UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

PRODUCTION PRACTICES AND SAMPLE COSTS FOR ORGANIC RAISIN GRAPES

SOUTHERN SAN JOAQUIN VALLEY
1997

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OVERVIEW OF ORGANIC RAISIN GRAPE PRODUCTION
SOUTHERN SAN JOAQUIN VALLEY - 1997

Introduction

The California grape industry ranks first in grape production in the nation with roughly 650,000 bearing acres. This produces about 90% of the total United States grape crop. From 1992 to 1995, grapes were the second largest contributor to farm income in California, with a gross value of between $1.7 and $1.8 billion for juice, raisin, table and wine grapes combined. Raisin grape production is concentrated in the Southern San Joaquin Valley, with the largest acreages located in Fresno and Madera counties.

By comparison, organic agriculture represented approximately 0.5% of the total farmed acres and total gross sales for all agriculture in California during the 1992-1993 time period, excluding dairy and livestock. Fruit and nut crops represented 42% of the total farmed acres and 44% of total gross sales for organic agriculture. Industry experts consider organic grapes to be a leading organic commodity in the state. Like production for all raisin grapes, the majority of organic raisin grapes are produced in the Southern San Joaquin Valley.

This overview is meant to familiarize the reader with grower practices and important issues facing producers of organic raisin grapes today. The first section details the seasonal flow of operations for organic raisin grape production. The subsequent sections discuss cover crops and floor management, as well as pest management. Following these discussions, grower risk and marketing are addressed. The current status of regulations governing organic commodities is encapsulated in the final section.

Production Practices

Many of the production practices for organically grown raisin grapes are similar to those of a conventionally grown crop. Cultural operations typically begin in the fall by re-leveling the vineyard row centers (middles), irrigating vines postharvest and planting a cover crop. Pruning, tying and vineyard maintenance take place between December and March depending on vineyard conditions. Most of the fertilization, irrigation, cultivation, pest management and related operations are performed in the spring and summer months. Harvest takes places in August and/or September.

Ground Work. Production practices begin after harvest by re-leveling vineyard middles. Depending on soil type and tilth, some growers then work the ground with a subsoiler (ripper) in every middle or in alternate middles. For example, growers in areas with heavy, compacted soils may subsoil every middle, while growers with less problematic soils may subsoil every other middle. Subsoiling is intended to improve water penetration and encourage root growth. However, not all vineyards are subsoiled each year. The vineyard is then disced and furrowed; a postharvest irrigation follows. The postharvest irrigation provides water for the grapevines, and in addition, adds moisture to the soil profile for planting a cover crop. Growers then drill or broadcast and till cover crop seed in vineyard middles. (Refer to the Cover Crops/Floor Management section for more detailed information.)

Soil amendments are applied to vineyard soils when plant tissue, water and soil analyses, as well as grower experience, have shown it to be appropriate. When nutrient deficiencies are detected, organic raisin grape growers amend soils with compost, livestock manure, gypsum and/or fish and kelp products. If compost or manure is used, it is often spread throughout the vineyard to supply nutrients to the vines, add organic matter to the soil and stimulate microbial activity. Alternatively, compost or manure may be spread

in only vineyard middles or rows depending on the vineyard's particular needs. Gypsum is used to add calcium to the soil, improve soil tilth for soils high in sodium and/or improve water penetration with low salt irrigation water. Fish and kelp products add very small amounts of nitrogen, phosphorus, potassium, micronutrients and other organic constituents to the soil. They may also be foliar-applied. When used, these materials are applied either in the fall or spring months. Whether or not applications take place on a yearly basis depends on the soil conditions in each vineyard.

Pruning and Vineyard Maintenance. Vineyards are usually pruned between December and March each year. Larger prunings (arms and trunks) are removed from the vineyard. Smaller prunings are thrown into the center of every other row where they are shredded and chopped with a brush shredder, thus returning organic matter to the soil. Shredding and chopping is performed soon after pruning or later in the season in conjunction with cover crop mowing depending on the amount of rainfall, vineyard floor management practices and frost conditions.

Vineyard maintenance consists of multiple practices, including replanting missing vines, replacing stakes and end posts, tying canes, and trellis and wire repair. Vineyard maintenance takes place after pruning operations.

Pest Management. Pest management techniques for the control of diseases, insects, mites, weeds and vertebrates begin shortly after bud break and continue throughout the spring and summer months. Pest pressure varies depending on farm location, seasonal conditions and the previous year's pest incidence. (Refer to the Pest Management section for further information.)

Irrigation. Vineyard irrigations (other than the postharvest irrigation) are usually performed from late March through early August. In this area, furrow irrigation is the most common method of application. District (surface) and pumped (well) water are both used to irrigate the crop. The amount of each type of water that is used depends primarily on district water availability. Growers either irrigate every middle or every other middle to allow for flexibility in scheduling operations, especially when a cover crop is planted.

Total water use for each vineyard varies from location to location and depends on soil type and structure, the amount of rainfall and residual soil moisture, rooting depth of the vines, water availability and floor management practices. Cover crops and soil organic matter content may also play a role in the total amount of water applied and the number of irrigations each year. Cover cropped soils, or soils amended with organic matter have been shown to improve water penetration and infiltration rates. Therefore, irrigation efficiency may be increased by reducing surface ponding and/or runoff.

Frost protection is mostly achieved through floor management and irrigation practices in the Southern San Joaquin Valley. Therefore, growers do not have on-farm investments specifically for frost protection. In periods of frost danger, growers flood irrigate to moisten the soil and decrease the risk of frost damage.

Vineyard irrigations end at least two to three weeks prior to harvest to minimize vegetative growth, enhance crop maturity and quality, and ensure that soil is dry enough for laying down raisins. To prepare the vineyard for harvest, terraces are formed in the vineyard middles with a specialized terrace implement. Sufficient moisture must remain in the soil, however, to sustain the vines through the harvest and raisin drying process.

Harvest. Grapes are harvested by hand in August and/or September. Clusters are set on paper trays, which are laid on terraces to dry, after which time they are turned and rolled before removing from the field. Turning is performed primarily to expose the bottom fruit for evenness and acceleration of drying, and for this reason may be omitted from harvest practices in ideal drying weather. After drying, fruit is boxed (in bins) in the field and transported on trailers to a shaker for removal of sand and leaves. If the crop is relatively free of sand and leaves, shaking is also omitted from harvest practices, provided it is not required by the packer.

After these operations, fruit is transported to a packer for inspection by a United States Department of Agriculture (USDA) representative for crop maturity, quality and moisture. After inspection, the packer retains control of the product for marketing purposes. (For additional information on marketing, refer to the Grower Risk and Marketing section.)

Yields of organically and conventionally produced raisin grapes are similar, and range from approximately 1.5 to 3.0 tons per acre using a drying ratio of 4.1 to 4.5:1 (green fruit to raisin grapes). Yields vary depending on a number of factors including the vineyard planting density, vineyard age, production location and yearly growing conditions. The vast majority of raisins are produced from the Thompson Seedless grape variety.

Cover Crops and Floor Management

Potential Benefits. Cover crops have numerous potential benefits. 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 improving soil structure and increasing microbial activity, which has 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 add nitrogen to the soil through nitrogen fixation processes. Weed suppression may be another benefit. Cover crops increase plant diversity in a vineyard and in the flowering stage can provide pollen and nectar to attract and sustain beneficial arthropods (insects and predatory mites). They can also reduce dust problems, which in turn can help reduce spider mite pests. Lastly, farm machinery may be able to enter vineyards earlier in the season in situations where a cover crop's mat of root and vegetative growth provides support on wet soil. This may also serve to reduce soil compaction.

Potential Disadvantages. There are also potential disadvantages with cover crop use. Cover crops can attract arthropod and/or rodent pests to the vineyard. Cover crops increase the cash costs associated with planting and may require the rental or purchase of specialized farm equipment. Competition between vines and cover crops for water and nutrients may increase the need for additional inputs. In this region, water use in particular should be taken into consideration because it may be in short supply in some years and for some farms. However, some 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. The presence of a cover crop after bud break may increase the hazard of frost. This is due to the insulative effects that reduce radiant heat absorption during the day and its release at night from the soil. Frost hazard can be minimized by mowing the cover crop close, early incorporation, or cover cropping in alternate middles only.

Cover Crop Selection. Cover crop species and mixes should be selected for compatibility to a particular vineyard's operations, and should also be utilized to maximize potential benefits. In this region, annually sown leguminous cover crops are planted, often as mixes. Species include bell beans, clovers, medics, field peas and vetch ('Cahaba white', common, hairy, 'Lana' woollypod and purple). They are usually planted to add nitrogen and organic matter to the soil, and to provide a habitat to attract and sustain beneficial arthropods. Also, 'Cahaba white' vetch functions as a relative non-host to most nematode species in the area. Cereal grasses (barley, oats and rye) are planted to increase cover crop biomass and return organic matter to the soil. Grasses, especially cereal rye ('Merced'), can be planted later in the fall to establish a good stand than legumes, thereby providing growers with some planting flexibility in years when harvest operations and ground work are delayed. In this area, a mixture of legumes and grasses is often planted to derive some of the benefits associated with each species. Cover crop selection is generally tailored to meet the unique needs of each vineyard and is often determined by observation and experimentation over a period of years.

Planting. Cover crops are commonly planted in six-foot strips in vineyard middles by either drilling or broadcasting and tilling seed. If nitrogen is not a limiting factor, cover crops may be planted in every other middle rather than every middle. Good stands are more likely to be established when a seedbed is well-prepared, that is, when the vineyard is re-leveled after harvest, disced to incorporate weeds and residue (trash) from the harvest, and irrigated either before or after planting. The postharvest irrigation mentioned above often functions as a preirrigation for planting a cover crop. Therefore, growers do not always irrigate the vineyard after the cover crop is planted, but instead depend on fall and winter rains for subsequent cover crop growth. However, fall and early winter rainfall is often insufficient for early cover crop growth in this area. Therefore, stand establishment may be improved by irrigating after planting.

Floor Management. In the spring months, floor management practices vary depending upon grower preference, equipment complement and yearly production conditions. Growers incorporate the cover crop either by mowing and discing, or by discing only. Cover crop incorporation speeds decomposition of the vegetation and recycling of nutrients for crop production. It also serves to reduce competition between the vines and the cover crop for water and nutrients. In contrast, some growers mow the cover crop in late winter or early spring to reduce only a portion of the above ground biomass, then allow the cover crop to regrow, and possibly reseed, until early summer when it is incorporated by both mowing and discing. Under these conditions, the cover crop is utilized to attract and sustain beneficial arthropods, reduce dust (therefore spider mite pests) later in the growing season, increase water penetration and provide reseeding capability. The cover crop's nitrogen contribution is considered less important. However, this practice may lead to substantial water use by the cover crop.

After a cover crop is incorporated, most growers disc periodically in vineyard middles during the remaining spring and/or summer months to control weeds, typically after irrigating the vineyard. Weeds in vine rows are controlled by mechanically cultivating with an in-row cultivator (e.g. a French Plow, Clemens or comparable implement), and by hand hoeing. Therefore, little or no additional water is usually required for cover crop growth or for resident weeds during the remainder of the growing season. The number of discings and hand weedings depends on weed species and density and will therefore vary from location to location.

Pest Management

Pest identification, monitoring and prevention are essential elements of successful raisin grape production. This is especially true for organic production because many of the pesticides that are currently used by producers of conventionally grown raisin grapes are not approved for use by organic raisin grape growers. Sulfur is a notable exception. Many of the legal (allowed) pest control products may be less effective for acute problems than the synthetically formulated pesticides prohibited in organic production. For raisin grapes, growers either monitor their own vineyards or enlist the services of an agricultural professional, who functions jointly as a licensed pest control advisor (PCA) and an input supplier.

Treatments such as natural pesticides and biological controls are used to decrease pest damage and reduce short-run economic risks when needed. 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 Regulation of Organically Grown Commodities section for further information.)

Diseases. Diseases that occur in Southern San Joaquin Valley organic vineyards include: powdery mildew (*Uncinula necator*), phomopsis cane and leaf spot (*Phomopsis viticola*), bunch rot (*Botrytis cinerea*) and various other rots and molds associated with grape harvest and fruit drying. Disease incidence is often increased by moist, humid weather and spring and summer rains. Powdery mildew infections are reduced with sulfur applications. Sulfur applications, which typically begin at bud break, are applied as a dust or in

wettable form seven to 12 times per year depending on seasonal conditions. The incidence of phomopsis cane and leaf spot is reduced by wettable sulfur and copper sprays, which are applied immediately preceding rains. The same sulfur applications used for phomopsis control may also assist in powdery mildew control. Bunch rot infections in grapes can be reduced by canopy management. For example, leaves may be removed around clusters to open the canopy to sunlight and increase air circulation. However, leaf removal to control bunch rot in raisin grapes is not a common practice in this area, nor is it practical with cane-pruned vines. Other measures, such as powdery mildew and caterpillar control, are utilized. This is because the damage caused by both caterpillars and powdery mildew can lead to bunch rot.

In addition, some growers treat grapevines with the plant growth regulator gibberellic acid during bloom. Gibberellic acid assists in bloom thinning, and its use may help lessen the incidence of bunch rot. However, some certification agencies restrict or prohibit its use. Growers should therefore be certain that this material is acceptable for use in organic production by appropriate private certification agency standards.

Crop losses that occur from the various other molds and rots can be reduced when care is taken to avoid fruit injury during both the growing season and harvest. Also, losses can be reduced during fruit drying if vineyard terraces are formed with an adequate slope and appropriate firmness. This serves to minimize moisture retention and accelerate drying if rains should occur before fruit is removed from the field.

Insects. Growers indicate that crop damage from insects is not significant in long-standing organic raisin grape vineyards in this region. For one reason, naturally occurring beneficial arthropods (e.g., parasites and predators) are often present in vineyards in large enough numbers to assist in pest reduction. Beneficial arthropods include: spiders, predatory mites, green lacewings (*Chrysopa* spp.) and other generalist predators. Nevertheless, fluctuations in both pest and beneficial arthropod populations occur. Therefore, growers sometimes release predators and parasites to augment levels that already exist in the field. This helps regulate pest densities on a year-to-year basis, and may assist in controlling pests in areas of the vineyard where significant pest outbreaks occur.

Growers report that five arthropod pests have periodically infested vineyards in the area and been responsible for some damage in years when conditions were optimal for insect development. The arthropod pests are: omnivorous leafroller (*Platynota stultana*), grape leafhopper (*Erythroneura elegantula*), variegated grape leafhopper (*E. variabilis*), western grapeleaf skeletonizer (*Harrisina brillians*), and spider mites. Life cycles and feeding habits for each pest vary, however, the leaves and the fruit are most often damaged by these arthropods.

The mineral insecticide cryolite and the bacteria *Bacillus thuringiensis* (Bt) are commonly used for omnivorous leafroller control. In addition, a relatively new Bt and sulfur formulation is used to control this pest. When necessary, insecticidal soap is used to reduce populations of leafhoppers. Also, some growers trap leafhoppers before they enter the field by attaching a 6-inch yellow sticky tape to end posts on two sides of the vineyard's perimeter. Although not recently considered a major raisin grape pest in this area, western grapeleaf skeletonizer is controlled, if necessary, with cryolite and Bt.

Spider mite control is achieved through a variety of techniques. Irrigation water should be managed to avoid vine stress, which may exacerbate spider mite problems. As mentioned above, cover crops help to reduce dust in vineyards, which otherwise contributes to increased spider mite populations. Summer cover crops may therefore be helpful in managing spider mites, particularly in areas with sandy soils and a history of significant pest infestations. A number of growers also release predatory mites to assist in spider mite control. The application rate for each input and the number of acres treated will depend on vineyard location and the extensiveness of a particular infestation.

Weeds. Weeds in the vineyard middles are most often controlled by discing. Within vine rows, growers use specialized equipment such as a Bezzerides cultivator or an in-row cultivator. Some growers also hand weed in addition to mechanical cultivations to control weeds in vine rows. Perennial weeds are usually more difficult to control than are annual weeds. For this reason, vineyards with higher densities of perennial weeds often require greater control measures to be taken.

Vertebrate Pests. Only minor crop damage from birds and ground squirrels occur in organic vineyards in this area. Therefore, vertebrate pest damage is not deemed significant enough to require specific control measures on a regular basis.

Grower Risk and Marketing

Risk. Growers perceive that the risks associated with general farm management, and in particular pest management, are increased somewhat for organic raisin grape production relative to conventional production. This is especially true for the transition years, or the years when agricultural production changes from conventional to organic practices. The production techniques commonly used in conventional systems are sometimes inappropriate for organic systems, necessitating adoption of new methods of production. Growers therefore find that the "learning curve" for organic production and farm management is steeper during the transition period. Some organic growers also report a willingness to bear somewhat higher costs for organic production relative to conventional production. These higher costs are not viewed as short-term monetary losses, but rather as long-term investments in such areas as soil fertility and environmental quality.

Federal crop insurance is purchased by almost all growers, both organic and conventional, to reduce the production risks associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. In addition, some growers also purchase reconditioning insurance, which covers some of the costs for reconditioning raisins (e.g. turning, rolling, washing and drying) if rains should occur during the harvest period. Insurance costs will vary depending on the type and level of coverage.

Marketing. The raisin grape market is regulated by a federal marketing order that is administered by the Raisin Administrative Committee (RAC). Each year, the RAC sets minimum industry standards that must be met by both the organic and conventional crop. In addition, the RAC regulates, on a percentage basis, the amount of the harvested crop that is offered for immediate sale (free tonnage), and the amount that is held in reserve for later sale (the reserve pool), to control the overall supply of raisin grapes on the market.

Raisins that are produced organically are usually sold for a "bonus price", a premium price higher than the comparable conventional product. Returns to growers are on a per ton basis, and vary depending on a number of factors, including the agreement between a grower and his or her packer, crop maturity, quality and moisture, industry supply and consumer demand. Growers may not market or sell their product as organic during the transition years, and therefore cannot take advantage of potentially higher returns to offset the increased management and production risks during this time.

After harvest, both organic and conventional raisin grapes are delivered to one of two packer types for United States Department of Agriculture (USDA) inspection: 1) grower-owned cooperatives or 2) independent/commercial packers. Growers receive payment for their crop from the packer. Conceivably, each grower and packer could negotiate the price a grower receives. However, the structure of the industry is such that the Raisin Bargaining Association (RBA), a grower-owned bargaining collective, now sets the recognized field price for free tonnage for Thompson Seedless and Zante currant raisins. The price for the portion of the crop held in the reserve pool is known only after the reserve pool is sold. It is frequently, and often considerably, less than the field price. Therefore, growers seldom know the exact price they will receive for all delivered tonnage until much later in the year.

Unlike the price and tonnage structures set by the RBA and RAC, respectively, growers and packers negotiate the above mentioned bonus price on an individual basis. In the past, the bonus price has been offered for the entire crop, or both the free and reserve tonnage. Organic growers must, however, adhere to all other directives of the marketing order. In most cases, the packer retains control of the raisin crop for marketing purposes, however, a very small percentage of growers market their own product.

Regulation 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. The law contains rules and regulations to which all producers, processors and handlers of organic commodities must adhere. As of January 1, 1996, in order to qualify as organic, commodities must be produced on land where no prohibited substances have been applied for a minimum of three years immediately preceding harvest of the crop. Annual registration fees are levied by the state and, in addition, a one-time initial registration fee is assessed. Fees are payable before any sales of the commodity occur and are based on projected estimates of 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, because of 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. Nevertheless, it would be prudent for growers to follow current recommendations for the federal law (in addition to state regulations) even before implementation and enforcement take place. 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 currently recommends that growers 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. The best available statistics for organic agriculture show that during the 1992-1993 time period, 45% of California's registered organic farmers were also certified by a private certification agency. Of the 45% that were certified, 41% were certified by California Certified Organic Farmers (CCOF). In addition to CCOF, seven other organizations now actively certify growers in the state. They are: Farm Verified Organic (FVO), Oregon Tilth Certified Organically Grown (OTCO), Organic Certifiers (OC), 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 associated costs. Domestic and international product sales may also be affected by certification itself, and by the certification agency used. 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 (additional sources of information are provided in the reference section of this publication).

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

COST AND RETURNS STUDY FOR ORGANIC RAISIN GRAPES
SOUTHERN SAN JOAQUIN VALLEY - 1997

General Information

The practices described for the hypothetical organic vineyard used in this report are considered common for raisin grapes in the Southern San Joaquin Valley. Sample costs given for labor, materials, equipment and contract services are based on 1997 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 assumptions used for organic raisin grape production, along with the following 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. Annual Equipment, Investment And Business Overhead Costs
Table 5. Hourly Equipment Costs
Table 6. Ranging Analysis

For an explanation of calculations used for this 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 Establish a Vineyard and Produce Raisins in the San Joaquin Valley - 1997* is available for those interested in vineyard establishment costs and for production costs of conventionally grown raisin grapes.

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

Cost of Production Assumptions For Organic Raisin Grapes

This study reflects the practices and costs associated with a production system for organically grown raisin grapes in the Southern San Joaquin Valley of California. 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 vineyard or production region. This study should be interpreted as a representative operation only and not as a statistical average. Costs are presented on an annual per acre basis.

The vineyard in this report is assumed to have been established as a conventional vineyard for raisin grape production but is now 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 to organically acceptable practices. Federal, state and certification agency rules and regulations specific to organic commodities must be adhered to during this time period if 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 higher, premium price than 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 organic raisin grapes.

Land. The total farm size is 120 acres, 80 of which are in raisin grape production. The remaining 40 acres are dedicated to other agricultural enterprises and land for the farmstead, roads and wells. Land is owned by the grower and is valued at $4,500 per acre. This figure is within the low and high ranges of values for undeveloped land with vineyard potential in the Southern San Joaquin Valley. Land costs per acre vary within the region and within each county. Land is not depreciated. Land is assumed to be level, with well-drained soils of moderate depth and fertility.

Vineyard Establishment. The establishment cost is the sum of the costs for the land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested (year three). The vineyard establishment cost is used to determine the non-cash overhead expenses, capital recovery and interest on investment during the production years. (For more detailed information on this cost refer to the study *Sample Costs To Establish A Vineyard And Produce Raisins in the San Joaquin Valley - 1997*). The vineyard life is assumed to be 22 years beyond three establishment years.

Vines/Trellis System. The grape variety is assumed to be Thompson Seedless. Vines are planted on a 7' x 12' spacing with 519 vines per acre. The trellis system is a two-wire cross-arm design.

Production Practices. Production practices for organic raisin grapes are listed in Table 1 Costs Per Acre - Operations. This table shows the order in which the operations are performed, as well as the hours per acre required for each operation. Labor, contract and rental rates, materials, 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 monthly cash costs per acre for the crop are located in Table 3 Monthly Cash Costs Per Acre.

Cover Crops/Floor Management. In this study, a winter annual cover crop is drill-seeded in the fall after harvest. Prior to seeding the cover crop, vineyard middles are re-leveled (terraced back), subsoiled (ripped 20 to 24") in every other row and irrigated. Planting into moisture serves to improve stand establishment and early cover crop growth. After this time, cover crop growth is assumed to be dependent on fall and winter rains.

The cover crop is a mixture of common vetch and barley, which is planted into each middle in six-foot strips at a rate of 50 pounds per planted vineyard acre. This represents 50% of the seeding rate per acre to account for space taken up by the vine rows. This seeding rate also represents a mixture of the two species of cover crops (40 pounds of common vetch and 10 pounds of barley). It may be necessary to increase seeding rates for late season plantings to insure a good stand.

The cover crop is mowed in February in one-half of the vineyard in conjunction with shredding and chopping brush from pruning operations. In April, the entire cover crop is mowed once, and then incorporated into the soil by discing twice. Vineyard middles are disced three times during the remaining spring and summer months to control weeds. Therefore, no additional water is required for cover crop growth or for resident weeds during the summer.

Weeds in vine rows are controlled by mechanically cultivating with an in-row cultivator once in February, and by hand hoeing once in April. No other means of weed control are used in this report.

Crop Irrigation. The amount of irrigation water applied to vineyards in this region ranges from 2.5 to 4.5 acre-feet per acre per year, averaging a total of 3.5 acre-feet per acre. However, this amount is dependent on soil type, rainfall and residual soil moisture, and water availability. Raisin grapes are most typically furrow irrigated with a combination of district (surface) and well (pumped) water. The amount of water that is applied to the crop from each source is determined primarily by the availability of district water. In this study, approximately 60% (25 acre-inches) of the total applied water is delivered from the district; 40% (17 acre-inches) is pumped. No assumption is made with respect to effective rainfall.

In most districts, the cost for water is based on a flat tax rate, and ranges from $17 to $38 per acre, averaging about $25 per acre. In the Madera area, delivery charges are incurred, and district water costs average $46 per acre-foot. The cost included in this study for district water is $30 per acre.

Costs for pumped water depend on well design, equipment and depth. In this study, water is assumed to be pumped from a depth of 130 feet in a 400-foot well using a 40 horsepower (hp) pump that produces a flow of 700 gallons per minute (gpm). The cost for pumped water is estimated to be $42 per acre-foot. The vineyard is assumed to be irrigated after harvest in October, and during the growing season between April and August.

Costs for the furrow irrigation system include charges to refurbish the motor and pump, clean the well and install underground mainline pipe and risers for each vineyard row. The irrigation system has a 25 year lifespan, is an improvement to the property, and is therefore included in Table 4 as an investment.

Pest Management. Disease incidence and arthropod and vertebrate pest damage vary on a year-to-year basis depending on pest populations and management techniques. This study assumes that vineyards are monitored for disease, insect and mite pests periodically throughout the growing season by the grower or by an input supplier who is also a licensed pest control advisor (PCA). Therefore, no specific cost is incurred for monitoring services. The following table shows the pest management materials used in this report.

Pest Management Materials

Material	Number of Applications	Application Rate Range/Acre[†]	Month(s) Performed[†]
Dusting Sulfur	10	10-12 lbs	March - July
Wettable Sulfur[‡]	2	2 lbs	May, July
Cryolite[‡]	2	6 lbs	May, July

[†] Application rates and months performed are those used in this study. Individual situations will vary.

[‡] Wettable sulfur and cryolite are mixed and applied in one operation.

Many beneficial arthropods occur naturally within fully transitioned organic vineyards, therefore, growers do not necessarily release beneficial arthropods on a year-to-year basis. However, a number of growers do release beneficial arthropods each year, primarily predatory mites and green lacewings, to augment the levels that already exist in the field. The cost to purchase and release beneficial arthropods varies depending on the type and number purchased. It also depends on the number of acres treated and on field labor charges. Costs range from $35 and $75 per acre. A cost of $40 per acre is included in this report.

Harvest. In this study, grapes are assumed to be hand harvested at a contract rate of $0.24 per tray. Contract services are also used for turning, rolling and pick up ($84 per thousand trays), and for transporting raisins to a packer ($10 per ton). Labor and taxes are included in all of the above contract rates. Boxing and shaking raisins is performed by the grower. Harvest costs are located in Tables 1 through 3. Harvest begins in August and is completed in September.

Because contract services are assumed for most harvest operations, costs for harvest equipment (other than equipment to box and shake raisins) are not included in this study. If growers choose to perform all harvest operations, equipment for the appropriate operations should be inventoried and labor, fuel, repairs and capital recovery costs should be added as a cost of production. Contract harvest costs, then, would not be included.

Packers. After harvest the crop is transported to a packer where it is inspected by a representative of the United States Department of Agriculture (USDA) for maturity, quality and moisture. Organic raisins must meet the same industry standards as the conventional crop to pass inspection. Industry standards are set by the Raisin Administrative Committee (RAC), the administrative arm of the federal marketing order for raisins. Fees are associated with both USDA inspections and RAC administrative responsibilities; these are paid for by the packer. Growers receive payment for their crop from the packer. In most cases, the packer retains control of the raisin crop for marketing purposes after inspection, however, a very small number of growers market their own product.

Yield and Return Ranges. This study assumes a yield of 2.1 tons of raisins per acre in Tables 1 to 3. Yields for organically grown raisins typically range from 1.5 to 3.0 tons per acre. Yield is determined by a variety of factors, including growing location and conditions, soil type and fertility, irrigation practices and pest management.

The price received by growers of organic raisins is estimated to be $1,175 per ton, which is calculated by adding a per ton "organic bonus" price for 100% of the organic crop to a "constructed" per ton price for 100% of the conventional crop. The constructed per ton price on 100% of the conventional crop is based on tonnage percentages and values for both free tonnage and the reserve pool as announced by the

Raisin Administrative Committee (RAC) and the Raisin Bargaining Association (RBA). In the past, constructed prices for the conventional crop have ranged from $800 to $1,200 per ton. For this study, the price is estimated to be $1,025 per ton. The organic bonus price is negotiated between each grower and packer, and usually ranges from $100 to $175 per ton. The price of $1,175 per ton therefore equals the estimated price of $1,025 plus an organic bonus of $150 per ton for 100% of the crop. However, the exact price each grower receives will vary depending on crop maturity, quality and moisture, and on the organic bonus price negotiated between the grower and packer.

For the raisin grape operation analyzed in this study, the breakeven yield at an average price of $1,175 per ton is 1.8 tons per acre. Breakeven yields are 2.3 and 1.5 tons per acre at the low price of $950 and at the high price of $1,350 per ton, respectively.

Labor. Basic hourly wages for workers are $5.75 and $5.00 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 $7.71 per hour for machine labor and $6.70 per hour for non-machine labor. The percentage charged for benefits varies depending upon whether or not growers utilize labor contractors or hire their own laborers. For those growers handling their own labor, benefit percentages are often lower than 34%, and have been as low as 18% in the past.

On March 1, 1997, the minimum wage increased from $4.25 per hour to $5.00 per hour. It will rise to $5.15 per hour on September 1, 1997 and to $5.75 per hour on March 1, 1998. The wage rate for non-machine labor used in this study reflects the March 1, 1997 rate. Growers using wage rates different from those shown in this report may adjust their labor costs by subtracting or adding the appropriate amounts.

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.

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, office expenses, property and liability insurance, sanitation services and equipment repairs. Cash overhead costs are found in Tables 1 through 4.

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 10.00% per year. A nominal interest rate is the going market cost for borrowed funds. The short-term interest rate is calculated by the Production Credit Association using various criteria including a 2% stock ownership.

Office and Business Expense. Office and business expenses are estimated at $12 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 $526 per year.

Sanitation Services. Sanitation services (portable toilets) are provided by the contractor when contract labor is used. Because contract labor is assumed for many of the operations included in this study, the minimal cost of $100 for santitation services is included here.

Crop Insurance. This study assumes that the grower pays a total of $46.70 per ton for crop insurance. This rate includes 65% crop loss coverage under the federal crop insurance program ($31 per ton) and also includes a premium for reconditioning insurance ($15.70 per ton).

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.

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 8.25% 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.

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 are 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 $0.97 and $1.30 per gallon, respectively.

Assessments. In this study, registration and certification fees for an established organic vineyard are estimated and included as a cost of production. All organic growers who produce and market their crop as organic must pay state registration fees. Certification is currently optional for organic production, but in most cases will become mandatory upon implementation of the federal law. Certification fees for new operations may be higher than for established operations because of the initial certification and inspection process.

For comparison purposes, fees from two different certification organizations are listed below. However, only fees from California Certified Organic Farmers (CCOF) are included in the actual cost calculations of this study. The costs can be adjusted for Farm Verified Organic (FVO) growers by subtracting CCOF fees and adding FVO fees. Some growers have multiple certifications for marketing purposes. In this case, both sets of fees would be added.

California Department of Food and Agriculture (CDFA) Organic Program. A stepped scale organic grower's registration fee of $300 is assessed by the State of California on the gross sales amount of $197,400. The gross sales amount is calculated by multiplying the yield of the crop per acre (2.1 tons) by the price received for the crop per ton ($1,175) and the number of planted acres for the crop (80). This is only an estimate of potential fees; they will vary depending on yields and returns. Contact the County Agricultural Commissioner in your area for further details.

California Certified Organic Farmers (CCOF). Annual membership fees are estimated to be $125. Annual inspection fees are $250. In addition, CCOF growers are also required to pay assessment fees of 0.5% of their gross sales. Total CCOF assessments for the 80 acres of raisin grapes in this study are $987. 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.

Farm Verified Organic, Inc. (FVO). Fee structures for FVO vary depending on what category the operation qualifies under (e.g. Family Farm, Cottage Industry, Regular or Cooperative). For a grower in the FVO Family Farm category, the annual participation fee is $150. Inspection costs are charged at $15 per hour for travel and $39 per hour for inspection and audit, plus expenses. In addition, growers pay a licensing fee of 0.5% on all FVO certified sales, or they may pursue a pass-through fee arrangement and pay nothing.

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U.C. COOPERATIVE EXTENSION

Table 1. COSTS PER ACRE TO PRODUCE ORGANIC RAISIN GRAPES - OPERATIONS
SOUTHERN SAN JOAQUIN VALLEY - 1997

Labor Rate: $ 7.71/hr. machine labor Interest Rate: 10.00%
$ 6.70/hr. non-machine labor Yield per Acre: 2.10 ton

Operation	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
	---------- Cash and Labor Costs per Acre ----------						
Cultural:							
Terrace Back	0.25	2.31	1.17	0.00	0.00	3.49	
Subsoil - 1/2 Acres	0.50	4.63	2.79	0.00	0.00	7.42	
Disc - Prepare Seedbed	0.20	1.85	1.16	0.00	0.00	3.01	
Furrow Out	0.86	7.94	3.99	0.00	0.00	11.93	
Postharvest Irrigation	0.50	3.35	0.00	14.16	0.00	17.51	
Plant Cover Crop - Drill Seed	0.50	4.63	2.84	22.70	0.00	30.16	
Pruning	0.00	0.00	0.00	0.00	124.56	124.56	
Vineyard Maintenance	1.00	15.95	4.61	0.00	31.14	51.70	
Shred/Chop Brush	0.13	1.16	0.70	0.00	0.00	1.86	
Cultivate In Row	0.74	6.80	3.88	0.00	0.00	10.69	
Sulfur Application 10X	1.25	11.57	6.03	18.02	0.00	35.62	
Mow Cover Crop	0.20	1.85	1.12	0.00	0.00	2.97	
Disc 2X - Incorporate Cover Crop	0.40	3.70	2.31	0.00	0.00	6.01	
Border Disc	0.14	1.32	0.81	0.00	0.00	2.13	
Hand Hoe	1.20	8.04	0.00	0.00	0.00	8.04	
Irrigation 6X	4.98	33.37	0.00	76.02	0.00	109.39	
Insect Spray/Sulfur Application	0.50	4.63	3.13	34.40	0.00	42.15	
Beneficial Insects - Release	0.10	0.67	0.00	40.00	0.00	40.67	
Disc 3X - Floor Management	0.60	5.55	3.32	0.00	0.00	8.87	
Terrace	0.25	2.31	1.17	0.00	0.00	3.49	
Pickup Use	2.38	21.97	9.44	0.00	0.00	31.42	
TOTAL CULTURAL COSTS	16.67	143.59	48.47	205.30	155.70	553.07	
Harvest:							
Harvest - Contract	0.00	0.00	0.00	46.50	223.20	269.70	
Turn & Roll - Contract	0.00	0.00	0.00	0.00	78.12	78.12	
Box & Shake	0.60	37.36	2.76	0.00	8.25	48.37	
Haul To Packer	0.00	0.00	0.00	0.00	21.00	21.00	
TOTAL HARVEST COSTS	0.60	37.36	2.76	46.50	330.57	417.19	
Assessments:							
California State Organic Registration Fees	0.00	0.00	0.00	3.75	0.00	3.75	
CCOF Membership Fees	0.00	0.00	0.00	1.04	0.00	1.04	
CCOF Inspection Fees	0.00	0.00	0.00	2.08	0.00	2.08	
CCOF .5% of Gross Sales	0.00	0.00	0.00	12.34	0.00	12.34	
TOTAL ASSESSMENT COSTS	0.00	0.00	0.00	19.21	0.00	19.21	
Interest on operating capital @ 10.00%						27.66	
TOTAL OPERATING COSTS/ACRE		180.96	51.23	271.01	486.27	1017.12	

U.C. COOPERATIVE EXTENSION
ORGANIC RAISIN GRAPES - SOUTHERN SAN JOAQUIN VALLEY - 1997
Table 1. continued

Operation	Cash and Labor Costs per Acre						
Operation	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:							
Office Expense						12.00	
Soil/Tissue Analysis						2.95	
Liability Insurance						4.38	
Sanitation Services						1.25	
Crop Insurance						98.07	
Property Taxes						68.71	
Property Insurance						48.99	
Investment Repairs						11.54	
TOTAL CASH OVERHEAD COSTS						247.89	
TOTAL CASH COSTS/ACRE						1265.02	
NON-CASH OVERHEAD:							
Investment	Per producing Acre	-- Annual Cost -- Capital Recovery					
Buildings	143.33	13.03				13.03	
Shop tools	41.67	4.94				4.94	
Land	4500.00	371.25				371.25	
Vineyard Establishment	3839.00	383.81				383.81	
Irrigation System	187.08	17.90				17.90	
Equipment	427.70	57.52				57.52	
TOTAL NON-CASH OVERHEAD COSTS	9138.78	848.47				848.47	
TOTAL COSTS/ACRE						2113.48	

U.C. COOPERATIVE EXTENSION

Table 2. DETAIL OF COSTS PER ACRE TO PRODUCE ORGANIC RAISIN GRAPES - INPUTS
SOUTHERN SAN JOAQUIN VALLEY - 1997

Labor Rate: $ 7.71/hr. machine labor Interest Rate: 10.00%
$ 6.70/hr. non-machine labor

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
OPERATING COSTS					
Water:					
Pumped	17.00	acin	3.54	60.18	
District	25.00	acin	1.20	30.00	
Cover Crop Seed:					
Common Vetch	40.00	lb	0.52	20.80	
Barley	10.00	lb	0.19	1.90	
Contract:					
Prune	519.00	vine	0.24	124.56	
Tie Canes	519.00	vine	0.06	31.14	
Harvest	930.00	tray	0.24	223.20	
Turn & Roll	0.93	thousand	84.00	78.12	
Haul to Packer	2.10	ton	10.00	21.00	
Pest Management:					
Dusting Sulfur	106.00	lb	0.17	18.02	
Cryolite	12.00	lb	2.68	32.16	
Wettable Sulfur	4.00	lb	0.56	2.24	
Beneficial Insects	1.00	acre	40.00	40.00	
Miscellaneous:					
Paper Trays	0.93	thousand	50.00	46.50	
Rent:					
Forklift	2.00	acre	4.12	8.25	
Assessment:					
CA St. Org. Reg. Fees	1.00	acre	3.75	3.75	
CCOF Membership Fees	1.00	acre	1.04	1.04	
CCOF Inspection Fees	1.00	acre	2.08	2.08	
CCOF .5% Gross Sales	1.00	acre	12.34	12.34	
Labor (machine)	12.58	hrs	7.71	97.01	
Labor (non-machine)	12.53	hrs	6.70	83.95	
Fuel - Gas	4.46	gal	1.30	5.79	
Fuel - Diesel	25.05	gal	0.97	24.30	
Lube				4.52	
Machinery repair				16.61	
Interest on operating capital @ 10.00%				27.66	
TOTAL OPERATING COSTS/ACRE				1017.12	

U.C. COOPERATIVE EXTENSION
DETAIL OF COSTS PER ACRE TO PRODUCE ORGANIC RAISIN GRAPES - INPUTS
Table 2. Continued

CASH OVERHEAD COSTS:	
Office Expense	12.00
Soil/Tissue Analysis	2.95
Liability Insurance	4.38
Sanitation Services	1.25
Crop Insurance	98.07
Property Taxes	68.71
Property Insurance	48.99
Investment Repairs	11.54
TOTAL CASH OVERHEAD COSTS/ACRE	247.89
TOTAL CASH COSTS/ACRE	1265.02
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):	
Buildings	13.03
Shop tools	4.94
Land	371.25
Vineyard Establishment	383.81
Irrigation System	17.90
Equipment	57.52
TOTAL NON-CASH OVERHEAD COSTS/ACRE	848.47
TOTAL COSTS/ACRE	2113.48

U.C. COOPERATIVE EXTENSION

Table 3. MONTHLY CASH COSTS PER ACRE TO PRODUCE ORGANIC RAISIN GRAPES
SOUTHERN SAN JOAQUIN VALLEY - 1997

Beginning OCT 96 / Ending SEP 97	OCT 96	NOV 96	DEC 96	JAN 97	FEB 97	MAR 97	APR 97	MAY 97	JUN 97	JUL 97	AUG 97	SEP 97	TOTAL
Cultural:													
Terrace Back	3.49												3.49
Subsoil-1/2 Acres	7.42												7.42
Disc-Prepare Seedbed	3.01												3.01
Furrow Out	1.99						1.99	1.99	3.98		1.99		11.93
Postharvest Irrigation	17.51												17.51
Plant Cov. Crop-Drill Seed	30.16												30.16
Pruning			62.16	62.40									124.56
Vineyard Maintenance				51.70									51.70
Shred/Chop Brush					1.86								1.86
Cultivate In Row					10.69								10.69
Sulfur Application 10X						3.80	11.06	6.92	10.38	3.46			35.62
Mow Cover Crop							2.97						2.97
Disc 2X-Incorp. Cov. Crop							6.01						6.01
Border Disc							2.13						2.13
Hand Hoe							8.04						8.04
Irrigation 6X							28.57	13.06	26.12	13.06	28.57		109.39
Insect Spray/Sulfur Appl.								21.08		21.08			42.15
Beneficial Insects-Release								40.67					40.67
Disc 3X-Floor Management									2.93	3.01	2.93		8.87
Terrace											3.49		3.49
Pickup Use	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	31.42
TOTAL CULTURAL COSTS	66.19	2.62	64.78	116.72	15.16	6.42	63.39	86.33	46.03	43.22	39.60	2.62	553.07
Harvest:													
Harvest - Contract											134.60	135.10	269.70
Turn & Roll - Contract											38.64	39.48	78.12
Box & Shake											24.15	24.22	48.37
Haul To Packer											10.50	10.50	21.00
TOTAL HARVEST COSTS											207.89	209.30	417.19

U.C. COOPERATIVE EXTENSION
MONTHLY CASH COSTS PER ACRE TO PRODUCE ORGANIC RAISIN GRAPE
Table 3. Continued

Beginning OCT 96 Ending SEP 97	OCT 96	NOV 96	DEC 96	JAN 97	FEB 97	MAR 97	APR 97	MAY 97	JUN 97	JUL 97	AUG 97	SEP 97	TOTAL
Assessments:													
CA St. Org. Reg. Fees												3.75	3.75
CCOF Membership Fees												1.04	1.04
CCOF Inspection Fees												2.08	2.08
CCOF .5% of Gross Sales												12.34	12.34
TOTAL ASSESSMENT COSTS												19.21	19.21
Interest on oper. capital	0.55	0.57	1.11	2.09	2.21	2.27	2.79	3.51	3.90	4.26	6.32	-1.93	27.66
TOTAL OPERATING COSTS/ACRE	66.74	3.19	65.89	118.80	17.37	8.68	66.18	89.85	49.93	47.48	253.80	229.21	1017.12
CASH OVERHEAD:													
Office Expense	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	12.00
Soil/Tissue Analysis								2.95					2.95
Liability Insurance												4.38	4.38
Sanitation Services	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	1.25
Crop Insurance												98.07	98.07
Property Taxes			34.35				34.35						68.71
Property Insurance				48.99									48.99
Investment Repairs	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	11.54
TOTAL CASH OVERHEAD COSTS	2.07	2.07	36.42	51.06	2.07	2.07	36.42	5.02	2.07	2.07	2.07	104.52	247.89
TOTAL CASH COSTS/ACRE	68.80	5.26	102.31	169.86	19.44	10.75	102.60	94.86	51.99	49.54	255.87	333.73	1265.02

U.C. COOPERATIVE EXTENSION

Table 4. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ORGANIC RAISIN GRAPE PRODUCTION
SOUTHERN SAN JOAQUIN VALLEY - 1997

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	- Cash Overhead - Insurance	Taxes	Total
97	50 HP 2WD Tractor	29923	12	7481	3633.81	133.35	187.02	3954.18
97	75 HP 2WD Tractor	33247	12	8312	4037.48	148.16	207.80	4393.44
97	Air/Fan Sprayer	11130	10	1968	1543.20	46.69	65.49	1655.38
97	Brush Shredder 6'	5721	10	1012	793.20	24.00	33.66	850.86
97	Disc - Border	2876	10	509	398.73	12.07	16.92	427.72
97	Disc - Tandem 7'	3729	10	659	517.06	15.64	21.94	554.64
97	Drill Seeder 5'	2413	10	427	334.55	10.12	14.20	358.87
97	Duster	2520	10	446	349.38	10.57	14.83	374.78
97	Flat Furrower	1494	10	264	207.16	6.27	8.79	222.22
97	In-Row Cultivator	3910	10	691	542.16	16.40	23.01	581.57
97	Pick up - 1/2 ton	16226	7	6155	2458.72	79.79	111.91	2650.42
97	Shaker & Bin Dumper	12870	10	2276	1784.44	54.00	75.73	1914.17
97	Subsoiler - 3 Shank	1791	10	317	248.31	7.52	10.54	266.37
97	Terracer	2465	10	436	341.77	10.34	14.51	366.62
97	Trailer #1	1287	12	178	163.76	5.22	7.33	176.31
97	Trailer #2	1287	12	178	163.76	5.22	7.33	176.31
TOTAL		132889		31309	17517.49	585.36	821.01	18923.86
60% of New Cost *		79733		18785	10510.49	351.22	492.61	11354.32

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

U.C. COOPERATIVE EXTENSION

WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ORGANIC RAISIN GRAPE PRODUCTION

Table 4. Continued

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead: Insurance	Cash Overhead: Taxes	Cash Overhead: Repairs	Cash Overhead: Total
INVESTMENT								
Buildings	17200	30		1564.01	61.32	86.00	100.00	1811.33
Vineyard Establishment	307120	22		30705.20	1094.88	1535.60	0.00	33335.68
Irrigation System	22450	25		2148.18	80.03	112.25	1235.00	3575.46
Land	540000		540000	44550.00	3850.20	5400.00	0.00	53800.20
Shop tools	5000	15		593.09	17.82	25.00	50.00	685.91
TOTAL INVESTMENT	891770		540000	79560.48	5104.25	7158.85	1385.00	93208.58

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Crop Insurance	168.00	ton	46.70	7845.60
Liability Insurance	1.00	year	526.00	526.00
Office Expense	80.00	acre	12.00	960.00
Sanitation Services	1.00	farm	100.00	100.00
Soil/Tissue Analysis	80.00	acre	2.95	236.00

U.C. COOPERATIVE EXTENSION

Table 5. HOURLY EQUIPMENT COSTS FOR ORGANIC RAISIN GRAPE PRODUCTION
SOUTHERN SAN JOAQUIN VALLEY - 1997

Yr	Description	Actual Hours Used*	COSTS PER HOUR						
				- Cash Overhead -			- Operating -		
			Capital Recovery	Insurance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
97	50 HP 2WD Tractor	999.5	2.18	0.08	0.11	1.27	2.74	4.01	6.39
97	75 HP 2WD Tractor	999.2	2.42	0.09	0.12	0.61	4.11	4.72	7.35
97	Air/Fan Sprayer	200.0	4.63	0.14	0.20	1.84	0.00	1.84	6.81
97	Brush Shredder 6'	250.0	1.90	0.06	0.08	1.19	0.00	1.19	3.24
97	Disc - Border	199.4	1.20	0.04	0.05	0.46	0.00	0.46	1.74
97	Disc - Tandem 7'	200.0	1.55	0.05	0.07	0.59	0.00	0.59	2.25
97	Drill Seeder 5'	120.0	1.67	0.05	0.07	0.49	0.00	0.49	2.28
97	Duster	200.0	1.05	0.03	0.04	0.41	0.00	0.41	1.54
97	Flat Furrower	199.6	0.62	0.02	0.03	0.23	0.00	0.23	0.90
97	In-Row Cultivator	199.8	1.63	0.05	0.07	0.87	0.00	0.87	2.62
97	Pick up - 1/2 ton	285.0	5.18	0.17	0.24	1.18	2.80	3.98	9.56
97	Shaker & Bin Dumper	47.9	22.35	0.68	0.95	0.00	0.00	0.00	23.98
97	Subsoiler - 3 Shank	200.0	0.74	0.02	0.03	0.40	0.00	0.40	1.20
97	Terracer	40.0	5.13	0.16	0.22	0.28	0.00	0.28	5.78
97	Trailer #1	80.0	1.23	0.04	0.05	0.19	0.00	0.19	1.51
97	Trailer #2	249.9	0.39	0.01	0.02	0.19	0.00	0.19	0.62

* Actual hours used equals combined hours for raisins and other enterprises.

U.C. COOPERATIVE EXTENSION

Table 6. RANGING ANALYSIS FOR ORGANIC RAISIN GRAPE PRODUCTION
SOUTHERN SAN JOAQUIN VALLEY - 1997

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ORGANIC RAISIN GRAPES

	YIELD (TON/ACRE)						
	1.5	1.7	1.9	2.1	2.4	2.8	3.0
OPERATING COSTS/ACRE:							
Cultural Cost	553	553	553	553	553	553	553
Harvest & Assessment Costs	312	354	395	436	498	581	623
Interest on operating capital	28	28	28	28	28	28	28
TOTAL OPERATING COSTS/ACRE	893	934	976	1017	1079	1162	1203
TOTAL OPERATING COSTS/TON	595	550	514	484	450	415	401
CASH OVERHEAD COSTS/ACRE	248	248	248	248	248	248	248
TOTAL CASH COSTS/ACRE	1141	1182	1224	1265	1327	1410	1451
TOTAL CASH COSTS/TON	760	695	644	602	553	503	484
NON-CASH OVERHEAD COSTS/ACRE	848	848	848	848	849	849	849
TOTAL COSTS/ACRE	1989	2031	2072	2113	2176	2259	2300
TOTAL COSTS/TON	1326	1195	1091	1006	907	807	767

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ORGANIC RAISIN GRAPES

PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
Raisins	1.5	1.7	1.9	2.1	2.4	2.8	3.0
950.00	532	681	829	978	1201	1498	1647
1025.00	644	808	972	1135	1381	1708	1872
1100.00	757	936	1114	1293	1561	1918	2097
1175.00	869	1063	1257	1450	1741	2128	2322
1250.00	982	1191	1399	1608	1921	2338	2547
1300.00	1057	1276	1494	1713	2041	2478	2697
1350.00	1132	1361	1589	1818	2161	2618	2847

U.C. COOPERATIVE EXTENSION
Table 6. Continued
RANGING ANALYSIS FOR ORGANIC RAISIN GRAPE PRODUCTION

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ORGANIC RAISIN GRAPES

PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
Raisins	1.5	1.7	1.9	2.1	2.4	2.8	3.0
950.00	284	433	581	730	953	1250	1399
1025.00	397	560	724	887	1133	1460	1624
1100.00	509	688	866	1045	1313	1670	1849
1175.00	622	815	1009	1202	1493	1880	2074
1250.00	734	943	1151	1360	1673	2090	2299
1300.00	809	1028	1246	1465	1793	2230	2449
1350.00	884	1113	1341	1570	1913	2370	2599

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ORGANIC RAISIN GRAPES

PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
Raisins	1.5	1.7	1.9	2.1	2.4	2.8	3.0
950.00	-564	-416	-267	-118	104	401	550
1025.00	-452	-288	-125	39	284	611	775
1100.00	-339	-161	18	197	464	821	1000
1175.00	-227	-33	160	354	644	1031	1225
1250.00	-114	94	303	512	824	1241	1450
1300.00	-39	179	398	617	944	1381	1600
1350.00	36	264	493	722	1064	1521	1750