The perennial ryegrass density on these sites was not significantly different. It is suspected that the perennial ryegrass in the rubber incorporated plots will be considerably healthier in the spring of 1991 due to decreased compaction. The study will be continued in 1991 as well as more extensive studies at the Hancock Turfgrass Research Center.

III. Effects of perennial ryegrass/Kentucky bluegrass seeding mixtures and compositions on wear tolerance.

In June 1989 a study was initiated at the Hancock Turfgrass Research Center to determine the effects of different perennial ryegrass/Kentucky bluegrass seeding mixtures, their eventual turf composition, and their subsequent ability to resist and recuperate from wear. Two studies were conducted in this area. The first study involved five perennial ryegrass/Kentucky bluegrass ('Citation II'/'Ram I') seeding mixture percentages (0/100, 20/80, 35/65, 50/50, and 80/20) and two priming procedures for Kentucky bluegrass seed (primed vs unprimed). All seeding rates totaled 2.0 lbs/1000 ft^2. The second study involved a 80/20 percentage mix of perennial ryegrass/Kentucky bluegrass at three seeding rates (2,4, and 6 lbs/1000 ft^2) and the priming factor. All of these treatments were seeded June 30, 1989 and allowed to mature until a wear treatment was initiated May 15, 1990. The turf was subjected to wear using a Brinkman Traffic Simulator (BTS) purchased through funds donated by the Michigan Turfgrass Foundation. The BTS simulates athletic field traffic (soccer and/or football) and has an equivalancy of two passes with a water-filled drum type roller with cleat-like appendages equaling traffic received at 40 yard line of one football game. This equivalency was developed by inventors of the BTS at the University of California - Riverside. From May 15 to June 25, 1990 there were two passes two times/week with the BTS. This was increased to four passes three times/week until August 30. This wear constituted what is referred to as Spring/Summer wear. On September 7, a Fall Wear treatment was initiated on a previously undisturbed portion of each plot. The wear was 12 passes/week until November 30, 1989.

Data collected in these studies included turfgrass density, quality resulting from wear treatment, color, and impact values measured with the Clegg Impact Soil Tester. The results of the turfgrass mixes study are presented in Table 3 while the results from the similar mix/different seeding rate study are presented in Table 4. Very little differences were found among the measured characteristics in relation to turfgrass rates (Table 4). The Kentucky bluegrass seed priming was unsuccessful. No significant differences between primed vs unprimed seed were recorded in either study.

In 1991, turfgrass wear will continue. In addition, plant species counts and change in species composition due to wear treatments will be collected and assessed.

IV. Effects of potassium on wear tolerance in turf grasses.

A study was begun in cooperation with Paul Rieke and Mike Saffel at the Hancock Turfgrass Research Center, Michigan State University, in 1989 to investigate the long term effects of annual potassium applications on wear

tolerance in Kentucky bluegrass, tall fescue, and perennial ryegrass turfs. Five K levels (0, 4, 8, 12 lbs/1000 ft^2/year, and K based on soil test recommendation) and four replications were used on separate test areas of 'Baron' Kentucky bluegrass, 'Rebel' tall fescue, and 'Manhattan' perennial ryegrass. The applications were made in 1989 and 1990 at a rate of 2.0 lbs K/1000 ft^2 on a three week interval beginning June 1 and ending September 15.

Wear traffic was begun on May 15, 1990 using the Brinkman Traffic Simulator, BTS. The BTS was developed by researchers at the University of California-Riverside to simulate the wear action of athletic cleats from sports such as football and soccer. The device is made of two hollow steel drums 15" in diameter and 42" wide. There are nuts and bolts attached perpendicular to the drums such that they protrude out to simulate cleats. The drums are filled with water for a total weight of 860 lbs. Data from these researchers show that two passes with the BTS equal the amount of wear on a field at the forty yardline of one football game. The turf was subjected to two passes twice/week from May 15 to June 25, and four passes three times/week from June 25 to August 30, 1990. Another series of wear treatments was begun September 7, 1990 at four passes three times/week on previously unworn plot areas to evaluate effects more closely simulating those obtained during the football season. These treatments ended November 30, 1990.

Turf shear and quality ratings were made periodically throughout the year and are presented for each turfgrass in Table 6. There were no quality or shear resistance differences due to wear or K fertility for any grasses except in tall fescue. During the Fall wear treatment (Sept. 17), the check plot was significantly lower in quality than the soil test and the 8 lb. K treatments.

This study will be continued in 1991. Quantitative sampling of leaf tissue will be analyzed.

Table 5. The effects of potassium fertility and turfgrass wear on turfgrass quality and shear resistance in Kentucky bluegrass, tall fescue, and perennial ryegrass turf.

Treatment	Turfgrass Quality[1]				Shear Resistance		
	Spring/Summer Wear			Fall Wear			
	June 9	July 10	August 10	Sept 17	April 20	July 5	Aug 15
						(Nm/m^2)	
Kentucky bluegrass							
1. Soil Test[2]	6.0	4.8	4.3	6.5	47.5	20.0	19.8
2. 4 lbs K/1000 ft^2/yr	5.8	5.0	3.8	5.5	46.2	19.0	18.8
3. 8 lbs K/1000 ft^2/yr	5.8	5.0	4.0	5.8	45.0	19.5	18.4
4. 12 lbs K/1000 ft^2/yr	5.5	4.5	4.0	6.0	44.3	19.5	18.5
5. Check	6.0	5.0	3.8	5.3	45.9	19.6	18.4
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS
Tall Fescue							
1. Soil Test[2]	5.5	4.8	4.0	6.0	41.1	17.7	13.6
2. 4 lbs K/1000 ft^2/yr	5.5	4.5	3.3	5.3	42.0	18.2	14.1
3. 8 lbs K/1000 ft^2/yr	6.0	5.3	3.5	5.8	43.2	18.4	15.0
4. 12 lbs K/1000 ft^2/yr	5.8	4.8	4.3	5.0	38.5	17.7	14.7
5. Check	6.0	4.8	3.5	4.5	43.0	17.4	13.5
LSD (0.05)	NS	NS	NS	1.1	NS	NS	NS
Perennial ryegrass							
1. Soil Test[2]	5.0	4.5	4.5	5.5	43.3	17.2	15.5
2. 4 lbs K/1000 ft^2/yr	5.5	5.3	3.5	6.3	42.0	18.0	14.3
3. 8 lbs K/1000 ft^2/yr	5.8	4.5	3.8	6.0	43.7	17.4	14.6
4. 12 lbs K/1000 ft^2/yr	5.8	5.0	3.5	5.8	42.5	17.8	14.5
5. Check	5.0	4.8	4.0	6.3	41.9	16.2	15.6
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS

[1] Turfgrass quality on a scale of 1-9 with 1 = bare ground and 9 = ideal turf.
[2] Soil test K recommendation was 2.0, 2.5, and 3.0 lbs K/1000 ft^2/year for Kentucky bluegrass, tall fescue, and perennial ryegrass, respectively.