

ADOPT FINAL REPORT - Project #20090441

Project Identification

- 1. Project Title:** Establishing Cicer Milkvetch Using Trampling from Bale Grazing
 - 2. Project Number:** 20090441
 - 3. Producer Group Sponsoring the Project:** Saskatchewan Forage Council (SFC)
 - 4. Project Location(s):**
 1. Estevan, SK – Brian Ross
 2. Tessier, SK – Rod and Val Petrie
 3. Medstead, SK – Ryan Sommerfeld
 - 5. Project start and end dates:**
 - October 2009 – October 2011
 - 6. Project contact person & contact details:**
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Objectives and Rationale

7. Project objectives:

This project demonstrated various seeding rates of cicer milkvetch and subsequent bale grazing as a method to establish this legume into existing grass stands. Both the effectiveness of trampling from bale grazing as an incorporation method and the various seeding rates were compared at three sites across the province.

8. Project Rationale:

Many livestock producers are interested in improving hay or pasture stands by addition of a legume. The use of non-bloating legumes such as cicer milkvetch are desirable for many livestock and forage producers due to pasture management options, productive capability and nutritional quality. Producers are also interested in low-cost methods to establish this legume in existing hay or pasture stands. Some producers have experienced limited success with novel introductions of legumes and this project provided the opportunity to test the trampling method by winter bale grazing livestock under more controlled yet practical conditions.

Methodology and Results

9. Methodology:

Three treatments were established on pre-existing pasture with little or no legume in the stand including:

- broadcast cicer milkvetch at ½ the recommended seeding rate;
- broadcast cicer milkvetch at the recommended seeding rate; and
- broadcast cicer milkvetch at 1.5 times the recommended seeding rate.

All treatments were broadcast in late fall 2009 (between October 27 and November 16, 2009) after a grazing event. Treatments were then bale grazed during the winter of 2010 with the trampling effect from cattle serving as an incorporation method for the broadcast seed.

Cicer milkvetch growth and establishment success was assessed during the summer of 2010 and 2011 by conducting seedling counts, botanical composition and an estimate of forage yield. Seedling counts were conducted by placing a quadrat at each of three defined locations (see location description below) in 5-10 spots for each seeding treatment and recording any seedlings that appear in the quadrat. Locations were:

- Bale centre (0-10 feet from the centre of the bale)
- Bale periphery (0-15 feet from the centre of the bale) and
- Between bales (15-20 feet from the bale centre)

A visual assessment of botanical composition (percent cicer contribution to forage yield within the quadrat area) was also recorded for each of the quadrats used for the seedling counts. A visual assessment of forage yield was also recorded for each seeding treatment by looking at the area beneath and between bales. Forage yield estimation was also based upon bales per acre if the area was hayed during the summer of 2010 and 2011, or through the use of stocking rates if the area was grazed in either year. All data collection was conducted as late as possible in the season but prior to any defoliation by haying or grazing in the summer of 2010 or 2011.

Site Location	Seedling Date	Seedling Assessment Date 2010	Seedling Assessment Date 2011
Estevan, SK – Brian Ross	November 16, 2009	August 25	July 14 and September 28
Tessier, SK – Rod and Val Petrie	October 27, 2009	September 14	June 28
Medstead, SK – Ryan Sommerfeld	November 9, 2009	June 16 and October 21	August 25

A cost/benefit analysis based on input costs and average forage production values, was also conducted for each site.

10. Final Results

Estevan, SK – Brian Ross

This site saw cicer milkvetch seed broadcast on to an alfalfa (20%), quackgrass (80%) hay field on November 16, 2009 using a Valmar. Seeding rates were as follows:

- 2.0 lbs/acre (1.9 acres)
- 4.0 lbs/acre (1.9 acres)
- 7.5 lbs/acre and 10 lbs/acre(2.3 acres)

A control plot adjacent to seeding treatments was also included in this demonstration where seed was broadcast but no bale grazing took place. Bale grazing took place on the site from mid December 2009 to mid January 2010 by cow/calf pairs. The site was inspected on April 20, 2010 and the litter layer (beneath and surrounding bales in a 25 foot diameter) was approximately 2-4 inches thick.

Seedling counts were conducted on August 25, 2010 with the following results:

- No cicer milkvetch seedlings found.
- Cicer milkvetch therefore contributed 0% to the botanical composition.

During the winter of 2010/2011, bale grazing again took place on this site with bales placed in between where bales had been placed the previous winter. Bale grazing took place on the site from December 2010 to March 2011 by cow/calf pairs.

Seedling counts were conducted on July 14 and September 28, 2011 with the following results:

- Only a few (less than 10) cicer milkvetch seedlings found over the entire area.
- Cicer milkvetch therefore contributed 0% to the botanical composition.

In both years, there were no trends noted for cicer milkvetch establishment related to either seeding rate, or distance from bale centres. Cicer seedlings found were randomly located throughout the entire demonstration area.

Hay was cut from this demonstration site in August of both 2010 and 2011 with no grazing of the site in either year. Hay yields were 1.5 tons/acre and 1.75 tons/acre in 2010 and 2011, respectively.

Tessier, SK – Rod and Val Petrie

This site saw cicer milkvetch seed broadcast by Valmar on October 27, 2009 onto a smooth bromegrass/alfalfa stand that was in fair condition but with low vigour. Due to difficulties in calibration of the seeding equipment, seeding rates on this site were higher than recommended. Seeding rates were as follows:

- 6.8 lbs/acre (2.17 acres)
- 12.5 lbs/acre (1.45 acres)
- 18.5 lbs/acre (1.08 acres)

Bale grazing took place from December 31, 2009 to April 28, 2010 by 145 cows. Cattle finished bale grazing April 28, but still had access to the area during calving. On May 10, 2010 the site was visited and litter measurements were made on the bale grazed area. Both hay and greenfeed bales were used at this site. Greenfeed bales had approximately 3-4 inches of litter left in the bale centre with less at the perimeter and no litter between bales. Hay bales had very little litter in any area.

Due to high rainfall recorded in 2010, there was significant plant growth at this site. The area was swathed at a high height in effort to decrease competition from the existing forage and allow more light into the canopy for cicer seedlings on July 23, 2010. Due to the abundant plant growth on the site it was also impossible to follow the sampling procedure as set out in the methodology for this project. Instead, cicer seedling counts were conducted along a one foot wide transect across the width of each plot. The following were the results of the count conducted on September 14, 2010.

- 1-2 cicer milkvetch seedlings per square foot (11-22 per square meter). This level of germination was consistent across all seeding rates. Number of plants was similar between bales, at bale centres and at bale periphery, but seedlings between bales appeared more vigorous. This is likely due to less litter cover allowing light lower into the canopy where these new plants were developing as well as less vigorous plant growth from established plants in these areas.
- Cicer milkvetch was estimated to contribute less than 1% of the botanical composition.
- Forage yield was estimated at 1.5 ton/acre on average. Around bale centres yield was estimated at 2.5 ton/acre and 1-1.5 ton/acre between bales.

The site was grazed lightly during the fall of 2010.

Seedling counts were conducted again on June 28, 2011 using the original methodology (counts and visual estimation of botanical composition in 5-10 quadrats) with the following results:

Average number of cicer milkvetch plants per square metre, June 28, 2011

Treatment	Between bales	Bale periphery	Centre of bale
Treatment 1 (6.8lbs/acre)	3.8	1.2	0
Treatment 2 (12.5lbs/acre)	4.8	1.4	0
Treatment 3 (18.5lbs/acre)	3.6	4.2	0

Cicer milkvetch plants were found between where bales were placed for the 2009/2010 winter and around bale periphery. No cicer plants were found where the centre of bales was set during the bale grazing activity. This is expected due to the fact that seed was broadcast following placement of bales on the area. There did not appear to be a consistent trend associated with seeding rates and seedling establishment. The higher number of seedlings located around bale periphery in treatment 3 (highest seeding rate) was the result of a high number of seedlings found in one of the five quadrats during site assessment.

Based on visual estimation for 2011, forage yield was estimated at 1.5 ton/acre on average. Around bale centres yield was estimated at 2.5 ton/acre and 1-1.5 ton/acre between bales. Cicer milkvetch botanical composition ranged from less than 1% (in the 6.8 lbs/acre seeding rate treatment in the bale periphery locations) to approximately 7% (in the 12.5 lbs/acre in the between bale locations). On average cicer milkvetch was estimated to contribute approximately 3.5% of the botanical composition for this site (in the area between bales and bale periphery) in 2011.

Medstead, SK – Ryan and Michelle Sommerfeld

This site saw cicer milkvetch seed broadcast by an ATV broadcast seeder on November 9, 2009 onto a smooth bromegrass stand that contained very little alfalfa and red clover. Again, due to difficulties in calibration of the seeding equipment, four seeding rates were actually achieved on this site. Seeding rates were as follows:

- 2.5 lbs/acre (2.36 acres)
- 4.75 lbs/acre (3.14 acres)
- 7.5 lbs/acre (1.57 acres)
- 15.0 lbs/acre (0.8 acres)

An area where seed was broadcast but no bale grazing took place was also included as a check. At this site the producer fed animals by bale grazing and by shredding bales on the area. Winter feeding of 250 cows took place at this site from mid December, 2009 to mid January, 2010 (approximately 3 weeks). Hay and pea straw bales were used as the feed source. In the area that was bale grazed, litter measurements taken in the spring were approximately 4-6 inches at bale centre, 2-4 inches at the bale periphery and 0 between bales. In the area that was bale shredded, litter was more uniform at 1-2 inches across the entire area.

The site was visited on June 16 and October 21, 2010. During the June 16 visit, the decision was made to record seedling counts in the fall to allow the longest possible time for seedling germination and establishment. It was however noted during the June 16 visit, that seedlings were not difficult to find in any of the bale grazed areas. The site cooperator noted that about three weeks later (early July), the brome grass was about 1 ½ feet tall and the cicer seedlings were looking more yellow and less robust than on June 16. During the October 21, 2010 visit, cicer seedlings were extremely hard to find. Therefore seedlings counts were recorded as 0 or non-existent across all seeding treatments.

This effect is difficult to explain (herbicide injury, insects and disease were all ruled out), but it appears that due to the high rainfall recorded in 2010, there was excessive plant growth of existing grass at this site. The competition that existing plants posed to the new cicer seedlings may have been enough to out-compete the seedlings that were present in June. Forage yield on average, was estimated at 1.65 tons/acre.

In 2011, the site was inspected in August with poor results. Virtually no cicer milkvetch seedlings were found both on the area that was bale grazed and the area where no bale grazing took place. There were no differences noted between seeding rates or location from bale centres and cicer contributed less than 1% of the stand across all seeding treatments. Forage yield was estimated at 1 ton/acre on average.

It is assumed that due to strong competition from the existing forage, cicer seedlings were unable to successfully establish. Although this result was disappointing, the producer indicated that he will continue to monitor the area into the future to observe if cicer milkvetch begins to contribute to the stand.

Multi-Site Discussion

The variable response noted at these three sites has made conclusions about this method of establishing cicer milkvetch difficult. The Tessier site did appear to be successful in that cicer milkvetch seedlings were found in both years and in 2011 were beginning to establish and contribute to the overall forage stand. This could be attributed to the seeding rates at this site (higher than intended), or could be due to a number of other factors (soil, moisture, animal density, etc). There did not appear to be a positive result at the Estevan site as cicer seedlings were difficult to locate in any of the treatments. Although the Medstead site looked promising early in the year during 2010, seedlings were less vigorous later that fall and were also difficult to find 2011. Above average moisture in both 2010 and 2011 contributed to high forage yield at all three sites and may have resulted in significant competition from established forage in the stand. Established forages may have utilized nutrients and moisture more effectively than the newly germinated cicer milkvetch plants making it difficult for these new seedlings to compete.

Anecdotal evidence from producers who have attempted this method of establishment for cicer milkvetch indicates that plants did eventually establish, but that time is a major factor. Past research indicates that the hard seed coat increases the ability of the seed to stay dormant for an extended period of time which often results in slow and uneven germination rates. However, a positive aspect of the hard seed coat is that seeds can remain viable in the soil for long periods of time, eventually germinating and producing seedlings. Cicer milkvetch also has a prostrate growth habit, so competition from other plants can be a major restriction to establishment of this forage. The high rainfall in both 2010 and 2011 allowed for excessive growth of existing vegetation at these demonstration sites and likely resulted in restricted light for seedlings located lower in the canopy. Grazing existing vegetation early in the year may be an important factor to provide an open canopy and to limit competition from other forages allowing cicer milkvetch seedlings to establish and grow.

Although it appears that only one of the three demonstration sites in this project was successful in establishing cicer milkvetch, due to the relatively slow establishing nature of this forage, it is difficult to conclude if this method of establishment was effective after only two years of monitoring. Continued evaluation is required to determine if broadcasting and bale grazing is an effective method to establish cicer milkvetch.

Low Cost Establishment Option

The method of cicer milkvetch establishment tested at these demonstration sites was considered as a low cost rejuvenation option. Rejuvenation of an existing forage stand by adding a legume is a common method of improving a stand. With seed broadcast into existing forage stands, input costs are limited and there is no loss of production that would be associated with other methods of rejuvenation such as spraying and re-seeding.

The decision of whether to spray and re-seed or attempt to add a legume into an existing stand will be dependent on a number of factors including cost, production needs, condition of existing stand, and time available for cicer establishment. The table below shows a comparison of costs between adding cicer to an existing stand or spraying and re-seeding.

Cost comparison of cicer milkvetch establishment methods

Method	Seed cost/acre*	Herbicide cost/acre**	Equipment cost/acre***	Total cost/acre
Broadcast into existing stand	\$19.45	-	\$6.78	\$26.23
Spray and re-seed (broadcast + harrow)	\$57.65	\$7.50	\$13.97	\$79.12
Spray and re-seed (drilled)	\$46.12	\$7.50	\$22.86	\$76.48

*Based on seed prices listed in the Saskatchewan Forage Council July 2009 *Market Price Discovery for Forages in Saskatchewan*. Broadcast seed at 5lbs/acre of cicer, and 10 lbs/acre of meadow bromegrass. Drilled seed at 4lbs/acre of cicer and 8lbs/acre of meadow bromegrass.

**Based on 2L/acre application of glyphosate.

***Based on the Saskatchewan Ministry of Agriculture 2010-2011 *Farm Machinery Custom and Rental Rate Guide*.

The costs associated with spraying a forage stand and re-seeding as a means of establishing cicer milkvetch is of course greater than that of simply broadcasting the seed into an existing forage stand. This demonstration did not look at a comparison between these two methods, thus the efficacy of cicer establishment resulting from these two methods cannot be directly compared. The major difference between these two approaches will be that spraying and re-seeding will take the area out of production for a minimum of one growing season. However, establishment results from the spray and re-seed method is expected to be more uniform and robust than broadcasting into an existing stand. Ultimately, producers will have to consider a number of factors when deciding how to establish cicer milkvetch. We can determine that for producers who are unable or unwilling to lose production from a forage stand for a year or more, broadcasting into an existing forage stand may be worth considering. However, one must recognize that establishment success may be riskier and a long-term endeavor. Again, more time is necessary to determine the full extent of cicer milkvetch establishment using this method.

Extension/Promotion Activities:

Extension activities completed to date as part of this project included:

- Signs placed at all three sites.
- Co-operator from the Medstead site gave a presentation at a Beef and Forage Day on December 2, 2009 in North Battleford (information was included in the 2010 progress report for this project).
- The Estevan site was included in a field day held on January 27, 2011 at which there were 40 producers in attendance (see Appendix B for flyer).
- The Medstead site was included in a field day held on August 23, 2011 at which there were more than 30 producers in attendance (see Appendix B for flyer).
- The Tessier site was included in a field day held on August 9, 2011 at which there were 30 producers in attendance (see Appendix B for flyer).
- Information on this project was included in the August 26, 2011 issue of the Saskatchewan Forage Council's *Saskatchewan Hay and Pasture Report*.
- Information regarding this project has been included on the Saskatchewan Forage Council website (average hits of 1100+ per month).
- With final results now available, this information will be included in upcoming editions of the *SFC Forage and Livestock eNews* as well as other communication material.

It must be noted that the most valuable aspect of this demonstration project has been the peer-to-peer discussions that were facilitated at field days and through extension materials. And it is anticipated that

this information will continue to be of value to producers into the future. With this demonstration of how cicer milkvetch can be added to existing grass stands, producers will be better equipped to evaluate the potential of this practice on their own operation.

11. Conclusions and Recommendations

The purpose of this project was to evaluate the use of trampling from bale grazing as an option to establish cicer milkvetch into existing grass stands. Both the effectiveness of trampling from bale grazing as an incorporation method and various seeding rates were to be compared at the three demonstration sites.

The project was somewhat successful in comparing the effectiveness of bale grazing as an incorporation technique and the effect of seeding rates on cicer milkvetch establishment. At one of the three sites, cicer establishment was considered successful however, there did not appear to be a difference between seeding rates. At the other two sites, establishment success was limited. Again there did not appear to be a difference between seeding rates. At these two sites, competition from existing forage appears to have played an important role in suppressing the growth of any cicer seedlings that may have initially established. It should be noted that during both years of this project above average moisture conditions were experienced, thus results from these sites may not be typical.

Although it appears that only one of the three demonstration sites in this project was moderately successful, due to its nature of slow and uneven germination rates, it is difficult to conclude if this method of cicer milkvetch establishment was effective after only two years of monitoring. Continued evaluation is required to determine if broadcasting and bale grazing is an effective method to establish cicer milkvetch.

Reduced productivity is a major concern with older grass stands and this project has demonstrated that variable results can be expected when broadcasting cicer milkvetch seed and bale grazing as a method of incorporation. If a low cost option for establishing cicer is required, one may consider this method, however it should not be deemed as a reliable option. Due to the slow and often delayed establishment of this legume, more than two years of monitoring is required to determine the full extent of cicer milkvetch establishment into existing grass stands using trampling from bale grazing as a method of incorporation.

Supporting Information

12. Acknowledgements

The Ministry's support for the project was acknowledged on signage displayed at each site and in all communication/extension materials.

Industry/co-operator support has also been noted all project site signage and in all communication/extension materials.

Industry Support – Northstar Seed Ltd. provided cicer milkvetch seed for all three project sites.

In-kind support was provided by Saskatchewan Ministry of Agriculture Regional Forage Specialists to oversee these demonstration sites.

13. Appendices

Appendix A – Site Photos

Appendix B – Project Field Days

Abstract

14. Abstract/Summary

With the assistance of ADOPT funding, the Saskatchewan Forage Council collaborated with three co-operators to demonstrate the effectiveness of establishing cicer milkvetch into existing forage stands using bale grazing as an incorporation method at three different seeding rates. At sites located near Tessier, Estevan and Medstead, Saskatchewan, cicer milkvetch was broadcast onto existing grass stands during the fall of 2009 and each site was bale grazed during the winter of 2009/2010. Demonstration areas showed a variable response to this method of establishment. Only the Tessier site showed a positive response, with cicer milkvetch seedlings establishing and contributing to the forage stand. The Estevan and Medstead sites appeared to be unsuccessful in that cicer seedlings were difficult to find across all seeding treatments after two growing seasons. There did not appear to be an effect due to seeding rate at any of the sites. More effective suppression of the existing grass in the stand may have been required to create favourable conditions for establishment of cicer at the Estevan and Medstead sites. However, due to the slow establishment rate of cicer milkvetch, it is difficult to conclude if this method of establishment should be recommended as more time is needed to evaluate the full extent of establishment. Field days were held at all three locations (Estevan – January 27, 2011; Tessier – August 9, 2011; Medstead – August 23, 2011) with a total of approximately 100 in attendance. As well, a number of communication materials including articles and producer presentations were compiled to facilitate widespread messaging about the project. Individual producers are urged to consider local environmental and vegetation conditions before implementing this method of establishing cicer milkvetch into an existing grass stand. These demonstration sites and the resulting extension activities and communication materials provided valuable and practical information as well as a first-hand look at opportunities that may be explored. With a visual and practical demonstration of how cicer milkvetch established into existing grass stands using bale grazing as an incorporation method, producers may begin to explore options that exist for them to rejuvenate their own forage stands.

Finances

15. Expenditure Statement

Project expenditures are reported in the attached Excel spreadsheet.

Appendix A – Site Photos

Brian Ross Site – Estevan, SK



One of the very few cicer seedlings observed at this site – July 14, 2011

Ryan Sommerfeld Site – Medstead, SK



Ryan Sommerfeld at demo site during tour – Aug 23, 2011



Appendix B – Project Field Days and Extension Material



Winter Grazing Feeding Tour

Thursday January 27, 2011

Prairie Animal Health Centre, Estevan

Sign in and coffee 12:30 P.M., Presentations start at 1:00 P.M.

- Water Systems 101: Basics of Water System Design
- Etienne Souliodre, Sask. Watershed Authority
 - ADOPT Forage Demonstration: Oats, Barley, Millets and Corn
 - ADOPT Cicer Milkvetch Establishment Demonstration
 - "Combine or Swath Graze" Calculator
- Lorne Klein, Saskatchewan, Ministry of Agriculture
 - Upper Souris River Watershed Protection Plan
- Vicki East, Watershed Co-ordinator
 - Agri-Environmental Group Plans and Funding Opportunities for Producers
- Kylie McRae, Cornerstone AEGP and Ducks Unlimited Canada
 - Sask. Forage Council ADOPT Projects
- Cory Schellenberg, Saskatchewan Forage Council
- Vans depart at 2:30 P.M. for field tour
- Corn grazing, winter watering system and ADOPT forage demonstration
- Chad and Crystal Ross
 - Bale grazing and ADOPT cicer milkvetch demonstration
- Brian and Rosale Ross
- Vans arrive in Estevan at 5:00 P.M.

In order to arrange for tour transportation, we need to know if you will attend. Please register by 5:00 P.M. January 24. There is no fee to attend. For more information and to register, call (306) 848-2857 or (306) 421-0863.

Sponsors:



LIVESTOCK

AGRICULTURE



SOUTHERN EAGLE CREEK WATERSHED AND SASKATCHEWAN FORAGE COUNCIL INVITE YOU TO A SUMMER FIELD DAY

When – Tuesday, August 9th, 2011

Time – 9 am to 5pm

Location – Starting at Rosetown, Sk. – Be there by 9am
(Meeting at the Rosetown Rink, North side on town on Highway 4)

Tour will include:

Establishing Cicer Milkvetch Using Trampling from Bale Grazing Adopt Project
Nutrient and Yield Effect of Bale Grazing on Hay Fields Adopt Project
Modifying and Revegetating Waterway (water run) Demo
Eco Buffer Demonstration Adopt Project
A Comparison of Chemical and Biological Control of Scentsless Chamomile in
Mixed Alfalfa/Grass Hay and Pasture Stands Adopt Project
There will also be guest speakers throughout the day

Lunch will be provided

**Please dress accordingly as we will be walking through demo sites

**Please RSVP to Lexie Adamson by Tuesday August 2nd
eaglecreekwatershed@hotmail.com (email)**

463-2748 (w)

831-6009 (c)



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada



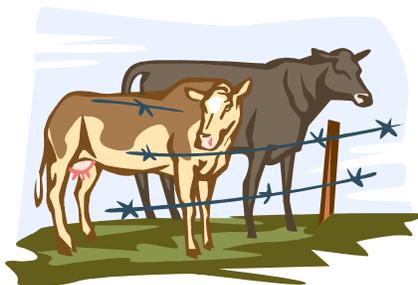
PCAB



Saskatchewan
Ministry of
Agriculture

ADOPT

Agricultural Demonstration of Practises and Technologies



Tuesday August 23rd Tour

Leaving 9:30 am from Medstead
Cavalier Agrow returning approx.
3:00 pm

**No charge - LUNCH
INCLUDED**

Tour Stops:

Agri-Environmental Group
Projects:

- Perimeter fencing for wildlife exclusion & environmentally sensitive areas

Cicer Milk Vetch establishment
using bale grazing and bale
shredding -

Sask Forage Council ADOPT
Project

- Ryan, Ray and Pauline Sommerfeld - co-operators

Brush Control -

Seven different chemical
treatments applied to
buckbrush and various weeds
Sask Forage Council ADOPT
Project

- Witchekan First Nation @ Bapaume Pasture - co-operators

Corn Trials - Cavalier Agrow

- Six different varieties
- Neil Doucette - Spiritwood - co-operator

Saskatchewan Agriculture staff
will explain ADOPT projects.

*Technicians from local Agri-Environmental
Group Plans will be on hand to answer*