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Introduction

Forages are the cheapest source of feed for livestock. The productivity of a seeded perennial forage stand declines over time. To increase the productivity of old stands, producers generally break up the stand through tillage and then re-seed (Kruger, 1997).

Rather than breaking the stand, rejuvenation of forage stands is probably the most economic and practical method to improve production and quality of forage stands (Lardner et al., 2002).

Nitrogen is the most commonly deficient essential nutrient in soil and generally has greatest impact on forage production (Malhi, et al., 2004), but phosphorus also may be limiting in some soils (Sedivec and Manske, 1990; Berg and Sims, 1995)

The effectiveness of fertilizers in increasing forage dry matter yield (DMY) and economic return is dependent upon the levels of nutrients in soil, climatic conditions, source, rate and method of fertilizer application, soil type and forage species.

Objective

To reveal plant and soil response of grass dominated hayland to N and P fertilizer application rate and placement.

Materials & Methods

The experiment was set out on old meadow bromegrass dominated pastures near Rosthern, Vanscoy and Colonsay, Saskatchewan in spring 2005 (Figure 1).

The experimental design for the fertilizer rates and application methods is a randomized complete block design.

The forage fertilization experiment conducted in spring 2005 involved six fertilizer rate treatments 1) Control-No fertilizer 2) 50 kg N ha^{-1} 3) 50 kg N and 25 kg P_2O_5 ha^{-1} 4) 100 kg N ha^{-1} 5) 100 kg N and 25 kg P_2O_5 ha-1 6) 200 kg N ha^{-1}

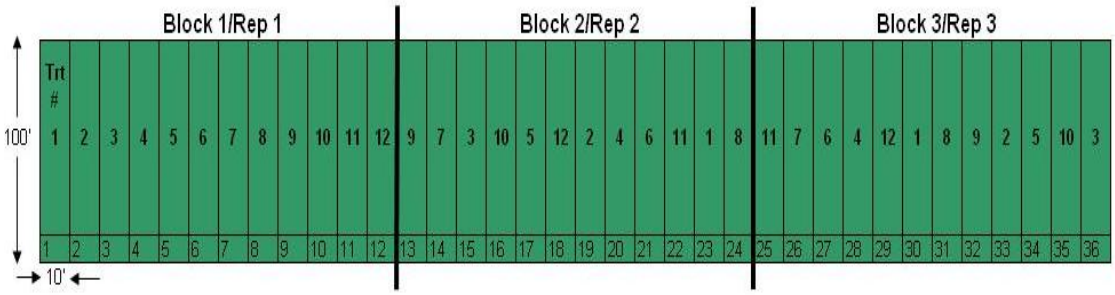


Fig. 1 Plot diagram

1. Coulter Control-No Fertilizer (Coulter Inserted)
2. 50 kg N and 25 kg P_2O_5 ha^{-1} Blend Coulter Injected
3. 100 kg N and 25 kg P_2O_5 ha^{-1} Blend Coulter Injected
4. Dribble Control-No fertilizer
5. 50 kg N and 25 kg P_2O_5 ha^{-1} Blend Dribble Banded
6. 100 kg N and 25 kg P_2O_5 ha^{-1} Blend Dribble Banded
7. 50 kg N ha^{-1} Dribble Banded (no P_2O_5)
8. 100 kg N ha^{-1} Dribble Banded (no P_2O_5)
9. 200 kg N ha^{-1} Dribble Banded (no P_2O_5)
10. 50 kg N ha^{-1} Coulter Injected (no P_2O_5)
11. 100 kg N ha^{-1} Coulter Injected (no P_2O_5)
12. 200 kg N ha^{-1} Coulter Injected

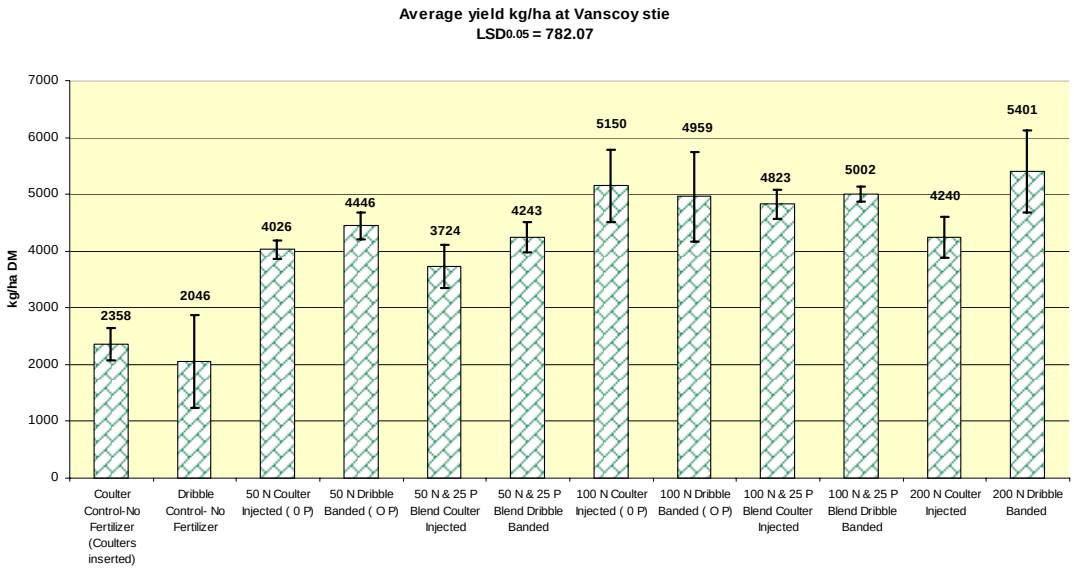
These fertilizer treatments were applied as solution N and P fertilizers (28-0-0 and 10-34-0) using two different application methods: 1) dribble banded in which fertilizer was surface - applied as a dribble band, and 2) coulter injected with a coulter disc placing the fertilizer directly in the soil as band

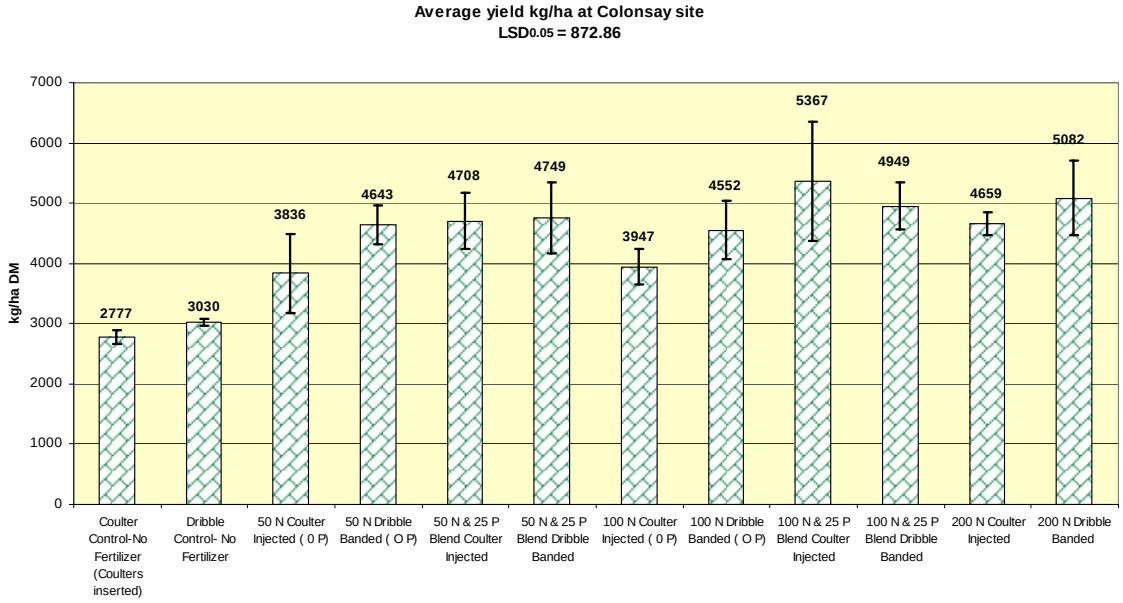
In spring 2006, the same experiment will be conducted in natural pasture in Baruunkharaa Soum of Selenge Aimag of Mongolia. This site is located in the Mountain Forest Steppe Zone of Mongolia.

Result and Discussion

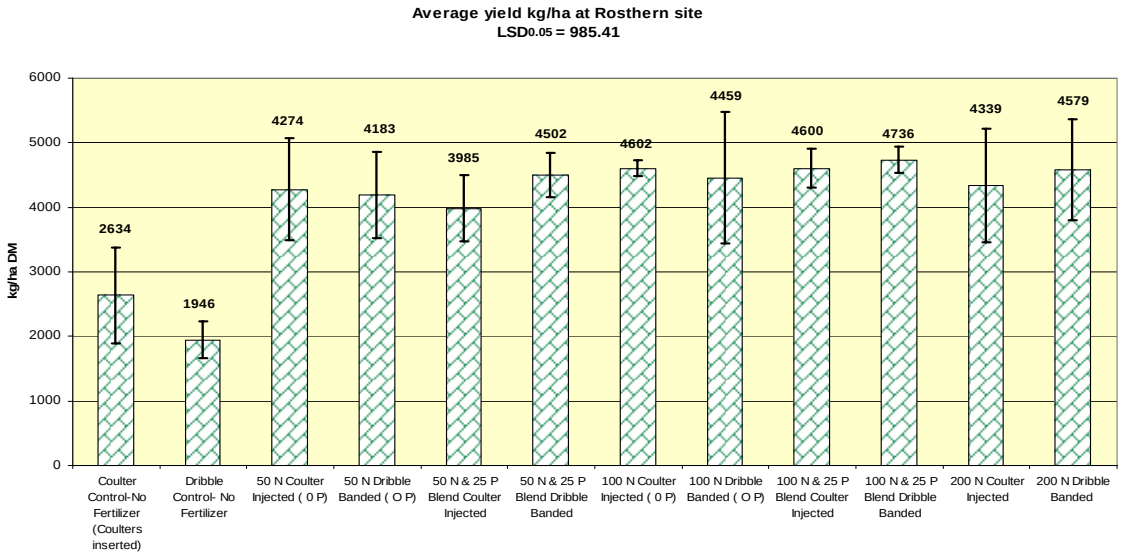
The N and P fertilizer treatments produced significantly higher forage dry matter yield than the control (no fertilizer) plots (Charts. 1, 2 and 3). There was no significant difference between the two application methods (surface dribble band vs coulter injected) for any fertilizer treatments.

Yield was generally maximized at ~ 100 kg N/ha rate (Charts.1, 2 and 3). Meadow brome grass tended to yield better at the higher rate of fertilizer applications (100 N or 100 N + 25 P_2O_5) than low rate fertilizer treatments (50 N or 50 N + 25 P_2O_5). However, often the 100 kg N/ha rate yield was not significantly higher than the 50 kg N/ha rate. Response to the added P fertilizer in this study was limited.





Previous studies suggest that nitrogen is the major limiting nutrient in grass pastures (Sedivec and Manske, 1990; Berg and Sims, 1995; Malhi, et al., 2004) and the results of our study support this. Significant rainfall after application of the fertilizer likely contributed to a lack of difference between surface banding and coultering methods of application in this study, as the rainfall would move the surface banded nitrogen into the mineral soil.



Future work

Future work will include the set up of a similar experiment in Mongolia and completing the analysis of soil organic carbon, carbon dioxide and nitrous oxide evolution and assessment of the residual effect of the applications on available nutrient supply rates and second year (residual) effects of the applications on yield. An economic analysis will be conducted using the results of the study over two years.

Acknowledgements

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