THE STATE OF THE ALFALFA ADDRESS

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Introduction

Alfalfa has been a primary forage crop on Wisconsin dairy farms for many years. As we enter 2013 it is readily apparent that today’s alfalfa varieties are much different than those planted 15-20 years ago. Further, alfalfa is managed more intensively from a cutting frequency standpoint in an attempt to harvest forage of higher quality. In 2012 Wisconsin alfalfa was subject to a multitude of stresses, the consequences of which have yet to be seen. As we enter 2013 it seems appropriate to take inventory of the current state of alfalfa, looking both at factors that have been changing over the past 20 years and those that have impacted the crop and its management recently.

Long-term Trends and Impacts

Changes that occur over many years often are not often noticed because they occur in small increments. Several of the changes that have impacted alfalfa in the past 20 years fall into this category, while others have been readily apparent. Here are seven significant trends and conditions that have shaped the current status of alfalfa:

1. Consolidation of alfalfa breeding programs
2. Characteristics of alfalfa varieties
3. Alfalfa yield enhancement
4. Increase in alfalfa persistence and winter survival
5. Increase in harvested forage quality
6. Changes in soil fertility status
7. Introduction of transgenic traits

Consolidation of alfalfa breeding programs:

In October 2012 Dow AgroSciences LLC acquired Cal/West Seeds. The company had previously purchased Wisconsin-based Dairyland Seeds in 2008. The merging of these two previously independent entities continues a long-term consolidation trend and now means that effectively all dormant alfalfa varieties will come from one of three breeding programs—Dairyland-Cal/West, DuPont Pioneer, or Forage Genetics International.

Characteristics of alfalfa varieties:

Alfalfa varieties today “look” very different than those of the 1990s. Table 1 compares the fall dormancy (FD) ratings of alfalfa varieties tested in the University of Wisconsin performance

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trials in 1995 and 2012. In 1995 over 60% of the varieties were FD 2 or 3. Today, over 80% are FD 4 or 5. In the past 20 years we have also seen a large proliferation of alfalfa varieties with specialized traits. Included are traits for higher forage quality, standability, potato leafhopper resistance, defined soil conditions (wet, salt, etc.), and glyphosate resistance. Hybrid alfalfas have also been made available.

Table 1. Fall dormancy ratings of alfalfa varieties tested in the UW performance trials – 1995 vs. 2012

<table>
<thead>
<tr>
<th>FD Rating</th>
<th>1995</th>
<th>2012</th>
<th>% of total</th>
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<tbody>
<tr>
<td>2</td>
<td>19</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td># varieties</td>
<td>103</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

Alfalfa yield enhancement:
Gains in alfalfa yield were shown to be on a small decline from 1978 through the mid-1990’s (Wiersma et al., 1997). Although varieties showed improvements in disease resistance, it came at the expense of winter survival and persistence under more intensive cutting systems. In the past 20 years, alfalfa yields have been on a slow, but steady increase. Since 1989, mean alfalfa yield of varieties entered in the UW performance trials at the Arlington site have increased by an average of 0.1 tons/acre/year for 1st and 2nd production year stands (Figure 1). Mean trial yields now are routinely near 7 tons/acre. Individual varieties have recently yielded over 10 tons/acre.

Persistence and winter survival:
The extreme alfalfa winterkill years of the early 1990’s in the upper Midwest shifted the focus of alfalfa breeding programs. Cultivar selections started to be made under intense cutting regimes, while still putting an emphasis on yield potential. This has resulted in the breaking of the long-standing fall dormancy x winter survival/persistence relationship (Table 2). Fall dormancy 4 and 5 varieties with fast regrowth and yield potential now also possess exceptional winter survival and persistence characteristics.
Forage quality:

Alfalfa producers are now harvesting much higher quality forage than was the case 20 years ago. Many factors have contributed to this change, but alfalfa scissors-cut programs, pressure from nutrition consultants, and improved varieties have been major factors. Data from the Wisconsin Agricultural Statistics Service clearly shows that the state’s alfalfa growers are harvesting 1st-cut hay much earlier in recent years compared to before the mid-1990s (Figure 2). The average percent of hay harvested by June 1st in Wisconsin has been 8, 14, and 21 for the years 1980-89, 1990-99, and 2000-10, respectively.

Changes in soil fertility status:

Two well-documented trends in soil fertility have taken place in the past ten years; both have consequences to alfalfa production. First, the state’s soils have seen an overall decline in potassium (K) fertility. Visual deficiency symptoms are becoming more commonplace. The increase in corn silage acres and a corresponding increase in fertilizer price are likely major contributing factors to declining soil K levels.

A second trend has been a long-term decline in available soil sulfur (S) caused by a reduction in the amount of atmospheric S deposition. Like K, both plant tissue tests and visual field observations help to confirm the increase in deficient situations. Where K and/or S are limiting, alfalfa production can be significantly impacted.
Transgenics:
For alfalfa, the road to transgenic traits has lagged behind other grain and oilseed crops, but the availability of glyphosate resistant alfalfa varieties has now made it possible for future traits to be offered. Currently, plant breeders are developing cultivars with low lignin, drought tolerance, enhanced yield genes, pest resistance (both insect and disease), and improved animal protein utilization.

Table 2. Comparison of fall dormancy, winter survival (1=best), and persistence (10=best) between typical 1990s and current alfalfa varieties

<table>
<thead>
<tr>
<th></th>
<th>Winter Survival Score (1-6)</th>
<th>3rd-Yr. Persistence Index (10-1)</th>
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<tbody>
<tr>
<td><strong>Typical &quot;1990s&quot; alfalfa varieties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low FD = best winter survival, low yield, poor under intensive cutting management</td>
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<tr>
<td>High FD = faster regrowth, higher initial yield, poor winter survival/persistence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FD2</td>
<td>2.6</td>
<td>3.2</td>
</tr>
<tr>
<td>FD4</td>
<td>4.7</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>New generation alfalfa (means of several varieties)</strong></td>
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<td></td>
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<tr>
<td>No relationship of FD to winter survival</td>
<td></td>
<td></td>
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<tr>
<td>High yielding and persistent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FD4</td>
<td>1.7</td>
<td>7.9</td>
</tr>
<tr>
<td>FD5</td>
<td>1.6</td>
<td>7.9</td>
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Data provided by M. McCaslin, Forage Genetics Int.

Figure 2. Percent of 1st-crop hay harvested by June 1 in Wisconsin, 1980-2012 (NASS)
Current Short-term Factors

In addition to long-term impacts and trends, there are also some significant short-term factors having immediate consequence to Wisconsin alfalfa production. These include:

1. Stresses induced by the 2012 growing season
   a. Drought
   b. Short or more frequent cutting intervals
   c. Insects
2. Seed supplies
3. Hay price
4. Fungicides
5. Forage inventory

Stresses--drought:
   The degree of drought during the 2012 growing season ranged from severe to non-existent, but most areas experienced some degree of moisture deficit. Though drought has a significant impact on productivity, it is mostly a temporary condition and one that is overcome when normal moisture conditions return. For some areas this has already occurred and for the rest it is reasonable to assume that 2013 won’t be a continuation of 2012; or at least that is the hope.

Stresses--frequent cutting:
   Perhaps of greater consequence than drought alone were the multiple factors in 2012 that contributed to more frequent cutting of alfalfa stands. These factors included: drought (fewer days to flower), an early spring (longer growing season), and an above average number of growing degree days (fewer days to flower). The long, warm, and dry growing season resulted in some alfalfa stands being harvest as many as 5 or 6 times.

Stresses--insect pressure:
   Though insect pressure on alfalfa is a problem in many years, coupled with drought-stress it can be especially detrimental. Variegated cutworms reached rock star status about the time 1st-cutting was ready to be made and many stands needed to be treated with insecticide. Reports of alfalfa weevils also were above average in 2012. Potato leafhoppers reached economic threshold levels in many fields and damage was significant where control measures weren’t implemented.

Stresses--combined:
   There’s an old saying along the lines of “you can cut an alfalfa field ten times in one year or one time per year for ten years.” The numbers are arguable, but the underlying principle is sound ---multiple stresses shorten stand life. The good news is that this is less true today than it was 20 years ago because of improved genetics.

   Under moisture stress, alfalfa begins flowering in fewer days than normal. This doesn't necessarily need to, but often does prompt a more frequent cutting regime. Add into the mix
potato leafhopper pressure that goes uncontrolled, yet an additional late-fall cutting to fill forage voids, and soon the situation develops into an all-out stress-fest. It's these fields that will demand the most attention and evaluation in 2013. Conversely, fields that experienced only moderate or short-term drought conditions, were allowed longer cutting intervals, had low or controlled insect pressure, or were not cut in the fall should bounce back to full production in 2013 given favorable winter and spring weather.

**Seed situation:**

Alfalfa seed availability looks to be adequate in 2013. Of course the best varieties will be in the shortest supply. Growers should also be cognizant that more and more seed is being sold with a seed coating that can comprise up to one-third of the seed bag weight.

**Alfalfa hay price:**

Since 2003, the US marketing year hay price has only had one year-to-year decrease (Figure 3). Current 2012-13 hay prices are at an all-time high with upper Midwest hay auction prices in the $250-$350 per ton range for premium quality.

**Fungicides:**

Alfalfa is last frontier for exploring the use of fungicides as a routine management practice. In the past couple of years many on-farm and research station plot trials have been initiated to quantify the economic consequences of fungicide use. To date, results have been variable. One thing that has been reinforced from these trials is the positive economic benefit of insecticide applications to control potato leafhoppers; many of the fungicide trials included insecticide treatments mixed with the fungicide or applied alone.

**Forage inventory:**

Although most farms will have enough forage to get them through the spring, typical carryover supplies will be depleted in drought areas. Alfalfa feed reserves will likely need to be replenished in 2013. This might mean seeding down more alfalfa acres than normal, especially if production in multi-stressed fields is reduced. Perhaps there are opportunities to lease established stands of alfalfa from neighboring operations or to produce alternative feeds. Planning now, using reasonable 2013 yield expectations and evaluating stands early and often in spring will help to avoid a crisis mode later in 2013.
Conclusion

Even with some short-term concerns following a stressful 2012 growing season, there is a bright future for alfalfa in Wisconsin. Some of the long-term improvements made to alfalfa in the past 20 years will help the crop withstand many of the stresses encountered in 2012. Even so, a high level management will still be needed to achieve the potential yields possible with current and future alfalfa varieties.