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# Establishment of Short Rotation Forage Crops

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## Problem

Forages could provide annual crop producers with a cash hay crop as a viable option in rotation. However, traditional perennial forage crop species that are difficult to establish and left in for many years are not the best option for short rotations of forage (1-3 years) and annual crops. Short-lived grass species that establish quickly and produce more forage for one to three years would provide traditional crop producers with a cash crop that would fit in their crop rotation system. New annual crops have not been tested as companion crops for establishment of grasses with high seedling vigour.

## Objective

The objective of the project is to determine the establishment success (risk) and first year production of fast-establishing forage grasses as affected by soil zone, companion crop, and legume associate.

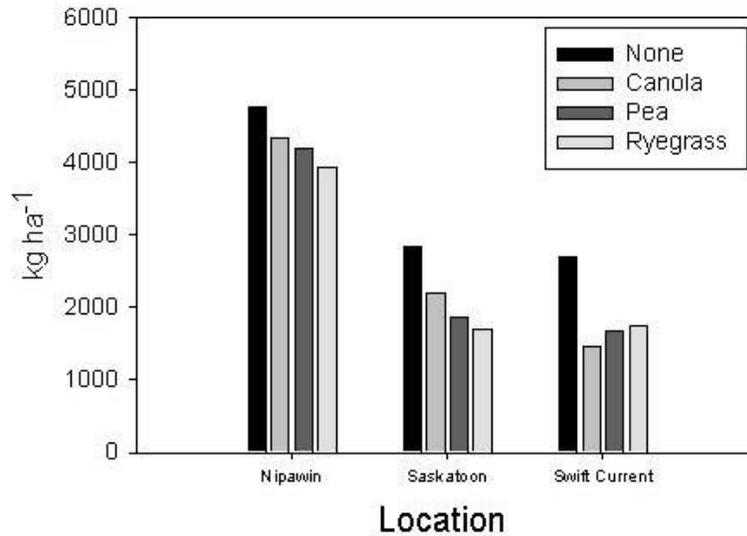
## Materials and Methods

Cereal stubble sites at Swift Current (SPARC), Saskatoon (Saskatchewan Forage Council) and Nipawin (Newfield Seeds) were direct-seeded with Dahurian wildrye, and intermediate wheatgrass with pea, canola, perennial ryegrass, or no companion crop in spring 1998, 1999 and 2000. Companion crops were the main plot, grass species were the subplot and legume mixture (none, non-dormant alfalfa, cv Nitro, vs dormant alfalfa, cv Beaver) were the sub-subplot. Seedling plant counts were taken twice or three times in the seeding year. Total biomass and/or seed yield data on the companion crops were collected. In the year following establishment, tillers were counted for the grasses and plants counted for alfalfa in the spring. Forage yield (DM basis) was determined for one (at Swift Current) or two harvests (at Saskatoon and Nipawin).

## Results and Discussion

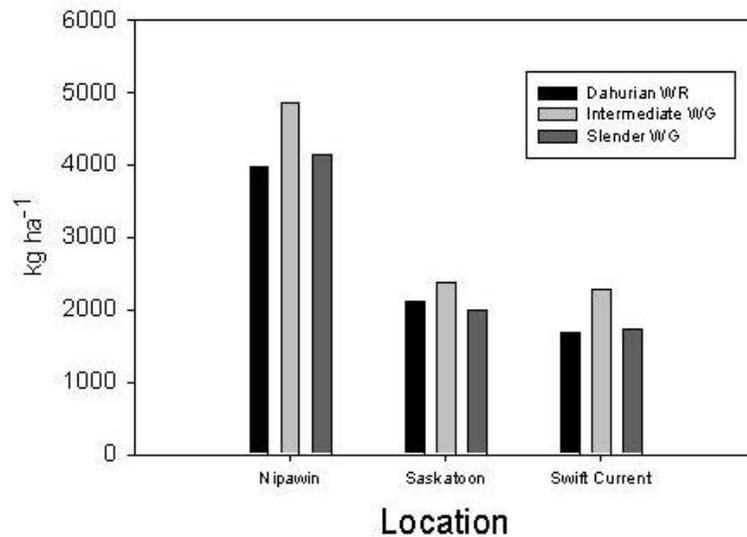
Forage yield in the year after establishment was not reduced by companion crops at Nipawin in 1999 or 2000. However, in 2001, companion crop establishment did reduce forage yield at Nipawin. In Saskatoon, companion crops reduced forage yield in the first year in 1999 and 2000 but not in 2001. In Swift Current, companion crops reduced forage yield in all three trials. The impact of companion crops on forage yield was greater at Swift Current compared to Nipawin when averaged over all three trials (Figure 1).

Forage DM yield at first cut, one year after establishment under three companion crops averaged over three years at each location.



Intermediate wheatgrass produced more forage than Dahurian wildrye or slender wheatgrass at first cut at all three sites (Figure 2).

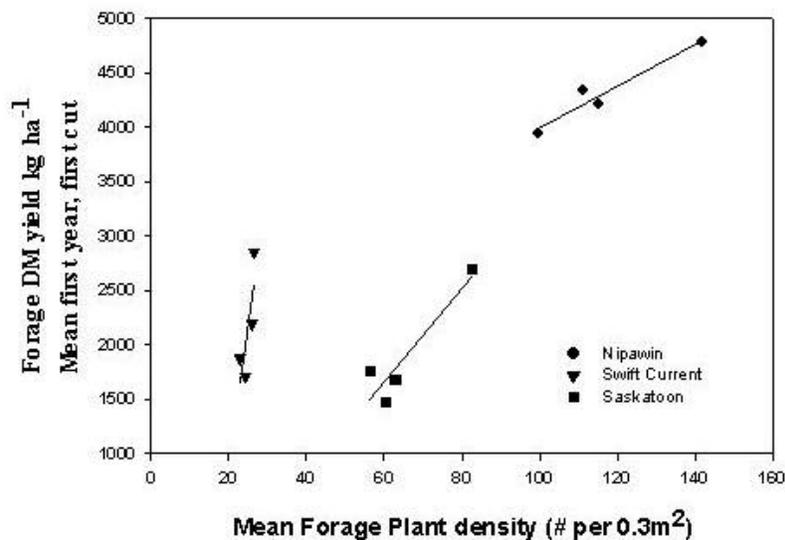
First-cut forage DM yield one year after establishment for three grasses averaged over three years at each location.



Beaver alfalfa mixtures produced more forage than Nitro alfalfa mixtures which were generally similar to grass monocultures in forage yield (data not shown). Beaver alfalfa had superior winter survival compared to Nitro as was expected. This advantage in hardiness produced forage with a greater alfalfa concentration and higher yield than Nitro mixtures.

Companion crops reduced both seedling density and forage yield at all three sites in this study (Figure 3). However, the relationship between seedling density and forage yield differed among the sites. At Nipawin, seedling density was very high and companion crops reduced seedling density by 30% but this was associated with only 15% decline in forage yield. At Swift Current, however, companion crops reduced seedling density by 5% but forage yield was reduced by 30%. This suggests that seedling density is not as important as seedling size in determining subsequent forage yield at semiarid sites such as Swift Current. At Nipawin, however, the relationship between seedling density and forage yield fit our expectations.

Effect of companion crop on forage seedling density and its relationship to forage DM yield at three sites in Saskatchewan.



## Conclusions

These companion crops can be used to establish short rotation forages in the Black soil zone with small impacts on subsequent forage yield. In the Dark-Brown and Brown soil zones, companion crops have a larger negative impact on seedling size and subsequent forage yield. Economic analysis will examine these companion crop results to compare financial returns to producers among these systems.

Intermediate wheatgrass exhibited higher forage productivity than slender wheatgrass or Dahurian wildrye and this was consistent across all three sites.

Beaver alfalfa produced more forage in mixture with grasses than did Nitro alfalfa. Nitro lacked sufficient winterhardiness to survive one winter and the yield of Nitro alfalfa-grass mixtures was generally similar to grass monoculture.

## **Acknowledgment**

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