

# The Effect of Topdressing with Rubber Buffings on Intensely Trafficked Football Turf

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A study was initiated during the summer of 1996 at Ames High School football field in Ames, Iowa to evaluate the effects of buffings rubber on a intensely trafficked football turf. The experimental plots were arranged behind the east goal post on a mature stand of Kentucky bluegrass overseeded with perennial ryegrass. The experimental plot was measured to the size of a football exercise apparatus called strings. The object of the exercise is to develop balance of the athlete and to teach foot and eye coordination. The athlete runs through the strings by placing his foot into the desired square sector. The coach can instruct the athlete to do various exercises such as a criss-cross, bunny-hop, side step, diagonal, and others. The apparatus was placed over the experimental plot such that each square of the apparatus was over the top of the 2 x 3 ft treatments and controls. The number of feet to hit each plot was calculated with a hand-held counter and later recorded to find the total number of feet placed into each square (Table 1). Human athletes, wearing 3/8-inch high-density plastic cleats, were used to uniformly apply traffic to the research plots during a football practice exercise. Other research has used various cleated roller devices to simulate traffic (i.e. Brinkman traffic simulator, Differential slip-2 simulator, and modified Brouwer roller). Overall plot size was 6 x 20 ft with individual plots being 2 x 3 ft for a total of 18 plots, 2 rows of 9 plots each. Plots were positioned opposite one another in pairs. Each pair of plots had a rubber treatment and a non-rubber control. There were three replications of each pair of plots. The three treatments were 0.25-, 0.50- and 0.75-inch depths of medium buffings rubber (Table 2). The particle size of medium buffings is 1 mm diameter (18 mesh) to 0.5 mm diameter (35 mesh). The average ratio of length to width for the longest treads of rubber is approximately 7:1. A 6 x 20 ft area was scalp-mowed to 0.75 inches and core aerified with 0.50-inch diameter hollow tines, cores removed, and rubber topdressing treatments applied on 3 June 1996 (Table 2). It was found that topdressing the scalp plot with the 0.75-inch treatment was excessive, therefore a remaining amount of rubber was added later, after settling had occurred, to achieve the desired amount.

The main objective was to evaluate the effects of buffings rubber on turf cover under intense football-type traffic. A secondary objective was to evaluate turf re-establishment by reseeding into worn turf containing rubber buffings.

Measurements were taken for traffic [percentage of turfgrass cover with the remaining percentage equal to the amount of topdressed rubber or soil showing] (Table 3) and temperatures within the grass canopy and at a 1.0-inch depth (Table 4). The surface/canopy temperature was measured using a hand-held infrared probe (Cole-Parmer, Type J, model # H-39652-00) plugged into a thermocouple thermometer held at a height of 24 inches above the plot. The effective diameter cone measured was 6-inches with an area of 28.3 square inches. The 1.0-inch depth temperature was measured with a 12-inch, 0.25-inch diameter heavy-duty penetration probe (Cole-Parmer, Type T, model # H-93601-26). A g-max was also initially measured (Table 3).

Results of surface/canopy temperature showed that the rubber treatments were 6 to 9° F higher than the no-rubber controls. However, temperatures at the 1.0-inch depth showed the rubber treatments having the same and in some cases a lower temperature than the no-rubber control (Table 4). Black rubber exposed to direct sunlight may accelerate turf canopy temperature but has little impact on shallow soil temperatures. It may be possible that the rubber layer is acting like a mulch and reducing underlying soil temperature.

The plots were overseeded on 24 September 1996. Grass plants were at a height of 1.0-inch on 16 October 1996. No phytotoxicity was observed at this time on the new seedlings.

**Table 1.** Average number of feet hit into each plot for the 5-day training camp.

Date	Aug 5	Aug 6	Aug 7	Aug 8	Aug 9	Total
Average number of feet per plot	130	330	550	445	346	1670
Total number of feet for entire exp plot (all 20 plots)	2600	6608	11,000	8910	6920	33,440

**Table 2.** Treatments and the arrangement of treatments in the experimental plots.

1	C	2	C	3	C	1	C	2	C
C	3	C	1	C	2	C	3	C	1
Rep I			Rep II			Rep III			leftover

Depths

1. 0.25-inch medium rubber buffings
2. 0.50-inch medium rubber buffings
3. 0.75-inch medium rubber buffings

C = control, no rubber

**Table 3.** Initial g-max before traffic and the percentage turf cover during traffic treatments.

Treatments	G-max June 5, 1996	percent turf cover			
		Aug 6	Aug 7	Aug 8	Aug 9
1. 0.25-inch depth of MB control for trt 1	62.1 67.0	96.7 93.3	80.0 65.0	53.3 43.3	18.3 7.3
2. 0.50-inch depth of MB control for trt 2	61.0 66.7	95.0 90.0	90.0 31.7	60.0 28.3	35.0 6.7
3. 0.75-inch depth of MB control for trt 3	60.0 68.1	95.0 95.0	73.3 65.0	30.7 36.7	36.7 10.0

MB=Medium rubber buffings

**Table 4.** Surface and subsurface temperatures taken on 24 September 1996, 45 days after traffic treatments were applied. Air temperature was 67° F during data collection.

Treatments	Average temperature on the surface (°F)	Average temperature at the 1.0-inch depth (°F)
1. 0.25-inch depth of MB control for trt 1	73.4 67.2	67.6 68.2
2. 0.50-inch depth of MB control for trt 2	74.2 68.3	67.2 67.6
3. 0.75-inch depth of MB control for trt 3	78.0 69.0	66.6 67.7

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MB=Medium rubber buffings