

TURFGRASS SOIL MANAGEMENT RESEARCH REPORT
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During 1992 several new soil management projects were established as well as having several projects continued from 1991. Results will be addressed by general topic in this report.

NITROGEN CARRIER EVALUATIONS

Description of studies: Two studies were initiated at the Hancock Turfgrass Research Center during the year designed to provide information on evaluation of some new nitrogen carriers as compared to some traditional fertilizers. One study was initiated on an annual bluegrass fairway turf which had been seeded in 1991. Plots were mowed at 5/8 inch and irrigated to prevent wilt. Plot size was 4 feet by 12 feet and there were 4 replications for each of the 13 treatments.

A second study was initiated on a tall fescue turf which had been seeded in 1991. The mowing height was 2 inches. Plot sizes and replications were the same as for the annual bluegrass carrier study. Both these studies were established on new plots in the expanded research area at the Hancock Center. The soil for both studies was a loam.

In the annual bluegrass carrier study, nitrogen was applied at the rate of 1 lb. N per 1000 sq. ft. on June 12, July 16 and August 31. Turfgrass quality ratings were taken on 12 different dates during the season. Clipping weights were obtained from an area 21 inches wide by 10.25 feet long and are reported in dry clipping weights per plot. There were 2 clipping sampling dates for the annual bluegrass study.

On the tall fescue study, nitrogen was applied at the rate of 1.5 lbs. N per 1000 sq. ft. on July 5 and September 14. Turfgrass quality ratings and clipping weights (3 dates) were obtained as described for the annual bluegrass study.

The nitrogen carriers evaluated are listed in Tables 1 and 2 for the annual bluegrass and tall fescue studies, respectively. The Scotts fertilizers are experimental polymer-coated urea products; SCU is sulfur-coated urea from The Anderson's; Herbruck's fertilizers are experimental poultry manure-based carriers from the Herbruck's Co. in Michigan; Nutralene is from the Nor-Am Co.; Once is a polymer-coated fertilizer from the Sierra Co.; Terrene is an organic sludge-based material; Milorganite is from the Milwaukee Sewerage Commission; Ringer's is from the Ringer Corp.; and Sustane is a poultry manure-based product from the Sustane Corp.

Results: The annual bluegrass plots provided excellent differentials in response to nitrogen carriers although the responses tended to be of short duration. On several dates, response to the nitrogen was depleted before the next nitrogen application, resulting in many plots exhibiting a light yellow-green color and low quality ratings. A quality rating of 6.0 to 6.5 is considered minimum on annual bluegrass. The excessive rainfall during the summer apparently contributed to rapid depletion of the applied nitrogen on the annual bluegrass plots. This rapid loss of response to these nitrogen carriers was not evident on the tall fescue plots. There was serious dollarspot incidence on the annual bluegrass plots during late summer. This contributed to the very low quality ratings observed on some dates. Dollarspot disease severity ratings were taken, but no significant differences were observed.

Most of the carriers resulted in a spotty response on the annual bluegrass. This spotty condition made the plots difficult to rate, with ratings which were not considered acceptable on several dates. The spotty response was not evident on the tall fescue turf. Grasses maintained at a short mowing height are more susceptible to such spotty responses. We have seen this on bentgrass greens in the past even with water soluble carriers such as urea or ammonium nitrate when applied in the dry form. High analysis fertilizers do not permit a high enough density of particle placement resulting in the particles being far apart. The nitrogen is released from these particles and does not move very far laterally, giving the spotty response observed. However, most fertilizers designed for greens and fairways have smaller particle sizes and lower analyses than was the case for most of the fertilizers utilized in this study.

As a fast-acting carrier, urea gave typical responses on the annual bluegrass (Table 1) which were very quick, but did not last as long as some other carriers. The first date of evaluation (July 29, 17 days after application) is a prime example with urea ranking best among all carriers. The effect of polymer coating thickness is evident on that first date of evaluation as well. Among the 3 Scott's experimental carriers, the 40-0-0 has the thinnest polymer coating, making it the fastest acting of the 3, while the 38.5-0-0 has the thickest coating, giving the slowest response while the length of response is generally longer. Another polymer-coated fertilizer, Once, exhibits similar long term response as does sulfur-coated urea. The natural organic carriers gave adequate responses on many dates, but did not provide as good long-term response in this study as did the polymer-coated sources.

When evaluating such data in these tables the reader is reminded that any number followed by the same letter in a column is not significantly different on a statistical basis from any other number followed by the same letter. This is true even though there may be a large difference among several numbers followed by the same letter. On the other hand, some times the numbers are different statistically (followed by different letters), but practically it is not reasonable to say the difference is meaningful. Usually, when comparing quality ratings a number difference of greater than 1 is needed for a difference to be somewhat practical. For a major effect, a rating difference of 2 or more is usually needed, depending on the turf and the person doing the rating.

Table 1

Evaluation of Nitrogen Carrier Affects on Annual Bluegrass Fairways
Quality Ratings, 1 = poor 9 = excellent

Treatments were applied June 12, July 16, and August 31, 1992 at the rate of 1 pound of nitrogen per 1000 sq. feet.

TREATMENT	JUN 29	JUL 22	AUG 6	AUG 18	AUG 26	SEP 8	SEP 10	SEP 17	OCT 7	OCT 14	OCT 22	OCT 27
Scotts 40-0-0	5.8 d	4.5 bcd	4.0 bcde	3.9 cd	5.1 a	6.9 b	7.4 bc	5.5 a	3.6 cd	6.5 b	5.8 a	6.1 bcd
Scotts 39-0-0	5.3 f	4.4 cde	3.9 bcde	3.8 d	5.1 a	6.8 bc	7.5 ab	5.5 a	4.0 abc	6.5 b	6.0 a	5.9 cd
Scotts 38.5-0-0	4.6 g	4.0 ef	4.0 bcde	3.5 d	5.3 a	6.9 b	7.3 bcd	5.5 a	3.9 abc	6.9 ab	5.9 a	6.6 ab
SCU 32-0-0	6.3 c	4.8 bc	4.6 ab	5.1 a	5.4 a	7.1 ab	7.6 ab	5.5 a	4.5 ab	6.6 b	6.0 a	6.4 abc
Herbruck's 6-2-4	5.6 de	3.6 f	4.4 abc	4.4 abcd	5.4 a	6.4 cd	6.8 e	5.5 a	3.9 abc	5.6 cd	5.4 b	5.6 de
Herbruck's 10-3-4	7.4 b	4.9 ab	4.6 ab	4.4 abcd	5.3 a	7.0 ab	7.5 ab	5.5 a	3.8 bcd	5.1 de	5.3 bc	5.0 f
Nutralene 40-0-0	4.8 g	3.8 f	4.1 bcd	4.8 abc	5.4 a	7.0 ab	7.6 ab	5.5 a	4.1 abc	5.9 c	5.4 b	5.1 ef
Terrene 6-2-0	4.3 h	3.1 g	3.6 cde	4.0 cd	5.3 a	6.1 d	6.6 e	5.5 a	3.0 d	4.8 e	5.0 c	5.0 f
Milorganite 6-2-0	4.6 g	3.0 g	3.1 e	4.1 bcd	5.3 a	6.1 d	6.6 e	5.5 a	3.5 cd	5.4 cd	5.4 b	5.1 ef
Once 35-0-6	4.5 gh	4.3 de	4.0 bcde	4.1 bcd	5.4 a	6.9 b	7.3 bcd	5.5 a	4.6 a	7.3 a	6.0 a	6.9 a
Urea 46-0-0	8.4 a	5.3 a	5.1 a	5.0 ab	5.4 a	7.4 a	7.9 a	5.5 a	3.9 abc	5.8 c	5.4 b	5.0 f
Ringer 10-2-6	5.6 de	3.0 g	4.3 abcd	5.0 ab	5.4 a	6.1 d	7.0 cde	5.4 b	3.6 cd	5.1 de	5.4 b	5.3 ef
Sustane 5-2-4	5.4 ef	3.6 f	3.4 de	3.8 d	5.1 a	6.1 d	6.9 de	5.5 a	3.5 cd	5.4 cd	5.3 bc	5.1 ef

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

The nitrogen carrier study on tall fescue (Table 2) gave responses typically observed in the past on Kentucky bluegrass and perennial ryegrass. Generally, the relative responses among carriers was similar to those observed on annual bluegrass, but the responses lasted longer and differences were smaller on the tall fescue. This was due in part to the higher rate of nitrogen applied per application (1.5 lbs N per 1000 sq ft). And, as in past studies we have observed that grasses which are mowed higher tend to hold nitrogen responses longer than do those mowed short. This was likely the case in these studies even though both grasses were growing on similar soils.

Clipping weight data (Table 3 for annual bluegrass and Table 4 for tall fescue) suggest growth rates in response to the nitrogen carriers was generally consistent with quality rating responses, depending on carrier and time of sampling after application.

TIMING OF NITROGEN ON ANNUAL BLUEGRASS

A study to evaluate timing of nitrogen application on annual bluegrass fairway turf was initiated in 1992 on the new plot area. Nitrogen was applied as urea according to the schedule shown in Table 5. The dates of application are approximately the 15th of each month. Plot size was 4 feet by 14 feet with 4 replications. The plots were mowed at 5/8 inch. Irrigation was applied to prevent wilt.

Turf quality ratings for these plots are given in Table 7 and clipping weight data for 3 dates are given in Table 6. There were no unusual responses this first growing season. The untreated check had very low quality ratings throughout the season with significant dollarspot at times. Those plots receiving 1 and 2 lbs N per 1000 sq ft often had low ratings as well. The objective of this study is to determine if very low nitrogen rates or if timing of application of nitrogen will have an impact on turf quality and susceptibility to stress.

Table 2

Evaluation of Nitrogen Carrier Affects on a Tall Fescue Lawn
Quality Ratings, 1 = poor 9 = excellent

Treatments were applied July 5 and September 14, 1992 at the rate of 1.5 pounds of nitrogen per 1000 sq. feet

TREATMENT	JUL 16	AUG 6	AUG 26	SEP 8	SEP 17	SEP 21	SEP 22	SEP 29	OCT 6	OCT 14	OCT 22	OCT 27
Scotts 40-0-0	7.1 bcde	7.4 ab	7.0 abc	7.8 abc	7.3 bc	7.5 b	8.0 b	7.1 ab	7.6 abc	7.9 a	7.8 ab	7.3 ab
Scotts 39-0-0	7.0 cdef	7.6 a	7.4 a	8.0 a	7.3 bc	7.5 b	8.0 b	7.0 abc	7.8 abc	7.9 a	7.9 a	7.6 a
Scotts 38.5-0-0	6.6 efg	7.4 ab	7.4 a	8.0 a	7.1 cd	7.4 bc	7.9 b	7.1 ab	7.8 abc	7.9 a	7.6 ab	7.0 ab
SCU 32-0-0	7.4 abc	7.1 bod	7.3 a	7.9 ab	7.3 bc	7.5 b	8.1 ab	7.3 a	7.9 ab	7.5 abc	7.8 ab	7.1 ab
Herbruck's 6-2-4	6.4 gh	7.4 ab	7.1 ab	7.8 abc	6.5 e	6.5 d	7.0 c	6.8 cd	7.5 bcd	7.5 abc	7.8 ab	7.0 ab
Herbruck's 10-3-4	7.8 a	7.0 cd	6.8 bcd	7.5 c	7.4 ab	7.9 a	8.3 ab	7.3 a	7.8 abc	7.9 a	7.8 ab	7.3 ab
Nutralene 40-0-0	7.3 abcd	7.0 cd	7.0 abc	7.6 bc	7.0 d	7.1 c	7.9 b	7.0 abc	7.6 abc	7.6 abc	7.8 ab	7.1 ab
Once 35-0-6	6.6 efg	7.4 ab	7.3 a	8.0 a	7.1 cd	7.3 bc	7.9 b	7.0 abc	7.5 bcd	7.8 ab	7.9 a	7.4 ab
Urea 46-0-0	7.6 ab	7.3 bc	6.8 bcd	7.5 c	7.5 a	7.9 a	8.5 a	7.3 a	8.0 a	7.9 a	7.8 ab	7.3 ab
Terrene 6-2-0	6.5 fg	7.0 cd	6.6 cd	7.5 c	6.5 e	6.4 d	6.8 c	6.6 d	7.1 d	7.3 c	7.4 b	6.6 b
Milorganite 6-2-0	5.9 h	6.9 d	7.0 abc	7.6 bc	6.5 e	6.4 d	6.6 c	6.8 cd	7.1 d	7.4 bc	7.5 ab	7.0 ab
Ringer 10-2-6	6.8 defg	7.4 ab	7.0 abc	7.8 abc	6.5 e	6.4 d	6.8 c	7.0 abc	7.8 abc	7.8 ab	7.6 ab	6.9 ab
Sustane 5-2-4	6.6 efg	7.1 bod	6.5 d	7.5 c	6.5 e	6.5 d	7.0 c	6.9 bcd	7.4 cd	7.4 bc	7.6 ab	6.8 ab

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

Table 3. Annual Bluegrass Nitrogen Carrier Study 1992
Clipping Weights in grams

Treatments applied June 12, July 16, and August 31, 1992
Each treatment 1 pound of nitrogen per 1000 sq. ft.

TREATMENTS	JULY 7	AUGUST 4
Scotts 40-0-0	25.85 abc	13.10 abc
Scotts 39-0-0	18.35 cd	10.30 abc
Scotts 38.5-0-0	21.35 bcd	11.78 abc
SCU 32-0-0	29.10 a	10.78 abc
Herbruck 6-2-4	16.20 d	9.32 abc
Herbruck 10-3-4	27.23 ab	12.91 abc
Nutralene 40-0-0	19.00 cd	6.20 abc
Terrene 6-2-0	14.75 d	6.05 bc
Milorganite 6-2-0	18.73 cd	9.07 abc
Once 35-0-6	21.45 bcd	10.44 abc
Urea 46-0-0	28.92 ab	15.84 a
Ringer 10-2-6	19.33 cd	4.58 c
Sustane 5-2-4	25.88 abc	14.46 ab

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

Table 4

Tall Fescue Nitrogen Carrier Study 1992
Clipping weights in grams

Treatments applied July 5 and September 14, 1992
Each treatment 1.5 pounds of nitrogen per 1000 sq. ft.

TREATMENT	JULY 22	AUGUST 10	SEPTEMBER 30
Scotts 40-0-0	15.4 bc	28.1 a	26.7 ab
Scotts 39-0-0	12.8 cde	29.0 a	27.5 ab
Scotts 38.5-0-0	8.2 ef	27.2 a	27.8 ab
SCU 32-0-0	16.2 bc	25.3 ab	27.2 ab
Herbruck's 6-2-4	9.0 def	27.4 a	16.8 cd
Herbruck's 10-3-4	19.4 ab	25.1 ab	21.8 bcd
Nutralene 40-0-0	14.3 bcd	25.3 ab	22.6 bcd
Once 35-0-6	9.03 def	29.1 a	24.5 abc
Urea 46-0-0	23.9 a	26.6 a	31.7 a
Terrene 6-2-0	7.01 ef	19.4 b	14.3 d
Milorganite 6-2-0	6.0 f	27.1 a	14.1 d
Ringer 10-2-6	15.5 bc	24.3 ab	16.3 cd
Sustane 5-2-4	10.9 cdef	24.28 bc	14.2 d

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