

STOP 7

RESPONSES TO LATE FALL APPLICATIONS OF NITROGEN CARRIERS

R. A. Bay and P. E. Rieke

The benefit of early fall (early September in mid-Michigan) application of nitrogen at appropriate rates is well documented. This allows the plant to accumulate carbohydrates and grow new roots after the summer stress season, yet the plant can begin the hardening process in October. Early fall fertilization is essential for good turf maintenance. Increasingly, nitrogen is being applied in late fall (sometimes called dormant or late season application) on turf with good results. Timing of this application is critical especially on greens, tees and fairways. The nitrogen should be applied so uptake occurs after vertical shoot growth ceases, yet early enough so the nitrogen can still be taken up by the active roots and some photosynthesis still occurs.

In mid-Michigan the time for this late fall application of nitrogen is suggested for November 7-10 when using soluble nitrogen sources. The appropriateness of this date will vary with the particular season and the location in the state.

For several years, we have had late fall nitrogen fertilization studies on annual bluegrass fairways, while other studies have been carried out on Kentucky bluegrass for 3 years and 2 years on a bentgrass green. Typical data for quality ratings are given in Tables 1 and 2 for applications on a green and a fairway, respectively. Similar responses have been observed on Kentucky bluegrass, although fewer carriers were studied.

Clearly, response to timing of the fall application is dependent on the nitrogen carrier. Slow release nitrogen sources must be applied much earlier than soluble sources as would be expected. Based on experience for several years, suggested timing of specific carriers can be related to the date of application of a soluble source such as urea or ammonium nitrate recommended for November 7-10. The following nitrogen sources should be applied at the intervals previous to these dates depending on the season: sulfur coated urea from C.I.L., 10-14 days; sulfur coated urea from LESCO, 2-3 weeks; Milorganite, 3-4 weeks; IBDU, 4-5 weeks; fertilizers containing both soluble and slow release nitrogen sources, 7 days, depending on the relative amounts of each and the slow release carrier present. To date, no differences in snowmold or winter injury occurred on these studies, although these may yet occur in the future.

Advantages of successful late fall nitrogen applications include: 1) Good turf color in the spring without the flush of growth typical of spring applications; 2) The plant is able to continue photosynthesis in the fall, increasing carbohydrate levels and root growth; 3) These may be less susceptible to spring and summer diseases than when comparable spring applications are made.

Potential disadvantages are: 1) Foliar burn can occur after the irrigation system is shut down; 2) Unusual periods of warm weather after application could result in too much late growth and potential loss of hardiness--of greatest concern with early application of slow release sources; 3) There could be greater susceptibility to snowmold diseases if the turf is not treated for control; 4)

There could be greater susceptibility to late winter-early spring low temperature injury; 5) The potential for leaching of nitrate nitrogen exists--for this reason completely soluble sources should not be used on sand soils.

We suggest 1 pound of nitrogen per 1000 square feet timed for the specific nitrogen source according to the above outline. A carrier which provides both fast and slow release sources is probably safest to use.

The plots shown include year-round fertilization programs with some late fall nitrogen treatments. No differences in winter injury or snowmold occurred this past winter. Similar late fall studies have been initiated on annual bluegrass, Kentucky bluegrass and perennial ryegrass plots.

Table 1. 1980-81 Fall N on a Penncross bentgrass green at East Lansing.
Averages for 3 replications.

Carrier	Treatment		Evaluation date (9-1;9=dark green)			
	N rate lbs/M	Date of application	11/20/80	12/17/80	4/8/81	5/13/81
Milorganite	1	Oct 15	3.5mp#	3.5ru	3.0uw	4.0qr
Milorganite	1	Nov 1	3.3np	2.7wx	2.7wx	3.8rs
Milorganite	1	Nov 15	3.2op	2.7wx	2.3xy	3.5s
Milorganite	2	Oct 15	4.3kl	4.3oq	4.3pq	6.7h
Milorganite	2	Nov 1	3.8lo	3.7rt	4.2pr	6.3hi
Milorganite	2	Nov 15	3.3np	2.8vx	3.5su	6.0ij
10-1-8*	1	Oct 15	5.8gh	5.3jl	5.3lm	5.0o
10-1-8	1	Nov 1	4.3kl	4.3oq	5.0mo	5.3mo
10-1-8	1	Nov 15	3.0p	3.2tw	5.0mo	5.2no
10-1-8	2	Oct 15	7.3bd	7.2df	7.5bd	8.0de
10-1-8	2	Nov 1	5.5hi	5.8hj	7.3ce	8.3bd
10-1-8	2	Nov 15	3.5mp	3.7rt	6.5gi	8.0de
Urea	1	Oct 15	6.3eg	5.8hj	5.0mo	5.0o
Urea	1	Nov 1	4.7jk	4.8lo	5.2mn	5.0o
Urea	1	Nov 15	3.5mp	3.7rt	5.2mn	5.7km
Urea	2	Oct 15	7.8eg	7.5de	7.2cf	7.5fg
Urea	2	Nov 1	6.3eg	6.2gi	7.2cf	8.5ac
Urea	2	Nov 15	4.2km	7.3oq	6.5gi	8.2cd
Urea-Dwell*	1	Oct 15	6.3eg	5.7il	5.3lm	5.7km
Urea-Dwell	1	Nov 1	4.3kl	4.7mo	5.2mn	5.7km
Urea-Dwell	1	Nov 15	3.3np	3.7rt	5.2mn	5.7km
Urea-Dwell	2	Oct 15	7.5bc	7.0ef	7.0dg	8.3bd
Urea-Dwell	2	Nov 1	5.8gh	5.8hj	7.0dg	8.5ac
Urea-Dwell	2	Nov 15	4.0kn	4.0pr	6.2hj	8.7ab
14-0-0*	1	Oct 15	7.5bc	6.7fg	5.8jl	4.5p
14-0-0	1	Nov 1	7.0ce	7.7cd	6.8eg	4.5p
14-0-0	1	Nov 15	5.2hj	8.2bc	8.0b	5.3mo
14-0-0	2	Oct 15	9.0a	8.2bc	6.7fh	7.3fg
14-0-0	2	Nov 1	9.0a	8.5ab	7.3ce	7.3fg
14-0-0	2	Nov 15	7.0ce	9.0a	9.0a	8.0de
18-4-10*	1	Oct 15	5.0ig	4.3oq	3.5su	4.0qr
18-4-10	1	Nov 1	4.2km	3.3sv	2.8vx	4.0qr
18-4-10	1	Nov 15	3.0p	2.8vx	2.7wx	4.5p
18-4-10	2	Oct 15	7.0ce	6.2gi	5.5km	7.2g
18-4-10	2	Nov 1	5.5hi	5.0ln	4.7np	7.2g
18-4-10	2	Nov 15	3.2op	3.3sv	4.0qs	7.5fg

Table 1. Continued.

Carrier	N rate lbs/M	Date of application	11/20/80	12/17/80	4/8/81	5/13/81
Ammonium nitrate	1	Oct 15	6.3eg	5.8hj	4.7np	5.5lm
Ammonium nitrate	1	Nov 1	5.0ij	5.2km	5.2mn	6.0ij
Ammonium nitrate	1	Nov 15	3.3np	3.8qs	5.3lm	6.2ij
Ammonium nitrate	2	Oct 15	7.8b	7.0ef	7.7bc	8.3bd
Ammonium nitrate	2	Nov 1	6.7df	6.2gi	7.5bd	8.5ac
Ammonium nitrate	2	Nov 15	3.8lo	4.3pr	7.2cf	8.5ac
20-0-16*	1	Oct 15	4.7jk	3.8qs	4.0qs	4.5p
20-0-16	1	Nov 1	3.8lo	3.3sv	3.7rt	4.5p
20-0-16	1	Nov 15	3.2op	2.8vx	3.7rt	5.0o
20-0-16	2	Oct 15	6.2fg	4.7mo	5.2mn	7.7ef
20-0-16	2	Nov 1	5.5hi	4.5np	5.0mn	8.0de
20-0-16	2	Nov 15	3.2op	3.7rt	4.3pq	7.7ef
S. coated urea#	1	Oct 15	5.3hj	5.3jl	4.5oq	5.7km
S. coated urea	1	Nov 1	4.0kn	4.5np	4.2pr	5.8jl
S. coated urea	1	Nov 15	3.0p	3.3sv	4.0qs	6.2ij
S. coated urea	2	Oct 15	7.3bd	6.3gh	6.5gi	8.8a
S. coated urea	2	Nov 1	5.5hi	5.2km	6.2hj	8.8a
S. coated urea	2	Nov 15	3.7lp	3.7rt	6.0ij	8.8a
IBDU-fine	1	Oct 15	3.2op	3.0ux	2.8vx	5.0o
IBDU-fine	1	Nov 1	3.0p	2.5x	1.8yz	4.3pq
IBDU-fine	1	Nov 15	3.0p	2.5x	1.8z	3.5s
IBDU-fine	2	Oct 15	4.2km	3.5ru	4.5oq	7.7ef
IBDU-fine	2	Nov 1	3.5mp	2.8vx	4.2pr	7.2g
IBDU-fine	2	Nov 15	3.3np	2.5x	3.3tv	6.0ik

*Carriers are 10-1-8 from Milwaukee Sewage Commission; Dwell from Olin-Matheson Co.; 14-0-0 (Iron-S) from Scott's; 18-4-10 from Lebanon Co.; 20-0-16 from Lakeshore Equipment Co.; S-coated urea - special grade for greens from CIL.

#Quality ratings in columns followed by the same letter are not significantly different from each other using Duncan's Multiple Range Test at the 5% level.

Table 2. 1980-81 fall N on a Poa annua fairway at the Walnut Hills Country Club, East Lansing. Averages for 3 replications. N applied at 1.5 pounds per 1000 square feet.

Treatment		Evaluation date (9-1;9-dark green)					
Carrier	Date of application	10/31/80	11/18/80	12/17/80	4/6/81	4/22/81	5/15/81
IBDU	Oct 15	5.8f [#]	5.7i	5.8hm	5.7ij	6.7g	7.2hk
IBDU	Nov 1	5.5fg	4.7kl	5.0lp	5.5jl	7.3ef	7.2hk
IBDU	Nov 15	5.3g	4.0m	3.7qt	4.5m	6.0h	6.5km
IBDU	Dec 1	5.3g	4.0m	3.2t	2.7n	5.5h	5.3n
S.C. Urea (CIL)*	Oct 15	8.2b	8.5bc	7.7bd	6.8df	8.3ac	8.0cg
S.C. Urea (CIL)	Nov 1	5.5fg	7.2f	7.3df	6.7dg	8.7a	7.8dh
S.C. Urea (CIL)	Nov 15	5.3g	4.0m	5.5in	6.8df	8.3ac	8.3ae
S.C. Urea (CIL)	Dec 1	5.3g	4.0m	3.5rt	5.7ij	7.7ce	8.5ad
18-5-9*	Oct 15	8.3b	8.3cd	6.5ei	4.8lm	7.2eg	6.3lm
18-5-9	Nov 1	5.3g	7.2f	8.3ac	7.2ce	8.2ac	7.0il
18-5-9	Nov 15	5.3g	4.8kl	5.2kp	7.7ac	8.7a	7.8dh
18-5-9	Dec 1	5.2g	4.0m	4.3os	6.5eh	7.7ce	7.3gj
Milorganite	Oct 15	6.3e	6.5gh	6.3gk	6.8df	7.2eg	7.0il
Milorganite	Nov 1	5.5fg	5.2j	4.8mp	6.7dg	7.3ef	7.7ei
Milorganite	Nov 15	5.5fg	4.0m	3.5rt	6.2fj	7.3ef	8.2bf
Milorganite	Dec 1	5.2g	4.0m	3.3st	4.8lm	6.7g	6.8jl
Urea*	Oct 15	9.0a	9.0a	6.8dh	4.8lm	7.2eg	6.0m
Urea	Nov 1	5.5fg	8.2cd	8.5ab	6.2fj	7.7ce	6.8jl
Urea	Nov 15	5.2g	4.7kl	5.8hm	7.8ac	8.2ac	7.3gj
Urea	Dec 1	5.2g	4.0m	4.2ps	6.8df	7.2eg	7.5fj
Dwell*-Urea	Oct 15	8.7a	8.5bc	7.2dg	5.8hj	7.5de	7.3gj
Dwell-Urea	Nov 1	5.3g	7.8e	8.3ac	6.7dg	8.3ac	7.5fj
Dwell-Urea	Nov 15	5.3g	4.7kl	6.2gk	7.7ac	8.3ac	7.7ei
Dwell-Urea	Dec 1	5.5fg	4.0m	4.5nr	6.2fj	7.5de	7.3gj

Table 2. Continued.

Carrier	Date of application	10/31/80	11/18/80	12/17/80	4/6/81	4/22/81	5/15/81
31-3-10*	Oct 15	7.8c	7.8e	6.3fj	6.3fi	7.3ef	6.31m
31-3-10	Nov 1	5.5fg	6.7g	7.5ce	7.2ce	8.0bd	6.0m
31-3-10	Nov 15	5.5fg	4.0m	5.3jo	6.8df	8.5ab	7.8dh
31-3-10	Dec 1	5.3g	4.0m	3.7qt	5.0km	7.2eg	7.5fj
24-4-12*	Oct 15	7.3d	8.0de	6.0hl	6.0gj	7.8ce	7.0il
24-4-12	Nov 1	5.5fg	6.8g	7.2dg	6.2fj	8.3ac	7.8dh
24-4-12	Nov 15	5.2g	4.0m	5.0lp	6.7dg	7.8ce	7.3gj
24-4-12	Dec 1	5.3g	4.0m	3.5rt	5.5jl	7.7ce	6.8jl
Ammonium nitrate	Oct 15	9.0a	8.7ab	6.8dh	4.7m	6.8fg	6.31m
Ammonium nitrate	Nov 1	5.3g	7.8e	9.0a	6.8df	8.2ac	6.5km
Ammonium nitrate	Nov 15	5.3g	5.0jk	5.8hm	8.0ab	8.7a	7.3gj
Ammonium nitrate	Dec 1	5.5fg	4.0m	4.3os	6.2fj	7.5de	7.5fj
S.C. Urea (LESCO)*	Nov 1	5.5fg	6.2h	6.3fj	7.3bd	8.7a	8.7ac
S.C. Urea (LESCO)	Nov 15	5.3g	4.0m	4.3os	6.7dg	8.0bd	9.0a
S.C. Urea (LESCO)	Dec 1	5.5fg	4.0m	3.3st	5.8hj	7.8ce	8.5ad
28-0-10*	Nov 1	5.7f	5.8i	5.2kp	6.8df	8.5ab	8.2bf
28-0-10	Nov 15	5.5fg	4.0m	4.2ps	6.8df	8.3ac	8.5ad
28-0-10	Dec 1	5.5fg	4.0m	3.3st	5.8hj	8.3ac	8.8ab
Check		5.3g	4.0m	3.2t	2.3n	3.8i	3.8o

*Carriers are S.C. Urea (sulfur coated urea), regular grade, from CIL; 18-5-9 from Lebanon Co.; Dwell from Olin-Matheson Co.; 31-3-10 from Scott's; 24-4-12 from Estech; S.C. Urea from LESCO; 28-0-10 from LESCO.

#Quality ratings in columns followed by the same numbers are not significantly different from each other using Duncan's Multiple Range Test at the 5% level.