Sorghum: Production Varieties Fertilization

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SORGHUM

Production
Varieties
Fertilization

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Sorghum

In the last several years about 300,000 acres of sorghum have been planted annually in South Dakota and it appears the acreage will increase. Approximately 40% of it has been harvested for grain.

Sorghum withstands drought, heat, and grasshoppers and is not attacked by corn rootworms, that are causing the corn producer many problems. It is one of our low risk crops, provided you select an early, adapted variety and follow the necessary cultural practices; however, if you select a late variety, sorghum becomes one of the more risky crops.

Sorghum, a relatively new crop to many farmers, offers some special problems. Studying production practices and varieties can help you avoid many difficulties. In the present feed grain program sorghum is handled the same as corn.

Some new grain sorghum hybrids produce more grain than corn in much of southern South Dakota. Most forage sorghum hybrids produce as much or more forage (silage) as corn.

Grain sorghum is a highly palatable feed for livestock. For lambs, dairy cows, broilers, and laying hens, it has about the same feed efficiency as corn. For beef cattle and hogs, however, corn is slightly more efficient. Grain sorghum is a carbohydrate feed and is more efficiently utilized by livestock when supplemented by protein.

Sorghum silage is an excellent feed for dairy cattle, beef cattle, and sheep. Forage sorghum silage contains less grain than well-eared corn silage, and therefore, has slightly less value per ton as feed. The concentration of grain in grain sorghum silage exceeds that of forage sorghum and may exceed that of corn depending on the height of cut. The shorter growing grain sorghum produces fewer tons per acre. Cattle do not chew the seed in sorghum silage as thoroughly as they do corn.

**SORGHUM PRODUCTION PRACTICES**

If sorghum is planted in rows, the major difference between sorghum production and corn production comes at harvest time. Sorghum, originally a perennial plant, has had most of the perennial characteristics removed through breeding. However, sorghum still has a tendency to stay green until after a hard frost. After frost many varieties and hybrids start to lodge. As a result sorghum grain does not get dry enough to harvest before it starts to lodge and forage does not get dry enough to make good silage. Because of this sorghum grain often has to be dried artificially.

Likewise, sorghum forage often has about 80% moisture at silo filling time.

**SEEDBED PREPARATION**

Proper seedbed preparation kills weeds, conserves moisture, and forms a firm, mellow, warm seedbed. Germination is faster in warm soil and more uniform in a firm seedbed. Since sorghum seedlings grow slowly and do not compete favorably with weeds, shallow cultivation immediately before planting is essential.

Plow in early spring, or if necessary, early fall. Just before planting, disk shallow and harrow the land. If you use a lister, blank list in late fall or early spring. Fill in blank listed rows before nosing out with a lister at planting time. A thorough preparation of the seedbed may increase your yield 50%.

**SEED TREATMENT**

Treat all sorghum seed to control sorghum smut and to protect the seed and seedling against harmful organisms. Seed sold by commercial seed companies is usually treated. If seed has not been treated, use one of the fungicides recommended in table 1. Mix seed and treatment material thoroughly according to directions.

**TIME OF PLANTING**

Since sorghum is a hot weather crop, delay planting until the soil is warm enough to insure good seed germination and rapid emergence of the plants. While sorghum can be planted as early as May 15 in some years, experience indicates that if it is planted too early, late germinating weeds like green and yellow foxtail may become troublesome. The usual planting date is between May 25 and June 10. The exact time of planting is modified by seasonal variations and areas of the state. If you use an early grain variety such as SD 441, aim to have the crop planted not later than June 15 to produce a mature crop before a killing frost. A later maturing variety necessitates an earlier planting date.

**METHOD OF PLANTING**

Plant sorghum, grain or forage, in rows at a depth of 1 inch in heavy soil and 1 ½ to 2 inches in sandy soil. A corn planter or lister is the most common seeding equipment. A corn planter with furrow-opener at-

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Rate</th>
<th>Formulation</th>
<th>Application Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arasan 50-</td>
<td>2 oz./bu.</td>
<td>Dust</td>
<td>Rotary or gravity treater</td>
</tr>
<tr>
<td>Red</td>
<td>½ oz./bu.</td>
<td>Dust</td>
<td>Rotary or gravity treater</td>
</tr>
<tr>
<td>Ceresan M</td>
<td>1 lb./gal. water</td>
<td>Dust</td>
<td>Slurry treater</td>
</tr>
<tr>
<td>Captan 75</td>
<td>1⅛ oz./bu.</td>
<td>Dust</td>
<td>Rotary or gravity treater</td>
</tr>
<tr>
<td></td>
<td>1½ oz./bu.</td>
<td>Dust</td>
<td>Slurry treater</td>
</tr>
</tbody>
</table>

Use of a trade name does not imply endorsement of that brand over another.
tachment is the ideal method. The furrow-opener assures uniform depth of planting and places the seed in moist soil to obtain immediate emergence of the seedling. If you use a lister, list shallower than for corn.

A grain drill can also be used to plant the seed in rows 18 to 42 inches apart. With a 11- to 14-foot drill several rows can be planted. Bore a hole in a stub 2 x 4 and fasten the stub in drill box above the hole from which the grain is to be seeded. Insert a funnel in the hole in the 2 x 4. A 8-inch funnel will hold about 2½ pounds of seed. A small gas funnel, which holds more seed, can be used.

During the last several years, there has been considerable interest in planting sorghum with narrower row spacings. Limited tests indicate that forage sorghums will produce more forage when planted in 20-inch rows than when planted in 40-inch rows if soil moisture and fertility are adequate.

Although sorghum will withstand drought, it responds to additional moisture. Poor yields have been obtained during relatively dry seasons from sorghum planted on alfalfa ground even though rows were spaced 40 inches apart. Under irrigation best sorghum grain yields have been obtained with rows spaced 18 to 22 inches apart.

SORGHUM PLATES FOR CORN PLANTER

Sorghum stands are often either too thin or too thick. To obtain satisfactory yields, a uniform stand is important; therefore, take care to use the right planter plates. For intermediate size seed varieties, pounds of seed planted per acre amount to approximately two-thirds the number of seeds dropped per foot. Example: If six seeds are dropped per foot in 40-inch rows, the rate of seeding is 4 pounds per acre.

Use plates with holes large enough to hold three to five seeds per hole. If holes are too small, bore them out to the desired size. Some planter plates have rounded notches around the outer edge of the plate. If these notches are too small, enlarge them with a rat-tail file. When fitting the seeds into the holes for testing, pack them in tightly. Count all seeds that will go in at least halfway because a seed that is halfway in a hole will be dropped by the planter.

Countersink holes from the under side. Cut out at an angle of about 30 degrees. The upper edge of the holes should be countersunk very slightly or just enough to take away the sharp edge. Use a false ring, if necessary, to prevent leakage and cracking of small seed.

CALIBRATING THE PLANTER

Because of the large variation in sizes of sorghum seed, even within the same variety, no "rule of thumb" in planting directions is absolutely reliable. Calibrate the planter each year as follows: (1) Block the drive wheel off the floor. (2) Turn drive wheel five complete revolutions, catching the seed in a pan. (3) Count the seeds in the pan and divide the number of seeds by five times the circumference of the drive wheel (in feet). This gives the number of seeds planted per foot.

RATE OF PLANTING

The seed size will influence the pounds of seed to plant per acre. For a grain sorghum variety with intermediate seed size, such as SD 441, use 3-5 pounds of seed per acre (4-7 seeds per foot) in low rainfall areas and about 4-6 pounds per acre (6-9 seeds per foot) in higher rainfall areas. Under irrigation the optimum stand is 100,000 plants in 18- to 22-inch rows. This is four plants per foot of row which would require a seeding of about five seeds per foot. Forage sorghums are usually planted a little thicker, from 8-12 pounds per acre.

HARVESTING

Most grain sorghums in the important sorghum growing areas are harvested with a combine while still standing. This method involves less manual work and can be used under most conditions. The crop must be ripe and the moisture content of the seeds below 13%. Drying equipment is desirable for sorghum production because you can combine the crop when the moisture content is higher (16-18%) and before the danger of the sorghum plants breaking over or lodging.

Harvesting with a grain binder and shocking to allow the seed to dry out in the shock is a satisfactory method, but it involves more labor. This method is especially good where a seed crop is being produced because stored sorghum seed should contain 12% or less moisture to assure high germination.

When threshing with either the combine or the threshing machine, reduce cylinder speed by one-half of that for wheat to prevent cracking the seed. Remove concave teeth as necessary. Use the same riddles and sieves as for barley.

Cut forage sorghum for fodder with a binder when the seed has reached dough stage to get the largest yield of nutrients per acre. For silage, cut in the medium hard dough stage to prevent too great an acidity and too high moisture content of the ensilage.

STORAGE

Take extreme care in storing grain sorghum. Cracked kernels and pieces of stem and stalks in combined grain increase the danger of heating and spoilage. Removing such inert materials before grain is binned can reduce moisture content of the grain. Store commercial sorghum grain at 13% moisture content or less. Keep the moisture content below 12% for safe storage of grain for seed.
**RECOMMENDED VARIETIES**

**Rancher** and **39-30-S**, two early, low prussic acid forage sorghum varieties, are well adapted to the entire state. Rox Orange, Leoti Red, and Norkan, later maturing varieties, should be grown only in the southern part of the state.

**SD 252F**, a hybrid forage sorghum, has large reddish colored kernels like those of Dual. The seed germinates fast, producing a strong, large, sturdy seedling with a short seedling dormancy which enables it to compete better with weeds. This hybrid is taller, a few days later, and similar in standing ability to Dual. It produces sweet, juicy, leafy stalks. It is a high yielder in both grain and forage but it grows too tall to combine for grain. It is well adapted to the entire state for fodder or silage.

**Winner**, an extra early maturing, low prussic acid grain sorghum, has a seedling of average size and vigor with the normal dormancy period. It is leafy, has slender, sweet, juicy stems, and grows to a height of 30-40 inches under good soil fertility and average climatic conditions. The open spreading panicle bears white mottled seeds. When planted in 40-inch rows during May, it matures 93-95 days after emergence. Planting in late June appears to materially shorten the time required for maturity.

**Winner**, recommended primarily as an emergency crop, can be seeded late in closely spaced drill rows to replace an earlier planted crop. High yields have been obtained from planting drilled rows 6-24 inches apart in late June. It is important to control weeds when planting late in closely spaced rows.

**SD 102**, an extra early grain sorghum, matures 3-5 days earlier and the plants are shorter than SD 441 or SD 451. The heads are open and fast drying. The heads extend well above the leaves which helps in combine harvesting. Its medium size grain has a brown-rust color. It lacks standing ability after a killing frost. This variety produces 2-5 tillers when planted thinly, but tillers and main stalks mature simultaneously. It is adapted for all areas where sorghum is grown, but in the southeast and south central counties it is recommended primarily for late planting.

**SD 441**, a hybrid grain sorghum, has a bright rust color grain and has a good test weight. The kernels are medium large and the plants are a few inches taller than SD 451. The heads extend well above the leaves facilitating an easy, clean harvest. The open heads are fast drying. SD 441 stands fair, but tends to lodge after a killing frost. It has high yield potentials under dryland conditions and is adapted for all areas where grain sorghum is grown.

**SD 451**, a hybrid grain sorghum, has rust colored grain and a medium kernel size—slightly smaller than SD 441. The plant height and the heads are somewhat more compact than SD 441 but are fast drying. The heads extend well above the leaves, a desirable characteristic for combine threshing. It has good lodging resistance. Its performance has been good. Since it is a few days later than SD 441, it is best adapted to the area south of U.S. Highway 14.

**SD 503**, a mid-season hybrid sorghum, has a semi-compact head with good head exertion. Plant height ranges from 40-44 inches. It has good stalk strength. SD 503 normally matures about the same time as SD 451, SD 502, and RS 501. It has good yielding potential. It is adapted to counties south of Highway 14.

**RS 501**, an early hybrid grain sorghum, is slightly later and a few inches taller than SD 441. Its greater height and large heads make it susceptible to stalk breakage, especially under drought conditions. The seed is light red and the head is open and spreading which facilitates rapid drying. It has excellent grain quality and the grain threshes clean. It is adapted to all areas where grain sorghum is grown.

**RS 608**, a hybrid grain sorghum, is one day earlier, about 4 inches shorter, has better lodging resistance, and a more open head than RS 601. The seed is reddish-yellow. The yield record is similar to that of RS 610. RS 608 is recommended for the southern areas of the state.

**RS 610**, a relatively short growing hybrid grain sorghum, is a few days later than RS 608. The head is rather compact, but dries rapidly. RS 610 is a high yielding variety, with fair to good resistance to lodging.

**Commercial Hybrid Varieties.** Several companies have varieties available that are proving satisfactory. The forage varieties include hybrids resulting from a sorghum-sorghum cross, hybrids from a sorghum-sudangrass cross, and true sudangrass hybrids. The sorghum-sudangrass crosses usually resemble sudangrass and the forage yield in tons per acre has been equal to or slightly higher than the true forage sorghum hybrids.

The true sudangrass hybrids are those resulting from crossing two sudangrass varieties. Presently there are only a few of these hybrids on the market and their forage yields under limited tests have been very competitive with other sorghums. The sorghum-sudan hybrids and the sudan hybrids are better adapted to pasturing than are the forage sorghum varieties. Use caution and proper management when pasturing these hybrids because of the danger from prussic acid poisoning. However, to date no livestock losses have been reported from pasturing sorghum-sudan or sudangrass hybrids.

*Developed by the South Dakota Experiment Station*
Because of limited tests, the Experiment Station does not make recommendations on commercial hybrids or varieties. According to experimental tests, the early to medium early grain hybrid varieties are superior to the late ones in yield and quality of grain. A few of the hybrid sorghum forage varieties developed in the southern states are too late to produce high quality forage. Select a forage variety that will normally reach the maturity stage for best quality forage.

**FERTILIZER**

Nutrient needs of sorghum closely resemble those of corn in that sorghum uses relatively large amounts of nitrogen and moderate amounts of phosphorus and potash. Sorghum will frequently respond to applications of commercial fertilizer containing any or all of the above nutrients, particularly where they are in short supply in the soil. Intensive past cropping management or inherently low soil fertility can cause such a condition. Overall fertilizer application rates for sorghum can be taken from the fertilizer recommendations for corn found in the fact sheet, “Fertilizing Corn in South Dakota.” Sorghum, like corn, will utilize nearly twice as much nitrogen as phosphorus or potassium. Use a soil test as a guide in determining the most economical fertilizer rate.

**SURFACE PLANTED SORGHUM**

Apply phosphorus and potassium, when needed, to surface planted sorghum at or prior to planting time to make sure these nutrients are available for early plant growth. Nitrogen, however, can be effectively applied and worked into the soil before or after seeding. Broadcast applications made prior to seeding are equally effective whether done in the spring or fall if nutrient loss due to erosion is prevented.

Suggested alternative methods of applying fertilizer to sorghum resemble those recommended for corn. Starter fertilizer applied at seeding time is an effective way of applying needed phosphorus where surface planting is practiced and adequate weed control measures are used. Common fertilizer ratios suitable for use as a starter would be 1-2-0, 1-3-0, 1-4-0, or grades such as 10-20-0, 16-48-0, and 8-32-0, respectively. Nitrogen, in addition to that contained in the starter, should be used and can be effectively applied broadcast on the field prior to seeding or sidedressed any time after planting.

For example, if the recommendation called for 50-20-0 and 100 lbs. of 10-20-0 is used as a starter, then approximately 40 lbs. of additional nitrogen should be applied.

**LISTED SORGHUM**

Fertilizer application for lister-planted sorghum varies somewhat from that of surface planted. Specialized designed lister-planter-fertilizer attachments that place the starter fertilizer about 2 inches to the side and slightly below the seed can be used. Apply the additional nitrogen after planting. This placement helps assure more efficient use of the fertilizer during and after cultivations. Broadcasting fertilizer prior to listing can give poor results because a considerable portion becomes mixed with the dry listed soil ridges between the rows where plants are unable to take full advantage of it.

Fertilizing irrigated sorghum is similar to that grown on dryland as far as method and time of application. Remember, however, that higher fertilizer rates should be used in irrigated sorghum fields for maximum profit because potentially higher yields result. If irrigation will increase sorghum yields 40% over dryland yield, then increase fertilizer rates 40% over those for dryland conditions.