Profitable Forage Systems: Is Double Cropping BMR Sorghum followed by a Winter Grain a Viable Cropping System Alternative in the NE?

Problem Statement: Adequate forage production of high quality is paramount in dairy and livestock production for farm profitability and sustainability. The established king and queen of forages, corn and alfalfa, do not perform competitively on low pH, poorly drained, steep and/or HEL (highly erodible land) rated fields. But these are the characteristics of at least half of the southeastern soils of NYS. Alternative crops that yield well at a reasonable cost of production are needed for expanding options for cropping systems on less than optimal ground.

Weather patterns present a second condition that has a growing impact on productivity and sustainability. We have experienced an increase in variable temperature, rainfall, pest events and violent storms within and across seasons. Wet springs affect crop establishment schedules and stretch already finite windows for timely spring’s work, dry conditions delay germination and stress crop growth to the point of reducing yields or causing crop failure. Over the last two seasons alone we have experienced localized hail storms, extended mid-season dry periods, and hurricane caused flooding and severe crop loss at worst and difficult conditions for harvest at best.

We want to gain experience with a crop that has not traditionally been grown in the Northeast - sorghum. Sorghum appears to be a reasonable substitute for corn silage offering similar yields, at a lower cost and as equally efficient harvest as a single chop system that can substitute for corn silage with nearly the same nutritive value.

The National Sorghum Producers describe sorghum as “among the most efficient crops in conversion of solar energy and use of water” and that it has “inherent tolerance to marginal lands and environmental conditions” – Sorghum 101

“When it comes to feed grains, corn gets all the glory. Point out that grain sorghum is almost equal to corn in nutritive value and that it will out produce corn in dry climates, and in fact, will grow in dry climates where corn won’t, and you are met with silent disbelief. A great many people have never even heard of grain sorghum.” – Gene Logsdon in Small Scale Grain Raising.

Sorghum is a tropical crop that does well in warm, dry soils. The challenge with sorghum will be the unpredictable variability in our growing seasons. If we have an unusually cool season with cool night temperatures it will be challenging for the crop to mature and reach an appropriate dry matter for good ensiling. If we have an unseasonably warm and dry summer it might out perform corn.

Understanding the necessary management to overcome some of these challenges with sorghum is the main interest for getting it out on farms to monitor its performance.

We want to see how well it will fit in a double cropping system with a fall grain harvested for early spring forage. Can this cropping combination provide a cost effective crop with consistent performance, adequate yield and help to overcome some or all of the outlined constraints?
Proposed Solution: Tom Kilcer, an independent agronomist, and innovator in cropping systems, is promoting an 80-85 day forage type (gene 6) brown midrib (bmr) dwarf forage sorghum. He professes that this crop offers yield and quality competitive with corn at a lower cost. Tom has 2 years of experience with this crop in the Capital District of NYS. I am proposing to field test this crop under the conditions of 4 farms in south central NY, specifically in Cortland, Onondaga, and Chemung counties. Our extension team currently serves a 3-county region in south central NY with over 400 dairy and grain farms.

Studies on sorghum in the NE are rare. Penn State tested sorghum as a renewable energy crop 2009/2010 (Penn State Live, 2010). In that study it yielded 5-10 tons of dry matter per acre but was very wet and lodged making it difficult to harvest. Many farms have used sorghum-sudangrass as an emergency forage or booster of summer feed. Previous SARE studies, (Cerosaletti and Fields, 2004; Leverett, 1995) have outlined some of the challenges such as inconsistent performance depending on the growing season; poorer when it’s cool and better when it is hot. At harvest it is often hard to dry down for a good fermentation. Sorghum would be harvested one time, direct chopped like corn silage.

I received several inquiries after putting Mr. Kilcer’s article, New Crop Old Use; New Use Old Crop in our Feb 2012 newsletter. One farmer took a leap of faith and planted 15 ac. of sorghum. I was very impressed when I visited the field in Sept prior to harvest. Considering the mid-summer drought I didn’t have high expectations. The crop was lush. The plants tiller heavily (several stems per plant) which should offer an advantage for weed suppression in both organic and conventional systems. The crop was not lodged and harvested easily. The crop would be harvested using Kilcer’s recommended practices as well as standard agronomic practices from its traditional growing area. As a new crop to this area we will learn first hand about its agronomic characteristics. The trial sites will provide a demonstration of this crop for the farm community.

Methods: I will document the experience of four farms with this cropping system as case studies. The farms are conventional and one is organic. Sorghum will be planted with each farm’s equipment once soil temperatures stabilize to 60 degrees, sometime between mid-May to early June. Two farms plan to rent a no-till drill from their local soil and water conservation district. The no-till drill will be used to seed the 4 sites. On the traditional farms the farmer, concept®, will be applied to the seed in order to use an annual grass herbicide (metolachlor). On the organic farm, compliant organic seed will be used and cultivation will provide weed control. Weather and soil conditions at the time of planting will be recorded. All field procedures and inputs will be recorded for each farm including; final seeding rate, row width, tillage, fertility inputs, weed control and harvest. Harvest will be measured with field equipment to the extent possible. We will use portable scales to record representative truck or wagon weights and record loads from the field. Forage samples will be taken for moisture and quality. If it is not possible to measure the machine harvest, a representative hand harvest will be taken. Fields will be rotated on a one year to 2 weeks interval so crop growth can be monitored closely as well as any potential pests or problems. An in-season field day will be
scheduled mid to late season as a ‘teachable moment’ of the crop’s growth habits and performance.

After harvest a winter grain; triticale, wheat or rye, will be established at 100 lb/ac seeding rate either drilled or broadcast. The crop will provide a winter cover, providing food and an attenuated environment for soil biology as well as an early forage crop for the farm. The cover crop yield will be measured and a forage analysis taken.

Timetable: This project is proposed for growing season 2013 through spring of 2014 to capture the cover crop harvest.

Field Establishment:
- Early spring 2013: finalize planning with cooperating farms.
- May: begin tracking soil temperatures.
- Mid May-June: plant sorghum (irrigation and soil conditions and farmer’s schedule dictate).
- During growing season: observe and photo-document crop progress.
- Mid-September to mid-October: harvest – measure yield, take sample for feed analysis.
- Immediately following harvest – seed fall cover crop (Even if the date is late rye can be established.)
- April/May 2014 – harvest cover crop, measure yield, note stage of maturity, collect sample for feed analysis.

Outreach Activities:
- Newsletter articles to be published spring, mid-summer 2013 and final report – summer 2014
- Field Day – begin planning March/April 2013.
- Select site and set date for event and begin publicity by June 30
- Outreach to extension field crop colleagues at fall gathering – Nov. 2014

Outreach Plan: This project will be highlighted in our Extension newsletter (circulation 700) – 3 times during the coming year to introduce the project, provide a mid-season update and final report. I will host an in-field meeting during the growing season to showcase the project. I will partner with local seed companies to broaden outreach and attendance at the field day. The meeting will be advertised in our newsletter and website, through the Cornell Small Farms Program and general farm columns including ag newspapers such as Country Folks and Lancaster Farm and. A final report will be adapted for several print and electronic sites to increase accessibility for example our extension team’s website, the Cornell Small Farm Management Newsletter, Small Farm Quarterly (SFPQ) News that is distributed print through the Country Folks Newspaper. The SFPQ is based on our website and delivered to 170,000 mailboxes from Pennsylvania to Maine. I will write an article for What’s Cropping Up, a newsletter for NY Field Crops and Soils, published by the Extension Group in the Crop and Soils Department of Cornell. I will share the
results of this project with my statewide field crops extension colleagues at our annual fall inservice. I will offer a webinar during the winter workshop season to share our findings.

Qualifications: I am an agronomist with an MPS degree in plant protection and BS in agronomy both from Cornell University. I have worked as a Field Crops Specialist with Cornell Cooperative Extension for over 20 years. I have participated in many applied research projects during my tenure. Most recently in 2012/2013, I established on-farm organic food grade soybean trials in 2 cooperators farms in collaboration with the Cornell Organic Cropping Systems Project Dr. Laurie Drinkwater, PI and Brian Caldwell, project coordinator. I have worked with Cornell Field Crops Extension faculty Bill Cox (2010/2011) on soybean hornworms comparing 4 seeding rates with treated and untreated soil. A 3 year study (2009-2011) with Dr. Quirine Ketterings looking at the potassium needs for alfalfa in NY. I collaborated in on-farm trial to compare efficacy of herbicides for the control of annual grasses post emergence on corn. Dr. Russ Hahn (2009). I collected and interpreted data from farm cooperators in the Mass Nutrient Balance Project for NY Dairy & Livestock Farms (2007-2009) with Dr. Ketterings. I received and successfully completed a SARE Partnership Grant in 2008 ONE-08-002, A study to look at Practices Aimed at Reducing Mechanical Cultivation in Organic Corn Production.

Cooperating Farmers: Mr. Carlton Dawson and Kevin Streeter of Streeter Holsteins co-manage 80 milking cows and custom raise heifers. Both partners have off-farm jobs. Their land is at 1410 foot elevation 1350 ft, with predominant matrix and volusia soils which are medium textured soils, moderately well drained to poorly drained, subject to erosion, with a fragipan present at varying depths. Their land has been seeded with sorghum-sudangrass but as interest in trying sorghum since it is a one-harvest crop and can gain higher energy than they have gotten with sorghum-sudangrass. Their sorghum-sudangrass has tested .68 NEL but they would like to attain .76 NEL and wonder if sorghum can deliver that.

Mr. Dennis Birdsall farms 450 acres to support his beef herd and produce cash crops. For the past 5 years he has grown sorghum-sudangrass to protect highly erodible ground, and as mid-summer pasture. The sorghum potentially offers similar yield to corn, at a lower cost of production and an efficient harvest as a single chop system that will replace corn silage on marginal ground while offering nearly the same nutrition for his livestock.

Mr. Dave Stow has a beef herd. He grows corn, oats as a cover crop for new seedings, hay and pasture. He can’t grow enough hay alone to meet the herd’s feed needs for pasture supplementation and winter feed. Dave is the one area farmer that I know that has any experience with sorghum, planting it for the first time this past season. Although the crop presented many challenges, Dave planted because he had to modify the seed drum of his cyclone air planter, minor nutrients because of dry soil at planting, in season lodging and high moisture at harvest he is not disappointed with the crop and wants to make improvements in this year’s seeding. He is looking forward to planting next season with a one-harvest crop in mind. He always ended up with sour silage. Greenchopping was no option for him. Since corn has become expensive to plant and grow he is looking for lower cost crop with comparable yield and energy.
Mr. Jason Tuning has an organic dairy farm. He grazes his herd and grows hay for winter feed. The farm is 160 acres, with low pH and fertility and requires significant inputs to upgrade its productivity. Because of the expense of inputs, improving the fields has been slow. As a result, productivity is average and meeting his forage needs is a challenge. With hay as his only crop, supplemental energy has to be purchased, which is costly. Jason has tried sorghum under his organic management system, but the results have been disappointing. We want to try sorghum to see if it will be manageable in an organic system and provide a decent yield of high-energy food.

Dawson-Street Holsteins is located in E. Homer/Truxton NY, Tuning in Cincinnatus, both in Cortland County. Birdsall is in the town of Spafford, southern Onondaga County and Stow in Horseheads, Chemung County.

Notes: Tom Kilcer is the principal operator of Advanced Ag Systems, an independent agronomy consultancy.

References: