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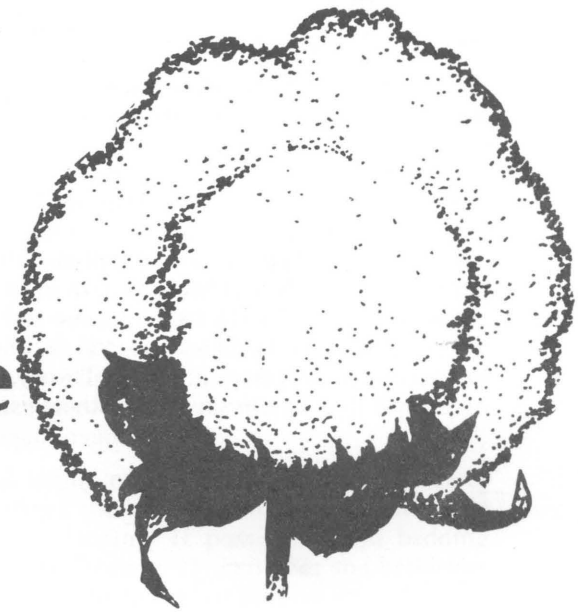
Texas Agricultural Extension Service

COTTON PRODUCTION

in the Blackland Prairie and Grand Prairie



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James Blalock and Robert Metzer*

To achieve high cotton lint yields, producers must make sound decisions in land selection, production methods and optimum timing of specific operations. This fact sheet provides current information on cultural practices for profitable cotton production.

Cultural Practices

Land Preparation

Among other considerations, necessary soil and water conservation practices are needed when preparing land for cotton. Protect sloping land by practices such as terraces with grassed waterways, contour farming and/or conservation tillage techniques. Technical assistance for proper residue management is available through local offices of the Soil Conservation Service and the Texas Agricultural Extension Service.

Retaining crop residues on the soil surface generally is a good practice and provides many benefits, including reducing surface sealing and crusting, reducing soil temperatures, decreasing evaporation losses, reducing runoff amount and velocity and controlling erosion. Current management systems and USDA regulations in some cases will dictate use of proper crop residue management practices, including retaining as much as possible on the soil surface where highly erodible lands are being farmed. Where possible, consider use of conservation tillage systems as a viable alternative. However, in some areas surface crop residues are associated with increases in insect and disease problems and alternative strategies may be required.

Begin land preparation immediately after harvest with shredding of stalks from the current crop. Comply with the cotton plow-up deadline set by the State Pink Bollworm Control Program. Thorough shredding of high-residue crops will maximize efficiency of all succeeding conventional tillage system operations—plowing under residue, precision planting, weed control, fertilizer application, bed shaping and high-speed sled cultivation on shaped beds. Where conventional practices are to be used, shred and plow under cotton stalks, boll residues and volunteer crop plants to a minimum depth of 6 inches where winter carryover of pink bollworms and boll weevils are a problem.

Many soils, even some of the heavy clays that shrink and swell, have a tendency to form root-restricting layers called "plow pans." Heavy tractor traffic, especially on wet soils, contributes to pan formation. Check soils to determine if a pan is present by probing and by evaluating root growth of previous crops. Destroy pans with appropriate subsoiling operation. Chisel and plow early to maximize effectiveness of fall rains. Floating or land leveling aids water distribution on irrigated land. Furrow diking is advised where soil moisture is yield limiting. The decision of whether to dike alternate furrows or every furrow will depend on drainage requirements.

Early fall listing or bedding (6 to 8 weeks before planting) allows the soil time to store moisture and settle before planting. If possible, avoid bedding operations after February 15. Fertilizer and herbicides may be applied prior to the last bedding operation.

Fertilization

Soil characteristics, past fertilization and cropping practices result in a wide range of fertility levels in soils. Therefore, a fertility program should be based on soil test recommendations. 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 three-fourths of a bale or more per acre. Bottomland or alluvial soils are generally low in nitrogen, with low to medium phosphorus levels and adequate potassium. Suggested rates of nitrogen for yield goals of one to one and a half bales per acre are 60 to 80 pounds per acre; 40 to 60 pounds of phosphorus and potassium are needed on soils low to medium in these nutrients. For more information, obtain a copy of L-743, *Crop Fertilization of Texas Blackland and Grand Prairie Soils* from your county Extension office.

Fertilizers can be applied a number of ways. If the fertilizer was not applied during seedbed preparation, it

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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 side-dress nitrogen within 4 weeks after cotton emerges. If fertilizer is applied directly in the seed furrow, the nitrogen level should not exceed 5 pounds per acre.

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 other high-residue forage crops, may be used. Some of the clovers and other soil building crops also may be used in the rotation program.

On a map, record known root rot areas to more effectively plan crop rotations. Other considerations such as livestock and availability of water will determine the crops used in a rotation.

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. Cotton acreage that can be irrigated in the central Texas blackland region is limited.

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 and 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 preplant irrigation can supply this water when rainfall has not replenished the root zone. Apply enough preplant 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 dense clay subsoils, compacted zones and weakly structured clay layers often restrict root development to shallow depths. Even in deep, medium-textured soils, most of the water for the crop is in the top 3 to 4 feet. In heavy clays, most of the usable available moisture is in the top 2 to 3 feet of soil.

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 is at field capacity 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 an equivalent amount. Coarse-textured soils or shallow soils may require lighter, more frequent irrigations.

Excessive soil moisture will delay crop 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 because of excessive stalk growth and delayed maturity.

Varieties and Planting Seed

Study the yield records and fiber properties of varieties planted in Experiment Station tests and Extension result demonstrations in your area. A well-adapted variety will show consistent high performance and will be in the upper third in yield test results over a period of years. Variety selection should be based on yield performance, earliness, disease resistance and desirable fiber properties. Stoneville, Deltapine and Coker varieties normally are spindle picked but can be harvested with a stripper. For stripper harvest, several TAMCOT varieties and varieties developed from TAMCOT lines have produced well in this region. A number of other varieties such as the Deltapine types have given equally good results. Consider recommended early-maturing varieties as they become available. 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 get the crop off to a good start. Planting seed should be of high germination and vigor. Avoid planting seed with high free-fatty acid, or seed that is cracked or mechanically damaged. Seed for planting purposes should be harvested only from a mature crop. Seed cotton stored with more than 12 percent moisture can became hot during storage. Under these storage conditions, seed deteriorates rapidly and cannot be used for planting purposes.

Practical Mechanization

Planting

Plant as soon after April 1 as soil moisture is favorable and soil temperature averages 65° F or higher in the seed zone. 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; earlier warm-up in the spring; 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; rapid seed germination; and increased rate and uniformity of growth and maturity. Bed planting improves chemical

weed control through better placement of preemergence and postemergence chemicals. Bed planting reduces the concentration of herbicides in the seed zone. Other operations such as furrow diking, defoliation, desiccation and harvesting are more easily accomplished on a shaped bed and harvesting efficiency can be increased as much as 10 percent.

Planting Date

Weather conditions often prevent planting cotton at the optimum time. South of Dallas, the optimum planting time usually is April 10—20 to May 1. North of Dallas, April 20 to May 10 is the optimum planting time. Plants from later plantings encounter more moisture stress, which results in reduced lint yields. In most cases, 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 14 to 16 pounds of acid-delinted seed per acre, depending on the germination and seed size. Calibrate your planter to obtain a final stand of 40,000 to 50,000 plants per acre. In certain areas, rolling the drill row approximately ½ to 1½ days after planting helps conserve moisture and improves postemergence weed control practices.

Cultivation

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

Insect, Disease and Weed Control

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.

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 fall food supply for the boll weevil to reduce the number of weevils for next year's crop. Weather conditions during the winter months also govern the survival of the overwintering boll weevil population.

Fall land preparation. Cultivate and prepare land to be planted to cotton the subsequent spring during the fall of the year. If seedbed preparations are conducted in the spring of the crop year, inadequate soil moisture may delay planting. Fall land preparation also helps control weed problems from previous crops.

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 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 difficult and expensive in the central blackland region.

Overwintered boll weevil management. Proper timing of insecticide treatments to control overwintered boll weevil populations is economical. Producers can initiate spray applications when cotton plants reach the 1/3-grown square stage. Make field checks to determine if subsequent applications are needed to control additional boll weevils moving into the field.

Management of early season pests. Control of thrips, fleahoppers and tarnished plant bugs is very important to the "earliness factor" of cotton production. Thrip control is needed in eight out of ten seasons to keep cotton growing rapidly after emergence. Cotton planted during optimum periods usually will overcome thrip infestations in 10 to 12 days, but fruiting and fruit set will be delayed. Use triple treated seed. Producers must make field checks to determine if fleahoppers or lygus bugs are decreasing the square set below acceptable levels. Use selective insecticides to control these pests and to conserve beneficial insect populations.

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, make field checks frequently and carefully to determine the extent of plant damage from harmful insects, and then use insecticides judiciously. Migration of beneficial species from other crop areas to cotton fields is important in an integrated pest control system.

For specific insecticide suggestions, see B-1204, *Management of Cotton Insects in the Southern, Eastern and Blackland Areas of Texas* and B-1511, *Pink Bollworm Management Program in Texas.*

Disease Control

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 varieties. The latest releases include TAMCOT CD3H and TAMCOT CABCS.

Cotton root rot. Follow a 3-year rotation program with cotton, sorghum or corn and small grains. Turn the residue of small grains under deeply with a moldboard plow. Plant as early as possible. Use early maturing varieties to escape the disease.

Weed control

Herbicides and mechanical methods can be combined to control weeds. Select herbicides for specific weed or grass problems encountered in each field and for the rotational crops to be planted after cotton harvest.

Prowl® and Treflan® are suggested for the control of seedling johnsongrass, annual grasses and broadleaved weeds such as pigweed (carelessweed), lambsquarters and purslane. Thoroughly incorporate these materials with a power rototiller, rolling cultivator or field cultivator, or with two passes of a disk.

Seed Treatments for Cotton Seedling Disease

Chemicals	Formulations	Rates	Remarks
captan	Captan 400®	2.5—5.0 fl oz/100 lb AD 3.5—7.0 fl oz/100 lb R	
	Captan 400-D®	2.5—5.0 fl oz/100 lb AD 3.5—7.0 fl oz/100 lb R	
	Captan 300®	1.8 fl oz/100 lb AD 2.8 fl oz/100 lb R	
	Captan 65® Sprills®	2.25 fl oz/cwt AD	
	Captan 30-DD®	1.8 fl oz/100 lb AD 2.8 fl oz/100 lb R	
	Captan 75-5®	2.0 oz/cwt	
metalaxyl	Apron FL®	0.75—1.5 fl oz/cwt	
	Apron 25W®	1.0—2.0 oz/cwt	
TCMTB + chloroneb	Nusan 30 EC®	1.25—4.0 fl oz/cwt AD 1.5—5.0 fl oz/cwt MD	
Carboxin	Vitavax 30 C® + Captan®	3.3 fl oz/cwt	
Imazalil	Nuzone ME®	4.8 fl oz/cwt AD	
PCNB + terazole	TSX 205®	12.0 fl oz/cwt 16.0 fl oz/cwt	Planter box
cloroneb	Nu Flow D® Flo Pro D® Cloroneb 65W®	5.3—17.6 fl oz/cwt 5.0—10.5 fl oz/cwt 6.0 oz/cwt	

AD = Acid delinted
R = Reginned
MD = Machine delinted
CD = Chemical delinted

Avoid bedding too deep. Deep bedding removes treated soil from the middles. Plant with equipment which will not remove all of the treated soil from the planted row. Plant seed near the bottom edge of the zone of treated soil.

Incorporate herbicides in a band on bedded land, using a power rototiller in heavy soils or a bed conditioner or rolling cultivator in coarse soils.

Treflan® may be applied in the spring or fall. Fall application controls henbit and annual sowthistle during wet winter months. Prowl® may be applied 140 days prior to planting.

Herbicides for use after planting but before cotton emerges include Bladex®, Caparol®, Cotoran®, Karmex®, Lasso® and Dual®. These materials are dependent upon rainfall to leach them into the soil where weed seed germinate. When a ½ inch of rain or more is received within 10 days or 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® and Dual® 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 also are infested with grass, a preplant incorporated herbicide may be applied, followed with a preemergence herbicide in a band at planting time.

Postemergence directed herbicides may be necessary, especially in fields heavily infested with broadleaved weeds 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 Bladex®, Caparol®, Cotoran®, Direx®, Goal®, Probe®, Karmex®, DSMA® and MSMA®. A surfactant should be added for best control, except with DSMA® or MSMA®, which usually contain surfactant. Bladex®, Caparol®, Direx®, Goal®, Karmex® and Probe® may be mixed with DSMA® or MSMA® to control broadleaved weeds and grasses. If grasses are the only problem, DSMA® or MSMA® may be applied alone. Direct these herbicides at the base of the cotton plants for maximum effectiveness and safety. Do not apply DSMA® and MSMA® after cotton has begun to bloom, or yields may be reduced.

Escaped johnsongrass and annual grasses can be controlled with Fusilade® or Poast®. It is important that these overtop herbicides be applied to actively growing grasses when they are young. A crop oil concentrate should be added to Poast® and either a surfactant or crop oil concentrate should be applied with Fusilade®.

Use herbicides in combination with mechanical and cultural control methods to produce cotton as economically as possible. Check with your county Extension agent for information on other treatments and herbicide application rates. Consult product labels before applying any herbicides.

Harvesting, Seed Handling and Ginning

Seed cotton is harvested by mechanical stripping in the blackland and grand prairies. A key to good harvesting is proper defoliation and/or desiccation. Some producers apply a defoliant prior to desiccation to reduce the amount of leaf in the harvested cotton. This practice becomes important when large stalks and high yield situations are encountered. Leaf drop prior to desiccation improves the grade of cotton, especially with hairy type varieties. Allow a sufficient time period for desiccation to reduce moisture in plant structures before harvesting.

Harvest cotton when the seed cotton moisture content is less than 12 percent. Trash is the main source of moisture in harvested cotton; therefore, every effort should be made to minimize trash content. This becomes even more important when the cotton is stored in modules. In general, harvest 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 be reduced. Stripper harvest cotton in a timely manner once the plant has dried enough to minimize problems with regrowth. Any delay in harvesting will increase the time open bolls are exposed to unfavorable weather that can result in reduced grades.

Use of module builders as a storage and handling system has gained popularity since its introduction in early 1970. Several factors are responsible for the rapid acceptance of these machines. The module builder permits the harvest operation to be independent of trailer availability and ginning capacity. This allows cotton harvest to proceed uninterrupted during favorable weather conditions.

Under proper management, the module builder can be used for safe storage of seed cotton to maintain lint and seed quality. It consists of forming a seed cotton module 24 or 32 feet long, 6 to 11 feet high, and with a density of 7 to 12 pounds/foot^3. The module can be transported directly to the gin or stored in the field. Seed cotton with less than 12 percent moisture content (WB) can be stored for prolonged periods with little or 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.

Lint and seed quality losses are minimized if certain key practices are followed during production, harvest and the module-building process. Additional information may be obtained from L-2078, *Keys to High Quality Lint and Seed with the Cotton Module Builder.*

Gin seed cotton when the moisture content is 6 to 8 percent at the feeder apron. Excessive drying will result in broken fibers and shorter staple length. 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. Take care to ensure that bale weights are within the TCA no-penalty range.

Marketing

Government farm programs have dominated cotton production and marketing for more than half a century. Recent farm programs have taken successive steps toward greater flexibility in decisionmaking by farmers and heavier reliance on the marketplace.

The market for U.S. cotton is strongly influenced by foreign production and use, economic and trade policies across the world, weather conditions, use of synthetic fibers, and by production of cotton in other countries. Aggressive and intelligent marketing programs have been undertaken by U.S. cotton producers under the Cotton Incorporated funded 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:

- Deliver and sell their lint cotton at the gin to a buyer for cash
- Place lint cotton in an approved warehouse and obtain a government loan, redeeming it at a later date for cash sale or forfeit title to the government
- Place the lint cotton in a warehouse and hold for cash sale at some later date
- Contract the crop to a buyer before harvest under specific price, non-price and payment terms
- "Hedge" using cotton futures and options and at harvest sell the lint cotton for cash or place it in the government loan for future sale
- Deliver to a producer-owned marketing organization.

Marketing tools cotton producers can use include:

- Aquire better market information, knowledge of what, where, when and how much of specific qualities of fiber are needed
- Harvest for quality because defoliation, maturity, moisture and foreign material are major factors affecting the cost of ginning and the resulting fiber quality
- Properly strip and module cotton to maintain quality
- Use automated quality determination, including sampling and High Volume Instrument (HVI) classing
- Use universal-density bale presses in all gins
- Integrate to extend producer control in the marketing of cotton and cotton products
- Practice product development to find new uses for cotton, improve traditional cotton products and determine optimum combinations with other fibers for specific blend products
- 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 as the low end of the range for each characteristic is the accepted basis for trading. Quality and quantity losses can occur in the market channel if succeeding buyers mutilate cotton bales by resampling.

Cost reductions in marketing are possible through improved 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 such as strength, is necessary to permit cotton to compete with other fibers in domestic and foreign markets.

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