

Effects of Wetting Agent Use to Reduce Turf Damage on Sand-Capped Athletic Fields

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Ben Pease, research associate
Adam Thoms, assistant professor
Nick Christians, university professor
Department of Horticulture

Introduction

Athletic field playability and safety is a growing national concern, particularly at the high school sports level. Athletic field usage rates increase each year while field maintenance budgets are stagnant, if not reduced. Many municipal and high school athletic fields endure multiple practices and games per week, despite weather-related conditions detrimental to field integrity. For example, Friday night high school games cannot be rescheduled due to a past or pending rain event. Research is needed to improve current cultural practices and to maximize playability and safety of natural grass athletic fields, especially in reference to prolonging field surface integrity throughout the high school football season.

The objective of this trial is to investigate the use of wetting agent products and application timings as part of a sand-capped natural grass athletic field management plan in preparation for a game event coinciding with a large rain event. Six products and three timings will be investigated to improve rootzone water content management.

Materials and Methods

Research was conducted at the Iowa State University Horticulture Research Station on a sand-capped rootzone. Treatments were arranged in a randomized complete block factorial design with three replications. Wetting agents tested were Alypso Plus,

Dispatch, Revolution, Sixteen90, Triplo, and Vivax. Experimental units were 3 ft x 5 ft with 2-ft alleys between replications. Treatments were applied using a CO₂-pressurized spray system with TeeJet 8004VS nozzles at two gallons water/1,000 ft². Treatments were watered in after application with 0.5 in. irrigation water and then additional irrigation (1.0 in.) was applied the evening prior to traffic to simulate a large rain event. Height of cut was 1.750 in. three days/week with a rotary mower, clippings returned. Turf type was an athletic field mix of Kentucky bluegrass (*Poa pratensis*) and perennial ryegrass (*Lolium perenne*), grown on a 4-in. sand-capped rootzone. One pound of nitrogen/1,000 ft² was applied/growing month. Maintenance standards were developed to best simulate low- to mid-budget athletic field operations with automatic irrigation.

Wetting agent treatments were applied at seven, five, or one day(s) prior to simulated traffic treatments that began August 2, 2017. Full-labeled-rates were used. Each wetting agent product also had an untreated control. Simulated traffic treatments were applied using a modified Baldree Traffic Simulator. Simulated traffic was applied 5 days/week at one practice/game per day for 5 weeks.

Weekly digital images were collected with a light box and camera system to track turfgrass performance by percent green cover, determined by digital image analysis (DIA) software. Weekly surface hardness was collected using the 2.25 kg Clegg Impact Soil Tester. Soil moisture was measured using a time domain reflectometry probe each time surface hardness data was collected. Turfgrass shear strength also was measured. This report

covers the first year of a two-year trial. Data were analyzed using SAS software.

Results and Discussion

Surface hardness readings-by-product were significantly different at 0, 15, and 20 simulated traffic events (Table 1). Dispatch had the lowest surface hardness readings at 15 and 20 simulated traffic events; highest readings were Alypso Plus and Sixteen90, respectively. Percent turf cover differences-by-product were significant at 10 and 20 simulated traffic events; highest percentages of cover were Alypso Plus/Triplo and Alypso

Plus, respectively. Lowest percent cover was Revolution on both dates.

Surface hardness and percent cover-by-timing of application were both not significant at any amount of simulated traffic events (Table 2).

This is the first year of a two-year trial. Continued research is necessary to determine treatment differences.

Acknowledgements

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Table 1. Surface hardness and percent cover ratings by wetting agent product and number of simulated traffic events for Kentucky bluegrass on a sand-capped rootzone, 2017.

Product	Cumulative simulated traffic event rating dates ¹				
	0	5	10	15	20
	Surface hardness ²	Surface hardness	Surface hardness	Surface hardness	Surface hardness
Alypso Plus	56.2ab ³	70.6	73.1	88.8a	73.8ab
Dispatch	54.3b	71.0	71.2	84.9b	68.0c
Revolution	55.2ab	70.9	71.4	86.3ab	69.3bc
Sixteen90	56.4ab	71.1	72.2	85.4ab	77.4a
Triplo	57.5a	71.4	70.8	85.9ab	74.4ab
Vivax	57.2ab	73.4	67.1	88.3ab	75.6a
LSD (0.05) ⁴	3.2	3.8	4.4	3.8	5.3
	Percent turf cover ⁵	Percent turf cover	Percent turf cover	Percent turf cover	Percent turf cover
Alypso Plus	93.8a	93.4	93.8a	43.0	66.7a
Dispatch	92.7bc	92.4	91.2ab	43.7	63.1ab
Revolution	92.4c	92.2	89.4b	41.0	61.6b
Sixteen90	93.0abc	92.6	91.9ab	42.1	63.5ab
Triplo	93.1abc	93.5	93.6a	41.6	64.0ab
Vivax	93.4ab	92.6	90.8ab	39.6	62.5ab
LSD (0.05)	1.0	1.7	3.1	5.5	4.6

¹Simulated athletic field traffic was applied using a modified Baldree Traffic Simulator.

²Surface hardness was collected using the average of three random drops of a 2.25 kg Clegg Impact Soil Tester. Soil moisture was collected at the same time with a TDR probe (data not presented).

³Treatments followed by different letters are significantly different.

⁴Means within a column were separated using Fishers LSD.

⁵Percent turf cover collected via digital image analysis.

Table 2. Surface hardness and percent cover ratings by wetting agent timing and number of simulated traffic events for Kentucky bluegrass on a sand-capped rootzone, 2017.

Timing	Cumulative simulated traffic event rating dates ¹				
	0	5	10	15	20
	Surface hardness ²	Surface hardness	Surface hardness	Surface hardness	Surface hardness
Control	55.9	71.2	69.7	86.8	74.1
1 day	57.2	71.0	71.1	86.4	71.8
5 day	56.3	71.8	71.1	87.4	73.2
7 day	55.1	71.5	72.0	85.7	73.2
LSD (0.05) ³	2.6	3.1	3.6	3.1	4.3
	Percent turf cover ⁴	Percent turf cover	Percent turf cover	Percent turf cover	Percent turf cover
Control	93.0	92.6	92.1	40.8	63.6
1 day	93.0	92.3	90.5	40.7	61.1
5 day	93.0	93.2	92.0	43.0	64.4
7 day	93.3	93.0	92.5	42.8	65.0
LSD (0.05)	0.8	1.4	3.1	4.5	6.0

¹Simulated athletic field traffic was applied using a modified Baldree Traffic Simulator.

²Surface hardness was collected using the average of three random drops of a 2.25 kg Clegg Impact Soil Tester. Soil moisture was collected at the same time (data not presented).

³Means within a column were separated using Fishers LSD.

⁴Percent turf cover collected via digital image analysis.