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Cornell sorghum variety and establishment

By Tom Kilcer

Sorghum, mainly a crop of the deep south, is being planted on more acres across the northeast. Originally relegated as an emergency summer feed when earlier crops had failed, or for part-time livestock farms, the crop is going mainstream because of the number of economic and practical advantages it offers. The sorghum species is supported by major breeding programs and has a huge, diverse genetic base. This allows tailoring to a wide range of needs and conditions. With New York Farm Viability Institute support we researched best management practices and varieties for north of the Mason-Dixon line.

Genetic choice matters. Nearly all the energy from highly digestible fiber, sugar and starch is stored in plant cells. BMR agronomic types with the BMR gene have significantly less lignin in the plant, which makes the fiber portion more digestible, with more utilzable feed for your effort.

Sorghum is grown as a one-cut, full-season crop. It has been crossed with Sudangrass to make sorghum-Sudan, which is normally a multi-cut crop. Sorghums, and to some degree sorghum-Sudan, have had a problem with severe lodging. Having two lbs of grain, 12 feet in the air, on the top of a stalk as thin as a fishing pole, is a prescription for disaster. Recently, brachytic dwarf varieties have become available. This gene shortens the stalk between the nodes but leaves the full number of nodes for high forage yield and gives good standability. The shortened nodes of the brachytic make a fatter stalk that maintains yield. Grain sorghum is non-BMR and a true dwarf with less nodes and low forage yield. The short season (85 – 90 day) BMR brachytic dwarf sorghum we tested has averaged, in multiple nitrogen trials, yields of 25 or more tons of 35 percent dry matter (DM) silage at optimum nitrogen, on ground that normally yields 18 to 20 tons of corn silage. Unfortunately, that short season variety is no longer sold, although longer season varieties are still available.

Recently in a NYFVI variety trial we tested another genetic line that has a male sterile gene. It does not produce pollen and so no seed is set (unless there is another pollenating variety nearby). Thus, there is no seed head to pull the crop down, yet the variety still has very high energy stored in the plant cells. In our 2017 replicated variety trial, a male sterile from Richardson seed, 400/36, yielded a mean of 31.59 tons of 35 percent dry matter silage/acre, in a trial where the overall mean was 21 tons silage/A. (Caution, not all are equal, a different company's male sterile only yielded 16.18 tons of silage.)

We tested sorghums within 20 miles of the Canadian border where in 2017 the yields were from 12 to 20.8 tons of silage/acre with a mean of 17. In 2018, a warmer summer, varieties ranged from 20.6 to 26.8 tons of 35 percent DM silage/acre at the same site. Our overall experience is that BMR sorghum frequently equals or exceeds corn silage in yield. Sorghum really shines when it turns hot, dry, or both. It will produce twice as much dry matter on an inch of water than does corn silage. It cannot get by on no water, but does give you more on limited water. Corn silage shuts down at temperatures over 85°F. Sorghum continues to grow up to 105°F. This is critical in southern areas with their hotter summers. Conversely, in cool or cold summers, all sorghums stand still. Corn will clearly out-yield the heat-requiring sorghum species.

A critical factor with sorghum is that it needs to be planted in warm soils. Temperature must be over 60°F with an increased forecast. I had a complete wipe-out of a research trial where we planted when the soil was 62°F. Three days later an unexpected cold rain dropped soil temperatures to 40°F, killing the seeds with imbibing chilling injury. I have also seen this happen with corn.

As sorghum is planted after haylage is finished, this fits very well in a double

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crop with winter forage. The winter forage adds eight to 10 tons of very highly digestible, high protein forage. From that same acre of land, sorghum can produce yields equal or exceeding corn silage. Because of allelopathic compounds from the winter forage, it is not suggested to no till sorghum into the winter grain stubble. The soil needs to be worked shallow, vertical tilled, or zone tilled (incorporating manure) or have several inches of rain to move the allelopathic compounds out of the seed zone.

Planting depth is best at ¾ to one inch deep. Cultipacker seeders plant it too shallow, so it is susceptible to drying, which can kill the emerging seedling. Narrow drilled rows and 15-inch row widths work best with sorghums, but planting in 30-inch rows to match your chopper is possible (do not use 30-inch rows for organic systems). Drilled BMR sorghum is suggested at 10 lbs of seed/acre. For 15-inch rows, eight lbs of seed is enough. For 30-inch rows five lbs of seed/acre is the suggested maximum. Higher seeding rates significantly increases the lodging. An attractive part of sorghum is that seed cost is about $120 less/acre than many of the corn varieties. Another benefit of sorghum is that it will tiller profusely and fill in thin areas until all sunlight is captured. A major problem with using even modern double disk drills is that the seed drop tubes are corrugated flexible rubber. As they flex on a pass over the field, the corrugations hold the seed, and then as it straightens, the seed is dumped in a pile, instead of being spread uniformly. We highly recommend that these be switched for sleeved tubes that deliver more uniform seed placement. This is critical for winter forage planting also.

Fertilizer is similar to corn silage. Slightly higher nitrogen (sulfur is critical if no manure has been applied) will give higher crude protein and thus increase the feed value of the forage produced. Caution: too much nitrogen even from manure, and especially when there is a shortage of sulfur, plus dry conditions followed by rain, can cause nitrate issues. We have grown sorghum very successfully on clay but it does not tolerate wet feet in a soggy summer. Topdressing nitrogen will help to pull the crop through, but it will not fix anaerobic conditions.

For the sorghums that emerge slower, especially the brachytic dwarfs, herbicide is critical. With a safener applied to the seed, atrazine plus metolachlor can be used. It is critical that the herbicide be applied immediately after you finish planting, not a week later. If annual grass gets started there are no post emergent herbicides available to control the weeds and you can lose the crop.

Sorghum-Sudan normally emerges much faster than most sorghums, especially the slower brachytic sorghum type. By utilizing a stale seed bed (prepare the field, wait a week for weeds to emerge, then harrow to kill them and immediately plant) and a higher seeding rate (60 to 75 lbs seed/acre instead of 40), we have completely controlled weeds with no herbicide. This has been a boon to organic farms (sorghum-Sudan is not GMO, but is traditional breeding) that spend considerable time cultivating corn during the critical period when they should be harvesting haylage. Rapidly emerging sorghum-Sudan in narrow rows controls weeds by shading, eliminating the cultivating and the soil erosion from corn, while providing high-energy forage.

Pests are few. Pea aphids feed on the plant but do no damage; the sorghum aphid is confined to the south. A very intense outbreak of armyworm will need to be controlled. On the plus side, sorghum species' natural compounds kill corn rootworm larvae. The rootworm adults also do not lay eggs in the crop. Thus, for a year or unsually two after sorghum, you will not need to plant the more expensive rootworm resistant corn. Another benefit we found was that deer hide in the sorghum and come out to eat the neighbor's corn. They leave the sorghum alone.

Sorghum is not a magic crop. You need to soil test before planting, use a recommended fertilizer program, control weeds, and harvest properly. With this basic management, sorghum is a crop for northeast farmers to consider. It is one more way to reduce risk in your forage production and to perhaps lower your digestible forage costs. ▮

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