintenance regime every two weeks following the resumption of maintenance at 584.6 ml ha<sup>-1</sup>.

## Results and Discussion

Turf performance, as judged by percent green cover lost after STE, was compared across management regimes once all treatments had been returned to the desired HOC for at least two months before STE. While there are differences in the slope of the loss of percent green cover, treatment differences were lacking except after the 15 STE collection date (Table 2). Orthogonal contrasts determined no differences between regime variables in percent green cover (data not shown). The minimum of a two month delay after achieving desired HOC before applying STEs may have allowed the turfgrass to acclimate and thus not result in STE stress to the degree that might be expected if simulated traffic occurred sooner after the desired HOC was reached.

Through all 25 STEs, treatments were separated by date. Due to a date\*treatment interaction, no dates or orthogonal contrasts for treatment factors were different for rotational resistance (data not shown). Additionally, there were no differences in surface hardness (GMAX) between treatments in trafficked plots. There were only three measurements during data collection that surpassed the GMAX safety threshold of 100 used by the National Football League (data not shown).

Future research may consider the minimum time after HOC is reached after unplanned suspension to achieve safe and aesthetic turfgrass.

**Table 2. Percent green cover of Kentucky bluegrass under simulated athletic field traffic treated with various maintenance regimes, 2020.**

Regime #	Mean (15 STE)	Cover lost/5 STE	Intercept
1	74.475 A	-11.7613	121.29
6	71.9533 AB	-12.6941	113.04
10	70.5725 AB	-10.527	115.45
2	69.63 ABC	-9.2017	114.03
3	68.22 BC	-12.0627	118.16
8	64.8375 DC	-11.8267	114.82
4	61.2225 DE	-9.9083	113.12
5	58.7875 E	-13.1163	109.3
7	56.4675 E	-7.7601	101.4
9	48.075 F	-12.0505	86.809

<sup>1</sup>Means were separated using Fisher's protected least significant difference at the 0.05 level of probability.

<sup>2</sup>For digital image analysis, linear regression analysis was performed to determine slope and intercept of each treatment.

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