Legume Inter-Seeding Field Trials, Lake County, MT
Sprinkler-Irrigated Sites

Field studies conducted in Lake County by the Lake County Conservation District (LCCD) and the NRCS Field Office have shown that **inter-seeding legumes into existing sprinkler-irrigated pastures can be successful**!

Legumes provide benefits to pasture by improving nitrogen-fixation and soil fertility. Legumes also provide high quality forage for livestock and grow strongest in mid-summer when the growth of most pasture grasses have slowed. If your pastures are short on legumes then they are likely not meeting their full production potential.

Field studies were conducted on seven ranches in Lake County in 2015 and 2016. Results and monitoring are on-going, but initial results are promising!

Legumes tested include red clover, alsike clover, ladio tall white clover, alfalfa, birdsfoot trefoil, sanfoin and cicer milkvetch.

Field trial plots were set up as 1.) broadcasted plots and 2.) no-till drilled plots. All plots were seeded in the early spring. All plots were on sprinkler-irrigated pastures

Prior to seeding, or immediately thereafter, each plot was grazed heavily by livestock, or plots had hay fed upon them. The heavy livestock pressure at or before seeding provided some disturbance to the soil, allowing the newly seeded legumes to gain better seed-to-soil contact necessary for germination. Additionally, heavy grazing of the existing plants decreases their competitiveness in the short term. Temporarily reducing competition of existing vegetation allows the legumes better opportunities to germinate and establish. Too much vegetative competition decreases germination and establishment of new plants. Additionally, or alternatively, sometimes light applications of Roundup® (glyphosate) following label instructions, can be applied to the pastures before seeding to set back (but not kill) the existing vegetation. Harrowing was also used on all broadcast plots and is useful in creating temporary disturbances to existing vegetation.

For the no-till drill plot, all species were seeded together as part of a mix. The broadcast plots were seeded in separate individual species plots as well as in a mixed plot.

The broadcast plots were seeded heavier, at twice the drilled rate; typically germination rates with broadcasting are lower than if seed is drilled so seeding rates are increased if seeded by broadcast methods.

For more information contact: Ronan NRCS Field Office and Lake County Conservation District (406) 676-2841
Case Study: Legume Inter-Seeding Continued
Drilled Plots

1. No-Till drilling legume plots, April 2016

2. No-Till plots after drilling immediately after seeding, April 2016

3. No-Till plots after germination, summer 2016. Notice legumes coming up in drill rows!

Notice the abundance of legumes in the drill rows 4 months after seeding. Success!

Notice in this photo a row where the drill didn’t put down seed…evidence of how effective the legumes established

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Case Study: Legume Inter-Seeding Continued
Broadcast Plots

Broadcast site prior to seeding, Feb. 2016. Site was harrowed and grazed.

Seeding, Feb. 2015

Germination of legume seedlings. March 2015

Broadcast plot success! Alsike clover, August, 2016

Broadcast red clover plot, August 2016

Broadcast mixed species legume plot, August 2016

Plot boundaries are readily identifiable

Broadcast red clover plot, August 2016

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Case Study: Legume Inter-Seeding Continued

Thus far the legume inter-seeding trials have successfully demonstrated that legumes can be effectively and inexpensively inter-seeded into existing sprinkler-irrigated pastures in Lake County. Early on, clovers (red, alsike and ladino-white) have been most successful. The non-bloating legumes birdsfoot trefoil and cicer milkvetch show promise especially in the no-till plots, but these species generally take longer to establish (2-4 years). The benefits of non-bloating legumes can be worth the wait though! It is strongly recommended to plant non-bloating legumes in a mix of inter-seeded legumes. Thus far success with inter-seeding sanfoin appears to be limited, but again, it may take more time to establish and the plots have only recently been seeded.

Recommended seeding mixes for implementing these trial are show below. Note that due to the expense and lack of success (so far) with sanfoin, we are not including it in this mix recommendation. It is estimated that the provided mix will cost approximately $25/acre for the seed. Feel free to adapt as needed to meet your desire and the needs of your pastures.

### Legume Inter-seeding recommended mix: No-Till

<table>
<thead>
<tr>
<th>Legume Species in Mix</th>
<th>Seeding Rate in Mix (lbs./acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Clover</td>
<td>0.5—1.0 lbs.</td>
</tr>
<tr>
<td>Alsike Clover (not good for horses)</td>
<td>0.5—0.75 lbs.</td>
</tr>
<tr>
<td>Ladino Tall-White Clover</td>
<td>0.5—0.75 lbs.</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>0.5—1.0 lbs.</td>
</tr>
<tr>
<td>Birdsfoot Trefoil (non-bloating)</td>
<td>1.0—2.0 lbs.</td>
</tr>
<tr>
<td>Cicer Milkvetch (non-bloating)</td>
<td>1.0—2.0 lbs.</td>
</tr>
<tr>
<td><strong>Total LBS/Acre in Drill Mix</strong></td>
<td><strong>5.0—7.0 lbs./ac</strong></td>
</tr>
</tbody>
</table>

### Legume Inter-seeding recommended mix: Broadcast Seeding

<table>
<thead>
<tr>
<th>Legume Species in Mix</th>
<th>Seeding Rate in Mix (lbs./acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Clover</td>
<td>1.0—2.0 lbs.</td>
</tr>
<tr>
<td>Alsike Clover (not good for horses)</td>
<td>0.5—0.75 lbs.</td>
</tr>
<tr>
<td>Ladino Tall-White Clover</td>
<td>0.75—1.0 lbs.</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>0.75—1.0 lbs.</td>
</tr>
<tr>
<td>Birdsfoot Trefoil (non-bloating)</td>
<td>2.0 — 2.5 lbs.</td>
</tr>
<tr>
<td>Cicer Milkvetch (non-bloating)</td>
<td>2.0 — 2.5 lbs.</td>
</tr>
<tr>
<td><strong>Total LBS/Acre in Broadcast Mix</strong></td>
<td><strong>6.0—9.0 lbs./ac</strong></td>
</tr>
</tbody>
</table>

### Steps for Implementing Legume Inter-seeding:

1. Locate suitable pasture or areas within pastures that lack legume components. Generally a healthy pasture should contain between 20% and 50% legumes, a mix of bloating and non-bloating legumes are preferred in addition to the grass.
2. Determine seeding method (no-till drill or broadcast).
3. Pre-treat area. Graze it heavily in the fall, feed on it in the winter or graze it in early spring (a combination of all of these works best). Or, apply a light glyphosate application in spring (follow label instructions) in addition to feeding or heavily grazing. Harrowing is also a good idea either before and/or immediately after seeding.
4. Seed desired legumes. If broadcasting, try to seed them in early spring (Feb. thru early April). If no-tilling, seed them any time before mid-May, the earlier the better.
5. Keep livestock off of seeded area until legumes are 6” to 12” tall (Late July, if possible) and irrigate to keep moist.
6. Follow a proper grazing strategy that provides 6” of residual after grazing events and 30 days of rest after grazing.
7. Enjoy a rejuvenated, higher-producing pasture for years to come!

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Case Study:

**Legume Inter-Seeding Field Trials, Lake County, MT**
**Flood/Sub-Irrigated Meadow Sites**

In addition to the sprinkler-irrigated legume inter-seeding trials, another trial was conducted on a flood and sub-irrigated wet meadow site in Lake County.

Legumes were inter-seeded via broadcasting and drill seeding into a wet meadow site that was dominated by the aggressive and sod-forming grass garrison creeping foxtail. Creeping foxtail and other sod-forming grasses (including quackgrass, smooth brome, and kentucky bluegrass among others) can be difficult to seed into because the competitive grasses prevent germination of new species. This trial attempted to determine if inter-seeding may be a viable option if prior control methods are taken.

This field study was conducted in the spring of 2016 in Lake County. Results and monitoring are on-going, but initial results are promising!

Legumes tested include red clover, alsike clover, ladino tall white clover, birdsfoot trefoil, and hairy vetch. Tall wheatgrass, a beneficial grass for grazing and habitat was also seeded along with the legumes. For this study all of these species were seeded together as a mix. The species selected for this trial are generally noted as being somewhat ‘aggressive’ which will hopefully give them better odds of establishing under difficult conditions.

Field trial plots were set up as 1.) broadcasted plots and 2.) no-till drilled plots. All plots were seeded in March and April, 2016.

Prior to seeding, multiple disturbance methods were completed on the test sites. Sites were burned and/or disked at varying intensities or left undisturbed. Disturbance can improve the ability of new seeds to establish.

Following disturbance the sites were seeded either via broadcasting or with a no-till drill. The broadcast plots were seeded heavier, at twice the drilled rate; typically germination rates with broadcasting are lower than if seed is drilled so seeding rates are increased if seeded by broadcast methods.

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**Case Study:**

**Legume Inter-Seeding Field Trials, Lake County, MT**

**Flood/Sub-Irrigated Meadow Sites**

**Preliminary Results**

**AVERAGE NUMBER OF PLANTS PER FT²:**

- Burn + Broadcast
- No Treatment + Drill
- 2X Disk + Drill
- 1X Disk + Broadcast
- 2X Disk + Broadcast
- Firebreak + Drill

**INTERSEEDING FOR WILDLIFE HABITAT PLANTS PER FT²:**

- Trefoil
- Ladino C
- Alsike C
- Red C
- Vetch

Initial results are promising! Based on the first-year plant density counts, it appears that in general increased disturbance and/or no-till drilling are generally more effective at establishing the legumes.

Although still very preliminary, all legume species have been able to establish in these trials. The clovers were the most successful at establishing in the first year, but these results may change over time.

As a whole, this study is promising and appears to indicate that legumes can be successfully established into existing competitive vegetation using relatively simple and inexpensive methods. Continued monitoring and evaluation are on-going.

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Case Study:

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Notes:

Support for these studies was provided in part by:

GLCI

Montana Department of Agriculture

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