1. **Project Title: Fertilizing Forage Grasses for Seed Production**

2. **Project Number: ADOPT 20090017**

3. **Producer Group Sponsoring the Project: Saskatchewan Forage Seed Development Commission (SFSDC)**

4. **Project Location(s):**
   - Near Carrot River, Saskatchewan
   - Cooperators:
     - Bruce Bartel, Carrot River, SK
     - David Maxwell, Carrot River, SK

5. **Project Timeline:** March 2010 to December 2012.

6. **Project contact person & contact details:**
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7. **Project objectives:**
   The objective of this project was to compare the benefits of using coated fertilizer products to non-coated products on forage grasses grown for seed and to demonstrate if field scale coated fertilizers will increase yields when applied directly after harvest.

8. **Project Rationale:**
   The project need was raised by producers who are members of the SFSDC Board of Directors. Nitrogen fertilizer increases seed yield of perennial grasses by increasing the number of seed-forming tillers (Kruger 1997). Timing of nitrogen application is important because many perennial grasses need nitrogen to ensure there are a number of well developed tillers present prior to induction of flowering tillers which can occur in the fall (Loeppky and Coulman 2001).

   The recommended nitrogen source for broadcast application in the fall is ammonium nitrate (34-0-0) because it is readily available to the plants and is not susceptible to nitrogen loss through volatilization (Kruger 1997). However, ammonium nitrate is not commercially available so growers are mainly using Urea (46-0-0) which is prone to volatilization, especially if applied in early fall when air and soil temperatures are higher. Agrotain, a nitrogen stabilizer, helps reduce vitalization by slowing the conversion of Urea to ammonium.

9. **Methodology:**
   Two field experiments were established to investigate the effects of Agrotain on hybrid bromegrass and timothy seed yield and quality. Due to extremely wet field conditions in the Carrot River area in the autumn of 2010, three additional planned sites were not established and expenses for the project were much lower than budgeted.

   Agrotain and Urea were applied to Success hybrid bromegrass (seeded in 2009) on October 4, 2010 at a rate of 196 lbs/acre (90 lbs/acre of N) on 7 acre plots near Carrot River, SK. Treatments were applied to Comtal timothy (seeded in 2011) on October 13, 2011 at a rate of 180 lbs/acre (82.8 lbs/acre of N) on 6 acre plots near Carrot River, SK.

   The number of flowering tillers per meter square was determined prior to swathing. Ten hybrid bromegrass stems were taken prior to swathing and florets from fifty randomly selected spikelets (five spikelets from each of ten panicles) were examined to determine the percentage of florets that developed normally. The centre portion of each plot was swathed, harvested and weighed using a weigh wagon (Figure 1) to determine gross seed yield each year. A seed sub-sample of each treatment was taken to determine seed

dockage, seed size, and germination.

The 2011 growing season (April 1 to August 15, 2011) in NE Saskatchewan can be described as normal to above normal for precipitation (85 to 150% of normal) and temperature (-1 to +2 degrees C of normal) with the exception of spring moisture (April 15 to June 13, 2011) which was below normal (<40 to 85% of normal). The 2012 growing season (April 1 to August 6, 2012) in NE Saskatchewan was above normal for precipitation (115 to 200% of normal) and normal to above normal for temperature (-1 to +4 degrees C of normal) (http://www.agr.gc.ca/pfra/drought/drmaps_e.htm).

It is very important to note that this is a demonstration trial, statistical analysis was not carried out and differences may or may not be significant.

10. Results

Agrotain and Urea increased the number of flowering tillers and seed yield of hybrid bromegrass compared to the unfertilized check (Table 1). Weed seed contamination of hybrid bromegrass seed was reduced when Agrotain and Urea were applied presumably due to increased competition from the grass (Table 2). Hybrid bromegrass seed size was reduced compared to the unfertilized check when Agrotain and Urea were applied (Table 2). Perennial grasses have the ability to compensate for a reduction in flowering tillers by increasing seed size and seed number per tiller (Meijer and Vreeke 1988b). This may explain why seed size increased when the number of flowering tillers decreased in the no nitrogen treatment. Hybrid bromegass and timothy had the highest seed yield and germination rate when Agrotain was used compared to Urea (Tables 1-3).

This project was described to forage seed producers and the support by the Ministry of Agriculture for the project was acknowledged during the following extension activities:

- The project was planned to be highlighted at the SFSDC summer 2011 field day. Due to heavy precipitation and extremely wet field conditions, the field day was postponed and then cancelled due to continued rainfall.
- The interim report was included in the Fall 2011 issue of the SFSDC Prairie Seeds Newsletter mailed to current (160) SFSDC levy payers in November 2011.
- The project was described at the grower information session (30 attending) on December 6, 2011.
- The interim report was posted on the SFSDC Website in July 2012.
- The project plans for 2012 were outlined in the Spring 2012 issue of the Prairie Seeds Newsletter mailed to current (175) SFSDC levy payers in July 2012.
- The final report will be highlighted at the SFSDC Annual Meeting on December 5, 2012.
- The final report will be posted on the SFSDC Website in January 2013.

11. Conclusions and Recommendations

The application of fertilizer increased yields of both hybrid bromegrass and timothy. Agrotain and Urea increased the number of flowering tillers and seed yield of hybrid bromegrass compared to the unfertilized check. Hybrid bromegass and timothy had the highest seed yield and germination rate when Agrotain was used compared to Urea.

It is very important to note that this project is not a replicated trial. Before adopting the results, it is recommended that producers try a small area on their own farm.

12. Acknowledgements

The project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement. The support by the Ministry of Agriculture for the project was acknowledged in the extension activities listed above.

Thank you to James Silcox (Pasquia Agro, Carrot River, SK) and Clayton Myhre (PICKSEED, Nipawin, SK) for technical support and Dr. Fran Walley (U of S Saskatoon, SK) for reviewing the annual report. Thank you to Nancy Johns for her efforts with the project funding application and organization. Without the support of the Saskatchewan Forage Seed Development Commission and grower co-operators like Bruce Bartel and Dave Maxwell (Carrot River, SK) projects like this would not be possible.

13. References

Kruger, G. 1997. Seed production of smooth bromegrass (*Bromus inermis* Leyss). Agric. And Agri-Food

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Loeppky, H. A. and B. E. Coulman. 2002. Crop residue removal and nitrogen fertilization affects seed production in meadow bromegrass. Agron. J. 94:450-454.
Meijer, W.J.M., and S. Vreeke. 1988b. Nitrogen fertilization of grass seed crops as related to soil mineral nitrogen. Neth. J. Agric. Sci. 36:375-385.

14. Appendices

Figure 1. Harvesting hybrid bromegrass plots near Carrot River, SK in 2011.

Table 1. The effects of two nitrogen sources on flowering tillers and seed yield of hybrid bromegrass near Carrot River, SK in 2011.

	Flowering Tillers	Seed Yield
Treatment	**#/m^2**	**lbs/acre**
No Nitrogen	219	167
Agrotain	309	272
Urea	306	248

Table 2. The effects of two nitrogen sources on hybrid bromegrass seed quality near Carrot River, SK in 2011.

	Weed Seeds	Seed Size	Germination
Treatment	**#/25 g**	**g/1000 Seeds**	**%**
No Nitrogen	100	3.91	66
Agrotain	42	3.59	75
Urea	30	3.60	67

Table 3. The effects of two nitrogen sources on flowering tillers, seed yield and quality of timothy near Carrot River, SK in 2012.

	Flowering Tillers	Seed Yield	Seed Size	Germination
Treatment	**#/m^2**	**lbs/ace**	**g/1000 Seeds**	**%**
Agrotain	1111	323	0.38	92
Urea	1105	283	0.34	88