Evaluating Establishment and Forage Production of Various Cover Crops in a Dryland Setting

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Introduction
Cover crops have made their way into many farmers’ crop rotations. They provide soil cover between cash crop plantings, and seed mixes can be formulated to address potential soil health concerns. Cover crops are widely used in irrigated systems, and as such the benefits they provide continue to be shown; however, it remains unclear how cover crops fit into a dryland system where moisture can be a primary limiting factor.

Objectives
Our objectives were to evaluate the establishment and forage production of four cover crop seed mixes in a dryland setting in north-central Wyoming.

Materials and Methods
We drill-seeded four cover crop seed mixes (Table 1) in spring 2017 across three replicated blocks at the Sheridan Research and Extension Center (ShREC) property east of Sheridan near Wyarno, Wyoming. Seed mixes one and two (primarily cool-season plants) were planted on May 15, and seed mixes three and four (primarily warm-season) were planted on May 26. Plot sizes measured 60 × 300 feet. On July 3, we visually estimated canopy cover in each plot within multiple 0.25m² (2.7ft²) quadrats (Fig. 1). All emerging plants that were not part of the seed mix were considered other species, and the seeded cover crops were considered forage species.

We collected biomass on July 19, 2017, from five frames in each plot. Biomass samples were clipped, dried, and weighed, and the data from the five frames within each plot were combined. On July 24, we terminated cover crop growth when half of each plot was mowed, while the other half was grazed by a flock of 30 sheep. We analyzed all data using a one-way analysis of variance.

Results and Discussion
Overall establishment was consistent across species mixes, with adequate stands of each mix establishing early in the season. Mid-summer forage production varied among seed mixes (Table 1; \(p=0.018\)). Non-forage biomass (largely composed of annual weeds) was statistically consistent across treatments (Table 1), although the less diverse warm-season mix provided the lowest forage production in conjunction with a relatively high weed population. Although we did not quantify regrowth following grazing or mowing, we observed noticeable regrowth in the warm-season mixes, suggesting a later termination date may have been more appropriate for such crops. Turnips and radishes were severely impacted by flea beetle herbivory. This pilot project indicates that diverse cover crop mixes can be grown under dryland conditions in north-central and northeast Wyoming, but there is much more to learn about the benefits and challenges of incorporating them into management programs. Additional research is planned to further investigate the use of cover crops in our region.

Acknowledgments
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### Table 1. Biomass of seeded forage and non-forage plants collected July 19, 2017, from four cover crop mixes grown on dryland at ShREC’s Wyarno facility east of Sheridan.

<table>
<thead>
<tr>
<th>Species mix*</th>
<th>Forage biomass (lb/ac)**</th>
<th>Other biomass (lb/ac)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 forage barley, forage pea</td>
<td>468 (81)</td>
<td>30 (13)</td>
</tr>
<tr>
<td>2 oats, forage pea, deep-root radish, bulb turnip</td>
<td>451 (79)</td>
<td>56 (30)</td>
</tr>
<tr>
<td>3 sorghum × Sudangrass, leaf turnip, sainfoin</td>
<td>92 (49)</td>
<td>93 (27)</td>
</tr>
<tr>
<td>4 millet, sunn hemp, phacelia, buckwheat, teff</td>
<td>112 (25)</td>
<td>66 (21)</td>
</tr>
</tbody>
</table>

*Seed mixes 1 and 2 are primarily cool-season plants; mixes 3 and 4 are primarily warm-season plants.

**The first number is the mean; the second number (in parentheses) is the standard error.