

FACT SHEET

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KEYS TO PROFITABLE SUMMER ANNUAL FORAGE PRODUCTION

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IMPORTANCE. Summer annual forages are often a useful and profitable part of the total forage program of many livestock producers. They are used to provide a plentiful supply of high-quality forage for grazing in mid-summer when perennial grasses are often relatively low in yield and/or quality. They are also used to provide hay, silage, haylage and green-chop.

Because of annual establishment, production costs of summer annuals are usually higher than for warm-season perennials (see Table 2), but summer annuals can provide the quantity and quality of forage at a time when it often cannot be supplied any other way. They therefore can serve as a useful part of the total forage program, such as supplement to permanent pastures, and enable better management of perennial pastures and rangelands. Since considerable cost is involved in the production of summer annuals, forage alternatives must be considered in relation to costs, returns and type of livestock enterprise involved. Potential quality of forage provided by summer annuals is usually most profitably utilized by producing dairy cows, steers or beef cows with late calves.

CHOICE OF PLANTS. Several groups and varieties of summer annual plants are used to provide forage. These are listed in Table 1 and in the following discussion. Selection of a type or variety to be grown should be based on adaptation, yield potential and how it will fit particular farm needs and livestock enterprise.

Sorghums. Sorghums for forage can be grouped into two general categories, based on frequency of harvest and use. These are: 1) those harvested frequently as grazing, green-chopping, hay or haylage (sudan hybrids, sudan varieties, sudan-johnsongrass types) and 2) those that are harvested only once or twice during the season for silage, green-chop and sometimes hay and bundle feed (forage and grain sorghum varieties and hybrids).

*Sudan*grass was first introduced and grown in Texas in 1909. It soon became an important pasture plant. After the original introduction, several improved varieties were developed and have been used widely. Then

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came the development and introduction of the *sudan-johnsongrass* types, which are classified as weak perennials. These replaced sudan varieties only under a few conditions.

In more recent years, *sudan hybrids* have been developed and introduced. These are hybrids with sudan as at least one parent. Hybrids essentially have replaced the use of sudan varieties. Currently, more than 100 such named hybrids are being marketed. These are largely hybrids resulting from grain sorghum x sudan crosses. A few are forage sorghum x sudan crosses; and some have sudan or similar-type grasses as both parents. Based on research results on a limited number of these hybrids, the following statements can be made about them:

1. Hybrids generally grow faster, produce more total dry matter and recover more rapidly following harvest than the sudan varieties and the sudan-johnsongrass types.
2. Leaf percentage of hybrids appears to be generally lower than that of the sudan varieties; therefore, leaf yield may not be much greater.
3. Sudan hybrids and varieties appear to be similar in quality when measured chemically, and have given similar performance when utilized by livestock.
4. Hybrid planting seeds range from being similar to grain sorghum to much like sudan. Cultural and management practices are similar for sudan varieties and hybrids.
5. Their best use appears to be for grazing, hay, haylage and green-chop. When considering both yield and quality, the boot stage should normally give the highest total digestible nutrients per acre. Research has shown that total leaf yield reaches a maximum by the time plants begin to boot. Therefore, increased dry-matter yield after this stage is primarily in the form of stems.

Forage sorghum varieties were first introduced and grown in Texas in 1857. Many varieties have since been developed, introduced and widely used. More recently, *forage sorghum hybrids* have been developed and are in use. These hybrids have resulted largely from grain sorghum x forage sorghum crosses. A few are forage x forage sorghum crosses. These hybrids are replacing forage sorghum varieties, but not to the

extent that the sudan hybrids have replaced sudan varieties. Approximately 90 such named hybrids are being marketed. The following general statements can be made regarding these:

1. The later the maturity, the greater the yield of both hybrids and varieties.

2. Within a maturity group, hybrids generally tend to yield more than the varieties.

3. Forage hybrids differ in many characteristics, such as days to maturity, yield, plant height, stalk size and percent head or grain. It is therefore possible to obtain a "tailor-made" hybrid if desired specifications are known. Tall, late-maturing hybrids generally produce very high tonnages, but small grain amounts. Shorter hybrids are available which are medium to early maturing and yield more grain than late-maturing hybrids.

4. Their best use appears to be for silage and green-chop. Forage hybrids and varieties are harvested at a later stage of maturity than the sudan hybrids to take advantage of their yield potential and to obtain maximum total digestible nutrients and a higher dry-matter silage. The soft-dough stage is usually suggested for harvest. At this stage the protein content will be relatively low, but the energy value will be at its maximum.

5. Cultural and management practices are similar for varieties and hybrids.

Grain sorghum hybrids are finding acceptance as a silage crop. Where silage is to serve as a major source of energy, grain sorghum is generally considered second choice to corn, followed by grain-type forage sorghum. For information on production practices for grain sorghum refer to *Keys to Profitable Grain Sorghum Production*, available at county Extension offices.

Millet. Pearl, or cattail, millet is grown to some extent to furnish forage for the same purposes as the sudan varieties and hybrids. Yields are lower generally than the sudan hybrids except under certain sandy, acid soil conditions in East Texas, and in other areas where iron chlorosis is a severe problem. Pearl millet is equal in quality to sudan and the sudan hybrids, and is more leafy. Millet can be safely grazed by horses and does not develop a prussic acid problem. It should be harvested in the boot stage for maximum total digestible nutrients per acre.

Other millets in use are German, or foxtail, and Browntop. These are used primarily as catch-crops for late-season hay production. Their yield potential is considerably less than Pearl millet or sudan.

Corn. A considerable acreage of corn in the state is devoted to silage production. The silage is generally higher in quality than sorghum silage, but the yield is usually less. Much of the corn for silage is produced under irrigation and utilized by dairy cattle and beef cattle in feedlots. For information on production practices for corn, please refer to *Keys to Profitable Corn Production*, available at the county Extension offices.

Legumes. Several warm-season annual legumes are used to some extent for forage production. Legume forage is of excellent quality if harvested at the proper time with leaves retained. The yield, however, is usually quite low when compared to summer annual grasses. The most important annual legumes are *cowpeas* and *soybeans*, grown primarily for grazing and hay.

Annual lespedeza is of some importance in certain areas, but is seldom grown in pure stands, but rather in association with warm-season grasses. Its principal use is for grazing and hay. *Peanuts* and *guar* are sometimes used for forage, but are seldom planted for this purpose alone.

ESTABLISHMENT. Seedbeds should be well prepared, clean and firm. Apply fertilizer before planting, as recommended by a soil test. Use high-quality seed of known varietal purity. Seeding rates as shown in Table 1 should be adequate with good planting conditions and good seed. Plant when soil is warm and moisture is available for germination and good growth. Planting dates may be staggered, if moisture is favorable, to extend the production period.

Crops for silage are usually planted in 36 to 42-inch rows to enable mechanical harvesting. Sudan varieties, hybrids, johnsongrass types and Pearl millet have been shown to produce about the same total forage per acre when planted in either rows, broadcast or close-drill. Close-drill or broadcast plantings produce more at the first harvest, but row plantings give better distribution of production and a longer grazing season, especially when moisture is somewhat limited. Grazing animals trample down less forage in row plantings and also, cultivation for weed control is possible. Irrigation and fertilizer applications can often be handled more easily in row plantings. Broadcast or close-drill plantings are usually suggested for hay production. Refer to Table 1 for additional establishment information.

FERTILIZATION. Adequate plant food is essential for profitable production and quality. Obtain a soil test to determine fertilizer and limestone needs. For broadcast or close-drill plantings, the initial fertilizer application can be made to the seedbed just prior to planting and incorporated with the soil. For row plantings, fertilizers are normally banded or otherwise applied in the bed below the seed zone. In addition to the initial fertilizer applied prior to or at planting, nitrogen top-dressing or side-dressing is essential to stimulate new growth and quality after each harvest.

IRRIGATION. Irrigation is essential for forage production in many areas and used as a supplement in other areas of the state. Due to the cost of irrigation, one should use only well-adapted plants with good potential quality and high production capability. These should be amply fertilized and established at a high seeding rate. Summer annuals, such as sudan hybrids, are capable of high production of good-quality forage and give quick returns. High yielding silage crops, such as the forage sorghum hybrids and corn, also can be profitably produced under irrigation. Good grazing

and harvesting management is necessary. Livestock utilizing the forage should be of high quality and capable of making the most profitable use of the quantity and quality of forage produced.

WEED CONTROL. Adequate seedbed preparation and use of high-quality weed-free seed, planted in a clean seedbed, is helpful in weed control. If planted at an adequate seeding rate and with good growing conditions, such as temperature, moisture and plant food, most annual forage plants will grow off rapidly ahead of many weeds. Broadcast or close-drill plantings, especially, will tend to retard weeds. Chemical weed control is often desirable and profitable. For chemical weed control information for specific summer annual forage crops, please refer to B-1029, *Suggestions for Weed Control with Chemicals*, available at the county Extension offices.

INSECTS. Summer annual forage crops are subject to insect attacks throughout the growing period. Type and severity of the insect problem will govern the control principles to be employed. Where forage growth is sufficient, it is usually more practical to make a forage harvest than to apply insecticides to stop an insect infestation. Since the forage produced is to be utilized by livestock, it is imperative that only those

insecticides approved for such use be applied. Some of the more common insects that may attack summer annual forages are the fall armyworm, aphids, sorghum midge, grasshoppers and certain soil insects, such as wireworms, cutworms and corn rootworms. Information on the identification, life history and control of these and other insects is available at county Extension offices.

DISEASES. Certain diseases may attack summer annual forage species and reduce yields. Producers, following production practices to achieve maximum yields, should be concerned with such possible disease losses. The more common diseases that damage summer annuals, such as sorghums and sudan, are listed below with control principles. Disease reactions of many of the sorghum and sudan varieties and hybrids may be obtained from county agricultural agents. If diseases appear on these or other summer annual forage crops where identification is needed, specimens may be submitted through the county agricultural agent to a plant disease diagnostic laboratory.

- *Seed rots and seedling disease* are caused by several fungi and bacteria. Recommended seed treatment fungicides used by seedsmen usually give protection. Keep crop residue out of the seeding zone and use crop rotation.

Table 1. Summer annual forage plants.

Plant	Planting date	Remarks
Sudan varieties Common, Sweet, Tift, etc.	7-10 lb. in 36-42 in. rows from spring through summer when moisture is available. Plant 20-25 lb. drilled. Cover 1-2 inches.	Principal use: grazing, hay, green-chop, haylage. Harvest in boot, earlier for grazing.
Sudan hybrids (Numerous trade names)	8-12 lb. in 36-42 in. rows from spring through summer when moisture is available. Plant 25-35 lb. drilled. Seed varies in size. Cover 1-2 in.	As above.
Sudan-johnsongrass types Sorghum alnum Columbusgrass DeSotograss, Sorgrass	5-7 lb. in 36-42 in. rows and cover 1-2 in. in spring. Drill 15-20 lb.	Principal use: As above. Harvest in boot, earlier for grazing. Weak perennials, usually require reseeding to maintain stand.
Millet, Pearl or cattail Gahi, Starr, etc.	5-7 lb. in 36-42 in. rows in spring or early summer, or drill 15-20 lb. Cover 1/2-1 inch.	Principal use: grazing, hay, green-chop, haylage. Harvest in boot, earlier for grazing.
Millet, foxtail or German	Drill 20-30 lb. for hay or plant 3-5 lb. in rows for seed. Cover 1/2-3/4 in. after planting in late spring or early summer.	Principal use: quick hay crop. Too shallow rooted for grazing. Harvest as heads start to emerge.
Millet Brown-top	5-7 lb. in 36-42 in. rows in spring or early summer, or drill 15-20 lb. Cover 1/2-3/4 in.	Short growth season. Principal use as catch-crop in upper Gulf Coast.
Forage & grain sorghum varieties & hybrids (numerous)	8-10 lb. in 36-42 in. rows in spring. Cover 1-2 inches.	Principal use: silage and green-chop. Harvest in soft dough.
Corn (several hybrids)	Use 6-9 in. plant spacing in rows when irrigated; 9-12 in. spacing when dryland. Plant in early spring. Cover 2-3 inches.	Used for silage. Harvest in soft to firm dough.
Cowpeas and soybeans	30-50 lb. in 36-42 in. rows or drill 60-90 lb. in spring and summer when soil is moist. Cover 1-2 inches.	Used for hay and grazing. Harvest when pods are 1/2-3/4 filled and before lower leaves begin to drop.
Alyceclover	Drill 15-20 lb. scarified seed to 1/4-1/2 in. and roll. Plant in summer after air temperature is 85° or above.	In limited use for hay in Southeast Texas. Harvest at 15-18 inch height and before leaves begin to fall.
Annual lespedeza kobe	Drill 30-35 lb. in February or early March. Cover 1/4-1/2 inch.	Limited primarily to East Texas. Principally used for hay when planted alone. Harvest in early bloom.

- *Downy mildew*, caused by a fungus, has symptoms including stripping of leaves, sterility of systemically infected plants and down-like appearance on lower leaf surfaces. Rotate with non-related crops and use tolerant hybrids or varieties.
- *Maize dwarf mosaic* gives a typical chlorotic mottle on upper leaves and a red-leaf symptom on highly susceptible sorghums. Susceptible plants are stunted and produce less forage when infected. The virus over-winters in rhizomes of johnsongrass and is transmitted by insects. Control johnsongrass in and around the field. Use tolerant hybrids or varieties.
- *Charcoal rot* is recognized by a shredded-stalk interior near ground level, poor seed development and stalk lodging. Infection by the fungus is likely when drought stress occurs near heading. Other stalk rots may be damaging. Use practices to conserve moisture and to mature crop before usual drought periods.

HARVESTING AND UTILIZATION. Sudan varieties, sudan-johnsongrass types and Pearl millet should be 18-24 inches in height before grazing is initiated. Sudan hybrids should be allowed to reach 24-30 inches of growth. These plants grow and mature very rapidly. In the young, immature stage, they are highest in protein, minerals and digestibility. As they approach the boot stage and later, there is a decrease in protein and an increase in fiber, especially in the stalk, which renders it less acceptable to the animal and of less value. It is important, therefore, that initiation of grazing and harvesting not be delayed too long. After the leaves have been stripped, grazing animals should be removed. Shred the remaining stalks to a height of approximately 6 inches to stimulate new leaf development and then apply nitrogen fertilizer. If needed and available, water should be applied at this period. Resume grazing again when plants have reached approximately 24 inches. There is a need for a system of rotational grazing for best management.

The boot stage is recommended when harvesting the above forages as hay, haylage or green-chop for most classes of livestock. Some adjustments can be made in the harvesting stage according to the quality needs of different classes of livestock. It should be remembered, however, that these plants mature rapidly, and are too often harvested at an advanced stage when the quality is too low to give the desired animal performance. For more information on hay production with these crops, refer to *Keys to Profitable Hay Production*, which is available from the county Extension office.

PRECAUTIONS. Sudan hybrids, varieties and sudan-johnsongrass types have been linked to the horse disease "Cystitis Syndrome." It has occurred only when horses have eaten the green forage, however when cured

as hay no problem has existed. One should therefore avoid grazing or feeding green-chop from these plants to horses. No such problems have been reported with other classes of livestock.

Young plants and leaves of sorghum, sudan and johnsongrass contain a glucoside, which breaks down to release a toxic material known as prussic acid or hydrocyanic acid (HCN). Caution should therefore be exercised in grazing plants that may contain appreciable quantities of the substance. Sorghum generally has a higher prussic acid potential than sudan. Silage and cured plants, such as hay, have not been a problem. Usually there is little danger of prussic acid poisoning in grazing the sudan hybrids and varieties, allow plants to reach at least 18 inches in height before grazing is initiated. Avoid grazing the young growth, such as that which follows clipping, drought or frost. Frosted or frozen leaves should be avoided until they are dry.

ECONOMICS OF PRODUCTION AND UTILIZATION. Although the production costs of the summer annuals will vary, depending on the crop involved, area of the state, etc., annual costs (see Table 2) are relatively high when compared to alternative perennial forage crops which usually can be grown. Quality of forage produced, however, usually is superior to that provided by warm-season perennials at the same season of the year. Careful consideration must therefore be given to the utilization of forage in order to maximize returns. As an example, potential quality of forage provided by summer annuals such as the sudan hybrids can usually be profitably utilized as grazing by producing dairy cows and stocker steers. Utilization with a cow-calf enterprise, or as hay, is usually less profitable than alternative perennial forage crops which may be grown.

Table 2. Estimated per acre production costs for summer annual forage production (hybrid sudans), dryland row planting.

Item	Unit	Amount	Price	Cost per acre
Seed	lb.	10	\$0.20	\$ 2.00
Fertilizer (120-40-40)				\$15.90
Machinery costs (fuel, oil, lube, repairs)	hr.	2.4	1.50	3.60
Total production costs*				\$21.50

*Costs do not include labor and unallocated overhead costs, such as taxes, interest, insurance, depreciation and miscellaneous items.