Managing alfalfa and grass for yield and quality

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Alfalfa vs. alfalfa-grass in cold-weather climates

- Alfalfa-grass is preferred to straight alfalfa in some cold-weather climates because of improved winter survival.

- About 85% of the alfalfa seeded in NY is planted with a grass companion crop.

- The grass helps catch and hold snow, protecting alfalfa crowns from cold weather damage.

- Grass also helps reduce frost-heaving damage, which can sever alfalfa tap roots, killing the plant.
More reasons to consider alfalfa-grass
Potato leafhopper, *E. fabae*
Potato leafhoppers do less damage in alfalfa-grass fields than in straight alfalfa.

Cornell University found less leafhopper damage in seeding year alfalfa-grass than with straight alfalfa.

In another trial, 67% of the leafhoppers emigrated from alfalfa-grass plots vs. 50% emigration from alfalfa plots.
Alfalfa weevil

- Impact of alfalfa-grass on weevil damage isn’t as clear as with leafhoppers.

- One California trial found 4-5 larvae/sweep in alfalfa-grass vs. 18 in alfalfa.

- Another CA trial with 3-acre plots found less weevil damage in alfalfa-grass vs. alfalfa.
Yields during the seeding year are often higher with alfalfa-grass than with alfalfa. If the alfalfa is killed by insects, disease or field traffic, the grass in the stand provides some yield security. As alfalfa plant population declines, grass becomes a higher percentage of the stand. Dairy manure or nitrogen fertilizer can significantly increase yields in the last year or two of stand life. Nitrogen does not decrease alfalfa yield!
5th year alfalfa-orchardgrass 1 week after 4th cut. Seeding rate: 14 lbs alfalfa + 1 lb orchardgrass
The grass in alfalfa-grass stands can be an advantage because it has less NFC (nonfibrous carbohydrate).

Grass has higher NDF-d, but alfalfa has a faster rate of NDF-d during the first 24 hours. This may limit the use of high rates of primarily grass forages, especially in high-producing herds.

Alfalfa-grass can be a good fit for high corn silage diets.
Alfalfa-grass: RFV can be misleading

Higher Digestible Fiber in Grasses

RFV or RFQ Value

Percent Legume in Mixture

Wisconsin, 2012
## Rations: Alfalfa vs. alfalfa + grass

<table>
<thead>
<tr>
<th>Feed</th>
<th>Alfalfa /Corn silage</th>
<th>Alfalfa/Corn silage/Tall fescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn silage</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Alfalfa silage</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Tall fescue silage</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>High moisture corn</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Protein/minerals</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>
Milk production and dry matter intake

Wisconsin, 2012
Alfalfa-tall fescue
Forage legumes have tap roots that reach deep into the soil while grasses have dense, relatively shallow root systems.

Grasses are much more efficient in nutrient uptake. This can be a plus or a minus.

Uptake efficiency of N and other water-soluble fertilizers by grasses is very high.

Grasses will thrive and accumulate ~2.5% K at soil K levels that are low enough to starve alfalfa to death. This can be a problem in producing grasses for dry cows—and in growing alfalfa-grass.
Leased field with “renter’s disease”, seeded to alfalfa-reed canarygrass after several years of corn silage. The alfalfa died but the canarygrass did just fine.

2008 Cornell University soil test K = zero lbs/A! Confirmed to be close to zero by a second soil sample.

Third cut grass, harvested a week before the soil sample was taken: Grass K = 2.65%, which is normal.

Where did the grass find the potassium?
Don’t seed grass with alfalfa if soil test K is low or medium-low.

The alfalfa may begin to grow well... but only until the grass root system becomes well established.

Then the alfalfa will start to disappear, even with the recommended K fertilizer application rates.

Build fertility (with manure if possible) **before** seeding alfalfa-grass.
Alfalfa stores carbohydrates in its taproot, *regrows from crown buds*.

Grass stores carbohydrates in the bottom 3-4” of the above-ground portion of the plant, *regrows from the cut stems*.

Harvesting at 2” or less stubble height has no effect on alfalfa nutrient reserves, but a big effect on grass nutrient reserves.

Alfalfa-grass—harvest at 3-4” stubble height.
Why Miner Institute changed grass species: Grass NDF harvested at the boot stage

<table>
<thead>
<tr>
<th>Grass Species</th>
<th>Boot Stage</th>
<th>NDF, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bastion ryegrass</td>
<td>May 15</td>
<td>50 🎉</td>
</tr>
<tr>
<td>Select tall fescue</td>
<td>May 16</td>
<td>59 🎉</td>
</tr>
<tr>
<td>Bravo bromegrass</td>
<td>May 16</td>
<td>64 🎉</td>
</tr>
<tr>
<td>Intensiv orchardgrass</td>
<td>May 18</td>
<td>60 🎉</td>
</tr>
<tr>
<td>Sunset timothy</td>
<td>May 20</td>
<td>63 🎉</td>
</tr>
<tr>
<td>Palaton reed canary</td>
<td>May 21</td>
<td>68 😞</td>
</tr>
</tbody>
</table>
## First cut alfalfa-reed canarygrass in established alfalfa-grass

<table>
<thead>
<tr>
<th></th>
<th>Alfalfa</th>
<th>Reed canarygrass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter, %</td>
<td>21.9</td>
<td>20.8</td>
</tr>
<tr>
<td>ADF, %</td>
<td>31.5</td>
<td>36.0</td>
</tr>
<tr>
<td>NDF, %</td>
<td>41.0</td>
<td>61.0</td>
</tr>
<tr>
<td>30-hr NDF digestibility, %</td>
<td>47.0</td>
<td>66.0</td>
</tr>
</tbody>
</table>

*Miner Institute, 2005*
Getting serious about sulfur
Sulfate Ion Wet Deposition 1985-2008

Sulfate as $SO_4^2$ (kg/ha)

- $\leq 3$
- 3 - 6
- 6 - 9
- 9 - 12
- 12 - 15
- 15 - 18
- 18 - 21
- 21 - 24
- 24 - 27
- $> 27$
# Sulfur fertilization of alfalfa

<table>
<thead>
<tr>
<th>Year</th>
<th>Condition</th>
<th>With 24 lbs. Sulfur</th>
<th>No Sulfur</th>
<th>Yield Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>normal</td>
<td>2.4</td>
<td>2.5</td>
<td>0.1 (0.4%)</td>
</tr>
<tr>
<td></td>
<td>chlorotic</td>
<td>1.9</td>
<td>3.2</td>
<td>1.3 (68%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>normal</td>
<td>5.4</td>
<td>5.2</td>
<td>(0.2) 0%</td>
</tr>
<tr>
<td></td>
<td>chlorotic</td>
<td>3.2</td>
<td>4.9</td>
<td>1.7 (53%)</td>
</tr>
</tbody>
</table>

2010: 2nd & 3rd cuttings. 2011: 1st, 2nd & 3rd cuttings. Tissue S in chlorotic alfalfa = 0.16%. Normal is at least 0.25%.

University of Wisconsin, 2012
**Sulfur economics**

- **Calcium sulfate** is the least expensive source of sulfur:
  Recent price: $0.60 per lb of S.

- If you also need potassium, the sulfur in potassium sulfate winds up costing $0.55 per lb of S.

- Ammonium sulfate is a good source of both N and S but not for alfalfa—the S would cost about $1.00 per lb since alfalfa doesn’t need supplemental N.

- $24\ lbs\ S \times 0.60 = $14.40$, or about 0.1 ton of alfalfa.
All the considerations for selecting a grass species/variety plus matching the heading dates of the grass and alfalfa.

Select the grass species, then choose one of the latest-maturing varieties within that species.