Field Studies Aim to Determine Nitrogen Needs of Brachytic Dwarf Brown Midrib Forage Sorghum in Northern NY

By Lisa Fields

Can forage sorghum substitute for some corn silage acres on Northern NY dairies? New to the region, brachytic dwarf brown midrib forage sorghum is a fast growing silage crop known for its drought tolerance.

"Results from Central NY over the past few years looked promising enough to try it here in the North Country," said Dr. Kitty O'Neil, Field Crops and Soils Specialist and leader of Cornell University Cooperative Extension Northern NY Regional Ag Team. "Forage sorghum is grown extensively for dairy feed in the southwestern United States as it's heat and drought tolerant with a lower water requirement than corn. We're examining whether it can fit well here in double-crop rotations with winter rye harvested for silage."

O'Neil participated in the Cornell Nutrient Management Spear Program's (NMSP) study initiated in 2016 entitled 'Nitrogen and Harvest Timing for Brachytic Dwarf Brown Midrib Forage Sorghum in Double Crop Rotations.'

Dr. Quirine Ketterings, leader of the NMSP initiated the study to determine the crop's nitrogen (N) fertility needs and optimal harvest timing for good yields and high quality feed. She explained, "The crop has the potential to produce high yields but we have very limited experience with it in New York. The naturally occurring brown midrib 6 gene makes it a highly digestible energy feed. The brachytic dwarf gene helps prevent it from lodging without losing yield, which can occur in related species with brown midrib genetics. Interest expressed by the crop community and farmers encouraged us to expand our studies to learn about growing it in North Country conditions."

The statewide study was co-funded by the Northern NY Agricultural Development Program (NNYADP), Alta Seeds, Federal Formula Funds, Cornell Cooperative Extension, and the Northeast Sustainable Agriculture Research and Education (NESARE) Program.

In Northern NY, plots were set up on three farms in St Lawrence and Jefferson Counties. At the two St Lawrence sites, the sorghum was planted at a depth of 1 to 1.5" using 8-12 lbs of seed/acre, and a 7.5 inch row spacing. To evaluate the crop's nitrogen (N) needs, five N rates were applied at planting: 0, 50, 100, 150 and 200 pounds per acre of actual N. Nitrogen was broadcast onto the plots in the form of urease inhibitor-treated urea just after planting. Harvest took place when the crop reached Stage 7 (soft dough).

Kitty O'Neil of Cornell Cooperative Extension (left), Peter Barney of Barney Consulting (center), and Sarah Lyons of the NMSP, in a field of brachytic dwarf brown midrib forage sorghum discussing the crop. Picture was taken July 12th.

O'Neil noted, "The seed requires warm soil, about 60 degrees, so in our area it's planted in early to mid June. The trials I worked with were planted on June 2 and 10 and harvested at the end of September. One site did not have manure applied and had no manure history and the other site received about 6-7 thousand

gallons per acre. It was interesting to watch it grow, as it appeared rather uneven in height and after about stage 6 when the seedheads formed, they looked like brown clumps from a distance. When I was in the field checking maturity stage, people were pulling off the road to ask me what the heck the crop was!"

The study showed a crop response to N at the non-manured site where about 160 lbs N per acre was needed to reach optimal yields. There was no yield response to added N at the site where manure had been applied. At both locations, yields were close to 10 tons of dry matter per acre where sufficient N was applied, showing the crop's potential to produce. Crude protein levels were 8.5 and 8.6% but the big difference was that fertilizer N was needed to reach this yield and CP content at the site with no manure history.

"The lack of a crop response to fertilizer N at the manured field is really good news for nutrient management and crop budgets, but additional trials are needed," commented O'Neil.

Weed control was an issue at some of the trials in 2016. O'Neil explained, "The low initial seed cost for forage sorghum is a plus but growers must be mindful of their weed control plans. If a pre-plant incorporated herbicide is used, growers must purchase seed coated with an herbicide safener. For pre-emergent weed control metolachlor, S-metolachlor, acetochlor and atrazine can be used. Currently the crop has a few broadleaf post-emergent herbicide options, but only atrazine for post-emergent grass control."

Weed control can be a concern for those planting in 30 inch rows to allow for harvest with conventional corn choppers, as weeds have full access to sunlight, water and nutrients between the rows. Harvest of forage sorghum planted with a grain drill is accomplished with choppers outfitted with bi-directional or rotating heads. If the soil is warm and seed depth is correct, pre-emergent weed control in drilled stands may be sufficient due to the crop's rapid early growth and dense ground cover.

Sarah Lyons, NMSP graduate student with the sorghum project, described 2017 on-farm research goals. "We are setting up two types of trials this year, including a few N rate studies as we did last year, as well as a direct comparison between short season corn silage and the BMR brachytic dwarf sorghum. Our plan is to repeat the 2016 N rate trials at five locations, including three in Northern NY with our collaborators. We have three sorghum/corn comparison trials planned as well, including 2 in Northern NY and one in Central NY. There have been a lot of questions about how this sorghum variety compares to corn silage, and this trial will allow us to directly compare the crops for both yield and quality."

Lyons added, "We also plan to evaluate if we can harvest the sorghum 2-3 weeks earlier and achieve quality forage while maintaining optimum yields. Earlier harvest would allow for timely planting of a winter cereal in double crop rotations, providing many important benefits such as nutrient uptake in the fall, better establishment, reduced risked of winter kill, and increased ground cover and root biomass. Forage sorghum has the potential to be a good alternative crop option to corn, and through our trials we are hoping to collect enough data to say with confidence that forage sorghum can indeed reach this potential."

O'Neil summarized, "It takes more than one season to evaluate a crop's performance. It's great to have this opportunity for area farmers to see an unfamiliar crop that may have potential here. Working with Quirine, Sarah and the NMSP team to get on-farm research in our region gives us the chance to get scientifically sound crop production information in North Country growing conditions."

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The **Nutrient Management Spear Program** (NMSP) is an applied research, teaching and extension program for field crop fertilizer and manure management on dairy and livestock farms. It is a collaboration among faculty, staff and students in the Department of Animal Science, Cornell Cooperative Extension, and PRO-DAIRY. Our vision is to assess current knowledge, identify research and educational needs, facilitate new research, technology and knowledge transfer, and aid in the on-farm implementation of strategies for field crop nutrient management including timely application of organic and inorganic nutrient sources to improve farm profitability while protecting the environment. An integrated network approach is used to address research, extension and teaching priorities in nutrient management in New York State. For more information on NMSP projects and extension/teaching activities, visit the program website (http://nmsp.cals.cornell.edu) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.