COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

California Turfgrass Culture (edited for Australia)

Volume 48, Nos. 3 & 4, 1998

Kikuyugrass *(Pennisetum clandestinum ex. Chiov.)* Cultural Practices: I. Response to Nitrogen Fertilization and Sports Traffic

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Introduction

Kikuyugrass *(Pennisetum clandestinum ex.* Chiov.) is well adapted to the coastal and adjacent inland areas of NSW and has come to predominate in many turgrass sites. It is found in highly trafficked areas as well as in areas that receive no traffic. Turfgrass quality is often an issue. Managers of golf courses and sports fields that are invaded by kikuyugrass are faced with the decision of controlling the grass or managing it. Even when maintained as an acceptable turf, the coarse texture and light green color are often objectionable. Therefore, it was the objective of the study reported here to examine the performance of kikuyugrass to nitrogen fertilization under simulated trafficked and nontrafficked conditions.

Methods and Materials

Nitrogen was applied one time, in June, to four replications of kikuyugrass turf as 16-16-16 at the rates of 12, 24, 48, and 96 kgs. N/ha in a randomised complete block design. Plots were mowed at 1.6cm. Visual turf score evaluations were at 2,4,6, 8 and 10 weeks after treatment (WAT).

The next step was a two-year field study to evaluate nitrogen (N) fertilizer applications and traffic on turf quality of kikuyugrass. The first year, ammonium sulphate was applied at 24, 48, and 96 kg N/Ha as described in Table 1. Plots were vertical mowed in May and October. All plots were mowed at a height of 1.3cm. Traffic was applied with a Brinkman Traffic Simulator (1) and, the first year, consisted of three football game equivalents per week during spring, four game equivalents per week in summer and two game equivalents per week in the autumn, which would be heavy golf traffic. The second year traffic was limited to two game equivalents per week, which would be moderate golf traffic. The experimental design was randomised complete block replicated four times. Visual colour ratings and turf scores were used to evaluate traffic and recovery. A Clegg Impact Tester was used to compare the biomass differences among the treatments (2).

Results and Discussion

A one-time application of nitrogen of 24kg. N/Ha to kikuyugrass turf that was not subjected to traffic provided adequate turf quality for up to 10 weeks, (Table 2). Application of less nitrogen will still last up to 4 weeks after application. Nevertheless, as expected, kikuyugrass turf will respond to high nitrogen application rates.

In the first year of a two-year study of nitrogen application timing, nitrogen applied once in the spring at 48kg N/Ha produced a slight improvement in kikuyugrass traffic tolerance and an increase in turf quality in the fall. Applied at 96kg./Ha, nitrogen decreased trafficked, turf quality by fall, (Table 3). Three applications at 48 kg .N/Ha produced the highest quality kikuyugrass turf with and without traffic. No traffic treated turf was significantly better than all treatments. The next highest quality turf was the N treated trafficked turf. No nitrogen (control) trafficked turf exhibited the poorest quality.

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Table 1. Nitrogen Application Treatments (two-year study).

kgs N/Ha	Year 1 Treatments	Year 2 Treatments
12	Apr., Jun., Jul., Aug., Sep.	May, Jun., Jul., Aug.
24	Apr.	May
48	Apr., Jun., Aug.	May, Jun., Aug.
96	Apr.	May
Control	None	None

Table 2. Kikuyugrass Response to Fertilizer Application (no traffic) (Turf Score*).

Treatment lbs. N/1000 ft^2	Weeks After Treatment				
	2	4	6	8	10
96	8.0	7.7	7.0	7.0	7.0
48	7.7	7.3	6.3	6.3	6.8
24	6.7	6.3	5.3	6.3	6.8
12	6.3	6.0	5.0	5.0	5.3
Control	5.3	6.0	5.0	5.0	5.0
LSD**			1.1		

*Turf Score: 1 = poor turf quality; 9 = excellent turf quality.
**LSD for all columns.

Table 3. Summary of Nitrogen Treatments on Kikuyugrass (with and without traffic) (Turf Scores*).

lbs. N/1000 ft2	APR.		MAY		JUN.		JUL.		AUG.		SEPT.	
	T	NT	T	NT	T	NT	T	NT	T	NT	T	NT
1 .O-Apr.	5.8	7.0	5.5	6.5	4.8	5.8	4.5	6.3	4.8	6.0	4.8	6.3
2.0-Apr.	5.5	7.0	6.0	7.0	6.0	6.8	4.5	6.3	4.5	6.0	4.5	6.3
1 .O-Apr., Jun., Aug.	6.3	6.8	5.3	6.8	5.8	6.0	5.8	7.0	5.0	6.3	5.8	7.0
0.5-Apr., Jun., Aug., Jul., Sep.	5.5	7.0	5.3	6.8	4.8	5.5	5.3	5.3	5.3	6.3	5.5	7.0
Control	5.3	6.5	5.3	6.0	4.5	5.5	4.5	5.3	4.3	5.5	4.5	5.5
LSD***	0.7		0.7		0.7		0.8		0.6		0.7	

*Turf Score: 1 poor turf quality; 9 = excellent turf quality.
**T= traffic; NT = no traffic.
***LSD = for both T and NT columns of each monthly rating, respectively.

Five applications at 24Kg/N improved kikuyugrass-turf quality significantly over all treatments in the no traffic treatment. In the traffic treatment the quality increase from five applications was significant only over the trafficked no nitrogen control. The five application trafficked turf was as good as, and not significantly different, from the no traffic, no nitrogen (control).

In the second year of the study, the non-trafficked kikuyugrass turf responded to the five applications at 24 kg.N/Ha the same as to the three 48 kg. N/Ha treatments. The trafficked turf response was similar to Year 1 with the three applications of 48 kg. N/Ha treatment rating highest. Kikuyugrass treated with five applications at 24 kg N/Ha under traffic began to respond with improved turf quality by Autumn.

The Clegg Impact Tester showed the trafficked kikuyugrass turf to be significantly harder with a higher impact (Gmax) rating than the no traffic turf, (Table 4). Three applications at 48kg. N/Ha and five applications of 24 kg.N/Ha provided the greatest impact absorption capability. Those treatments also produced the greatest accumulation of biomass.

Conclusions

Kikuyugrass turf that is not trafficked can be adequately

Table 4. Kikuyugrass Fertilizer Timing x Traffic. (Clegg Impact Tester (gMax))*

Treatment	Traffic	No traffic
0.5-May, Jun., Jul., Aug.	54.6	37.2
1.O-May	58.7	51.7
1.O-May, Jun., Aug.	52.7	44.8
2.0-May	60.8	46.0
Control	69.4	51.4
LSD**	3.2	

*gMax = higher values reflect firmer surface.
**LSD for both columns.

maintained with an application of 24kg. N/Ha once per year. For higher turfgrass performance, three applications of nitrogen at 48kg./Ha provided the highest quality kikuyugrass turf with or without traffic. A single application at 96 kg N/Ha reduced turf quality.

Good quality kikuyugrass turf was maintained with five applications of 24 kg.N/Ha. Biomass accumulated with increasing N, particularly with no traffic. Increased biomass production reduced soil compaction caused by traffic.

References:

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