THE EFFECT OF CRUMB RUBBER AS A SOIL AMENDMENT IN A HEAVY TRAFFIC SITUATION

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INTRODUCTION

Incorporating crumb rubber into the soil profile has indicated the ability to reduce compaction and increase wear tolerance in high trafficked areas. The main focus of available second year data targeted athletic fields without forfeiting turf quality and aesthetics.

Crumb rubber has proven to also provide a softer surface for athletic activity particularly at fields representative of high schools. Inevitably, a safer playing surface is targeted, but an arbitrary figure to define the threshold level is undetermined and currently impractical.

The management practices of current athletic fields is usually below standards, however by employing crumb rubber the safety and playability of the fields can be increased.

MATERIALS AND METHODS

The study was resumed in 1992 at the Hancock Turfgrass Research Center (HTRC) at Michigan State University. Crumb rubber (6 mm diameter) was tilled into the soil at two depths (7.6 and 15.2 cm) in five volumes (0, 10, 20, 30 and 40% v/v). The design was a factorial randomized complete block with three replications. Lolium perenne var. `Dandy' was seeded at 5.6 $kg*ha^{-1}$ in one plot, and Poa pratensis with 15% Poa annua was sodded in a second plot of same design. Data collection was taken 26 September, 2 October and 20 November. Stresses or environmental tests collected were impact absorption, shear resistance, moisture content and soil temperature. Wear treatments were facsimiled by the Brinkman Traffic Simulator (BTS) six times per week to equal the amount of traffic received inside the hashmarks between the 40 yard line of two football games. Impact absorption was applied by the Clegg Impact Hammer (2.25 kg hammer). The value recorded was the average of three measurements. Shear resistance was measured with the Eijkelkamp Shearvane. The value recorded an average of three measurements. Soil temperature was recorded for surface and at 7.6 cm depth for 26 September and 2 October, but only 7.6

cm depth temperature was recorded for 20 November. Both temperatures were read by the Barnant 115 Thermocoupler Thermometer. Soil moisture recordings were provided by the Gravimetric method on 2 October and 20 November. Three soil samples (7.6 cm) per treatment were used for this method.

RESULTS

Increasing crumb rubber volumes in both Kentucky bluegrass and perennial ryegrass turf caused a decrease in impact absorption values (lower values equate to a softer surface)(Table 1). There was no significant difference in impact absorption between incorporation depth on either Kentucky bluegrass and perennial ryegrass (except 20 November).

There was no significant difference in shear resistance between incorporation depth for either Kentucky bluegrass or perennial ryegrass turf (Table 2). Increasing crumb rubber volumes on Kentucky bluegrass caused an increase in shear resistance (higher values equate to better traction) while decreasing crumb rubber volumes increased shear resistance on perennial ryegrass.

Kentucky bluegrass soil moisture values increased with crumb rubber volumes while perennial ryegrass values tended to be inconsistent (Table 3). However, no significant difference in soil moisture was reported between incorporation depth in either Kentucky bluegrass or perennial ryegrass turf.

CONCLUSION

From our results, ideal volumes of incorporating rubber volumes is 20 to 30 percent. This assessment compromises a softer surface, moisture retention and traction while not sacrificing aesthetics and playability of the playing surface.

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Table 1. Effects of crumb rubber on impact absorption in Kentucky bluegrass and perennial ryegrass at the Hancock Turfgrass Research Center, 1992.

	Turf Species					
	Kentucky bluegrass			Perennial ryegrass		
	26 Se	2 Oc	20 Nv	26 Se	2 Oc	20 Nv
Soil Depth(cm)	Impact Absorption values(g)					
7.6	83.5	90.1	71.2	94.2	107.6	67.7
15.2	82.9	90.3	69.5	93.5	109.8	65.0
Lsd(0.05)	-NS-	-NS-	-NS-	-NS-	-NS-	2.6
Rubber Volume(V/V)						
0	91.8	97.1	73.3	96.1	116.3	69.6
10	86.6	96.8	75.3	95.8	112.5	69.7
20	78.6	84.0	68.9	96.0	108.6	67.4
30	79.0	87.0	69.6	92.7	105.6	63.0
40	80.0	86.0	64.8	88.6	100.4	61.9
Lsd(0.05)	-NS-	9.1	6.6	-NS-	10.0	4.1

** Significant at 0.05 level

Table 2. Effects of crumb rubber on shear resistance in Kentucky bluegrass and perennial ryegrass at the Hancock Turfgrass Research Center, 1992.

	Turf Species					
	Kentucky bluegrass			Perennial ryegrass		
	26 Se	2 Oc	20 Nv	26 Se	2 Oc	20 Nv
Soil Depth(cm)	Shear Resistance values (N/M)					
7.6	120	121	109	89	81	85
15.2	115	121	106	85	85	84
Lsd(0.05)	-NS-	-NS-	-NS-	-NS-	-NS-	-NS-
Rubber Volume(V/V)						
0	116	118	103	100	91	91
10	115	128	107	99	85	87
20	115	121	107	91	81	86
30	122	121	111	72	76	82
40	120	118	110	73	78	76
Lsd(0.05)	-NS-	-NS-	-NS-	16.3	10.0	5.4

Table 3. Effects of crumb rubber on soil moisture in Kentucky bluegrass and perennial ryegrass at the Hancock Turfgrass Research Center, 1992.

	Turf Species			
	Kentucky bluegrass		Perennial ryegrass	
	2 Oc	20 Nv	2 Oc	20 Nv
Soil Depth(cm)	Soil Moisture values (%)			
7.6	25.9	30.2	20.8	25.3
15.2	26.3	33.3	18.3	24.8
Lsd(0.05)	2.1	1.4	**	-NS-
Rubber Volume(V/V)				
0	23.3	30.1	21.1	24.6
10	25.2	30.3	20.8	26.6
20	27.4	31.9	19.6	24.5
30	27.0	33.0	19.0	23.7
40	27.6	33.4	17.6	25.9
Lsd(0.05)	3.2	-NS-	2.2	-NS-

** Significance at 0.05 level