KEYS TO PROFITABLE PRODUCTION

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KEYS TO PROFITABLE COTTON PRODUCTION IN THE ROLLING PLAINS

CONTENTS

Cultural Practices 3
- Land Preparation 3
- Fertilization 3
- Rotations 3
- Irrigation 4
- Varieties and Planting Seed 4

Follow Practical Mechanization 4
- Planting 4
- Planting Date 4
- Planting Rates and Patterns 5

Control Insects, Diseases and Weeds 5
- Insect Control 5
- Seed Decay and Seedling Diseases 5
- Bacterial Blight 6
- Cotton Root Rot 6
- Boll Rots 6
- Nematodes and Fusarium Wilt 6
- Verticillium Wilt 6
- Weed Control 6

Harvesting, Handling and Ginning 7
- Marketing 7

Economics 8

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KEYS TO PROFITABLE COTTON PRODUCTION IN THE ROLLING PLAINS

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Cotton and wheat are the principal crops produced in the Rolling Plains. Moisture is a limiting factor in crop production since the average annual rainfall ranges from 20 to 25 inches. Crop yield potentials vary greatly within this area because of erratic rainfall distribution each year. Moisture management is the key to increased production.

Soil types range from sandy loams to clays. Less than 5 percent of the cropland is irrigated. Therefore, much of the approximately 1 million acres planted to cotton annually is grown under dryland conditions in skip-row planting patterns. Cotton yields for the last 10 years have averaged 311 pounds of lint per planted acre.

Cultural Practices

Land Preparation. Reduced tillage is now a common practice for much Rolling Plains cotton. On many soils, cotton is produced with only seven operations. One procedure used at the Texas A&M Chillicothe Experiment Station is to (1) shred stalks; (2) bed, apply herbicide and incorporate with a sweep disk bedder (February or March); (3) subsoil, rip and furrow dike in one operation; (4) cultivate beds; (5) plant; (6) cultivate and reestablish furrow dikes; and (7) harvest.

Several variations to this reduced tillage system can be used depending on individual situations. All soils do not need subsoiling. Subsoiling is usually needed on sandy soils but seldom on clays. Apply herbicides just before or at planting time instead of at bedding.

Prepare furrow dikes, for moisture conservation, in time to store April-May rains and reestablish to catch late summer and early fall moisture.

Reduced tillage may not be possible on all soils. Deep tillage, for residue management, may be necessary in areas subject to cotton root rot or for insect and disease management.

Regardless of the methods used, cotton requires a moist, firm, weed-free seedbed.

Fertilization. Soils in the Rolling Plains generally are deficient in nitrogen and phosphorous. Research conducted by the Texas Agricultural Experiment Station indicates that profitable fertilizer rates range from 20 to 40 pounds of nitrogen in combination with 20 to 40 pounds of phosphorous (P_2O_5) per acre. No significant response to potassium fertilization has been observed. Consider varying soil properties, cropping history, past fertilization and moisture prospects when determining fertilization programs. Apply all phosphate and potassium before planting. Nitrogen timing may vary according to soil type. Make nitrogen applications on sandy soils as near the time the plants need it as possible. Zinc also may be deficient on low organic matter, high pH soils. A soil test conducted by a reputable laboratory is the best method for developing a sound fertilization program. For more information, obtain L-983, *Crop Fertilization on Rolling Plains, Central Prairies and Cross Timbers Soils* from your county Extension office.

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

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ture limitations have minimized the use of soil-building crops.

Root rot infested acres and possible chemical residues affect rotations. Record these areas on a map. Livestock and the availability of stock water also influence the type of rotations that can be established.

Turn under as much organic matter as possible before seedbed preparation to increase water infiltration and reduce cotton root rot. Make maximum use of crop residues. Cotton burs applied at 2 to 6 tons per acre improve soil tilth, but this practice occasionally spreads wilt disease and weed seeds. Use farm and commercial feedlot manure where available.

Irrigation. Maximum cotton yields may require 21 to 25 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 water demand periods. Efficient and profitable irrigation depends on the time and amount of water available.

Daily water use generally is less than 0.1 inch per day until squares form but 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 the first open bolls appear.

Adequate moisture at planting time helps assure 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. In many cases, furrow dikes eliminate the need for preplant irrigation.

Cotton roots may grow to a depth of 5 to 6 feet in deep loam or sandy loam soils. But heavy clay subsoils, compacted zones, clay layers and other poor soil conditions often restrict root development to shallow depths. Even in deep, medium soils most of the water for the crop is removed from the top 3 to 4 feet. In heavy clays, most of the crop's water is from the top 2 to 3 feet of soil.

Rainfall variations prevent establishment of specific irrigation schedules during the growing season, but irrigation generally is not required before the bloom stage if the root zone is saturated when the crop is planted. Adequate moisture is especially important from early bloom period through boll development. For high yields, cotton requires 3 to 4 inches of water every 12 to 15 days during this time. If rainfall does not supply this water, irrigate to provide an equivalent amount. Some very coarse sands or shallow soils may require smaller amounts of water more frequently.

Excessively moist soil conditions may slow maturity. To encourage earlier maturity, increase the interval between irrigations after peak bloom stage, about 30 to 35 days after first bloom. Irrigation past mid-August can delay maturity and increase the risk of poor fiber quality and harvest conditions. Early determinate varieties may benefit from irrigation at heavy square stage.

Varieties and Planting Seed. Study the yield records and fiber properties of varieties planted in Experiment Station and result demonstration tests in your area. A well-adapted variety shows consistently high performance and is in the upper third of the test in yielding ability over a period of years. Base variety selection on yield performance, earliness to obtain desired maturity, disease resistance and desirable fiber properties. Consider early maturing varieties to reduce production cost through better pest management and harvesting before unfavorable weather.

High quality seed is essential to getting the crop off to a good start. Use planting seed of high germination and density. Avoid planting seed with low germination or high free fatty acid, as well as cracked or mechanically damaged seed or seed stored under high moisture conditions. Seed for planting should be harvested only from a mature crop. Do not save seed for planting which has been stored at 12 percent moisture or above for 24 hours or longer.

Follow Practical Mechanization

Planting. Where possible, plant on shaped beds with precision depth control planting equipment rather than in furrow planting. Advantages of bed planting include less power requirements, soil temperature 3° to 4° 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 emergence* rate, quicker seed germination, increased rate and uniformity of growth and maturity and increased yield. Bed planting helps chemical weed control practices of preemergent and post-emergent chemicals. Other operations such as defoliation, desiccation and harvesting are easier on bed-planted cotton. Harvesting efficiency can be increased as much as 10 percent.

Planting Date. To reduce damage from the boll weevil and seedling disease, a uniform planting date of May 20 or later is suggested. This date is set each year by the County Crops Committee in most Rolling Plains counties. June 20 is the last practical date for planting but in some years cotton, planted through July 4, has produced about 1/2 bale per acre.

By planting after May 20, seedling emergence is faster and a stand is achieved in 3 to 5 days because of warmer soils. Fewer seeds are needed (10 to 15 pounds per acre) depending on the variety. This planting date has reduced the number of cultivations and trips over the field to salvage the stand. Cotton planted after May 20 is less likely to require replanting than earlier planted cotton. In addition, research

data consistently indicate a yield advantage for cotton planted the last half of May.

When all producers in an area delay planting until after May 20, squares one-third grown (large enough to support boll weevil larvae) are not present until the last few days of June or early July. When hot, dry conditions prevail during July the boll weevil population increases slowly if at all. The second generation boll weevil adults begin to migrate during the second week of August. The number of migrating weevils is a good indication of how the weevil population fared during July. Adequate moisture conditions during July result in larger boll weevil populations and a higher level of damage late in the growing season.

Planting Rates and Patterns. Planting rates of 15 to 20 pounds per acre under irrigation are recommended. Higher planting rates increase seed costs, have adverse effects on yield and quality and intensify seedling disease problems. Under favorable dryland conditions, a planting rate of 10 to 15 pounds per acre is sufficient. Seed size varies among varieties and should be considered when planting. Normally four to five seed per foot on 40-inch rows give an adequate stand of three seedlings per foot of row. Under dryland conditions, any stand greater than 45,000 plants per acre (3.4 plants per foot) is excessive.

From 1979 through 1981, Rolling Plains cotton was planted in the following row patterns:

	Percent of the total acreage
38- to 40-inch rows	38.5
2 X 1, 40-inch rows	30.8
2 X 2, 40-inch rows	21.6
4 X 1, 40-inch rows	1.2
30-inch rows	1.3
20-inch rows	4.3
10-inch rows	2.3
	100.0

Plant seed at a 2-inch depth with a seed press wheel. Uniform planting depth gives earlier and more uniform stands resulting in higher yield.

Crops grown skip-row under irrigation require less fallow area than dryland crops. Furrow irrigation of a skip-row pattern is more efficient than sprinkler irrigation, since sprinklers irrigate the entire planted and fallow area. On clay soils, less fallow area is desirable than on a sandy soil since the lateral root growth is less extensive.

Do not decrease the seeding rate on skip-row compared to solid planting. Do not exceed a seeding rate of six seed per foot of row or a final stand of four plants per foot of row, regardless of row pattern.

Control Insects, Diseases and Weeds

Insect Control. Insect populations are a major factor limiting cotton production in the Rolling Plains. For effective economic control, combine cultural control measures with natural control agents in the field and with the judicious use of insecticides. To manage insect infestations efficiently each producer should learn how to determine insect infestation levels, recognize damage caused by various insects and base insecticide application decisions on current field situation.

Cultural practices, such as a uniform planting date and use of early-maturing cotton varieties, shorten the time a crop is susceptible to insect damage and limit the numbers of damaging pests.

Thrips, aphids, fleahoppers and boll weevils are early season pests and can be found in cotton before the first one-third grown squares (½ inch in diameter). Fleahoppers can delay cotton production by blasting small squares during the early fruiting period. When this happens, insecticidal control measures are required. Thrips and aphids seldom cause excessive damage. Boll weevils can be found in fields near favorable overwintering quarters in late June. If overwintered boll weevils are present, apply an insecticide just before the appearance of one-third grown squares. If boll weevils are found in the field 5 days later, make a second application. By obtaining effective control of overwintered boll weevils, the damage caused by this pest during the growing season is reduced greatly.

From the time one-third grown squares are present until peak bloom (late June until mid-August) boll weevils, bollworms and tobacco budworms are of primary concern. If at all possible, limit insecticide use during this period. When needed, six insecticidal applications may be required to control these pests, and in addition to being economically prohibitive, it is often difficult to obtain effective control of bollworm and budworm populations.

In mid to late August, boll weevil populations begin to migrate. As populations grow, increased damage to squares and small bolls occurs. To prevent excessive boll damage two or three insecticidal applications may be required. Continue field inspection until mid-September to avoid excessive damage from large bollworm, budworm or boll weevil populations.

For specific insecticide recommendations, see B-1209 *Management of Cotton Insects in the High Plains, Rolling Plains and Trans-Pecos Areas of Texas.* This leaflet also describes methods for determining the infestation levels and the need for insecticidal applications.

Seed Decay and Seedling Diseases. Planting seed should be of the highest quality, most vigorous and best germination available. They should be acid delinted and treated with a seed protectant fungicide

such as Captan, Thiram or Terracoat L-21®. Seedling disease should not be a persistent problem. Bed planting is also helpful to control seedling disease.

Bacterial Blight. Use resistant varieties such as Tamcot SP37H, SP21S, SP23, Lockett 77, GP 3774, Cascot BR-1, B2, L7, GSA 74, CAMD-E and PR 68. Use acid delinted, treated seed and rotate with other crops. Avoid excessive nitrogen rates.

Cotton Root Rot. Follow a 3-year rotation program with cotton, sorghum and small grains. Turn under the crop residue by deep-breaking with a moldboard plow.

Boll Rots. This may be damaging in some years. Use cultural practices that discourage excessive vegetative growth such as moderate use of water and nitrogen. Control insect injury to bolls. Fungicidal control is usually not necessary in the Rolling Plains.

Nematodes and Fusarium Wilt. Resistant varieties are now available for controlling this disease complex. Most have desirable agronomic characteristics and good resistance. Some of the varieties are Cascot L-7, Tamcot SP-21, SP-37, Paymaster 303, PR 68 and Paymaster 145. Soil fumigation controls nematodes; use especially when susceptible varieties are planted in infested soil.

Verticillium Wilt. Plant to assure uniform and adequate stands. Avoid excessive irrigation, high nitrogen fertilizer rates, deep cultivation and crop residues. Rotate with grass crops or other immune crops, and plant resistant varieties such as Cascot L-7, Tamcot SP-21, SP-23, Paymaster 303, PR 68, GSA 74, Paymaster 145 and DPL SR-5. Other resistant varieties with improved agronomic characteristics continue to be released by several cotton breeders.

Weed Control. Combine crop rotation, mechanical methods and herbicides to insure a successful weed control program at minimum cost. Select herbicides based on specific weed or grass problems encountered in each field and rotational crop intentions.

Basalin®, Prowl® and Treflan® are suggested for preplant incorporated use to control seedling johnsongrass, annual grasses and small seeded broadleaved weeds such as pigweed (carelessweed). Incorporate these herbicides according to label instructions. Other incorporated herbicides include Zorial® and Dual®. Treflan® or Basalin® may be applied in the spring or fall. Prowl® is labeled for application less than 140 days before planting.

Incorporate Zorial® 2 to 3 inches deep from 30 days before planting up until planting. Do not apply Zorial® to furrow-planted cotton or on glandless varieties. Suppression of purple nutsedge is generally good. Only cotton, soybeans or peanuts can be planted the following year.

Incorporate Dual® very shallow (about 1 inch). This is the best treatment for supression of yellow nutsedge. Plant cotton below the incorporated zone.

Control rhizome and escaped seedling johnsongrass with Roundup applied in a ropewick or spot sprayer. Two parts water and one part Roundup are suggested for wipe-on application and a 2.0 percent solution is suggested for spot treatment.

Rotating to wheat, which allows summer plowing, is an effective method for suppressing rhizome johnsongrass, especially if the summer is dry.

Fusilade® or Poast® are effective for the control of escape grasses if applied early. Apply these selective overtop herbicides broadcast, banded over the row or spot sprayed as a 1.0 percent solution. Treat annual grasses when they are 3 to 8 inches tall. Johnsongrass up to 20 inches tall can be controlled if soil moisture is good. Tillage to disrupt and chop rhizomes improves johnsongrass control. Spray bermudagrass before plant diameter exceeds 6 inches or leaf height exceeds 1 inch. Retreatment may be necessary. Effectiveness is limited on all grasses if applied during droughty conditions.

It is essential to add a crop oil concentrate or surfactant according to label directions. These herbicides do not control broadleaved weeds and do not injure cotton. Spray drift will damage sorghum or forage crops adjacent to cotton.

Regardless of the methods chosen to control rhizome johnsongrass, it is important to apply Basalin®, Prowl® or Treflan® to control seedling johnson grass and pigweeds (carelessweeds). Continued use of these preplant herbicides, however, may result in an increase of resistant weeds such as morningglory, lanceleaf sage, cocklebur, devil's claw and other broadleaved annual weeds. These weeds are best controlled with Caparol or Sancap applied at planting (preemergence). Lasso and Dual® may also be applied preemergence for pigweed and annual grass control. Preemergent materials depend on rainfall to leach into the soil where weed seed germinate. When 1/2 inch of rain or more is received within 10 days to 2 weeks after application, these herbicides normally perform very well. Consistent control of seedling johnsongrass and large-seeded annual grasses such as Texas panicum (Coloradograss) cannot be expected with these herbicides. Apply all of these herbicides on a band over the row to reduce cost.

If morningglory, cocklebur and other large-seeded, broadleaved weeds occur in fields also infested with grass, apply a preplant incorporated herbicide followed with Caparol or Sancap on a band at planting time.

Fields heavily infested with broadleaved weeds may require a postemergent-directed herbicide application. The key to effective control is timely application. Weeds should be 2 to 4 inches tall and use care to direct the spray toward the base of the cotton plants.

Caparol or Karmex plus a surfactant are suggested for broadleaved weeds. If grasses are also present, tank mix DSMA or MSMA with Karmex or mix MSMA with Caparol to control a broad spectrum of weeds and grasses. Apply DSMA or MSMA alone if grasses or cockleburs are the only problems. Spot treatment with DSMA or MSMA also controls young cockleburs.

When lanceleaf sage (mint weed), prairie sunflower or other broadleaved weeds germinate late in the season, control with a layby application of Caparol or Karmex plus surfactant. Small weeds will be killed and emergence of later germinating seedlings will be prevented. Make this application after the last cultivation.

Perennial weeds such as silverleaf nightshade (whiteweed), western horsenettle (treadsalve) and Texas blueweed are difficult to control. Spot treatment with a 2 percent Roundup solution at the fruiting stage for silverleaf nightshade or horsenettle or at the full bloom stage for blueweed result in a high degree of root kill. Ropewick application of Roundup in the fall in skip row cotton has been successful in controlling silverleaf nightshade. Cultivation must cease early enough to allow the weeds to reach the fruiting (berry) stage before treating between the rows. Treatment for several years is necessary to clean up a field.

Spot treatment with Roundup is not highly successful in controlling hog potato (Indian rushpea), devil's claw or cocklebur, but it is the only recourse other than rotation to wheat or grain sorghum.

Details concerning other herbicides and suggested rates can be found in Supplement to MP-1059, *Suggestions for Weed Control with Chemicals in Cotton.* Always consult product labels before applying herbicides.

Harvesting, Handling and Ginning

Harvesting seed cotton is accomplished by mechanical stripping in the Rolling Plains. A key to good harvesting is proper defoliation and/or desiccation. Some producers have applied a phosphate defoliant before desiccation to remove the leaves. The more common practice is to desiccate with arsenic acid 7 to 10 days before harvesting. A good job of desiccating the plant allows the bolls to break free and minimize "tagging."

Harvest cotton when the seed cotton moisture content is less than 12 percent. Trash in 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, 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 drops.

Harvest timing is critical. Following desiccation, 7 to 10 days are required for lint, seed, burs and stems to dry. Stalks lose moisture faster than bark. As a result, the stalk pulls away from the bark. If harvest is started while the stalk is in this condition, the cotton will grade "barky." Eight to 10 days following desiccation, the bark loses moisture and again tightens up. This is a good time to strip. If harvest is delayed 3 weeks beyond desiccation, the bark again becomes loose due to normal deterioration and barky cotton can result.

Gins may not be able to process seed cotton at the same rate it is harvested. The cost of gin equipment for this purpose is prohibitive. Labor and energy costs at gins have risen and brought about a shorter work week and a longer gin season. Hence, seed cotton storage is a common practice in the Rolling Plains.

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" 24 or 32 feet long and 6 to 11 feet high with a density of 7 to 12 pounds per cubic foot. Store the module on well drained, compacted sites and cover with a tarp. The module can be transported directly to the gin or stored. Seed cotton moisture should not exceed 12 percent to avoid hot modules. A moisture level of 8 to 10 percent is considered ideal for harvesting and storage. A 32-foot module of stripped cotton contains approximately 10 bales. Special module transporters are used to move modules from the field to the gin or central storage location. For further information refer to L-2078, *Keys to High Quality Lint and Seed with Cotton Module Builder.*

Gin seed cotton with a moisture content at the feeder apron of 6 to 8 percent. Excessive drying results in broken fibers. Not enough drying reduces the seed cotton cleaning equipment efficiency, resulting in trash particles in the lint. Portable meters are available to monitor feeder apron moisture content. Two stages of lint cleaning are recommended. Take care to insure that bale weights are within the TCA no-penalty range.

Marketing. The market for U.S. cotton is strongly influenced by synthetic fibers and cotton production in other countries. Aggressive and intelligent marketing programs have been undertaken by U.S. cotton producers under the Cotton, Inc. program to strengthen the demand for U.S. cotton. While production efficiencies and government price support programs may cover production costs for some producers in the short run, greater reliance on effective marketing is the only real long-term solution.

Cotton producers, as individuals or a group, may (1) deliver and sell their lint cotton at the gin to a buyer for cash; (2) place the lint cotton in a warehouse and hold for cash sale at some later time; (3) contract the crop to a buyer before harvest under specific price, non-price and payment terms; (4) "hedge" at harvest

and sell the lint cotton for cash; or (5) deliver to a producer-owned marketing organization.

Some cotton marketing tools include: (1) acquire better market intelligence 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 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 producer control in marketing cotton and cotton products; (7) practice produce development to find new uses for cotton, improve traditional cotton products and determine optimum combinations with other fibers for specific blend products; and (8) practice market development, domestic and foreign, by planning with other producers.

Quality determination and control are particularly important in cotton marketing. Government classing offices categorize cotton samples based on grade, fiber length, uniformity, fineness, strength and whiteness. High Volume Instrument (HVI) Classing is replacing the older manual classing system. Variations of 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.

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. Achieving 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

Ask your county Extension agent for current economic information on cotton production in the Rolling Plains.

See current budget, MP-1266A, *Economics of Cotton Production in the Rolling Plains* (Texas Agricultural Extension Service).

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