Improving Alfalfa Forage Performance, or "Why Not Just Use Vernal?"

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I am pleased to report that the forage variety test program is growing! Support for this endeavor has come from increased industry entries, Project GREEEN, MDARD, and the Rood Trust. In addition to the conventional alfalfa test, we have added tests for Roundup Ready alfalfa in East Lansing, Lake City, and Chatham, and the first yield data is being collected this year. We have expanded the grass variety test to begin a new test every year instead of every four years, with new tests planted this year at all three locations. We are also conducting an annual grass test this year in East Lansing. With all this activity, we expect to have lots of new data to show you in the near future.

So what about that Vernal? Since arriving at MSU, I have repeatedly heard the comment that the old standby Vernal alfalfa outlasts and outperforms modern varieties. I have heard this often enough that I began to wonder what is behind it. Obviously producers would not think this without some reason. Now, bear in mind that Vernal was released in 1953 and is used as the check variety in public alfalfa tests because it has been around forever. Long ago it really was the variety to beat. Today it is very unusual for Vernal to rank anywhere except at the bottom of a public test conducted in any state, but we keep using it as a check because it allows us to compare relative yields across all years and environments in the time span since its release. Vernal is a fall dormancy 2 alfalfa with excellent winter survival. It has a very weak package of pest resistance traits compared to most modern varieties. Of the eight pests currently rated for resistance by the National Alfalfa and Forage Alliance, Vernal is resistant to only two: bacterial wilt and fusarium wilt. It is susceptible to phytopthera root rot, anthracnose, verticillium wilt, aphanomyces race 1, and stem nematode, all of which occur in Michigan. Its low fall dormancy number helps boost winter survival, but also indicates that it is slow to break dormancy in the spring, slow to regrow after harvest, and quick to go dormant in the fall. This combination of traits explains why it does not yield as well as modern varieties in tests under intensive cutting management with harvest in the bud stage.

Our test data in Michigan do not support the idea that Vernal is a superior alfalfa variety. The two figures below show the results of 16 years of variety testing in Michigan, averaged over three full production years (seeding year is not included). Figure 1 indicates the mean of all entries in each test and Figure 2 indicates the best entry in each test, all expressed as a percentage of the corresponding Vernal yield. The dark horizontal line at 100% is the Vernal reference line. Values greater than 100% yielded more than Vernal and values less than 100% yielded less than Vernal. Vernal never won a single test during this period in Michigan (Fig. 2), although it did yield better than the average in 2 out of 14 tests in Lake City and 1 out of 6 tests in Chatham (Fig. 1). In all other cases, it ranked near the bottom. It is noteworthy that the relative advantage of new varieties over Vernal has tended to increase over time at East Lansing and Lake City, with the exception of the 2010 test which was probably unduly impacted by the 2012 drought. This shows that, as expected, new varieties improve over time. The relative advantage of new varieties over Vernal tends to decrease as the tests move farther north, but it is difficult to tell if this is simply because we get fewer entries in the northern tests and therefore don't have as much data to evaluate the best varieties.

Figure 1. Mean 3-year DMY relative to Vernal in Michigan alfalfa tests.

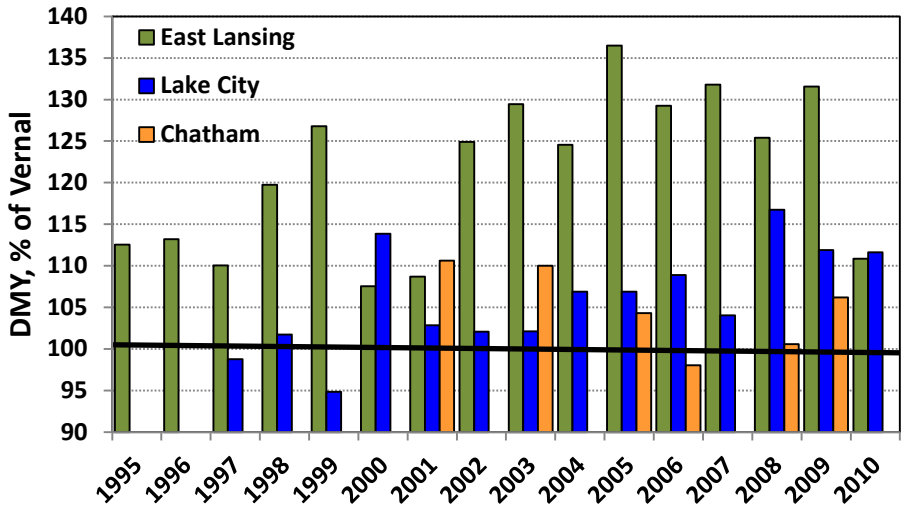
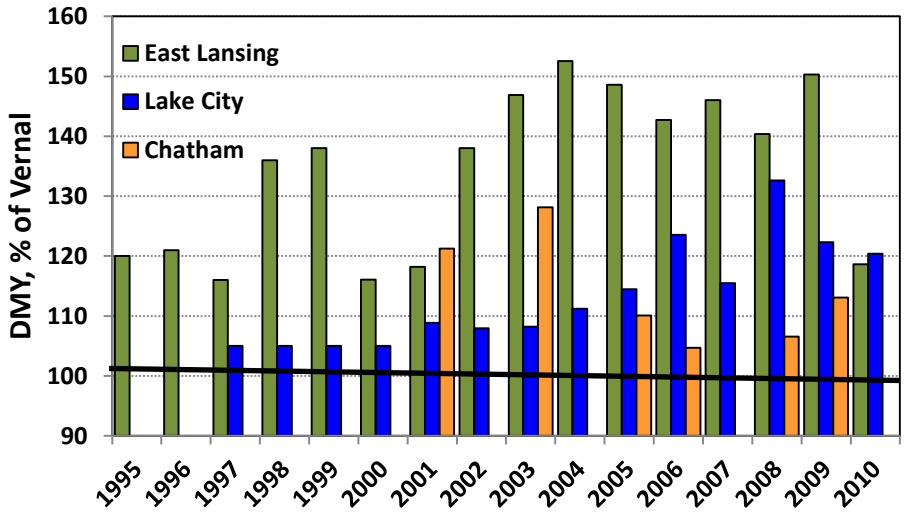


Figure 2. Best 3-year DMY relative to Vernal in Michigan alfalfa tests.



My second and possibly more important point regarding Vernal is the question of whether new seed is really Vernal at all. *What?!?* This was brought home to us when we tried to obtain some Certified Vernal seed for use in the variety tests in 2012.

We were not able to locate a single commercial source of Certified Vernal seed.

Why is this so important? The key is to understand how seed is produced by the alfalfa plant. Alfalfa is cross-pollinated by bees and this means that each seed has potential to be different

from the parent plant. Certified seed is carefully produced from fields of known parentage using methods designed to prevent drift of plant characteristics away from the original variety traits. As a public variety, Vernal seed can legally be produced by anyone, but after 61 years on the market and potentially up to 61 seed selection cycles in a multitude of different environments, it is quite likely that the genetics of uncertified seed have shifted. Furthermore, different sources of Vernal seed have almost certainly shifted in different directions. Unfortunately, this makes buying uncertified Vernal seed rather like gambling. Are you getting a descendant of Vernal that is similar to the original, better, ... or worse? If you are lucky and get one well-adapted to your growing conditions and harvest system, then you are probably one of the people asking me why I don't recommend growing more Vernal. If not, then you won't be so happy.

When planting alfalfa, consider that seeding 16 lb/acre of a Certified top-yielding conventional variety costing approximately $4.80/lb only incurs an extra $23/acre for purchase of seed compared to planting uncertified Vernal at $3.40/lb of seed. Based on the Michigan test data, over three production years, that extra $23 in seed cost is worth up to 1.8 tons of extra alfalfa hay in Lake City and Chatham, and a whopping 6.4 tons of extra alfalfa hay in East Lansing. At a hay value of $200/ton, that returns $15 to $56 for each extra dollar invested in seed. Of course, your numbers will differ from this example, but it should serve as an illustration that being too focused on cheap seed may be a case of "penny wise, pound foolish."

Many producers have commented that the advantage of Vernal is persistence, and then they ask why modern alfalfa varieties don't persist like they used to. This is because modern alfalfa varieties are designed for a three year productive stand life. The potential for fast regrowth means less energy is put into roots and long-term survival, and intensive cutting schedules eventually deplete the plant. As a result, these varieties simply do not live as long. Most alfalfa breeders are not focusing on long term persistence traits because research indicates alfalfa production falls below the economic threshold of an intensive cutting schedule after the third production year. At that point, it is more economical for most farmers to rotate out of alfalfa and use the nitrogen credits towards another crop.

Because Vernal holds back some production potential to protect its survival resources, it is quite possible that Vernal stands might last longer than three years, especially if there is not much pest pressure and a conservative harvest schedule is used. The question then becomes, is that still a profitable yield? If you have paid careful attention to your costs of production, in some cases using a lower-yielding but longer-lived variety like Vernal may indeed be satisfactory if you can keep the stand producing at a profitable level for more than three years and do not need the land for a more valuable rotation. However, in most production situations where alfalfa is desirable, spending the money for a better variety and rotating stands more frequently will give better return on your land investment.

For more information:
The 2013 Michigan Forage Variety Test Report is online at
http://fis.msue.msu.edu/extension/MSU_Variety_Test_Reports/2013-Forage-Variety-Test-REPORT.pdf.