UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

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PRODUCTION PRACTICES AND SAMPLE COSTS FOR ORGANIC COTTON

NORTHERN SAN JOAQUIN VALLEY

1995

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OVERVIEW FOR ORGANIC COTTON PRODUCTION

Introduction:

The California cotton production industry ranks second in cotton production in the nation with over one million acres of irrigated cropland. This comprises about 15% of the United States cotton production, and about 4% of the global total. Cotton is the fifth largest contributor to total farm income in the state, and regularly has a gross value of approximately $1 billion in seed and lint. The vast majority of California's cotton is produced in the San Joaquin Valley, with lesser acreages found in the Imperial, Palo Verde and Sacramento Valleys.

In recent years California's organic agricultural industry has expanded considerably. The production of organic cotton has likewise increased. Several San Joaquin Valley growers now devote a portion of their acreage to the production of organic cotton, with a substantial number of those acres located in the Northern San Joaquin Valley. San Joaquin Valley farms producing organic cotton are typically large, with farm size reaching up to 2,500 acres. Growers either commit all, or only a portion, of their farm acreage to organic production. Crops are also rotated on the organic acreage, making the number of acres planted to organic cotton smaller than the total, usually ranging from 10 to 800 acres each year. Crops rotated with organic cotton include alfalfa, dried beans, leguminous green manure crops (bell beans, peas, and vetch), processing tomatoes, oats and wheat.

This overview is meant to familiarize the reader with grower practices and critical issues facing producers of organic cotton today. The first section details the seasonal flow of operations for the production and ginning (processing) of organic cotton. The subsequent sections discuss crop rotation and diversification, cover crops and pest management. Following these discussions, grower risk and marketing for organically produced cotton are addressed. The current status of regulations governing organic commodities is encapsulated in the final section.

Production and Ginning Practices:

Many of the production practices for organically grown cotton are similar to that of a conventionally grown crop. Cultural operations begin with land preparation in either the fall or winter depending on the rotation and/or preceding crop. Bed preparation, planting and all subsequent operations take place during the spring and summer months until harvest in October or November. At harvest, cotton is referred to as seed cotton. Ginning takes place after harvest and is usually completed by February. The ginning process yields two products: cotton lint and cottonseed. Cultural operations are often delayed in years with cool, wet springs. When this occurs, ginning may not be completed until March.

Land Preparation. Production practices typically begin by working the ground with a subsoiler, followed by two discings. After these initial tillage operations, a composted poultry manure is often spread and incorporated into the soil by two additional discings. This fertilizing material provides organic matter as well as nitrogen, phosphorus, potassium and other nutrients at varying levels depending on the material's composition. The volume of compost that is spread and the number of passes for each operation varies and is dependent on soil fertility, surface residue and soil tilth.

No other fertilizing materials are commonly applied prior to planting the crop. However, some fields may require additional or alternative fertilizing material applications. Only those materials considered organically acceptable by certification agencies and/or state and federal law may be used. Materials are generally applied if soil analyses indicate a need. In addition, grower experience, cropping sequence and cost will help determine the appropriate fertility program. Other soil fertility management techniques include crop rotation, and to a lesser extent, cover cropping.

After the initial land preparation, fields are preirrigated once in February or March depending on seasonal rains and water availability. In April, beds are listed and then worked with a rolling cultivator to remove weeds and prepare for planting.

Planting. Cotton is direct seeded in April on single row 38-inch beds (furrow to furrow). An approved Acala variety is planted. For organic production, California state law and certification agency regulations stipulate the use of seed that has not been fungicide treated, unless untreated seed is unavailable. Organic cotton is often planted less densely than conventionally grown cotton to minimize competition for sunlight, water and nutrients, and encourage large boll development. Fields that are less densely planted also require fewer beneficial insects to assist in pest management.

Pest Management. Pest management techniques for the control of diseases, insects, mites and weeds begin after planting and continue throughout the summer. Pest pressure varies depending on the farm location, climatic conditions, the previous year's pest incidence, and neighboring crops and habitat. Refer to the **Pest Management** section for further information.

Irrigation Management. Crop irrigations are usually performed from May through August. The delivery method, number of applications, and the amount of applied surface water varies from location to location. Total applied water depends on the soil type, residual soil moisture and water availability. Furrow irrigation is the preferred application method for cotton. Water is either pumped from underground wells or delivered by an irrigation district and applied to fields using ditches and siphon tubes or gated pipe. Gated poly or aluminum pipe is used to improve irrigation efficiency by minimizing evaporative water loss and reducing labor costs.

Proper irrigation management is essential for cotton, and is used to balance vegetative growth with boll development, as well as to manage disease and insect populations. Frequent, excessive irrigations promote "rank" cotton, that is, plants that favor vegetative growth over boll development. Not only is yield sacrificed in the long-run by too much water, but insect pests such as aphids and lygus bugs are more attracted to the lush vegetative growth that results. In contrast, too little water stresses cotton and also results in reduced boll development. For organic cotton, water management is commonly used as a defoliant tool: by curtailing the supply of water earlier in the season than for conventionally grown cotton, defoliation is enhanced.

Boll Maturation and Defoliation. Prior to harvesting a conventionally grown cotton crop, synthetic growth regulators and defoliants are applied to fields to stimulate uniform boll maturation and leaf drop, respectively. These practices are used to increase the efficiency of mechanical harvesting and ginning. Specifically, plant leaves (trash) clog mechanical pickers, slow harvest, and stain cotton lint. Gin costs increase with increased trash levels because a greater amount of seed cotton is required to make a bale of cotton lint. In addition, stained lint reduces the grade of cotton.

According to California State law, the growth regulators and defoliants used by conventional growers are not allowed for use by growers of organic cotton. Instead, organic cotton growers rely on nutrient and water management to assist in boll maturation, opening and plant defoliation. For example, growers supply only enough nitrogen to insure fruit set and boll development on a yearly basis. Overfertilization or excessive soil nitrogen promotes vegetative growth and discourages boll maturation, resulting in reduced yields. Petiole analysis is sometimes used to determine the level of plant nitrogen, and to manage growth. Also, zinc sulfate is foliar-applied to assist in boll maturation and opening. A soil or plant deficiency in either zinc or sulfur must be demonstrated before this material can be applied. As mentioned above, water is cut off early in the season in an attempt to stress plants and aid in defoliation.

While these techniques help with respect to boll maturation and plant defoliation, they do not always achieve the same results as the synthetically formulated materials used by conventional growers. In cases where a low level of defoliation is attained, harvests may be slowed and cotton grades reduced, with trash levels and ginning costs increased. Defoliation presents one of the greatest challenges for the production of organic cotton. A number of different techniques that meet federal, state and certification agency standards are currently being tested for their value in assisting the defoliation process, including the use of various organically acceptable foliar sprays. However, at present none have been found to be as effective for defoliating organic cotton as the materials available to conventional growers.

Harvest and Ginning. Organic cotton is mechanically harvested with spindle-type pickers by the grower, a custom operator, or a combination of the two. Harvest is performed in October or November depending on the seasonal conditions. Harvested seed cotton is unloaded into a module builder near the field, where it is compressed and then transported to the cotton gin for processing.

It is best if the crop is harvested with a low moisture content so that, if necessary, the cotton can be stored for a period of time prior to ginning without reducing quality or grade. To achieve this, harvest of organic cotton often begins later and is finished earlier in the day than is typical for conventionally grown cotton. Low moisture content (12% or less), and the potential for storage, is particularly important because state law and certification agency regulations require organic and conventional cotton to remain separated at the gin if the product is to be sold on the organic market. Gins must shut down and clean out their machinery prior to processing organic cotton in order to meet these regulations. Consequently, a gin may not be immediately available to accept and gin the

organic seed cotton, resulting in the need for storage. Cotton that is harvested at a relatively high moisture content, and not ginned promptly, may have lower grades due to lint staining caused by leaf trash. In addition, decomposition of seed cotton can occur.

Yields for organically produced cotton in the Northern San Joaquin Valley range from 1.3 to 2.0 (500 pound) bales per acre for cotton lint, and 1,100 to 1,500 pounds per acre of cottonseed. This yield range is somewhat lower than the five year range average for conventionally grown cotton in the San Joaquin Valley. Yields are influenced by many factors including production location, weather conditions, soil fertility, pest control, irrigation and grower management.

Crop Rotation and Diversification:

Crop rotation and diversification are important elements of organic row and field crop operations. Diversification can enhance economic stability by allowing production risks to be spread over a greater number of crops. Ideally, the crop mix should be complementary; that is, all practices should be performed in a timely manner without competition for labor, equipment, and management expertise. In reality, this may not always be possible because of factors beyond a grower's control, such as unusual weather conditions, pest infestations, or peak work periods. Diversification may also mean that a grower will need additional resources such as specialized farm machinery.

Rotations are characterized by cropping sequences that alternate a variety of crops and may include a cover or green manure crop. A crop rotation's purpose is to recycle nutrients, break pest cycles, and/or maintain a balance between soil organic matter accumulation and decomposition. Organic matter is particularly important for improving soil structure and for providing nitrogen and other nutrients for crop production. Individual organic farmers have differing strategies for planting and rotating a variety of crops. Cropping history and grower experience will factor into the determination of each year's rotation. Other considerations include:

1. The requirements of each crop's culture.

2. The compatibility of each crop in terms of labor, equipment and seasonal timing.

3. The ability to provide year-round employment for farm workers.

4. The availability of nutrients. Crops with greater nutrient requirements may produce higher yields when following a cover crop. Also, crops with different root growth patterns may be better able to utilize residual nutrients that a previous crop was unable to capture.

5. The existing pest complex including weeds, disease, and arthropods (insects and mites). Selection of a crop that competes well with weeds, or planting disease-resistant cultivars may help overcome some of these difficulties.

6. The crop value and access to markets.

Organic cotton growers usually plant cotton once every two to three years on a given field. Since a typical farm consists of multiple fields, cotton will be grown somewhere on the farm each season. In addition, because growers use a limited number of crops in their rotations, cotton is sometimes grown back-to-back on the same acreage. Other crops used with cotton in rotation include alfalfa, dried beans, leguminous green manure crops (bell beans, winter peas, and vetch), processing tomatoes, oats and wheat.

Cover Crops:

Cover crops can be beneficial for crop production in a number of ways. Water penetration and infiltration can be improved by root growth of a cover crop and by returning organic matter to soils. Grasses are particularly helpful in promoting soil structure and soil aggregate stability because of their fibrous root systems. Microbial activity, often stimulated by cover crop root exudates and organic matter additions to soils, has also been shown to promote aggregate stability. This is important because soil erosion and degradation processes are reduced in aggregated soils. In addition, nutrients are released as microbes decompose organic matter. Leguminous cover crops can increase soil nitrogen through nitrogen fixation. Weed suppression for subsequent crops may be another benefit. Furthermore, cover crops increase plant diversity in a farming system and in the flowering stage can provide pollen and nectar to attract and sustain beneficial arthropods. Cover crops (and other rotation crops) also act as trap crops, attracting cotton crop pests away from cotton.

Planting cover crops may result in some negative impacts. Cover crops can attract some arthropod pests to production areas. Cover crops often require additional inputs such as seed, irrigation water and labor. In this area, water use in particular should be taken into consideration because it may be in short supply for some farms. Cover crops may also reduce the amount of land to which revenue-producing crops are planted unless land would otherwise have been winter-fallowed. However, some organic growers view the cost of planting and maintaining a cover crop as the cost of producing nitrogen and/or improving soil quality for the long-term.

Selection of a particular cover crop species should take into account the growing requirements of the cover crop itself as well as the previous and subsequent crops, the soil type, and possible irrigation for stand establishment. In this region grasses such as barley and wheat, and legumes such as bell beans, winter peas and vetch have been successfully managed and rotated on a small scale with cotton in the short winter between production seasons. However, the timing of cover crops and cotton plantings should remain flexible in response to winter weather in any given production year.

Pest Management:

Pest identification, monitoring and prevention are essential elements of successful cotton production. This is especially true for organic production because most of the pesticides that are currently used by producers of conventionally grown cotton are not approved for use by growers of organic cotton. Moreover, allowed pest control products are generally not as effective as synthetic pesticides for immediate or acute problems. Treatments such as biological controls and natural pesticides are used to decrease pest damage and reduce short-run economic risks when needed. These treatments, in conjunction with crop rotation, diversification and cultural practices may reduce and/or control disease, weed and insect problems. Growers should be certain that any materials used are in compliance with the rules and regulations of federal, state and organic certification agencies (refer to the **Regulations of Organically Grown Commodities** section). Application rates vary depending the extensiveness of a pest infestation.

Diseases. The incidence of disease in organic cotton fields is similar to that of conventionally farmed acreages. Techniques used to minimize disease incidence include 1) avoid planting in cold, wet soils which encourage seedling diseases, 2) improve field drainage and/or modify irrigations methods so that saturated soils cannot provide a favorable environment for disease, and 3) crop rotation.

Insects and mites. Important arthropod pests found in organic cotton production systems in the Northern San Joaquin Valley include lygus bugs (*Lygus hesperus)*, cotton aphid (*Aphis gossypii*) and spider mites (*Tetranychus* spp.). These insects feed on plant foliage, squares and small bolls. Economic damage occurs when pest populations are significant enough to weaken and reduce plant growth, promote square shedding and reduce overall yields. The aphid exudate honeydew can also contaminate cotton lint, and encourage sooty mold growth. Under these conditions, yields are also reduced.

In organic cotton fields, insect and mite pests are primarily managed by monitoring the level of natural predators, parasites and parasitoids, and by the release of biological control agents to augment that which already exists in the field. Fields are usually checked two to three times weekly. The natural predators, parasites and parasitoids that are found in Northern San Joaquin Valley cotton fields include: assassin bugs (Family *Reduviidae*), bigeyed bugs (*Geocoris* spp.), minute pirate bugs (*Orius* spp.) and various spiders and parasitic wasps. Green lacewings larvae (*Chrysopa* spp.) are often released to help reduce populations of lygus bugs, mites and other soft-bodied insects such as aphids. In the past predaceous mites and beneficial wasps of the genus *Trichogramma* have also been released to help reduce certain insect and caterpillar populations present in cotton fields.

When necessary, sulfur dust is applied to fields and/or field edges to control mites. Alfalfa that is planted in neighboring fields also acts as a host or trap crop for insect pests, particularly lygus bugs. Native or planted vegetation can also act as beneficial insect habitats in which native predators are conserved. These management techniques, in addition to management of water and plant density, can successfully keep insect pests at tolerable levels.

Weeds. Optimal weed control for organically produced cotton in the San Joaquin Valley results from the integration of mechanical cultivations and hand hoeing. Beds are mechanically cultivated prior to planting to remove weeds. After planting, weeds are largely managed by tillage with a cultivator that disturbs a weed's root system and prevents regrowth. The total number and exact timing of each cultivation is dependent on the crop's planting date, the amount of soil moisture, the crop's stage of growth, and the crop's ability to compete effectively with weeds. Hand weeding and chopping are also necessary for weed control in cotton rows.

Growers report greater difficulty in managing weeds in organic cotton acreages than in conventional cotton acreages. Furthermore, greater difficulty is encountered in managing perennial weeds over annual weeds within organic cotton systems in general. Perennial weeds are sometimes managed in organic fields by rotating land with known problems out of cotton and into a winter wheat (or other grain) crop. By spring, the grain crop is established and has the potential to suppress germination of perennial weeds by excluding sunlight. Because an overwintered grain crop is not irrigated in the spring, weeds must also complete with the established crop for water. In some cases, fields may be fallowed over the winter and cultivated multiple times in the spring and early summer to reduce perennial weed growth. In contrast herbicides, mechanical cultivations and hand hoeing are used to control annual and perennial weeds in conventional cotton fields.

Grower Risk and Marketing:

Growers of organically produced cotton currently face three major production and market risks each year. As mentioned above, defoliation of organic cotton is one of the major production challenges, or risks. Lack of defoliation can increase production costs, decrease yields and reduce overall cotton grade. A second, but equally important production risk is that of securing a production loan each year. Securing a yearly production loan is crucial to managing finances and bringing the crop to harvest.

The third major risk is marketing or selling the crop after ginning has been completed. Each gin retains the cottonseed that results from the ginning process, in effect purchasing the seed from the grower in "exchange" for the costs incurred to gin the cotton (refer to the **Cost and Returns** portion of this study for additional information). This means that growers are mainly concerned with selling the cotton lint. While commodities that are produced organically can often be sold for a premium price, production supply, market competition and consumer demand all affect returns to growers. At present the market for organic cotton is volatile, that is, demand and price vary significantly from year to year. Sales contracts and price premiums are not guaranteed nor are all bales of lint necessarily sold at one set price. Depending on the attained level of defoliation and leaf stain, a portion of the ginned cotton lint may be graded a lower quality, and therefore a receive a lower price. In addition, growers are sometimes forced to sell their product on the conventional market when a market for organic cotton lint is not available. In total, the risks associated with organic cotton should not be minimized; each affects the long-run economic viability of an operation.

Regulations of Organically Grown Commodities:

State Registration. Growers who choose to produce and market their crops as organic must register on a yearly basis with the State of California under the California Organic Foods Act of 1990. Enforced under this act are the provisions of Article 4.5 (commencing with Section 26569.20) of Chapter 5 of Division 21 of the California Health and Safety Code and of the California Food and Agricultural Code commencing with Section 46000. These provisions contain rules and regulations that must be adhered to by all producers, processors and handlers of organic commodities. As of January 1, 1996 organic commodities must not be produced on land to which a prohibited substance has been applied for a minimum of three years immediately preceding harvest of the crop to qualify as organic. Annual registration fees are levied by the state and, in addition, a one-time only initial registration fee is assessed. Fees are payable before any sales of the commodity occur and are based on projected estimates from a previous year's gross receipts. The state program is administered through the California Department of Food and Agriculture (CDFA).

Federal Regulations. On October 1, 1993, the federal Organic Foods Production Act of 1990 (OFPA) became effective. This act sets forth production standards and regulates all organic commodities on the national level. However, due to budget and time constraints, final recommendations for the law's implementation have not been completed. Therefore, even though the law is now in place, implementation and enforcement have been delayed. Current estimates indicate that implementation and enforcement will take place in late 1996. Nevertheless, growers would be wise to conform to federal production standards (in addition to state regulations) at this time. The federal program is administered through the United States Department of Agriculture (USDA).

In most cases the OFPA will preempt state law except in those cases where the state applies to the USDA for approval of stricter standards. One difference between state and federal law is noteworthy. The federal law stipulates that growers must be certified by a federally accredited certifying agent on an annual basis if yearly gross sales total more than $5,000. This federal requirement should not be confused with, and is separate from, state registration.

Certification. During the 1992-1993 time period, 45% of the registered organic farmers in California were also certified by a certification agency. Ninety percent of those certified were certified by California Certified Organic Farmers (CCOF). In addition to CCOF, six other organizations now actively certify growers in the state. They are: Farm Verified Organic (FVO), Oregon Tilth Certified Organically Grown (OTCO), the Organic Crop Improvement Association (OCIA), the Organic Growers and Buyers Association (OGBA), Quality Assurance International (QAI) and Scientific Certification Systems (SCS). Each agency must adhere to all state and federal laws regulating organic commodities, and in addition may enforce procedures specific to their own agencies. Organizations differ with respect to the certification process and the associated costs. The above organizations are registered with the State of California. However, none are currently accredited by the USDA since the USDA's certification program has not yet been implemented. Refer to the references section of this publication for additional sources of information.

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COST AND RETURNS STUDY FOR ORGANIC COTTON

NORTHERN SAN JOAQUIN VALLEY - 1995

The practices described for the hypothetical farm used in this report are considered common for organic cotton in the Northern San Joaquin Valley. Sample costs given for labor, materials, equipment, and custom and contract services are based on 1995 prices. **The use of trade names is not an endorsement or a recommendation, nor is criticism implied by omission of similar products**. A blank **Your Cost** column is provided to enter your actual costs on **Table 1. Costs Per Acre - Operations** and **Table 2. Detail of Costs Per Acre - Inputs**. Costs and practices detailed in this study may not be applicable to all situations. This study is only intended as a guide and can be used in making production decisions, determining potential returns, preparing budgets, and evaluating production loans.

This report consists of the set of **Cost of Production Assumptions For Organic Cotton** and six tables.

Table **1.** **Costs Per Acre - Operations**
Table **2.** **Detail of Costs Per Acre - Inputs**
Table **3.** **Monthly Cash Costs Per Acre**
Table **4.** **Whole Farm Annual Equipment, Investment And Business Overhead Costs**
Table **5.** **Hourly Equipment Costs**
Table **6**. **Ranging Analysis**

For an explanation of calculations used for the study refer to the attached assumptions, call the Department of Agricultural and Resource Economics, Cooperative Extension, University of California, Davis, California, (530) 752-3563 or call the farm advisor in the county of interest.

A study entitled *Sample Costs to Produce Cotton - 40-inch Row - San Joaquin Valley - 1995* is available for those interested in production and ginning costs for conventionally grown cotton.

Copies of this, and the above study, can be requested through the Department of Agricultural Resource Economics, U.C. Davis, (530) 752-1515, or from selected county Cooperative Extension offices.

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COST OF PRODUCTION ASSUMPTIONS FOR ORGANIC COTTON

This study reflects the practices and costs associated with a production system for organically grown cotton in the Northern San Joaquin Valley. While every effort is made to model a production system based on real world practices, this report cannot fully represent the costs and practices that are specific to each operation or production region. Production and management techniques are individualized to meet the specific needs of each operation. Therefore, this study should be interpreted as a representative operation and not as a statistical average. Costs are represented on an annual per acre basis.

The farm in this report is assumed to have all acreage registered and certified as organic. To be registered and certified organic, a transition period is required when any farm or production unit changes from conventional practices to organically acceptable methods. Federal, state and certification agency rules and regulations that are specific to organic commodities must be adhered to during this time period if the crops are to be marketed as organic. Crops grown in transition years may not be sold or labeled as organic. Commodities that are produced organically can often be sold for a premium price over conventionally grown products. However, the supply of organic products, market competition, and consumer demand will affect grower returns.

The following is a description of general assumptions pertaining to sample costs for the organic cotton.

1. LAND:

The total farm size is assumed to be 1,200 acres, 800 of which are in organic cotton production each year. Other crops grown organically in rotation on the 1,200 acres include alfalfa, dried beans, leguminous green manure crops (bell beans, winter peas and vetch), processing tomatoes, oats and wheat. Land is assumed to be level with well drained soils of moderate depth and fertility.

2. RENTAL AGREEMENT:

Land is rented by the grower on an annual per acre basis. Rental costs per acre range from $125 to $325, depending on such factors as parcel location, soil type, water availability, and land owner's contribution to costs such as water, taxes and road maintenance. A per acre cost of $140 is used in this study.

3. PRODUCTION PRACTICES:

Production practices for the cotton crop are listed in **Table 1. Costs Per Acre - Operations**. These tables show the order in which the operations are performed, as well as the hours per acre to perform each operation. Labor and custom rates, material and fuel and repair costs are also included in this table. Input costs can be found in **Table 2. Detail of Costs Per Acre - Inputs.** In addition, the sequence of operations and the monthly cash costs per acre for the crop can be found in **Table 3. Monthly Cash Costs Per Acre**.

In this report an approved Acala variety is assumed to be planted. The crop is direct seeded in April on 38-inch beds at the rate of 15 pounds per acre. Seed cotton is custom harvested in November.

4. FERTILIZING MATERIALS:

A composted poultry manure is spread and incorporated into the soil each year prior to planting the cotton crop at the rate of six tons per acre. In addition, zinc sulfate is applied twice to the crop, once during September and once during October. No other fertilizing materials or soil amendments are used to produce the crop.

Cover crops are grown in rotation with revenue-producing crops on a small portion of the organic acreage each year. Cover crops planted in this area include winter peas and vetch. In this report, specific costs for growing a cover crop are not shown, however, costs can range from $50 to $120 per acre.

5. CROP IRRIGATION REQUIREMENTS:

Irrigation requirements for cotton generally range from 24 to 36 acre-inches per acre per year depending on rainfall and the amount of water stored in the soil profile.

In this study the crop is assumed to be furrow irrigated by gated poly-pipe with a total of 27 acre-inches of water per acre per year including one preirrigation. Water is pumped from a depth of 175 feet in a 250 foot well at a cost of $4.16 per acre-inch. This figure is within the range of water costs for growers in the area.

Because the land is rented, the land owner is assumed to be responsible for well and underground irrigation system maintenance and repair. Individual irrigation practices and costs will vary among locations. Costs for poly-pipe and poly-pipe gates are located in **Table 4. Whole Farm Annual Equipment, Investment, and Business Overhead Costs** under investments.

6. PEST MANAGEMENT:

Disease incidence and invertebrate and vertebrate pest damage varies on a year to year basis depending on pest populations and management techniques. This study assumes that insect and mite populations are monitored twice weekly. In addition, larvae of the beneficial insect green lacewings are released 11 times during the growing season to reduce lygus bug, aphid, and mite populations. The application rate for green lacewings is 10,000 larvae per acre. This rate will vary depending upon the field, season and target pest. Sulfur dust is applied to field perimeters twice to assist with mite control. Weeds are controlled using by mechanical cultivations, and by hand chopping and hoeing. Refer to **Table 1. Costs Per Acre - Operations**, and **Table 2. Detail of Costs Per Acre - Inputs**, following this section for pest control measures pertinent to this study. Individual situations may vary.

7. HARVEST:

Seed cotton is custom harvested in November. The custom harvest rate used in this study is calculated using a $3.25 per hundredweight (cwt) cost. Assuming a seed cotton yield of 2,720 pounds per acre, harvest costs equal $88.40. This rate includes the cost to build and tarp modules. Custom rates can range from $80 to $120 per acre depending upon whether costs are based on yield or on a flat per acre fee.

Because a custom harvest is assumed, no costs for harvest equipment are included in this study. If growers choose to perform their own harvesting, equipment for the required operations should be inventoried and labor, fuel, repairs and capital recovery charges should be added as a cost of production. Custom harvest costs, then, would not be included.

8. TRANSPORTATION:

Growers within a 20-mile radius of the gin are not required to pay transportation costs from the harvest site to the gin. Therefore, no transportation costs are included in this study. Growers outside of the 20-mile radius must pay transportation charges which are based on distance between the harvest site and gin, and on module weight. As distance from the gin increases, hauling costs increase. Transportation costs range from approximately $7.50 to $35.00 per bale of cotton lint outside the 20-mile radius. Growers with modules under a minimum weight may also be required to pay a surcharge for hauling costs.

9. GINNING:

The ginning process yields two products from harvested seed cotton: lint and cottonseed. Currently, ginning costs are $3.35 per cwt for seed cotton. Assuming a seed cotton yield of 2,720 pounds per acre for this study, gin costs are calculated to be $91.12 per acre. Turnout rates are estimated to be 34% for lint and 51% for cottonseed. Costs to gin seed cotton are essentially paid for by a "cottonseed credit", that is, the cotton gin retains the ginned cottonseed and gives growers a credit to cover ginning costs. The cost of ginning is not included as a line-item cost because it is deducted directly from the grower's returns by the gin. Ginning costs are only represented in **Table 6. Ranging Analysis**.

Some gins charge growers a fee to shut down and clean out the gin prior to processing organic seed cotton. In this area, no surcharges are stipulated, therefore, none are included in this study.

10. YIELD & RETURN RANGES FOR ORGANIC COTTON:

This study assumes a yield of 1.85 bales of cotton lint per acre, and 1,387 pounds of cottonseed per acre in **Tables 1-3**. Yields for organically grown cotton range from 1.3 to 2.0 (500 pound) bales of lint per acre and 1,100 to 1,500 pounds of cottonseed per acre. Yields will vary depending on growing conditions, soil type and fertility, irrigation practices and pest populations.

Price premiums for organic cotton are not guaranteed, nor are all bales necessarily sold at one set price. In this study, however, the price received by growers of organic cotton lint is estimated to be $1.20 per pound for all bales. With the estimated price of $1.20 per pound for cotton lint, net returns above total costs are positive at a yield of 750 pounds lint per acre for the hypothetical farm analyzed in this study. At a low price of $1.00 per pound lint, the breakeven yield is 869 pounds lint per acre. At a high price of $1.40 per pound lint, the breakeven yield is 604 pounds lint per acre. Returns to growers range from $1.00 to $1.40

per pound lint with the organic premium. Refer to **Table 6. Ranging Analysis** for costs and returns at various prices and yields.

If a market for organic cotton lint is unavailable in any given year, the lint is sold on the conventional market without receiving a premium. For 1995, the preliminary price for conventional cotton is estimated to be $0.815 per pound.

11. LABOR:

Basic hourly wages for workers are $6.61 and $4.83 per hour for machine operators and field workers, respectively. Adding 34% for workers compensation, social security, insurance and other benefits increases the labor rates shown to $8.86 per hour for machine labor and $6.47 per hour for non-machine labor. The labor hours for operations involving machinery are 20% higher than the operation times listed on **Table 1** to account for extra labor involved in equipment set-up, moving, maintenance, work breaks and repair. Wages for managers are not included as a cash cost. Any returns above total costs are considered returns to management and risk.

12. CASH OVERHEAD:

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, but are not limited to, property taxes, interest on operating capital, offices expenses, property and liability insurance, sanitation services and equipment repairs.

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 additional taxes are charged 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 two, on a per acre basis.

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 11.61% per year. A nominal interest rate is the going market cost for borrowed funds.

Office and Business Expense: Office and business expenses are estimated at $30 per acre. These expenses include, but are not limited to, office supplies, telephones, bookkeeping, accounting, legal fees and road maintenance.

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 0.713% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs $960 per year. Cash overhead costs are found in **Tables 1, 2, 3** and **4.**

Sanitation Services: Sanitation services provide portable toilets for the operation and cost the farm $3,780 annually.

13. NON-CASH OVERHEAD:

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Although farm equipment is often purchased used, this study shows the current purchase price for new equipment adjusted to 60% of the new value to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in **Tables 1, 2** and **4.** They represent the capital recovery cost for each investment on an annual per acre basis.

Capital Recovery Costs: Capital recovery cost is the annual depreciation and interest cost for a capital investment. In other words, it is the amount of money required each year to recover the difference between the purchase price and salvage value, or unrecovered capital. Capital recovery cost is equivalent to the annual payment on a loan for an investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than by using straight-line depreciation and opportunity costs. However, it more accurately represents the annual costs of ownership because it takes the time value of money into account. The calculation for annual capital recovery costs is as follows.

[(Purchase Price - Salvage Value) x (Capital Recovery Factor)]
+
[Salvage Value x Interest Rate]

Salvage Value: Salvage value is an estimate of the remaining market value of an investment at the end of its useful life. Salvage value is calculated differently for different investments. For farm machinery (tractors and other implements), the remaining value is a percentage of the new cost of the investment. Salvage value for farm equipment is calculated as follows.

[New Price x % Remaining Value]

Salvage value for other investments including farm buildings, irrigation systems and miscellaneous tools and equipment is zero. The salvage value for land is equal to the purchase price because land does not depreciate. Purchase price and salvage value for the equipment and investments used in this study are shown on **Table 4**. Note that salvage values for different investments vary.

Capital Recovery Factor: The capital recovery factor is the amortization factor or annual payment whose present value at compound interest is equal to one. The capital recovery factor is a function of the interest rate and years of life of the equipment.

Interest Rate: An interest rate of 3.72% is used to calculate capital recovery costs. This interest rate is the United States Department of Agriculture Economic Research Service's (USDA-ERS's) ten year average of the 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 the specialized resources that can only be used effectively in the agricultural sector. In other words, the next best alternative use of these resources is in another agricultural enterprise.

14. EQUIPMENT CASH COSTS:

Equipment costs are composed of three parts; cash overhead, non-cash overhead and operating costs. Both of the overhead factors are detailed in previous sections. The operating costs consist of fuel, lubrication and repairs.

In allocating the equipment costs on a per acre basis, the following hourly charges are calculated first and shown in **Table 5**. Repair costs are based on the 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 power take-off (PTO) horsepower (hp) and the type of fuel used. The fuel and repair costs 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 cultural practice by the number of hours per acre for that operation. Tractor operation time is 10% higher than implement operation time to account for fueling, equipment moving and setup time. Prices for on-farm delivery of diesel and gasoline are $0.75 and $1.15 per gallon, respectively.

15. ASSESSMENTS:

In this study, a number of different assessment fees are included as a cost of production for organic growers. They are:

California Department of Food and Agriculture (CDFA) Organic Program: A stepped scale organic grower's registration fee of $750 is assessed by the State of California on the gross sales amount of $888,000. The gross sales amount is calculated by multiplying the yield of the crop per acre (925 pounds lint) by the price received for the crop per pound ($1.20 for lint) and the number of planted acres for the crop (800). Income from seed is not included in assessments. This is only an estimate of potential fees and will vary depending on yields and returns. Contact the County Agricultural Commissioner in your area for further details.

California Certified Organic Farmers (CCOF): The grower is assumed to be certified by CCOF. Annual membership fees are $175. Inspection fees are $150. In addition, CCOF growers are also required to pay assessment fees of .5% of their gross sales. Total CCOF assessments for the 800 acres of cotton in this study are $4,440. Fees are based on the production amount, the number of acres and parcels

contained in an operation as well as whether or not the farm is totally organic. Therefore, individual situations will vary.

In addition, both conventional and organic cotton growers are also assessed several fees from different organizations and for different purposes. They are:

National Cotton Council: The National Cotton Council is a voluntary organization which collects assessments to provide lobbying, advocacy and public relations for the cotton industry at the national level. The current assessment is $0.45 per bale of lint.

Cotton Incorporated: Cotton Incorporated was created by a federal marketing order and is overseen by the Cotton Board. Cotton Incorporated provides funds for industry research, promotion and marketing and currently requires growers to pay $1.00 per bale plus 0.5% of the lint sale price.

USDA-HVI: The USDA levies a fee for High Volume Instrumentation (HVI) classing. This determines the classification grade of cotton for marketing purposes. Growers are required to pay $1.55 per bale lint.

California Cotton Growers and Ginners Association (CCGGA): CCGGA assists California growers and ginners in advocating their position in the legislature. CCGGA fees are $0.12 per bale lint. Participation is the organization is voluntary.

California Department of Food and Agriculture (CDFA) Pink Bollworm Project: CDFA regulates this program, which, through detection and legislated postharvest practices, controls pink bollworm in the state. The Pink Bollworm Project maintains several control districts to administer the program. Growers are assessed fees of $2.00 per bale lint only if their cotton is ginned within a project district.

16. ACKNOWLEDGEMENT:

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U.C. COOPERATIVE EXTENSION

Table 1. COSTS PER ACRE TO PRODUCE ORGANIC COTTON - OPERATIONS

NORTHERN SAN JOAQUIN VALLEY - 1995

Labor Rate: $ 8.86/hr. machine labor Interest Rate: 11.61%

$ 6.47/hr. non-machine labor Yield per Acre: 925 lb lint, 1,387 lb cottonseed

Operation	Cash and Labor Costs per Acre					
Your Operation Cost	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost
Cultural:						
Subsoil (Rip)	0.40	4.25	1.17	0.00	30.00	35.42
Disc 4X	0.67	7.09	10.68	0.00	0.00	17.77
Manure Application	0.00	0.00	0.00	0.00	112.50	112.50
Preirrigate 1X	0.09	0.58	0.00	24.96	0.00	25.54
Make Beds	0.14	1.49	1.99	0.00	0.00	3.48
Work Beds	0.22	2.36	2.28	0.00	0.00	4.65
Plant Cotton	0.24	2.55	3.33	16.05	0.00	21.94
Cultivate 9X	1.03	10.94	13.60	0.00	0.00	24.53
Chop Weeds & Grasses 3X (Hand)	12.00	77.64	0.00	0.00	0.00	77.64
Pest Management Services	0.00	0.00	0.00	0.00	40.00	40.00
Irrigate 10X	0.90	5.82	0.00	87.36	0.00	93.18
Sulfur Application-Field Edges	0.10	0.65	0.00	0.65	0.00	1.29
Foliar Treatment (2X)	0.25	2.66	1.90	12.80	0.00	17.36
Pickup Use	0.29	6.17	2.87	0.00	0.00	9.04
TOTAL CULTURAL COSTS	16.33	122.20	37.83	141.82	182.50	484.34
Harvest:						
Harvest Cotton	0.00	0.00	0.00	0.00	88.40	88.40
Transportation to Gin*	0.00	0.00	0.00	0.00	0.00	0.00
Ginning**	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL HARVEST COSTS	0.00	0.00	0.00	0.00	0.00	88.40
Assessments:						
California State Registration Fees	0.00	0.00	0.00	0.94	0.00	0.94
CCOF Membership/Inspection Fees	0.00	0.00	0.00	0.41	0.00	0.41
CCOF .5% Gross Sales	0.00	0.00	0.00	5.55	0.00	5.55
National Cotton Council	0.00	0.00	0.00	0.83	0.00	0.83
Cotton Incoporated	0.00	0.00	0.00	7.40	0.00	7.40
USDA High Volume Instrumentation(HVI)	0.00	0.00	0.00	2.87	0.00	2.87
California Cotton Growers Asso	0.00	0.00	0.00	0.22	0.00	0.22
CDFA Pink Bollworm Project	0.00	0.00	0.00	3.70	0.00	3.70
TOTAL ASSESSMENT COSTS	0.00	0.00	0.00	21.92	0.00	21.92
Postharvest:						
Chop Stalks	0.13	2.76	2.54	0.00	0.00	5.30
Disc Residue 2X	0.33	3.51	5.34	0.00	0.00	8.85
TOTAL POSTHARVEST COSTS	0.46	6.27	7.88	0.00	0.00	14.15
Interest on operating capital @ 11.61%						37.19
TOTAL OPERATING COSTS/ACRE		128.47	45.70	163.74	270.90	646.00
TOTAL OPERATING COSTS/LB LINT						0.70

* Harvest site is within a 20-mile radius of gin, so no transportation costs are incurred.

** Gin costs are deducted directly from grower returns by the gin and are reflected in Table 6. Ranging Analysis only.

U.C. COOPERATIVE EXTENSION
ORGANIC COTTON - NORTHERN SAN JOAQUIN VALLEY - 1995
Table 1. continued

Operation	Cash and Labor Costs per Acre					
Your Operation Cost	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost
CASH OVERHEAD:						
Land Rent						140.00
Office Expense						30.00
Liability Insurance						0.80
Sanitation Services						3.15
Soil Analysis						1.37
Property Taxes						2.26
Property Insurance						1.61
Investment Repairs						1.98
TOTAL CASH OVERHEAD COSTS						181.18
TOTAL CASH COSTS/ACRE						827.18
TOTAL CASH COSTS/LB LINT						0.89
NON-CASH OVERHEAD:						
Investment		Per producing Acre		-- Annual Cost -- Capital Recovery		
Buildings		62.68		4.50		4.50
Fuel Tanks & Pumps		14.01		1.01		1.01
Fuel Wagon		1.42		0.17		0.17
Shop Tools		10.00		0.88		0.88
Tool Carrier		12.07		0.87		0.87
Poly Pipe		8.52		8.84		8.84
Poly Pipe Gates		4.07		1.46		1.46
Equipment		275.71		27.53		27.53
TOTAL NON-CASH OVERHEAD COSTS		388.47		45.26		45.26
TOTAL COSTS/ACRE						872.43
TOTAL COSTS/LB LINT						0.94

U.C. COOPERATIVE EXTENSION

Table 2. DETAIL OF COSTS PER ACRE TO PRODUCE ORGANIC COTTON - INPUTS
NORTHERN SAN JOAQUIN VALLEY - 1995

Labor Rate: $ 8.86/hr. machine labor Interest Rate: 11.61%
$ 6.47/hr. non-machine labor

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
OPERATING COSTS					
Rent:					
D8K Crawler Rental	1.00	acre	30.00	30.00	
Custom:					
Manure-Poultry	6.00	ton	18.75	112.50	
Pest Management Services	1.00	acre	40.00	40.00	
Harvest	27.20	cwt	3.25	88.40	
Water:					
Pumped	27.00	acin	4.16	112.32	
Seed:					
Cotton	15.00	lb	1.07	16.05	
Pest Control:					
Sulfur Dust	3.80	lb	0.17	0.65	
Fertilizing Material:					
Zinc Sulfate	40.00	lb	0.32	12.80	
Assessments:					
Ca. St. Org. Reg. Fees	1.00	acre	0.94	0.94	
CCOF Membership Fees	1.00	acre	0.22	0.22	
CCOF Inspection Fees	1.00	acre	0.19	0.19	
CCOF .5% Gross Sales	1.00	acre	5.55	5.55	
Nat'l Cotton Council	1.85	bale	0.45	0.83	
Cotton Incoporated	1.85	bale	1.00	1.85	
Cotton Incorp .5%	1.00	acre	5.55	5.55	
USDA High Vol. Inst.	1.85	bale	1.55	2.87	
CCGGA	1.85	bale	0.12	0.22	
CDFA Pink Bollworm	1.85	bale	2.00	3.70	
Labor (machine)	4.94	hrs	8.86	43.78	
Labor (non-machine)	13.09	hrs	6.47	84.69	
Fuel - Gas	1.60	gal	1.15	1.84	
Fuel - Diesel	26.41	gal	0.75	19.81	
Lube				3.25	
Machinery repair				20.80	
Interest on operating capital @ 11.61%				37.19	
TOTAL OPERATING COSTS/ACRE				646.00	
TOTAL OPERATING COSTS/LB LINT				0.70	

U.C. COOPERATIVE EXTENSION
DETAIL OF COSTS PER ACRE TO PRODUCE ORGANIC COTTON - INPUTS
NORTHERN SAN JOAQUIN VALLEY - 1995
Table 2. Continued

CASH OVERHEAD COSTS:	
Land Rent	140.00
Office Expense	30.00
Liability Insurance	0.80
Sanitation Services	3.15
Soil Analysis	1.37
Property Taxes	2.26
Property Insurance	1.61
Investment Repairs	1.98
TOTAL CASH OVERHEAD COSTS/ACRE	181.18
TOTAL CASH COSTS/ACRE	827.18
TOTAL CASH COSTS/LB LINT	0.89
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):	
Buildings	4.50
Fuel Tanks & Pumps	1.01
Fuel Wagon	0.17
Shop Tools	0.88
Tool Carrier	0.87
Poly Pipe	8.84
Poly Pipe Gates	1.46
Equipment	27.53
TOTAL NON-CASH OVERHEAD COSTS/ACRE	45.26
TOTAL COSTS/ACRE	872.43
TOTAL COSTS/LB LINT	0.94

U.C. COOPERATIVE EXTENSION

Table 3. MONTHLY CASH COSTS PER ACRE TO PRODUCE ORGANIC COTTON
NORTHERN SAN JOAQUIN VALLEY - 1995

Beginning JAN 95 Ending DEC 95	JAN 95	FEB 95	MAR 95	APR 95	MAY 95	JUN 95	JUL 95	AUG 95	SEP 95	OCT 95	NOV 95	DEC 95	TOTAL
Cultural:													
Subsoil (Rip)	35.42												35.42
Disc 4X	17.77												17.77
Manure Application	112.50												112.50
Preirrigate 1X			25.54										25.54
Make Beds				3.48									3.48
Work Beds				4.65									4.65
Plant Cotton				21.94									21.94
Cultivate 9X					7.57	8.49	8.47						24.53
Chop Weeds & Grasses 3X(Hand)					25.88	25.88	25.88						77.64
Pest Management Services					40.00								40.00
Irrigate 10X					9.32	18.64	27.95	37.27					93.18
Sulfur Application-Field Edges						0.65	0.65						1.29
Foliar Treatment 2X									8.68	8.68			17.36
Pickup Use										9.04			9.04
TOTAL CULTURAL COSTS	165.70		25.54	30.06	82.77	53.66	62.95	37.27	8.68	17.71			484.34
Harvest:													
Harvest Cotton											88.40		88.40
Transportation to Gin*													
Ginning**													
TOTAL HARVEST COSTS									88.40		88.40		
Assessments:													
California State Registration Fees											0.94		0.94
CCOF Membership/Inspection Fees											0.41		0.41
CCOF .5% Gross Sales											5.55		5.55
National Cotton Council											0.83		0.83
Cotton Incoporated											7.40		7.40
USDA High Volume Instrumentation (HVI)											2.87		2.87
California Cotton Growers & Ginners Associaion											0.22		0.22
CDFA Pink Bollworm Project											3.70		3.70
TOTAL ASSESSMENT COSTS											21.92		21.92
Postharvest:													
Chop Stalks											5.30		5.30
Disc Residue 2X											8.85		8.85
TOTAL POSTHARVEST COSTS											14.15		14.15
Interest on oper. capital	1.60	1.60	1.85	2.14	2.94	3.46	4.07	4.43	4.51	4.69	5.89		37.19
TOTAL OPERATING COSTS/ACRE	167.30	1.60	27.39	32.20	85.71	57.12	67.02	41.70	13.19	22.40	130.36		646.00
TOTAL OPERATING COSTS/LB LINT	0.18	0.00	0.03	0.03	0.09	0.06	0.07	0.05	0.01	0.02	0.14		0.70

U.C. COOPERATIVE EXTENSION
MONTHLY CASH COSTS PER ACRE TO PRODUCE ORGANIC COTTON
NORTHERN SAN JOAQUIN VALLEY - 1995

Table 3.Continued

Beginning JAN 95 Ending DEC 95	JAN 95	FEB 95	MAR 95	APR 95	MAY 95	JUN 95	JUL 95	AUG 95	SEP 95	OCT 95	NOV 95	DEC 95	TOTAL
OVERHEAD:													
Land Rent	140.00												140.00
Office Expense	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73		30.00
Liability Insurance	0.80												0.80
Sanitation Services	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29		3.15
Soil Analysis					1.37								1.37
Property Taxes				1.13								1.13	2.26
Property Insurance	1.61												1.61
Investment Repairs	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	1.98
TOTAL CASH OVERHEAD COSTS	145.59	3.18	3.18	4.31	4.55	3.18	3.18	3.18	3.18	3.18	3.18	1.30	181.18
TOTAL CASH COSTS/ACRE	312.89	4.78	30.57	36.51	90.26	60.30	70.20	44.88	16.37	25.58	133.54	1.30	827.18
TOTAL CASH COSTS/LB LINT	0.34	0.01	0.03	0.04	0.10	0.07	0.08	0.05	0.02	0.03	0.14	0.00	0.89

* Harvest site is within a 20-mile radius of gin, so no transportation costs are incurred.
** Gin costs are deducted directly from grower returns by the gin and are reflected in Table 6. Ranging Analysis only.

Table 4. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ORGANIC COTTON PRODUCTION
NORTHERN SAN JOAQUIN VALLEY - 1995

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	- Cash Overhead - Capital Recovery	Insur-ance	Taxes	Total
95	106 HP 2WD Tractor	54269	12	13568	4771.35	241.84	339.19	5352.38
95	140 HP 2WD Tractor	86216	12	21555	7580.15	384.20	538.85	8503.20
95	150 HP 2WD Tractor	98038	12	24511	8619.52	436.89	612.75	9669.16
95	Alloway Cultivator	9116	10	1612	972.29	38.25	53.64	1064.18
95	Alloway Cultivator	9116	10	1612	972.29	38.25	53.64	1064.18
95	Alloway Cultivator	9116	10	1612	972.29	38.25	53.64	1064.18
95	Disc - Offset 18'	16286	10	2880	1737.02	68.33	95.83	1901.18
95	Disc - Offset 21'	17144	10	3032	1828.51	71.93	100.88	2001.32
95	Flail Chopper	14593	10	2581	1556.41	61.23	85.87	1703.51
95	Lister - 6 Row	5388	10	953	574.65	22.61	31.71	628.97
95	Pickup - 1/2Ton	16000	7	6069	1863.29	78.68	110.35	2052.32
95	Pickup - 1/2Ton	16000	7	6069	1863.29	78.68	110.35	2052.32
95	Planter - 6 Row	12476	10	2206	1330.67	52.34	73.41	1456.42
95	Planter - 6 Row	12476	10	2206	1330.67	52.34	73.41	1456.42
95	Ripper - 10'	12500	5	4072	2029.77	59.08	82.86	2171.71
95	Rolling Cultivator-6 Row	7524	10	1331	802.45	31.57	44.27	878.29
95	Rolling Cultivator-6 Row	7524	10	1331	802.45	31.57	44.27	878.29
95	Sprayer-Self Propelled	53625	10	9483	5719.48	224.98	315.54	6260.00
TOTAL		457407		106683	45326.55	2011.02	2820.46	50158.03
60% of New Cost *		274444		64010	27195.93	1206.61	1692.28	30094.82

* Used to reflect a mix of new and used equipment.

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	------ Cash Overhead ------ Capital Recovery	Insur-ance	Taxes	Repairs	Total
INVESTMENT								
Buildings	75210	20		5397.75	268.12	376.05	1504.00	7545.92
Fuel Tanks & Pumps	16813	20		1206.65	59.94	84.06	336.00	1686.65
Fuel Wagon	1707	10		207.53	6.09	8.54	35.00	257.16
Poly Pipe	6819	1		7072.67	24.31	34.10	50.00	7181.08
Poly Pipe Gates	3255	3		1166.71	11.60	16.27	25.00	1219.58
Shop Tools	12000	15		1058.27	42.78	60.00	100.00	1261.05
Tool Carrier	14479	20		1039.14	51.62	72.40	290.00	1453.16
TOTAL INVESTMENT	130283		0	17148.72	464.46	651.42	2340.00	20604.60

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Land Rent	800.00	acre	140.00	112000.00
Liability Insurance	1200.00	acre	0.80	960.00
Office Expense	1200.00	acre	30.00	36000.00
Sanitation Services	1200.00	acre	3.15	3780.00
Soil Analysis	800.00	acre	1.37	1096.00

U.C. COOPERATIVE EXTENSION

Table 5. HOURLY EQUIPMENT COSTS FOR ORGANIC COTTON PRODUCTION
NORTHERN SAN JOAQUIN VALLEY - 1995

Yr	Description	Actual Hours Used	COSTS PER HOUR						
			Capital Recovery	- Cash Overhead - Insurance	Taxes	Repairs	Operating Fuel & Lube	Total Oper.	Total Costs/Hr.
95	106 HP 2WD Tractor	999.2	2.86	0.15	0.20	2.54	5.31	7.85	11.06
95	140 HP 2WD Tractor	999.6	4.55	0.23	0.32	4.03	7.01	11.04	16.15
95	150 HP 2WD Tractor	1292.7	4.00	0.20	0.28	4.58	7.51	12.09	16.58
95	Alloway Cultivator	199.9	2.92	0.11	0.16	1.99	0.00	1.99	5.19
95	Alloway Cultivator	199.9	2.92	0.11	0.16	1.99	0.00	1.99	5.19
95	Alloway Cultivator	199.9	2.92	0.11	0.16	1.89	0.00	1.89	5.08
95	Disc - Offset 18'	599.3	1.74	0.07	0.10	2.72	0.00	2.72	4.63
95	Disc - Offset 21'	264.0	4.16	0.16	0.23	2.87	0.00	2.87	7.42
95	Flail Chopper	200.0	4.67	0.18	0.26	6.23	0.00	6.23	11.34
95	Lister - 6 Row	200.0	1.72	0.07	0.10	0.90	0.00	0.90	2.79
95	Pickup - 1/2 Ton	284.2	3.93	0.17	0.23	1.19	3.31	4.50	8.83
95	Pickup - 1/2 Ton	284.2	3.93	0.17	0.23	1.19	3.31	4.50	8.83
95	Planter - 6 Row	150.0	5.32	0.21	0.29	3.50	0.00	3.50	9.33
95	Planter - 6 Row	150.0	5.32	0.21	0.29	3.50	0.00	3.50	9.33
95	Ripper - 10'	400.0	3.04	0.09	0.12	2.93	0.00	2.93	6.19
95	Rolling Cult - 6 Row	269.2	1.79	0.07	0.10	1.64	0.00	1.64	3.60
95	Rolling Cult - 6 Row	199.9	2.41	0.09	0.13	1.64	0.00	1.64	4.28
95	Sprayer-Self Propelled	220.0	15.60	0.61	0.86	0.00	6.90	6.90	23.97

Table 6.

UC COOPERATIVE EXTENSION
RANGING ANALYSIS FOR ORGANIC COTTON PRODUCTION
NORTHERN SAN JOAQUIN VALLEY - 1995

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ORGANIC COTTON

	YIELD (LB/ACRE)						
	650	750	850	925	950	975	1000
OPERATING COSTS/ACRE:							
Cultural Cost	484	484	484	484	484	484	484
Harvest, Gin & Assessement Costs	142	163	185	201	207	212	218
Postharvest Cost	14	14	14	14	14	14	14
Interest on operating capital	37	38	38	38	38	38	38
TOTAL OPERATING COSTS/ACRE	678	700	722	738	743	749	754
TOTAL OPERATING COSTS/LB LINT	1.04	0.93	0.85	0.80	0.78	0.77	0.75
CASH OVERHEAD COSTS/ACRE	181	181	181	181	181	181	181
TOTAL CASH COSTS/ACRE	859	881	903	919	925	930	936
TOTAL CASH COSTS/LB LINT	1.32	1.17	1.06	0.99	0.97	0.95	0.94
NON-CASH OVERHEAD COSTS/ACRE	45	45	45	45	45	45	45
TOTAL COSTS/ACRE	904	926	948	964	970	975	981
TOTAL COSTS/LB LINT	1.39	1.23	1.12	1.04	1.02	1.00	0.98

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

PRICE (DOLLARS/LB)		YIELD (LB/ACRE)						
Lint		650	750	850	925	950	975	1000
	Seed	1100	1200	1300	1387	1400	1450	1500
1.00	0.05	27	110	193	256	277	299	321
1.05	0.06	71	160	249	316	338	362	386
1.15	0.07	147	247	347	423	447	474	501
1.20	0.08	190	296	402	483	509	537	566
1.25	0.09	234	346	458	543	570	600	631
1.35	0.10	310	433	556	649	679	712	746
1.40	0.11	353	482	611	710	741	776	811

U.C. COOPERATIVE EXTENSION
RANGING ANALYSIS FOR ORGANIC COTTON PRODUCTION
NORTHERN SAN JOAQUIN VALLEY - 1995
Table 6. continued

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ORGANIC COTTON***

PRICE (DOLLARS/LB)		YIELD (LB/ACRE)						
Lint		650	750	850	925	950	975	1000
	Seed	1100	1200	1300	1387	1400	1450	1500
1.00	0.05	-154	-71	12	75	95	117	139
1.05	0.06	-110	-21	68	135	157	181	204
1.15	0.07	-34	66	166	242	266	293	319
1.20	0.08	9	115	221	302	327	356	384
1.25	0.09	53	165	277	362	389	419	449
1.35	0.10	129	252	375	468	498	531	564
1.40	0.11	172	301	430	528	559	594	629

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ORGANIC COTTON***

PRICE (DOLLARS/LB)		YIELD (LB/ACRE)						
Lint		650	750	850	925	950	975	1000
	Seed	1100	1200	1300	1387	1400	1450	1500
1.00	0.05	-199	-116	-33	30	50	72	94
1.05	0.06	-155	-66	23	90	112	135	159
1.15	0.07	-79	21	121	196	221	247	274
1.20	0.08	-36	70	176	257	282	311	339
1.25	0.09	8	120	232	317	344	374	404
1.35	0.10	84	207	330	423	453	486	519
1.40	0.11	127	256	385	483	514	549	584

*** Net returns reflect returns to growers after ginning costs have been deducted.