

ADOPT FINAL REPORT - Project #20110370

Project Identification

- 1. Project title:** A Comparison of Cicer Milkvetch Establishment Methods
- 2. Project number:** 20110370
- 3. Producer group sponsoring the project:** Saskatchewan Forage Council
- 4. Project location(s):**
 - Medstead, SK – Ryan Sommerfeld, SW 19-51-14 W3
 - Luseland, SK – Blaine Thrun, SE 5-37-23 W3
- 5. Project start and end dates:** March 2012- January 2014
- 6. Project contact person and contact details:**

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Objectives and Rationale

7. Project objectives:

Many livestock producers are interested in improving hay or pasture stands with the 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 interested in the most effective methods of establishing this sometimes difficult to establish legume. The objective of this project was to demonstrate various establishment strategies for cicer milkvetch as part of a new forage stand and evaluate the relative effectiveness of these strategies.

8. Project Rationale:

The Saskatchewan Forage Council (SFC) and Agriculture Knowledge Centre regularly receive calls from producers inquiring about the best way to establish cicer milkvetch. This non-bloat legume has the reputation of being difficult and slow to establish. This project provided a visual demonstration of various establishment methods and gave producers a comparison to help them evaluate ways to

establish cicer milkvetch on their own operations. This project can be considered as follow up to a previous demonstration where cicer milkvetch was broadcast onto an existing grass stand and bale grazing was used as an incorporation method (ADOPT project #20090441).

Methodology and Results

9. Methodology:

This project demonstrated the establishment of cicer milkvetch in a forage mixture (cicer milkvetch, brome grass and alfalfa) using three (3) establishment methods at two (2) sites. The three (3) treatments were:

1. Spray out (herbicide) existing old forage stand and drill new forage mixture into sod;
2. Work up (tillage) existing old forage stand and drill in new forage mixture;
3. Seed new forage mixture into stubble of previously annual cropped area (stubble).

Each treatment was sown on a plot of approximately 5 acres in size. Plots were prepared for seeding beginning in the fall of 2012 through cultivation of the tillage treatment and spraying of the herbicide treatment. Further cultivation (tillage treatment) and herbicide (herbicide treatment) were utilized in the spring of 2013 to ensure adequate weed control and to prepare the seedbed. Plots were assessed for establishment success as late as possible in the summer/fall of 2013 but prior to any defoliation of the cicer milkvetch plants. Seeding and assessment dates for each site are listed in the table below:

ADOPT Cicer Milkvetch Establishment Site Activity

Site Location	Seeding Date	Spraying Date	Tillage Date	Seedling Evaluation Date
Medstead	May 28, 2013 July 15, 2013*	Sept. 18, 2012 May 22, 2013 July 10, 2013*	N/A	September 10, 2013
Luseland	June 12, 2013	Aug. 23, 2012	Aug. 20, 2012	August 22, 2013

**Five acres were sprayed out and reseeded due to poor emergence. See Medstead site results for details*

10. Results

Medstead Site

The Medstead site is located in the black soil zone in north-west Saskatchewan. The area designated for the stubble treatment was too wet to access in late 2012 and in the summer of 2013 and so could not be seeded. The remaining 10 acres of plot space was located on a tame hay (alfalfa/brome) field that had been sprayed on September 18, 2012 with glyphosate. The late spring thaw made it difficult to access the site to perform a tillage operation and the producer determined that he would perform another application of herbicide to the entire 10 acres and then seed the plots to two varieties of cicer milkvetch, Oxley II and AC Veldt. Seeding took place on May 28, 2013 with a Haybuster drill. Cicer seed was not scarified prior to seeding due to lack of equipment to complete this operation on a large enough scale (see discussion below). The producer felt that the seed may have been placed too deep and was not satisfied with initial emergence of the cicer milkvetch. He sprayed 5 acres with herbicide and reseeded both the Oxley II and AC Veldt blends on this area on July 15, 2013. The result is that there are

four plots included in the demonstration at Medstead including both AC Veldt and Oxley II blends seeded on May 28 or July 15. These plots were inspected for establishment success on September 10, 2013.

Medstead site Seeding rates and blends

	Cicer milkvetch	Fleet meadow brome	3010 alfalfa
Oxley II cicer milkvetch blend	6 lbs/acre	5 lbs/acre	1.5 lbs/acre
AC Veldt cicer milkvetch blend	6 lbs/acre	5 lbs/acre	1.5 lbs/acre

Medstead site establishment results at September 10, 2013

	Early Seeding Oxley II	Early Seeding AC Veldt	Late Seeding Oxley II	Late Seeding AC Veldt
Seeding Date	May 28, 2013	May 28, 2013	July 15, 2013	July 15, 2013
Cicer milkvetch seedlings counted*	3.8	0.3	0	0
Range of seedlings counted (plants/0.25m²)	0-15	0-2	N/A	N/A
Average percentage Cicer milkvetch**	9%	1%	0%	0%
Average percentage Bromegrass	4%	3%	0%	0%
Average percentage Alfalfa	7%	1%	2%	1%
Average percentage Weeds**	80%	95%	98%	99%

*All counts are per 0.25m², average of 6 quadrats per treatment

**percent of total botanical cover

When plots were sprayed out and reseeded for the late -seeded Oxley II and AC Veldt, the cooperater reported that there was a very effective kill of the growing forage and weeds. There were no cicer milkvetch seedlings observed and the site supervisor was unable to determine if the seeds did not germinate or if they did germinate and were affected by the herbicide. The supervisor also reported that the early seeded plots showed the greatest number of seedlings at the ends of the plots where the tractor turned around. It is suspected that the packing wheels did not line up with the shanks in this area, resulting in shallower seeding in loosely packed soil (site photos are included in Appendix A).

Luseland Site

The demonstration at Luseland is located in the moist dark brown soil zone. The stubble treatment is located approximately 10 miles from the sprayed and tillage treatment plots in an adjacent Rural

Municipality and is located in the dark brown soil zone. Soils are clay-loam in texture for all plots at the Luseland site. Previous usage of the land was a forage stand with 85-90% meadow brome and 10-15% alfalfa (tilled and sprayed treatments). The stubble treatment was barley stubble in which the 2012 barley crop was completely hailed out.

On August 23, 2012, the Luseland site cooperator sprayed the five (5) acre herbicide treatment plot with glyphosate at a rate of 2 L/ac. The five (5) acre tillage treatment was cultivated by discer on August 20, 2012. The seeding implement used was a Flexi-coil model 5000 air seeder.

The goal for seeding rate of the blend at the Luseland site was 10 lbs/acre. Seed was premixed and coated and the producer used all the seed provided which resulted in actual seeding rates of: AC Veldt cicer milkvetch (3 lbs. /acre); alfalfa (0.5 lb. /acre) and hybrid bromegrass (7.3 lbs. /acre). Cicer milkvetch seed was not scarified prior to seeding, as the producer did not have access to equipment or knowledge of how to scarify.

Luseland site establishment results at August 22, 2013

	Sprayed with Herbicide	Tilled	Sown into Stubble
Cicer milkvetch seedlings counted*	0.4	1.0	0.6
Range of seedlings counted (plants/0.25m²)	0-1	0-3	0-1
Average percentage Cicer milkvetch**	2%	4%	3%
Average percentage Bromegrass	34%	15%	7%
Average percentage Alfalfa	9%	16%	18%
Average percentage Weeds	55%	65%	72%

**All counts are per 0.25m², average of 5 quadrats per treatment*

***percent of total botanical cover*

The tilled treatment was slightly more successful than the herbicide or stubble treatment at the Luseland site in the first year in terms of cicer milkvetch seedling counts and the average percentage of cicer milkvetch in the stand. It is interesting to note that the herbicide treatment had the highest percentage of bromegrass observed in year one, while the stubble treatment displayed the highest percentage of alfalfa. Photos of the three treatments are included in Appendix A. Further monitoring of this site in future years will be required to determine the ultimate success of these three treatments.

Weeds observed in the forage stand at Luseland included stinkweed, absinth, hawk’s-beard, dandelion, buckwheat, Canada thistle, Persian darnel, flixweed, pigweed and volunteer barley. When inspected on August 22, 2013, it was noted that on the stubble treatment the cicer plants were small and appeared to have only germinated within the last 4-5 weeks.

Discussion

On average, establishment of both AC Veldt and Oxley II cicer milkvetch ranged from 0-3 plants per 0.25 m² (0-12 plants/m²) in this demonstration. The most successful treatment was the Oxley II cicer milkvetch sown on May 28, 2013 at the Medstead site. At this plot, 3.8 seedlings per 0.25 m² (15.2 seedlings/m²) were observed on average when this plot was assessed on September 10, 2013. The range of seedlings observed was 0-15/0.25 m² (0-60/m²). The more successful areas of the Medstead plots were those where seeding was believed to be shallow and the soil was not packed as firmly.

Observation of these plots in upcoming years will be necessary to truly gauge how successfully these forages will establish. Many perennial forages and cicer milkvetch in particular, are slow to establish and require more than one year of monitoring to determine success. According to Alberta Agriculture and Rural Development (<http://www1.agric.gov.ab.ca>) "Cicer milkvetch seed contains a high percentage of hard seeds. This seed coat acts as a barrier preventing microbial invasion that would otherwise penetrate and damage the seed germ. The coat also reduces the ability of the seed to absorb water, which has the effect of increasing the seed's ability to stay dormant for an extended time. The result is slow and uneven germination rates." Seed scarification is recommended in order to allow for more even germination of cicer milkvetch. Unfortunately, producers often do not have the required equipment/expertise to scarify seed on farm and seed should be used within one week of scarification, to avoid a decline in viability of seed. This can present a problem if weather conditions are not ideal for seeding within that time period. Cicer milkvetch seed was not scarified at the Luseland or Medstead sites in this demonstration as producers did not have the equipment required for scarification. In future years it will be interesting to note whether more cicer milkvetch seeds germinate at these sites and if the percentage of this forage increases in the mixed stand.

From 2009 to 2011, a Saskatchewan Forage Council ADOPT project demonstrated establishment of cicer milkvetch using trampling from bale grazing on three farms in Saskatchewan. The results from this project indicated that in the first two years of monitoring, the most successful establishment (highest seedling counts) occurred at a site where seeding rates were unintentionally higher than at other sites. It is likely that at many of these sites, the hard seed coat has allowed the seed to remain viable in the soil over the course of one to two years and that these seeds may germinate and the forage stand will be established successfully over time.

Weed control is another important factor in establishment success of perennial forages. At the time of observation, all plots were reported to comprise over 50% weeds by percentage of botanical cover. The tilled treatment was slightly more successful than the other two treatments at the Luseland site. One reason for the higher success rate may be that there was less competition for the cicer seedlings in some portions of this plot in spite of average percent weed cover of 65%. One area of the tilled plot was composed of 10% cicer milkvetch, 25% brome, 15% alfalfa and 50% weeds. The herbicide treatment at Luseland had a lower percentage of weeds observed in the forage stand on average, but had 34% brome grass, which may have competed with the cicer milkvetch plants. The stubble treatment had the highest percentage of weeds at the Luseland site, which may have also been a source of competition. Good weed control prior to seeding can have a significant impact on establishment success, as it is very difficult to control weeds in a mixed forage stand. The prostrate growth habit of cicer milkvetch means that its growth may be restricted by surrounding plant growth and it will likely perform more successfully with less competition. One recommendation arising from the cicer bale trampling project was that grazing existing vegetation early in the year may be one method to open the canopy and limit competition to give cicer milkvetch seedling an opportunity to thrive. Whether the competition is from

weeds, as in the new stand establishment demonstration or from an existing forage stand being rejuvenated, it is clearly important to reduce competition in order to see promising establishment results in the first and second year after seeding cicer milkvetch.

Extension/Promotion Activities:

The following extension activities were completed to communicate results and raise awareness of this demonstration:

- Signs placed at each of the sites
- An article on the results of this project is included in the October, 2013 issue of the *Saskatchewan Forage and Livestock eNews*.
- A YouTube video featuring cicer milkvetch has been produced and posted to the SFC website and uploaded to the SFC's YouTube channel ([click here for Cicer Milkvetch video link](#)).
- A producer event is being hosted by the Saskatchewan Ministry of Agriculture in Spiritwood, SK on January 14, 2014 to communicate the results of the project.
- Luseland demonstration site results will be presented at two producer events in late January, 2014 by John Hauer, Regional Forage Specialist from the Saskatchewan Ministry of Agriculture
- Information regarding this project has been included on the Saskatchewan Forage Council website (average hits of 1500+ per month). The final report will now be posted on the website.

11. Conclusions and Recommendations

This project was successful in demonstrating three options for establishing cicer milkvetch as part of a perennial forage stand in Saskatchewan. Establishment of both the Oxley II and AC Veldt varieties of cicer milkvetch ranged from 0-9% of the total plant cover in the plots. The most successful treatment was the herbicide treatment on the Oxley II variety sown on May 28, 2013 at the Medstead site, in which cicer milkvetch composed 9% of the total botanical cover on average at the time of observation on September 10, 2013. The areas where the most cicer milkvetch plants were counted at Medstead were those where seeding was shallow and the soil was less firmly packed. Weeds made up a lower percentage of the stand on this plot (80% versus 95-99% on all other plots at Medstead), which may have improved the opportunity for cicer milkvetch to establish.

The Medstead plots sown to both Oxley II and AC Veldt cicer milkvetch on July 15, 2013 were the least successful, with no cicer milkvetch or bromegrass seedlings and only 1-2% alfalfa observed on the September 10, 2013 evaluation date. Whether this is due to the late seeding date, damage from herbicide or a combination of factors is not known.

The most successful treatment at the Luseland site was the tilled treatment, in which AC Veldt cicer milkvetch composed 4% of the total botanical cover on average; however the herbicide and stubble treatments had 2% and 3% cicer milkvetch respectively, making the tilled treatment only moderately more successful. Weeds composed 55-72% of the Luseland plots and bromegrass also established quickly on the herbicide treatment (34% of total plant cover), creating competition for new cicer milkvetch seedlings at this site. It is clearly important to reduce competition in order to see promising establishment results in the first year cicer milkvetch is planted.

Differences between the three treatment types applied at Medstead and Luseland may become apparent in subsequent years, but initially there appear to be little difference in establishment success between seeding into sod (either sprayed or tilled) versus seeding into stubble. Time to establish cicer milkvetch and proper preparation of seed and seedbed appears to have had a greater influence on success of establishment in this demonstration.

The producer workshops held in the winter of 2013/2014 were an effective method of communicating the results of this demonstration and in conveying the producer experience and lessons learned regarding cicer milkvetch establishment over the course of this project and the previous Saskatchewan Forage Council project titled *Establishing Cicer Milkvetch Using Trampling from Bale Grazing*. In addition, a web video produced highlighting this cicer milkvetch project has been posted to the Saskatchewan Forage Council's YouTube channel and the Saskatchewan Forage Council website. The web video and YouTube channel will also be effective in communicating the results of this demonstration beyond the project endpoint and will assist with promotion of the results to a wider and more diverse audience.

Due to the slow and often delayed establishment of this legume, a number of years of monitoring are required to determine the full extent of cicer milkvetch establishment using herbicide, tillage or seeding directly into annual crop stubble. Producer cooperators and partners on this project will continue to monitor these plots to gain a better understanding of the establishment success of these various establishment options for the Oxley II and AC Veldt varieties of cicer milkvetch.

Supporting Information

12. Acknowledgements

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

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

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

Northstar Seed Ltd. donated the cicer milkvetch seed for both sites. Cavalier Agrow in Medstead, SK donated the brome grass and alfalfa seed for the Medstead site.

Co-operating producers: Ryan Sommerfeld (Medstead, SK) and Blaine Thrun (Luseland, SK)

13. Appendices

Appendix A – Site Photos

Appendix B – Project Extension

Abstract

14. Abstract

Under the ADOPT program, the Saskatchewan Forage Council received funding to demonstrate methods for establishing the non-bloating legume cicer milkvetch. Saskatchewan Ministry of Agriculture Forage Specialists worked with producer cooperators in Medstead and Luseland, SK to observe the results of planting cicer milkvetch as part of a forage mixture using three methods; sod seeded into an old forage stand that was tilled, sod seeded into an old forage stand that had been sprayed with glyphosate or seeded into annual crop stubble. Establishment success was observed through plants counts and visual assessment comparing the percentage of cicer milkvetch seedlings as part of the total plant cover on each plot. Cicer milkvetch composed a minimum of 0% and a maximum of 9% of the total botanical cover in the first year of establishment. At Medstead, where two varieties of cicer milkvetch were sown, the Oxley II variety was the most successful on a plot sown in late May under the herbicide treatment. The tilled treatment was slightly more successful than the herbicide or stubble treatments at the Luseland site where AC Veldt was the only variety of cicer milkvetch sown. Shallow seeding depth, as well as competition from weeds and other forages appears to have impacted establishment success in year one, however monitoring over multiple years will be required to gain a better understanding of the success of these three establishment options. Cicer milkvetch seed was not scarified prior to seeding in this demonstration, which likely impacted establishment success in the first year. Presentations at producer events in the winter of 2013/2014, a web video highlighting establishment options and inclusion of the results on the Saskatchewan Forage Council's website and publications provided an effective means of communicating information from this demonstration to producers.

Finances

15. Expenditure Statement

	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Total Budgeted(\$)
Salaries and Benefits				
• Students				
• Postdoctoral / Research Associates				
• Technical / Professional Assistants				
Consultant Fees & Contractual Services				
Rental Costs				
• Rentals				
Materials / Supplies				
Project Travel				
• Field Work				
• Collaborations/consultations				
Other				
• Field Day				
• Administration				
• Miscellaneous				
Total				

***See attached expenditure statement**

Appendix A – Site Photos

Medstead Site



July 15, 2013
Medstead site location of
Late-Seeded AC Veldt and
Oxley II prior to reseeding.



September 10, 2013
Medstead site
Cicer milkvetch establishment was
most successful on the ends of the
field where the tractor turned.
Seeding appeared to be shallower
and the soil was not as firmly
packed in this area.



July 15, 2013
The producer seeded the Late
AC Veldt and Oxley II using the
same Haybuster drill used for
the early seeded plots. The
highest percentage of
seedlings was observed at the
ends of the fields where the
tractor turned around.

Luseland Site



August 22, 2013

Herbicide treatment

When plots were assessed on this date, 0-1 seedlings were observed/0.25m² and cicer milkvetch represented 2% of the total botanical cover for this treatment.



August 22, 2013

Tillage treatment

When plots were assessed on this date, 0-3 seedlings were observed/0.25m² and cicer milkvetch represented 4% of the total botanical cover for this treatment.



August 22, 2013

Stubble treatment

When plots were assessed on this date, 0-1 seedlings were observed/0.25m² and cicer milkvetch represented 3% of the total botanical cover for this treatment.

Appendix B – Project Extension

Spiritwood, SK Forage and Livestock Update, January 15, 2014



Forage and Livestock Update

January 15, 2014 1 p.m. to 5 p.m.

Pioneer Center, 410 Main Street, Spiritwood SK

Topics include:

- Introduction to Livestock Price Insurance
Jodie Griffin, Livestock Price Insurance Advisor, Saskatchewan Crop Insurance Corporation
- Cicer Milk Vetch Producer Panel and ADOPT Project results
- Beaver River/North Saskatchewan River Agri-Environmental Group Plan Update and GF2 Funding
- Environmental Farm Plan Update
- Ergot: What you should know!
- Predation Program
Karen McCaffrey, Manager, Turtleford Customer Service Office, Saskatchewan Crop Insurance Corporation
- Verified Beef Production: On Farm Food Safety

REGISTRATION AT NO COST

To register, contact: Laura Hoimyr at 306-969-4616 or ml.hoimyr2@yourlink.ca

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