



## Utilizing Brown Mid-Rib (BMR) Summer Annuals

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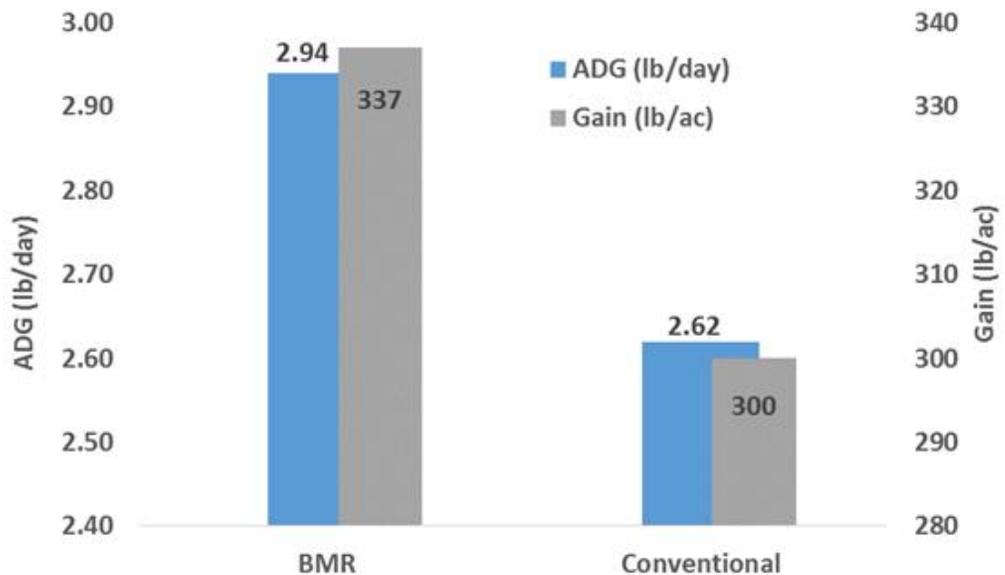
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The use of warm-season annuals can help improve grazing during the summer. In the south, most producers are usually plant conventional varieties of summer annual grasses such as sorghum-sudan hybrids, sudangrass, pearl millet, and forage sorghum. Improvement in breeding and selection has allowed the development of new varieties within these species by incorporating a Brown Midrib (BMR) visual trait.

Brown Midrib is a genetic mutation in several of these summer annual species that reduces the lignin content of the total plant parts (leaf and stem) and therefore, cultivars tend to have low lignin and higher digestibility. There are at least four genes (BMR-6, BMR-12, and BMR-18) that exist in sorghum which produce a brown midrib reaction. The BMR-6 trait is the most commonly found in these summer annuals. The visual manifestation of this trait is observed by light to dark brown coloring of the midrib of the leaf, although the discoloration tend to disappear in intensity with increase in plant maturity.

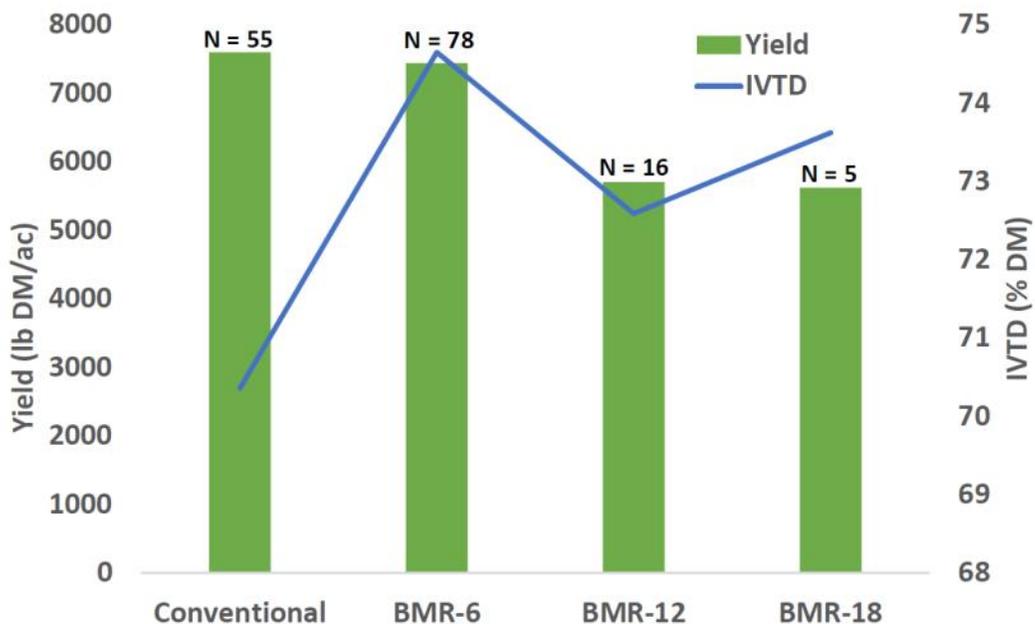
These improvements make BMR a very attractive characteristic for different forage cultivars. During the past several years the BMR trait has been incorporated into forage sorghum, sudangrass, pearl millet, and sorghum-sudan hybrids.



Some producers often asked how should be species containing the BMR agronomically handled? They should be handled like any conventional varieties of the species in terms of seeding rates, fertilization, and utilization (harvesting or grazing). The adjustment that might be recommended is a slight reduction in seeding rate to maintain stem size and prevent lodging in some instances. The recommended seeding rates for these forage species are: forage sorghum (15-20 lb/ac), sudangrass (25-30 lb/ac), sorghum-sudan hybrids (25-30 lb/ac), and pearl millet (25-30 lb/ac). They need to be planted into warm soils that are between 60 and 65°F. As soil temperature increases, seed might germinate quickly and allow for the establishment of a dense stand. Phosphorus and potassium should be applied based on soil test recommendations. Nitrogen application of 30 to 40 lbs of actual nitrogen per acre should be sufficient for each grazing and 40 to 50 lbs of actual nitrogen per acre per each cutting cycle.

Most of these BMR species should be grazed at 24-30 inches or harvested for hay at a height of 36-48 inches. Grazing or cutting at the recommended heights can have good energy and crude protein levels. Strip grazing using a portable fencing system work well. Delaying utilization beyond the recommended target heights will result in lower crude protein and energy levels, but more yield per acre per cutting. Although fiber digestibility usually declines with plant maturity, BMR cultivars tend to have higher digestibility at taller heights compared to conventional cultivars with the same summer annual species. When harvesting these forage species for hay production, it is important to let them dry well since more of the plant water is the stems. To ensure regrowth after harvest, it recommended to mow when plants are 36 to 48

inches and leaving a 4 to 6 inches stubble height. This residual will allow for best plant recovery and rapid regrowth. Mow at a full width swath to increase moisture loss and decrease drying time. Although flail conditioners might be a good idea, there are sometimes difficult to set and break the stems without shredding the plant. After grazing or cutting hay, it will take approximately 21 to 35 days of regrowth for the next grazing cycle or harvest. Keep in mind that weather conditions, pests, and nitrogen fertilization can greatly influence the rate of regrowth in this summer annual species.



**Figure 2.** Six-year average yield production and *in vitro* true digestibility (IVTD) of summer annual species with different BRM genes at Blackstone, VA. Source: Teutsch, 2017.

Keep in mind that most of the summer annual forages can be damaged by armyworms and different species can have different degrees of damage and yield reduction to sugarcane aphids. The damage to summer annual forage crops depend on several factors such as aphid density and duration of the infestation period. Most summer annuals get infected soon after plant emergence, but threshold infestation levels occur during the late growth stages (plants that are more than 12 inches tall) and during dry periods. No sugar cane aphid has been identified in hybrid pearl millet and it seems to have a higher degree of resistance to aphids.

Forages with the BMR trait usually tend to have improved forage quality that result in increased average daily gain in livestock (Fig. 1). Some of the data collected in Texas A&M has indicated that BMR forage sorghums has an overall 10.8% lodging compared to 29.2, 6.4, and 18.7% lodging for sudangrass types, photosensitive forage sorghums, and conventional forage sorghums, respectively. Quality data comparing BRM forage hybrid varieties to conventional varieties indicated that BMR cultivars were 40% higher in crude protein, 20% higher in digestibility, and 32% lower in structural carbohydrate lignin. An overall assessment of BRM cultivars and species over a six year period at Blackstone, VA indicated that cultivars with the BMR-6 gene had similar biomass production compared to the Non-BMR cultivars, but yields were much lower of BMR 12 and 18 traits (Fig. 2). It is important to note that the number of cultivars having the BMR-12 and BMR-18 during this six-year testing in VA were very small. Cultivars with the BMR trait had a higher *in vitro* true digestibility (IVTD).

Summer annual forages such as millets, sudangrass and forage sorghums can be effectively used to overcome short-term shortages in pasture production. It is important for the individual producer to determine the economics of production when deciding if and which summer annuals will benefit his operation. Producers need to look at the overall benefit received versus the cost incurred to receive that benefit. The decision to establish these summer annual should be based on cost of establishment, grazing strategy and utilization, water availability, and health concerns associated with grazing certain species of these summer annual forage crops such as prussic acid and nitrates. Some of the challenges associated with summer annuals will be the annual establishment cost, increased risk of stand failures, and the limited growth due to drought.

### Upcoming Events

July 17, 2018—MSU Forage Field Day, Starkville, MS

August 20-21, 2018—GLCI Conference, Hattiesburg, MS

For upcoming forage related events visit: <http://forages.pss.msstate.edu/events.html>

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