



Sorghum Production in Nevada

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Sorghum (*Sorghum bicolor*) is a summer, warm-season, gluten-free and drought-tolerant annual crop that can be grown as an alternative crop in Nevada. It is a multipurpose crop utilized for human consumption, feed grain for livestock, forage and industrial applications, such as ethanol production. About one-third of U.S. grain sorghum production is used for feed in the poultry, beef and pork industries. Sorghum stalks and leaves are used for green chop, hay, silage and pastures. Sorghum grain produces the same amount of ethanol per bushel as corn but uses one-third of the water in production. This qualifies sorghum as an advanced water-efficient biofuel. It is an excellent whole-grain dietary alternative for persons with celiac disease or gluten intolerance. Various fermented and unfermented beverages are made from sorghum, and it can also be steamed or popped and used to make syrup.

Types of sorghum

Several types of sorghum are available for planting that producers can choose from based on their desired end-use market:

1. Forage sorghum
2. Sorghum-sudangrass
3. Sweet sorghum
4. Grain sorghum

Forage sorghum

Forage sorghum can grow 5 to 15 feet tall, and may or may not produce grain, depending upon the hybrid. Forage sorghum is usually harvested once at the end of the season. It is best adapted to a single-cut harvest for silage. Forage sorghum yield varies from 15 to 30 tons of biomass per acre, depending upon soil type, weather and hybrid selection. Net energy, protein content and protein digestibility differ widely among different sorghum hybrids and are highly dependent on management practices. It is always best to consider yield and protein quality for variety selection. For example, protein quality will likely be more important for lactating cows than beef operations, where yield may be a more important factor to consider.

Sorghum-Sudangrass

Sorghum-sudangrass is a hybrid, a cross between forage-type sorghums and sudangrass. It grows about 5 to 12 feet tall, depending on the hybrid, and usually produces 4,000 to 5,000 pounds of biomass per acre. It can also produce good quality silage. It can be used as a summer forage that produces stalks up to one-half inch in diameter. These hybrids can tolerate soil pH as high as 9.0 and as low as 5.0; however, they prefer near-neutral soil pH.

Sweet sorghum

Sweet sorghum stalks contain up to 75% juice, and between 12% to 23% of this juice is sugar. The extracted juice can be used for sorghum syrup, fermented beverages and ethanol production. During the growing season, sweet sorghum can grow 10 to 15 feet tall. Sweet sorghum reaches maximal sugar accumulation at the soft dough stage of grain development and is typically harvested before full maturity.



Figure 1: Sorghum planted at University of Nevada, Reno Experiment Station, Valley Road, 2020. Photo by Melinda Yerka.

Grain sorghum

Grain sorghum is also known as “milo.” It is mainly grown for the grain, which can be used as animal feed, ethanol feedstock, or a gluten-free food and beverage ingredient for human consumption. Grain sorghum is typically bred to be less than 3 feet tall, and it always yields better when grown in rotation with other crops. Most hybrids require 90 to 120 days to reach maturity. After the grain is harvested, stalks can be used for winter grazing. The harvested seed varies in color and can be yellow, white, red, black, orange, pink, gray, blue or brown.

Key points to consider for sorghum production

1. Always plant a variety based upon adaptability and maturity considerations for your region.
2. Plant sorghum when soil temperatures reach 65 F to 70 F.
3. The optimum planting depth differs with soil types and moisture conditions. In heavier soils, a planting depth of 1 inch is satisfactory. In sandy soils, seeds can be placed 2 inches deep without problems. The seed should be well covered with soil for excellent seed-soil contact to aid germination.
4. Too early and too deep planting reduces sorghum stands.
5. Sorghum is less tolerant of cool soil temperature conditions than corn.
6. Always consider the seed emergence rate before planting.
7. Plant population recommendations are listed on the bag of seed and vary for each hybrid.
8. Plant populations can be adjusted based upon the type of planter being used. Typically, 30- or 40-inch row spacing is used, but seeds can be planted in narrow rows using grain drills as long as the total plant population per acre is kept constant. Plants in narrower rows shade the soil quicker, improving weed control and reducing soil erosion.
9. The seeding rate will vary depending upon the soil type, hybrid, expected water availability and growing conditions.
10. A higher seeding rate can increase the risk of lodging.

11. Soil pH should be above 6.0 for sorghum production, with a target pH of 6.5.
12. Always add nutrients based upon soil test results, considering previous crop or manure application.
13. Split nitrogen fertilizer applications are more important in sandy soils where they can reduce leaching losses and ensure sufficient plant nutrition during flowering and grain fill.
14. Warm soil temperature and minimal weed competition during early growth stages increase production. Unfortunately, sorghum does not compete well with weeds during early growth.
15. Livestock grazing of young, drought-stressed, or recently killed plants by frost poses prussic acid poisoning risk. If prussic acid is a concern, many hybrids (sorghum-sudangrass, forage sorghum) are available that have low levels.
16. Some sorghum hybrids produce more prussic acid than others.

Integrated pest management

Integrated pest management (IPM) practices can make sorghum an economical option for growers, while also making the crop more sustainable and beneficial to humans. This approach incorporates mechanical, biological and chemical pest control methods. It is always preferable to plant into a weed- and disease-free seedbed and choose regionally adapted varieties. The inclusion of crop rotation with a legume such as alfalfa will reduce pest pressure by varying tillage methods, soil management and herbicide use. Tillage before planting and cultivation between rows during early sorghum growth can

also help with weed control. Herbicides may substitute for some or all pre-plant tillage. Some herbicides are best applied before planting, while others are best applied at planting, or after crop emergence. Pre-emergence herbicides (such as Dual- or Bicep-like herbicides) are very effective at early season weed control, but they require purchasing seeds that have been treated with a safener. Nowadays, most commercial sorghum hybrid seed is sold as “safened” in the U.S. The application rate and timing of different pre- and post-emergence herbicides vary depending upon the hybrid, growth stage and soil types. It is always best to check with the vendor and/or a crop advisor before purchasing and applying herbicides.

Sorghum research in Nevada

The University of Nevada, Reno is working closely with several major seed companies in the U.S. to develop sorghum as an alternative crop in Nevada. The primary characteristics being developed include early maturity, tolerance to sodic and saline soils, drought tolerance indicated by increased root production, and protein quality. Precision irrigation management techniques, including improved irrigation systems, are being applied to quantify, assist and improve water use and yield of grain sorghum grown on the heterogeneous soils of the Great Basin. In addition, new remote-sensing technologies for monitoring aboveground and belowground traits of different sorghum varieties, including grain density, nutrient quality, water use, stalk height, root volume and depth, biomass, and yield, are being developed.

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