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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2003

SAMPLE COSTS TO PRODUCE

COTTON

ACALA VARIETY

30-INCH ROW
SAN JOAQUIN VALLEY

Robert B. Hutmacher	UC Cooperative Extension Agronomist, Department of Agronomy and Range Science, UC Davis
Ron N. Vargas	UC Cooperative Extension Farm Advisor, Madera County
Bill L. Weir	UC Cooperative Extension Farm Advisor Emeritus
Steven D. Wright	UC Cooperative Extension Farm Advisor, Tulare County
Bruce A. Roberts	UC Cooperative Extension Farm Advisor, Kings County
Brian H. Marsh	UC Cooperative Extension Farm Advisor, Kern County
Daniel S. Munk	UC Cooperative Extension Farm Advisor, Fresno County
Karen M. Klonsky	UC Cooperative Extension Specialist, Department of Agricultural and Resource Economics, UC Davis
Richard L. De Moura	UC Cooperative Extension Staff Research Associate, Department of Agricultural and Resource Economics, UC Davis

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SAMPLE COST TO PRODUCE COTTON – ACALA VARIETY
SAN JOAQUIN VALLEY - 2003

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INTRODUCTION

Sample costs for SJV Acala cotton production in the San Joaquin Valley (SJV) are presented in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described are based on production procedures considered typical for growing conditions in the San Joaquin Valley region. Sample costs given for labor, materials, equipment and contract services are based on current figures. Some costs and practices used in this study may not be applicable to your situation. A blank *Your Cost* column is provided to enter your actual costs on Tables 1 and 2.

For an explanation of calculations used for the study refer to the Assumptions or call the Department of Agricultural and Resource Economics, University of California- Davis, (530) 752-3589 or the UC Cooperative Extension Farm Advisor in the county of interest**.**

Sample cost and return studies for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis. Current studies can be downloaded from the department website at http://coststudies.ucdavis.edu or obtained from selected county UC Cooperative Extension offices.

The University of California and the United States Department of Agriculture, Federal Crop Insurance Program Cooperating

ASSUMPTIONS

The following assumptions give background information relevant to the values shown in Tables 1 to 6 and pertain to sample costs for producing SJV Acala cotton in the San Joaquin Valley region. This study also assumes the grower will partially participate in the government crop programs under the Farm Security and Rural Investment Act of 2002. **The costs figures are based on typical cultural practices for 30-inch rows used by farmers in the San Joaquin Valley and are not University of California recommendations.** Some farming practices described may not be used during every production year or on every farm, while some operations not described may be needed. *The use of trade names in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products.*

Land. The farm consists of 1,500 acres of non-contiguous land, which includes 750 acres rented and planted to cotton. The remaining acres are planted to other field and row crops including processing tomatoes, corn, wheat, alfalfa, barley, onions, garlic, carrots, lettuce and broccoli. Land rental costs are described in the "Cash Overhead Costs" section of the text and tables. The owner manages the farm.

Production Operating Costs

Tables 1-3 show the costs associated with ground preparation, planting, growing, and harvesting cotton. Land preparation is done from October to March and the crop is harvested in October and November. The crop year in this study is November to November.

Land Preparation. The ground is ripped or subsoiled in two passes, 2 to 3 feet deep, to break up compaction, which affects root penetration and water infiltration. In this study subsoiling is done once every three years and one-third of the cost is allocated to the crop each year. The ground is then disced twice with a stubble disc to break up large clods and smooth the surface. The ground is again disced twice with a finish (offset disc) – once while applying an herbicide and once to further incorporate the herbicide and smooth the surface. Afterwards the beds are listed.

Row Spacing. In this study, cotton is planted on 30-inch beds. Forty-inch row spacing constitutes the majority of the cotton acreage in the San Joaquin Valley. However, 30-inch row spacing acreage is increasing in the San Joaquin Valley and is an alternative to 38 or 40-inch row cotton. Some field trials in the 1980's and 1990's done by University of CA researchers indicated that yields could increase as much as 7% by changing from 38 or 40 inch row spacing to 30 inch rows. In the research evaluations, these yield improvements were achieved without increases in water or fertilizer requirements. The yield improvements were most commonly observed in the northern part of the SJV, with less consistent results or even no reported yield increases in UC studies in other parts of the San Joaquin Valley. Carefully consider local experience with 30-inch cotton and examine several row spacing options to determine the best system and likely impacts on yields and production costs. Refer to the study *Sample Costs To Produce Cotton, 40-Inch Row, San Joaquin Valley, 2003* for cost comparisons.

Planting. An Acala cotton variety is seeded at a rate of 18.0 pounds per acre during April. Cotton is planted using an eight-row or 10-row planter. Seed populations range from 35,000 to as much as 85,000 per acre, with an optimum stand of 40,000 to 55,000 plants per acre. Yields are generally not significantly affected by plant populations ranging from about 30,000 to 60,000 plants per acre, but average final plant population targets for most growers and varieties in 30-inch row cotton production areas are generally in the 45,000 to 60,000 plants per acre range. The seed cost includes the San Joaquin Valley Cotton Board assessment. (See Assessment Section).

Irrigation. In this study a water cost of $60 per acre-foot is used. Grower applied water ranges from 2.0 to 3.5 acre feet based upon soil type, irrigation method, water application uniformity, crop rooting depth in some soils, evaporation, and runoff. Based on current information it is estimated that 2.5 acre-feet of water is applied during the growing season for cotton in this region, though this amount is dependent upon soil and climatic factors. Water cost for irrigation represents a combination of district water and pumped water. Price per acre-foot for water will vary by grower depending on the irrigation district and its limits on available water, increased costs and competition for water, and increased energy costs for running irrigation wells where groundwater is available as a backup water supply. Water costs depending on irrigation district or pumping variables can range from $20 per acre-foot to over $140 per acre-foot for late season irrigation in water-short districts.

Most UC and USDA research has indicated that total water use in crops planted in 30-inch rows is similar to that in 38 or 40-inch rows. In this cost study example, the rented land has an irrigation system adequate to irrigate the total cotton acreage. The irrigation system cost, therefore, is included as part of the land rental cost, which is under the category later described as "Cash Overhead Costs". A ditch-based furrow irrigation system is assumed for this example.

Fertilization. Nitrogen is the primary nutrient applied to cotton throughout the growing season. UN-32 (32-0-0) is sidedressed at a rate of 150 pounds of N per acre during the month of May. A fertilizer applicator is rented from the fertilizer dealer. Thirty pounds of N as UN-32 is water run in July. The labor cost for applying the water run N is included in the irrigation costs. A foliar application of potassium nitrate (13-0-45) at 1.3 pounds of N per acre is mixed with the growth regulator and applied in late-June or July. The desirability of this foliar nutrient application is largely dependent upon the yield potential of the plant and relative plant vigor (i.e. the better the yield potential on the plant, or the lower the vigor, the more likely that a favorable, cost-effective response will be obtained with foliar nutrient applications).

Cotton is very responsive to nitrogen, but excessive applications can cause rank or vegetative growth and lead to increased pest problems, poor defoliation, lower yields, and nitrate leaching. If the crop rotation includes heavily-fertilized vegetable crops or alfalfa, or if dairy waste or manure applications are common practices on individual fields, residual soil nitrogen and even potassium may be high. These situations would then present an opportunity to reduce input costs and lower applied nitrogen, resulting in fewer problems with excessive growth and leaching losses.

Pest Management. The pesticides, rates, and cultural practices mentioned in this cost study are listed in the *UC IPM Pest Management Guidelines, Cotton* **Pesticides mentioned in this study are not recommendations, but those commonly used in the region.** For information and pesticide use permits, contact the local county Agricultural Commissioner's office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at www.ipm.ucdavis.edu. **Pest control costs can vary considerably each year depending upon local conditions and pests in any given year. Ranges can be as dramatic as $50 per acre for one year and $200 the next.**

Pest Control Adviser (PCA). Written recommendations are required for many pesticides and are made by licensed pest control advisers. In addition the PCA or an Agronomist consultant will monitor the field for agronomic problems including pests and nutrition. Growers may hire private PCA's or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. In this study, a fee is allocated for a PCA.

Insects. In this study, pest management is for mites, aphids, and lygus. An aerial application of Zephyr is made in May for mite control, Warrior insecticide in June for lygus control, and Provado insecticide in July for aphid control. Monitoring of insect populations is necessary to determine if and when to treat the crop. There may be some assumptions that the more closed crop leaf canopy would impact potential for pest problems in the narrower 30-inch row spacing as compared to 38 or 40 inch spacings, but there are no definitive studies done in California on which to base differences in insect or mite population pressures or control costs. For this reason, the assumptions regarding pest populations, management thresholds and practices, and control costs are assumed to be the same in 30-inch row spacing as with 40-inch spacing.

Lygus bugs feed on the squares (flower buds) and small fruit (bolls). Damaged squares will usually drop off while damaged bolls at a minimum may have stained lint and damaged seeds, or can be lost if damaged when bolls are less than 10 to 12 days in age past the flowering stage. In cases where there are repeated or sustained infestations of lygus bugs, it is not uncommon to need more than the assumed one insecticide application for lygus bug control to protect yields.

Aphids cause physical damage to the leaves and/or contaminate the lint with their honeydew production. Also, their feeding may reduce the carbohydrates needed for boll maturation, resulting in yield loss. Mites feeding on the leaves reduce plant vigor and result in extensive defoliation.

Cost estimates do not include insecticide applications for beet armyworm control. In some years and/or locations, beet armyworm can develop into populations capable of causing significant yield reductions, and their control will cause an additional expense.

Cost estimates also do not include control measures for silverleaf whitefly, which in some years can be a major late-season pest in parts of the southern and even central San Joaquin Valley. Silverleaf whitefly has the potential to cause sticky cotton and reduce the value of cotton lint (fiber). Insect growth regulators and insecticides are available to aid in control, but costs are highly variable by location and timing of infestations, choice of control measures, and number of applications required. Similarly, if aphid problems continue into the late-season when bolls open and cotton lint is exposed to aphid honeydew, another insecticide application in addition to the assumed one application may be required to prevent sticky cotton.

Weeds. Beginning in November, a pre-emergent herbicide (Treflan) is applied and incorporated in the fields at discing. This application will control many early season annual broadleaves and grasses. An "over-the-top" herbicide, Staple in this study, for control of broadleaves is sprayed in May. Cultivations also begin in late April (depending upon planting date) and continue until the end of June. A total of four cultivations are done in this study, using rolling cultivators. The first cultivation is made prior to planting in March and the remaining three are done from April to June. Hand hoeing is done in June and a post-directed herbicide/layby treatment is made in June with Caparol.

Weed management practices and options will differ if a transgenic, herbicide-resistant cotton variety is grown. Some of the cultural practice assumptions, herbicide materials used, and differences in production cost estimates are shown in the separate cost study entitled *"2003 Sample Costs to Produce Cotton – Acala, 40-Inch Rows, Transgenic Herbicide-Resistant Varieties".*

Growth Regulator & Defoliation. A plant growth regulator (mepiquat chloride, also known as "Pix" or other trade names) is applied with the foliar nutrients near first bloom in late June through mid-July. There is little conclusive data available to indicate that growth regulator use typically differs much in 30-inch row spacing cotton as compared with 40-inch cotton, although a large number of field studies have resulted in some differences in recommendations for application rates based on plant monitoring information and expected yield responses.

Harvest aid chemicals, also called by the group name "defoliants", are applied in September and/or October. Typical harvest aid applications include two application timings, with materials such as Prep and Ginstar applied in the first application, and a second application 14 days or more later with materials such as Defol and Gramoxone Max.

Plant growth regulators control excessive vegetative growth and promote a balance between vegetative and reproductive growth. This results in a more uniform boll set for once over harvesting. Defoliants are applied prior to picking to aid harvest by causing the leaves to drop. Defoliation is essential for efficient mechanical picking. It reduces the amount of trash collected with the cotton, and reduces staining of the lint.

Harvest. The farm in this study owns two five-row cotton harvesters and two module builders. The cotton is dumped from the harvester directly into the module builder that presses loose seed cotton into a dense and economical unit for transportation to the gin. A tractor and tractor driver monitor each module. Two laborers maintain the area – cleaning cotton off the ground, placing a tarp on the finished module, etc. – during the harvest operations. It is important to note that unless growers have pickers with moveable heads, the choice to produce cotton on 30-inch or 40-inch rows dictates that at least some harvest equipment (pickers) be set up and available to operate at that row-spacing. At least on the short-term basis of day to day operations, pickers set up for 30-inch rows will be used only for picking 30-inch row fields.

Custom Operators costs range around $85 per acre for picking and building module. Growers may choose to own cotton pickers and module builders, purchased either new or used, or hire a custom harvester to perform the harvest. Many factors are important in deciding which harvesting option a grower uses. The decision to invest in cotton harvesting equipment requires consideration of differences in production practices and equipment requirements for all of the crops in rotation as well as the direct cost of the harvesting equipment. These factors and appropriate method of analysis are discussed by Blank et al, (1992). Though their report specifically addresses hay harvesting the same principles and methodology can be used with cotton harvesting.

Yields. The crop yield used in this study is 1,340 pounds of lint and 2,378 pounds of seed per acre for San Joaquin Valley cotton. The yield is based on an assumed yield of 1,250 lbs of lint per acre for 40-inch row cotton, with the assumption that yield under 30-inch row production will be increased by approximately 7%.

The increase is based on field trials mostly in the 1980's and early 1990's, showing that lint yields could increase about 7% by changing from 40-inch to 30-inch row spacing without any increase in water or fertilizer needs. These yield improvements were most commonly observed in the northern SJV, with less consistent results in other areas of the SJV.

If your experience or assumptions are that yields with 30-inch rows for cotton are similar to those with 38 or 40-inch rows, use the cost and return calculations in Table 6 of both this study and the cost study for 40 inch cotton to compare values at the same yields.

Returns. An estimated price of a $0.70 per pound of lint is used to calculate returns above several levels of cost. Some cooperative cotton gins pay growers as much as $5 to $25 per bale for seed credit above grower ginning costs, but is not a regular practice. Table 6 shows grower returns for varying yields. In this study, all cotton acres are assumed to be covered by program payments. In reality, however, maximum payment limitations may leave some acres uncovered, which will reduce income.

Revenue from federal government programs. A typical cotton farm may receive revenue from three major payment programs under the Farm Security and Rural Investment Act of 2002 (FSRI).

Direct Payments in the FSRI Act pay a predetermined amount per unit of established crop-specific farm program base, but do not require growing the program crop or any other crop. Since these payments are essentially unrelated to cotton production itself, this revenue is not appropriately associated with costs and is not included in the "cotton" revenue in Table 2.

Counter-Cyclical Payment program payments are designed to payout the difference between the legislated target price for the commodity and the national average market price for that marketing year. However, as with the direct payment program, these counter-cyclical payments are made on the basis of historical base and do not require any program crop production. Therefore it is inappropriate to associate these payments with the production of cotton and they are not included in the "cotton" revenue presented in Table 2.

Marketing Loan and Loan Deficiency Payment programs make payments to farmers equal to the difference between the loan rate and the loan repayment rate for each pound of cotton received. Because these payments are tied directly to cotton production, they are included as a part of the revenue from cotton farming in Table 2. The loan rate for cotton is scheduled to be $0.52 per pound for the next six years. The loan program in essence pays the grower the difference between this loan rate and the applicable adjusted world price (AWP), which currently is fluctuating around $0.37. Based on past price relationships, the assumed cotton price of $0.70 used for the analysis below is consistent with a marketing loan benefit of about $0.15 per pound. The grower receives the benefit, regardless of the price he receives for his cotton. Therefore, for the hypothetical farm in this study the revenue is $.85 per pound of production.

Transportation. Transportation costs are based on roundtrip distances from the field to the gin. Most gins within a close radius of the field do not charge because the cost is included in the ginning fee. Longer hauls (over 40 miles round trip) will have a hauling charge. Hauling companies may also have a surcharge for modules less than a minimum weight.

Ginning. Commercial cotton gins normally keep cottonseed and give growers a credit to cover ginning and transportation costs so most growers do not see a ginning charge. In this study, ginning fees are covered by the seed credit and are not included as a line-item cost. Some gins especially cooperatives may return to the grower a net difference of $5 to $25 per bale between the seed value and ginning costs

Cotton gins charge growers for compressing lint into universal density (UD) bales for shipping. In this study a fee of $7.00 per bale is charged which includes hydraulic compressing, a sample for the merchant, and a loading charge. Some ginners also charge a $1 invoicing fee, but the fee is not included in this study.

Assessments. Most assessments are collected by the gin or handler and deducted from the growers' gross returns. Both mandatory and voluntary assessments are discussed below.

USDA-HVI. The USDA levies a fee for High Volume Instrumentation (HVI) classing. This determines the marketing classification cotton grade. Growers are mandated with a $1.55 per bale fee.

Cotton Incorporated. Cotton Incorporated was created by a federal marketing order and is overseen by the Cotton Board. Cotton Inc. provides funds for industry research and promotion and currently requires growers to pay $1.00 per bale plus a supplemental 0.5% lint assessment on the current gross value lint returns per bale. The supplemental assessment in this study is $1.75 per bale ($0.70 x .005 x 500 lb bale).

Pink Bollworm Project. The California State Department of Food and Agriculture (CDFA) manages and enforces the Pink Bollworm Project. This program, which through detection and legislated postharvest practices, controls pink bollworm in the San Joaquin Valley and other cotton growing districts in the state. The Pink Bollworm Project maintains several control districts to administer the program. Under the project growers are assessed a fee only if cotton is ginned within a project district. CDFA has a current charge of $2.00 per bale.

National Cotton Council. The National Cotton Council, a voluntary organization, collects an assessment to provide lobbying, advocacy, and public relations for the cotton industry at the national level. The current assessment rate paid by growers is $0.45 per bale.

California Cotton Growers And Ginners Association. The California Cotton Growers And Ginners Association assists California cotton growers in advocating their position in the legislature. The growers are charged $0.15 per bale and the ginners are charged $0.15 per bale. Participation in this organization is voluntary.

San Joaquin Valley Cotton Board. The board reviews test program data and approves variety releases. Most of the money goes to the University of California for variety evaluation. The assessment is added to the seed price. The current assessment paid by the grower is $3.75 per planting seed hundredweight. Revenue collected by the board in 2001 averaged $0.85 per producing acre.

Pickup. Two pickups – one-half ton and three-quarter ton – are used on the ranch. It is assumed that each pickup travels 4,998 miles each year for total ranch use.

Labor. Basic hourly wages for workers are $9.51 per hour for machine operators and $8.23 per hour for non-machine workers. Adding 34% for the employers share of federal and state payroll taxes and other benefits raises the total labor costs to $12.74 per hour for machine operators and $11.02 per hour non-machine labor. The labor for operations involving machinery is 20% higher than the operation time to account for the additional time involved in equipment set up, moving, maintenance and repair.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are $1.11 and $1.58 per gallon, respectively. The cost includes a 2.25% sales tax (effective September 2001) on diesel fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 1 is determined by multiplying the total hourly operating cost in Table 5 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

Interest on Operating Capital. Interest on operating capital is based on cash production costs and is calculated monthly until harvest at a nominal rate of 7.14% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge.

Risk. The risks associated with crop production should not be minimized. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks, which affect the profitability and economic viability.

Cash Overhead Costs

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.676% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs $1,246 for the entire farm.

Office Expense. Office and business expenses are estimated at $30 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop, and office utilities, and miscellaneous administrative charges.

Land Rent. The land is rented on a cash basis for $125 per acre. The agreement includes the use of the irrigation system on the property.

Investment Repairs. Annual maintenance is calculated as 2% of the purchase price.

Non-Cash Overhead Costs

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is ((Purchase Price – Salvage Value) x Capital Recovery Factor) + (Salvage Value x Interest Rate).

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE, by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for equipment and investments are shown in Table 5.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table that corresponds to the interest rate used and the life of the machine.

Interest Rate. The interest rate of 6.25% used to calculate capital recovery cost is the USDA-ERS's ten-year average of California's agricultural sector long-run rate of return to production assets from current income. It is used to reflect the long–term realized rate of return to these specialized resources that can only be used effectively in the agriculture sector.

Land. The grower owns 750 acres of row-crop land valued at $3,300 per acre. Values for land with relatively secure irrigation water supplies in the region range from $700 per acre to $5,000, depending upon location and soil condition. The site for the cotton in this study is rented land enrolled in the government subsidy program.

Building. The buildings are metal buildings erected on a cement slab and cover approximately 2,400 square feet.

Tools. This includes shop tools, hand tools, and miscellaneous field tools. The number is not based upon an actual or average inventory.

Fuel Tanks. Diesel and gasoline fuel tanks with electric pumps are set up in a cement containment pad that meets federal, state, and county regulations.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 4. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

Table Values. Due to rounding, the totals may be slightly different from the sum of the components.

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REFERENCES

American Society of Agricultural Engineers. 1994. *American Society of Agricultural Engineers Standards Yearbook*. Russell H. Hahn and Evelyn E. Rosentreter (ed.) St. Joseph, Missouri. 41st edition.

American Society of Farm Managers and Rural Appraisers. 2002. *Trends in Agricultural Land & Lease Values*. California Chapter of the American Society of Farm Managers and Rural Appraisers. Woodbridge, CA.

Annual Crop Reports. 1997 – 2002. Tulare, Madera, Kings, Kern, Fresno counties. Agriculture Commissioner of listed counties.

Blank, Steve, Karen Klonsky, Kim Norris, and Steve Orloff. 1992. *Acquiring Alfalfa Hay Harvest Equipment: A Financial Analysis Of Alternatives*. University of California. Oakland, California. Giannini Information Series No. 92-1.

Boelje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, New York

Goodell, Peter B., Larry Godfrey, Beth Grafton-Cardwell, Nick Toscano, and Steve Wright, 2002, *Insecticide Resistance Management in San Joaquin Valley Cotton*, University of California, Cooperative Extension

California Association of Winegrape Growers. 2002. *Farm Employers Labor Service 2001 Wage and Benefit Survey Statewide All Crops*. California Association of Winegrape Growers. Sacramento, CA.

California Chapter of the American Society of Farm Managers and Rural Appraisers. 2002. *Trends in Agricultural Land & Lease Values*. California Chapter of The American Society of Farm Managers and Rural Appraisers. Woodbridge, CA

California Cotton Production Information. University of California Agriculture and Natural Resources and Cooperative Extension. http://cottoninfo.ucdavis.edu. Internet accessed October 2002.

Hake, S. Johnson, T. A. Kerby, K. D. Hake. (Ed). 1996. *Cotton Production Manual.* University of California, Division of Agriculture and Natural Resources. Pub 3352.

University of California Statewide Integrated Pest Management Program. *UC Pest Management Guidelines, Cotton*. 2001. University of California, Davis, CA. http://www.ipm.ucdavis.edu

USDA-ERS. 2000. *Farm Sector: Farm Financial Ratios*. Agriculture and Rural Economics Division, ERS. USDA. Washington, DC http://www.ers.usda.gov/data/farmbalancesheet/fbsdmu.htm; Internet; accessed January 4, 2003.

Vargas, Ron, Bill Weir, Steve Wright, Bruce Roberts, Bob Hutmacher, Brain Marsh, Karen Klonsky, and Pete Livingston. 1999. *Sample Cost To Produce 30-Inch Row Cotton In The San Joaquin Valley*. Department of Agricultural Economics, University of California, Cooperative Extension, Davis, CA.

Williams, Earl. 2002. (Furnished various information sources relating to ginning and assessments). California Cotton Ginners and Growers Association. Fresno, CA.

UC COOPERATIVE EXTENSION

Table 1. COSTS PER ACRE to PRODUCE ACALA COTTON

SAN JOAQUIN VALLEY - 2003

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre: Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Rip Fields 1X/3Yrs	0.27	4	7	0	0	11	
Primary Discing 2X	0.25	4	7	0	0	11	
Apply Herbicide	0.20	3	4	5	0	12	
Incorporate Herbicide w/Disc	0.14	2	3	0	0	5	
List Beds	0.07	1	1	0	0	2	
Make Ditch	0.06	1	1	0	0	2	
Irrigate (labor includes water run UN32)	5.00	55	0	150	0	205	
Fertilizer - Water Run UN32	0.00	0	0	8	0	8	
Close Ditch	0.06	1	1	0	0	2	
Cultivate – Preplant	0.10	2	1	0	0	3	
Plant	0.12	2	2	24	0	28	
Uncap Beds	0.08	1	1	0	0	2	
Cultivate - 3X	0.31	5	4	0	0	9	
Fertilizer - Sidedress UN32	0.14	2	2	39	2	45	
Weed Control - Over-The-Top Spray	0.20	3	2	18	0	24	
Insect Control - Mites	0.00	0	0	36	8	43	
Weed Control - Hand Hoe	5.00	55	0	0	0	55	
Weed Control - Post Directed/Layby	0.20	3	2	16	0	21	
Insect Control - Lygus	0.00	0	0	9	8	16	
Insect Control - Aphids	0.00	0	0	16	8	24	
Apply Growth Regulator & KNO3	0.00	0	0	11	8	18	
Defoliate Cotton 2X	0.00	0	0	43	15	58	
PCA	0.00	0	0	0	12	12	
Pickup Truck Use	0.44	7	2	0	0	9	
TOTAL CULTURAL COSTS	12.64	151	40	375	59	624	
Harvest:							
Harvest	0.30	5	20	0	0	24	
Build Module and Haul	0.30	8	4	0	0	12	
TOTAL HARVEST COSTS	0.60	13	24	0	0	36	
Gin:							
Gin (paid by seed credit)	0.00	0	0	0	0	0	
Gin Compression Charge	0.00	0	0	0	19	19	
TOTAL GIN COSTS	0.00	0	0	0	19	19	
Assessment:							
Assessments	0.00	0	0	18	0	18	
TOTAL ASSESSMENT COSTS	0.00	0	0	18	0	18	
Postharvest:							
Chop Stalks	0.10	2	2	0	0	4	
Disc Residue - 2X	0.24	4	8	0	0	11	
TOTAL POSTHARVEST COSTS	0.34	5	9	0	0	14	
Interest on operating capital @ 7.14%						24	
TOTAL OPERATING COSTS/ACRE		168	73	392	78	736	
Cash Overhead:							
Land Rent Cotton						125	
Office Expense						30	
Liability Insurance						1	
Property Taxes						5	
Property Insurance						4	
Investment Repairs						3	
TOTAL CASH OVERHEAD COSTS						167	
TOTAL CASH COSTS/ACRE						904	

UC COOPERATIVE EXTENSION
Table 1. continued

			Total Costs	Your Costs
Non-Cash Overhead:	Per Producing Acre	Annual Cost Capital Recovery		
Buildings	40	3	3	
Fuel Tanks	4	0	0	
Shop/Field Tools	8	1	1	
Siphon Pipes 3"x 90"	5	1	1	
Service Truck 2-Ton	84	10	10	
Equipment	741	91	91	
TOTAL NON-CASH OVERHEAD COSTS	882	106	106	
TOTAL COSTS/ACRE			1,010	

UC COOPERATIVE EXTENSION

Table 2. COSTS AND RETURNS PER ACRE to PRODUCE ACALA COTTON

SAN JOAQUIN VALLEY - 2003

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Lint	1,340.00	lb	0.70	938	
LDP	1,340.00	lb	0.15	201	
TOTAL GROSS RETURNS				1,139	
OPERATING COSTS					
Herbicide:					
Treflan HFP	1.50	pt	3.50	5	
Staple	0.38	floz	48.23	18	
Caparol	1.50	qt	10.57	16	
Water:					
Water	30.00	acin	5.00	150	
Seed:					
Seed	18.00	lb	1.35	24	
Insecticide:					
Zephyr	6.00	floz	6.00	36	
Warrior	3.20	oz	2.73	9	
Provado	3.75	oz	4.27	16	
Growth Regulator:					
Pix	0.50	pt	15.16	8	
Fertilizer:					
13-0-46 Solution Grade	10.00	lb	0.32	3	
UN32	180.00	lb N	0.26	47	
Defoliant:					
Prep	2.00	pt	6.24	12	
Ginstar	8.00	floz	1.83	15	
Defol 6	1.00	gal	10.00	10	
Gramoxone Max	1.00	pt	5.78	6	
Assessment:					
Cotton Incorporated	2.68	bale	1.00	3	
Cotton Incorporated Supplemental	2.68	bale	1.75	5	
California Ginners and Cotton Growers	2.68	bale	0.15	0	
National Cotton Council	2.68	bale	0.45	1	
Pink Bollworm Project	2.68	bale	2.00	5	
USDA Classing Fee	2.68	bale	1.40	4	
Rent:					
Fertilizer Applicator	1.00	acre	2.00	2.00	
Custom:					
Air Application	6.00	acre	7.50	45	
Gin Compression Charge	2.68	bale	7.00	19	
Gin Charge (Paid by seed credit)	2.68	bale	0.00	0	
Contract:					
PCA/Consultant Fee	1.00	acre	12	12	
Labor (machine)	4.31	hrs	12.74	55	
Labor (non-machine)	10.30	hrs	11.02	114	
Fuel - Diesel	32.56	gal	1.11	36	
Lube				5	
Machinery repair				32	
Interest on operating capital @ 7.14%				24	
TOTAL OPERATING COSTS/ACRE				736	
NET RETURNS ABOVE OPERATING COSTS				403	

UC COOPERATIVE EXTENSION
Table 2. continued

	Value or Cost/Acre	Your Costs
CASH OVERHEAD COSTS:		
Land Rent Cotton	125	
Office Expense	30	
Liability Insurance	1	
Property Taxes	5	
Property Insurance	3	
Investment Repairs	3	
TOTAL CASH OVERHEAD COSTS/ACRE	167	
TOTAL CASH COSTS/ACRE	904	
NON-CASH OVERHEAD COSTS (Capital Recovery)		
Buildings 2,400sqft	3	
Fuel Tanks 2-500 gal	0	
Shop/Field Tools	1	
Siphon Pipes 3"x 90"	1	
Service Truck 2-Ton	10	
Equipment	91	
TOTAL NON-CASH OVERHEAD COSTS/ACRE	106	
TOTAL COSTS/ACRE	1,010	
NET RETURNS ABOVE TOTAL COSTS	129	

UC COOPERATIVE EXTENSION

Table 3. MONTHLY CASH COSTS PER ACRE to PRODUCE ACALA COTTON

SAN JOAQUIN VALLEY - 2003

Beginning NOV 02 Ending NOV 03	NOV 02	DEC 02	JAN 03	FEB 03	MAR 03	APR 03	MAY 03	JUN 03	JUL 03	AUG 03	SEP 03	OCT 03	NOV 03	TOTAL
Cultural:														
Rip Fields 1X/3Yrs	11													11
Primary Discing 2X	11													11
Weed: Apply Herbicide	12													12
Incorporate Herbicide	5													5
List Beds	2													2
Make Ditch				1			1		1					2
Irrigate				51				38	77	39				205
Close Ditch				1				1			1			2
Cultivate 4X					3	3	3	3						11
Plant						28								28
Uncap Beds						2								2
Fertilize - Sidedress UN32							45							45
Weed Control - Over-The-Top							24							24
Insect Control - Mites							43						5	43
Weed Control - Hand Hoe								55					5	55
Weed Control - Direct/Layby								21						21
Insect Control - Lygus								16					5	16
Insect Control - Aphids									24				4	24
Apply Growth Regulator & Fertilizer									18					18
Fertilizer - Water Run UN32									8					8
Defoliate Cotton 2X												58		58
PCA	1	1	1	1	1	1	1	1	1	1	1	1	1	12
Pickup Truck Use	1	1	1	1	1	1	1	1	1	1	1	1		9
TOTAL CULTURAL COSTS	43	2	2	54	4	35	117	136	129	40	3	60	1	624
Harvest:														
Harvest													24	24
Build Module													12	12
Gin Compression Charge													19	19
TOTAL HARVEST COSTS													55	55
Assessment:														
Assessments													18	18
TOTAL ASSESSMENT COSTS													18	18
Postharvest:														
Chop Stalks													3	3
Disc Residue - 2X													11	11
TOTAL POSTHARVEST COSTS													14	14
Interest on operating capital	0	0	0	1	1	1	2	2	3	3	3	4	4	24
TOTAL OPERATING COSTS/ACRE	43	2	2	55	5	36	119	138	132	44	6	63	93	736
TOTAL OPERATING COSTS/LB	0.03	0.00	0.00	0.04	0.00	0.03	0.09	0.10	0.10	0.03	0.00	0.05	0.07	0.55
OVERHEAD:														
Land Rent Cotton													125	125
Office Expense	2	2	2	2	2	2	2	2	2	2	2	2	2	30
Liability Insurance			1											1
Property Taxes			3						3					5
Property Insurance						2						2		4
Investment Repairs	0	0	0	0	0	0	0	0	0	0	0	0		3
TOTAL CASH OVERHEAD COSTS	3	3	6	3	3	4	3	3	5	3	3	4	127	167
TOTAL CASH COSTS/ACRE	46	4	8	57	8	40	121	141	137	46	8	68	220	904
TOTAL CASH COSTS/LB	0.03	0.00	0.01	0.04	0.01	0.03	0.09	0.10	0.10	0.03	0.01	0.05	0.16	0.67

UC COOPERATIVE EXTENSION

Table 4. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, and BUSINESS OVERHEAD

SAN JOAQUIN VALLEY - 2003

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Total
03	105 hp 2wd Tractor	62,000	10	18,314	7,151	271	402	7,824
03	105 hp 4wd Tractor	75,000	10	22,154	8,650	328	486	9,464
03	150 hp 4wd Tractor	110,000	10	32,492	12,687	482	712	13,881
03	230 hp track-type	154,000	10	45,489	17,761	674	997	19,433
03	Cultivator Rolling 20' #1	6,800	5	2,215	1,234	30	45	1,310
03	Cultivator Rolling 20' #2	6,800	5	2,215	1,234	30	45	1,310
03	Disc - Finish 21'	19,595	12	2,714	2,211	75	112	2,398
03	Disc-Stubble 18' #1	42,000	10	7,427	5,217	167	247	5,632
03	Disc-Stubble 18' #2	42,000	10	7,427	5,217	167	247	5,632
03	Ditcher - 8'	7,800	15	749	785	29	43	856
03	Harvester 5-Row #1	275,000	10	51,873	33,918	1,105	1,634	36,657
03	Harvester 5-Row #2	275,000	10	51,873	33,918	1,105	1,634	36,657
03	Lister 6 Row 20'	5,500	12	762	621	21	31	673
03	Module Builder #1	24,000	10	4,244	2,981	95	141	3,218
03	Module Builder #2	24,000	10	4,244	2,981	95	141	3,218
03	Mower-Flail 20'	14,445	15	1,387	1,453	54	79	1,586
03	Pickup - 1/2 Ton	24,000	5	10,756	3,838	117	174	4,129
03	Pickup - 3/4 Ton	28,000	5	12,549	4,477	137	203	4,817
03	Planter-8 Row 20'	15,015	15	1,442	1,511	56	82	1,648
03	Rear Blade - 10'	2,581	18	172	237	9	14	261
03	Saddle Tank 300gal #1	3,218	5	1,048	584	14	21	620
03	Saddle Tank 300gal #2	3,218	5	1,048	584	14	21	620
03	Spray Boom 20' #1	913	3	380	224	4	6	235
03	Spray Boom 20' #2	913	3	380	224	4	6	235
03	Subsoiler 10'	14,800	10	2,617	1,838	59	87	1,984
03	Uncapper-8 row 20'	8,500	10	1,503	1,056	34	50	1,140
	TOTAL	1,245,098		287,474	152,592	5,180	7,663	165,438
	60% of New Cost *	747,059		172,484	91,556	3,108	4,598	99,262

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Repairs	Total
Buildings 2,400 sqft	60,000	30		4,476	203	300	1,200	6,179
Fuel Tanks 2-500 gal	6,514	20	651	562	24	36	130	752
Service Truck 2-Ton	125,500	10	25,000	15,379	509	752	2,510	19,151
Shop/Field Tools	12,000	15	1,200	1,205	45	66	240	1,556
Siphon Pipes 200 3"x 90"	8,024	10		1,103	27	40	160	1,330
TOTAL INVESTMENT	212,038		26,851	22,726	807	1,194	4,240	28,968

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Land Rent Cotton	750	acre	125.00	93,750
Liability Insurance	1,500	acre	0.83	1,246
Office Expense	1,500	acre	30.00	45,000

UC COOPERATIVE EXTENSION
Table 5. HOURLY EQUIPMENT COSTS
SAN JOAQUIN VALLEY - 2003

			COSTS PER HOUR						
		Actual		Cash Overhead		Operating			
		Hours	Capital	Insur-			Fuel &	Total	Total
Yr	Description	Used	Recovery	ance	Taxes	Repairs	Lube	Oper.	Costs/Hr.
03	105 hp 2wd Tractor	1,178.60	3.64	0.14	0.20	2.81	7.78	10.59	14.58
03	105 hp 4wd Tractor	1,599.60	3.24	0.12	0.18	1.94	7.78	9.72	13.27
03	150 hp 4wd Tractor	1,730.90	4.40	0.17	0.25	2.86	11.11	13.97	18.78
03	230 hp track-type	1,600.20	6.66	0.25	0.37	4.00	17.04	21.04	28.32
03	Cultivator Rolling 20' #1	231.80	3.20	0.08	0.12	0.65	0.00	0.65	4.05
03	Cultivator Rolling 20' #2	154.50	4.43	0.11	0.16	0.65	0.00	0.65	5.35
03	Disc - Finish 21'	273.20	4.85	0.17	0.24	3.11	0.00	3.11	8.37
03	Disc-Stubble 18' #1	199.50	15.69	0.50	0.74	6.79	0.00	6.79	23.73
03	Disc-Stubble 18' #2	200.00	15.65	0.50	0.74	6.79	0.00	6.79	23.69
03	Ditcher - 8'	130.00	3.62	0.13	0.20	1.19	0.00	1.19	5.14
03	Harvester 5-Row #1	124.60	163.36	5.32	7.87	39.97	19.26	59.23	235.78
03	Harvester 5-Row #2	124.60	163.36	5.32	7.87	39.97	19.26	59.23	235.78
03	Lister 8 Row 20'	165.70	2.25	0.08	0.11	1.10	0.00	1.10	3.54
03	Module Builder #1	113.20	15.80	0.51	0.75	3.25	0.00	3.25	20.30
03	Module Builder #2	113.20	15.80	0.51	0.75	3.25	0.00	3.25	20.30
03	Mower-Flail 20'	130.20	6.69	0.25	0.36	6.33	0.00	6.33	13.64
03	Pickup - 1/2 Ton	399.60	5.76	0.18	0.26	1.78	2.55	4.33	10.53
03	Pickup - 3/4 Ton	399.60	6.72	0.21	0.30	2.08	2.55	4.63	11.86
03	Planter-8 Row 20'	132.70	6.83	0.25	0.37	2.96	0.00	2.96	10.41
03	Rear Blade - 10'	160.00	0.89	0.03	0.05	0.37	0.00	0.37	1.35
03	Saddle Tank 300gal #1	400.00	0.88	0.02	0.03	0.02	0.00	0.02	0.95
03	Saddle Tank 300gal #2	400.00	0.88	0.02	0.03	0.02	0.00	0.02	0.95
03	Spray Boom 20' #1	500.00	0.27	0.01	0.01	0.25	0.00	0.25	0.53
03	Spray Boom 20' #2	500.00	0.27	0.01	0.01	0.25	0.00	0.25	0.53
03	Subsoiler 10'	200.00	5.52	0.18	0.26	3.34	0.00	3.34	9.29
03	Uncapper-8 row 20'	60.70	10.43	0.33	0.49	1.73	0.00	1.73	12.98

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS
SAN JOAQUIN VALLEY - 2003

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ACALA COTTON

	LINT YIELD (lbs/acre)							
	750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
OPERATING COSTS/ACRE								
Cultural Cost	624	624	624	**624**	624	624	624	624
Harvest Cost	22	28	34	**37**	41	47	53	59
Assessment Cost	10	14	17	**18**	20	24	27	30
Ginning/Compression Cost	10	14	18	**19**	21	25	28	32
Postharvest Cost	14	14	14	**14**	14	14	14	14
Interest on operating capital	24	24	24	**24**	25	25	25	25
TOTAL OPERATING COSTS/ACRE	704	718	731	**736**	745	759	771	784
TOTAL OPERATING COSTS/LB	0.94	0.72	0.58	**0.55**	0.50	0.43	0.39	0.35
CASH OVERHEAD COSTS/ACRE	167	167	167	**167**	167	167	167	167
TOTAL CASH COSTS/ACRE	871	885	898	**904**	912	926	938	951
TOTAL CASH COSTS/LB	1.16	0.89	0.72	**0.67**	0.61	0.53	0.47	0.42
NON-CASH OVERHEAD COSTS/ACRE	106	106	106	**106**	106	106	106	106
TOTAL COSTS/ACRE	977	991	1,004	**1,009**	1,018	1,032	1,044	1,057
TOTAL COSTS/LB	1.30	0.99	0.80	**0.75**	0.68	0.59	0.52	0.47

UC COOPERATIVE EXTENSION
Table 6. continued

NET RETURNS PER ACRE **ABOVE OPERATING COSTS** FOR ACALA COTTON

PRICE ($/lb)		LINT YIELD (lbs/acre)							
Lint		750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
	LDP	750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
0.55	0.15	-179	-18	144	202	305	466	629	791
0.60	0.15	-142	32	207	269	380	554	729	904
0.65	0.15	-104	82	269	336	455	641	829	1,016
0.70	**0.15**	-67	132	332	403	530	729	929	1,129
0.75	0.15	-29	182	394	470	605	816	1,029	1,241
0.80	0.15	9	232	457	537	680	904	1,129	1,354
0.85	0.15	46	282	519	604	755	991	1,229	1,466

NET RETURNS PER ACRE **ABOVE CASH COST** FOR ACALA COTTON

PRICE ($/lb)		LINT YIELD (lbs/acre)							
Lint		750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
	LDP	750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
0.55	0.15	-346	-185	-23	35	138	299	462	624
0.60	0.15	-309	-135	40	102	213	387	562	737
0.65	0.15	-271	-85	102	169	288	474	662	849
0.70	**0.15**	-234	-35	165	236	363	562	762	962
0.75	0.15	-196	15	227	303	438	649	862	1,074
0.80	0.15	-159	65	290	370	513	737	962	1,187
0.85	0.15	-121	115	352	437	588	824	1,062	1,299

NET RETURNS PER ACRE **ABOVE TOTAL COST** FOR ACALA COTTON

PRICE ($/lb)		LINT YIELD (lbs/acre)							
Lint		750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
	LDP	750	1,000	1,250	**1,340**	1,500	1,750	2,000	2,250
0.55	0.15	-452	-291	-129	-71	32	193	356	518
0.60	0.15	-415	-241	-67	-4	107	281	456	631
0.65	0.15	-377	-191	-4	63	182	368	556	743
0.70	**0.15**	-340	-141	59	130	257	456	656	856
0.75	0.15	-302	-91	121	197	332	543	756	968
0.80	0.15	-265	-41	184	264	407	631	856	1,081
0.85	0.15	-227	9	246	331	482	718	956	1,193

LDP = Loan Deficiency Payment
BOLD = Data used in study