

Turfgrass Soil Management
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SULFUR STUDIES

Three studies were initiated in 1986 to study the response of turfgrasses to sulfur applications. These studies were initiated in July. The first was applied on a Kentucky bluegrass turf which had been seeded in 1980. The soil was compacted clay loam subsoil. Plot size was 6 feet by 10 feet with 3 replications for each treatment. Treatments applied are given in Table 1. Data for this study are given in Tables 1 and 2. Rates of sulfur application were 10 and 20 pounds of sulfur carrier depending on treatment.

The most striking responses were to treatments with Cleary's flowable sulfur. There was a significant response in turf density and clipping weights (Table 1) as well as in color and turf quality ratings (Table 2). Note the dramatic increase in weight of clippings as an indicator growth response. In one month after application the 10 and 20 pound rates of applications gave comparable growth responses, while after two months the 20 pound rate resulted in significantly more growth than the 10 pound rate.

There were few responses to other sulfur carrier applications except for Thiolutax which showed some tendency to result in a darker green color. Although there was a significant response to the flowable sulfur in particular, the rates applied were quite high and injury could easily result from such application rates. In this regard, there was reduction in color ratings taken in October on both 10 and 20 pound treated plots.

Soil pH tests taken in October indicated there was no change in pH when sampled to the 1.0 inch depth. pH values ranged from 7.2 to 7.5. Injury from sulfur applications will occur because of rapid pH change in the very soil surface. This pH change can be very dramatic and can cause injury to plant tissue (roots and crowns). Gradually the acid released will leach downward to change the pH a little deeper in the soil. In this study the reduction in turf color is not understood. It could result from too much acidity in the surface 1/4 inch or so (although there was no indication of this in the pH test) or from some other nutritional response.

Responses to the sulfur applications on annual bluegrass fairway height turf at the Hancock Turfgrass Research Center were quicker than on the Kentucky bluegrass. There was very clear growth and density response to both the 5 and 10 pound rates used in this study (see Table 3), within a week or so although no clipping weights were taken because of smaller plot size. Turf color response was different than with Kentucky bluegrass. There was a short term response in turf color causing a darker green on the flowable sulfur plots but after one month the turf was lighter green than on the untreated plots. This was very noticeable two months after

treatment in September when all other plots had a darker green color. In September the turf density on the flowable treated plots was more open especially at the 10 pound rate (compared to the 5 pound rates). Clearly there was weakening of the turf during the fall due to treatment. Again soil test did not reflect a meaningful change in pH at least in the 1.0 inch depth.

It should be noted that there was some response of annual bluegrass to the Thiolut treatments. There was darker green color, an improvement in quality ratings and relative growth compared to the untreated control for about a month (Table 3). There was also some indication of injury which occurred on small spots at the edges of plots where a little extra product fell during application of Thiolut. To a lesser degree this occurred with the flowable product. No indication of this occurred with other products.

A second study on annual bluegrass was initiated in August as outlined in Table 4. There was no indication of any response to any of these treatments with Thiolut or Cleary's flowable sulfur. Apparently there are other factors involved in the nature of this response. It is not known if these are related to physiological, environmental, or soil conditions.

On July 19 a small study on sulfur response of Penncross creeping bentgrass under greens conditions was begun. After about a month there was significant turf color response to the flowable sulfur that persisted through the end of the growing season. There was no apparent response in turf density or growth rate although no clipping weights were taken because of small plots size.

Table 1. Effect of sulfur applications on turf density and clipping weights of Kentucky bluegrass growing on clay loam subsoil. Treatments applied July 12, 1986 at rates shown pounds product per 1000 square feet. Averages for 3 replications. Hancock Turfgrass Research Center. A density rating of 9 = highest density.

Carrier	Treatment	Rate	Turf density		Clipping weight gm	
			8/14	9/8	8/14	9/10
Thiolut		10	8.0 a	7.5 bc	21	40 c
		20	6.3 b	7.2 cd	6 b	39 c
LESCO Microprill		10	6.3 b	6.0 d	7 b	25 de
		20	6.7 b	6.5 cd	10 b	21 e
LESCO Water degradable		10	6.5 b	6.3 cd	9 b	23 e
		20	6.5 b	6.7 cd	11 b	38 cd
Frit-Sul-Ate		10	6.7 b	6.7 cd	11 b	29 cde
		20	6.3 b	6.8 cd	5 b	31 cde
Cleary Flowable		10	8.5 a	8.5 ab	47 a	75 b
		20	8.7 a	9.0 a	49 a	143 a
Check			6.7 b	6.0 d	5 b	20 e

Table 2. Effect of sulfur applications on color and turf quality ratings of Kentucky bluegrass growing on clay loam subsoil. Treatments applied July 12, 1986. Application rate in pounds product per 1000 square feet. Hancock Turfgrass Research Center. Averages for 3 replications. A rating of 9 = dark green color or high turf quality.

Carrier	Treatment Rate, lbs	Color rating			Turf quality		
		7/31	8/14	10/23	8/14	9/8	10/23
Thiolux	10	7.8 ab	7.8 ab	7.0 b	7.7 ab	7.7 bc	6.5 ab
	20	7.0 bc	7.0 ab	8.0 a	6.8 bc	7.0 c	6.2 b
LESCO Microprill	10	6.5 cd	6.7 ab	6.8 b	6.2 c	6.7 c	6.3 ab
	20	6.8 bd	6.8 ab	6.8 b	6.5 c	6.8 c	6.3 b
LESCO Water Degradable	10	6.7 cd	6.7 ab	6.8 b	6.3 c	7.0 c	7.2 ab
	20	6.5 cd	6.5 b	7.2 b	6.3 c	7.3 c	6.8 ab
Frit-Sul-Ate	10	5.8 d	7.0 ab	7.3 b	6.5 c	7.2 c	7.3 a
	20	6.8 bd	6.5 b	7.0 b	6.0 c	7.0 c	7.2 ab
Cleary Flowable	10	8.5 a	8.0 a	6.0 c	8.3 a	9.0 a	6.7 ab
	20	8.3 a	8.0 a	6.0 c	7.8 a	8.5 ab	6.2 b
Check	-	6.3 cd	6.5 b	6.7 b	6.2 a	6.8 c	6.7 ab

Table 3 . Effect of sulfur applications on annual bluegrass turf growing on loam soil. Treatments applied July 12, 1986 at rates shown in pounds per 1000 square feet. Averages of 3 replications. Hancock Turfgrass Research Center. A rating 9 is best.

<u>Treatment</u>		<u>Color rating</u>			<u>Quality rating</u>		<u>Relative</u> <u>shoot growth</u>	<u>Relative</u> <u>density</u>
Carrier	Rate	7/21	8/14	9/19	8/14	9/18	7/21	9/8
Thiolux	5	7.2 ac	7.5 ab	6.0 a	7.8 a	6.8 ab	7.3 b	7.2 a
	10	8.0 a	8.2 a	6.2 a	7.3 ab	7.0 a	6.8 bc	6.8 ab
LESCO Microprill	5	6.5 cd	7.2 ac	6.3 a	7.0 ab	6.7 ab	6.0 d	6.8 ab
	10	6.3 cd	7.0 bc	6.2 a	7.7 a	6.5 ab	6.0 d	6.7 ac
LESCO Water degradable	5	6.0 d	6.5 bc	6.3 a	6.3 bd	6.7 ab	6.0 d	6.7 ac
	10	6.3 cd	7.0 bc	6.5 a	6.5 ad	7.0 a	6.5 cd	7.2 a
Frit-Sul-Ate	5	6.7 bd	6.7 bc	6.2 a	6.3 bd	6.5 ab	6.3 cd	6.3 bc
	10	6.3 cd	7.0 bc	6.2 a	6.7 ac	6.5 ab	6.0 d	6.5 ac
Cleary Flowable	5	7.7 ab	6.2 cd	5.2 b	5.5 cd	5.8 b	8.5 a	6.0 c
	10	7.7 ab	5.5 d	5.0 b	5.2 d	4.8 c	8.5 a	5.2 d
Check		6.0 d	7.0 bc	6.3 a	6.3 bd	6.5 ab	6.0 d	6.7 ac

Table 4. Effect of sulfur applications on annual bluegrass turf growing on loam soil -- Study II. Treatments applied August 22, 1986 at rates shown in pounds per 1000 square feet. Averages of 3 replications. Hancock Turfgrass Research Center. A rating of 9 is best.

Carrier	<u>Treatment</u>		<u>Color rating</u>	
	Rate	9/8	9/19	
Thiolux	1	6.7 ns	6.0 ns	
	2	6.7	5.8	
	5	6.8	5.8	
Cleary	1	7.3	5.0	
	2	7.0	5.8	
	5	6.8	5.3	
Check	-	6.8	5.3	

Table 5. Effects of sulfur applications on Pennncross creeping bentgrass turf growing on loamy sand soil. Treatments applied July 19, 1986 at rates shown in pounds product per 1000 square feet. Averages for 3 replications. Hancock Trufgrass Research Center. A rating of 9 is best.

Carrier	<u>Treatment</u>		<u>Color rating (9=dark green)</u>			
	Rate	8/8	8/14	9/8	9/19	10/16
Cleary	5	6.7 ab	7.5 a	7.0 b	7.3 a	7.5 a
	Flowable 5 + 5	7.2 a	6.8 a	7.5 a	7.5 a	7.5a
LESCO	5	5.7 b	5.7 b	5.5 c	5.5 b	6.3 b
	Microprill 5 + 5	6.2 ab	5.7 b	5.5 c	5.5 b	6.3 b
Check	-	6.5 ab	5.7 b	5.5 c	5.7 b	6.3 b