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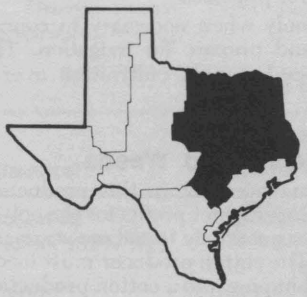

COTTON PRODUCTION IN THE BLACKLAND PRAIRIE AND GRAND PRAIRIE

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To achieve high cotton lint yields, producers must have the ability to make sound decisions in land selection, production methods and optimum timing of specific operations. The objective of this Fact Sheet is to furnish information on key practices for profitable cotton production.

Cultural Practices

Land preparation. Preparing land for cotton should include the necessary soil and water conservation practices. Sloping land should be terraced using applicable graded, bench or parallel types. Graded furrows should be considered in some areas. Technical assistance is available through your local Soil and Water Conservation Service.

Land preparation should start immediately after harvest with shredding of stalks from the current crop. Producers should comply with the cotton plow-up deadline set by the State Pink Bollworm Control Program. Thorough shredding of high-residue crops will make all the succeeding operations of plowing under residue, precision planting, weed control, fertilizer application, bed shaping and high speed sled cultivation on shaped beds more efficient.

Shred and plow under cotton stalks, boll residues and volunteer cotton to a minimum depth of 6 inches. This practice reduces or prevents winter carryover of pink bollworms and boll weevils. Chiseling and plowing should be conducted early to take advantage of fall rains. Floating or leveling aids water distribution on irrigated land.

Early fall listing or bedding for final seedbed preparation allows the soil time to store moisture and to firm before planting. Some areas may require rebedding. This should be done 6 to 8 weeks before planting, but not after February 15. Before the last rebedding, commercial fertilizer may be applied based on soil tests and past experience with fertilizer results.

Fertilization. Soil characteristics, past fertilization and cropping practices have resulted in a wide range of fertility levels in these soils. Therefore, an efficient fertility program must be based on soil test recommendations. Frequently, excess nitrogen with above normal rainfall or irrigation reduces lint yield because of delayed maturity and greater insect damage. Upland soils are particularly low in nitrogen and phosphorus. Heavy blackland clays usually are well supplied with potassium, but shallow, eroded soils may be low in this nutrient. Soils low in nitrogen and phosphorus require up to 50 pounds of nitrogen and 40 to 50 pounds of phosphorus to attain yield levels of 3/4 bale or more per acre.

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Bottomland or alluvial soils are generally low in nitrogen, have low to medium phosphorus levels and are well supplied with potassium. Suggested rates of nitrogen for yield goals of 1 to 1½ bales per acre are 60 to 80 pounds per acre. Forty to 60 pounds of phosphorus and potassium are needed on soils low to medium in these nutrients. For more information, obtain L-743, *Crop Fertilization of Texas Blackland and Grand Prairie Soils* and L-720, *Crop Fertilization on Texas Alluvial Soils* from your county Extension agent's office.

Fertilizer can be applied a number of ways. If the fertilizer was not applied during seedbed preparation, it can be chiseled into the side of the bed 3 to 4 weeks before planting and the beds rerun immediately. Another method is to apply phosphate (P_2O_5) in the seed furrow at planting and nitrogen side-dressed within 4 weeks after cotton emerges.

Rotations. Follow a 3-year rotation when possible, using cotton, grain sorghum, corn or small grains, or other crops, depending on local conditions. Fibrous-rooted crops, including hay crops and high-residue forage crops, may be used. Some of the clovers and other soil building crops may also be used in the rotation program.

On a map, record known root rot acres and areas where there may be chemical residues. This information will affect crop rotation, as will livestock on the farm and the availability of water.

Turn under as much organic matter as possible before seedbed preparation to increase water infiltration and reduce cotton root rot. Make maximum use of soil residues. Use farm and commercial feedlot manure when available.

Irrigation. Maximum cotton yields may require 18 to 20 inches of water for plant use. However, good yields are possible with less water if irrigation is timed carefully to adequately supply the crop during critical fruiting periods.

Daily water use by the cotton plant generally is less than 0.1 inch per day until squares form. Water use increases rapidly when blooming starts. It remains at 0.25 to 0.40 inch per day through the blooming-boll development period, and decreases as bolls reach maturity.

Adequate moisture at planting time helps ensure uniform stands, provides water for early season growth and encourages deep root development. A pre-plant irrigation can supply this water when rainfall has not replenished the root zone. Apply enough pre-plant irrigation water to fill the potential root zone to field capacity.

Cotton roots may grow to 5 or 6 feet in deep loam or sandy loam soil. But conditions such as heavy clay subsoils, compacted zones and clay layers often restrict root development to shallow depths. Even in deep, medium texture soils, most of the water for the crop is in the top 3 to 4 feet. In heavy clays, most of the available moisture is in the top 2 to 3 feet of soil.

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Variable rainfall prevents the establishment of specific irrigation schedules during the growing season, but irrigation generally is not essential before the bloom stage if the root zone contains maximum moisture when the crop is planted. Adequate moisture is especially important from early to peak bloom stage through the boll development period. For profitable yields, the cotton crop requires 2½ to 3 inches of water every 12 to 15 days during this critical fruiting period. If rainfall does not supply this water, irrigation should be used to apply the equivalent amount. Coarse textured soils or shallow soils may require lighter, but more frequent irrigations.

Excessive soil moisture may slow maturity. To promote early maturity, the time period between irrigations may be increased after the peak bloom stage. This stage occurs about 25 days after the first bloom. Irrigations past mid-August increase the risk of poor harvest conditions due to rank cotton and delayed maturity.

Varieties and planting seed. Study the yield records and fiber properties of varieties planted in Experiment Station tests and result demonstrations in your area. A well-adapted variety will show consistent high performance and will be in the upper third of the test in yielding ability over a period of years. Variety selection should be based on yield performance, earliness to obtain desired maturity, disease resistance and desirable fiber properties. Stoneville, Deltapine and Coker varieties are used for spindle picking in the bottomlands. For stripper harvest, varieties such as Lankart and Tamcot SP-37 have produced well in this region. A number of other varieties have given equally good results. Producers should consider recommended early-maturing varieties as they become available in the future. Short-season production offers an opportunity to reduce production costs through improved pest management and earlier harvest prior to unfavorable weather.

High quality seed is essential to getting the crop off to a good start. Planting seed should be of high germination and density. Avoid planting seed with low germination or high free fatty acid, or seed that is cracked or mechanically damaged or seed stored under high moisture conditions. Seed for planting purposes should be harvested only from a mature crop. Seed cotton stored at 12 percent moisture or above for 24 hours or longer should not be saved for seed.

Follow Practical Mechanization

Planting. Plant as soon after April 1 as soil moisture and soil temperature conditions are favorable. Where possible, plant on shaped beds with precision depth control planting equipment, rather than in the furrow. Advantages of bed planting are: lower power requirement; soil temperature 3 to 4 degrees higher in beds than in furrows; more precise control over depth of seed placement with less scatter pattern in the drill; significant increase in speed and capacity; more uniformity in the rate of emergence; quicker seed germination; increased rate and uniformity of growth and maturity; and an average overall increase in yield of about 28 percent. Bed planting improves chemical weed control through better placement of preemergence and postemergence chemicals. Other operations such as defoliation, desiccation and harvesting are more easily accomplished on a shaped bed and harvesting efficiency can be increased as much as 10 percent.

Planting dates. Weather conditions often prevent getting cotton planted at the optimum time. South of Dallas the optimum planting date usually is April 1-10. North of Dallas April 10-20 is the optimum planting date. With few exceptions, early planting is associated with high lint quality and yields.

Planting rate. Plant six to eight seed per foot of row to provide a final stand of three to four plants per foot. This requires 16 to 20 pounds of acid delinted seed per acre, depending on the germination and seed size. Attempt to obtain a final stand of 40,000 to 50,000 plants per acre. In certain areas, the use of a steel roller approximately 1 to 1½ days after planting helps conserve moisture and improves post-emergence weed control practices.

Cultivation. Cultivate only when necessary to control weeds, improve aeration and prepare for irrigation. The rotary hoe allows high speed, timely cultivation over a maximum number of acres.

Control Insects, Diseases and Weeds

Insect control. Insect management in this production area of Texas is vital to maximizing net profits for the cotton producer. Insect damage is second only to soil moisture as a limiting production factor. The cotton producer must incorporate six management techniques into a cotton production system to achieve proper insect control.

(1) *Early harvest and prompt stalk destruction.* It is essential for the cotton producer to harvest cotton as early in the fall as possible, and to destroy stalks before regrowth occurs in order to reduce food for the boll weevil. The majority of the boll weevil population which will emerge the following spring is produced after September 1 in this production area. Producers must reduce or eliminate the food supply for the boll weevil at this time of the year. Weather conditions during the winter months also govern the survival of the overwintered boll weevil population.

(2) *Fall land preparation.* Land to be planted to cotton the subsequent spring must be cultivated and prepared for planting during the fall of the year. If seedbed preparations are conducted in the spring of the year, inadequate soil moisture will delay planting. Fall land preparation also helps control weed problems from previous crops.

(3) *Early spring planting.* Early planting in the spring of the year is the key to successful insect management in this area of Texas. Early planting allows the crop to mature early and escape mid- and late-season insect infestations. In this production area there are three damaging generations of cotton bollworms and tobacco budworms during the production season. Producers must depend on beneficial insects to control these very damaging pests. The movement of beneficial insects from other crop areas, such as sorghum, is critical in bollworm control. Chemical control of the tobacco budworm is impossible in the Blackland and Grand Prairies.

(4) *Overwintered boll weevil management.* The proper timing of insecticide treatments to control overwintered boll weevil populations is mandatory. Producers can initiate spray applications when seedling cotton plants reach the ⅓-grown-square stage. Field checks must be made to determine if subsequent applications are needed to control additional boll weevils moving into the field.

(5) *Management of early season pests.* Control of thrips, fleahoppers and lygus bugs is very important to the "earliness factor" of cotton production. Thrips control is needed in 8 out of 10 seasons to keep cotton growing rapidly after emergence. Cotton usually will overcome thrips infestations in 10 to 12 days, but fruiting and fruit set will be delayed. Producers must make field checks to determine if fleahoppers or lygus bugs are decreasing the square set below acceptable limits. Producers should use selective insecticides to control these pests in order to conserve beneficial insect populations.

(6) *Conservation of beneficial insect populations.* A sound insect control program maximizes the use of natural control agents and cultural control measures. To conserve beneficial insect populations, producers must make frequent and careful field checks to determine the extent of plant damage from harmful insects, and then use insecticides judiciously. The migration of beneficial species from other

crop areas to the cotton field is important in an integrated pest control system.

For specific insecticide suggestions, see L-1219, *Suggestions for Controlling Cotton Insects in the Texas Blacklands.* Also see L-219, *Ways to Fight the Pink Bollworm.*

Disease control. Treat seed with one of the following fungicides:

Fungicides for Cotton

Chemical	Ounces per 100 pounds of seed	
	Machine delinted	Acid delinted
Busan 72®	1.33-1.66 (ready mix)	1.66-2.0
Captan®(50% WP)	.75-4.0 (slurry)	.75-4.0 (slurry)
	1.13-2.7 (dry)	1.13-2.7 (dry)
Thiram®	1.89-2.10 (slurry)	1.89 (slurry)
	2.25 (dry)	2.25-3.0 (dry)
Demosan® + Arasan®		4.0 + 2.75
Captan® + PCNB®	4.8 + 4.8	4.8 + 4.8
PMA®	3.0 - 6.0	2.0 - 4.0
Terrazole® + PCNB®	1.25 + 5.0	1.0 + 4.0
Vitavex® + Captan®	1.22 + .86	1.22 + .86
Vitavex® + Arasan®	3.0 + 2.25	3.0 + 2.75

Seedling disease: Use high-quality seed. Keep crop residue out of the seedling zone. If seedling disease is a consistent, serious problem, use an in-furrow fungicide (such as PCNB + Captan, Terraclor Super X, or Demosan) at planting time.

Bacterial blight: Use acid-delinted treated seed and rotate with other crops. Use resistant varieties such as Tamcot SP-21, Antone 2121, Lockett 77, Tamcot SP-37 or Tamcot SP-23.

Cotton root rot: Follow a 3-year rotation program with cotton, sorghum and small grains. Turn the residue of small grains under deeply with a moldboard plow. Plant as early as possible.

Boll rots: Avoid excessive stalk growth. Bottom defoliation is helpful. Botran®, a fungicide, is effective in controlling boll rots.

Verticillium wilt: Use a balanced fertility program, controlled irrigation, crop rotation and shallow cultivation to avoid root pruning. Use resistant varieties such as Paymaster 303 or Paymaster 909, but only when severe verticillium wilt conditions exist.

Weed control: Herbicides and mechanical methods can be combined to control weeds. Herbicides should be selected based on specific weed or grass problems encountered in each field, and the rotational crops which will be planted after cotton harvest.

Amex 820®, Basalin®, Prowl®, Cobex®, Treflan® and Tolban®, are suggested for the control of seedling Johnsongrass, annual grasses and broadleaved weeds such as pigweed (carelessweed), lambsquarters and purslane. These materials should be thoroughly incorporated with a power rototiller, rolling cultivator or bed conditioner, or with two passes of a disk. Cobex should be incorporated no deeper than 2 inches.

Care should be taken to avoid bedding too deep, since this removes treated soil from the middles. Planting should be done with equipment which will not remove all of the treated soil from the planted row. Seed should be planted near the bottom edge of the zone of treated soil.

Incorporation of these herbicides may be done in a band on bedded land, using a power rototiller in heavy soils or a bed conditioner in light soils.

Treflan may be applied in the spring or in the fall. Fall application controls henbit and annual sowthistle during wet winter months. The other preplant incorporated herbicides are labeled for spring application only.

If rhizome Johnsongrass is a severe problem, consider applying Treflan at a double rate for 2 consecutive years. Label directions should be closely followed to ensure control and avoid injury to the cotton.

Herbicides for use after planting but before cotton emerges include Caparol®, Cotoran®, Dynex®, Karmex®, Lanex®, Lasso® and Sancap®. These materials are dependent upon rainfall to leach them into the soil where weed seed germinate. When a half inch of rain or more is received within 10 days to 2 weeks after application, these herbicides usually perform very well. Consistent control of seedling Johnsongrass and large-seeded annual grasses such as Texas panicum (Coloradograss) cannot be expected with these herbicides. Lasso will give some degree of seedling Johnsongrass control. All of these herbicides may be applied on a band over the row to reduce costs.

If morningglory and other large-seeded, broadleaved weeds occur in fields that are also infested with grass, a preplant incorporated herbicide may be applied followed with a preemergence herbicide in a band at planting time.

Post emergence herbicides may be necessary, especially in fields heavily infested with grass and in years when wet weather prevents cultivation and application of preplant or preemergence herbicides. The key to effective control is timely application. Weeds should be 2 to 4 inches tall when postemergence applications are made.

Suggested herbicides include Caparol, Cotoran, Dynex, Karmex, Lanex and Probe. With the exception of Probe, a surfactant should be added for best control. Cotoran, Dynex, Karmex and Lanex may be mixed with DSMA or MSMA to control broadleaf weeds and grasses. Caparol and Probe may be mixed with MSMA. If grasses are the only problem, DSMA or MSMA may be applied alone. These herbicides should be directed at the base of the cotton plants for maximum effectiveness and safety. One formulation of DSMA is labeled for a single application over the top of cotton after the two-leaf stage and before squaring. DSMA and MSMA should not be applied after cotton has begun to bloom, or yields may be reduced.

Herbicides should be used in combination with mechanical and cultural control methods to produce cotton as economically as possible. Details concerning other treatments and herbicide application rates can be found in MP-1059, *Suggestions for Weed Control with Chemicals — Agronomic Crops, Perennial Weeds, Fence Rows and Non-Cropped Areas.* Product labels should be consulted before applying any herbicides.

Harvesting, Seed Handling and Ginning

Harvesting seed cotton is accomplished by mechanical stripping in the Blackland and Grand Prairies. A key to good harvesting is proper defoliation and/or desiccation. Some producers have followed the practice of applying a phosphate defoliant prior to desiccation to remove the leaves. The more common practice is to desiccate with arsenic acid 7 to 10 days prior to harvesting. A good job of desiccating the plant will allow the bolls to break free and minimize "tagging."

Harvest cotton when the seed cotton moisture content is less than 12 percent. The trash in the seed cotton stores considerably more moisture than does the lint or seed. Early morning and late evening cotton should go directly to the gin for processing. In general, harvesting should be performed when the relative humidity is less than 60 percent. Strive for a harvesting efficiency of 96 to 99 percent. As a rule, when fields contain "dead cotton" (root rot), harvesting efficiency will drop.

Cotton should be harvested when it is ready. Any delay in harvesting is, in effect, storage in the field and/or in trailers. Gins will not be able to process seed cotton at the same rate that it is harvested. The cost of gin equipment for this purpose is prohibitive. Labor and energy costs at gins have risen and are likely to bring about a shorter work week and a longer gin season. Hence, seed cotton storage is a necessity and will become more important in the future.

Ricking and module building are two new methods that have been developed to allow for storage of seed cotton. Ricking is the storage of seed cotton on the ground on the turnrow. It allows the producer to maintain his harvesting rate even though he may have exceeded his trailer capacity. Seed cotton stored in ricks usually has a density of 3 to 5 lbs./ft.^{3}. Plastic is available to cover ricks and protect seed cotton from rain, but some problems have been encountered with condensation of moisture on the underside of the plastic. Ricks should be placed on high, well-drained soils. Ricks are normally stored until near the end of the gin season; then front-end loaders are used to pick up seed cotton and place it in trailers to be transported to the gin. Ricking is not recommended in humid, high moisture areas.

Module building is the best method of storing seed cotton for the preservation of lint and seed quality. It consists of forming a seed cotton "module" which is 24 or 32 feet long, 6 to 11 feet high, and with a density of 7 to 12 lbs./ft^3. The module can be transported directly to the gin or stored. Seed cotton less than 12 percent moisture content (WB) can be stored for 6 months with no loss in lint and seed quality. A 32-foot module of stripped cotton will contain approximately 10 bales. Special module transporters are used to move modules from the field to the gin or central storage location.

Seed cotton should be ginned when the moisture content is 6 to 8 percent at the feeder apron. Excessive drying will result in broken fibers. Too little drying reduces the seed cotton cleaning equipment efficiency, resulting in trash particles in the lint. Portable moisture meters are available to monitor feeder apron moisture content. Two stages of lint cleaning are recommended. Care must be taken to ensure that bale weights are within the TCA no-penalty range.

Marketing. Cotton production and marketing was dominated by government farm programs for 40 years. Recent farm programs have taken successive steps toward greater flexibility in decision making by farmers, and heavier reliance on the market place.

The market for U.S. cotton is strongly influenced by use of synthetic fibers and by production of cotton in other countries. While world cotton consumption has increased during recent years, U.S. consumption has decreased. Aggressive and intelligent marketing programs have been undertaken by U.S. cotton producers under the dollar-a-bale program to strengthen the demand for U.S. cotton. While efficiencies in production and government price support programs may cover costs of production for some producers in the short run, greater reliance on effective marketing is the only real solution for the long run.

Cotton producers, as individuals or as a group, may: (1) deliver and sell their lint cotton at the gin to a buyer for cash; (2) place the lint cotton in an approved warehouse and obtain a government loan, redeeming the cotton at a later date for cash sale or forfeiting title to the government; (3) place the lint cotton in a warehouse and hold for cash sale at some later date; (4) contract the crop to a buyer before harvest under specific price, non-price and payment terms; (5) "hedge" at harvest and sell the lint cotton for cash, or place it in the government loan for future sale; or (6) deliver to a producer-owned marketing organization.

Some tools producers can use in marketing cotton include: (1) *acquire better market intelligence,* knowledge of what, where, when and how much of specific qualities of fiber are needed; (2) *harvest for quality* — since defoliation, maturity, moisture and foreign material are major factors affecting the cost of ginning and the resulting fiber quality; (3) *block* or *blend* ginning of uniform qualities of fiber to meet specific predetermined needs; (4) *use automated quality determination,* including sampling and classing with legal deterrents to trade abuses; (5) *use universal-density* bale presses in all gins; (6) *integrate* to extend the producer control in the marketing of cotton and cotton products; (7) *practice product development* to find new uses for cotton, improve traditional cotton products and determine optimum combinations with other fibers for specific blend products; (8) *practice market development,* domestic and foreign, by planning with other producers.

Quality determination and control is particularly important in cotton marketing. Government classing offices categorize cotton samples based on grade, fiber length, uniformity, fineness, strength and whiteness. Variations of these characteristics within each bale of cotton are extremely costly to most producers, since the low end of the range for each characteristic is the accepted basis for trading. Quality and quantity losses occur in the market channel as succeeding buyers mutilate cotton bales by resampling.

Cost reductions in marketing are possible through changes in harvest, assembly and ginning procedures, transportation, compress and storage procedures and industry-wide inventory and market control systems. Achievement of these potential cost reductions in production and marketing, combined with quality control and better utilization of fiber property information, is necessary to permit cotton to compete with other fibers in domestic and foreign markets.

Grower participation in product and market development, through the check-off program, is one way to strengthen demand for cotton and improve its future. Technological improvements in spinability, ease and speed of fabrication, pressing and weaving quality and other characteristics also strengthen demand. Grower supported development programs should be carried out in both domestic and foreign markets.

Economics

See current budgets, L-884A, *Economics of Cotton Production in the Blackland Prairie and the Grand Prairie* (Texas Agricultural Extension Service).

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