ADVANCED AG SYSTEMS'S

Crop Soil News

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"It is the crops that feed the cows that make the milk which creates the money."

Advanced Ag Systems
Research, Education, Consulting

Sorghum Alternative Management

The past two issues we highlighted some research that failed spectacularly. This issue will focus on research in progress that did work and has tremendous potential for **high quality dairy forage** across much of the northeast and central US and parts of Canada. We got into this project because winter forage acres need to be planted early (2 weeks before wheat for grain) for high yield and soil protection, but this directly reduces the corn season. There is no short-season BMR corn. Short season BMR sorghum has been tested and produces high yields and quality to replace corn silage. My research, documented by Dr. Chase (Professor Emeritus, Dairy Nutrition, Cornell), found that with proper balancing, BMR sorghum sp. can produce the same milk as corn silage. Work at Miner Institute on BMR sorghum-Sudan also documented the same milk production as corn silage but with higher components and greater feed conversion efficiency (Click for Link).

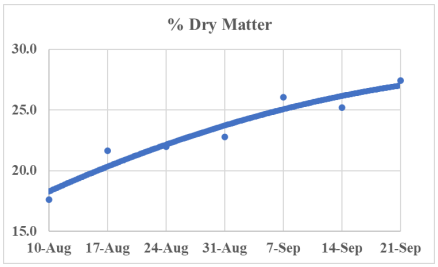
BMR sorghum sp. has numerous benefits compared to corn. Corn seed is increasingly expensive to grow. Sorghum is $100/acre cheaper to grow for just seed cost. Genetic rootworm resistance in corn is failing, and disease controls require expensive fungicides. Sorghum species eliminates corn rootworm for following corn crops, is not susceptible to corn disease, and is deer-proof. For organic farmers corn silage requires multiple cultivations which leave the soil vulnerable to erosion. Cultivation, critical for the crop success, is at the same time that organic haylage needs to be made. Thus, the haylage is often late, severely limiting the profit potential of the organic farm. Optimum sorghum planting is in drilled narrow rows (replicated research found an 18% higher yield compared 30-inch row) quickly canopies to prevent erosion, shade out weeds, and maximize sunlight interception in short seasons. Based on our work, sorghum-Sudan's rapid emergence and dense stands utilizing a stale seedbed is replacing corn silage on organic farms without cultivation to control weeds. Thus, more organic farms are switching to BMR sorghum-Sudan as their energy forage.

31.6 tons/acre @ 35% DM male sterile sorghum stood without lodging

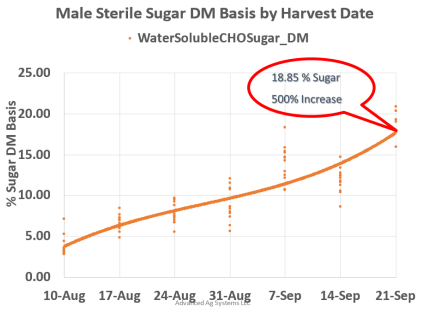
My research and that from Wisconsin, found that a one cut management of sorghum sp. will double yields, little reduction in quality, and cut harvest cost nearly in half when compared to multi cut management. Our work found that most sorghum, even the Brachytic dwarf type, and especially sorghum-Sudan stalks, will lodge as the grain fills – a major limit to farmer adoption. New York research found that of the BMR, the male-sterile without a seed head, either sorghum or sorghum-Sudan, gave some of the highest yields and had the best standability with no maturing seed weight to bring the plant down. In paired comparisons, the male-sterile had higher digestibility than their seeded counterparts. Unfortunately, with no grain we have no indicator for the optimum time to harvest male-sterile types. Sorghum breeders cannot tell farmers the optimum harvest time for a crop without seeds. This

knowledge is critical to determine varietal season length for our farms and for the farmers to harvest at the optimum time to support profitable milk. Additionally, our hypothesis is that photosynthetic energy continues to build in the plant cells past heading, and is not translocated to the seed sink because there is no fertile seed. Thus, in theory, the feed quality and milk producing ability of the forage should continue to increase, the more time we allow for the crop to grow after heading. We expect very little yield increase in this time, just **more milk producing ability in every ton of forage**.

With the help of Brian Chittenden of Dutch Hollow Farm, and support by **Northeast SARE grant** and Richardson's Seed, we established a four-acre field in the Hudson Valley, just south of Albany NY. We went from a colder than normal spring to a warmer than normal summer in May. The planting was in by May 25, earlier than normal but into warm soil with warm weather forecasted. We would like to report an outstanding crop – the reality is that it was the worst crop of sorghum I had grown in 40 years. Extreme dry weather limited initial emergence and prevented most of the herbicide from being activated. An error in tillage left most of the roots in the top two inches of soil. 30% of the stand was foxtail. Brian wanted to put up a sign saying it was not his field! Our variety was a low yielding in-bred type in order to achieve enough weeks post heading before frost. Our yield from the normal parts of the field was about 12 tons of 35% DM silage. We are hoping to rerun this experiment in 2021 with a normal high yielding hybrid that is presently being grown in South America. Fortunately, we had several blocks in the field that emerged normal and had good weed control which allowed realistic sampling. We sampled starting at boot stage on August 10, and continued on a weekly basis until a killing frost on September 21. Whole plants (without weeds) were chopped, inoculated, and fermented for three weeks before being analyzed. When we started harvesting at boot stage, the crop was 17% dry matter (see graph at right). As the weeks went on the dry matter continued to increase until the last harvest (which had a couple of late major rains keep it wet) was at 27% dry matter. Harvesting early means you are hauling more water and have increased potential for leachate from your silo. We used a Chr Hansen SiloSolve MC inoculant. Across all dry matter levels, it **dropped the pH to 3.65 and there was no butyric** in any of the samples. If our theory of waiting after heading to increase the forage quality proved out; it would have the immediate benefit of a high dry matter forage for more efficient harvest and fermentation.

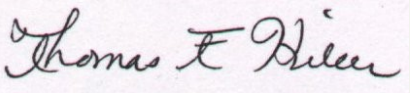


As to our original proposal, we clearly saw an ***increase in digestible components in the forage each week after heading***. This means that instead of sending digestible carbohydrates to a seed head that most likely will not be digested (hard seed); it maintains them in the plant forage cells as a fully available, slow, steady release energy source. An example is the change in sugar which we carefully measured by wet chemistry. From boot stage through the 7th week harvest, it increased 500% to **18.85 % sugar on a dry matter basis post fermentation** (see graph at right). Rumen available sugar is critical to high milk protein levels. Dumping sugar into the ration can cause low rumen pH and subclinical acidosis. The sugar contained in the sorghum is spread out through the plant cells. As rumen fungi break each cell open, there is a steady release of sugar that does not overwhelm the rumen system. This high sugar content also means that the use of an inoculant is critical for rapid silage pH drop, preserving this 100% digestible material.



The February issue will go into forage quality detail and milk producing ability of this research.

Sincerely,



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