HIGH POTASSIUM APPLICATIONS

There is widespread interest in use of high rates of potash on turfs to improve wear and stress tolerance. Some turf managers are using very high rates of application. In a cooperative study with John N. Rogers III established in 1990, we have applied up to 12 lbs K20 per 1000 sq. ft. annually to a creeping bentgrass green, an annual bluegrass fairway turf and a Kentucky bluegrass turf. All plots are 5 feet by 7 feet with 4 replications. The annual bluegrass and Kentucky bluegrass are growing on loam soils while the creeping bentgrass is growing on a modified loamy sand. We intended to subject these plots to dry down stress conditions in 1992, but the regularity of rainfall prevented effective use of dry down moisture stress during the growing season.

The soil tests for available K, Ca and Mg are given in Tables 8, 9 and 10 for the creeping bentgrass, annual bluegrass and Kentucky bluegrass, respectively. In all cases the application of potash has increased soil K tests as would be expected. With continued use the higher rates are resulting in saturation of the cation exchange capacity in the surface layer. The K then moves down in the profile. The sandy soil in the green does not hold as much K compared to the loam because of the lower cation exchange capacity. The maximum K tests in the 0–3 inch depth in the green soil are less than 250 lbs K per acre while in the loam soil, K tests range up over 600 lbs per acre and higher at the highest rate of application. It is also clear that the K test in the 3–6 inch depth of the green is very low (38 lbs per acre), a level that is probably deficient. With continued growth, roots which reach deeper into the soil will extract K and other nutrients. It is possible to remove so much of a given nutrient that it could become deficient at that depth. Of course, removing clippings results in significant removal of nutrients as well which could partially explain the lower K tests in the green. In spite of the very low K tests deeper in the soil we have seen no evidence of any deficiency response, however, likely because the K levels in the thatch and surface layer are adequate for these turf conditions where there is little stress.

There has been a report from Georgia that K levels lower than the maximum applied in this study resulted in some loss of turf quality due to the high level of salts applied with the potash, particularly with potassium chloride (muriate of potash, 0–0–60). We have seen no evidence of this on these plots to date. Still it wise to apply potash in modest amounts, particularly during the stress periods. If applied every month there should be no reason to apply more than 6 lbs K20 per 1000 sq. ft. annually in our climate even on sandy soils. The key on sandy soils is to apply the potash regularly throughout the growing season.

Table 8

High Potassium Study on Bentgrass 1992.
Initiated in 1990

TREATMENT K_2O in lbs/M/year	POTASSIUM LEVELS LBS/ACRE			CALCIUM LEVELS LBS/ACRE			MAGNESIUM LEVELS LBS/ACRE		
	THATCH	0–3 INCHES	3–6 INCHES	THATCH	0–3 INCHES	3–6 INCHES	THATCH	0–3 INCHES	3–6 INCHES
NONE	244.8 cde	62.00 hi	38.25 i	1987. ab	1049. d	790.5 defg	338.8 a	200.0 cde	143.0 efgh
SOIL TEST KCl carrier	254.3 cde	108.3 ghi	78.00 hi	1744. bc	1061. d	818.3 defg	297.5 ab	204.0 cd	155.8 defgh
4 lbs Kcl carrier	327.8 bc	136.5 fgh	73.75 hi	2052. a	1018. de	691.0 g	327.8 a	158.5 defg	118.0 fgh
8 lbs. Kcl carrier	281.8 cd	212.5 def	176.5 efg	1565. c	993.0 def	706.5 fg	250.0 bc	172.5 def	98.75 h
12 lbs. Kcl carrier	466.3 a	218.5 def	177.8 efg	2139. a	1035. de	752.5 efg	341.3 a	155.5 defgh	112.8 gh
12 lbs. K_2SO_4 carrier	410.0 ab	234.8 cde	195.5 defg	2063. a	1029. de	790.5 defg	342.5 a	132.3 fgh	104.0 gh

Means followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.

Table 9

High Potassium Study on Annual Bluegrass 1992.
Initiated in April 1990.

TREATMENT K_2O in lbs/M/year	POTASSIUM LEVELS LBS/ACRE			CALCIUM LEVELS LBS/ACRE			MAGNESIUM LEVELS LBS/ACRE		
	THATCH	0–3 INCHES	3–6 INCHES	THATCH	0–3 INCHES	3–6 INCHES	THATCH	0–3 INCHES	3–6 INCHES
NONE	747.8 c	128.0 hi	71.75 i	2240.0 a	1660.0 bcde	1456.0 de	457.8 a	395.0 cde	316.3 ghij
SOIL TEST Kcl carrier	747.3 c	474.0 defg	233.5 ghi	1790.0 b	1760.0 bc	1487.0 cde	371.0 def	349.8 fgh	300.0 ijk
4 lbs Kcl carrier	992.0 b	315.5 fghi	192.5 hi	2260.0 a	1680.0 bcd	1458.0 de	420.3 abc	358.3 efg	308.0 hijk
8 lbs. Kcl carrier	1317.0 a	553.5 cdef	332.0 efgh	2460.0 a	1720.0 bcd	1385.0 e	441.8 ab	332.3 fghi	278.0 jk
12 lbs. Kcl carrier	1348.0 a	570.0 cde	517.5 cdef	2325.0 a	1741.0 bc	1441.0 de	412.5 bcd	353.5 efg	274.0 jk
12 lbs. K_2SO_4 carrier	1459.0 a	632.3 cd	460.8 defg	2360.0 a	1683.0 bcd	1458.0 de	439.5 ab	343.3 fghi	270.0 k

Means followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.

Table 10 **High Potassium Study on Kentucky Bluegrass 1992**
Initiated in April 1990

TREATMENT K_2O in lbs/M/year	POTASSIUM LEVELS LBS/ACRE			CALCIUM LEVELS LBS/ACRE			MAGNESIUM LEVELS LBS/ACRE		
	THATCH	0-3 INCHES	33-6 INCHES	THATCH	0-3 INCHES	3-6 INCHES	THATCH	0-3 INCHES	3-6 INCHES
NONE	396.0 de	134.8 gh	75.8 h	2160.0 a	1720.0 cd	1283.0 fgh	427.5 a	352.5 b	280.0 de
SOIL TEST Kcl carrier	434.0 de	208.3 fgh	145.3 gh	2000.0 ab	1531.0 def	1146.0 h	403.8 a	339.0 b	240.0 ef
4 lbs Kcl carrier	649.5 c	342.0 ef	229.3 fg	2140.0 a	1786.0 bcd	1344.0 fgh	407.3 a	347.8 b	258.0 def
8 lbs. KCl carrier	1032.0 b	506.3 d	340.0 ef	1961.0 abc	1455.0 efg	1182.0 h	342.0 b	284.0 cd	216.0 f
12 lbs. KCl carrier	973.0 b	738.8 c	450.0 de	1920.0 abc	1765.0 bcd	1253.0 gh	340.0 b	325.3 bc	232.0 f
12 lbs. K_2SO_4 carrier	1206.0 a	672.5 c	506.3 d	1960.0 abc	1602.0 de	1251.0 gh	346.3 b	278.0 de	222.0 f

Means followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.