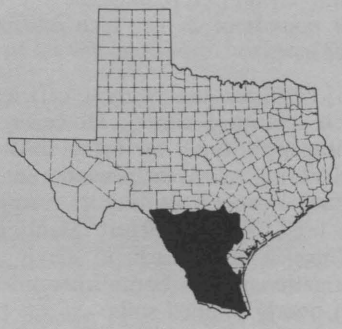
FACT SHEET

L-890

KEYS TO PROFITABLE GRAIN SORGHUM PRODUCTION IN THE RIO GRANDE PLAIN AND LOWER RIO GRANDE VALLEY



Over 900 thousand acres of grain sorghum are grown on the deep, level to slightly sloping soils of the Rio Grande Plain. About 550 thousand acres are located in the northern and eastern counties and 350 thousand acres occur in the Lower Rio Grande Valley. Although the frost-free period is 260-340 days, variable distribution of the 18 to 30-inch annual rainfall, high summer temperatures and late season insect buildup limit grain sorghum planting to late winter or early spring. Irrigated production occurs in most counties but more widely in the valley counties. Problems with drainage, salinity and irrigation management occur in some areas.

Cropping Sequence

A farming system that avoids growing the same crop on a field in succeeding years helps to reduce some disease, insect and weed problems, but suitable systems vary for individual farms. Two-year rotations of grain sorghum and cotton are favored in much of the area. Flax is used in some rotations and permits Johnsongrass eradication during the long fallow period following harvest. Longer term rotations have shown advantages where livestock is available. Farm program regulations offer opportunities to grow soil-improving crops in diverted acreage. One such rotation could be oats-hubam sweetclover for 1 or 2 years followed by cotton, then grain sorghum. Plow hubam out each year as soon as blooming starts to avoid a weed problem with volunteer crops. On irrigated soils, a wider variety of crops may be considered.

Keep records on the location of crops since chemical residue may require changes in the system.

Seedbed Preparation

Begin seedbed preparation after harvesting the previous crop to allow more time to store soil moisture, decay crop residue, apply fertilizer and firm the soil for planting. Early listing may be needed on coarse textured soils to control wind erosion.

Such operations include: (1) shred stalks of a previous crop promptly, (2) chisel, disk, plow or bed to stop crop and weed growth and to mix the plant residue in the soil, (3) bed or list land by early fall and complete rebedding by December, and (4) control winter weeds with chemicals, row disk or by rotary hoe to avoid disturbing the seedbed.

Forming a raised flat surface with bed shapers on irrigated land may improve stands and seedling growth. If two narrow rows per bed are planted, it permits use of precision planters. Problems with salt affecting germination and seedling growth may be reduced by planting on the shoulder of wide-shaped beds or in the furrow of conventional beds since salt accumulation is higher at the top and center of beds.

Fertilization

A balanced fertilizer program is essential for optimum yield and water use efficiency plus growth to maturity in a normal time interval. The wide range of soils, rainfall, irrigation resources and management practices requires tailoring fertilizer applications for each field situation. The best guide is a soil test recommendation obtained from a reliable laboratory that can correlate the amount of available nutrients in the soil with local fertilizer research and farm trials. The amount of fertilizer needed depends upon the level of available nutrient in the soil and yield potential. Send the laboratory a representative soil sample plus general soil description and cropping information.

If a soil test is not available, some general considerations on needs at 3,500-pound dryland and 6,000-pound irrigated yield levels include:

For dryland production soils may need about 40 pounds of nitrogen and 40 pounds of P_2O_5. Very few need potassium (K_2O).

Most irrigated soils are low in nitrogen and usually require 80-120 pounds of N. Sandy soils may be low

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in phosphorus and need 30-60 pounds of P_2O_5. Phosphorus requirements on other soils may range from 0-30 pounds of P_2O_5. Potassium is usually adequate.

If considerable undecayed crop residue remains at planting time because of late seedbed preparation or a high residue crop, increase the nitrogen application by 15 pounds of N for each estimated ton of dry residue per acre.

Fertilizer use is most efficient when application is near planting time. However, it may be easier or cheaper to apply on many soils in the late fall before rebedding or in early winter in the sides of beds with chisel or sweep applicators. Apply anhydrous ammonia at least 2 weeks before planting or as a sidedressing. Nitrogen may leach in sandy soils and under high irrigation rates. Some nitrogen may be lost to the air on poorly drained soils.

Place N and K_2O 4 inches to the side and 4 inches below where the seed will be. P_2O_5 near or in contact with the seed may improve production in a cold wet spring. If sidedressing is needed, apply within 3-5 weeks after emergence near the side roots. Place anhydrous ammonia midway between the rows.

Zinc and iron deficiencies occur on some soils. Iron deficient areas may need two to three foliage sprays of iron sulphate at 10 to 14-day intervals. Soil applications of zinc sulphate or chelate can be used.

Seed

Since seed is a low production cost item, purchase only that of best adapted hybrids with high germination, vigorous seedling growth and a minimum of off-types. Seed produced by reliable seedsmen and properly treated with a fungicide and insecticide is the best assurance of meeting these requirements.

Select a hybrid based on previous performance under local or similar conditions. Ask your county agent about hybrids grown in local trials and in Texas Agricultural Experiment Station tests. Yield, standability, tolerance to important diseases in the area and maturity requirements should be considered. Later maturing hybrids have a higher yield potential under irrigated conditions and normal planting dates. Earlier maturing hybrids are often favored under the usual rainfall distribution of dryland production, especially if planting is delayed or moisture is short.

Planting

Plant near the average frost date when the soil temperature at about 7 a.m. reaches 55 degrees F. This will be from late February to mid-March in the Valley and March 1 to April 5 further north in the Rio Grande Plain.

Use 1 pound of seed for each 700 pounds of expected yield per acre regardless of row spacing. Plant about 1½ inches deep in moist soil. On medium to fine textured soils firm the drill row by lightly rolling to conserve moisture and insure germination.

Higher yields may be produced with row widths averaging 30 inches or less if weed control and other cultural practices can be performed properly. Shaped beds and precision planters are desirable where two rows per bed are planted. Planting on the shoulder of wide shaped beds or in the furrow may be needed where salt problems occur with irrigation.

Stubble Cropping

Stubble cropping is sometimes considered because of relatively low production costs on a second crop. However, insects are a frequent problem and rainfall is often limited and yields are less predictable. About 200 days are required from planting to harvest of the second crop which may delay seedbed preparation for the next year and also tends to increase certain insects and diseases.

Some procedures for stubble cropping are: (1) if needed, apply enough phosphorus and potassium for both crops, (2) after first harvest, cultivate to control weeds and apply nitrogen at least 10 inches away from the row, (3) shred the stalks to height of 3 inches and (4) check frequently for insects and control if necessary.

Irrigation

High yield grain sorghum will use 18-24 inches of water which may be supplied from moisture stored in the root zone before planting and from seasonal rainfall or irrigation. Roots of mature sorghum plants can penetrate 4-6 feet in deep, permeable soil, but may be shallower in less favorable conditions. Adequate moisture is necessary during the critical growth stages of boot, bloom and soft dough. Although grain sorghum is less salt tolerant than cotton, satisfactory yields can be produced under moderately saline soil conditions (salt index or mmho/cm 3.0 to 5.0), if water application rates and soil permeability provide leaching to avoid excess salt accumulation. Information on obtaining soil and water salinity tests can be obtained at the county agent office.

Preplanting irrigation may be used if rainfall has not filled the root zone. Additional water may be required for leaching excess salts from the root zone where water quality is a problem. During the growing season, either apply water each time 50-60 percent of the available moisture in the root zone has been used or with limited water supply irrigate for ample moisture during the early boot to soft dough stages. Additional water for leaching may be needed with each irrigation when using poor quality water. Rainfall, soil texture, rooting depth, climatic conditions and salt content of the soil and water will determine the number of irrigations and the amount of water per irrigation. Lighter but more frequent irrigation is required for sandy, shallow soils.

Figure 1 shows the daily water use by grain sorghum. Daily water use begins to increase at the seven-leaf stage and may be 0.30 inch per day during the boot to grain formation stages.

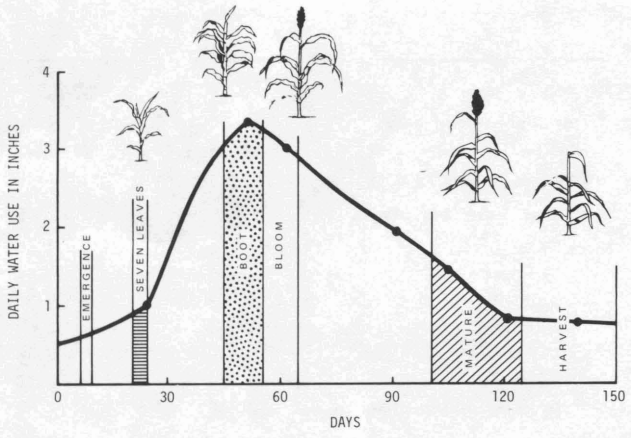

Fig. 1. Daily water use from planting to maturity.

Weed Control

Grass and broadleaved weeds reduce sorghum yields and may interfere with harvesting. Satisfactory control is often obtained by proper seedbed preparation and timely shallow cultivation. Herbicides may be required to control certain weeds or where rainfall prevents prompt tillage. In selecting herbicides consider (a) label clearances, (b) effectiveness on specific weeds, (c) effect on sorghum, nearby crops and following crops and (d) cost. General topics on herbicides are given below.

Application before Planting

Johnsongrass — After previous crop, broadcast or spot spray with Dalapon when Johnsongrass is 8-12 inches tall. If applied near planting, row disk beds 3 days later and wait at least 18 days to plant.

Annual broad-leaved winter weeds — Apply 2,4-D type herbicides when weeds are small and at least 3 weeks before planting.

Application at Planting

Annual broad-leaved and *grass weeds* — Use Herban, Milogard or combinations of Milogard with Herban or Lorox. Combinations may give better control of large-seeded grasses. Do not use on sands or loamy sands. Band applications are cheaper and may leave less residue than if broadcast. Fall crops can follow Herban but not Milogard. See B-1029 concerning spring crops.

Application after Planting

Broad-leaved weeds and *some small seeded grasses*—AAtrex, with a surfactant or a non-toxic oil added, can be used 3 weeks after sorghum emergence to control small (2-inch) weeds except on sandy or loamy sand soils. Residue limits next crop to sorghum or corn.

Broad-leaved and *grass weeds* — Karmex with a surfactant as directed spray to small weeds after the crop is 15 inches tall, regardless of soil texture.

Broad-leaved weeds — Use 2,4-D after the crop is 6 inches tall and before flowering. Use salt formulations with a low vapor hazard, use precautions against spray drift and comply with restrictions in regulated counties. Banvel can be used during 10-25 days after sorghum emergence. At recommended rates, it is less hazardous to nearby crops than 2,4-D.

Insects

Description of the more common insects that may attack grain sorghum in this area and some principles of control follow.

Sugarcane borer (most common borer in this area) and *southwestern corn borer* larvae feed within crown and stalk, causing stunting, lodging and yield loss. Plant early to avoid late-season buildups. Apply insecticides when 25 percent of plants show injury. Shred and plow under stalks promptly after harvest.

Corn earworms and *sorghum webworms* feed on developing and maturing grain. Corn earworm is cannibalistic and insecticides often are not needed. Plant early to avoid late-season buildups. Check plants frequently after heading. Apply insecticides when necessary.

Fall armyworm larvae feed on seedlings and in the whorl during preboot stage, causing leaf ragging and "buck shoting." Apply insecticides when stand or bud damage is threatened.

Aphids suck plant juices. Severity of damage depends upon plant size, kind and number of aphids, parasites and predators. The yellow sugarcane aphid and greenbug may cause losses from the seedling through grain formation stages. The corn leaf aphid sometimes causes seedling loss. Use Extension publications for detection and control information.

Sorghum midge adult deposits eggs in florets at blooming time. Larvae consume developing seeds, resulting in "blasted" heads. Plant early to avoid late-season buildups. If midge are present and damage is expected, begin insecticide applications when about 50 percent of heads begin blooming.

Soil insects (seed-corn maggot, corn rootworms, wireworms, cutworms) in larval stages feed on seeds, seedlings, roots or stems of sorghum. Preplant soil application is the most effective control, but seed furrow treatment often is satisfactory. Treatments on seedlings may control cutworms.

Other insects (chinch bug, false chinch bug, stinkbug, flea-beetle) occur in local areas. Chinch bugs suck juices from young plants. Flea beetles chew holes in leaves. Stinkbugs and false chinch bugs suck juices from developing grains. Apply insecticides when populations reach damaging levels.

Diseases

Description of the more common diseases that damage sorghum in this area and control principles follow. For best results, use a combination of suggested control practices.

Seed rots and *seedling disease* are caused by several fungi and bacteria. The recommended seed treatment fungicides used by seedsmen usually give protection, but keep corn residue out of seeding zone and use crop rotation.

Downy mildew, caused by a fungus, has symptoms including striping of leaves, sterility on systemically infected plants and down-like appearances on lower leaf surface. Rotate with nonrelated crops. Use tolerant hybrids.

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 yield less if infected within 45 days after emergence. The virus overwinters in rhizomes of Johnsongrass and is transmitted by insects. Control Johnsongrass in and around field. Use tolerant hybrids.

Head smut, caused by a fungus, produces smut galls on the stalk and heads are sterile. Use resistant hybrids. Rotate with crop not related to sorghum.

Charcoal rot causes shredded stalk interior near ground level, poor seed development and stalk lodging. Infection by the fungus is likely when drouth stress occurs near heading. Other stalk rots may be damaging. Conserve moisture and mature crop before usual drouth periods.

Anthracnose, caused by a fungus, forms circular to oval spots on leaves. Neck and stalk rots occur if the fungus penetrates the stalk. Use tolerant hybrids and crop rotation where the problem exists.

Leaf spots and *rust,* caused by several fungi and bacteria species, produce spots, stripes, pustules or streaks on leaves depending on casual organism. Use crop rotation.

Nematodes stunt the root system, resulting in poor uptake of water and nutrients. Rotate with crops which do not host the nematode involved.

Desiccants

In some situations, a desiccant to kill leaves on sorghum or grass and certain broad-leaved weeds may help dry the grain faster or reduce harvesting problems with vegetation. Desiccants presently available for grain sorghum used as feed or food usually do not kill the stalks. Sodium chlorate may be applied up to 6 pounds per acre of active ingredient when the sorghum is fully mature and 7-10 days before harvest. Four pounds usually are sufficient for desiccation of sorghum and grass. Nitrogen solutions may be applied at a minimum of 30 pounds of total nitrogen per acre. Add a wetting agent. With either material, use 5-10 gallons of solution per acre for aerial applications and 20 gallons per acre with ground equipment.

Harvesting

Harvest when moisture in the grain has reached a proper level for available handling facilities. Delay means losses. Acceptable moisture for storage is 13 percent. The grain may be harvested with up to 18 percent moisture if drying facilities are available. The combine operator should follow the manufacturer's manual for proper combine adjustment to avoid waste. Trash and cracked grain favor stored grain insects plus moisture accumulation and mold damage. Practice good sanitation with all harvesting and storing. Protect grain from rodents and insects.

Estimated Yield, Income, Costs and Income Over Specified Costs Per Acre

	Dryland	Irrigated
Yield—pounds per acre	3500	6000
Price—per cwt	$ 1.85	$ 1.85
Income—per acre[1]	$64.75	$111.00
Preharvest costs per acre		
Seed	$ 1.00	$ 1.60
Fertilizer	6.40	9.70
Herbicide		4.00
Irrigation		12.00
Machinery	4.27	5.66
Labor	4.34	8.48
Interest on operating capital	.64	1.66
Total specified preharvest costs	$16.65	$ 43.10
Harvesting costs per acre		
Combining—custom	$ 5.25	$ 9.00
Hauling—custom	3.50	6.00
Total specified harvesting costs	$ 8.75	$ 15.00
Total specified costs	$25.40	$ 58.10
Income over specified costs[2]	$39.35	$ 52.90

[1]Does not include any government payments.

[2]Costs do not include unallocated costs such as interest, taxes and insurance on farm real estate and machinery, depreciation on farm buildings and machinery and pickup expense.

Cultural Practices, Usual Dates, Times Over, Hours Per Acre, Cost Per Hour and Cost Per Acre for Dryland and Irrigated Grain Sorghum

Cultural practice	Usual date	Times over	Hours per Acre		Cost per Hour		Cost per Acre	
			Labor	Machinery	Labor	Machinery	Labor	Machinery
Shred stalks	June-July	1	.28	.25	$1.30	$1.24	$ .36	$ .31
Disk	June-July	1	.28	.25	1.30	1.32	.36	.33
Deep plow[1]	July-Aug.	0.3	.33	.3	1.30	1.44	.43	.43
Deep plow[2]	July-Aug.	0.5	.55	.5	1.30	1.44	.72	.72
Disk[1]	Aug.-Sept.	1	.28	.25	1.30	1.32	.36	.33
Disk[2]	Aug.-Sept.	1.5	.42	.38	1.30	1.32	.55	.50
Bed	Oct.-Nov.	1	.36	.33	1.30	1.56	.47	.51
Fertilize	Nov.-Dec.	1	.36	.33	1.30	1.28	.47	.42
Rebed	Dec.-Jan.	1	.36	.33	1.30	1.56	.47	.51
Plant	Feb.-March	1	.36	.33	1.30	1.56	.47	.51
Apply herb[2]	Feb.-March	1	.15	.1	1.30	1.31	.20	.13
Cultivate	March-April	2	.73	.66	1.30	1.39	.95	.92
Irrigation[2]		3	2.00		1.30		2.60	
Make ditches[2]	March-May	2	.33	.3	1.30	1.32	.43	.40
Level ditches[2]	April-June	2	.33	.3	1.30	1.32	.43	.40
Harvest	June-July		Custom					
Total—Dryland			3.34	3.03			$4.34	$4.27
Total—Irrigated			6.51	4.06			$8.48	$5.66

[1]Practices do not apply to irrigation budget.

[2]Practices do not apply to dryland budget.

More detailed information on grain sorghum production is available at the county Extension offices.

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