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# Agronomic analysis of sainfoin (*Onobrychis viciifolia* Scop.) and grass mixtures for forage production in western Canada

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## Introduction

Sainfoin is a perennial forage legume that **does not cause frothy bloat**

- Easy to establish, well adapted to western Canada.
- Drought tolerant, no major diseases or insect pests
- Yields similar to alfalfa, matures earlier.
- Highly palatable.
- Succulent into the fall.



- Lack of updated agronomic information for western Canada.
- Limited use due to agronomic superiority of alfalfa: slower regrowth, not as winter hardy.
- High sainfoin seed cost.

## Objectives

- Determine feasibility of **reducing sainfoin seeding rate**.
- Determine **optimum seeding ratios** of sainfoin/grass mixtures under one-cut and two-cut systems.

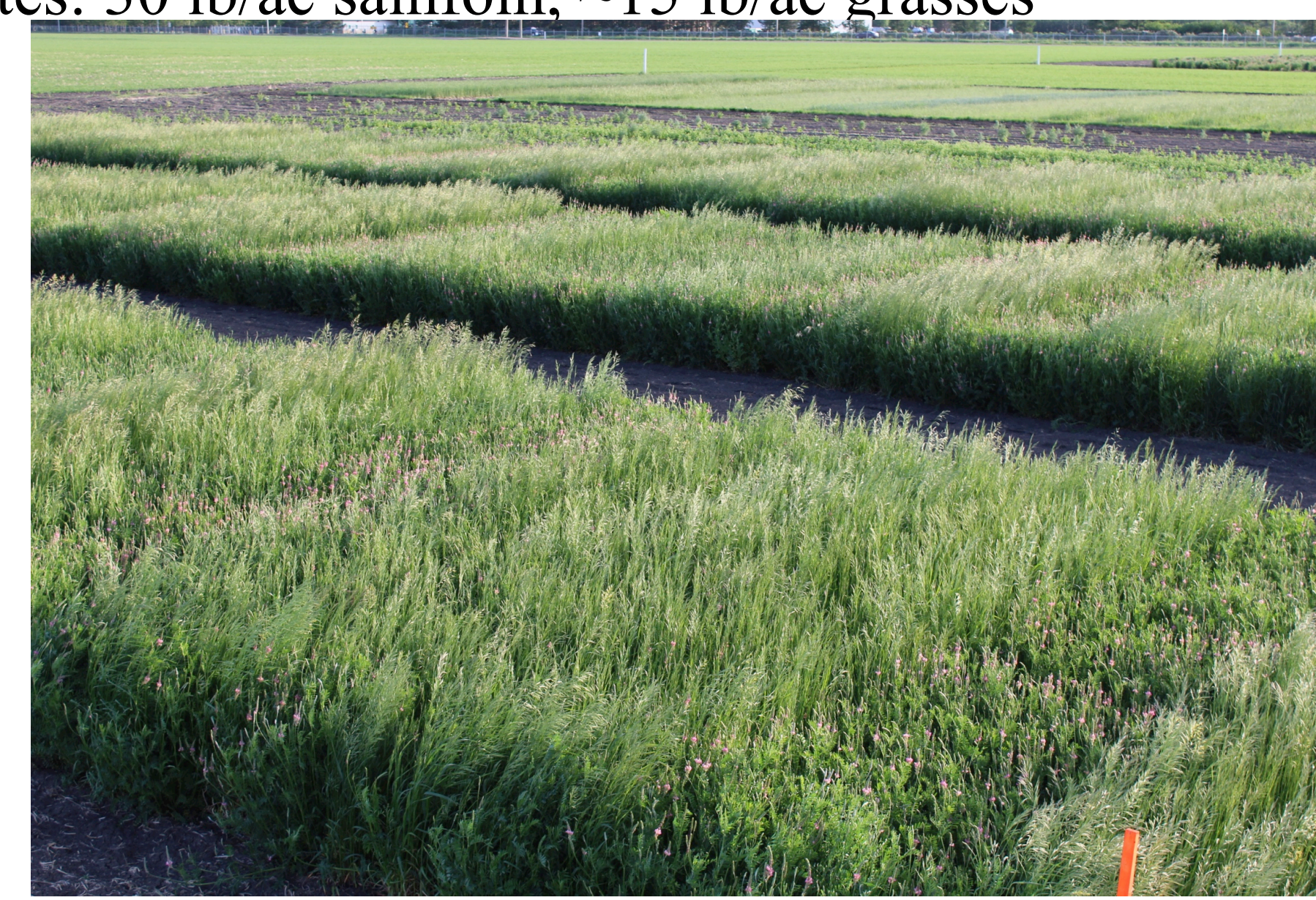
## Results

Mixture		Crude Protein Content (%)			
		2016		2017	
		1 Cut	2 Cut	1 Cut	2 Cut
Saskatoon	70/30	11	12	14	13
	50/50	11	10	12	13
	30/70	9	9	13	10
MV-MB	70/30	9	13	13	11
	50/50	8	10	18	11
	30/70	9	8	9	10
M-HB	70/30	10	12	23	12
	50/50	11	12	14	11
	30/70	10	10	21	11
MV-HB	70/30	13	13	15	12
	50/50	11	12	14	11
	30/70	9	10	11	10
M-CW	70/30	10	13	11	12
	50/50	11	13	13	12
	30/70	11	11	14	11
MV-CW	70/30	11	12	14	12
	50/50	12	13	13	10
	30/70	11	12	13	10
Alfalfa-MB 15/85	9	10	17	12	
Swift Current	70/30	6	6	-	9
	50/50	6	8	-	10
	30/70	5	8	-	9
MV-MB	70/30	7	6	-	9
	50/50	6	6	-	10
	30/70	6	10	-	9
M-HB	70/30	6	9	-	10
	50/50	8	9	-	11
	30/70	6	9	-	9
MV-HB	70/30	7	9	-	10
	50/50	7	8	-	10
	30/70	8	9	-	9
M-CW	70/30	8	9	-	11
	50/50	7	10	-	12
	30/70	7	8	-	10
MV-CW	70/30	8	10	-	10
	50/50	7	7	-	11
	30/70	9	8	-	10
Alfalfa-MB 15/85	7	7	-	11	
Brandon	70/30	15	15	9	11
	50/50	15	16	9	12
	30/70	14	15	10	11
MV-MB	70/30	14	16	10	11
	50/50	14	16	8	11
	30/70	15	16	9	13
M-HB	70/30	14	18	10	12
	50/50	14	16	9	12
	30/70	15	17	11	11
MV-HB	70/30	15	16	10	12
	50/50	15	16	10	11
	30/70	14	16	10	9
M-CW	70/30	15	17	12	11
	50/50	15	17	10	11
	30/70	15	18	9	11
MV-CW	70/30	15	15	9	11
	50/50	15	17	9	12
	30/70	15	17	8	13
Alfalfa-MB 15/85	15	17	11	14	

- Seeding ratio had no effect on crude protein content
- All mixtures in Saskatoon and Brandon met or exceeded the 8% crude protein requirement for beef cattle. Crude protein was lower in Swift Current.
- Concentrations of acid detergent fiber and neutral detergent fiber were similar for all mixtures (data not shown).

## Materials and Methods

- Two sainfoin varieties, **Melrose** and **AAC Mountainview**, were grown with 'AC Goliath' **crested wheatgrass** (*Agropyron cristatum*), 'Armada' **meadow brome** (*Bromus riparius* Rehm.), and 'AC Knowles' **hybrid brome** (*Bromus riparius* x *Bromus inermis*).
- Split-plot RCBD with 3 replicates in 3 soil zones: **Saskatoon, SK** (Dark Brown), **Swift Current, SK** (Brown), and **Brandon, MB** (Black) of Canada. Main plot factor: species mixtures, sub-plot factor: harvest frequency.
- Seeding ratios as a percentage of the recommended seeding rates: 30 lb/ac sainfoin, ~15 lb/ac grasses
- **100% sainfoin**      **70% sainfoin/30% grass**
- **50% sainfoin**      **50% sainfoin/50% grass**
- **25% sainfoin**      **30% sainfoin/70% grass**
- Industry check: 15% 'Beaver' alfalfa (*Medicago sativa*)/ 85% 'Armada' meadow brome.
- Each mixture grown under a **one-cut** and a **two-cut** forage production system.
- Plots seeded in June 2015 and harvested, using a forage harvester, in 2016 and 2017. One-cut plots were harvested at 80% sainfoin bloom. Two-cut plots were harvested at 50% sainfoin bloom (mid-June) and 25cm regrowth or mid-August.



## Results

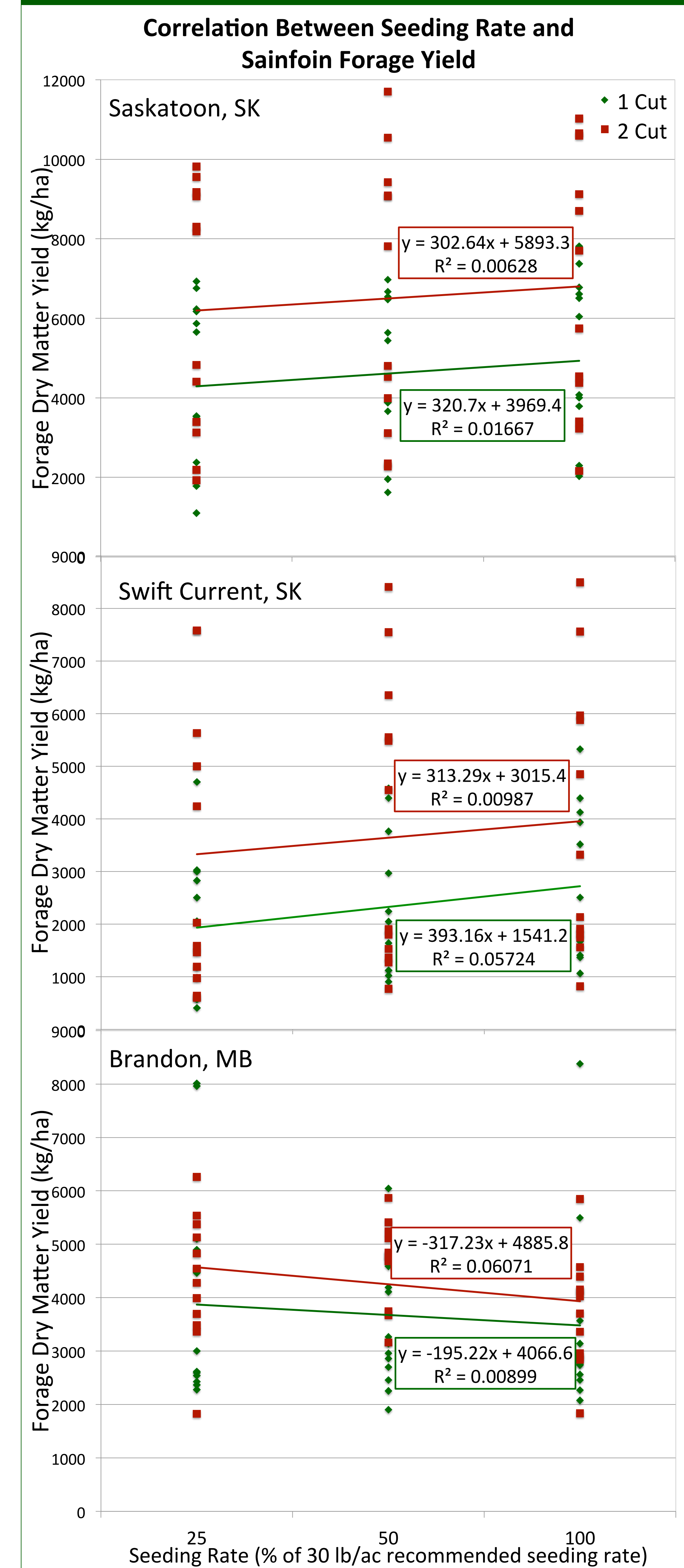


- Most **2-cut mixtures** yielded higher than the 1-cut mixtures.
- The highest yielding sainfoin mixtures yielded similar to the alfalfa industry check.
- 2017 was drier than 2016 resulting in lower yields in Saskatoon and Swift Current. Brandon had higher yields in 2017 than 2016.
- Overall, the **Melrose sainfoin mixtures** yielded slightly higher than the **AAC Mountainview** sainfoin mixtures in **Saskatoon and Brandon**. The **AAC Mountainview mixtures** yielded slightly higher than the **Melrose** in **Swift Current**.
- The mixtures with **hybrid brome** yielded slightly higher than the mixtures with meadow brome or crested wheatgrass.
- The **mixture ratios** yielded similar at all sites.

## Conclusions

- To **reduce the sainfoin seeding rate** by as much as 50% is possible without reducing yields to reduce seed costs.
- Saskatoon and Brandon had similar yields and forage quality that were higher than in Swift Current
- The **Melrose/hybrid brome** mixtures were the highest yielding in the **Dark Brown and Black soil zone**. The **AAC Mountainview/hybrid brome** mixtures were the highest yielding in the **Brown soil zone** and met the protein requirements for beef cattle.
- Based on yield, quality, and species compatibility data, the **30/70 Melrose/hybrid brome** mixture is recommended for use in the Dark Brown and Black soil zones, and the **30/70 AAC Mountainview/hybrid brome** and **30/70 AAC Mountainview/crested wheatgrass** mixtures are recommended for use in the Brown soil zone.

## Results



- The 50% seeding rate yielded similar to the 100% seeding rate at all sites and years.

## Future work

- Continue to evaluate yield, quality, and stand longevity for three years
- Update sainfoin agronomic information and seeding rates for producers
- Determine optimum economic sainfoin seeding rate

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