

## **Effect of Uflexx and Urea with Agrotain on Lawn Height Kentucky bluegrass**

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### **Objective**

The objective of this study was evaluate the effects of Uflexx and urea with Agrotain on growth, visual quality and color of Kentucky bluegrass blend maintained at lawn height.

### **Rationale**

Fertility is one of the basic building blocks of turfgrass management. Selecting the proper material, application rates and timing are all crucial to developing an overall sound program. When developing a fertility plan, important consideration must be given to the nitrogen release characteristics of the fertilizer material. This study was designed to examine the response of Kentucky bluegrass mowed at lawn height to Uflexx and urea treated with Agrotain.

### **How It Was Done**

The study was located at the Wm. H. Daniel Turfgrass Research and Diagnostic Center at Purdue University, West Lafayette IN. The soil type was Starks-Fincastle silt loam. The area was previously in corn and this was the initial turf planting of a Kentucky bluegrass blend on the site. The blend consisted of 'Merit', 'SR2100', 'Fairfax', and 'Freedom' mowed at 2.5 inches. Turf areas were irrigated to prevent moisture stress and clippings were not returned. No fertilizer was applied to the area in 2001 prior to initiation of the studies.

The fertility treatments were a 3 x 4 factorial with three rates and four fertilizers. The rates consisted of 0.5, 0.75 and 1.0 lbs N/1000 ft<sup>2</sup>. Fertilizer treatments included 1:1 blend of urea and sulfur coated urea, urea alone, urea plus Agrotain (5 quarts/ton), and Uflexx. Treatments were applied June 5, July 19 and Sep. 14 and thoroughly watered-in after application. Experimental design for was a randomized complete block with three replications. Clippings were harvested once per week with one pass of a 16-inch wide reel-type mower. The clippings were oven-dried at 140°F for at least 48 hours prior to weighing. Plot area was left unmowed 4 to 6 days prior to clipping harvest. Plot size was 5 X 10 ft. Visual quality of plots was rated on a scale of 1 to 9 where 1=dead turf, 5=acceptable, and 9=excellent. Color was also rated visually on a scale of 1 to 9 where 1=dead turf, 5=acceptable green, and 9=dark green. Data was recorded until treatment effects were no longer visible or dormancy. At the termination of the study all data was analyzed with SAS.

### **Results**

Only means that were statistically significant are presented in Tables 1-4, whereas all means from the study are presented in Tables 5-6. Overall, there were very few consistent trends in the data over the 18 weeks of the study. This may be due to the fertile soils inherent to the site, even though no fertility was applied in Fall of 2000 or Spring of 2001 prior to the treatments. Additionally, a relatively small range of fertilizer rates was used (0.5 to 1.0 lbs N/1000 ft<sup>2</sup>) in order to mimic what would be used in turf production. But this range likely made it more difficult to pick up small differences in fertilizer responses.

### **Color**

Differences in color due to the fertilizer treatment were only apparent early in the experiment on June 11, June 17 and June 25 (Table 1). As expected, urea alone produced the quickest color response, followed in order by urea+Agrotain, Uflexx and urea+SCU. However, even though urea gave numerically higher color ratings than urea+Agrotain, the ratings were not statistically different indicating the bluegrass responded identically to these two products. The response to Uflexx was not significantly different from that of the urea plus SCU suggesting

that Uflexx responds more like the slow release combination of urea and SCU. While differences due to fertilizer were only apparent at the onset of the experiment, differences due to nitrogen rate were apparent throughout June, July and the end of August with representative results shown in Table 1. There were no significant interactions between the fertility rate and the fertilizer.

### **Quality**

Urea, urea plus Agrotain, and Uflexx all improved the quality of the Kentucky bluegrass over that of the urea plus SCU on June 25 (Table 2). Urea plus Agrotain, Uflexx and urea plus SCU improved the quality over that of the urea alone on Oct. 12. On the final date of Nov 16, urea alone and Uflexx improved quality over urea+SCU and urea+Agrotain. Differences in quality due to fertility rate were apparent in June, July, the end of August and during the November rating date with representative results in table 2. As with the color ratings, there were no significant interactions between the fertility rate and the fertilizer.

### **Clippings**

There were no significant effects of the fertilizers on clipping production. However, increasing the nitrogen fertility rate increased clipping production mid June, July, the end of August and Oct. Table 3 contains representative results. In addition to examining individual dates, clipping collections were totaled between treatment application dates as well as a grand total. As with the individual dates, there were no significant differences between fertilizer materials (Table 4). As expected the higher nitrogen rates produced the larger clipping totals.

**Table 1.** Color effects of fertilizer type and nitrogen rate on Kentucky bluegrass at 2.5 inches during the summer of 2001.

		June 11				June 17				June 25			
Nitrogen Rate (R) (lbs N/1000 ft <sup>2</sup> /app)		0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean
Fertilizer (F)	Urea + SCU	5.0	6.0	6.3	5.8	5.7	6.3	6.7	6.2	5.7	6.3	6.7	6.2
	Urea	6.3	7.3	7.3	7.0	6.7	7.3	7.3	7.1	6.7	7.3	7.7	7.2
	Urea + Agro	6.0	6.7	7.3	6.7	6.3	6.3	7.0	6.6	6.3	6.7	7.3	6.8
	Uflexx	5.7	6.3	6.7	6.2	6.0	6.3	6.7	6.3	6.0	6.3	6.7	6.3
R mean		5.8	6.6	6.9		6.2	6.6	7.0		6.2	6.7	7.1	
LSD 0.05 for F			0.6				0.5				0.5		
LSD 0.05 for R			0.5				0.4				0.4		
LSD 0.05 for FxR			NS				NS				NS		

Treatments were applied June 5, July 19 and Sep. 14.

**Table 2.** Quality effects of fertilizer type and nitrogen rate on Kentucky bluegrass at 2.5 inches during the summer of 2001.

		June 25				Oct 12				Nov 16			
Nitrogen Rate (R) (lbs N/1000 ft <sup>2</sup> /app)		0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean
Fertilizer (F)	Urea + SCU	5.3	6.3	6.7	6.1	8.3	7.7	8.0	8.0	5.3	6.0	6.3	5.9
	Urea	6.3	7.0	7.3	6.9	6.3	8.0	8.0	7.4	6.0	7.3	7.0	6.8
	Urea + Agro	6.3	6.7	7.0	6.7	8.0	8.0	8.0	8.0	6.0	6.3	6.7	6.3
	Uflexx	6.3	6.7	7.7	6.9	8.0	8.0	8.7	8.2	6.7	7.3	7.0	7.0
R mean		6.1	6.7	7.2		7.7	7.9	8.2		6.0	6.8	6.8	
LSD 0.05 for F			0.6				0.6				0.5		
LSD 0.05 for R			0.5				NS				0.5		
LSD 0.05 for FxR			NS				NS				NS		

Treatments were applied June 5, July 19 and Sep. 14.

**Table 3.** Clipping production effects of fertilizer type and nitrogen rate on Kentucky bluegrass at 2.5 inches during the summer of 2001.

		June 17				June 25				Oct 12			
Nitrogen Rate (R) (lbs N/1000 ft <sup>2</sup> /app)		0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean
Fertilizer (F)	Urea + SCU	5.7	6.6	8.3	6.9	3.9	3.9	6.0	4.6	8.5	8.0	8.5	8.3
	Urea	5.7	9.4	10.3	8.5	3.5	6.5	8.0	6.0	6.9	9.2	13.0	9.7
	Urea + Agro	7.6	8.2	11.3	9.1	5.4	6.1	7.2	6.3	8.8	8.8	11.7	9.8
	Uflexx	6.9	7.8	10.9	8.6	4.4	5.8	8.0	6.1	7.5	10.4	10.7	9.5
R mean		6.5	8.0	10.2		4.3	5.6	7.3		7.9	9.1	11.0	
LSD 0.05 for F		NS				NS				NS			
LSD 0.05 for R		1.5				1.4				1.8			
LSD 0.05 for FxR		NS				NS				NS			

Treatments were applied June 5, July 19 and Sep. 14.

**Table 4.** Cumulative clipping production effects of fertilizer type and nitrogen rate on Kentucky bluegrass at 2.5 inches during the summer of 2001.

		June 11-July 16				July 23-Sep. 12				Sep. 21-Nov.			
Nitrogen Rate (R) (lbs N/1000 ft <sup>2</sup> /app)		0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean	0.5	0.75	1.0	F mean
Fertilizer (F)	Urea + SCU	31.9	35.9	43.4	37.1	78.6	89.3	92.7	86.8	30.8	33.1	33.2	32.8
	Urea	30.6	42.3	50.2	41.0	71.6	84.9	90.5	82.3	27.3	36.5	45.7	36.5
	Urea + Agro	41.1	42.1	47.0	43.4	81.2	81.2	86.7	83.0	33.8	33.1	40.4	37.0
	Uflexx	34.0	38.0	50.0	40.7	83.0	80.7	92.2	85.3	32.4	40.4	40.2	37.6
R mean		34.4	39.6	47.7		78.6	84.0	90.5		31.1	35.8	40.8	
LSD 0.05 for F		NS				NS				NS			
LSD 0.05 for R		6.9				6.3				5.7			
LSD 0.05 for FxR		NS				NS				NS			

Treatments were applied June 5, July 19 and Sep. 14.

**Table 5.** Color rating means for all dates collected from Kentucky bluegrass at 2.5 inches during the summer of 2001.

Fertilizer	Rate Aug 27	June 11	June 17	June 25	July 2	July 9	July 16	July 23	July 30	Aug 13	Aug 20	
	lb N/1000 ft <sup>2</sup>	-----g/plot-----										
Urea + SCU	0.5	5.0	5.7	5.7	6.0	5.7	6.3	6.0	7.3	7.7	8.0	9.0
	0.75	6.0	6.3	6.3	6.3	7.7	7.3	7.7	8.0	8.0	8.3	8.7
	1.0	6.3	6.7	6.7	8.0	8.0	7.3	7.7	8.3	8.0	8.7	8.7
Urea	0.5	6.3	6.7	6.7	7.3	6.7	6.7	6.7	7.3	7.3	7.7	7.7
	0.75	7.3	7.3	7.3	7.3	7.0	6.3	7.3	8.3	7.7	8.0	8.3
	1.0	7.3	7.3	7.7	7.3	7.3	7.7	7.7	8.0	8.0	8.3	8.7
Urea + Agro	0.5	6.0	6.3	6.3	7.0	6.3	6.0	7.3	8.0	7.7	8.0	9.0
	0.75	6.7	6.3	6.7	7.7	6.7	7.0	7.3	8.0	8.0	8.0	8.6
	1.0	7.3	7.0	7.3	8.0	7.3	7.7	7.0	8.3	7.3	8.0	8.7
Uflexx	0.5	5.7	6.0	6.0	7.0	6.7	6.7	6.0	8.0	7.7	8.0	8.7
	0.75	6.3	6.3	6.3	7.3	7.0	6.0	7.0	8.0	7.7	8.3	8.3
	1.0	6.7	6.7	6.7	8.0	7.7	7.3	7.7	9.0	8.0	8.3	8.3

**Table 5.** Continued.

Fertilizer	Rate Nov 16	Sept 5	Sept 12	Sept 21	Sept 28	Oct 12	Oct 31	
	lb N/1000 ft <sup>2</sup>	-----g/plot-----						
Urea + SCU	0.5	8.0	8.0	7.7	7.7	8.0	6.7	6.3
	0.75	8.0	7.7	7.7	7.7	8.0	7.0	6.3
	1.0	7.7	8.0	8.3	8.7	8.0	6.7	6.3
Urea	0.5	7.7	7.3	7.3	7.0	7.0	6.7	5.7
	0.75	7.7	8.0	8.3	8.7	8.7	7.3	6.7
	1.0	7.7	8.0	8.0	8.3	8.0	7.3	6.7
Urea + Agro	0.5	8.0	7.7	7.7	7.3	7.7	7.3	6.3
	0.75	7.7	8.3	8.0	8.0	8.0	7.0	6.3
	1.0	7.7	7.7	8.0	8.7	8.3	8.0	6.7
Uflexx	0.5	7.7	7.7	8.0	7.3	8.0	7.7	6.7
	0.75	8.0	8.3	7.7	8.7	8.0	7.3	7.0
	1.0	7.7	8.0	8.3	8.3	8.7	7.7	7.0

**Table 6.** Quality rating means for all dates collected from Kentucky bluegrass at 2.5 inches during the summer of 2001.

Fertilizer	Rate Aug 27	June 11	June 17	June 25	July 2	July 9	July 16	July 23	July 30	Aug 13	Aug 20	
	lb N/1000 ft <sup>2</sup>	-----g/plot-----										
Urea + SCU	0.5	5.7	5.7	5.3	6.0	6.7	6.3	6.0	7.3	7.7	7.7	8.7
	0.75	6.0	6.3	6.3	6.3	7.3	7.3	7.7	8.3	8.0	8.3	9.0
	1.0	6.7	6.7	6.7	7.7	7.7	7.3	7.7	8.3	7.7	8.3	8.7
Urea	0.5	5.3	6.0	6.3	7.0	6.3	6.7	7.0	7.7	7.7	7.7	8.0
	0.75	6.3	7.0	7.0	7.0	7.0	6.3	7.3	8.3	8.0	8.0	8.3
	1.0	7.0	7.3	7.3	7.3	7.3	7.7	7.7	8.7	8.0	8.0	8.3
Urea + Agro	0.5	6.3	6.3	6.3	6.3	6.0	6.0	7.7	8.3	8.0	8.3	8.7
	0.75	6.7	6.7	6.7	7.0	7.0	7.0	8.0	8.3	7.7	8.0	8.7
	1.0	6.7	7.0	7.0	7.7	7.7	7.7	7.7	8.7	7.3	8.0	8.3
Uflexx	0.5	5.7	6.3	6.3	6.7	6.7	6.7	6.7	7.7	7.7	8.7	8.3
	0.75	5.3	6.3	6.7	7.0	7.0	6.0	7.3	7.7	8.3	8.3	8.3
	1.0	7.0	7.3	7.7	7.7	7.3	7.3	8.0	8.7	7.7	8.3	8.7

**Table 6.** Continued.

Fertilizer	Rate Nov 16	Sept 5	Sept 12	Sept 21	Sept 28	Oct 12	Oct 31	
	lb N/1000 ft <sup>2</sup>	-----g/plot-----						
Urea + SCU	0.5	8.7	8.3	7.7	7.7	8.3	6.7	5.3
	0.75	8.0	8.3	7.7	7.7	7.7	7.0	6.0
	1.0	7.3	8.0	7.7	8.7	8.0	7.0	6.3
Urea	0.5	8.0	7.3	7.0	7.0	6.3	6.7	6.0
	0.75	8.0	8.0	8.0	7.7	8.0	7.3	7.3
	1.0	7.7	8.3	8.0	8.0	8.0	7.7	7.0
Urea + Agro	0.5	7.7	8.7	8.3	8.0	8.0	7.0	6.0
	0.75	8.3	8.0	7.7	8.0	8.0	6.3	6.3
	1.0	8.0	8.0	8.0	8.7	8.0	7.7	6.7
Uflexx	0.5	8.3	8.0	8.0	7.7	8.0	7.0	6.7
	0.75	7.7	8.0	8.0	8.0	8.0	7.3	7.3
	1.0	8.0	8.0	8.3	8.3	8.7	6.7	7.0

**Table 7.** Clipping weight means for all dates collected from Kentucky bluegrass at 2.5 inches during the summer of 2001.

Fertilizer	Rate Aug 27	June 11	June 17	June 25	July 2	July 9	July 16	July 23	July 30	Aug 13	Aug 20	
	lb N/1000 ft <sup>2</sup>	-----g/plot-----										
Urea + SCU	0.5	3.7	5.7	3.9	5.5	5.7	7.3	9.6	20.5	6.1	7.3	14.2
	0.75	4.3	6.6	3.9	6.2	6.4	8.5	12.8	25.2	7.3	8.3	15.5
	1.0	4.8	8.3	6.0	8.0	7.1	9.3	12.7	28.7	7.7	8.5	15.2
Urea	0.5	5.2	5.7	3.5	5.0	4.8	6.4	11.8	21.0	6.2	6.5	11.7
	0.75	4.4	9.4	6.5	7.7	6.3	8.0	11.5	27.2	6.2	7.1	14.5
	1.0	5.4	10.3	8.0	9.6	7.8	9.1	13.0	29.0	7.7	7.8	14.2
Urea + Agro	0.5	5.3	7.6	5.4	7.3	6.8	8.6	10.2	22.8	6.1	7.4	13.6
	0.75	4.4	8.2	6.1	8.1	6.9	8.3	11.3	24.8	6.3	6.6	13.4
	1.0	3.9	11.3	7.2	8.9	7.5	8.1	11.6	29.2	6.6	7.4	14.5
Uflexx	0.5	3.4	6.9	4.4	6.2	6.0	7.0	10.0	25.7	6.9	7.6	14.7
	0.75	3.4	7.8	5.8	7.6	6.3	7.1	9.9	25.8	6.5	6.9	13.3
	1.0	5.1	10.9	8.0	9.0	7.6	9.5	12.5	28.3	7.6	8.6	15.4

**Table 7.** Continued.

Fertilizer	Rate total	Sept 5	Sept 12	Sept 21	Sept 28	Oct 12	Oct 31	Nov 16	July 16	Sep. 12	Nov. 16	
	lb N/1000 ft <sup>2</sup>	-----g/plot-----										
Urea + SCU	0.5	10.7	10.1	4.0	9.3	8.5	5.8	3.3	31.9	78.6	30.8	141.3
	0.75	9.8	10.3	4.2	10.6	8.0	6.7	3.6	35.9	89.3	33.1	158.3
	1.0	10.1	9.8	4.1	10.7	8.5	6.6	3.3	43.4	92.7	33.2	169.3
Urea	0.5	6.8	7.6	3.6	8.2	6.9	6.1	2.5	30.6	71.6	27.3	129.5
	0.75	9.3	9.0	4.3	10.6	9.2	8.1	4.3	42.3	84.9	36.5	163.6
	1.0	9.4	9.5	5.0	14.1	13.0	9.3	4.4	50.2	90.5	45.7	186.4
Urea + Agro	0.5	10.4	10.8	4.5	10.6	8.8	6.5	3.4	41.1	81.2	33.8	156.0
	0.75	9.2	9.4	4.8	9.7	8.8	6.4	3.4	42.1	81.2	33.1	156.4
	1.0	8.3	9.1	4.8	13.7	11.7	9.2	4.6	47.0	86.7	44.0	177.7
Uflectx	0.5	8.6	9.7	4.5	10.6	7.5	6.2	3.5	34.0	83.0	32.4	149.4
	0.75	8.8	9.5	4.4	11.7	10.4	9.1	4.8	38.0	80.7	40.4	159.0
	1.0	10.5	9.5	4.8	11.7	10.7	8.6	4.3	50.0	92.2	40.2	182.4