Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION
Center for Forage Management and Environmental Stewardship

Water Use by Forage Crops

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As we approach the spring and summer, producers tend to prepare for the hay production and grazing season of summer forage crops such as bermudagrass and bahiagrass. Due to the growing conditions in Mississippi with average rainfall ranging from 50 to 60 inches annually, we do not pay much attention to water use by perennial summer forage crops. Usually, warm-season perennial grasses (bermudagrass, bahiagrass, and dallisgrass) utilize water more efficiently than cool-season perennials grasses (tall fescue). Warm-season perennial can use 30% to 50% less water than cool-season perennial grasses. Additionally, bahiagrass could be more productive that bermudagrass under drought stress because it can green up faster following a rain event.

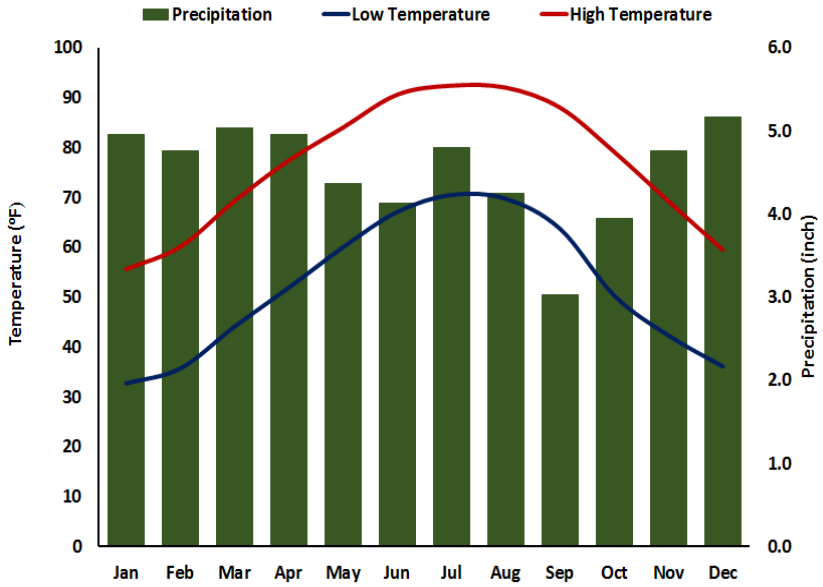

Figure 1. 30-year monthly high and low termperatures and rainfall for Jackson, MS

Water is a very important component for plant growth and development. It is used in the plant to transport nutrients, organic compounds and allow chemical and physiological process to occur such as photosynthesis. It is important in cell division, cell elongation, and maintaining cell turgidity for structure and growth. Water is also an important component of the cooling mechanism in the plant.

Despite the adaptability of bermudagrass and bahiagrass to the environmental conditions and soil types in the southern US, it is not uncommon for them to use 120 (960 lbs in a dry year) to 105 gallons of water (840 lbs in a wet year) to produce one pound of dry matter forage. Depending on the forage crop, water efficiency (amount of water needed to produce one unit of dry matter forage) can be used as an index to estimate forage production, but it is important to note that not all the rain fall can be captured by plants. The amount of water available to the plant can vary depending on the soil type (clay vs. sandy), soil depth, root mass and depth (can be affected by pH and soil structure), ambient temperature, fertilization practices, soil pH, and management practices (hay vs. pasture), and plant canopy cover.

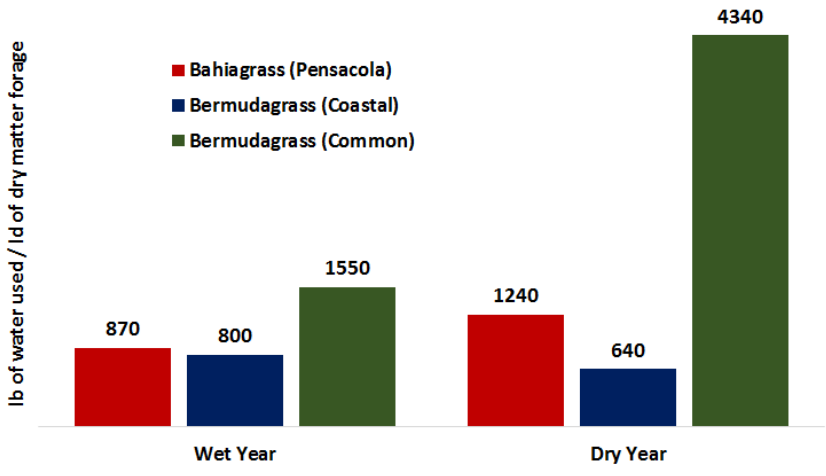

Figure 2. Water use efficiency of warm-season perennial grasses during a wet (135% of the normal rainfall) and dry (47% of the normal rainfall) in South Georgia. Source: Burton et al., 1954.

With the amount of rain received during the season, water is lost back to the atmosphere through the process of evapotranspiration (ET), a basic

component of the hydrologic cycle. Evapotranspiration is a combination of water transpired by the grasses and what is evaporated from soil, water and plant surfaces. ET can be affected by solar radiation temperature (soil and air), relative humidity, wind, soil moisture and grass' growth stage. That means that under Mississippi's conditions ET can be higher, especially when forage systems are over-grazed and there is little plant canopy for plants to recover faster.

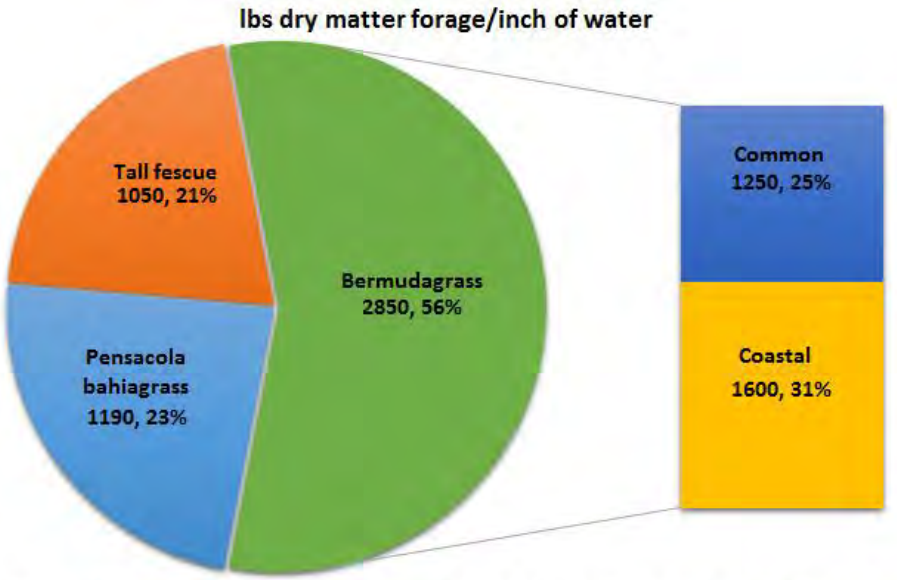

Figure 3. Water use efficiency of selected forage crops (Doss et al., 1962; Bennet and Doss, 1963

Bahiagrass and bermudagrass are extremely drought-tolerant because they a very extensive root system, but they have a high water requirement and fertility to produce adequate yields. Some of the research conducted in the south has indicated that with adequate nitrogen (~50 lb N/ac/cut) it will require about 6 to 8 inches of water to produce a ton of dry matter. Warm-season perennial grasses will require at least 50 lbs of nitrogen (N), 15 lbs of phosphorous (P) and 42 lbs of potassium (K) to produce one ton of dry matter forage (4-1-3 ratio of N-P-K). That means that if a producer is expecting to have a bermudagrass hay production of 4 tons, it will take a minimum of 25 inches of water during the growing season along with 200 lbs of N, 60 lbs of P and 168 lbs of K. Research also shows that with no added fertility the water requirements to produce a ton of bermudagrass can take 15 to 20 inches of water. The amount of water used by these forage crops is obtained from the soil water holding capacity (which varies with soil type) and rainfall accumulation. Also, keep in mind that the amount of water needed by summer perennial grass can be increased when pastures or hayfields are over-seeded with annual ryegrass. Competition for moisture from cool-season annual grasses such annual ryegrass can severely impact bermudagrass and bahiagrass production. Ryegrass will remove high water quantities due to its fine and extensive root system. Annual ryegrass could reduce potential yield of summer grasses by 1,500 to 2,000 lbs per acre.

Weather conditions in Mississippi provide the opportunity to grow a large array of forages in Mississippi. It is important for forage and livestock producer to keep in mind how rainfall, temperatures and fertility can impact forage production. Forage species selection should be based on variety evaluation conducted across the state to evaluate forage production, persistence, nutrient requirement, and grazing or hay production management.

Upcoming Events

April 7, 2016—Cool-season Forage Tour, Starkville, MS
April 22, 2016—Pearl River Co. Forage Field Day, Poplarville, MS
April 28, 2016—Pike County Field Day, Summit, MS
May 12, 2016—Hinds Co. Forage Field Day, Utica, MS
May 19, 2016—Alfalfa Field Day, Newton, MS
June 10, 2016—Lawrence Co. Alfalfa Field Day, New Hebron, MS
June 17, 2016—Clay Co. Forage Field Day, West Point, MS
June 28, 2016—Warm-season Forage Field Day, Starkville, MS

For detailed information related to upcoming forage events please visit:
http://forages.pss.msstate.edu/events.html

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