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

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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/Tripl0 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
The authors thank Aquatrols and Precision Labs for donation of test products.
### 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.

<table>
<thead>
<tr>
<th>Cumulative simulated traffic event rating dates&lt;sup&gt;1&lt;/sup&gt;</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alypso Plus</td>
<td>56.2ab&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70.6</td>
<td>73.1</td>
<td>88.8a</td>
<td>73.8ab</td>
</tr>
<tr>
<td>Dispatch</td>
<td>54.3b</td>
<td>71.0</td>
<td>71.2</td>
<td>84.9b</td>
<td>68.0c</td>
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<tr>
<td>Revolution</td>
<td>55.2ab</td>
<td>70.9</td>
<td>71.4</td>
<td>86.3ab</td>
<td>69.3bc</td>
</tr>
<tr>
<td>Sixteen90</td>
<td>56.4ab</td>
<td>71.1</td>
<td>72.2</td>
<td>85.4ab</td>
<td>77.4a</td>
</tr>
<tr>
<td>Triplo</td>
<td>57.5a</td>
<td>71.4</td>
<td>70.8</td>
<td>85.9ab</td>
<td>74.4ab</td>
</tr>
<tr>
<td>Vivax</td>
<td>57.2ab</td>
<td>73.4</td>
<td>67.1</td>
<td>88.3ab</td>
<td>75.6a</td>
</tr>
<tr>
<td><strong>LSD (0.05)&lt;sup&gt;4&lt;/sup&gt;</strong></td>
<td>3.2</td>
<td>3.8</td>
<td>4.4</td>
<td>3.8</td>
<td>5.3</td>
</tr>
</tbody>
</table>

<sup>1</sup>Simulated athletic field traffic was applied using a modified Baldree Traffic Simulator.

<sup>2</sup>Surface 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).

<sup>3</sup>Treatments followed by different letters are significantly different.

<sup>4</sup>Means within a column were separated using Fishers LSD.

<sup>5</sup>Percent 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.

<table>
<thead>
<tr>
<th>Cumulative simulated traffic event rating dates&lt;sup&gt;1&lt;/sup&gt;</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>55.9</td>
<td>71.2</td>
<td>69.7</td>
<td>86.8</td>
<td>74.1</td>
</tr>
<tr>
<td>1 day</td>
<td>57.2</td>
<td>71.0</td>
<td>71.1</td>
<td>86.4</td>
<td>71.8</td>
</tr>
<tr>
<td>5 day</td>
<td>56.3</td>
<td>71.8</td>
<td>71.1</td>
<td>87.4</td>
<td>73.2</td>
</tr>
<tr>
<td>7 day</td>
<td>55.1</td>
<td>71.5</td>
<td>72.0</td>
<td>85.7</td>
<td>73.2</td>
</tr>
<tr>
<td><strong>LSD (0.05)&lt;sup&gt;3&lt;/sup&gt;</strong></td>
<td>2.6</td>
<td>3.1</td>
<td>3.6</td>
<td>3.1</td>
<td>4.3</td>
</tr>
</tbody>
</table>

<sup>1</sup>Simulated athletic field traffic was applied using a modified Baldree Traffic Simulator.

<sup>2</sup>Surface 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).

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