Creeping Red Fescue Seed Production Comparison with Different Nitrogen Sources, Rates & Timing

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Introduction

Forage seed crops are frequently produced on infertile soils, which increase the importance of nutrient management on these crops in the region. Creeping red fescue is traditionally fertilized with nitrogen (N) in early or late fall and spring application of the year prior to the production of a seed crop. The form of N can have a major impact on the grass seed yield response if a surface-broadcast application method is used. With the unavailability of ammonium nitrate, the main nitrogen source for surface-broadcast application is the urea that becomes the predominant N application for forage seed crops. Although urea is highly soluble in water, it is vulnerable to N loss through ammonia volatilization when surface applied and thus less nitrogen may be available to the crop.

Materials and methods

Forage seed crop yield is usually limited by nitrogen (N) more than any other nutrient in agricultural soils. Thus, N fertilization is widely practiced to optimize creeping red fescue seed yields. Increasing N-use efficiency has become an important concern to forage seed producers due to escalating N fertilizer prices and environmental concerns. Therefore, two field experiments were conducted in 2013, one at Beaverlodge, AB, and the other at Valhalla, AB. The experiment will utilize two producer-cooperator fields of creeping red fescue at first-year seed production stage. One trial will be located at Beaverlodge, Alberta, plus one trial will be located at Valhalla, Alberta, in each year. The fertility trials in the study will be applied at the first-year of seed production:

1. Three N rates of 0, 45 and 100 kg ha^{-1} (0, 40.2 and 89.3 lb $acre^{-1}$)
2. Two times of N application including mid-September and mid-October
3. Three forms of N fertilizer including urea, urea treated with agrotain and polymer coated urea (ESN)

The trial consisted of 15 treatments in four replications in a randomized complete block design. Three N rates were applied mid- September and mid-October either as urea, urea treated with Agrotain or ESN (Polymer coated Urea). The trial was consisting of 15 treatments in four replications in a randomized complete block design. Three N rates were applied mid-September and mid-October either as urea, urea treated with Agrotain or ESN (Polymer coated Urea).

Results and discussion

At the Beaverlodge, AB site: The creeping red fescue seed increased 110 lb $acre^{-1}$ by the Mid-September application of 89.3 lb N $acre^{-1}$ Urea treated with Agrotain as compared to the same mid-September application of Urea N treatment. The fescue seed yield increased by 88 lb $acre^{-1}$ under 58.1 lb $acre^{-1}$ of ½ ESN and ½ Urea mid-October treatment as compare to the application of 58.1 lb $acre^{-1}$ of urea in mid-October treatment. The mid-September application of 89.3 lb $acre^{-1}$ of Urea produced significantly lower seed yield than the 89.3 lb $acre^{-1}$ application of Urea treated with Agrotain or ½ ESN and ½ Urea treatments. The mid-October application of 58.1 lb $acre^{-1}$ produced lower seed yield than the application of 58.1 lb $acre^{-1}$ in Urea treated with Agrotain or ½ ESN and ½ Urea treatments at Beaverlodge site.

There were no significant differences in creeping red fescue seed yield at Valhalla site between the three N sources treatments. This was due to extremely dry weather conditions. The Urea is highly soluble in water, it is vulnerable to N loss through ammonia volatilization when surface applied and thus less nitrogen may be available to the crop. Following the completion of two harvested years of each trial 2015 and 2016 will give us better evaluation to the stabilized N Technology to control ammonia loss to the environment under different N rates and timing.

Table 1. Creeping red fescue seed yield at Beaverlodge site under three nitrogen (N) sources at two time application and at three nitrogen rates.

Treatments	Application time	
	15 Sept	15 Oct
	lb $acre^{-1}$	
Urea-N (58.1 lb $acre^{-1}$)	866	615
Urea-N (89.3 lb $acre^{-1}$)	814	859
Urea-N treated with Agrotain (58.1 lb $acre^{-1}$)	766	630
Urea-N treated with Agrotain (89.3 lb $acre^{-1}$)	925	830
½ Urea + ½ ESN (29 + 29 lb $acre^{-1}$)	820	703
½ Urea + ½ ESN (48.7 + 48.7 lb $acre^{-1}$)	857	824
ESN-N (58.1 lb $acre^{-1}$)	702	
ESN-N (89.3 lb $acre^{-1}$)	645	
No-Nitrogen (Check)	470e	
$LSD_{0.05}$	258	

Table 2 . Creeping red fescue seed yield at Valhalla site under three nitrogen (N) sources at two time application and at three nitrogen rates.

Treatments	Application time	
	15 Sept	15 Oct
	lb $acre^{-1}$	
Urea-N (58.1 lb $acre^{-1}$)	615	654
Urea-N (89.3 lb $acre^{-1}$)	677	653
Urea-N treated with Agrotain (58.1 lb $acre^{-1}$)	654	625
Urea-N treated with Agrotain (89.3 lb $acre^{-1}$)	671	691
½ Urea + ½ ESN (29 + 29 lb $acre^{-1}$)	646	604
½ Urea + ½ ESN (48.7 + 48.7 lb $acre^{-1}$)	695	673
ESN-N (58.1 lb $acre^{-1}$)	632	
ESN-N (89.3 lb $acre^{-1}$)	675	
No-Nitrogen (Check)	422	
$LSD_{0.05}$	101	

Field Scale Trial – Prespatou, BC

The fescue seed yield increased by 139 lb $acre^{-1}$ under mid-October application and by 54Ibs $acre^{-1}$ under mid-Sept. application as compare to the control (Fig. 1). The 25-May fertilizer application produced the lowest seed yield as compared with other treatments. This may resulted from the crop damaged by Urea fertilizer that applied at early active growth stage of the crop

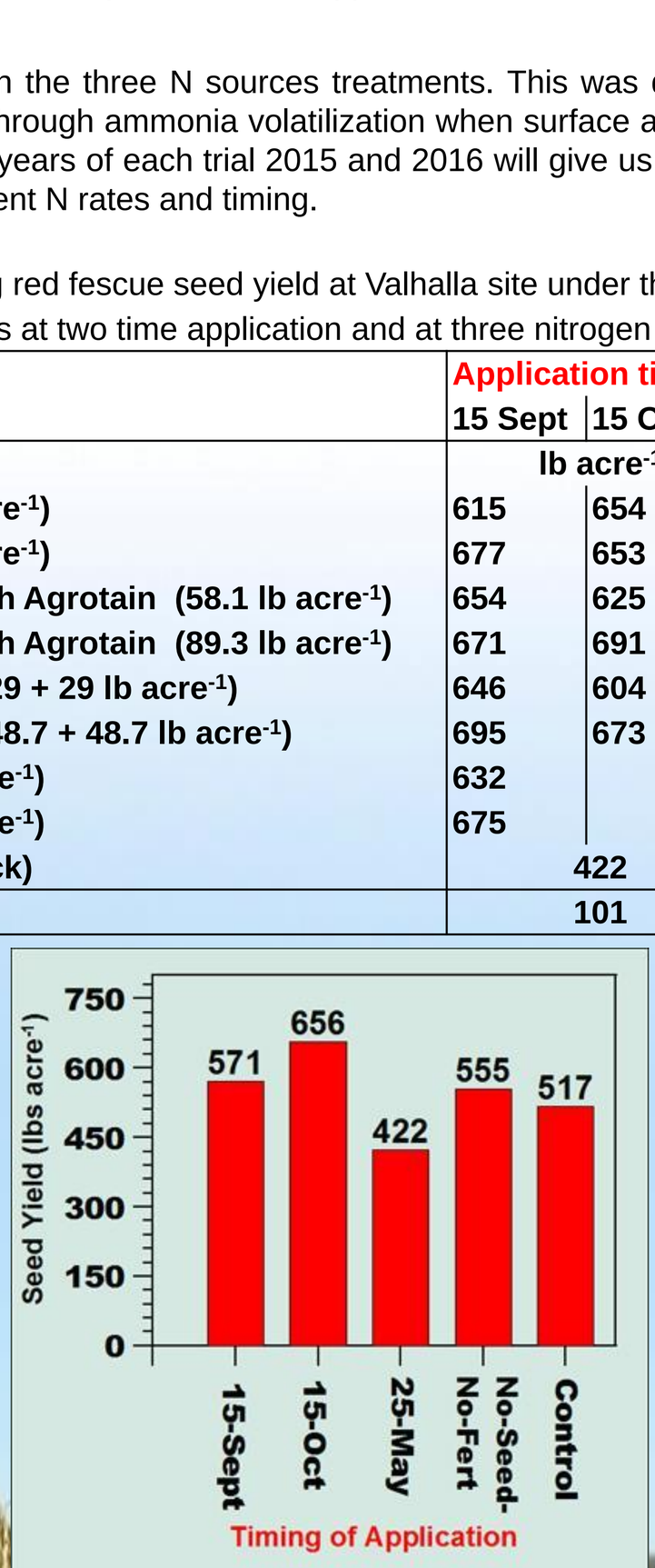

Fig. 1. Effect of different timing applications of 60 lbs $acre^{-1}$ 46-0-0 fertilizer on fescue seed yield in Reuben Loewen's field, Prespatou, BC in 2014

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