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**1993-1994**

**U.C. COOPERATIVE EXTENSION**

**PRODUCTION PRACTICES AND SAMPLE COSTS  
FOR ORGANIC PROCESSING TOMATOES  
IN THE SACRAMENTO VALLEY**

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## OVERVIEW FOR ORGANIC PROCESSING TOMATOES IN THE SACRAMENTO VALLEY

### **Introduction:**

California is the largest producer of processing tomatoes in the world, with over one-third of the state's crop produced in the Sacramento Valley. In recent years California's organic agricultural industry has expanded considerably. Coinciding with the expansion of organic agriculture, several Sacramento Valley growers now dedicate a portion of their acreage to the production of organic processing tomatoes.

Sacramento Valley farms producing processing tomatoes for the organic market are typically large, with a farm size ranging from 600 to 4,500 acres. However, only a small portion of the acreage (150 to 500 acres) is committed to organic production. Crops are rotated on these farms so the number of acres planted each year to tomatoes is smaller yet, and usually ranges from 50 to 150 acres. Crops rotated with tomatoes include alfalfa, corn, legumes (vetch, chick peas, cowpeas, dry beans and clover), melons, rice, safflower, squash, sugar beets, sunflower and/or wheat.

Like conventional farming, there are a number of different approaches to growing organic tomatoes. This overview is meant to guide the reader through the critical topics and issues that are related to producing organic processing tomatoes. The first section discusses contracts for processing tomatoes and grower risk. The second section describes the general sequence of operations for the production of organic processing tomatoes. Following this description, three additional sections provide more detail about crop rotation and diversification, cover crops, and pest management. In the final section, we address the current status of regulations governing organic commodities.

### **Processing Tomato Contracts and Grower Risk:**

Growers do not plant tomatoes for processing without a contract. Contracts between growers and processors are negotiated in the fall or winter before the crop is planted. This contract specifies the amount of tonnage that is expected to be delivered to the cannery during a particular period and the return price on a per ton basis. Contracts with processors for organic tomatoes usually provide a pricing premium of \$20 to \$40 per ton over the conventional market price.

To insure that sufficient tonnage is produced to meet the contractual agreement, growers sometimes plant a greater number of acres to tomatoes in case the yield per acre is lower than expected. Occasionally, additional acreage is planted in anticipation of increased demand by a cannery. Both of these practices increase grower risk over and above the usual production risks since there is no guarantee that any additional tonnage will be purchased by a cannery. For organic growers, overproduction may result in returns that are the same as for conventionally produced tomatoes.

Organically produced canning tomatoes currently represent only a small segment of the processing industry and contracts are limited. Few California canners currently handle organically grown processing tomatoes. They are: Escalon Packers located in Escalon, Gilroy Foods located in Gilroy and Sun Garden Packing Company located in San Jose. Organically produced canning tomatoes are labelled and marketed as whole peel, diced, ground, paste or sauce under a variety of different brand names, including Muir Glen of Sacramento and Millina's Finest of Aptos, California. Additionally, Timber Crest Farms located in Healdsburg contracts with growers for tomatoes for drying.

To reduce overall production risks for organic processing tomatoes, many growers purchase crop insurance. Insurance is purchased on a per acre basis and covers crop losses caused by specific natural hazards. Approximately one-third of the total California processing tomato crop is insured.

## Production Practices:

Many of the production practices for organically grown processing tomatoes are similar to that of a conventionally grown crop. Cultural operations begin in the fall with land preparation and ground work often takes place before contracts are signed in anticipation of securing a tomato contract.

**Land Preparation.** Ground work typically begins by discing the soil twice. After this initial discing, land is chiseled once or twice, followed by one or two additional discings. Fields are then land-planed twice. The number of passes for each operation is dependent on the amount of residue to be turned under from the previous crop as well as the tilth of the soil.

Fertilizing materials such as manure, composted manure, mined gypsum and/or rock phosphate are often spread by a custom operator or by the grower during land preparation. Manure and composted manure provide organic matter as well as nitrogen, phosphorus and potassium at varying levels depending on the material's composition. Gypsum adds calcium and sulfur for crop production and can be used to improve soil tilth with soils high in sodium. Rock phosphate adds phosphorus and calcium to soils. It is not necessary to apply some fertilizing materials every year to successfully produce a tomato crop. Materials are generally applied if soil sample 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 cover cropping.

When fertilizers are used, growers usually disc shallowly after the application to incorporate materials into the soil's top layer. Beds are then listed and shaped. These operations are generally performed in October, but may be slightly delayed depending on the previous crop's harvest period. No further operations are usually performed until December, January or February when beds are mechanically cultivated to remove weed growth prompted by fall and winter rains.

**Direct seeding.** Tomatoes are direct seeded on single or double row 60-inch beds (furrow to furrow). Direct seeded crops are planted as early as January and as late as March. A liquid starter fertilizer of fish powder and kelp extract is sometimes applied at the time of seeding. Alternatively, some growers sprinkler irrigate directly after seeding and apply a "top dressing" of manure or compost after planting. Pre and post emergence flame weeding is sometimes utilized by growers. Hand thinning and weeding is required approximately three to five weeks after the initial planting depending on soil temperatures and germination rates.

**Transplanting.** In the Sacramento Valley, transplanted tomatoes are generally planted on single row 60-inch beds. Transplanting takes place in March for a July harvest or in April for an August harvest. Although establishment costs are greater for transplanting than for direct seeding, there are potential benefits:

1. Transplanting extends the period of time for winter cover crop growth. Many growers would like to precede a tomato crop with a cover crop to increase organic matter and nitrogen levels. However, green manure crops are typically planted in the fall, grown over the winter and incorporated into soils in the spring after the majority of vegetative growth has occurred. The optimum time for incorporation is well past the optimal planting dates for organically grown direct seeded tomatoes.
2. Tomatoes transplanted in early March can be harvested in July thus avoiding periods of peak fruit damaging insect activity. This practice may not be practical when used in conjunction with a green manure crop because the cover crop might not have attained maximum vegetative growth by the early March tomato transplant date.
3. Transplants often compete better with weeds initially and may therefore reduce the total number of cultivations.
4. By reducing irrigations for field stand establishment, transplants may reduce the total number of field irrigations and overall water use.

Under organic regulations, transplants must be grown in accordance with the California Organic Foods Act of 1990 and the federal Organic Foods Production Act of 1990 in addition to specific organic certification rules and regulations (where applicable). Refer to the **Regulations of Organically Grown Commodities** section for additional information.

**Cultivars and General Management.** Hybrid varieties are predominantly used. Cultivar selection is based on yield potential with considerations for disease resistance, plant characteristics and field performance. Processors usually request specific cultivars based on canning characteristics. Currently, three varieties are commonly planted in this area: Ferry Morse 882, Orsetti's Halley 3155 and Asgrow Brigade 5210. All three varieties are bred for resistance to the fungal pathogens Fusarium wilt (*Fusarium oxysporum f.sp. lycopersici* races 1 and 2) and Verticillium wilt (*Verticillium dahliae* strain 1). Ferry Morse 882 is also bred for resistance to bacterial speck (*Pseudomonas syringae* pv. *tomato*) and root-knot nematode (*Meloidogyne* spp).

Other pest management techniques for the control of diseases, insects, mites and weeds begin as early as the month of March and extend through July depending on the farm location, the previous year's pest incidence and climatic conditions. Refer to the **Pest Management** section for further information.

Growers in this area often apply foliar nutrient sprays one to two times in the spring and summer months to enhance plant growth and health. Some nutrient materials are added to irrigation water rather than applied as foliar sprays.

Crop irrigations are usually performed from March through July. 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, whether the crop is direct seeded or transplanted, and water availability. A number of growers use sprinkler irrigation for crop germination and early seedling growth and then switch to furrow irrigation. Alternatively, some growers use furrow irrigation during the entire growing season.

For some tomato cultivars, it is necessary to train vines prior to harvest. Like conventionally grown processing tomatoes, organically grown tomatoes are mechanically harvested. Fruit maturity at harvest is largely determined by the planting date and weather conditions. At harvest, tomato fruit is transported to a cannery for processing. Processors require organically produced fruit to meet the same industry standards for quality as those of conventionally grown tomatoes. Yields for organically produced tomatoes in the Sacramento Valley range from 20-38 tons per acre. Yields are influenced by many factors including varietal selection, production location, weather conditions, soil fertility 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 often include a cover or green manure crop. Because of the importance of soil fertility and soil organic matter, organic farmers are increasingly planting some acreage to cover crops (refer to the **Cover Crops** section). 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.

**Figure 1. *Sample Rotations for Organic Processing Tomatoes*** includes information on three different rotation schemes for processing tomatoes. 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, spiders 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 processing tomato growers usually plant tomatoes once every two to four years on a given field. Since a typical farm consists of multiple fields, tomatoes will be grown somewhere on the farm each season. Other crops used with tomatoes in rotation include alfalfa, corn, legumes (vetch, chick peas, cowpeas, dry beans and clover), melons, rice, safflower, squash, sugar beets, sunflower and wheat.

Figure 1. Not available

### **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. Nutrients are released as microbes decompose organic matter. If leguminous cover crops are grown, soil nitrogen can be increased 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 nectar to attract and sustain beneficial arthropods. Although most cover crops are incorporated before flowering, some growers plant cover crops on field borders or perimeters as habitat for beneficials.

Planting cover crops may result in some negative impacts. Cover crops may attract some arthropod pests to production areas. Fall planted cover crops prevent ground from being worked up in the fall for early spring planting which is typical in conventional systems. Cover crops also require additional inputs such as seed, irrigation water, and labor. However, many 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 dry years. In this region legumes such as vetch and cowpeas are commonly planted as cover crops. Revenue-producing crops that follow a cover crop do not generally require a compost or manure application to supply nutrients for crop production. Growers in some areas may find that certain cover crop species are not suitable for the soils and conditions on their farm. Often, the most appropriate cover crop in each situation is determined by observation and experimentation over a period of years.

## Pest Management:

Many pesticides that are currently used by producers of conventionally grown processing tomatoes are not approved for use by growers of organic tomatoes. In general, pest control products used by organic growers are not as effective as synthetic pesticides for immediate or acute problems. Therefore, pest identification, monitoring and prevention are essential elements of successful organic processing tomato production. However, when necessary some treatments such as natural pesticides and biological controls are used to decrease pest damage and reduce short-run economic risks. These treatments, in conjunction with crop rotation, diversification and cultural practices may reduce and/or control disease, weed and insect problems. When pest management materials are used, application rates will vary depending the extensiveness of a pest infestation. 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).

**Diseases.** Important diseases that have occurred in organic tomato production areas of the Sacramento Valley include: phytophthora root rot (*Phytophthora* spp.), vascular wilts caused by the fungi *Fusarium* and *Verticillium*, powdery mildew (*Leveillula taurica*) and bacterial speck. Techniques used to minimize the incidence of disease for organic processing tomatoes include:

1. Plant cultivars resistant to multiple diseases.
2. Improve field drainage and/or modify irrigation methods. Saturated soils provide a favorable environment for *Phytophthora* and *Pythium* root rots.
3. Remove weeds that may harbor disease by cultivating mechanically or by hand.
4. Control disease-transmitting insects such as aphids with insecticidal soap sprays and diversified plantings for biological control.
5. Clean equipment when moving from field to field to avoid spreading weeds and diseases.
6. Use crop rotations.

When necessary, organic tomato growers in the Sacramento Valley apply sulfur dust once or twice aerially to control powdery mildew. If conditions are ideal for bacterial speck (cool, wet springs), growers apply copper fungicides to control the disease.

**Insects and mites.** Insect pests found in organic production systems in the Sacramento Valley include the tomato russet mite (*Aculops lycopersici*), cucumber beetles (*Diabrotica undecimpunctata undecimpunctata*) and flea beetles (*Epitrix* and *Phyllotreta* spp.). Periodically various stink bugs and caterpillars also infest processing tomato fields. These insects feed on plant foliage, stems, flowers and fruit. Economic damage occurs when pest populations are significant enough to weaken and reduce plant growth, scar and damage fruit, and decrease overall yields.

The same sulfur dust application that is used to control the disease powdery mildew (refer to the disease section above) also controls tomato russet mites. When necessary, growers use the mineral insecticide Cryolite for controlling various beetle and caterpillar species. The bacterium *Bacillus thuringiensis* (Bt) may also be helpful in reducing some caterpillar populations in tomato fields.

Pest management may also include the release of biological control agents to augment that which already exists in the field. For example, release of beneficial wasps of the genus *Trichogramma* may help reduce certain caterpillar populations. Also, green lacewings (*Chrysopa* spp.) may help reduce mite populations and soft bodied insects such as aphids. Additionally, some growers maintain insectary plantings in or near fields to provide a habitat and food source for beneficial arthropods while at the same time increasing the farm's biological diversity.

**Weeds.** Optimal weed control for organically produced tomatoes in the Sacramento Valley results from the integration of a number of weed control techniques. Beds are mechanically cultivated prior to planting to remove many weeds. After planting, weeds are largely managed by tillage with a sled type cultivator. 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 is often used in addition to mechanical cultivations. Furthermore, weeds should be removed from fields and field perimeters before seed sets to reduce the total weed seed bank.

Flame weeders are also being utilized by some growers to reduce weed populations before and after emergence of direct seeded tomato crops. Weeds are not actually burned back by flaming; they are killed by desiccation when the plant's cells burst upon exposure to the high temperatures that a flame weeder produces. Flame weeding is most effective when used on broadleaf seedling weeds. Volunteer grasses with protected growing points are generally more difficult to eliminate with flame weeding. Since no soil disturbance occurs with flame weeding, additional weed seeds are not brought to the soil surface for germination.

### **Regulations of Organically Grown Commodities:**

As of January 1, 1992 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. Currently, the act states that prior to January 1, 1995, producers of organic commodities may not apply prohibited materials or substances to annual or two-year crops for a minimum of twelve months prior to seed planting or twelve months prior to the appearance of flower buds for perennial crops to qualify as organic. From January 1, 1995 through December 31, 1995, this rule increases to a twenty-four month period of prohibition. On or after January 1, 1996 the restriction increases to thirty-six months. State registration fees apply. Also, a one-time only initial registration fee is assessed by the state. 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).

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 will be delayed for at least one year. Nonetheless, 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 preempts state law except in those cases where the state applies to the USDA for approval of stricter standards. Two differences between state and federal laws are noteworthy. First, the federal law stipulates that organic foods 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. Second, federal law states 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.

In 1992 only one-third of the registered organic farmers in California were certified by a certification agency. Approximately ninety percent of those certified were certified by California Certified Organic Farmers (CCOF). In addition to CCOF, five other organizations actively certify growers in the state. They are: Farm Verified Organic (FVO), the Organic Crop Improvement Association (OCIA), the Organic Growers and Buyers Association (OGBA), Quality Assurance International (QAI) and Scientific Certification Systems (SCS). Each agency should adhere to all state and federal laws regulating organic commodities, and in addition may enforce standards and 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.

## 1993-1994 - U.C. COOPERATIVE EXTENSION

### ORGANIC PROCESSING TOMATO COST AND RETURNS STUDY

#### General Information

The practices described for the hypothetical farm used in this report are considered appropriate for this area. Sample costs given for labor, materials, equipment, and custom and contract services are based on 1993-1994 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**. Some costs and practices detailed in this study may not be applicable to your situation. 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 Producing Organic Processing Tomatoes** 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.

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### **Cost Of Production Assumptions For Organic Processing Tomatoes In The Sacramento Valley**

This study reflects the practices and costs associated with a production system for organically grown processing tomatoes in the Sacramento 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 the variations that exist between the counties that comprise this region. Actual production practices and management techniques are generally individualized to meet the specific needs of each grower. Therefore, this study should be interpreted as a representative operation only and not as a statistical average. Costs are represented on an annual per acre basis.

The farm in this report is assumed to be an operation with both organic and conventional acreage. The organic acreage is assumed to be registered and certified. 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 can affect grower returns.

The following is a description of general assumptions pertaining to sample costs for the organic processing tomato operation analyzed in this study.

#### **1. LAND:**

The total farm size is assumed to be 1,200 acres, 310 of which are registered and certified organic. Ninety of the 310 acres produce organic processing tomatoes in any one year. The maximum number of acres that produce processing tomatoes (conventional and organic) in a given year is assumed to be 400. Other crops grown organically in rotation on the 310 acres include legumes (vetch, chick peas and dry beans), rice, sugar beets, sunflower 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. Under this agreement, the landowner receives 15% of the grower's gross returns per acre. This figure is within the 10-15% per acre rent range commonly agreed upon by growers and land owners in the area. Rental costs vary 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.

#### **3. PRODUCTION PRACTICES:**

Production practices for the tomato 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 a tomato variety is not specified. The crop is direct seeded in March and harvested in August. The crop is assumed to be a single row planting on 60-inch beds. Seed cost is within a range of costs for different hybrid cultivars. Varietal planting decisions should ultimately be based on the crop's yield potential, its compatibility to the climatic region, the disease-resistance capability, and overall quality at harvest.

If transplants are used, costs for greenhouse growing and field planting are estimated at \$250 per acre excluding the cost for seed. This figure is based on a per acre planting density of 5,800 plants.

#### 4. FERTILITY:

This study assumes that composted poultry manure is spread and incorporated into the soil each year at a rate of 4.5 tons per acre prior to planting the tomato crop. Mined gypsum is also applied once every three years at a rate of 1.5 tons per acre. A liquid fertilizer of kelp extract and fish powder is soil-applied at the time of seeding; a foliar spray of the same materials is performed in June. Kelp extract is applied at the rate of 1 pound per acre and fish powder at the rate of 4 pounds per acre regardless of the type of application.

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

#### 5. CROP IRRIGATION REQUIREMENTS:

Irrigation requirements for processing tomatoes generally range from 30-40 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 irrigated first by sprinkler and then by furrow (gated pipe) irrigation with a total of 36.5 acre-inches of water per acre per year. Water is delivered by the district at a cost of \$44 per acre-foot including standby charges. This figure is within a range of water costs commonly charged to growers in the area. Individual irrigation practices and costs may vary among locations. Costs for irrigation pipe 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 are assumed to be low. However, these may vary on a year to year basis depending on pest populations and management techniques. Weeds are controlled using a variety of techniques including mechanical cultivations, hand hoeing and flame weedings. 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:

Harvest operations are assumed to be performed by the grower. Fruit is mechanically harvested. One tomato harvester is utilized for the harvest. Besides the driver, seven hand sorters work on the harvester. Two tractors and two trailer dollies are used to haul tomatoes from the field. Transportation from the production site to the cannery are paid for by the processor. Growers own their equipment which is used on the entire 1,200 acre operation. Refer to **Table 1. Costs Per Acre - Operations** for the harvest costs incurred in this study. Costs can also be found in **Table 3. Monthly Cash Costs Per Acre**. Equipment costs are located in **Table 4. Whole Farm Annual Equipment, Investment and Business Overhead Costs**.

If the harvest is performed by a custom operator, equipment for the required operations should be deleted from the equipment list. Labor, fuel, repairs, depreciation and interest on investment should be also be subtracted as a cost of production. Custom charges, then, would be added to harvest costs. Custom harvest costs are estimated at \$350 per acre. For information on custom harvesting, contact the farm advisor or companies contracting for tomatoes in the area of interest.

#### 8. YIELD & RETURN RANGES FOR ORGANIC PROCESSING TOMATOES:

Yields for organically grown processing tomatoes range from 20-38 tons per acre. This study assumes a yield of 28 tons per acre in **Tables 1-3**. Yields will vary depending on cultivar selection and seasonal growing conditions.

Prices received by growers of organic processing are estimated at \$75 per ton. Returns to growers have been as high as \$125 and as low as \$55 per ton in the past. Current prices now range from \$72 to 75 per ton.

For the hypothetical farm analyzed in this study, with an average price of \$75 per ton, net returns above total costs are positive at a yield of 20.7 tons per acre. At a low price of \$55 per ton the breakeven yield is 29.9 tons per acre. At a high price of \$125 per ton the breakeven yield is 11.8 tons per acre. Refer to **Table 6. Ranging Analysis** for costs and returns at various prices and yields.

## 9. 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 operations to account for extra labor involved in equipment set-up, moving, maintenance and repair. Wages for managers are not included as a cash cost. Any returns above total costs are considered returns to management and risk.

## 10. 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 and investment repairs.

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 is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 7.89% per year. A nominal interest rate is the going market cost for borrowed funds.

Office and business expenses are estimated at \$30 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc. Costs for an agricultural consultant and/or pest control advisor (PCA) are \$18 per acre and are listed under professional services. Charges for soil tests and leaf analyses are included in this cost. Sanitation services provide portable toilets for field workers and cost the farm \$1,308 annually. Crop insurance for tomatoes is included at a cost of \$36 per acre.

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 \$952 per year. Cash overhead costs are found in **Tables 1, 2, 3, 4 and 5.**

## 11. NON-CASH OVERHEAD:

Non-cash overhead is comprised of depreciation and interest charged on equipment and other 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 equipment and investment costs are shown in **Tables 1, 2 and 4.** They represent depreciation and opportunity cost for each investment on an annual per acre basis.

Depreciation is a reduction in market value of investments due to wear, obsolescence and age and is on a straight line basis. Annual depreciation is calculated as the purchase price minus the salvage value divided by the years the investment is held. The purchase price and years of life are shown in **Table 4.**

Interest is charged on investments to account for income foregone (opportunity cost) that could be received from an alternative investment. The investments are assumed to be owned outright. Therefore, interest on investments is a non-cash cost. Investments include, but are not limited to, land, buildings and equipment. Interest is calculated as the average value of the investment during its useful life, multiplied by a real interest rate of 3.72% per year. Average value for the equipment and buildings equals the new cost plus the salvage value divided by two on a per acre basis.

## **12. 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 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 time is 10% higher than implement time for a given operation to account for setup time. Prices for on-farm delivery of diesel and gasoline are \$0.85 and \$1.17 per gallon, respectively.

## **13. ASSESSMENTS:**

In this study, a stepped scale organic grower's registration fee of \$300 is assessed by the State of California on the gross sales amount of \$189,000. The gross sales amount is calculated by multiplying the yield of the crop per acre (28 tons) by the price received for the crop per ton (\$75) and the number of planted acres for the crop (90). 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.

The grower is assumed to be certified by California Certified Organic Farmers (CCOF). Annual membership fees are \$175. Inspection fees are \$150. Assessment fees are .5% of a grower's gross sales and are included as a cost of production. Total CCOF assessments for 90 acres of tomatoes in this study are \$945. 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.

## **14. ACKNOWLEDGEMENT:**

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Table 1.

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO PRODUCE ORGANIC PROCESSING TOMATOES - OPERATIONS  
 SACRAMENTO VALLEY - 1993-1994

Labor Rate: \$ 8.86/hr. machine labor                      Interest Rate: 7.89%  
 \$ 6.47/hr. non-machine labor                      Yield per Acre: 28.00 tons

Operation	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Disc-2X	0.29	3.04	6.63	0.00	0.00	9.67	
Chisel	0.25	2.66	5.93	0.00	0.00	8.58	
Disc	0.14	1.52	3.32	0.00	0.00	4.84	
Land Plane Fields-2X	0.33	3.54	8.42	0.00	0.00	11.96	
Composted Manure Application	0.00	0.00	0.00	0.00	139.50	139.50	
Gypsum Application-1 of 3 years	0.00	0.00	0.00	0.00	22.00	22.00	
Disc-Incorporate Fertilizing Materials	0.14	1.52	3.32	0.00	0.00	4.84	
List Beds	0.22	2.36	2.64	0.00	0.00	5.01	
Preplant Cultivation-2X	0.50	5.32	6.00	0.00	0.00	11.31	
Shape Beds	0.22	2.36	2.81	0.00	0.00	5.17	
Plant & Fertilize Tomatoes	0.33	5.68	4.56	130.04	0.00	140.28	
Preemergence Flame Weed	0.50	5.32	4.15	6.25	0.00	15.72	
Sprinkler Irrigate-2X	5.80	37.53	0.00	18.35	0.00	55.88	
Hand Thin & Weed	7.72	49.95	0.00	0.00	0.00	49.95	
Cultivate/Reshape Beds	0.25	2.66	2.17	0.00	0.00	4.83	
Hand Weed-3X	15.00	97.05	0.00	0.00	0.00	97.05	
Cultivate/Clean Furrows-3X	0.75	7.97	6.52	0.00	0.00	14.49	
Make Ditches	0.09	0.94	1.08	0.00	0.00	2.03	
Furrow Irrigate-7X	4.20	27.17	0.00	115.60	0.00	142.78	
Close Ditches	0.09	0.94	0.72	0.00	0.00	1.66	
Foliar Feed	0.00	0.00	0.00	14.24	6.75	20.99	
Sulfur Application	0.00	0.00	0.00	4.40	8.00	12.40	
Copper Application-1/2 of acreage	0.08	0.87	0.71	5.10	0.00	6.68	
Train Vines	0.21	2.23	2.59	0.00	0.00	4.82	
Miscellaneous/Cleanup	0.86	5.56	0.00	0.00	0.00	5.56	
Pickup Use	0.25	2.66	1.71	0.00	0.00	4.37	
<b>TOTAL CULTURAL COSTS</b>	<b>38.23</b>	<b>268.85</b>	<b>63.28</b>	<b>293.98</b>	<b>176.25</b>	<b>802.37</b>	
Harvest:							
Machine Harvest	1.18	70.36	60.82	0.00	0.00	131.18	
In Field Hauling	2.36	25.09	39.86	0.00	0.00	64.95	
<b>TOTAL HARVEST COSTS</b>	<b>3.54</b>	<b>95.45</b>	<b>100.68</b>	<b>0.00</b>	<b>0.00</b>	<b>196.13</b>	

U.C. COOPERATIVE EXTENSION

Table 1. Continued

Operation	Operation			Cash and Labor Costs per Acre			Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
Assessments:								
California State Organic Registration Fees	0.00	0.00	0.00	3.33	0.00	3.33		
CCOF Membership Fees	0.00	0.00	0.00	0.56	0.00	0.56		
CCOF Inspection Fees	0.00	0.00	0.00	0.48	0.00	0.48		
CCOF .5% of Gross Sales	0.00	0.00	0.00	10.50	0.00	10.50		
TOTAL ASSESSMENT COSTS	0.00	0.00	0.00	14.87	0.00	14.87		
Interest on operating capital @ 7.89%								34.43
TOTAL OPERATING COSTS/ACRE		364.31	163.95	308.86	176.25	1047.80		
TOTAL OPERATING COSTS/TON						37.42		
CASH OVERHEAD:								
Land Rent								315.00
Office Expense								30.00
Liability Insurance								0.79
Sanitation Services								1.09
Crop Insurance								36.00
Professional Services								18.00
Property Taxes								4.88
Property Insurance								2.44
Investment Repairs								0.79
TOTAL CASH OVERHEAD COSTS								408.99
TOTAL CASH COSTS/ACRE						1456.79		
TOTAL CASH COSTS/TON						52.03		
NON-CASH OVERHEAD:								
Investment	Per producing Acre	Annual Cost		Interest @ 3.72%				
		Depreciation						
Buildings	30.83	0.93		0.63		1.56		
Fuel Tanks & Pumps	6.75	0.30		0.14		0.44		
Shop Tools	9.17	0.55		0.19		0.74		
Tool Carrier	10.17	0.46		0.21		0.67		
Irrigation Pipe	24.75	2.23		0.51		2.73		
Irrigation Pipe Trailers	0.83	0.04		0.02		0.05		
Equipment	804.94	93.22		16.47		109.69		
TOTAL NON-CASH OVERHEAD COSTS	887.44	97.73		18.16		115.88		
TOTAL COSTS/ACRE						1572.67		
TOTAL COSTS/TON						56.17		

U.C. COOPERATIVE EXTENSION

Table 2. DETAIL OF COSTS PER ACRE TO PRODUCE ORGANIC PROCESSING TOMATOES - INPUTS  
SACRAMENTO VALLEY - 1993-1994

Labor Rate: \$ 8.86/hr. machine labor Interest Rate: 7.89%  
\$ 6.47/hr. non-machine labor

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
=====					
OPERATING COSTS					
-----					
Custom:					
Composted Manure Appl.	4.50	ton	31.00	139.50	
Gypsum Application	0.50	ton	44.00	22.00	
Flying Service-Foliar Feed	1.00	acre	6.75	6.75	
Flying Service-Sulfur Dust	1.00	acre	8.00	8.00	
Seed:					
Hybrid	60.00	thou	1.93	115.80	
Soil-Applied Nutrients:					
Fish Powder	4.00	lb	2.07	8.28	
Kelp Extract	1.00	lb	5.96	5.96	
Miscellaneous:					
Propane	5.00	gal	1.25	6.25	
Water:					
District	36.50	acin	3.67	133.96	
Foliar Nutrients:					
Fish Powder	4.00	lb	2.07	8.28	
Kelp Extract	1.00	lb	5.96	5.96	
Pest Control:					
Sulfur Dust	40.00	lb	0.11	4.40	
Copper Hydroxide	2.00	lb	2.55	5.10	
Assessments:					
Ca. St. Org. Reg. Fees	1.00	acre	3.33	3.33	
CCOF Membership Fees	1.00	acre	0.56	0.56	
CCOF Inspection Fees	1.00	acre	0.48	0.48	
CCOF .5% Gross Sales	1.00	acre	10.50	10.50	
Labor (machine)	11.24	hrs	8.86	99.62	
Labor (non-machine)	40.91	hrs	6.47	264.69	
Fuel - Gas	0.73	gal	1.17	0.85	
Fuel - Diesel	70.97	gal	0.85	60.32	
Lube				9.17	
Machinery repair				93.62	
Interest on operating capital @ 7.89%				34.43	
				-----	
TOTAL OPERATING COSTS/ACRE				1047.80	
TOTAL OPERATING COSTS/TON				37.42	
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U.C. COOPERATIVE EXTENSION  
Table 2. Continued

Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS:				
			315.00	
			30.00	
			0.79	
			1.09	
			36.00	
			18.00	
			4.88	
			2.44	
			0.79	
TOTAL CASH OVERHEAD COSTS/ACRE			408.99	
TOTAL CASH COSTS/ACRE			1456.79	
TOTAL CASH COSTS/TON			52.03	
NON-CASH OVERHEAD COSTS (DEPRECIATION & INTEREST):				
			1.56	
			0.44	
			0.74	
			0.67	
			2.73	
			0.05	
			109.69	
TOTAL NON-CASH OVERHEAD COSTS/ACRE			115.88	
TOTAL COSTS/ACRE			1572.67	
TOTAL COSTS/TON			56.17	

Table 3.

U.C. COOPERATIVE EXTENSION  
 MONTHLY CASH COSTS PER ACRE TO PRODUCE ORGANIC PROCESSING TOMATOES  
 SACRAMENTO VALLEY - 1993-1994

Beginning	OCT 93	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Ending	SEP 94	93	93	93	94	94	94	94	94	94	94	94	94	
<b>Cultural:</b>														
Disc-2X		9.67												9.67
Chisel		8.58												8.58
Disc		4.84												4.84
Land Plane Fields-2X		11.96												11.96
Composted Manure Appl.		139.50												139.50
Gypsum Appl.-1 of 3 years		22.00												22.00
Disc-Incorp.Fert. Materials		4.84												4.84
List Beds		5.01												5.01
Preplant Cultivation-2X					5.66	5.66								11.31
Shape Beds							5.17							5.17
Plant & Fertilize Tomatoes							140.28							140.28
Preemergence Flame Weeding							15.72							15.72
Sprinkler Irrigate-2X							27.94	27.94						55.88
Hand Thin & Weed								49.95						49.95
Cultivate/Reshape Beds								4.83						4.83
Hand Weed-3X								32.35	64.70					97.05
Cultivate/Clean Furrows-3X								4.83	4.83	4.83				14.49
Make Ditches								0.51	0.51	1.01				2.03
Furrow Irrigate-7X								20.40	40.79	40.79	40.79			142.78
Close Ditches								0.42		0.83	0.42			1.66
Foliar Feed										20.99				20.99
Sulfur Application										12.40				12.40
Copper Appl.-1/2 of years										6.68				6.68
Train Vines											4.82			4.82
Misc./Cleanup												5.56		5.56
Pickup Use		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		4.37
<b>TOTAL CULTURAL COSTS</b>		<b>206.79</b>	<b>0.40</b>	<b>0.40</b>	<b>6.05</b>	<b>6.05</b>	<b>189.50</b>	<b>141.62</b>	<b>111.23</b>	<b>87.94</b>	<b>46.42</b>	<b>5.96</b>		<b>802.37</b>
<b>Harvest:</b>														
Machine Harvest												131.18		131.18
In Field Hauling												64.95		64.95
<b>TOTAL HARVEST COSTS</b>												<b>196.13</b>		<b>196.13</b>

U.C. COOPERATIVE EXTENSION  
Table 3. Continued

Beginning OCT 93	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Ending SEP 94	93	93	93	94	94	94	94	94	94	94	94	94	
<b>Assessments:</b>													
Ca. St. Org. Reg. Fees											3.33		3.33
CCOF Membership Fees											0.56		0.56
CCOF Inspection Fees											0.48		0.48
CCOF .5% of Gross Sales											10.50		10.50
<b>TOTAL ASSESSMENT COSTS</b>											<b>14.87</b>		<b>14.87</b>
Interest on oper. capital	1.36	1.36	1.36	1.40	1.44	2.69	3.62	4.35	4.93	5.24	6.66		34.43
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>208.15</b>	<b>1.76</b>	<b>1.76</b>	<b>7.46</b>	<b>7.50</b>	<b>192.19</b>	<b>145.24</b>	<b>115.58</b>	<b>92.87</b>	<b>51.66</b>	<b>223.62</b>		<b>1047.80</b>
<b>TOTAL OPERATING COSTS/TON</b>	<b>7.43</b>	<b>0.06</b>	<b>0.06</b>	<b>0.27</b>	<b>0.27</b>	<b>6.86</b>	<b>5.19</b>	<b>4.13</b>	<b>3.32</b>	<b>1.85</b>	<b>7.99</b>		<b>37.42</b>
<b>CASH OVERHEAD:</b>													
Land Rent											315.00		315.00
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											0.79		0.79
Sanitation Services											1.09		1.09
Crop Insurance						36.00							36.00
Professional Services	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64		18.00
Property Taxes			2.44				2.44						4.88
Property Insurance				2.44									2.44
Investment Repairs	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.79
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>4.43</b>	<b>4.43</b>	<b>6.87</b>	<b>6.87</b>	<b>4.43</b>	<b>40.43</b>	<b>6.87</b>	<b>4.43</b>	<b>4.43</b>	<b>4.43</b>	<b>321.31</b>	<b>0.07</b>	<b>408.99</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>212.58</b>	<b>6.19</b>	<b>8.63</b>	<b>14.33</b>	<b>11.93</b>	<b>232.62</b>	<b>152.11</b>	<b>120.01</b>	<b>97.30</b>	<b>56.09</b>	<b>544.93</b>	<b>0.07</b>	<b>1456.79</b>
<b>TOTAL CASH COSTS/TON</b>	<b>7.59</b>	<b>0.22</b>	<b>0.31</b>	<b>0.51</b>	<b>0.43</b>	<b>8.31</b>	<b>5.43</b>	<b>4.29</b>	<b>3.48</b>	<b>2.00</b>	<b>19.46</b>	<b>0.00</b>	<b>52.03</b>

Table 4.

U.C. COOPERATIVE EXTENSION  
 WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ORGANIC PROCESSING TOMATOES  
 SACRAMENTO VALLEY - 1993-1994

ANNUAL EQUIPMENT COSTS

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Yr	Description	Price	Yrs Life	- Non-Cash Over. -		- Cash Overhead -		Total
				Depre- ciation	Interest	Insur- ance	Taxes	
94	115 HP 2WD Tractor	56300	12	4222.50	1151.90	154.82	309.65	5838.87
94	225 HP Crawler	155500	12	11662.50	3181.53	427.63	855.25	16126.91
94	85 HP 2WD Tractor	42900	12	3217.50	877.73	117.97	235.95	4449.15
94	Bed Shaper - 3 Row	6061	15	363.67	124.01	16.67	33.34	537.69
94	Chisel - Heavy 10'	3890	15	233.40	79.59	10.70	21.40	345.09
94	Cultivator Sled	3857	15	231.47	78.90	10.60	21.21	342.18
94	Disc - Offset 21'	16990	15	1019.40	347.62	46.72	93.45	1507.19
94	Flame Weeder	2500	10	225.00	51.15	6.88	13.75	296.78
94	Generator & Lights	3600	7	462.86	73.66	9.90	19.80	566.22
94	Tomato Harvester	203775	5	36679.60	4169.23	560.38	1120.76	42529.97
94	Land Plane - 14'	18323	15	1099.40	374.88	50.39	100.78	1625.45
94	Lister - 3 Row	3535	15	212.07	72.34	9.72	19.45	313.58
94	Pickup Truck - 1/2 ton	16500	7	2121.43	337.59	45.37	90.75	2595.14
94	Planter-3 Row/Sled	3893	7	500.57	79.65	10.70	21.41	612.33
94	Saddle Tank-300 gallon	1690	10	152.10	34.58	4.65	9.29	200.62
94	Scraper Blade 8'	1887	15	113.27	38.60	5.19	10.38	167.44
94	Sprayer-150 gallon	2161	10	194.50	44.21	5.94	11.89	256.54
94	Trailer Dollie #1	1200	10	108.00	24.55	3.30	6.60	142.45
94	Trailer Dollie #2	1200	10	108.00	24.55	3.30	6.60	142.45
94	V Ditcher	4635	15	278.07	94.84	12.75	25.50	411.16
94	Vine Trainer	4944	10	445.00	101.15	13.60	27.19	586.94
TOTAL		555341		63650.31	11362.26	1527.18	3054.40	79594.15
60% of New Cost *		333205		38190.19	6817.36	916.31	1832.64	47756.49

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

ANNUAL INVESTMENT COSTS

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Description	Price	Yrs Life	- Non-Cash Over. -		- Cash Overhead -			Total
			Depre- ciation	Interest	Insur- ance	Taxes	Repairs	
INVESTMENT								
Buildings	37000	30	1110.00	757.02	101.75	203.50	100.00	2272.27
Fuel Tanks & Pumps	8100	20	364.50	165.73	22.28	44.55	125.00	722.06
IrrigationPipe Trailers	1000	20	45.00	20.46	2.75	5.50	25.00	98.71
Irrigation Pipe	29700	10	2673.00	607.66	81.67	163.35	500.00	4025.68
Shop Tools	11000	15	660.00	225.06	30.25	60.50	100.00	1075.81
Tool Carrier	12200	20	549.00	249.61	33.55	67.10	100.00	999.26
TOTAL INVESTMENT		99000	5401.50	2025.54	272.25	544.50	950.00	9193.79

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U.C. COOPERATIVE EXTENSION

Table 4. Continued

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Crop Insurance	90.00	acre	36.00	3240.00
Land Rent	90.00	acre	315.00	28350.00
Liability Insurance	1200.00	acre	0.79	948.00
Office Expense	1200.00	acre	30.00	36000.00
Professional Services	90.00	acre	18.00	1620.00
Sanitation Services	1200.00	acre	1.09	1308.00

Table 5.

U.C. COOPERATIVE EXTENSION  
 HOURLY EQUIPMENT COSTS FOR ORGANIC PROCESSING TOMATOES  
 SACRAMENTO VALLEY - 1993-1994

Yr Description	Actual Hours Used	COSTS PER HOUR							Total Oper.	Total Costs/Hr.
		-Non-Cash Over- Depre- ciation	Interest	- Cash Overhead - Insur- ance	Taxes	Repairs	Fuel & Lube	Operating		
94 115 HP 2WD Tractor	999.9	2.53	0.69	0.09	0.19	3.38	6.52	9.90	13.40	
94 225 HP Crawler	999.1	7.00	1.91	0.26	0.51	7.78	12.76	20.54	30.22	
94 85 HP 2WD Tractor	999.4	1.93	0.53	0.07	0.14	2.57	4.32	6.89	9.57	
94 Bed Shaper - 3 Row	166.0	1.31	0.45	0.06	0.12	1.74	0.00	1.74	3.68	
94 Chisel - Heavy 10'	165.5	0.85	0.29	0.04	0.08	1.12	0.00	1.12	2.37	
94 Cultivator Sled	166.0	0.84	0.29	0.04	0.08	1.11	0.00	1.11	2.35	
94 Disc - Offset 21'	165.4	3.70	1.26	0.17	0.34	0.64	0.00	0.64	6.10	
94 Flame Weeder	250.0	0.54	0.12	0.02	0.03	0.72	0.00	0.72	1.43	
94 Generator & Lights	356.7	0.78	0.12	0.02	0.03	0.86	1.95	2.81	3.77	
94 Tomato Harvester	471.7	46.65	5.30	0.71	1.43	39.19	4.89	44.08	98.18	
94 Land Plane - 14'	166.0	3.97	1.35	0.18	0.36	2.66	0.00	2.66	8.53	
94 Lister - 3 Row	166.0	0.77	0.26	0.04	0.07	1.01	0.00	1.01	2.15	
94 Pickup Truck - 1/2 ton	266.5	4.78	0.76	0.10	0.20	2.92	3.92	6.84	12.68	
94 Planter-3 Row/Sled	171.0	1.76	0.28	0.04	0.08	1.95	0.00	1.95	4.10	
94 Saddle Tank-300 gallon	120.0	0.76	0.17	0.02	0.05	0.85	0.00	0.85	1.85	
94 Scraper Blade 8'	166.0	0.41	0.14	0.02	0.04	0.54	0.00	0.54	1.15	
94 Sprayer-150 gallon	119.4	0.98	0.22	0.03	0.06	1.09	0.00	1.09	2.38	
94 Trailer Dollie #1	471.2	0.14	0.03	0.00	0.01	0.15	0.00	0.15	0.33	
94 Trailer Dollie #2	471.2	0.14	0.03	0.00	0.01	0.15	0.00	0.15	0.33	
94 V Ditcher	166.0	1.01	0.34	0.05	0.09	1.33	0.00	1.33	2.82	
94 Vine Trainer	83.9	3.18	0.72	0.10	0.19	1.42	0.00	1.42	5.62	

Table 6.

U.C. COOPERATIVE EXTENSION  
RANGING ANALYSIS FOR ORGANIC PROCESSING TOMATOES  
SACRAMENTO VALLEY - 1993-1994

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE TOMATOES

	YIELD (TON/ACRE)						
	20	23	26	28	30	34	38
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OPERATING COSTS/ACRE:							
Cultural Cost	802	802	802	802	802	802	802
Harvest Cost	140	161	182	196	210	238	266
Assessment Cost	15	15	15	15	15	15	15
Interest on operating capital	34	34	34	34	35	35	35
TOTAL OPERATING COSTS/ACRE	991	1013	1034	1048	1062	1090	1118
TOTAL OPERATING COSTS/TON	49.57	44.02	39.76	37.42	35.40	32.06	29.43
CASH OVERHEAD COSTS/ACRE	408	408	409	409	409	410	410
TOTAL CASH COSTS/ACRE	1399	1421	1442	1457	1471	1500	1528
TOTAL CASH COSTS/TON	69.97	61.78	55.48	52.03	49.04	44.11	40.22
NON-CASH OVERHEAD COSTS/ACRE	97	105	111	116	120	128	136
TOTAL COSTS/ACRE	1497	1526	1554	1573	1591	1628	1664
TOTAL COSTS/TON	74.85	66.33	59.77	56.17	53.04	47.88	43.80
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NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ORGANIC PROCESSING TOMATOES

PRICE (DOLLARS PER TON)	YIELD (TON/ACRE)						
	20	23	26	28	30	34	38
-----							
55.00	109	252	396	492	588	780	972
60.00	209	367	526	632	738	950	1162
70.00	409	597	786	912	1038	1290	1542
75.00	509	712	916	1052	1188	1460	1732
90.00	809	1057	1306	1472	1638	1970	2302
105.00	1109	1402	1696	1892	2088	2480	2872
125.00	1509	1862	2216	2452	2688	3160	3632
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U.C. COOPERATIVE EXTENSION  
 ORGANIC PROCESSING TOMATOES - SACRAMENTO VALLEY  
 Table 6. continued

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ORGANIC PROCESSING TOMATOES

PRICE (DOLLARS PER TON)	YIELD (TON/ACRE)						
	20	23	26	28	30	34	38
55.00	-299	-156	-12	83	179	370	562
60.00	-199	-41	118	223	329	540	752
70.00	1	189	378	503	629	880	1132
75.00	101	304	508	643	779	1050	1322
90.00	401	649	898	1063	1229	1560	1892
105.00	701	994	1288	1483	1679	2070	2462
125.00	1101	1454	1808	2043	2279	2750	3222

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ORGANIC PROCESSING TOMATOES

PRICE (DOLLARS PER TON)	YIELD (TON/ACRE)						
	20	23	26	28	30	34	38
55.00	-397	-261	-124	-33	59	242	426
60.00	-297	-146	6	107	209	412	616
70.00	-97	84	266	387	509	752	996
75.00	3	199	396	527	659	922	1186
90.00	303	544	786	947	1109	1432	1756
105.00	603	889	1176	1367	1559	1942	2326
125.00	1003	1349	1696	1927	2159	2622	3086