1990 Athletic Field Research Summary

John N. Rogers III and Michael W. Ventola
Department of Crop and Soil Sciences
Michigan State University

Research in the area of athletic fields and high traffic areas was conducted in 1990 at the Hancock Turfgrass Research Center and the Michigan State University Varsity practice fields. This research was made possible by the support provided by the Michigan Turfgrass Foundation.

I. Perennial ryegrass variety trial on Michigan State University varsity practice field.

A cooperative study with the Michigan State University departments of Intercollegiate Athletics and Grounds Maintenance was initiated on May 1, 1990, to evaluate 19 perennial ryegrass (Lolium perenne) cultivars and four perennial ryegrass blends for density and wear tolerance after subjection to actual wear from football players. (It is believed by the author to be the first test of this type.) The perennial ryegrasses used were those sent by seed companies as their recommendation for sports turf. The companies participating in the study were NK Lawn and Garden, Turf Seed Inc., Pickseed Inc., Lofts Seed Inc., and International Seeds Inc. (Note: Jacklin Seed Co. also sent samples for the study but they arrived too late to be included in the trial.)

The studies were established in two locations on the East Varsity football practice field on the Michigan State University campus. The locations were areas of high and medium traffic. The high traffic location was between the 10 and 30 yardline while the medium traffic location was between the 40 yard lines on the field. (This is opposite of the wear pattern on a game field. In the practice scheme at MSU, the players are divided into their specialties and practice at opposite ends of the field. The high wear location was subjected to the offensive unit.) Both studies were established between the hashmarks.

The plot sizes were 1.2 x 1.8 m (4 x 6 feet) and replicated three times. The plots were seeded at a rate of 6.7 kg/ha (6.0 lbs/1000 ft^2) on May 1 and areas needing additional help in obtaining a full stand were seeded June 12. Traffic was withheld from this area until practice began, August 21. The ryegrasses were evaluated for density (qualitatively) seven times beginning September 5 and every two weeks until November 30. The data were analyzed as a one factor (variety) randomized complete block design combined over locations (high and medium wear).

The density ratings are presented in Table 1. There was a significant difference in density between locations on five of seven evaluation periods. The reason for a low density rating on September 5 and then a large increase in density September 20 was due to the environmental conditions present in late August/early September. This was an unusually hot, dry period and the turf received no supplemental irrigation until September 2. The ratings from September 5 reflected these conditions. After this period the growing conditions were very good for the remainder of the fall.

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.)

Table 1. The effects of football wear on density of Perennial ryegrass cultivars - Michigan State University Varsity Practice Field - 1990.

Date		Sept 5	Sept 20	Oct 4	Oct 19	Nov 2	Nov 16	Nov 30
Location					% Density			
Medium Wear		65	71	73	81	66	69	72
High Wear		47	61	60	50	34	32	33
Significance (0.05)		*	NS	NS	*	*	*	*
Variety								
Dandy	1	64.2	69.2	70.8	72.5	63.3	60.0	65.8
Delray	2	48.3	56.7	57.5	57.5	34.2	40.0	40.8
Caddie	3	39.2	58.3	60.0	58.3	40.8	49.2	45.8
Target	4	63.3	67.5	68.3	67.5	48.3	50.8	55.0
Charger	5	57.5	70.0	68.3	66.7	47.5	52.5	51.7
Birdie II	6	48.3	61.7	63.3	62.5	45.0	45.0	45.8
Citation II	7	45.8	51.7	60.0	57.5	36.7	48.3	43.3
Omega II	8	50.0	69.2	65.0	68.3	52.5	55.8	55.0
Dasher II	9	48.3	66.7	60.8	64.2	50.0	47.5	48.3
Fiesta	10	57.5	68.3	61.7	67.5	50.8	47.5	53.3
Blazer II	11	65.0	72.5	69.2	62.5	52.5	50.8	58.3
N4-88	12	55.8	67.5	65.8	63.3	47.5	50.0	52.5
Repell	13	55.0	65.0	70.8	70.8	58.3	51.7	61.7
Prelude	14	65.0	65.8	71.7	65.8	59.2	55.8	55.8
Palmer	15	64.2	70.8	67.5	73.3	55.8	58.3	57.5
Derby Supreme	16	55.0	67.5	68.3	67.5	51.7	48.3	55.8
Gator	17	56.7	62.5	71.7	68.3	50.0	52.5	50.8
Strider	18	50.8	64.2	74.2	69.2	58.3	49.2	53.3
Troubador	19	54.2	60.8	63.3	61.7	45.0	45.0	45.8
Medalist 8	20	60.0	71.7	65.8	66.7	49.2	53.3	55.0
Alliance	21	55.8	68.3	66.7	67.5	51.7	51.7	54.2
Ultima	22	65.0	70.0	70.8	70.0	56.7	58.3	57.5
Derby/Regal	23	59.2	68.3	67.5	65.8	50.8	45.8	47.5
LSD (0.05)		13.2	NS	9.9	NS	15.7	NS	12.5