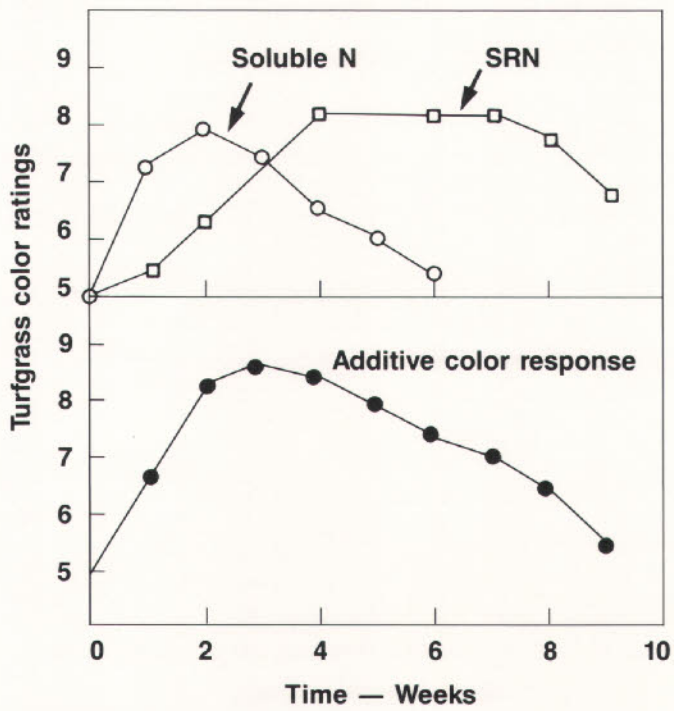
BENTGRASS RESPONSE TO SRN AND SRN - UREA COMBINATIONS

By David Guthery

Turf fertilizer manufacturers often blend a soluble N source with a slow release N (SRN) source in an attempt to provide uniform turfgrass response over an extended period of time. The inherent assumption is that the fast release soluble N provides quick response until such time that the SRN begins to release comparable amounts of N. Based on this assumption, one would expect a turfgrass color response such as that shown in the top of Figure 1.

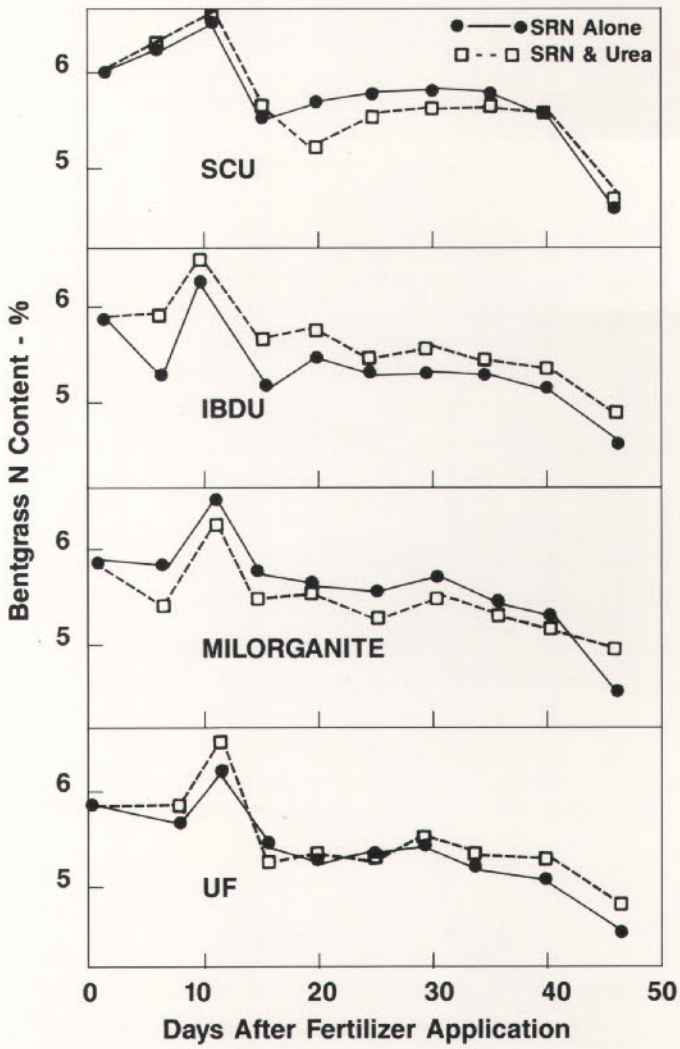
Is the assumption underlying fast release N-SRN combinations valid? From a theoretical perspective, perhaps not. As shown in the top of Figure 1, there is a considerable period of time during which the turfgrass is simultaneously receiving N from both the soluble and the SRN sources. Logic tells us that when this overlap occurs, responses of the turfgrass to the two N sources are additive. If so, then the expected turfgrass response pattern is that shown in the lower half of Figure 1.

Fig. 1
Presumed (top) and theoretical (bottom) color responses of turfgrass to soluble N-SRN combinations.



In comparing the two situations depicted in Figure 1, we find that the SRN alone provides turfgrass color ratings of 7 to 8 for a period of six weeks. When the color response is additive, the period of acceptable but not excessive color (ratings of 7 to 8) is only about 4½ weeks. This raises some serious questions regarding the advantages of blending SRN's with soluble N sources.

Fig. 2.
Nitrogen content of bentgrass fertilized with various SRN's and SRN-Urea combinations.



The purpose of the present study was to test the hypothesis that blending of SRN's with Urea does not improve turfgrass response to fertilizer N. The study was conducted in the greenhouse with Penncross creeping bentgrass growing in pots containing an 80:20 blend of sand and peat.

OBSERVATIONS

Over short periods of time, nitrogen content of turfgrass is a much more sensitive measure of response to fertilizer N than is color. Detectable color changes often do not arise for several days after major increases in turfgrass N content. It is for these reasons that turfgrass N content was chosen as the measure of bentgrass response to SRN's and SRN-Urea combinations applied at the constant rate of 1 lb. N/1000 ft.^{2}

As shown in Figure 2, there were no readily apparent advantages of blending SCU, IBDU, Milorganite or UF (Nitroform Blue Chip) with Urea such that equal amounts of N were provided by the SRN's and the Urea. With only minor exceptions, bentgrass tissue N concentration for each of the SRN and SRN-Urea combinations was essentially the same throughout the duration of the study. For reasons that are unknown, bentgrass N content was rather consistently less when Milorganite was combined with Urea than when Milorganite alone was applied.

The patterns of bentgrass tissue N content (Fig. 2) are not exactly those expected. Tissue N concentrations in all treatments declined sharply between 11 and 14 days after fertilizer application. There are two reasons for this. First is the fact that daytime temperatures in the greenhouse rose above 85°F. for a period of about ten days. This depressed top growth and led to a pythium infestation that was eventually brought under control with two applications of Koban.

TABLE 1.
INCREASES IN BENTGRASS CLIPPING WEIGHT RESULTING FROM APPLICATION OF SRN AND SRN+UREA

	Increase in Clipping Weight*	
SRN	SRN Alone	SRN+Urea
	g/pot	
SCU	0.44	0.40
IBDU	0.33	0.26
MILORGANITE	0.50	0.52
UF	0.19	0.45
Blsd(k=50) = 0.22 g		

*As compared to the control.

Except in the case of UF, applying the SRN's alone or in combination with Urea had no effect on bentgrass clipping weights (Table 1). Blending Urea with the UF significantly increased clipping weights. Without Urea, clipping weight increases for the UF treatment were significantly less than for the SCU and Milorganite treatments.

TABLE 2.
BENTGRASS RECOVERY OF N FROM SRN AND SRN+UREA

	Fertilizer N Recovery	
SRN	SRN Alone	SRN+Urea
	%	
SCU	37.1	31.1
IBDU	21.7	24.8
MILORGANITE	40.7	36.9
UF	17.8	33.5
Blsd(k=50) = 7.2%		

Fertilizer N recovery values (Table 2) paralleled increases in bentgrass clipping weights. For the SRN's applied alone, fertilizer recovery by the bentgrass over the 46 day growth period ranged from a low of 17.8% for UF to a high of 40.7% for Milorganite. Blending Urea with UF increased fertilizer N recovery to 33.5%, a level comparable to that of SCU and Milorganite.

Recovery of N from IBDU and the IBDU-Urea combinations was notably less than recovery of N from the Milorganite treatments (Table 2). This is believed to be due to the fact that microbial release of N from Milorganite is greatly favored by greenhouse growing conditions. This was evidenced by fungal micelial growth that completely covered the Milorganite treated pots between approximately 5 and 10 days after Milorganite application.

TABLE 3.
BENTGRASS COLOR RATINGS 46 DAYS AFTER FERTILIZER APPLICATION

	Color Rating*	
SRN	SRN Alone	SRN+Urea
SCU	7.9	7.7
IBDU	8.3	7.5
MILORGANITE	7.7	7.4
UF	7.6	7.3
Blsd(k=50) = 0.4		

*Scale 1 to 9 with 9 being very dark green.

Turfgrass color ratings at the end of the study averaged less for the SRN-Urea combinations than for the SRN only treatments (Table 3). This difference, however, was significant only in the case of IBDU.

Even more striking than color differences, per se, was the uniformity of bentgrass color at the end of the study. With exception of SCU, the bentgrass color was decidedly more uniform for the SRN than the SRN+Urea treatments (Table 4). This occurred despite the fact that the Urea and SRN fertilizers were individually applied as uniformly as possible.

TABLE 4.
UNIFORMITY OF BENTGRASS COLOR 46 DAYS AFTER FERTILIZER APPLICATION

	Color Uniformity*	
SRN	SRN Alone	SRN+Urea
SCU	6.7	7.2
IBDU	8.1	5.9
MILORGANITE	7.7	6.3
UF	8.5	6.3
Blsd(k=50) = 0.6		

*Scale 1 to 9 with 9 being completely uniform throughout the pot.

CONCLUSIONS

This study failed to provide any evidence that blending SRN's with a soluble N source provides longer term or more

uniform response of bentgrass to fertilizer N. Rather, once the Urea was depleted, turfgrass color intensity and color uniformity were generally better when the SRN's were applied alone.

Because these results were obtained in a short-term greenhouse study, they require field verification. It is clear, however, that such field studies are warranted.

Editor's Note: David Guthery is a 1989 graduate of the UW-Madison Turf and Grounds Management program. His interest in the turfgrass profession stems from several summers' work at the Racine Country Club. David is currently pursuing an M.S. degree in Ornamental Horticulture under the guidance of Dr. Ed Hasselkus.

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The University of Wisconsin College of Agricultural and Life Sciences will offer a one week turfgrass management short course the week of January 8-12, 1990. The course will meet every day during the week from 10 a.m. to 3 p.m., and the cost will be $50.00. Professor Robert Newman of the University Horticulture Department will be teaching the course. Other faculty in CALS will be featured as guest lecturers. Housing and parking will be available for the week on the Madison campus. A registration form is enclosed for your convenience. Please note that registration forms are due by December 15, 1989. A course description is listed below.

The turfgrass management short course is both an entry level course into turfgrass management and a review course for practicing turf professionals. The course deals with cool season turf grasses including both golf and home lawn situations. The unit covers selection of grasses for various sites and purpose and management practicing including:

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