Influence of Nitrogen Source on Kentucky Bluegrass Seed Yield in Central Oregon, Hermiston and Eastern Washington, 2011

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Abstract

Kentucky bluegrass seed growers in central Oregon, the lower Columbia Basin and eastern Washington use surface-applied nitrogen in the fall. The fall nitrogen source seed yield is the third component of an overall project that also includes quantifying ammonia volatilization using masts and N15 to determine nitrogen in the soil and crop. Five nitrogen sources: urea, Agrotain-coated urea at 5 lbs/agrotain per ton, UAN 32, CAN 27 and ammonium nitrate were applied at 150 lbs N/acre. These products were applied at the same time to the same commercial fields for all three components (yield, ammonia loss and N15 experiments). There was a significant yield difference between all the N applications and the untreated control, with no significant differences between the five nitrogen sources in central Oregon. There was a statistical separation between N treatments in eastern Washington, but the reasons for the differences are unclear.

Introduction

Kentucky bluegrass seed growers in central Oregon, the lower Columbia Basin and eastern Washington use surface-applied nitrogen (N) following the irrigation season to provide a majority of nitrogen needs. Adequate fertility in the fall when plant differentiation occurs is critical for fertile tiller establishment. Fertile tillers determine next year's seed yield for the following harvest. Accounting for nitrogen fertilizer applied to Kentucky bluegrass seed fields is difficult. A three piece (yield ammonia loss and N15) project was established in an effort to measure nitrogen losses in Kentucky bluegrass in three environments. N15 was used to determine the amount of N in both the soil and crop at two growth stages, early spring and pre-harvest. Application of nitrogen fertilizers without the ability to irrigate it into the soil means growers depend on natural precipitation for its incorporation. Volatilization under these conditions is a concern because it remains at the surface for potentially long periods of time. Urea is particularly susceptible to loss when there is little to no precipitation and it remains on the surface. A second companion project was established to quantify ammonia volatilization and establish whether there are yield reductions from the ammonia loss. The possibility also exists that the use of a urease inhibitor could reduce ammonia volatilization but also reduce plant available N and thus reduce yield during the critical fall growth stage.

The objective of this part of the project was to evaluate seed yield for the different N sources in the same commercial fields as the ammonia volatilization and N15 projects in three environments: irrigated in central Oregon and Hermiston, and dryland in the Pullman area of eastern Washington.

Methods and Materials

Plots were placed at five Pacific Northwest commercial fields of Kentucky bluegrass grown for seed, including two in central Oregon, two at Hermiston and one in eastern Washington. Fertilizer was applied in central Oregon on October 11, 2010 at the Culver location and October 19 at the Madras location, Treatments were applied on October 11 at both Hermiston sites and the one in eastern Washington. Five nitrogen sources were applied: urea, Agrotain-coated urea at 5 lbs/ton, UAN 32, CAN 27 and ammonium nitrate. They were all applied at 150 lb N/acre. Plots were 6 ft by 25 ft, replicated four times in a randomized complete block design.
When the commercial fields received their fall nitrogen fertilization, our plots were covered with tarps to exclude the grower's fertilizer application. In all other respects, plots were managed in the same way by the grower until harvest. Central Oregon plots were swathed on July 14 at the Madras location and on July 18 at the Culver location using a small-plot, forage harvester. Samples were bagged and hung to air dry until threshing with a stationery Wintersteiger plot combine. Seed samples were debearded and cleaned with a small scale Clipper cleaner. Once cleaned seed weight was measured and yield calculated. The two Hermiston sites located in the lower Columbia basin were lost prior to harvest so no yield data is available. Plot harvest and seed processing in eastern Washington was similar in timing and procedures to those used in central Oregon.

Results and Discussion

Seed yields from both central Oregon locations indicate a statistical difference between all treatments and the untreated check, with no differences between the nitrogen sources (Table 1). Results from eastern Washington had some differences between N sources. The Agrotain and untreated check were lower than the CAN-27 treatment. Urea and UAN 32 provided similar results that were not statistically different from each other or the Agrotain treatment. Overall seed yields from eastern Washington were less than those at either irrigated location in central Oregon.

Table 1. 2011 Seed yields from nitrogen sources: urea, Agrotain-coated urea at 5 lbs/ton, CAN 27, UAN 32, and ammonium nitrate on Kentucky bluegrass in central Oregon and Eastern Washington.

Fertilizer Source	Madras	Culver	Eastern Washington
	--------------------(lbs/acre)-------------------		
Unfertilized	643 b	278 b	329 c
Urea	1097 a	933 a	415 ab
Agrotain-coated Urea 5 lbs/ton	1158 a	820 a	351 bc
CAN 27	1217 a	787 a	430 a
UAN 32	1243 a	881 a	425 ab
NH_4NO_3	1262 a	906 a	*
LSD	*313*	*285*	*76*

*Not applied at this site

Influence of Nitrogen Source on Kentucky Bluegrass Seed Yield in Central Oregon, 2012

Marvin Butler and Rhonda Simmons

Abstract

Kentucky bluegrass seed growers in central Oregon use surface-applied nitrogen applied in the fall. This nitrogen source seed yield project is a companion project to one established to quantify ammonia volatilization in fall-applied nitrogen following the irrigation season. The same five nitrogen sources urea, Agrotain-coated urea at 1.5 lbs/ton, Agrotain-coated urea at 3 lbs/ton, Agrotain-coated urea at 5 lbs/ton and ammonium nitrate were applied at 150 lbs N/acre at the same time and in the same commercial fields. There was a significant yield difference between treated and the untreated control, with no significant differences between the five nitrogen sources at the Madras location. There was statistical separation between treatments in Culver.

Introduction

Kentucky bluegrass seed growers in central Oregon use surface-applied nitrogen (N) following the irrigation season to provide a majority of plant nutrient needs. Adequate fertility in the fall when plant differentiation occurs is critical to fertile tiller establishment that determines seed yield the following harvest. Application of fertilizer without the ability to follow with irrigation leaves growers depend on natural precipitation for incorporation. Volatilization under these conditions is a concern, particularly for urea-based fertilizers when there is little to no precipitation over weeks or months. A companion project was established to quantify ammonia volatilization under these conditions in the same fields at both locations.

The objective of this project was to evaluate seed yield in the same commercial fields and from the same nitrogen sources used in the companion ammonia volatilization project under irrigation in central Oregon.

Methods and Materials

Plots were placed at two commercial fields of Kentucky bluegrass grown for seed in central Oregon. Fertilizer was applied on November 9, 2011 at the Culver location and November 10 at the Madras location. Five nitrogen sources, urea, Agrotain-coated urea at 1.5 lbs/ton, Agrotain-coated urea at 3 lbs/ton, Agrotain-coated urea at 5 lbs/ton, and ammonium nitrate were applied at 150 lb N/acre. Plots were 6 ft by 25 ft, replicated four times in a randomized complete block design.

When the remainder of the commercial fields received their fall fertilization, plots were covered with tarps to prevent additional fertilizer application. In all other respects, plots were managed by grower cooperators the same as the remainder of the commercial field until harvest. Plots were swathed on July 6 at the Madras location and July 9 at the Culver location using a small-plot, forage harvester. Samples were bagged and hung to dry until threshing with a stationery Wintersteiger plot combine. Seed samples were cleaned using a debearder and small scale Clipper cleaner to determine clean seed weight.

Results and Discussion

Results from the Madras locations indicate a statistical difference between all treatments and the untreated check, but no differences between the nitrogen sources (Table 1). Results from the Culver location indicated a significant difference between all treatments and the untreated, with seed yield from Agrotain-coated urea at 5 lbs/ton and ammonia nitrate plots being statistically higher than Agrotain-coated urea at 1.5 lbs/ton. Urea and Agrotain-coated urea at 3 lbs/ton provided similar results that were not statistically different from the other two treatments.

Table 1. 2012 Seed yields from nitrogen sources: urea, Agrotain-coated urea at 5 lbs/ton, CAN 27, UAN 32, and ammonium nitrate on Kentucky bluegrass in central Oregon.

Fertilizer Source	Madras		Culver	
	-------------(lbs/acre)-----------			
Unfertilized	368	b	227	c
Urea	568	a	470	ab
Agrotain-coated Urea 1 lb/ton	576	a	400	b
Agrotain-coated Urea 3 lbs/ton	534	a	504	ab
Agrotain-coated Urea 5 lbs/ton	619	a	523	a
NH_4NO_3	568	a	512	a
LSD	*313*		*285*	