

Short Rotation Forage Legumes

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Grain crop production uses crop rotation to reduce disease infection, insect damage, and market risk. The inclusion of annual legumes in crop rotation also increases soil organic nitrogen (N) supplying power through symbiotic N fixation in legume crop root nodules and release of N when crop residues break down. The N 'benefit' or fertilizer equivalent gained from annual legume crops such as pea and lentil has been a key factor in the improved economic returns to producers from diversified crop rotations.

Research results from perennial forage legumes in crop rotation in Manitoba suggest that the N fertilizer benefit could range from 80 to 150 kg ha⁻¹ while results from the semiarid Brown Soil zone of Saskatchewan have been about 35 to 70 kg ha⁻¹. This suggests that soil, precipitation, and location differences across the prairies will produce differing amounts of residual N. Beef producers need hay for wintering cattle or backgrounding calves and yearlings. If beef producers can partner with a grain producer neighbour to grow legume hay in a crop rotation then both partners can benefit from this arrangement.

The objective of this project is to determine the amount of residual N from a two year crop of alfalfa or red clover at 4 locations in Saskatchewan. The locations are Swift Current, Saskatoon, Lanigan and Melfort. Four rotations were seeded in replicated plots in 2010 and the perennial forages harvested in the seeding year for hay yield. They will be harvested again in 2011 for hay and then terminated with herbicide and two more annual crops grown on all treatments in 2012 and 2013. The rotations and years are listed in the table below:

Rotation/Year	2010	2011	2012	2013
1	Alfalfa	Alfalfa	Wheat	Canola
2	Red Clover	Red Clover	Wheat	Canola
3	Barley	Pea	Wheat	Canola
4	Barley	Flax	Wheat (N rate)	Canola (N rate)

In rotation 3, a pea crop is included to compare a rotation that includes an annual legume crop. Yield and N content of the wheat in 2012 and canola in 2013 will be determined.

The spring and summer of 2010 had record precipitation at WBDC and the plots were badly rutted by the plot drill. Excellent stands of alfalfa and red clover were established but the barley crop did not grow well due to saturated soil. Weeds were sprayed once in 2010 and then left to transpire soil water for the remainder of the growing season. Barley did not mature to produce grain and was harvested as green feed. The yield of the barley green feed crop in rotations 3 and 4 yielded 4410 kg ha⁻¹ of greenfeed while alfalfa produced 5150 kg ha⁻¹ and red clover produced 2525 kg ha⁻¹. While the growing conditions were extreme in 2010, these yields indicate that good hay yields can be achieved even in the year of establishment.