

months. In addition, the hydrophobic condition apparently redevelops with time necessitating retreatment every year or two depending on the severity of the problem, and the effectiveness of the treatment.

In 1964 Merion Kentucky bluegrass plots were established with sod or seeded. Nitrogen treatments were applied at rates ranging from 0 to 14 pounds (each divided into 6 monthly applications) per 1000 square feet annually. The study was concluded in 1976. There has been differential encroachment of weedy grass species into the plots. The plots which were originally seeded (Table 10) have had considerable weedy grass encroachment at the lower nitrogen rates. Under the conditions of clipping removal from these plots an annual nitrogen rate of 6 pounds was necessary to keep at least 90% Kentucky bluegrass in the turf. The plots which had received no nitrogen at all had a high concentration of timothy with some orchard grass and red fescue. When 2 or 4 pounds N were applied annually red fescue increased while other volunteer species decreased. These volunteer grass species were not apparent in the turf during the first 7 or 8 years of the study.

The sodded plots had essentially no weedy grasses present at the conclusion of the study (Table 11). These results substantiate that Merion is a cultivar which responds well to higher nitrogen rates. This applies when there is no disease development. Merion is susceptible to Fusarium blight and stripe smut, both of which tend to increase in severity with higher nitrogen fertilization.

Another conclusion is that the sodded turf was more resistant to weedy grass encroachment than the seeded turf. Throughout the study the sodded plots required about 2 pounds less nitrogen annually to attain a similar quality of turf.

Nugget Kentucky bluegrass plots were sodded in 1974 in the M.S.U. Shade Trial area. The treatments shown in Tables 12 and 13 were initiated in 1975 and continued through 1976. Better turf resulted (Table 12) when the turf was mowed at 2.5 inches (compared to 1.5 inches); when annual nitrogen rates of 1.5 pounds per 1000 square feet were applied (compared to higher nitrogen rates); and when the plots were treated with fungicides for powdery mildew and Fusarium blight.

Applying the nitrogen in March improved turf cover slightly over plots receiving a comparable nitrogen rate split in to April and September treatments (Table 13). But the highest percent of turf cover occurred when the nitrogen was all applied in October. These results need to be substantiated before October fertilization under heavily shaded conditions can be recommended but it would seem wise to fertilize shaded turfs at an appropriate time so the turf could take advantage of those periods when there is more sunlight penetration (before leaf development in the spring or after leaf fall in autumn). Certainly a 3 pound nitrogen treatment at one time (as used in this study) would not be recommended. If one application of nitrogen is desired per year perhaps 1 to 1.5 pounds could be applied under shaded turfs after leaf fall. Remember that leaf removal is essential for maintaining the best turf density possible under the shade conditions.

Appreciation is kindly expressed to Ed Karcheski, superintendent of the Traverse City Country Club, and Mert Nye, superintendent of the Boyne Highlands Golf Course for their excellent cooperation in providing the out-state plots areas for the research reported herein.

Table 11. ANNUAL NITROGEN RATE EFFECTS ON ENCROACHMENT OF WEEDY GRASSES INTO SODDED KENTUCKY BLUEGRASS AFTER 12 YEARS OF TREATMENT at East Lansing.

Annual N Rate lbs/1000 sq ft	% Composition		
	Merion	Red Fescue	Rough Bluegrass
0	99.1	0.5	0.4
2	99.8	0	0.2
4	100.0	0	0
6	100.0	0	0
8	100.0	0	0
10	100.0	0	0
12	100.0	0	0
14	100.0	0	0

Table 12. EFFECT OF NITROGEN TREATMENT, MOWING HEIGHT AND FUNGICIDE TREATMENT ON NUGGET KENTUCKY BLUEGRASS UNDER SHADE at East Lansing.

MOWING HEIGHT	TREATMENT		9/1/76 RATINGS	
	N RATE * lbs/1000 sq ft	FUNGICIDE	% COVER	QUALITY
in				
2.5	1.5	NO	50.0	6.3
2.5	1.5	YES	82.5	2.8
2.5	3.0	NO	22.5	7.9
2.5	3.0	YES	81.3	4.0
2.5	6.0	NO	30.0	7.0
2.5	6.0	YES	68.8	5.0
1.5	1.5	NO	32.5	8.1
1.5	1.5	YES	61.3	6.1
1.5	3.0	NO	27.8	7.9
1.5	3.0	YES	34.5	7.8
1.5	6.0	NO	30.5	7.0
1.5	6.0	YES	30.0	7.0

* Nitrogen treatment divided equally into late April and mid-September applications.

Table 13. EFFECT OF NITROGEN TREATMENT, MOWING HEIGHT AND FUNGICIDE TREATMENT ON NUGGET KENTUCKY BLUEGRASS SHADE at East Lansing.

MOWING HEIGHT in	ANNUAL N RATE lbs/1000 sq ft	TIME OF APPLICATION	FUNGICIDE	
			TREATED	UNTREATED
1.5	3.0	APR-SEPT	34.5	27.8
1.5	3.0	MAR	40.0	25.0
1.5	3.0	OCT	85.0	71.7
2.5	3.0	APR-SEPT	81.3	22.5
2.5	3.0	MAR	76.7	46.7