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EC199 Revised Sorghums in Nebraska

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Sorghums in Nebraska

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Sorghums In Nebraska

O. J. Webster and J. D. Furrer 1/

Restrictions on corn production, below normal rainfall, and the development of hybrids have increased interest in sorghum production in recent years. Of particular interest is the development of hybrid grain sorghum. In that part of the state where Martin, Midland, and Redbine 60 have been most popular, adapted hybrid sorghums have yielded 16% more than the popular varieties under moderate to excellent soil moisture and fertility conditions. In this same area where yields have been low because of limited moisture, adapted hybrids have given 35% greater yields than Martin and Redbine 60.

Where Norghum and Reliance are best adapted RS 501 hybrid has given yield increases of 38% under conditions of good moisture and fertility. However, where moisture was limited the hybrid showed no yield advantage over Reliance and Norghum.

ADAPTATION

Sorghums are adapted to a wide variety of soils found in the Great Plains. However, they do best on land that is fertile, friable, well drained, and level to gently rolling. Sorghum is a hot weather crop and may do quite poorly in cool seasons, especially when frosts are early.

In Nebraska grain sorghums are most popular in the territory south of the Platte River. In seasons of normal temperature or above they can be expected to yield as much as or more than corn. Like corn, they respond well to irrigation on fertile soils. Yields of over 100 bushels per acre can be obtained.

The sorgos (forage sorghums) are commonly used for silage or fodder. They can be grown successfully throughout the state. The selection of varieties which will mature before frost is important. Under favorable conditions and when planted in rows and cultivated, some sorgos may produce 20 tons or more of silage per acre.

1/ Agronomist, Agricultural Research Service, USDA, and Assistant Extension Agronomist, respectively.

SEED SELECTION

Sorghum seed should be pure. A crop planted from impure seed is variable in height, maturity, head shape, and seed color, thus making harvesting more difficult and lowering the quality. All sorghums hybridize freely with each other, making it difficult to maintain purity when two or more kinds are grown close together. Seed fields should be isolated at least 40 rods from other sorghum. Removal of off-type plants from the fields before blooming is essential for the production of pure seed.

When purchasing hybrid seed, make certain the seed has been produced in a field isolated from Johnson grass. Johnson grass may cross with sorghum. It is impossible to tell from seed appearance what type of plants will be produced from a hybrid sorghum seed of questionable parentage. They could produce Johnson grass type plants and be a potential source of serious weed infestation. Hybrid seed carelessly produced is likely to result in variation in plant height and type, seed color, maturity, and in general be disappointing to the purchaser.

Seed certification requirements provide adequate isolation, field inspection, and laboratory analysis to safeguard the genetic purity of the seed. The use of certified seed assures purity and uniformity.

SEED TREATMENT

All sorghum seed should be treated for control of kernel smut and for other organisms that cause rotting of the planted seed. Seed should be treated according to instructions for each specific compound. Treating with some compounds at rates more than the recommended rate will cause serious injury to the seed. Most materials used for treating are poisonous to man and farm animals.

SEEDBED PREPARATION

The principal objectives of seedbed preparation for sorghums are to kill weeds, conserve moisture, and to pulverize and warm soil. Warming is particularly important because sorghum seed germinates poorly when the soil is cold. Weed control is also important be-

cause sorghum plants grow slowly during the early stages of their development. It is much easier to kill weeds before seeding than after the small plants have emerged. Any practical procedure of preparing the seedbed that accomplishes these objectives is satisfactory.

PLANTING

Sorghum is a small-seeded crop. Surface planting with a corn planter or with a grain drill with certain spouts stopped to give the desired row spacing is recommended. Furrow openers should be used if the surface soil is dry to a depth of three inches or more. Listers are not recommended unless the furrows are shallow and have a broad base. Planting in deep furrows in cold soil, as is done with corn, may result in the seed's rotting before germination or in slow seedling growth. Rains falling on listed fields may wash soil into the furrows and cover the seed too deeply for emergence.

DATE OF PLANTING

Sorghum is a hot-weather crop. For this reason, planting should be delayed until the soil is warm enough to insure good seed germination and rapid emergence of the plants. A soil temperature of 68 to 70° F is desirable.

As a general rule, it should be planted about 10 days to two weeks later than the normal time for planting corn. In most parts of Nebraska this will be in late May and early June. In areas where chinch-bug infestations are likely to occur, damage from these pests may be reduced by planting somewhat earlier than is ordinarily recommended.

RATE OF PLANTING

Only seed of high germination should be planted. No sorghum seed should be used that has not been tested for germination, and in general seed that germinates less than 85 per cent is unsatisfactory. Field germination of sorghum seed with good viability will usually average from 30 to 50 per cent less than the laboratory germination. Thus if it is desired to obtain a field stand of two plants per foot of row, it is usually necessary to drop four to five seeds per foot to compensate for reduced field germination and loss of plants by other hazards.

Under dryland conditions most grain sorghum is planted too thick rather than too thin for maximum yields. When planting in 40 or 42 inch rows, drop 5 to 6 seeds per foot of row in eastern Nebraska and 3 to 4 seeds per foot of row in central and western Nebraska. Under irrigation, planting rates may be increased. Thicker planting rates under favorable moisture conditions produce smaller heads which are easier to combine. Quicker shading of the ground also results from increased planting rates and this may help control weeds.

Sorgos (forage sorghums) usually yield more and give higher quality forage from closer spacings either when grown in rows or when drilled. When planted in rows in eastern Nebraska, drop 8 to 10 seeds per foot of row and 4 to 6 seeds per foot of row in central and western Nebraska. When drilled for hay, about 50 pounds of seed per acre should be sown in eastern Nebraska and 35 pounds per acre farther west in the state.

Early maturing hybrids and varieties such as RS 501, Reliance and Norghum should be planted at a rate of 4 to 6 seeds per foot of row throughout the state.

Rule of thumb for planting: The number of seeds dropped per foot of row is approximately equal to the number of pounds planted per acre.

DEPTH OF PLANTING

Sorghum seed should generally be covered with 1 to 1 1/2 inches of soil. If the seed is planted shallower than this the surface soil may dry out before it germinates and if planted deeper the seedlings may fail to merge. In light soils the seed may be placed somewhat deeper than in heavy soils.

It is important that the soil be firmly packed, since this retards drying of the soil immediately surrounding the seed.

CULTIVATION

Sorghum planted in rows is cultivated the same as corn, the amount necessary depending on growth of weeds. For surface-planted sorghum a light harrowing or use of a

rotary hoe before emergence and after the crop is two to three inches in height will eliminate most of the problem of weed control. These operations followed by two or three cultivations with a shovel cultivator should be adequate. If the crop is listed, cultivation is the same as for corn.

CHEMICAL WEED CONTROL

The use of 2, 4-D to control broadleaf weeds such as pigweed, cocklebur, sunflower, and ragweed in growing sorghum should be only a supplement to mechanical cultivation. In years when timely cultivation is impossible because of wet fields, chemicals may have to be used for weed control. There is no time in the growth of the plant when some injury might not occur. The most critical periods are (1) flowering time when spraying is likely to cause considerable head sterility and (2) when the plants are less than 4 inches high, at which time spraying is likely to inhibit root development.

The safest time to spray grain sorghum is during the four to fourteen inch stage. Recommended rates of 2, 4-D are 1/2 to 1 pound of the amine salt or 1/4 to 1/2 pound of the ester formulations.

IRRIGATION

Sorghum may be grown successfully under irrigation and usually produces high yields of grain or forage. Yields may be increased somewhat under irrigation by narrowing the row widths to less than the customary 40 inches and establishing a stand of 3 to 4 plants per foot of row. Otherwise cultural practices are similar. Later-maturing varieties may be grown under irrigation than on dry land at the same location, because the more favorable water supply hastens plant development.

Sorghums appear to have particular merit where abundant water for irrigation is available only in the fall and spring. If the subsoil can be thoroughly filled with moisture, sorghums can usually produce a satisfactory crop without additional summer irrigation.

FERTILIZATION

The plant food requirements for sorghum are quite

similar to those of corn except sorghum is likely to show a greater response to phosphate. On soils low in nitrogen, apply about 40 pounds of nitrogen in late June for grain sorghums and at planting time for forage varieties. Higher rates should prove more profitable on irrigated land.

When a soil test shows a field is low in available phosphate, apply it before or at planting time. When phosphate is applied at planting time, care should be taken to place the fertilizer close to the seed but not in contact with it. Broadcasting phosphate fertilizer ahead of listing is much less satisfactory than ahead of a surface planter. If sorghum is to be listed in a field requiring phosphate, it should be banded near the seed. Twenty to forty pounds of available phosphate per acre is suggested where fertilizer is banded in the row; use 2 to 3 times that amount if it is broadcast before planting. Broadcast applications should be worked into the seedbed by disking or plowing prior to planting.

HARVESTING FOR GRAIN

Practically all grain sorghum is now harvested with combines. The crop should be left standing in the field until the grain is thoroughly dry unless artificial drying facilities are available. During good drying weather the crop is generally ready for combining 10 days to two weeks after a good killing frost.

The combine reel should be equipped with wide slats and set so that they just clear the sickle bar. The cylinder speed should be reduced to one-half or two-thirds the normal speed used for threshing small grain. The operator's manual provided by the manufacturer gives recommendations for correct speed and other necessary combine adjustments.

STORING GRAIN SORGHUM

Difficulties with heating and spoilage of sorghum grain in storage are quite common. Such problems are generally due to excess moisture in the grain at the time of harvesting. Modern drying facilities will help eliminate this problem. When mechanical drying facilities are used the

grain can be combined with a moisture content of about 20% with considerable saving in field loss in those years when the crop may lodge. Drying to a moisture content of 13% or less is necessary for safe storage.

Cracked kernels and pieces of stems and stalks in combined grain may increase danger of heating and spoilage. Removal of such inert materials before the grain is binned may reduce moisture content of the grain 1/2 to 1 1/2%.

HARVESTING FOR ROUGHAGE

Definite rules cannot be given regarding the time of harvesting forage sorghums.

In general when sorgos are utilized as hay, cured fodder, or silage, the seed should be permitted to reach the hard dough stage before the crop is harvested. At this time the sugar content has reached a maximum.

When the soil moisture becomes exhausted in September and the lower leaves begin to fire, the crop should be harvested although the heads are not matured. If this drouth condition occurs in August it would be advisable under most conditions to delay harvesting. If there are early fall rains the plants will revive and a good growth of forage may be produced before frost. It is fairly well established that sorghum will make good feed even if cut prematurely.

Silage made from immature sorghum may become too acid in the fermentation process. However, if drouth injures the crop before maturity, it can be safely ensiled.

When close drilled or broadcast, sorghum is commonly mowed and cured in the windrow. If the crop is not too tall and coarse, it may be cut with a grain binder and shocked in the field for curing. This method often facilitates handling and curing.

SORGHUM IN THE ROTATION

The expression is often heard that sorghum is "hard on the land." The principal reasons for this are the greater depletion of soil moisture and the temporary tie-up of available nitrates. The nitrate tie-up effect can be over-

come by adding nitrogen to the soil in the form of manure or commercial fertilizer and by using more legumes in the rotations.

Where summer fallow is practiced, a good rotation is fallow, wheat, and sorghum. In other areas corn and sorghum are better crops with which to follow sorghum than are small grains. One of the things to avoid in rotations is the sowing of winter wheat on land which has been in sorghum during the same year. Such a practice should be followed only if the soil has a good supply of moisture, and nitrogen fertilizers are applied at seedtime. Since winter wheat requires larger quantities of nitrates earlier in the season than any other crop, it suffers most from the shortage of nitrates.

UTILIZATION

Sorghums are utilized largely in the same manner as corn. The whole sorghum plant may be fed either cured or ensiled. The composition of sorghum grain is nearly the same as that of corn and it is generally considered that its feeding value is nearly equal to that of corn for most classes of livestock. Like corn, sorghum grain must be supplemented with other feeds to provide a balanced ration.

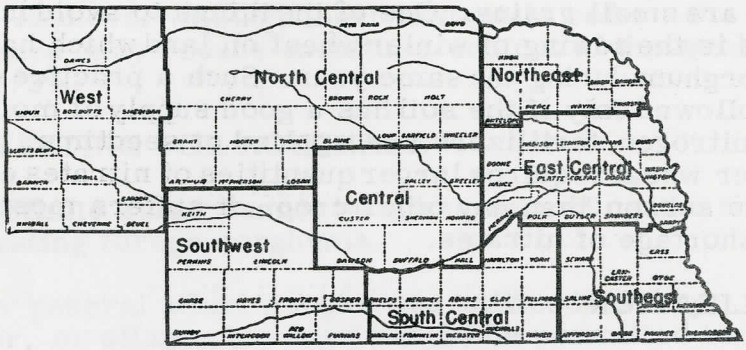
Because of the small size and hardness of the grain much of it is passed through the animals undigested. The grains should therefore be cracked for all classes of livestock, except hogs, sheep, and poultry when self-fed. The brown-seeded varieties are somewhat unpalatable because of their bitter taste, and are eaten less freely than those with white, yellow, or red seed.

LIVESTOCK POISONING

All sorghums are capable of producing enough prussic (hydrocyanic) acid to cause the death of livestock when pastured under certain conditions of growth. The leaves, particularly young leaves, contain most of the poison but young branches and suckers on large plants may be as dangerous as young plants. New plants or shoots and regrowth from stunted or frosted plants may cause death when eaten by animals. Cattle and sheep should not be pastured on sorghum when conditions are favorable for the development of prussic acid.

RECOMMENDATIONS

Grain and forage sorghum varieties and hybrids are recommended by cropping district. Each recommended hybrid or variety is described briefly.



Principal Cropping Districts in Nebraska

RECOMMENDED GRAIN SORGHUMS

District	Varieties	Hybrids	
Southeast	Midland	RS 501*	RS 610
	Redbine 60	RS 590	Tex 620
		RS 650**	
East Central	Martin	RS 501*	RS 610
	Midland	RS 590	Tex 620
	Redbine 60	RS 650**	
Northeast	Martin	RS 501*	
	Midland	RS 590	
	Norghum	RS 610	
	Redbine 60	Tex 620	
	Reliance	RS 650**	
South Central and Central	Martin	RS 501*	RS 610
	Midland	RS 590	Tex 620
	Redbine 60	RS 650**	

Continued on page 11.

Recommended Grain Sorghums (continued)

District	Varieties	Hybrids
Southwest	Coes	RS 501*
	Martin	RS 590
	Midland	RS 610
	Redbine 60	Tex 620
	Reliance	RS 650**
North Central and West	Coes	
	Norghum	RS 501
	Reliance	

* For late plantings.
** Recommended only under irrigation or favorable moisture conditions.

DESCRIPTION OF RECOMMENDED GRAIN SORGHUMS

MIDLAND

Midland is a selection from Kalo that matures in a little over 100 days. It is a combine type with an average height of 3 1/2 feet. It is quite lodge resistant, combines easily, and threshes free from the glumes. It has a short semi-compact head with reddish-brown, kalo-type seed. Yields of over 100 bushels have been reported on farms in Nebraska.

MARTIN

Martin is a selection from Wheatland that matures in slightly over 100 days. It is a combine-type that grows about 3 1/2 feet tall. It is quite lodge resistant. It is susceptible to chinch bugs and should not be grown in southeastern Nebraska. Martin is a good yielder. It has long, semi-compact heads with fairly large, orange-brown colored seeds. The seed of Martin is of a harder texture than Midland and stands are more easily obtained. It also has a dry head stem which permits the crop to be combined before frost.

COES

Coes matures in slightly less than 100 days. It grows about 4 1/2 feet tall. It is fairly lodge resistant and yields well. Its earliness makes it a good variety for the pan-

handle region and southwestern Nebraska. The grain is small and white, sometimes with pink spots. The heads are long, erect, and semi-compact to open. Coes is often harvested with a grain binder and used as bundle feed.

NORGHUM

Norghum is an early-maturing grain sorghum developed and released by the South Dakota Agricultural Experiment Station. At Alliance it matures approximately two weeks earlier than Martin. It is a combine-type growing approximately four feet tall. Norghum is adapted in the west district and the northern section of the north central district. In the remainder of the state it is a suitable variety for late planting. It should be seeded at approximately one-third heavier rate than other grain sorghums. Norghum tends to lodge quite badly if left standing long after maturity.

RELIANCE

Reliance is an early maturing grain sorghum released by the South Dakota Experiment Station in 1952. It is about ten days earlier than Martin and Midland and about three days later than Norghum. It grows about 38 inches tall and stands well late in the fall. In seed size and color it is similar to Midland. Yields compare favorably with other recommended varieties.

REDBINE 60

Redbine 60 is a red-seeded, double-dwarf combine variety recently distributed by the Texas Agricultural Experiment Station. It is a variety which will compete with Martin. It is a day or two earlier in heading, and has a larger and softer seed which may be better as a livestock feed. Yields have been comparable to those of Martin and Midland. Its earlier maturity is desirable for the central part of the state.

HYBRID RS 501

RS 501 is a cross between ms Combine Kafir 60 and Norghum. This is an early hybrid, with approximately the same maturity as Reliance. When yields of over 30 bushels are expected, this hybrid will out-yield Norghum

and Reliance by a substantial margin. It has excellent grain qualities and the grain threshes clean. Under irrigation it grows up to 12 inches taller than Reliance. In lodging, RS 501 has not given trouble under irrigation. Its greater height may partially account for a tendency to lodge when available moisture is in short supply. Under dry conditions, it lodges less than Norghum but more than Reliance.

HYBRID RS 590

RS 590 is a cross between ms Combine Kafir 60 x Redbine 60. It heads one or two days earlier than Martin. The heads are well extended above the flag leaf which is a desirable characteristic for combine harvesting. Its yield has averaged higher than Martin and Redbine 60 in yield tests during the past two years.

HYBRID RS 650

RS 650 is a cross between ms Combine Kafir 60 and Plainsman. It heads in about the same number of days as Martin. It has a semi-dry head which dries more slowly than Martin. As yield tests indicate, RS 650 has a good potential under irrigation. Its yield under droughty conditions has not been as good. For this reason production of RS 650 should be limited to irrigated or favorable non-irrigated moisture conditions.

HYBRID RS 610

RS 610 is a cross between ms Combine Kafir 60 x SA 7078. It is approximately three days earlier in heading than Martin. It has a dry head stalk at maturity. The head is well extended above the flag leaf and the large grain is lighter red than RS 590. This hybrid has a good yield record among the common varieties and hybrids tested in recent years. Although lodging has not been a factor under irrigation, RS 610 is more subject to lodging under stress due to droughty conditions.

HYBRID TEXAS 620

Texas 620 is a cross between ms Combine Kafir 60 x TX. 07. It has about the same maturity as Martin, and has a dry head with good extension. The grain color is

red, similar to that of RS 590. In yield, its performance in Nebraska has been similar to RS 590.

RECOMMENDED SORGOS

District	Varieties	Hybrids
Southeast	Atlas Axtell Rox Norkan	RS 301 F RS 302 F RS 303 F
East Central	Atlas Axtell Rox Norkan	RS 301 F RS 302 F RS 303 F
Northeast	Axtell Norkan Rox Leoti	RS 301 F RS 302 F RS 303 F
South Central, Central, and Southwest	Axtell Norkan Rox Leoti	RS 301 F RS 302 F RS 303 F
North Central	Leoti Rox Norkan Fremont	RS 301 F* RS 302 F* RS 303 F*
West	Leoti Fremont	RS 301 F* RS 302 F* RS 303 F*

* For irrigated land only.

DESCRIPTION OF RECOMMENDED FORAGE SORGHUMS

ATLAS

Atlas is a full-season variety that requires over 120 days to mature. It grows over 7 feet tall and produces the highest forage yields of any of the recommended forage sorghums grown in southeastern Nebraska or under irrigation farther west. It also produces a grain yield comparable to the better grain sorghums. Atlas is superior to other forage sorghum varieties in resistance to lodging. It is highly resistant to damage by chinch bugs. Heads of Atlas are medium in length, erect, and compact. The kernels are medium-sized and are white with reddish-brown to black spots.

AXTELL

Axtell is an early selection from Atlas. It matures about a week earlier and the plant is slightly shorter. At Lincoln it yields an average of about a half ton less forage per acre than Atlas, but it exceeds Atlas in grain yield by about seven bushels. The heads and kernels are similar to those of Atlas.

NORKAN

Norkan matures a few days earlier than Axtell and grows over 6 feet tall. It is best described as an early Atlas, but it is not as lodge resistant. At Lincoln, Norkan has yielded a little less than Axtell in both grain and forage, but at North Platte it has yielded about the same amount of grain as Axtell. Heads are medium in length, erect, and compact. Kernels are medium-sized and are white with reddish-brown to black spots.

LEOTI

Leoti matures in 105 to 110 days and grows over 6 feet tall. The forage is of excellent quality. Leoti yields about the same as Norkan and Rox Orange, but less than Atlas and Axtell. It lodges severely under certain conditions. The heads are medium in length, erect, and semi-compact with the upper branches of the head drooping. Much of the threshed grain is enclosed in the shiny, orange-brown glumes. The seed is light brown. Its grain yield is somewhat below that of Atlas, Axtell and Norkan, but is equal to that of Black Amber and Rox Orange.

ROX ORANGE

Rox Orange matures in 105 to 110 days and grows over 6 feet tall. It yields slightly more forage and grain than Black Amber and Leoti. The forage is of a very high quality. Rox Orange is especially suited for farm production of syrup and molasses. The heads are quite compact and erect. The kernels are orange-brown in color.

FREMONT

Fremont matures in 95 to 100 days and grows about 6

1/2 feet tall. It is best described as an early maturing Early Sumac, and at North Platte it has given yields about equal to those of Early Sumac. The heads are compact and the kernels are light reddish-brown in color.

FORAGE HYBRIDS

Forage hybrids recommended for Nebraska are:

RS 301F (ms Combine Kafir 60 x Rox)
RS 302F (ms Combine Kafir 60 x Leoti)
RS 303F (ms Combine Kafir 60 x Axtell)

These hybrids will average from two to four days earlier in heading than their respective pollinators (Rox, Leoti and Axtell). In general they are more productive than the pollinators but will not yield as well as Atlas (in areas where it is recommended) which matures a week or more later. RS 301F and RS 303F are sterile and will not set seed unless there is pollen available from fertile plants growing in the field. Until the value of sterile plants for silage and bundle feed is determined, it is recommended that a pound of seed of Rox be blended with each 20 pounds of seed of RS 301F and the same amount of Axtell with RS 303F. RS 302F is fertile and will produce a plant similar to that of Leoti except that the spotting on the stalks and leaves will be purple instead of tan. RS 302F like Leoti is more susceptible to lodging than Rox, Axtell or the other two hybrids.