TURFGRASS SOIL MANAGEMENT RESEARCH REPORT - 1993

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NITROGEN FERTILITY EVALUATIONS

Three different nitrogen carrier evaluations were conducted at the Hancock Turfgrass Research Center in 1993. All three turfs were growing on loam soil. One was done on a tall fescue turf mowed at 2 inches. The turf was established in 1991. Plot size was 4 feet by 12 feet with 4 replications of each treatment. Treatments applied are shown in Table 1. The nitrogen carriers listed in the table were applied at 1.5 lbs. N per 1000 sq. ft. on May 27, July 8 and August 11.

The second study was conducted on an annual bluegrass fairway turf mowed at 5/8 in. Plot size and replication was the same as for the tall fescue study. Nitrogen was applied as the carriers shown in Table 3 at the rate of 1 lb. N per 1000 sq. ft. on May 26, June 29, July 23 and September 16.

A third study was conducted on Kentucky bluegrass mowed at 2 inches. Plot size and replication was the same as for the tall fescue study. The carriers shown in Table 4 were applied on June 29 at the rates of 1, 2 or 4 lbs. N per 1000 sq. ft. No further N was applied throughout the season.

All plots were rated periodically for turf quality, a combined evaluation of color, density and growth. In addition, clipping weights were collected on several dates and weighed for each study. Each year we subject the plots to dry down periods to determine if particular carriers or fertility programs are more susceptible to moisture stress. Because of extensive rainfall during 1993, there was little difference among plots in susceptibility to wilting.

The Scott's carriers are polymer-coated nitrogen carriers. The 40-0-0 has a thinner coating with a little higher N content while the 38.5-0-0 has the thickest coating and should have the longest N response. SCU is sulfur-coated urea. Herbruck's fertilizers are experimentals manufactured from poultry waste. Nutralene is a slow release carrier from the Nor-Am Co. Once is a polymer-coated carrier from Grace-Sierra. The Grace fertilizers are soluble experimentals from Grace-Sierra. The UHS carriers are polymer-coated carriers, 2002 should have a 2 month linear release while 2004 should have a 4 month release period. Ringer is a natural organic fertilizer from the Ringer Corp. Sustane is a poultry waste-based fertilizer.

As observed in recent studies, the coated fertilizers performed well on the tall fescue plots (Table 1). When a thicker coating is present this causes a slower nitrogen release rate giving a slower response. However, these materials gave good long term responses. An example is Scott's 38.5-0-0 which was slower to give response than the 40-0-0 which has a thinner coating. Another example is the UHS 2002 which is faster releasing of the UHS materials. The early release pattern was slow, but gave good responses at the end of the season. Because of cool, wet conditions earlier in the test period most of the natural organics started very slowly. An exception is Herbruck's 10-3-4 which gave good ratings early in the season but did not rank quite as high later. Herbruck's 10-2-8 had a problem in manufacturing and performed poorly throughout the season. Generally, the soluble fertilizers, urea and the Grace experimentals gave good ratings but ranked a bit lower later in the period. With

10-2-8 had a problem in manufacturing and performed poorly throughout the season. Generally, the soluble fertilizers, urea and the Grace experimentals gave good ratings but ranked a bit lower later in the period. With the exception of a few dates Nutralene performed well.

Clipping weights were obtained on these plots on 4 dates during the growing season (Table 2). The data reflect in general the quality rating data in Table 1.

Table 1. Evaluation of Nitrogen Carrier Effects on a Tall Fescue Lawn
Quality Ratings: 1 = poor, 9 = excellent
Treatments applied May 27, July 8, and August 11, 1993 at the rate of 1.5 pounds of nitrogen per 1000 sq. feet

Treatment	6-1	6-3	6-10	6-18	7-6	7-12	7-21	7-23	7-29	8-3	8-10	8-25	9-28
Scotts 40-0-0	6.6 abc	7.0 a	8.3 abc	6.8 bcde	7.5 abc	7.1 ab	8.0 a	8.0 a	7.5 a	8.3 ab	6.6 bcde	8.0 a	8.0 bcd
Scotts 39-0-0	6.5 bcd	6.9 ab	7.9 cde	6.6 bcde	7.4 bc	7.1 ab	8.0 a	8.0 a	7.5 a	8.4 a	6.6 bcde	7.6 ab	8.0 bcd
Scotts 38.5-0-0	6.6 abc	6.6 bc	7.8 def	6.5 cde	7.8 ab	7.4 a	8.0 a	7.9 a	7.5 a	8.4 a	7.1 ab	7.8 ab	8.8 a
SCU 32-0-0	6.8 ab	7.0 a	8.0 abc	7.0 abc	7.5 abc	7.0 ab	8.0 a	8.0 a	7.5 a	8.3 ab	6.9 abcd	7.9 a	8.1 abcd
Herbrucks 10-2-8	6.3 d	6.5 c	7.0 g	5.1 f	5.8 e	4.1 e	4.5 c	5.3 c	5.1 c	6.6 c	4.6 f	5.6 d	7.0 f
Herbrucks 10-3-4	6.5 bcd	6.9 ab	8.4 ab	7.1 abc	6.9 d	6.8 b	8.0 a	8.0 a	7.1 ab	7.8 b	6.3 e	7.9 a	7.5 def
Nutralene 40-0-0	6.6 abc	7.0 a	7.8 def	6.5 cde	7.1 cd	6.8 b	8.0 a	7.9 a	7.5 a	8.3 ab	6.3 e	8.0 a	8.1 abcd
Once 35-0-6	6.6 abc	7.0 a	7.6 def	6.3 de	7.9 a	7.1 ab	7.9 a	8.0 a	7.5 a	8.5 a	7.3 a	8.0 a	8.5 ab
Urea 46-0-0	6.9 a	7.0 a	8.4 ab	7.3 ab	7.4 bc	7.3 a	8.0 a	8.0 a	7.5 a	8.1 ab	6.6 bcde	7.9 a	8.0 bcdf
Grace 15-5-25	6.6 abc	7.0 a	8.5 a	7.5 a	7.1 cd	7.0 ab	8.0 a	8.0 a	7.4 ab	8.0 ab	6.5 cde	7.3 bc	7.3 ef
Grace 18-5-17	6.5 bcd	6.9 ab	8.5 a	7.1 abc	7.1 cd	7.0 ad	8.0 a	8.1 a	7.5 a	8.5 a	6.8 abcde	7.0 c	7.3 ef
UHS 25-5-10 2002	6.4 cd	6.5 c	7.6 def	6.9 abcd	7.9 a	7.3 a	8.0 a	8.0 a	7.5 a	8.5 a	7.0 abc	7.6 ab	8.3 abc
Ringer 10-2-6	6.3 d	6.0 d	7.5 ef	6.8 bcde	7.4 bc	6.0 c	8.0 a	7.9 a	7.5 a	8.4 a	6.6 bcde	8.0 a	8.1 abcd
Sustane 5-2-4	6.3 d	6.1 d	7.4 fg	6.1 e	6.9 d	5.4 d	6.8 b	7.0 b	6.9 b	8.0 ab	6.4 de	7.8 ab	7.8 cde

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

When higher analysis, large particle fertilizers are applied to annual bluegrass mowed at 3/4 inch a mottled response occurred (Table 3). It was clear that the coated fertilizers were giving significant release of nitrogen, but the resulting spotty response was caused by the fertilizer granules being too far apart when applied at 1 lb. N per 1000 sq. ft. As a result the natural organics, the solubles and Nutralene gave better relative responses than was observed in the study on tall fescue. We have consistently seen that when the high analysis fertilizers are applied to grass mowed at 2 inches or more, there is no mottled response to the fertilizer. However, even urea causes the mottled response on greens and fairway turf mowed at 3/4 inch or shorter. Fertilizer companies have developed smaller granules to alleviate this problem. The smaller granules permit closer spacing at a given rate of nitrogen, reducing the potential for the mottling.

One other response of note with the coated fertilizers applied to the annual bluegrass fairway plots was that as the nitrogen was being released in the spots where the granules were located, the grass was very green and highly susceptible to wilt. During dry down periods, these green spots always wilted first. This is consistent with observations made many times that grass which has been fertilized with high rates of nitrogen that result in high amounts of nitrogen in the plant are always more susceptible to moisture stress. For this reason it is very important that the fertilizer program be designed to provide a modest amount of nitrogen to the turf during temperature and moisture stress periods.

A different approach was taken in the study shown in Table 4. Several coated fertilizer products were applied on June 29 to a Kentucky bluegrass turf at rates of 1, 2 or 4 lbs. per 1000 sq. ft. Earlier in the period the highest rate of nitrogen gave the best responses as would be expected. However, by the end of the test period

in September, there were few major differences, even at the 1 lb. rate. This may have been due to the extensive rainfall received during the summer and fall. Whenever turf receives extensive rainfall or irrigation the responses to nitrogen applications are smaller than when the turf is kept drier. All these coated products performed well. Clipping weight data in Table 5 reveal the same trends for this study. By the end of the season (September) there were no differences among clipping weights. This lack of differences at the end of the season was surprising considering that a 4 lb. N rate was included in the study. Perhaps the regular rainfall during the summer of 1993 caused depletion of the nitrogen more quickly than normal. Another possibility is that there was enough nitrogen present from all treatments that no differences occurred, although this seems unlikely.

A study evaluating the effect of timing and rate of nitrogen applied as urea on an annual bluegrass fairway turf was established in 1992. The treatments are shown in Table 6. Plot size is 4 ft. by 12 ft. with 4 replications. Quality rating data reflect treatments and are not reported here. As noted in other studies of nitrogen applications on annual bluegrass, this grass responds quickly to applied nitrogen, but turns yellow as soon as the available nitrogen level is low. No other grass has given this dramatic response to nitrogen. This supports the importance of providing nitrogen at modest, but regular rates for annual bluegrass turfs. In May, the annual bluegrass had fairly heavy seedhead production. Seedhead density counts were obtained with a grid, giving percent of plants with seedheads. The data are given in Table 6. The check plot had significantly fewer seedheads than plots receiving nitrogen. However, the tendency for more seedheads on plots receiving high annual rates of nitrogen or a late fall application of nitrogen was not as evident as has been observed on 2 previous occasions.

Table 2. TALL FESCUE NITROGEN CARRIER STUDY 1993
Clipping Weights In Grams
Treatments Were Applied May 27, July 8, and August 11 1993 at the rate of 1.5 pounds of nitrogen per 1000 sq. feet

TREATMENTS	6-17	7-6	9-2	9-20
SCOTTS 40-0-0	28.2 a	48.4 abc	30.7 abc	26.8 bcd
SCOTTS 39-0-0	31.4 a	49.5 ab	26.4 c	27.0 bcd
SCOTTS 38.5-0-0	29.6 a	47.6 abcd	30.5 abc	28.7 ab
SCU 32-0-0	25.0 a	41.2 abcdef	33.1 ab	26.2 bcd
HERBRUCKS 10-2-8	24.1 a	37.4 bcdef	17.2 d	16.6 g
HERBRUCKS 10-3-4	20.8 a	41.6 abcdef	32.5 ab	25.2 bcde
NUTRALENE 40-0-0	25.2 a	30.6 f	31.1 abc	25.6 bcd
ONCE 35-0-6	25.2 a	54.1 a	34.2 a	31.9 a
UREA 46-0-0	23.2 a	45.0 abcde	34.3 a	24.8 cde
GRACE 15-5-25	23.8 a	33.4 ef	26.2 c	20.8 f
GRACE 18-5-17	23.0 a	35.7 cdef	28.2 bc	21.4 ef
UHS 25-5-10 2002	25.0 a	44.3 abcde	28.8 abc	27.9 bc
RINGER 10-2-6	20.0 a	40.6 bcdef	31.7 abc	23.9 def
SUSTANE 5-2-4	24.2 a	34.9 def	28.5 abc	24.1 def

Means in columns followed by the same letter are not significantly different at the 5% level using the LSD means seperation test.

Table 3. Evaluation of Nitrogen Carrier Effects on Annual Bluegrass Fairway Turf
Quality Ratings: 1 = poor, 9 = excellent
Treatments were applied May 26, June 29, July 23, and September 16, 1993 at the rate of 1 pound of nitrogen per 1000 sq. feet.

TREATMENTS	6-1	6-3	6-10	6-18	6-29	7-6	7-9	7-15	7-26	7-29	8-13	8-25
SCOTTS 40-0-0	6.1 C	5.6 DE	6.6 C	3.9 FG	5.0 BC	4.5 C	4.5 C	4.5 BCD	5.7 DE	5.1 DE	5.7 F	5.6 BCD
SCOTTS 39-0-0	5.9 CD	5.3 DEF	6.5 CD	3.5 GH	4.5 C	4.1 C	4.5 C	4.6 BC	5.7 DE	5.0 DE	5.7 F	5.3 CDE
SCOTTS 38.5-0-0	5.9 CD	5.1 EF	6.1 DE	3.9 FGH	4.5 C	3.9 C	5.0 C	3.7 DE	5.5 E	5.3 CDE	5.7 F	5.5 CDE
SCU 32-0-0	6.6 B	6.5 C	7.1 B	4.8 DE	5.6 A	4.3 C	4.7 C	5.5 A	6.5 A	5.7 BCD	6.6 BCD	5.8 BC
HERBRUCKS 10-2-8	5.5 DE	4.9 F	5.5 G	4.6 E	4.0 D	4.5 C	4.9 C	3.3 E	4.5 F	4.8 E	5.6 F	4.6 E
HERBRUCKS 10-3-4	7.6 A	7.1 AB	7.6 A	6.1 A	4.0 D	5.9 B	6.3 A	4.9 AB	6.4 AB	6.1 ABC	6.8 ABC	5.9 ABC
NUTRALENE 40-0-0	6.1 C	5.8 D	6.8 BC	5.5 BC	4.7 C	5.8 B	5.6 B	5.1 AB	6.1 ABCD	6.9 A	7.1 AB	6.1 ABC
UHS 25-5-10 2002	5.5 DE	5.5 DE	5.6 FG	4.1 F	4.8 C	3.9 C	5.0 C	3.9 CDE	5.9 BCDE	5.0 DE	5.9 EF	5.3 CDE
MILORGANITE 6-2-0	5.0 F	4.8 F	5.8 EFG	5.1 CD	4.8 C	5.8 B	6.1 A	5.0 AB	5.8 CDE	6.3 AB	7.1 AB	6.5 AB
ONCE 35-0-6	6.0 C	5.8 D	6.0 EF	3.4 H	4.5 C	3.9 C	5.0 C	4.7 BC	5.5 E	5.2 DE	6.0 DEF	5.7 BCD
UREA 46-0-0	7.8 A	6.8 BC	7.6 A	5.9 AB	4.0 D	7.3 A	6.0 AB	5.1 AB	6.3 ABC	6.4 AB	7.3 A	6.5 AB
GRACE 15-5-25	8.0 A	7.5 A	7.9 A	5.9 AB	4.6 D	7.0 A	6.0 AB	4.9 AB	6.1 ABCD	6.3 AB	6.4 CDE	4.8 DE
SUSTANE 5-2-4	5.1 EF	4.8 F	5.6 FG	5.4 BC	5.4 AB	5.6 B	6.0 AB	4.9 AB	5.7 DE	6.6 A	7.0 ABC	6.8 A

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

Table 4. Long Term Study of Nitrogen Carriers on Kentucky Bluegrass, 1993
Quality Ratings: 1 = Poor, 9 = Excellent. Application Date, June 29

Treatment	rate	7-7	7-9	7-12	7-21	7-26	7-29	8-10	9-1	9-14	9-28
UHS 25-5-10 2002	1#/M	7.3 fg	6.8 d	7.0 fg	7.7 ab	7.7 bc	7.7 cd	6.8 ab	8.7 ab	7.7 ab	7.0 c
UHS 25-5-10 2002	2#/M	8.3 abc	7.2 bcd	7.7 cde	8.0 a	8.0 a	8.0 abc	7.3 bcd	8.5 b	7.5 bc	7.0 c
UHS 25-5-10 2002	4#/M	8.5 ab	7.5 abc	8.0 abcd	8.0 a	8.0 a	8.7 ab	8.2 a	8.7 ab	7.8 ab	7.7 ab
Once 39-0-0	1#/M	7.2 fg	7.2 bcd	7.7 ef	7.3 ab	7.5 c	7.7 cd	6.2 ef	8.7 ab	7.7 ab	7.3 bc
Once 39-0-0	2#/M	8.0 cd	7.5 abc	7.8 bcd	8.0 a	8.0 a	8.0 abc	7.2 cd	8.7 ab	7.7 ab	7.0 c
Once 39-0-0	4#/M	8.2 bcd	8.0 a	8.5 a	8.0 a	8.0 a	8.3 a	8.5 a	8.8 ab	8.0 a	7.7 ab
Scotts 39-0-0	1#/M	8.0 cd	7.0 cd	7.0 fg	7.7 ab	7.5 c	7.7 cd	6.8 de	8.3 ab	7.5 bc	7.0 c
Scotts 39-0-0	2#/M	8.5 ab	7.7 ab	8.7 abc	7.3 ab	7.8 ab	8.7 ab	7.8 abc	8.7 ab	7.2 c	7.7 ab
Scotts 39-0-0	4#/M	8.5 ab	7.7 ab	8.3 ab	7.7 ab	7.8 ab	8.3 a	8.5 a	8.7 ab	7.8 ab	8.0 a
SCU	1#/M	7.8 de	7.0 cd	7.0 fg	7.3 ab	7.5 c	7.7 cd	6.7 def	8.5 b	7.5 bc	7.0 c
SCU	2#/M	8.3 abc	7.7 bcd	7.5 def	8.0 a	7.5 c	7.5 d	7.2 cd	8.7 ab	7.8 ab	7.0 c
SCU	4#/M	8.7 a	7.8 a	8.3 ab	7.7 ab	8.0 a	8.0 abc	8.2 a	8.7 ab	7.7 ab	8.0 a
UHS 25-5-10 2004	1#/M	7.0 g	6.7 d	6.5 g	7.0 b	7.5 c	7.5 d	6.0 f	8.5 b	7.5 bc	7.0 c
UHS 25-5-10 2004	2#/M	7.5 ef	6.8 d	7.2 ef	7.3 ab	7.5 c	7.5 d	7.0 a	8.5 b	7.5 bc	7.0 c
UHS 25-5-10 2004	4#/M	8.0 cd	7.5 abc	8.0 abcd	8.0 a	8.0 a	7.8 bcd	8.0 ab	9.0 a	7.5 bc	7.0c

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

TOPDRESSING AND HYDROJECT STUDIES

A long term topdressing study including treatments with straight sand, 80% sand/ 20% peat, or 60% sand/20% peat/20% soil was continued 1993 on a putting green at the Hancock Turfgrass Research Center. The