Nitrogen Fertility for Seed Production of Creeping Red Fescue

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Introduction

Creeping red fescue is grown for seed on as many as 100,000 hectares of land in the Peace River region of Alberta and British Columbia. Most of the seed is exported to the USA for amenity purposes on sports fields, golf courses and lawns, for set-aside areas, and for the production of herbage for ruminant livestock. Nitrogen (N) nutrition is an important aspect of seed production for any grass crop because it stimulates the production and development of new vegetative and reproductive tillers. The experimental objective was to conduct a study to investigate the effects of the method and time of application of N fertilizer on the yield and quality of seed of creeping red fescue.

Table 1. The effect of method and time of application of N fertilizer on seed yield and quality characteristics of creeping red fescue

	Fertile tiller density (# m^{-2})		Seed yield @ 12% moisture (kg ha^{-1})		Harvest index (%)		Seed dockage (%)		Specific seed weight (kg hL^{-1})		Thousand-seed weight (g)		Germination capacity (%)	
Nitrogen treatment[z]	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Method: Granular	1435	134	597	24.8	14.4	0.60	28.9	0.57	17.0	0.11	1.16	0.007	88.4	0.62
Sprayed	1267	120	535	22.4	14.6	0.57	28.5	0.60	17.3	0.11	1.15	0.007	88.9	0.61
Injected	1370	130	565	23.5	15.6	0.57	28.0	0.59	17.1	0.11	1.17	0.007	89.5	0.59
Significance	NS		NS		NS		NS		NS		*		NS	
Time: Fall	1445	135	584	24.3	15.1	0.57	28.0	0.59	17.5	0.11	1.15	0.007	89.8	0.58
Early spring	1221	117	567	23.6	14.1	0.57	28.9	0.58	16.9	0.11	1.15	0.007	87.9	0.63
Late spring	1412	133	547	22.8	15.5	0.60	28.5	0.59	16.9	0.11	1.18	0.007	89.2	0.61
Significance	NS		NS		NS		NS		**		**		NS	

[z] The interaction of method and time of application of N was not statistically significant (P=0.05) for any of the characteristics.
NS, *, ** Not statistically significant, and statistically significant at P=0.05 and P=0.01, respectively.
SE Standard error of the mean.

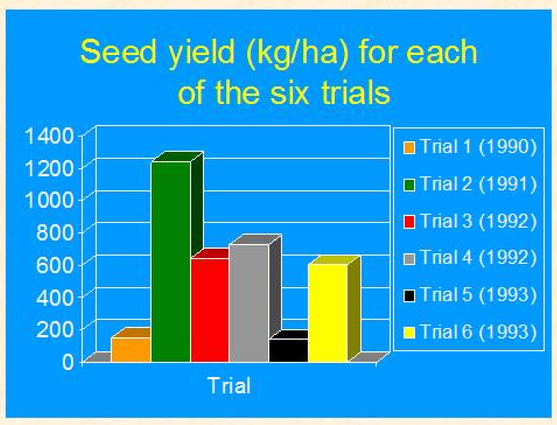
Experimental Details

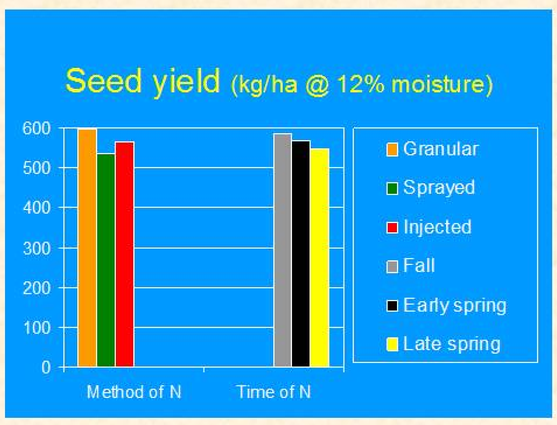
Six trials were conducted from 1990 to 1994 on commercial seed fields of creeping red fescue in the vicinity of Beaverlodge, Alberta (55 degrees North latitude). Each trial was located in a field in which the fescue was in its principal year of seed production, and showing and area of uniform plant distribution and height. All agronomic practices, other than the applied N treatments, were those applied to the crop by the grower. In each trial, 68 kg/ha of nitrogen was applied, the maximum recommended for seed crops of creeping red fescue in the region. Nine N treatments were studied, a factorial combination of three methods (surface-broacast, granular, ammonium nitrate 34-0-0; foliar/soil spray of 28-0-0 solution N fertilizer; and soil-injected 28-0-0 solution N fertilizer at a depth of 8-10 cm and a spacing of 30 x 20 cm) and three times of application (Fall, early-to-mid October just prior to soil freeze-up; Early spring, late-March to mid-April after snow-melt but before crop green-up; and Late spring, mid-April to early-May about three weeks after the Early spring application). Each trial was initiated in the fall of the year preceding the seed harvest; the first was initiated in 1990, the second in 1991, the third and fourth in 1992, and the fifth and sixth in 1993. The design for each trial was a randomised complete block of the nine N treatments with six replications. Each trial was considered as a random selection out of all possible combinations of sites and years, in order to determine the average response to the N treatments.

Views of the creeping red fescue trials

Results and Discussion

The nature of the crop, the general conditions of crop management, and the environmental characteristics prevailing at each site had a profound influence on productivity. The average seed yield over the six trials was 566 kg ha^{-1} while the individual trials averaged 153, 1240, 641, 729, 142 and 601 kg ha^{-1} of seed, respectively. Such variation in seed yield is typical for creeping red fescue in the study region. The interaction of method and time of N application was not statistically significant (P=0.05) for any of the yield and quality characteristics that were measured. Furthermore, the main effects of method and time of N application on fertile tiller density, harvest index, and on seed yield and quality characteristics, were remarkably small and generally not statistically significant (P=0.05). For the characteristics for which statistical significance was detected, i.e. for method and time of N on thousand-seed weight and for time of N on specific seed weight, the magnitude of the differences among the means is too small to be of any agronomic or economic significance (Table 1).





Conclusions

Under the conditions of this study, conducted during five consecutive years, the seed productivity and quality of commercial fields of creeping red fescue were not differentially affected by the combinations of diverse methods and times of application of N fertilizer. In each trial, the date of the early- and late-spring applications of N depended on when snow-melt and crop green-up occurred. The late-spring N treatments were applied from mid-April to early-May, prior to the time when the reproductive shoot apices commence their physical development. Application of N before this stage in plant development is necessary for maximizing seed yield and is most readily accommodated, in the study region, by applying N in October. The present results support this traditional recommendation but also indicate that growers of creeping red fescue for seed have considerable flexibility in the method and timing of N application, provided it is applied before the commencement of vigorous plant growth in the spring.

Acknowledgement: The cooperation of the seed growers Melvin and Wayne Longson, Melvin Toews, William Dyrkach, and Dennis Lay, and the technical assistance of Lois Connelly, Tom Cramer and Marlene Probst is appreciated greatly.

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