UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2012

SAMPLE COSTS TO PRODUCE

COTTON

TRANSGENIC HERBICIDE-RESISTANT ACALA VARIETY

SAN JOAQUIN VALLEY

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SAMPLE COSTS TO PRODUCE COTTON – TRANSGENIC HERBICIDE-RESISTANT ACALA SAN JOAQUIN VALLEY - 2012

CONTENTS

INTRODUCTION

Sample costs for Transgenic Herbicide Resistant 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. 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 in all situations. A blank column titled, "*Your Cost"*, is provided to enter your costs on Tables 1 and 2.

For an explanation of calculations used for the study refer to the "Assumptions" section or call the Department of Agricultural and Resource Economics, University of California, Davis at: (530) 752-3589, or your local UC Cooperative Extension Farm Advisor.

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

ASSUMPTIONS

The following assumptions give background information relevant to the values shown in Tables 1 through 7 and pertain to sample costs for producing Acala cotton in the San Joaquin Valley. **The cost figures are based on typical cultural practices used by farmers in the San Joaquin Valley. The specific costs shown are for the glyphosate herbicide-resistant variety, but similar production costs and returns are likely to apply to the other herbicide-resistant (Buctril resistance) transgenic Acala varieties.** Some practices described may not be used in every production year, or on every farm, and some operations not described may be performed. *The use of trade names and cultural practices does not constitute an endorsement or recommendation by the University of California, nor is any criticism implied by omission of other similar products, or cultural practices.*

Land. The farm consists of 1,500 acres of non-contiguous land valued at $8,500 per acre. Seven hundred fifty acres are planted to cotton, of which 375 acres to transgenic Acala and 375 to regular Acala. The remaining acres are planted to other field and row crops including processing tomatoes, corn, wheat, alfalfa, onions, garlic, pistachios and almonds. The owner manages the farm.

Production Operating Costs

Tables 1 through 3 show costs associated with ground preparation, planting, growing, and harvesting cotton. Land preparation is done from November 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 disced again with a finish (offset) disc to incorporate the herbicide and smooth the surface. Afterwards the beds are listed.

Planting. A transgenic, herbicide-resistant Acala cotton variety is seeded at an average rate of 16.0 pounds per acre in April. Cotton is planted using a six-row planter on 38 or 40-inch beds. Seed populations range from approximately 30,000 to 85,000 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 are generally in the 35,000 to 50,000 plants per acre range in most parts of the SJV when on 38 or 40-inch row spacing. Seed costs for transgenic, herbicide-resistant cotton include a technology fee. Technology fees may vary with the transgenic trait (in this case, resistance to the herbicide glyphosate versus the herbicide Buctril), the company controlling the trait, and the perceived value to the producer that the company supplying the trait associates with the transgenic trait or traits. The current technology fee for the transgenic variety with resistance to the herbicide glyphosate, in an approved Acala variety is $137 per 50 pounds or about $2.74 per pound of seed. This amount is in addition to the amount charged for the basic seed and seed treatments. The seed cost includes the San Joaquin Valley Cotton Board assessment. (See Assessment Section).

Irrigation. In this study, water costs $100 per acre-foot. Assumed water cost reflects a mix of district water supplies and pumped groundwater. Grower applied water ranges from 2.0 to 3.5 acre feet based on 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 the region. Irrigation water application amounts should be adjusted according to on-farm rainfall measurements. 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 to over $175 per acre-foot for late season irrigation in water-short districts.

For the purposes of this evaluation, the irrigation system used is a ditch-based furrow irrigation system, with the farm already having installed water delivery mainlines or primary ditches to move water to the fields. Other types of systems used in cotton production include level basin irrigation, gated pipe furrow irrigation, subsurface drip irrigation and various types of hand-move sprinkler systems. Many growers in clay loam soils use hand-move sprinklers to allow them to apply lower amounts of irrigation water for preplant and first within-season irrigations, then switch over to furrow irrigation for the remaining irrigations.

Fertilization. Nitrogen (N) 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 a 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 cost. 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 over $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 PCAs or receive the service as part of a service agreement with an agricultural chemical and/or fertilizer company. In this study, a fee is allocated for a PCA.

Insects. Some transgenic varieties incorporate resistance to insect pests, and such traits will impact insect management options and costs. The transgenic varieties represented in this cost study, however, are transgenic only in resistance to the herbicide glyphosate (another herbicide-resistant variety is available with resistance to Buctril herbicide), so this would be expected to have little or no impact on insect or mite management practices or control costs. In future years, varieties which incorporate several transgenic traits such as insect and herbicide resistance will become available, and this will change the discussion.

In this study, pest management is for thrips, mites, aphids, and lygus. Seeds are treated with Orthene at planting in April to control thrips. An aerial application of Carbine plus Zephyr is made in June for lygus and mite control, Leverage in July for lygus control, and Assail in August for aphid and whitefly 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 application may be required to prevent sticky cotton.

Weeds. In February a contact herbicide, glyphosate (Roundup), is applied. Some growers may apply additional herbicides, such as Shark, however careful timing must be taken to minimize chemical drift into neighboring crops. In March, a pre-emergent herbicide (Triflurex) 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, glyphosate, is sprayed in May. A post-directed herbicide/layby treatment of glyphosate is made in June. The field is cultivated three times, using rolling cultivators. Cultivations begin in March (depending upon planting date) and continue until the end of June. The first cultivation is made prior to planting in March and the remaining two are done from May to June. Hand weeding is usually necessary to control weed escape not controlled by herbicides or cultivating. Hand hoeing is done in June.

Genetically engineered herbicide tolerant cotton varieties with tolerance to glyphosate and glufosinate (Liberty) provide the grower with an additional management option for weed control. The value in use of an herbicide tolerant variety will depend upon a number of factors including weed species, susceptibility of the dominant weed species in the field to the specific herbicides used, weed density, and cost of alternative herbicides.

Weed management practices and options will differ if a conventional 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 titled "*2012 Sample Costs to Produce Cotton – Acala"*.

Growth Regulator & Defoliation. A plant growth regulator (mepiquat chloride, also known as "Stance", variations on the name "PIX", or other trade names) is applied with the foliar nutrients around first bloom in late June through mid-July. Plant growth regulators control excessive vegetative growth and promote a balance between vegetative and reproductive growth. Their use can result in a more uniform boll set for once-over harvesting.

Harvest aid chemicals, also called by the group names "defoliants" and "desiccants", are applied in September and/or October. Typical harvest aid applications include two application timings with materials such as Ethephon (Prep, Finish) and Ginstar applied in the first application, and a second application 10 to 14 days or more later with materials such as Defol, Shark, or ET.

Defoliants are applied prior to picking to aid harvest by causing the leaves to drop. Desiccants are applied to help reduce the presence of green, high water content leaves that can cause fiber staining and other damage to harvested fiber. 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 six-row cotton harvesters and two module builders. The cotton is dumped from the harvester into a cotton boll buggy, which then transports the cotton to 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.

Custom operator costs are around $110 per acre for picking and building modules. 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 1,625 pounds of lint and 2,876 pounds of seed per acre for San Joaquin Valley transgenic Acala cotton. A wide range of yields is possible in this production area, depending upon production area, weather, soil conditions, water quality, nutrient management practices, and relative losses due to weed and insect pests. Returns for various lint yields, and prices are shown in Table 4.

Returns. An estimated price of a $0.90 per pound of lint is used to calculate returns. Some cooperative cotton gins pay growers as much as $45 to $65 per bale for seed credit above grower ginning costs, and this study assumes growers receive $50 per 500 pound bale. Table 4 shows grower returns for varying yields.

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, counter-cyclical payments and marketing loan and loan deficiency programs. Although available to cotton growers, in this study we assume that growers do not receive governmental support revenue. For more information about governmental programs, visit: http://www.cotton.org/econ/govprograms/index.cfm or contact your local USDA Farm Service Agency.

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) may have a hauling charge. Hauling companies may also have a surcharge for modules less than a minimum weight. This study assumes the grower does not have additional transportation costs.

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 may return to the grower a net difference of $45 to $65 per bale between the seed value and ginning costs. In this study, we assume that growers receive $50 per bale return from the cotton gin.

Some cotton gins charge growers for compressing lint into universal density (UD) bales for shipping, merchant samples, a loading charge, or an invoice fee. This study assumes no additional ginning charges.

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 $2.15 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 $2.25 per bale ($0.90 x 0.005 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 $0.55 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 $0.25 per bale and the ginners are charged $0.25 per bale. Participation in this organization is voluntary.

San Joaquin Valley Cotton Board. The board reviews test program data and approves variety releases. The assessment is added to the seed price. As of March, 2012, the assessment paid by the grower is $4.72 per planting seed hundredweight.

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, Equipment, and Interest

Labor. Basic hourly wages for workers are $10.50 per hour for machine operators and $8.50 per hour for non-machine workers. Adding 37% for the employers share of federal and state payroll taxes and other benefits raises the total labor costs to $14.39 per hour for machine operators and $11.65 per hour non-machine labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for field crops, and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2011 (personal email from California Department of Insurance, March 2011, unreferenced). Machinery labor cost is approximately 20% higher than general labor prices, which accounts for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field 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 $3.43 and $3.82 per gallon, respectively. The cost includes a 2.50% sales tax on diesel fuel and 7.50% 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 6 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 operating costs and is calculated monthly until harvest at a nominal rate of 5.75% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest rate will vary depending upon various factors. The rate is this study is considered a typical lending rate by a farm lending agency as of January 2012.

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 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. Liability insurance covers accidents on the farm and costs $1,470 for the entire farm.

Office Expense. Office and business expenses are estimated at $50 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop, and office utilities, and miscellaneous administrative charges.

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. An interest rate of 4.75% is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2012.

Land. The grower owns 1,500 acres of row-crop land valued at $8,500 per acre. Values for land with relatively secure irrigation water supplies in the San Joaquin Valley range from $4,500 per acre to $11,000, depending upon location, soil condition and water availability.

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.

Irrigation. The irrigation system is assumed to be a ditch-based furrow irrigation system, with water delivery from the water source to the individual fields delivered through a pre-existing buried mainline or ditch. Ditches at the field level are pulled in for pre-irrigation, and removed prior to planting. Ditches are removed and replaced during the season to allow for ground equipment operations as defined in the list of field operations. Water is delivered from ditches to furrows using siphon tubes.

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

ACKNOWLEDGEMENTS

Thank you to the many individuals, businesses and associations in the agricultural industry that provided prices and inputs for this study.

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UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012

Table 1. COSTS PER ACRE TO PRODUCE TRANSGENIC ACALA COTTON

	Operation	Cash and Labor Costs per Acre					
Operation	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Rip fields 1X/3Yrs	0.13	2	9	0	0	12	
Disc 2X	0.27	5	14	0	0	19	
Apply herbicide (Roundup)	0.10	2	4	7	0	13	
Spray Triflurex	0.20	3	9	7	0	19	
Incorporate Triflurex	0.13	2	7	0	0	9	
List beds	0.07	1	2	0	0	4	
Make Ditch	0.06	1	3	0	0	4	
Irrigate	4.00	47	0	250	0	297	
Close ditch	0.06	1	3	0	0	4	
Cultivate - Preplant	0.10	2	3	0	0	5	
Plant	0.12	2	5	95	0	102	
Uncap beds	0.08	1	3	0	0	4	
Fertilize - Sidedress (UN32)	0.14	2	4	126	4	136	
Weed control - Over-the-top (Staple)	0.20	3	6	28	0	38	
Cultivate - 2X	0.21	4	7	0	0	10	
Weed control - Hand hoe	2.50	29	0	0	0	29	
Weed control - Direct/layby (Roundup)	0.20	3	6	28	0	38	
Insect control - Lygus (Carbine & Zephyr)	0.00	0	0	77	10	87	
Insect control - Lygus (Leverage)	0.00	0	0	19	10	29	
Apply growth regulator & KNO3	0.00	0	0	7	10	17	
Fertilize - Water run (UN32)	0.00	0	0	25	0	25	
Insect control - Aphid whitefly (Assail)	0.00	0	0	19	10	29	
Defoliate cotton - 2X	0.00	0	0	57	20	77	
PCA	0.00	0	0	0	12	12	
Chop stalks (post-harvest)	0.10	2	5	0	0	6	
Disc residue - 2X (post-harvest)	0.24	4	18	0	0	22	
Pickup truck use	0.44	8	4	0	0	12	
TOTAL CULTURAL COSTS	9.36	125	112	745	76	1,057	
Harvest:							
Harvest	0.30	5	58	0	0	63	
Boll buggy	0.08	1	4	0	0	5	
Build module (tractor #1)	0.15	3	5	0	0	7	
Build module (machines #1 and #2)	0.30	9	5	0	0	14	
Build module (tractor #2)	0.15	3	4	0	0	7	
TOTAL HARVEST COSTS	0.98	20	76	0	0	96	
Assessment:							
Assessments	0.00	0	0	25	0	25	
TOTAL ASSESSMENT COSTS	0.00	0	0	25	0	25	
Interest on operating capital at 5.75%						33	
TOTAL OPERATING COSTS/ACRE	10.34	146	188	770	76	1,211	
CASH OVERHEAD:							
Liability insurance						1	
Office expense						50	
Property taxes						88	
Property insurance						2	
Investment repairs						3	
TOTAL CASH OVERHEAD COSTS/ACRE						143	
TOTAL CASH COSTS/ACRE						1,355	

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012
Table 1. Continued

			Total Cost	Your Cost
NON-CASH OVERHEAD:	Per producing Acre	Annual Cost Capital Recovery		
Building - 2,400sqft	40	3	3	
Fuel tanks - 500 gallons (2)	4	0	0	
Service truck - 2 ton	90	10	10	
Shop/field tools	8	1	1	
Siphon pipes 3"x 90”	18	2	2	
Land	8,500	404	404	
Equipment	1,081	121	121	
TOTAL NON-CASH OVERHEAD COSTS	9,742	541	541	
TOTAL COSTS/ACRE			1,896	

UC COOPERATIVE EXTENSION

SAN JOAQUIN VALLEY - SOUTH 2012

Table 2. COSTS AND RETURNS PER ACRE TO PRODUCE TRANSGENIC ACALA COTTON

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Costs
GROSS RETURNS					
Lint (3.25 bales)	1625.00	lb	0.90	1,463	
Seed	3.25	bale equivalent	50.00	163	
TOTAL GROSS RETURNS	1625.00			1,625	
OPERATING COSTS					
Insecticide:				118	
Orthene	3.25	oz	0.98	3	
Zephyr	8.00	floz	7.46	60	
Carbine 50WG	2.50	oz	6.87	17	
Leverage 2.7	5.00	floz	3.88	19	
Assail 70WP	1.10	oz	16.82	19	
Defoliant:				50	
Finish 6 Pro	2.00	pint	13.75	28	
Ginstar	6.00	floz	2.74	16	
Defol 5	1.00	gal	6.37	6	
Herbicide:				76	
Triflurex HFP	96.00	floz	0.87	63	
Roundup (glyphosate)	1.50	pt	4.52	7	
Shark EW	0.75	floz	9.09	7	
Growth Regulator:				1	
Mepex Gin Out	2.00	floz	0.39	1	
Seed:				92	
Seed transgenic	16.00	lb	3.00	48	
Seed transgenic technology fee	16.00	lb	2.74	44	
Fertilizer:				158	
UN 32	180.00	lb N	0.84	151	
13-0-45 solution grade	10.00	lb	0.66	7	
Custom:				60	
Air application	6.00	acre	10.00	60	
Rent:				4	
Fertilizer applicator	1.00	acre	3.50	4	
Irrigation:				250	
Water	30.00	acin	8.33	250	
Contract:				12	
PCA/consultant fee	1.00	acre	12.00	12	
Assessment:				25	
Cotton Inc.	3.25	bale	1.00	3	
Cotton Inc. Supplemental	3.25	bale	2.25	1	
CA Cotton Growers	3.25	bale	0.25	6	
National Cotton Council	3.25	bale	0.55	2	
Pink Bollworm Project	3.25	bale	2.00	7	
USDA Classing Fee	3.25	bale	2.15	7	
Labor:				146	
Equipment operator labor	4.61	hrs	14.39	66	
Irrigation labor	4.00	hrs	11.65	47	
Non-machine labor	2.80	hrs	11.65	33	
Machinery:				188	
Fuel-gas	0.00	gal	3.82	0	
Fuel-diesel	33.74	gal	3.43	116	
Lube				17	
Machinery repair				55	
Interest on operating capital at 5.75%				33	
TOTAL OPERATING COSTS/ACRE				1,211	
NET RETURNS ABOVE OPERATING COSTS				414	

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012
Table 2. Continued

	Value or Cost/Acre	Your Costs
CASH OVERHEAD COSTS		
Liability insurance	1	
Office expense	50	
Property taxes	88	
Property insurance	2	
Investment repairs	3	
TOTAL CASH OVERHEAD COSTS/ACRE	143	
TOTAL CASH COSTS/ACRE	1,355	
NON-CASH OVERHEAD COSTS (Capital Recovery)		
Buildings - 2,400 sqft	3	
Fuel Tanks - 500 gallons (2)	0	
Service Truck - 2 Ton	10	
Shop/field tools	1	
Siphon pipes 3" x 90"	2	
Land	404	
Equipment	121	
TOTAL NON-CASH OVERHEAD COSTS	541	
TOTAL COST/ACRE	1,896	
NET RETURNS ABOVE TOTAL COST	-271	

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012

Table 3. MONTHLY CASH COSTS PER ACRE TO PRODUCE TRANSGENIC ACALA COTTON

Beginning 11-11	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
Ending 11-12	11	11	12	12	12	12	12	12	12	12	12	12	12	
Cultural:														
Rip fields 1X/3 yrs	12													12
Disc 2X	19													19
Apply herbicide (Roundup)				13										13
Spray Triflurex					19									19
Incorporate Triflurex					9									9
List beds					4									4
Make ditch					1		1		1					4
Pre-irrigate					95			78	62	62				297
Close ditch					1			1			1			4
Cultivate - Preplant					5									5
Plant						102								102
Uncap beds						4								4
Fertilize - Sidedress (UN32)							136							136
Weed Control - Over-the-top (Roundup)							38							38
Cultivate – 2X							5	5						10
Weed control - Hand hoe								29						29
Weed control - Direct/layby (Roundup)								38						38
Insect control - Lygus (Carbine & Zephyr)								87						87
Insect control - Lygus (Leverage)									29					29
Apply growth regulator & KNO3									17					17
Fertilize - Water run (UN32)									25					25
Insect Control - Aphid whitefly (Assail)										29				29
Defoliate cotton - 2X												77		77
PCA	1	1	1	1	1	1	1	1	1	1	1	1	1	12
Chop stalks (Post-harvest)													6	6
Disc residue - 2X (post-harvest)													22	22
Pickup truck use	1	1	1	1	1	1	1	1	1	1	1	1	1	13
TOTAL CULTURAL COSTS	32	2	2	15	136	108	182	240	137	92	3	79	30	1,058
Harvest:														
Harvest													63	63
Boll buggy													5	5
Build module (tractor #1)													7	7
Build module (machines #1 and #2)													14	14
Build module (tractor #2)													7	7
TOTAL HARVEST COSTS													96	96
Assessment:														
Assessments													25	25
TOTAL ASSESSMENT COSTS													25	25
Interest on operating capital at 5.75%	0	0	0	0	1	1	2	3	4	5	5	5	6	33
TOTAL OPERATING COSTS/ACRE	32	2	2	15	137	109	185	244	141	97	8	84	157	1,212
CASH OVERHEAD														
Liability insurance							1							1
Office expense	4	4	4	4	4	4	4	4	4	4	4	4	4	50
Property taxes		44				44								88
Property insurance			2											2
Investment repairs	0	0	0	0	0	0	0	0	0	0	0	0	0	3
TOTAL CASH OVERHEAD COSTS	4	48	6	4	4	48	5	4	4	4	4	4	4	143
TOTAL CASH COSTS/ACRE	36	50	8	19	141	157	190	248	145	101	12	88	161	1,356
TOTAL CASH COSTS/LB	0.02	0.03	0.01	0.01	0.09	0.10	0.12	0.15	0.09	0.06	0.01	0.05	0.10	0.83

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012
Table 4. RANGING ANALYSIS

COST PER ACRE AT VARYING YIELDS TO PRODUCE ACALA COTTON

	YIELD (lbs lint/acre)							
	750	1,000	1,250	1,500	**1,625**	1,750	2,000	2,250
OPERATING COSTS:								
Cultural cost	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057
Harvest cost	49	62	76	90	96	103	117	130
Assessment cost	25	25	25	25	25	25	25	25
Interest on operating capital at 5.75%	33	33	33	33	33	33	33	33
TOTAL OPERATING COSTS/ACRE	1,164	1,178	1,191	1,205	1,211	1,218	1,232	1,245
TOTAL OPERATING COSTS/LB	1.55	1.18	0.95	0.80	0.75	0.70	0.62	0.55
CASH OVERHEAD COSTS/ACRE	143	143	143	143	143	143	143	143
TOTAL CASH COSTS/ACRE	1,308	1,321	1,335	1,348	1,355	1,362	1,375	1,389
TOTAL CASH COSTS/LB	1.74	1.32	1.07	0.90	0.83	0.78	0.69	0.62
NON-CASH OVERHEAD COSTS/ACRE	541	541	541	541	541	541	541	541
TOTAL COSTS/ACRE	1,849	1,862	1,876	1,889	1,896	1,903	1,916	1,930
TOTAL COSTS/LB	2.46	1.86	1.50	1.26	1.17	1.09	0.96	0.86

NET RETURNS PER ACRE ABOVE OPERATING COSTS

		YIELD(lbs. lint/acre)							
		750	1,000	1,250	1,500	1,625	1,750	2,000	2,250
PRICE($/lb)	PRICE ($/bale)	YIELD ($/500 lb. lint bale equivalent)							
Lint	Seed	1.5	2.0	2.5	3.0	3.25	3.5	4.0	4.5
0.60	50.00	-639	-478	-316	-155	-74	7	168	330
0.70	50.00	-564	-378	-191	-5	89	182	368	555
0.80	50.00	-489	-278	-66	145	251	357	568	780
0.90	50.00	-414	-178	59	295	414	532	768	1,005
1.00	50.00	-339	-78	184	445	576	707	968	1,230
1.10	50.00	-264	22	309	595	739	882	1,168	1,455
1.20	50.00	-189	122	434	745	901	1,057	1,368	1,680
1.30	50.00	-114	222	559	895	1,064	1,232	1,568	1,905

NET RETURNS PER ACRE ABOVE CASH COSTS

		YIELD(lbs./acre)							
		750	1,000	1,250	1,500	1,625	1,750	2,000	2,250
PRICE($/lb)	PRICE ($/bale)	YIELD ($/500 lb. lint bale equivalent)							
Lint	Seed	1.5	2.0	2.5	3.0	3.25	3.5	4.0	4.5
0.60	50.00	-783	-621	-460	-298	-217	-137	25	186
0.70	50.00	-708	-521	-335	-148	-55	38	225	411
0.80	50.00	-633	-421	-210	2	108	213	425	636
0.90	50.00	-558	-321	-85	152	270	388	625	861
1.00	50.00	-483	-221	40	302	433	563	825	1,086
1.10	50.00	-408	-121	165	452	595	738	1,025	1,311
1.20	50.00	-333	-21	290	602	758	913	1,225	1,536
1.30	50.00	-258	79	415	752	920	1,088	1,425	1,761

NET RETURNS PER ACRE ABOVE TOTAL COSTS

		YIELD(lbs./acre)							
		750	1,000	1,250	1,500	1,625	1,750	2,000	2,250
PRICE($/lb)	PRICE ($/bale)	YIELD ($/500 lb. lint bale equivalent)							
Lint	Seed	1.5	2.0	2.5	3.0	3.25	3.5	4.0	4.5
0.60	50.00	-1,324	-1,162	-1,001	-839	-759	-678	-516	-355
0.70	50.00	-1,249	-1,062	-876	-689	-596	-503	-316	-130
0.80	50.00	-1,174	-962	-751	-539	-434	-328	-116	95
0.90	50.00	-1,099	-862	-626	-389	-271	-153	84	320
1.00	50.00	-1,024	-762	-501	-239	-109	22	284	545
1.10	50.00	-949	-662	-376	-89	54	197	484	770
1.20	50.00	-874	-562	-251	61	216	372	684	995
1.30	50.00	-799	-462	-126	211	379	547	884	1,220

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012

Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
12	105 hp 2WD tractor	94,159	10	27,813	9,809	490	610	10,909
12	105 hp 4WD tractor	107,347	10	31,709	11,183	558	695	12,437
12	150 hp 4WD tractor	153,548	10	45,356	15,996	799	995	17,789
12	230 hp track-type	287,000	10	84,775	29,899	1,493	1,859	33,250
12	Boll buggy	23000	10	4,067	2,615	109	135	2,859
12	Cultivator Roll 20'	16,000	5	5,212	2,722	85	106	2,913
12	Disc - Offset 21'	43,877	12	6,077	4,494	201	250	4,944
12	Disc - Stubble 18' #1	59,000	10	10,434	6,709	279	347	7,335
12	Disc - Stubble 18' #2	42,000	10	7,427	4,776	198	247	5,222
12	Ditcher - 8'	7,800	15	749	703	34	43	781
12	Harvester - 6-Row #1	557,253	10	105,115	62,838	2,659	3,312	68,809
12	Harvester - 6-Row #2	557,253	10	105,115	62,838	2,659	3,312	68,809
12	Lister - 6-Row 20'	22,000	12	3,047	2,253	101	125	2,479
12	Module builder #1	40,000	10	0	5,117	161	200	5,478
12	Module builder #2	40,000	10	0	5,117	161	200	5,478
12	Mower - Flail 20'	29,558	15	2,838	2,666	130	162	2,958
12	Pickup - 1/2 ton	24,000	5	10,756	3,549	140	174	3,862
12	Pickup - 3/4 ton	28,000	5	12,549	4,140	163	203	4,506
12	Planter - 6-Row 20'	41,784	15	4,012	3,768	184	229	4,181
12	Rear Blade - 10'	4,500	18	299	367	19	24	410
12	Saddle Tank 300 gal	3,218	5	1,048	548	17	21	586
12	Spray Boom 20'	3,630	3	1,510	847	21	26	893
12	Subsoiler - 10'	26,534	10	4,692	3,017	125	156	3,299
12	Uncapper - 6-row 20'	10,500	10	1,857	1,194	50	62	1,305
TOTAL		2,221,961		476,457	247,166	10,834	13,492	271,493
60% of new cost*		1,333,177		285,874	148,300	6,500	8,095	162,896

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insurance	Taxes	Repairs	Total
Buildings - 2,400 sqft	60,000	30	0	3,793	241	300	1,200	5,533
Fuel tanks 2-500 gallons	6,514	20	651	491	29	36	130	686
Service truck 2-ton	135,500	10	25,000	15,325	644	803	2,510	19,281
Shop/field tools	12,000	15	1,200	1,080	53	66	240	1,439
Siphon pipes 3"x90"	13,496	10	0	1,727	54	67	160	2,008
Land	12,750,000	25	12,750,000	605,625	0	127,500	0	733,125
TOTAL INVESTMENT	12,977,510		12,776,851	628,040	1,021	128,772	4,240	762,073

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability insurance	1,500	acre	0.98	1,470
Office expense	1,500	acre	50.00	75,000

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012
Table 6. HOURLY EQUIPMENT COSTS

		COSTS PER HOUR							
				Cash Overhead		Operating			
Yr	Description	Actual Hours Used	Capital Recovery	Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	Total Costs/Hr.
12	105 hp 2WD tractor	539	10.59	0.53	0.66	12.60	20.90	33.50	45.29
12	105 hp 4WD tractor	91	4.28	0.21	0.27	6.05	20.90	26.95	31.72
12	150 hp 4WD tractor	370	5.78	0.29	0.36	8.41	29.86	38.27	44.69
12	230 hp track-type	152	15.90	0.79	0.99	17.69	45.78	63.48	81.16
12	Boll buggy	29	7.85	0.33	0.41	3.17	0.00	3.17	11.75
12	Cultivator Roll 20'	116	10.12	0.32	0.39	1.94	0.00	1.94	12.77
12	Disc - Offset 21'	50	16.85	0.75	0.94	6.95	0.00	6.95	25.49
12	Disc - Stubble 18' #1	101	20.13	0.84	1.04	9.73	0.00	9.73	31.74
12	Disc - Stubble 18' #2	90	26.05	1.08	1.35	12.60	0.00	12.60	41.08
12	Ditcher - 8'	23	3.93	0.19	0.24	1.48	0.00	1.48	5.84
12	Harvester - 6-Row #1	62	158.60	6.71	8.36	116.39	79.63	196.01	369.69
12	Harvester - 6-Row #2	62	158.60	6.71	8.36	116.39	79.63	196.01	369.69
12	Lister - 6-Row 20'	26	9.66	0.43	0.54	5.31	0.00	5.31	15.93
12	Module builder #1	57	21.42	0.67	0.84	9.23	10.29	19.52	42.45
12	Module builder #2	57	21.42	0.67	0.84	9.23	10.29	19.52	42.45
12	Mower - Flail 20'	39	17.45	0.85	1.06	19.11	0.00	19.11	38.47
12	Pickup - 1/2 ton	83	6.73	0.26	0.33	3.29	6.86	10.15	17.48
12	Pickup - 3/4 ton	83	7.85	0.31	0.38	3.67	6.86	10.53	19.08
12	Planter - 6-Row 20'	46	25.84	1.26	1.57	12.77	0.00	12.77	41.44
12	Rear Blade - 10'	23	1.60	0.08	0.10	0.77	0.00	0.77	2.56
12	Saddle Tank 300 gal	288	0.92	0.03	0.04	0.00	0.00	0.00	0.98
12	Spray Boom 20'	262	1.10	0.03	0.03	1.08	0.00	1.08	2.24
12	Subsoiler - 10'	48	12.20	0.51	0.63	8.16	0.00	8.16	21.50
12	Uncapper - 6-row 20'	30	4.22	0.18	0.22	2.54	0.00	2.54	7.16

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012
Table 7. OPERATIONS WITH EQUIPMENT

Operation	Operation Month	Tractor	Implement	Field Labor Hrs/Acre	Material	Rate/ acre	Unit
Rip fields 1X/3 yrs	Nov	230 hp track-type	Subsoiler - 10'	0.16			
Disc 2X	Nov	150 hp 4WD tractor	Disc - Stubble 18'	0.32			
Apply herbicide	Feb	150 hp 4WD tractor	Saddle tank 300 gal	0.12	Roundup	32.00	floz
Spray Triflurex	Mar	150 hp 4WD tractor	Spray boom 20'	0.24	Triflurex HFP	1.50	pt
Incorporate Triflurex	Mar	150 hp 4WD tractor	Disc - ffset 21'	0.16			
List beds	Mar	105 hp 4WD tractor	Lister 6-row 20'	0.08			
Make ditch	Feb	150 hp 4WD tractor	Ditcher - 8'	0.02			
	May	150 hp 4WD tractor	Ditcher - 8'	0.02			
	July	150 hp 4WD tractor	Ditcher - 8'	0.02			
Irrigate	Mar			1.00	Water	10.00	acin
	June			1.00	Water	8.00	acin
	July			1.00	Water	6.00	acin
	Aug			1.00	Water	6.00	acin
	Mar	150 hp 4WD tractor	Rear Blade - 10'	0.02			
Close ditch	June	150 hp 4WD tractor	Rear Blade - 10'	0.02			
	Sept	150 hp 4WD tractor	Rear Blade - 10'	0.02			
	Mar	105 hp 2WD tractor	Cultivator Roll 20'	0.12			
Cultivate - Preplant	Apr	105 hp 2WD tractor	Planter - 6-Row 20'	0.15	Seed transgenic	16.00	lb
Plant & Orthene treatment					Seed transgenic tech fee	16.00	lb
					Orthene	3.25	oz
Uncap beds	Apr	105 hp 2WD tractor	Uncapper - 6-row 20'	0.10			
Fertilize - Sidedress (UN32)	May	105 hp 2WD tractor		0.17	UN32 lbN	150.00	lb N
					Fertilizer rental	1.00	acre
Weed control - Over -the-top (Roundup)	May	105 hp 2WD tractor	Saddle tank 300 gal Spray boom 20'	0.24	Roundup	32.00	floz
Cultivate - 2X	May	105 hp 2WD tractor	Cultivator roll 20'	0.12			
	June	105 hp 2WD tractor	Cultivator roll 20'	0.12			
Weed control - Hand hoe	June			2.50			
Weed control - Direct/layby (Roundup)	June	105 hp 2WD tractor	Saddle tank 300 gal Spray boom 20'	0.24	Roundup	32.00	floz
Insect control - Lygus (Carbine, Zephyr)	June				Carbine 50WG	2.50	oz
					Zephyr	8.00	floz
					Air application	1.00	acre
Insect control - Lygus (Leverage)	July				Leverage 2.7	5.00	floz
					Air application	1.00	acre
Apply growth regulator & KNO3	July				Mepex Gin out	2.00	floz
					13-0-45 solution grade	10.00	lb
					Air application	1.00	acre
Fertilize - Water run (UN32)	July				UN32 lbN	30.00	lb N
Insect control - Aphid whitefly (Assail)	Aug				Assail 70WP	1.10	oz
					Air application	1.00	acre
Defoliate cotton - 2X	Oct				Finish 6 Pro	2.00	pint
					Ginstar	6.00	floz
					Air application	1.00	acre
	Oct				Defol 5	1.00	gal
					Shark EW	0.75	floz
					Air application	1.00	acre
PCA	Oct				PCA/consultant fee	1.00	acre
Harvest	Nov		Harvester - 6-row	0.18			

UC COOPERATIVE EXTENSION
SAN JOAQUIN VALLEY - SOUTH 2012
Table 7. CONTINUED

Operation	Operation Month	Tractor	Implement	Field Labor Hrs/Acre	Material	Rate/ acre	Unit
Boll buggy	Nov	150 hp 4WD tractor	Boll buggy	0.09			
Build module (tractor #1)	Nov	105 hp 2WD tractor		0.18			
Build module	Nov		Module builder #1	0.15			
	Nov		Module builder #2	0.15			
Build module (tractor #2)	Nov	105 hp 4WD tractor		0.18			
Gin compression charge	Nov				Compression charge	3.25	bale
Assessments	Nov				Cotton Inc.	3.25	bale
					Cotton Inc. Additional	3.25	bale
					CA Cotton Growers	3.25	bale
					Nat'l Cot. Council	3.25	bale
					Pink Bollworm Proj	3.25	bale
					USDA Classing Fee	3.25	bale
Chop stalks (post-harvest)	Nov	105 hp 2WD tractor	Mower - Flail 20'	0.12			
Disc residue - 2X (post-harvest)	Nov	230 hp track-type	Disc - Stubble 18'	0.29			
Pickup truck use	Nov		Pickup - 3/4 ton	0.27			
	Nov		Pickup - 1/2 ton	0.27			