Forage Crop as Fallow Replacement in Dryland Winter Wheat near Hardin

Evan Van Order, NRCS Soil Conservationist, Hardin MT

County: Big Horn
Average annual precip: 11-12"
MLRA: 58A, Northern Rolling Plains
Dominant Soil Type: Colby Silty Clay Loam, 4-8% slope
Acres: 100
Planting Date: June 3, 2016
Seeding Rate: 798,880 seeds/acre, or 25.7 lb/acre
Seed cost: $26.71/acre (inoculant, seed, and delivery)
Seeding Method: John Deer No-till Grain drill, Double Disk
Row Spacing: 10"
Tillage: No-till
Previous Crop and Year: 2015, Winter Wheat
Herbicides: Pre: Glyphosate
Post: N/A
Insecticides/Fungicides: N/A
Fertilizer: N/A
Irrigation: N/A
Termination Date and Method: Swathed and baled in fall
Next Crop: Winter Wheat

Monthly Precipitation at Hardin, MT

<table>
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<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 yr avg 1981-2010</td>
<td>0.46</td>
<td>0.43</td>
<td>0.75</td>
<td>1.33</td>
<td>2.06</td>
<td>1.76</td>
<td>1.22</td>
<td>0.70</td>
<td>1.20</td>
<td>1.08</td>
<td>0.54</td>
<td>0.43</td>
<td>11.97</td>
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<tr>
<td>2014</td>
<td>0.47</td>
<td>1.28</td>
<td>1.23</td>
<td>0.68</td>
<td>2.65</td>
<td>1.97</td>
<td>0.24</td>
<td>2.46</td>
<td>1.09</td>
<td>0.40</td>
<td>0.66</td>
<td>0.54</td>
<td>11.7</td>
</tr>
<tr>
<td>2015</td>
<td>0.97</td>
<td>0.16</td>
<td>0.08</td>
<td>1.30</td>
<td>2.94</td>
<td>3.22</td>
<td>1.04</td>
<td>0.81</td>
<td>0.56</td>
<td>1.03</td>
<td>0.39</td>
<td>0.37</td>
<td>12.87</td>
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<tr>
<td>2016</td>
<td>0.40</td>
<td>0.16</td>
<td>1.37</td>
<td>2.71</td>
<td>2.36</td>
<td>0.17</td>
<td>0.71</td>
<td>1.94</td>
<td>3.29</td>
<td>4.14</td>
<td>0.27</td>
<td>1.16</td>
<td>18.68</td>
</tr>
</tbody>
</table>

Fig. 2. Monthly precipitation at Hardin, MT. Western Regional Climate Center, station #243915.

Introduction:

Two different multi-species forage mixes were planted as an alternative to fallow on a dryland winter wheat field near Hardin, MT. The field itself is 211.7 acres. The mixes were planted on June 3 on about 100 of those acres, with the remaining acres left in fallow for comparison. Forage Mix #1 was based on millet and Forage Mix #2 was based on sorghum-sudangrass. Both forage crops were swathed and baled in the fall, prior to winter wheat seeding in November.

Results:

Due to spring rains the soil moisture profile was full at the time of planting, the forage crops established and grew well. June was unseasonably hot and dry, stressing the cool season species in the planting. Warm season species in the mix continued good growth through the high temp/low moisture conditions. Mix #2 contained sorghum/sudangrass at 60% of the total seed mix. The Sorghum-sudan grew very well, however there was a noticeable lack of vigor in the other species seeded in this mix suggesting that the allelopathic effect of sorghum/sudangrass can reduce species diversity in the mix. In contrast, Forage Mix #1 contained millet species with no sorghum-sudangrass and contained much more plant species diversity in the final forage.
On Sept. 19th, 2016 sampling was conducted on 2 clipping sites per cover crop mix that were randomly selected across each cover crop stand, all sites were on Silty Clay Loam soils. There were 108 growing days from the time of planting to the time of clipping. There were 3525 Growing Degree Days (base 40) from the time of seeding to the time of sampling. Plants were separated by species in the field and air-dried at the Hardin Field Office. Total aboveground biomass after air-drying was Mix #1: 3583 lb/acre, or 1.79 ton/acre, Mix #2: 3754 lb/acre, or 1.9 ton/acre. Assuming 910 lbs of forage per animal month, and 50% utilization rate on 100 acres, there were 98.4 AUMs for Mix #1 and 103.1 AUMs for Mix #2 for a total of 201.5 AUMs available in this field.

**Summary and Discussion:**
Overall, this cover crop grew well with good biomass accumulation. The stand was healthy with very little weed pressure. Notice that 2016 was a wet year, with 64% more precipitation than the 30 year average. This certainly made a difference in the success of this dryland biomass production and should help offset any possible soil moisture loss when compared with fallow. In a normal precipitation year, production would not have been as vigorous, and soil moisture depletion could affect the subsequent wheat crop. Planting this mix a little earlier in the year (last week of May) might have given the cool season species a better opportunity to produce more biomass. Spring rains and a lack of available labor prevented an earlier planting in this instance. The producer was very pleased with the forage production, as he was able to produce forage on land that otherwise would have been fallow.

<table>
<thead>
<tr>
<th>Cover Crop</th>
<th>Mix #1 Percent of Total Seed</th>
<th>Mix #1 Plant Biomass %</th>
<th>Mix #2 Percent of Total Seed</th>
<th>Mix #2 Plant Biomass %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legumes</td>
<td>6</td>
<td>3</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>Brassicas</td>
<td>16</td>
<td>10</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Warm season grasses</td>
<td>75</td>
<td>66</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>Broadleaves</td>
<td>2</td>
<td>21</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

*Fig. 5. Comparison of planned seed mix percentage vs actual aboveground biomass percentage*