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# Legumes for Resiliency & Non Bloating

## Alternate Legumes for Consideration



Sainfoin (*background*) and birdsfoot trefoil (*foreground*) in demo plots in FSJ in July, 2011.

*"Birdsfoot trefoil helps me keep legumes in my hayfields where my soils are acidic."*  
Gordon Lazinchuk  
Bessborough, BC

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## What Do We Mean By Legumes For Resiliency?

This forage fact is part of the project "Innovative Management Practices for Resiliency". The project works with ranchers to identify and evaluate nutrient or cropping management practices that will be more resilient to climate change extremes.

Information is summarized here about three legume alternatives to alfalfa. As well as other special adaptations, birdsfoot trefoil, sainfoin and cicer milkvetch have moderate to high tolerance to drought. Birdsfoot trefoil also tolerates the other end of the spectrum well i.e. seasonal flooding or saturated soil. Sainfoin and cicer milkvetch have high winter hardiness and stand longevity.

Several members are disappointed the way alfalfa dies out after a few years due to the low pH of their soil. Ron Buchanan and Gordon Lazinchuk have found birdsfoot



Fall regrowth in 7 yr birdsfoot trefoil hayfield during dry season in 2015 at Ron Buchanan's ranch.

trefoil can tolerate low pH soils and so persists longer (7 and 10 years so far, respectively). Gordon Lazinchuk seeded a new birdsfoot trefoil hayfield in 2013 and Andrew Clarke seeded a new demo of birdsfoot trefoil - grass mix in 2015.

These adaptations of birdsfoot trefoil, sainfoin and cicer milkvetch extend the life of forage stands and increase the interval between costly rejuvenation cycles.

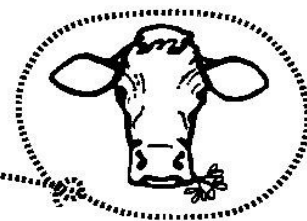
## What Do We Mean By Non Bloat Legumes?

Legumes breakdown in rumen 5 to 10 times more quickly than grasses because of their high protein content. This higher digestion rate is both an advantage for rapid weight gains but a disadvantage because of bloat risk. Bloat fermentation gases combine with the highly soluble proteins to produce foam that accumulates and builds up. It becomes coated with a impervious microbial skin so that it

blocks off the cow's esophagus, and prevents gas release or belching by the animal.

Birdsfoot trefoil, sainfoin, milkvetch and most grasses have higher levels of tannin that slow digestion and inhibit foam production and bloat. Feeding or grazing as little as 10% (on a dry matter basis) sainfoin was found to reduce bloat by 60 to 85% (AAFC, Kamloops).

Peace River Forage Association  
of British Columbia



**Abbreviations For:**

Ratings Both Tables

L = Low

M = Moderate

H = High

**Headings Table 1**

**Precipitation**

Min = Minimum

Max = Maximum

ppt = Precipitation

**Suitable Objectives**

Inv = Invasive

Veg = Vegetation

**Headings Table 2**

**Plant Adaptations**

Ease of Estab =

Ease of

Establishment

Winter Hard = Winter

Hardiness

Comp = Competitive

Long = Longevity

Graz Recov = Grazing

Recovery

**Soils Adaptations**

Texture = Soil Texture

Acidity = Acidity

Tolerance

Salinity = Salinity

Tolerance

**Ratings Table 2 For**

**Soil Texture Ratings**

A = All textures

C = Coarse textured

MC = Medium to

Coarse

textured

M = Medium textured

FM = Fine to Medium

textured

F = Fine textured

**Source for Tables:**

A. Dobb & S. Burton.

2013. Rangeland

Seeding Manual for

British Columbia. BC

Min.Agri. 282 pg.

**Table 1: Legumes for Different Climates & Seeding Objectives**

Agronomic Legumes	Min ppt (mm)	Max ppt (mm)	Drought Tolerance	Flooding Tolerance	Control Erosion	Suppress Inv Plants	Enhance Forage
Alfalfa	300	600	H	M	M	L	H
Birdsfoot trefoil	400	600	M	H	L	L	M
Alsike clover	400	600	L	M	M	M	M
Red clover	400	600	M	M	M	M	H
White clover	400	600	L	M			M
Sainfoin	300	600	H	L	M	L	H
Cicer milkvetch	350	600	M	L	H	L	H
Common vetch	310	1630		L	H	H	H
Hairy vetch	450	1650	H	M	H	H	H

In the middle of Table 1, we can see how the 3 non bloating legumes discussed in this factsheet (birdsfoot trefoil, sainfoin and cicer milkvetch) have moderate to high **drought tolerance** (see ratings in 4<sup>th</sup> column, M=moderate, H=high). Birdsfoot trefoil has an added advantage for being resilient to climate extremes, as it also has a higher **flooding tolerance** (see H rating in 5<sup>th</sup> column).

The right hand section of Table 1 shows the ratings for 3 common **seeding objectives**. When the goal is to **control erosion**, birdsfoot trefoil has a lower rating than alfalfa, while sainfoin is similar and cicer milkvetch is better. The 3 alternate legumes are similar in their low rating to **suppress invasive plants**. All have moderate to high ratings to **enhance forage stands**.

**Table 2: Adaptations of Legumes for Plant Growth & Soils**

Agronomic Legumes	Ease of Estab	Winter Hard	Comp	Long	Graz Recov	Texture	Acidity	Salinity
Alfalfa	H	M	M	H	M	A	L	M
Birdsfoot trefoil	L	L	L	M	M	FM	H	H
Alsike clover	H	H		L	H	F	H	L
Red clover	H	M	H	L	M	A	H	L
White clover	H	L	M	L	H	FM	H	L
Sainfoin	H	H	L	M	L*	A	L	L
Cicer milkvetch	M	H	M	H	H	A	L	L
Common vetch	M	L		L	M	A	M	
Hairy vetch		H	H	L		C	L	L

In Table 2 in the **left section**, each legume is rated for a number of special adaptations. Sainfoin and cicer milkvetch are comparable to alfalfa for **ease of establishment** and **longevity**, but better for **winter hardiness**. Cicer milkvetch rates higher for **grazing recovery** than alfalfa, birdsfoot trefoil or sainfoin.

L\* please note that an extensive literature search of all relevant research in 2013

did not include recent research with a new variety of sainfoin showing promise in **grazing recovery**.

In the **soils** section of Table 2 (*right side*), birdsfoot trefoil rates lower than alfalfa for ease of establishment, winter hardiness and longevity. However birdsfoot trefoil really shines when it comes to adaptation to difficult **soil** conditions such as **acidity**, **salinity** or low fertility.

## Birdsfoot Trefoil

Scientific name: *Lotus corniculatus* L.

### Description:

Birdsfoot trefoil is a non bloating agronomic legume. It is highly adapted to grow on challenging sites such as acidic or infertile soils, poorly drained or poorly prepared seedbeds.

The plant has a wide crown and taproot. Roots sometimes grow from older stems that have soil contact. It has fine erect stems and compound paired leaflets. Flowers are brilliant yellow and seed pods form at right angles to the stem.

### Uses:

Best suited for pasture but can be hayed. Also can be used in some cases for roadside revegetation.

### Recovery after use:

Moderate, requiring 4 to 6 weeks. Recovery is poor if continuously grazed. Need to allow some seed to set for stand self rejuvenation.

### Forage quality & palatability:

Crude protein 9% at full bloom & very palatable. Yields less quantity than alfalfa, but holds higher quality longer into the growing season and into later maturity stages because of better leaf retention.

### Advantages & adaptations:

Drought tolerance is moderate because of its deep taproot. Acidity and alkalinity tolerance is high. It can grow on soils with pH as low as 5.0. Flooding tolerance: high, up to 4 weeks of flooding, can tolerate wet soils for the whole season.

### Management considerations:

Cut or graze once a year during early bloom when there is full leaf canopy and ground cover. Manage snow cover to improve crown survival. Allow to self seed and build up seed bank to improve persistence of the stand.

## Sainfoin

Scientific name: *Onobrychis viciifolia* Scop.

**Description:** Sainfoin is a non bloating agronomic legume that is drought tolerant, deep rooted and somewhat short lived. It is important in grazing systems as it holds feed quality for later season or stockpiling forage. It is resistant to several diseases that often threaten productivity of alfalfa.

Sainfoin has deep taproots with many lateral roots and a broad branched crown. Stems are hollow, succulent and palatable. Leaves are compound with paired leaflets. Flowers are bright pink and seed pods are kidney shaped with dark brown seeds.

**Uses:** pasture, hay, stockpiled forage. Also used in reclamation and rehabilitation, as it will grow on high pH, alkaline, thin or gravelly soils.

### Recovery after use:

Recovery can be slow, with repeated, severe or continuous grazing.

Sainfoin needs its leaves actively photosynthesizing as little energy is stored in root reserves. Do not use during last 6 weeks before frost and leave 12" or 30 cm stubble.

### Forage quality & palatability:

18% protein & 63% digestibility, stems palatable. Yields 80 to 90% of alfalfa, but holds its quality holds longer than alfalfa.

### Advantages & adaptations:

Drought tolerance: moderate.  
Winter hardiness: high  
Longevity: moderate > 5 years

### Management considerations:

Inoculate and scarify seed before seeding sainfoin. Although seed is large, seed relatively shallow at  $\frac{1}{4}$  to  $\frac{3}{4}$  inches deep. Graze in spring or early summer. Can be fall grazed after first killing frost. Cut for hay earlier than alfalfa.

## Birdsfoot Trefoil



Birdsfoot trefoil established well in both demo plots & at field scales in the Peace.



Gordon Lazinchuk's 2nd year birdsfoot trefoil hayfield with low pH soils.

## Sainfoin



Sainfoin established well in plots in FSJ.

## Cicer Milkvetch



Cicer milkvetch established well in plots at Beaverlodge & Fort St. John. At field scales, Fred & Liz Schneider have been increasing the milkvetch in their pastures with strategic grazing.

### Photo credits:

Photos on this page by Calvin Yoder. All other photos: Vicki Moser or Sandra Burton

*"I think there is a lot of potential for the new Mountain View variety of sainfoin with grazing systems in our region."*  
*Freddy Schneider*  
*Pouce Coupe, BC*

## Cicer Milkvetch

Scientific name: *Astragalus cicer* L.

### Description:

Cicer milkvetch is a non bloating agronomic legume. The name comes from the belief that goats' milk supply was increased from eating vetches. It is different from many milkvetches ("loco weed") that accumulate selenium in toxic levels.

Cicer milkvetch has deep branched taproots with tough rhizomes and winter hardy wide crowns. Hollow succulent stems grow upright at first then lodge. Compound leaves are made up of 13 to 27 tiny paired leaflets. Pale yellow flowers produce long seed pods that blacken as they ripen. Bright yellow to pale green seeds are hard.

### Uses:

Used mainly for improving pastures and extending the grazing season. Since it holds its quality very well, it can be stockpiled for fall or winter grazing with good gains or even for spring grazing or maintenance feed.

## Key Messages

Many of forage producers' questions have been addressed in this factsheet about using alternative legumes such as birdsfoot trefoil, sainfoin and cicer milkvetch in pure and mixed forage stands. Key questions would relate to ease of establishment, adaptability to challenging weather and soil conditions, longevity, hardiness, grazing recovery and how yields compare with alfalfa.

Another important question is how the cost of seeding compares with alfalfas or clovers. The Forage Seeding Webtool is an interactive way to enter various seeding scenarios, seed mixes and rates. It then gives the current seed price postings from seed suppliers in the Peace Region. Visit the tool through the Forage website or directly through <http://www.peaceforagetool.ca>

Cicer milkvetch is also sometimes used for stabilizing soil.

### Recovery after use:

High recovery if not grazed lower than 10 cm (4 in). Root rhizomes tolerate hoof traffic well so cicer milkvetch can be grazed repeatedly.

### Forage quality & palatability:

Crude protein of 14.6% & digestibility of 61.5%. Yields less than alfalfa, but non-bloating and retains quality.

### Advantages & adaptations:

Drought tolerance: moderate  
 Winter hardiness: high  
 Longevity: high

### Management considerations:

Allow 2 full seasons for establishment. Since cicer milkvetch grows slower but holds its forage quality longer than alfalfa, it can be grazed early summer to fall. Allow to set seed every 3 years.

**Compiled by:** Sandra Burton in February 2016.

**With Contributions from:** Allen Dobb, Darryl Kroeker & Julie Robinson.

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