The varieties presented in Table 1 were averaged over locations as there was no significant location x variety interaction in 1990. Two varieties, in the author's opinion, did separate themselves from the other grasses in 1990, 'Dandy' and 'Repell'. These grasses had maintained consistently high densities throughout the trial.

This evaluation will continue for 1991. The high wear location will be reseeded in May (very typical of athletic field practices in this area) while the medium wear trial will not be subjected to reseeding.

II. Crumb rubber from used tires as a soil modifier for athletic fields.

A cooperative study with the Michigan State University departments of Intercollegiate Athletics and Grounds Maintenance was initiated May 1, 1990, at the varsity practice football fields of Michigan State University to investigate the effects of crumb rubber from used tires as a soil modifier. The pretrial thought was that the rubber in the soil would absorb the traffic and the soil would not compact as readily, thereby leaving pore space for root growth and a healthier, longer wearing turfgrass plant.

The rubber pellets (6.0 mm dia.) were tilled into the soil (textural class-sandy loam) at a depth of 10 cm. The plot size was 1.2 x 1.8 m (4 x 6 feet). There were three rubber volumes (0, 10, 15) and each of these treatments were replicated three times. The study was conducted in two separate areas on the field in areas of high and medium traffic (The traffic consisted of the Michigan State University varsity football team). The high traffic area was located between the 10 and 30 yard lines and the medium traffic areas between the 40 yard lines. (These traffic areas are directly opposite of the wear pattern for a actual game. The football team practices in specialized groups at ends of the field, thereby leaving the before mentioned wear patterns). Both studies were established between the hashmarks. The grass sown was perennial ryegrass (Lolium perenne) at a rate of 6.7 kg/ha (6.0 lbs/1000 ft^2). The perennial ryegrass was a blend by NK Lawn and Garden Inc. called Medalist 8. The varieties in the blend were 40% 'Dandy', 30% 'Delray' and 30% 'Target'. Traffic was withheld from these areas until the football practice began August 21.

The plots were evaluated for impact absorption every two weeks beginning September 5 with the Clegg Impact Soil Tester, CIT (Table 2.). The hammer weight was 2.25 kg. The CIT has been used by the author and several others to evaluate and compare turf, soil, and artificial surfaces. An accelerometer mounted in the hammer measures the duration of the impact. The shorter the time period, the greater the deceleration of the hammer, and the harder the surface. The impact is given in units of g's, with g_{max} being the peak deceleration of the object. The design was analyzed as a one factor (rubber volume) randomized complete block design combined over locations (high and medium wear). The rubber x location was not significant during 1990. On five of the seven evaluation dates the rubber incorporated plots had significantly lower g_{max} values than the control (0% rubber). Soil moisture on these dates was not recorded. Soil cores were taken from the areas on each visit. An interesting finding was that the rubber incorporated plots had deeper perennial ryegrass roots than the control plots. (The control plot however was considerably easier to sample with a soil probe.)

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

Table 2. Impact absorption values (g_{max}) of rubber incorporated plots subjected to football type wear. MSU Varsity Practice Fields - 1990.

Date	9/5	9/20	10/4	10/19	11/2	11/16	11/30
				g_{max}			
Location							
Medium Wear	64	54	58	64	97	75	66
High Wear	66	57	59	69	101	82	67
Significance (0.05)	NS	NS	NS	NS	NS	*	NS
% Rubber (v/v)							
0	67	60	63	72	105	82	69
10	63	53	57	63	96	76	65
15	65	54	55	64	96	77	65
LSD (0.05)	NS	4	5	5	NS	5	4