GR-VS-08-O

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2008

SAMPLE COSTS TO PRODUCE GRAPES FOR ORGANIC RAISINS

CONTINUOUS TRAY DRIED ORGANIC RAISINS

SAN JOAQUIN VALLEY- SOUTH

Stephen J. Vasquez	UCCE Farm Advisor, Fresno County
Jennifer Hashim-Buckey	UCCE Farm Advisor, Kern County
Matthew W. Fidelibus	UCCE Viticulture Specialist, Kearney Agricultural Center, Parlier, CA
L. Peter Christensen	UCCE Viticulture Specialist Emeritus
William L. Peacock	UCCE Farm Advisor, Tulare County
Karen M. Klonsky	UCCE Extension Specialist, Department of Agricultural and Resource Economics, UC Davis
Richard L. De Moura	Research Associate, Department of Agricultural and Resource Economics, UC Davis

UC COOPERATIVE EXTENSION

SAMPLE COST TO PRODUCE ORGANIC RAISINS
San Joaquin Valley – South 2008

CONTENTS

ACKNOWLEDGEMENTS: The authors thank the raisin farmers of California who helped with this study and the California Raisin Marketing Board for their financial support.

INTRODUCTION

Sample costs to produce organic raisins in the San Joaquin Valley using continuous tray drying are presented in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described are based on production practices considered typical for the crop and area, but these same practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, "*Your Costs*", in Tables 1 and 2 is provided for entering your costs.

The hypothetical farm operation, production practices, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3589 or your local UC Cooperative Extension office.

Sample Cost of Production Studies are available for many commodities. Current and archived studies can be downloaded from the Agricultural and Resource Economics website at UC Davis http://coststudies.ucdavis.edu. These studies as well as other archived studies not on the website can be requested through the department by calling (530) 752-1517.

ASSUMPTIONS

The assumptions refer to Tables 1 to 7 and pertain to sample costs to produce organic raisins using the continuous tray drying method in the southern San Joaquin Valley. The cultural practices described represent production operations and materials considered typical on a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure. The study does not represent a single farm and is intended as a guide only. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

Land. The 120 contiguous acre farm is owned and operated by the grower. Grapes for organic raisin production are on 100 acres and 15 acres are mature organic vines for wine production. Roads, irrigation systems, and farmstead occupy the remaining five acres. The production costs in this study are based on 100 acres of mature Thompson Seedless or Fiesta previously farmed conventionally, but are now being farmed using cultural practices appropriate for organic production and certification.

Production Operating Costs

Vineyard Preparation for Organic Production. The vineyard is assumed to have been established as a conventional vineyard. Changing a farming system from conventional to organic practices requires a 36 month transition period from the date of the final conventional material application. Crops grown in transition years can be sold or labeled transition, providing the organic rules and regulations are adhered to. Rules and regulations specific to organic commodities are established under the Organic Food Act of 1990 in the California Department of Food and Agriculture (CDFA) and the United States Department of Agriculture's (USDA) National Organic Program (NOP). Visit the CDFA website for current information and resources at http://www.cdfa.ca.gov/is/i_&_c/organic.html. USDA rules for organic production can be found at http://www.ams.usda.gov/nop/indexIE.htm. The vineyard in this report is considered to have been in conventional production for 20 years in addition to the three year transitional period. It has completed the transition period and has been certified organic and is expected to produce another 15 years, yielding the industry average of 2.0 tons per acre. However, older vineyards, 40 to 60 years, can also be considered for organic production if they are in good health and producing yields that reflect the industry average.

Vines. Thompson Seedless or Fiesta vines are planted on 7 x 12-foot spacing with 519 vines per acre. Plants were grafted on to a rootstock like Freedom or Harmony at establishment. At the time of planting the expected economic life was 30 years. Many vineyards in the area are 60 to 80 years old, but over time most of the vines have been replaced. In vineyards over 10 years old, weak or missing vines are replaced by layering. During dormancy (late November to February), one year old canes are buried (layered) in the soil next to the stake. These vines are trained the following spring and the layer is severed after 2 to 3 years when the new vine is fully established.

Trellis System. The trellis system is a two-wire 24-inch crossarm design that was installed by a custom trellis company during vineyard establishment and has been continually maintained. Additionally, vineyards being converted from hand to mechanical harvest may require substantial repairs to the trellis system in the first few years. Trellis repairs in this study are done after pruning (January) and the costs shown are assumed to be an average cost over the remaining life of the organic vineyard.

Prune/Tie/Sucker. The vines are pruned during the winter months and the prunings, placed in row middles, are shredded and disked (see weeds). The vines are pruned to six canes with an equal number of renewal spurs in January; canes are tied to the trellis wire(s) shortly after pruning or in early February by twisting around the trellis wire and attaching with twist-ties. In June and August, the canes are mechanically cut (skirted) to open the canopy and prevent canes from crossing rows.

Irrigation. The vineyard is drip irrigated during the growing season from April through September using 28 acre-inches of applied water. During June, July, and August, irrigations are applied frequently with no more than four days between irrigations. Daily irrigations during this period are preferable. Drip irrigation needs to be withheld completely prior to harvest in all vineyards to assure having a dry terrace. After raisins are removed from the field, irrigation resumes at full ET (evapotranspiration). Deficit irrigation (50% ET) can be applied beginning in early July in healthy vigorous vineyards to slow shoot growth. If deficit irrigation is used, in late October or November an irrigation is made to wet the soil profile to three to four feet deep. Irrigation amounts are based on vineyard ET and can vary from season to season. Water pumping costs plus labor, which includes checking the drip lines, constitute the irrigation cost. In this study, water is calculated to cost $5.67 per acre-inch or $68.00 per acre-foot. The pumping cost is based on using a 40 horsepower motor to pump from 130 feet deep. Price per acre-foot of water will depend on quantity used, water district, power cost, various well characteristics, and other irrigation factors. No assumptions are made about effective rainfall and runoff. In some years frost protection may be required and water applications may be necessary in March.

Nutrition. No fertilizer or soil amendments are applied to the vineyard. Prior to applying soil amendments or fertilizers, growers should have petioles tested to determine the vineyards nutritional status. Labs will collect 80-100 petioles per 20 acres and analyze them for mineral elements including nitrogen (N), phosphorous (P), potassium (K), as well as others. In this study a PCA collects the samples in May and sends them to the lab for analysis. Vineyards with different cultivar/rootstock combinations or different soils may need multiple samples. Fertilizers and amendments are applied when plant tissue, water and/or soil analyses, as well as grower experience have shown it to be appropriate.

Cover Crop. In this study, a Multiplex mix of bell beans, peas, vetch and barley is planted by the grower at 100 pounds per acre in October or November, mowed in March and disked down in May. Cover crops are usually planted to add nitrogen and organic matter to the soil and to provide a habitat to attract and sustain beneficial arthropods. Cover crop species and mixes should be selected for compatibility to a vineyard's operations. In the San Joaquin Valley, a mixture of legume and grasses is often planted to derive some of the benefits associated with each species. Annually sown leguminous cover crops (bell beans, clovers, medics, field peas, vetch) are planted, often as mixes, and will contribute to the nitrogen budget. Cereal grasses (barley, wheat, oats, and rye) are planted to increase cover crop biomass and return organic matter to the soil. Grasses, especially cereal rye (Merced Rye), can be planted later in the fall to establish a better stand than legumes, thereby providing growers with some planting flexibility in years when harvest operations and ground work are delayed. Growers will need to source cover crop seed to comply with organic certification.

Fertilizers. Additional N fertilizer may not be required when legume cover crops are grown. Nitrogen is the primary nutrient deficient in most San Joaquin Valley vineyards. The N requirement in grapes can be easily supplied with a leguminous cover crop. Care must be taken not to over supply the vine with N by additional applications of compost or manure when using a leguminous cover crop. If a leguminous cover crop is not being grown, growers can use compost to supplement the vineyards nitrogen needs. Compost or manure is spread throughout the vineyard to supply nutrients to the vines, add organic matter to the soil and stimulate microbial activity. Manure and/or compost must be incorporated into the soil shortly after being spread to avoid volatile losses of N. Generally 3 to 6 tons per acre is necessary if no other sources of N exist, such as well water containing nitrates. Some raisin vineyards may experience potassium deficiencies which are rarely uniform throughout the vineyard. Spot treatments of vines displaying deficiencies should be corrected with

heavy doses of potassium to overcome the strong K-fixing power of soil. Zinc and boron, micro nutrients, may also be deficient in vineyards. Vines are especially prone to zinc deficiency when heavy amounts of compost and/or manure are applied. Zinc and boron are best corrected with foliar sprays applied prior to bloom. Fish and kelp products add very small amounts of N, P, K, micronutrients and other organic constituents to the soil and their value is questionable in grape production. They may be foliar or ground applied in the fall or spring. Growers will need to source materials that are approved for organic production.

Soil Amendments. If water infiltration is a problem, gypsum may be used to add calcium to the soil, to improve soil tilth for soils high in sodium and/or improve water penetration with low salt irrigation water.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes.* For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your local organic certifier, PCA, viticulture farm advisor, and/or the UC IPM website for current recommendations for organic production.** Adjuvants are recommended for use with many pesticides for effective control, but adjuvants, their costs and their availability for organic production are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

Pest Control Adviser (PCA). Written recommendations are required for many commercially applied pesticides and are written by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Costs for a private PCA are not included in this study. PCAs should be knowledgeable in organic raisin production.

Weeds (Vineyard Floor Management). Vineyard middles are mowed in March (covercrop) and disked three times each season: May (cover crop disked in), June, and July. The vine rows are French plowed in February and in March the berms are remade by throwing the soil back using a border disk. The vine rows are mechanically weeded in April, June and July. Hand weeding may be necessary to remove weeds near the vines, stakes, end-post, standpipes, and risers. (See Vineyard Floor Management for harvest for additional disking).

Mites. Webspinning spider mites (Pacific spider mite) are treated with Ecotrol applied in July. Also, good irrigation and nutrition practices are imperative. Avoid dry dusty conditions in June and July, such as by watering down field roads. Cover crops can be beneficial in some cases. Other methods are the use of oil early in the season (prior to bloom) to knock down mite populations and improve predator and prey balances. Timing is critical.

Insects. In this study, Omnivorous leafroller (OLR) is treated with Dipel during the bloom spray in May. Although not considered in this study, western grapeleaf skeletonizer and grapeleaf folder can also be problematic. Application timing and materials are the same as OLR.

Leafhoppers (variegated and grape) are important pests faced by organic growers. Populations will vary depending on vineyard location. Vineyards located within five miles of riparian habitats generally benefit from the natural predator, *Anagros epos.* When leafhopper populations exceed 20 to 30 nymphs per leaf during the summer months, vines can be nearly defoliated by harvest time. To avoid this, organic growers often use Hopper Stopper tape prior to budbreak and PyGanic (botanical pyrethroid) or natural oils applied in early June.

There are two mealybugs (grape and vine) that are a concern to grape growers. The grape mealybug (*Pseudococcus maritimus*) is often kept at low populations by its natural enemies. When it is found in large populations, it is normally isolated to a portion of the vineyard and fruit of affected vines can be left on the vine without much loss. In contrast, vine mealybug (*Planococcus ficus*) infestations can quickly spread throughout a vineyard, making an entire crop unmarketable. Currently, organically approved management strategies do not exist for vine mealybug. Growers should monitor their vineyards closely for mealybugs and have them properly identified. The movement of plant debris on workers or equipment, to locations free of mealy bugs should be minimized through proper sanitation practices. Vines that are infected with vine mealybug should be isolated by summer pruning them immediately and destroying the crop. The use of pheromone traps and parasitic wasp should be considered to help identify and reduce populations, respectively.

Diseases. Diseases treated in this study are phomopsis cane and leafspot (*Phomopsis viticola)* and powdery mildew (*Erysiphe necator)*. Treatment for phomopsis begins at or shortly after bud break if spring rains are predicted. Additional applications for phomopsis may be necessary if rains persist. Management of powdery mildew begins shortly after bud break and continues until veraison (berry softening). Nordox (copper) for Phomopsis and Kumulus (micronized sulfur) for powdery mildew control are applied in late March. Mildew is controlled during the season with Kumulus at 7 to 10 day intervals. Intervals may need to be shortened to 5 days if temperatures are between 70-85˚F and/or the cultivar Fiesta is being grown on a site that encourages dense canopy growth. Kumulus is applied at 10 day intervals in April and May (one includes Dipel insecticide). Dusting sulfur is applied three times in June at 10 day intervals. All applications except in June are made driving alternate rows. Growers can access the UC Davis Powdery Mildew Risk Assessment Index on the UC IPM website to identify optimal powdery mildew growing conditions.

Harvest Disking/Terrace. After the last irrigation in July or August, the middles are disked once to prepare for harvest and paper laying. After the raisins are picked up in September, the field is disked again to incorporate vineyard debris and shredded paper. Depending on the time of year, terracing prior to harvest may improve drying. Growers will find a slight south facing terrace improves the drying process and allows free moisture that accumulates late in the season to migrate off the paper.

Harvest. Canes are cut for machine harvest from mid August to mid September, depending on the variety, stage of fruit maturation and desired harvest date. Fruit is allowed to dry on the vine for approximately 7-10 days before being harvested. Machines harvest semi-dried fruit onto a continuous tray and the fruit is left to dry for another 7-10 days, depending on weather conditions and equipment availability. The grower may purchase his own equipment either new or used or have the crop custom harvested. For information on conventional tray drying see *Sample Costs to Establish a Vineyard and Produce Grapes for Raisins, 2006. Tray Dried Raisins, San Joaquin Valley.*

Grower. The harvester, with driver, straddles the vine row, picking one row at a time. The raisins are delivered across the adjacent row to a traylayer. The traylayer, pulled by a tractor, holds a roll of paper; the paper widths range from 34 – 40 inches depending on yield. The operation includes the tractor driver and a person on the traylayer to guide the paper and regulate the fruit flow on to the paper. In approximately two weeks, the fruit is dried to 12 - 16% moisture and are ready for pickup. The pickup machine pulled by a tractor with a driver and one person on the pickup machine, picks up the paper with the raisins and delivers the raisins across the row to 1,000 pound bins on bin trailers. The pickup machine has a shredder which shreds the paper and scatters it in the middles for incorporating into the soil. Two tractors with bin trailers (4 per trailer) travel in the adjacent row moving with the pickup machine. One man rides the trailer to monitor the bins being filled. Once a trailer is loaded, the bins are delivered to a staging area where they are unloaded using a forklift and then reloaded with empty bins. Filled bins may also be loaded on a truck for delivery to the processor or dehydrator for finish drying.

Custom. A typical custom harvest consists of cane cutting, over the row harvesting of the grapes, onto continuous tray paper, picking up the raisins and loading into 1,000 pound bins, delivering the filled bins to the staging area in the field and shredding the paper as the raisins are picked up. Prices quoted ranged from about $425 to $500 per acre for complete harvest, but separate operations can be negotiated. Typically, the grower is asked to put one-third of the cost down at negotiation, one-third at harvest and one-third at completion of harvest.

Yields. Raisin vineyards reach maturity in the fourth year and over the remaining years the vineyard will average 2.00 dry tons per acre based on California Department of Food and Agriculture 1995 to 2004 data. The drying ratio of green fruit to raisins is 4.1 to 4.5:1. Two tons per acre is the industry average for Thompson Seedless; vineyards planted to Fiesta or new cultivars may have higher yields.

Returns. The estimated return for this study based on current raisin markets gives a final return (free + reserve tonnage + premium) of $1,450 per ton. Premiums are paid for organic raisins and are currently 20 to 25% of the conventional price. The raisin grape market is regulated by a federal marketing order administered by the Raisin Administrative Committee (RAC). Each year, the RAC sets minimum crop standards. 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 of the harvested crop that is held in reserve for later sale (the reserve pool), to control the overall supply of raisins on the market.

Assessments. The California Raisin Marketing Board assesses a $16.20 per ton fee to support and promote use of California grown raisins.

Dehydrator. Raisins must be at 16% moisture or less to meet industry incoming inspection requirements. Raisins greater than 16% moisture will need to be finish dried on the farm or at a commercial dehydrator. Drying is most likely not needed every year. Drying costs vary among commercial dehydrators; therefore a cost of $150 per ton represents the cost range and is used in this study.

Packers. Packing costs are not included in this study. The United States Department of Agriculture (USDA) inspects the raisins for maturity, quality, and moisture. The Raisin Administrative Committee (RAC), the administrative arm of the federal marketing order for raisins, sets industry standards. Fees are associated with both the USDA inspections and RAC administrative responsibilities; the packer pays for tonnage fees. Growers receive payment for the free tonnage (commercial sales) portion of their crop from the packer. The reserve tonnage portion (export sales and government purchases) is paid by the RAC. In most cases, the packer retains control of the raisin crop for marketing purposes after inspection.

Pickup/ATV. The grower uses the pickup for business and personal use. The assumed business use is 5,200 miles per year for the ranch. The All Terrain Vehicle (ATV) is used on the ranch for checking the vineyard and irrigating.

Labor, Equipment, Interest and Risk

Labor. Hourly wages for workers are $11.00 for machine operators and $8.25 per hour non-machine labor. Adding 33% for the employer's share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of $14.63 and $10.97 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2007 (personal email from California Department of Insurance, May 18, 2007, unreferenced). Labor for operations involving machinery are 20% higher than the operation time given in Table 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Equipment Operating Costs. Repair costs for all equipment, besides the harvest equipment are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Repair costs for the harvest equipment – picker and traylayer – are based on grower data. Prices for on-farm delivery of red dye diesel and gasoline are $2.50 and $3.10 per gallon, respectively. The cost includes a 2% local sales tax on diesel fuel, but does not include excise taxes. Gasoline costs include an 8% sales tax plus federal and state excise tax. Some federal and excise tax can be refunded for on-farm use when filing your income tax. The costs are based on 2007 American Automobile Association (AAA) and Department of Energy (DOE) monthly data. The fuel, lube, and repair cost per acre for each operation in Table 1 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 8.75% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge. The interest rate is the basic rate provided by a farm lending agency as of January, 2008.

Risk. The risks associated with crop production should not be minimized. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks, which affect profitability and economic viability. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. For raisin growers, income loss from bad weather during field drying is a major risk.

*Crop Insurance***.** Crop insurance is available, but not included in this study. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage. Coverage levels range from 50% to 75%. According to one insurer, premium and fees at the 60% level for 80 acres in Fresno County are $16.87 per ton for a $660 per ton return guarantee.

Cash Overhead Costs

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation.

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

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.728% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs $687 for the entire farm.

Office Expense. Office and business expenses are estimated at $80 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, and miscellaneous administrative charges.

Sanitation Services. Sanitation services provide portable toilets for the vineyard and cost the farm $2,500 annually. The cost includes two double toilet units with washbasins, delivery and pickup, and five months of weekly servicing. Costs also include soap or other suitable cleansing agent, and single use towels. Separate potable water and single-use drinking cups are also supplied.

Organic Production Annual Fees. Organic growers must meet certain criteria as defined by the National Organic Act requiring state registration and certification by a USDA accredited certifying agent. For this study, it is assumed the grower has paid the first year certification and application fees which are amortized under Non-Cash Overhead, therefore only the annual fees are shown here.

California Certified Organic Farmers (CCOF). CCOF is an accredited certifying agency. They charge an annual renewal fee of $650 or $6.50 per acre (this fee is based on gross organic income), and an annual farm inspection fee based on time and parcels, estimated at $700 or $7.00 per acre for this study totaling $13.50 per acre in annual fees. The CCOF also charges a one time membership/application fee (included in investment costs in this study). Additional fees can be incurred, but are voluntary. Other approved certifiers are available and are listed on the CDFA website under "Other Sites" at http://www.cdfa.ca.gov/is/i_&_c/organic.html .

California Department of Food and Agriculture (CDFA). State registration is required and the county agricultural commissioner collects the fees. There is a first time registration fee of approximately $75 for the farm and is included under Organic Registration in Non-Cash Overhead. Thereafter, the annual registration fee is based on gross organic income and for this study is $450 for the farm or $4.50 per acre.

Management/Supervisor Wages. Salary is not included. Returns above costs are considered a return to management

Investment Repairs. Annual maintenance on investments (Non-Cash Overhead) is calculated as 2% of the purchase price.

Non-Cash Overhead Costs

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

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

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 5.

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

Interest Rate. The interest rate of 6.25% used to calculate capital recovery cost is the effective long term interest rate effective January 2008. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Establishment Cost. Costs to establish the vineyard are used to determine capital recovery expenses, depreciation, and interest on investment for the production years. Establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested minus any returns from production. Being the vineyard is over 20 years old at the time of conversion, all costs are assumed to have been charged to the vineyard. For younger vineyards establishment costs of $6,746 per acre or $674,600 for the 100-acre vineyard taken from the publication, *Sample Costs to Establish a Vineyard and Produce Grapes for Raisins, 2006, Tray Dried, San Joaquin Valley* can be used in the calculations.

Irrigation System. The previous vineyard is assumed to have an irrigation system that has been refurbished. A new pump, motor, and filtration/injector station is being installed along with the drip irrigation system during planting. The filtration station, fertilizer injector system, drip lines and the labor to install the components are included in the irrigation system cost. Water is pumped from a 130-foot depth with a 40 horsepower pump and supplies water to the established acres. Another 40 horsepower pump (not included) is available for backup and for use on the rest of the ranch. The irrigation system is considered an improvement to the property and has a 25-year life.

Land. Bare or open land for raisin production is valued at $6,500 per acre. This study assumes the land was purchased. Because only 115 of the 120 acres are planted to vines, land is valued at $6,783 per planted acre.

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

Tools. This includes shop tools, hand tools, and miscellaneous field tools such as pruning tools.

Fuel Tanks. Two 250-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

Organic Registration (First Time Fees). For organic certification, the grower must meet the organic requirements and pay the required fees. The CDFA charges a first time registration fee of $75 for the farm ($0.75 per acre). A first time fee to get certified is also charged by the certifying agency. For this study, there is a $275 application fee and a new farm certification fee of approximately $1,000 totaling $1,350 in first year agency fees ($13.50 per acre). The fees are amortized over the remaining life of the vineyard.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 5. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

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

REFERENCES

Agricultural Commissioner. *Annual Crop Reports 2002, 2003, 2004, 2005, 2006.* Fresno County Agricultural Commissioner, Fresno, CA.

American Society of Agricultural Engineers. (ASAE). 1994. *American Society of Agricultural Engineers Standards Yearbook*. St. Joseph, Missouri.

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

California Chapter of the American Society of Farm Managers and Rural Appraisers. 2007. *Trends in Agricultural Land and Lease Values.* California Chapter of the American Society of Farm Managers and Rural Appraisers, Inc. Woodbridge, CA.

California State Automobile Association. 2008. *Gas Price Averages 2007.* AAA Press Room, San Francisco, CA. Internet accessed January 2008. http://www.csaa.com/portal/site/CSAA

California State Board of Equalization. *Fuel Tax Division Tax Rates.* Internet accessed January 2008. http://www.boe.ca.gov/sptaxprog/spftdrates.htm

Christensen, L. Peter (Ed,). 2000. *Raisin Production Manual*. University of California Agriculture and Natural Resources. Oakland, CA. Publication 3393.

Izumi, April Geary (Ed.) 2005. *California Agricultural Resource Directory 2005.* California Department of Food and Agriculture. (p 75) http://www.cdfa.ca.gov/

Energy Information Administration. 2007. *Weekly Retail on Highway Diesel Prices.* Internet accessed January 2008. http://tonto.eix.doe.gov/oog/info/wohdp

Peacock, William L., Stephen J. Vasquez, Jennifer M. Hashim, Matthew W. Fidelibus, George M. Leavitt, Karen M. Klonsky, and Richard L. De Moura. 2006. *Sample Costs to Establish a Vineyard and Produce Grapes for Raisins.* University of California Cooperative Extension. Department of Agricultural and resource Economics. Davis, CA.

University of California Statewide IPM Project. *UC Pest Management Guidelines, Grapes.* 2007. University of California, Davis. CA. http://www.ipm.ucdavis.edu

Vasquez, Stephen J., Jennifer M. Hashim-Buckey, William L. Peacock, Karen M. Klonsky, Richard L, De Moura. *Sample Costs To Establish and Produce Table Grapes, Thompson Seedless, San Joaquin Valley.* 2007. University of California Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.

Vasquez, Stephen J., Matthew W. Fidelibus, L. Peter Christensen, William L. Peacock, Karen M. Klonsky, Richard L. De Moura. *Sample Costs to Produce Grapes for Raisins; Continuous Tray, San Joaquin Valley*. 2006. University of California Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.

UC COOPERATIVE EXTENSION

Table 1. COSTS PER ACRE TO PRODUCE ORGANIC RAISINS

SAN JOAQUIN VALLEY - SOUTH 2008

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre: Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Prune: Vines	24.00	263	0	0	0	263	
Prune: Brush Disposal (Every Middle)	0.26	5	4	0	0	8	
Trellis: Repair	0.80	9	0	15	0	24	
Prune: Tie Canes	4.50	49	0	8	0	57	
Weed: Winter Strip (French Plow)	0.36	6	4	0	0	10	
Disease: Phomopsis (Nordox). Mildew (Sulfur)	0.38	7	5	12	0	24	
Weed: Vine Row (remake berms)	0.14	3	2	0	0	4	
Weed: Mow Middles 1X	0.17	3	3	0	0	6	
Disease: Mildew (Kumulus) alternate rows	1.91	34	26	23	0	83	
Irrigate: (Water)	5.50	60	0	159	0	219	
Weed: Vine Row (vine row weeder)	1.94	34	21	0	0	55	
Weed: Disk Middles 3X	0.86	15	10	0	0	25	
Nutrition: Plant Tissue Analysis	0.00	0	0	4	0	4	
Disease: Mildew (Kumulus). Insect: OLR (Dipel) alternate rows	0.76	13	11	19	0	43	
Disease: Mildew (Dusting Sulfur)	1.47	26	16	6	0	49	
Prune: Cane Cutting (Mechanical)	0.57	10	6	0	0	16	
Insect: Mites (Ecotrol)	0.76	13	11	38	0	62	
Harvest Disk & Roll Middles: Prepare for harvest	0.29	5	3	0	0	8	
Harvest Disk Middles: Incorporate trash (after harvest)	0.29	5	3	0	0	8	
Cover Crop : Plant (Multiplex Mix)	0.39	7	5	54	0	65	
Vine: Layering missing vines	0.80	9	0	0	0	9	
Pickup: Business Use	2.39	42	44	0	0	85	
ATV Use	2.00	35	3	0	0	38	
TOTAL CULTURAL COSTS/ACRE	50.54	653	176	337	0	1,166	
Harvest:							
Cut Canes (Hand) for drying grapes	4.70	52	0	0	0	52	
Harvest: Pick (Mechanical)	0.45	8	12	0	0	20	
Harvest: Traylayer (tractor, traylayer, paper, labor)	0.45	13	6	104	0	123	
Pickup Raisins (Tractors, Pickup Machine, Bin Trailers, Labor, Forklift)	1.83	43	19	0	0	61	
Haul Raisins to Dehydrator or Processor (Custom)	0.00	0	0	0	26	26	
TOTAL HARVEST COSTS/ACRE	7.43	115	36	104	26	282	
Other Harvest Costs:							
Dehydrator (Dry Raisins)	0.00	0	0	0	300	300	
Assessment Fees	0.00	0	0	32	0	32	
TOTAL OTHER HARVEST COSTS	0.00	0	0	32	300	332	
Interest on operating capital @ 8.75%						48	
TOTAL OPERATING COSTS/ACRE		768	212	474	326	1,828	
CASH OVERHEAD:							
Office Expense						80	
Liability Insurance						6	
Sanitation Fees						22	
Organic Certification Annual Renewal Fees						18	
Property Taxes						89	
Property Insurance						15	
Investment Repairs						33	
TOTAL CASH OVERHEAD COSTS						262	
TOTAL CASH COSTS/ACRE						2,090	
NON-CASH OVERHEAD:		Per producing		-- Annual Cost --			
Investment		Acre		Capital Recovery			
Land		6,783		424		424	
Drip Irrigation System		800		64		64	
Building		696		52		52	
Tools-Shop/Field		104		11		11	
Fuel Tanks 2-300G		30		2		2	
Organic Certification (first time fees)		14		1		1	
Equipment		2,080		259		259	
TOTAL NON-CASH OVERHEAD COSTS		10,506		813		813	
TOTAL COSTS/ACRE						2,902	

UC COOPERATIVE EXTENSION

Table 2. COSTS AND RETURNS PER ACRE to PRODUCE ORGANIC RAISINS

SAN JOAQUIN VALLEY - SOUTH 2008

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Raisins (Organic)	2.00	ton	1,450.00	2,900	
OPERATING COSTS					
Vine/Trellis Aids:					
Twist-ties ($0.004 each)	2,000.00	each	0.00	8	
Trellis Materials (various)	1.00	acre	15.00	15	
Fungicide:					
Kumulus DF (micronized wettable sulfur)	33.00	lb	0.91	30	
Nordox 75 WG	1.25	lb	7.11	9	
Dusting Sulfur	30.00	lb	0.22	6	
Insecticide:					
Dipel DF	1.00	lb	14.38	14	
Ecotrol EC	4.00	pint	9.42	38	
Nutrition:					
Tissue analysis	0.05	each	80.00	4	
Seed (Organic Multiplex Mixture) for cover crop	100.00	lb	0.54	54	
Water:					
Water -Pumped	28.00	acin	5.67	159	
Harvest Aids:					
Paper Continuous Tray 2550' x 38" Roll	1.55	roll	67.35	104	
Assessment:					
California Raisin Marketing Board	2.00	ton	16.20	32	
Custom/Contract:				0	
Haul Raisins to Processor/Dryer	2.00	ton	13.00	26	
Dehydrator (dry raisins)	2.00	ton	150.00	300	
Labor (machine)	21.21	hrs	14.63	310	
Labor (non-machine)	41.71	hrs	10.97	458	
Fuel - Gas	11.60	gal	3.10	36	
Fuel - Diesel	42.30	gal	2.50	106	
Lube				21	
Machinery repair				49	
Interest on operating capital @ 8.75%				48	
TOTAL OPERATING COSTS/ACRE				1,828	
NET RETURNS ABOVE OPERATING COSTS				1,072	
CASH OVERHEAD COSTS:					
Office Expense				80	
Liability Insurance				6	
Sanitation Fees				22	
Organic Certification Annual Renewal Fees				18	
Property Taxes				89	
Property Insurance				15	
Investment Repairs				33	
TOTAL CASH OVERHEAD COSTS/ACRE				262	
TOTAL CASH COSTS/ACRE				2,090	
NON-CASH OVERHEAD COSTS (Capital Recovery):					
Land				424	
Drip Irrigation System				64	
Building				52	
Tools-Shop/Field				11	
Fuel Tanks 2-300G				2	
Organic Certification (first time fees)				1	
Equipment				259	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				813	
TOTAL COSTS/ACRE				2,903	
NET RETURNS ABOVE TOTAL COSTS				-3	

UC COOPERATIVE EXTENSION

Table 3. MONTHLY CASH COSTS PER ACRE to PRODUCE ORGANIC RAISINS

SAN JOAQUIN VALLEY - SOUTH 2008

Beginning JAN 08 Ending DEC 08	JAN 08	FEB 08	MAR 08	APR 08	MAY 08	JUN 08	JUL 08	AUG 08	SEP 08	OCT 08	NOV 08	DEC 08	TOTAL
Cultural:													
Prune: Vines	263												263
Prune: Brush Disposal (Every Middle)	8												8
Trellis: Repair	24												24
Prune: Tie Canes		57											57
Weed: Winter Strip (French Plow)		10											10
Disease: Phomopsis (Nordox). Mildew (Sulfur)			24										24
Weed: Vine Row (remake berms)			4										4
Weed: Mow Middles 1X			6										6
Disease: Mildew (Kumulus) alternate rows				50	33								83
Irrigate: (Water)				15	29	43	51	41	40				219
Weed: Vine Row (vine row weeder)				18		18	18						55
Weed: Disk Middles 3X					8	8	8						25
Nutrition: Petiole analysis					4								4
Disease: Mildew (Kumulus). Insect: OLR (Dipel) alternate rows					43								43
Disease: Mildew (Dusting Sulfur)						49							49
Prune: Cane Cutting (Mechanical)						8		8					16
Insect: Mites (Ecotrol)							62						62
Harvest Disk & Roll Middles: Prepare for harvest								8					8
Harvest Disk Middles: Incorporate trash (after harvest)									8				8
Cover Crop : Plant (Multiplex Mix)										65			65
Vine: Layering missing vines												9	9
Pickup: Business Use	7	7	7	7	7	7	7	7	7	7	7	7	85
ATV Use	3	3	3	3	3	3	3	3	3	3	3	3	39
TOTAL CULTURAL COSTS	306	78	44	93	127	137	150	68	59	76	10	19	1,166
Harvest:													
Cut Canes (Hand) for drying grapes								52					52
Harvest: Pick (Mechanical)									20				20
Harvest: Traylayer (tractor, traylayer, paper, labor)									123				123
Pickup Raisins (Tractors, Pickup Machine, Bin Trailers, Labor, Forklift)									61				61
Haul Raisins to Dehydrator or Processor (Custom)									26				26
TOTAL HARVEST COSTS								52	230				282
Other Harvest Costs:													
Dehydrator (Dry Raisins)									300				300
Assessment Fees									32				32
TOTAL OTHER HARVEST COSTS									332				332
Interest on operating capital @ 8.75%	2	3	3	4	5	6	7	8	12	-1	0	0	48
TOTAL OPERATING COSTS/ACRE	308	81	47	97	132	143	157	127	633	75	10	19	1,828

UC COOPERATIVE EXTENSION

Table 3. CONTINUED

Beginning JAN 08 Ending DEC 08	JAN 08	FEB 08	MAR 08	APR 08	MAY 08	JUN 08	JUL 08	AUG 08	SEP 08	OCT 08	NOV 08	DEC 08	TOTAL
OVERHEAD:													
Office Expense	7	7	7	7	7	7	7	7	7	7	7	7	80
Liability Insurance									6				6
Sanitation Fees	2	2	2	2	2	2	2	2	2	2	2	2	22
Organic Certification Annual Renewal Fees			18										18
Property Taxes	44						44						89
Property Insurance	8						8						15
Investment Repairs	3	3	3	3	3	3	3	3	3	3	3	3	33
TOTAL CASH OVERHEAD COSTS	63	11	29	11	11	11	63	11	17	11	11	11	262
TOTAL CASH COSTS/ACRE	371	92	76	108	143	154	220	138	650	86	21	30	2,090

UC COOPERATIVE EXTENSION
Table 4. RANGING ANALYSIS
SAN JOAQUIN VALLEY – SOUTH 2008

COSTS PER ACRE AT VARYING YIELD TO PRODUCE ORGANIC RAISINS

	YIELD (tons/acre)						
	1.40	1.60	1.80	2.00	2.20	2.40	2.60
OPERATING COSTS:							
Cultural Cost	1,166	1,166	1,166	1,166	1,166	1,166	1,166
Harvest (cut canes, pick, lay, pickup)	228	237	246	256	265	274	283
Haul to Dehydrator/Processor	18	21	23	26	29	31	34
Dehydrator	210	240	270	300	330	360	390
Assessment	23	26	29	32	36	39	42
Interest on operating capital @ 8.75%	47	47	48	48	48	49	49
TOTAL OPERATING COSTS/ACRE	1,692	1,737	1,782	1,828	1,874	1,919	1,964
Total Operating Costs/ton	1,208	1,085	990	914	852	799	755
CASH OVERHEAD COSTS/ACRE	262	262	262	262	262	262	262
TOTAL CASH COSTS/ACRE	1,954	1,999	2,044	2,090	2,136	2,181	2,226
Total Cash Costs/ton	1,396	1,249	1,135	1,045	971	909	856
NON-CASH OVERHEAD COSTS/ACRE	811	812	812	813	813	813	814
TOTAL COSTS/ACRE	2,765	2,811	2,856	2,903	2,949	2,994	3,040
Total Costs/ton	1,975	1,757	1,587	1,451	1,340	1,247	1,169

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE	YIELD (tons/acre)						
$/ton	1.40	1.60	1.80	2.00	2.20	2.40	2.60
1,050	-222	-57	108	272	436	601	766
1,150	-82	103	288	472	656	841	1,026
1,250	58	263	468	672	876	1,081	1,286
1,350	198	423	648	872	1,096	1,321	1,546
1,450	338	583	828	1,072	1,316	1,561	1,806
1,550	478	743	1,008	1,272	1,536	1,801	2,066
1,650	618	903	1,188	1,472	1,756	2,041	2,326

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE	YIELD (tons/acre)						
$/ton	1.40	1.60	1.80	2.00	2.20	2.40	2.60
1,050	-484	-319	-154	10	174	339	504
1,150	-344	-159	26	210	394	579	764
1,250	-204	1	206	410	614	819	1,024
1,350	-64	161	386	610	834	1,059	1,284
1,450	76	321	566	810	1,054	1,299	1,544
1,550	216	481	746	1,010	1,274	1,539	1,804
1,650	356	641	926	1,210	1,494	1,779	2,064

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE	YIELD (tons/acre)						
$/ton	1.40	1.60	1.80	2.00	2.20	2.40	2.60
1,050	-1,295	-1,131	-966	-803	-639	-474	-310
1,150	-1,155	-971	-786	-603	-419	-234	-50
1,250	-1,015	-811	-606	-403	-199	6	210
1,350	-875	-651	-426	-203	21	246	470
1,450	-735	-491	-246	-3	241	486	730
1,550	-595	-331	-66	197	461	726	990
1,650	-455	-171	114	397	681	966	1,250

UC COOPERATIVE EXTENSION

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

SAN JOAQUIN VALLEY - SOUTH 2008

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Total
08	30 HP 4WD Tractor	19,305	15	3,758	1,862	84	115	2,061
08	50 HP 2WD Tractor	26,000	15	5,062	2,508	113	155	2,776
08	60 HP 4WD Narrow Tractor	36,000	15	7,009	3,472	157	215	3,844
08	ATV 4WD	6,700	5	3,003	1,071	35	49	1,155
08	Bin Trailer	2,100	20	109	184	8	11	203
08	Bin Trailer	2,100	20	109	184	8	11	203
08	Cane Cutter 12'	2,500	20	130	219	10	13	242
08	Disk - Tandem 8'	6,800	10	1,203	845	29	40	914
08	Disk - Border (adjustable)	2,000	10	354	248	9	12	269
08	Duster - 3 Pt 12'	5,000	10	884	621	21	29	672
08	Float 8'	1,500	20	78	131	6	8	145
08	Forklift Nissan 50	19,500	15	3,796	1,881	85	116	2,082
08	French Plow	650	10	115	81	3	4	87
08	Harvester Korvan (picker) (SP)	180,000	10	33,954	22,201	779	1,070	24,049
08	Mower-Flail 8'	9,600	15	922	966	38	53	1,057
08	Orchard/Vine Sprayer 500 gal	20,378	5	6,638	3,699	98	135	3,932
08	Pickup Truck 1/2 T	26,000	7	9,863	3,533	131	179	3,843
08	Seeder-Brillion 5'	4,673	10	826	581	20	28	628
08	KCI Tray Layer (pull type)	22,000	10	3,891	2,733	94	129	2,957
08	KCI Pickup Machine (pull type)	42,700	10	7,551	5,304	183	251	5,738
08	Vine Row Weeder-Bezzerides 6'	1,400	10	248	174	6	8	188
	TOTAL	436,906		89,503	52,496	1,916	2,632	57,045
	60% of New Cost *	262,144		53,702	31,498	1,150	1,579	34,227

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

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Repairs	Total
Building 2400 sqft	80,000	30		5,968	291	400	1,600	8,259
Drip Irrigation System 115 acres	92,000	25		7,369	335	460	1,840	10,004
Fuel Tanks 2-300 gal	3,500	30	350	257	14	19	70	360
Land (120 acres)	780,000	25	780,000	48,750	0	7,800	0	56,550
Organic Certification (first time fees)	1,350	15		141	0	0	0	141
Tools-Shop/Field	12,000	15	1,133	1,208	48	66	240	1,562
TOTAL INVESTMENT	968,850		781,483	63,693	688	8,745	3,750	76,876

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	115	acre	5.98	688
Office Expense	115	acre	80.00	9,200
Organic Annual Renewal Fee	100	acre	18.00	1,800
Sanitation Fees	115	acre	21.74	2,500

UC COOPERATIVE EXTENSION

Table 6. HOURLY EQUIPMENT COSTS

SAN JOAQUIN VALLEY - SOUTH 2008

			COSTS PER HOUR						
				Cash Overhead		Operating			
Yr	Description	Actual Hours Used	Capital Recovery	Insur-ance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
08	30 HP 4WD Tractor	800	1.40	0.06	0.09	0.83	4.24	5.07	6.62
08	50 HP 2WD Tractor	800	1.88	0.08	0.12	1.12	7.06	8.18	10.26
08	60 HP 4WD Narrow Tractor	1,544	1.35	0.06	0.08	0.88	8.47	9.35	10.84
08	ATV 4WD	241	2.67	0.09	0.12	0.50	1.19	1.69	4.57
08	Bin Trailer	150	0.74	0.03	0.04	0.31	0.00	0.31	1.12
08	Bin Trailer	150	0.74	0.03	0.04	0.31	0.00	0.31	1.12
08	Cane Cutter 12'	100	1.31	0.06	0.08	0.95	0.00	0.95	2.40
08	Disk - Tandem 8'	229	2.21	0.08	0.10	1.10	0.00	1.10	3.49
08	Disk - Border (adjustable)	14	10.42	0.36	0.49	0.32	0.00	0.32	11.59
08	Duster - 3 Pt 12'	192	1.94	0.07	0.09	0.70	0.00	0.70	2.80
08	Float 8'	150	0.53	0.02	0.03	0.22	0.00	0.22	0.80
08	Forklift Nissan 50	222	5.07	0.23	0.31	0.23	7.62	7.85	13.46
08	French Plow	36	1.35	0.05	0.06	0.18	0.00	0.18	1.64
08	Harvester Korvan (picker) (SP)	49	271.51	9.52	13.08	12.94	12.00	24.94	319.05
08	Mower-Flail 8'	150	3.86	0.15	0.21	4.30	0.00	4.30	8.52
08	Orchard/Vine Sprayer 500 gal	482	4.60	0.12	0.17	3.58	0.00	3.58	8.47
08	Pickup Truck 1/2 T	285	7.45	0.28	0.38	1.91	16.34	18.25	26.36
08	Seeder-Brillion 5'	39	8.86	0.31	0.42	1.25	0.00	1.25	10.84
08	KCI Tray Layer (pull type)	45	36.76	1.27	1.74	3.35	0.00	3.35	43.12
08	KCI Pickup Machine (pull type)	46	69.49	2.40	3.29	6.67	0.00	6.67	81.85
08	Vine Row Weeder-Bezzerides 6'	194	0.54	0.02	0.03	0.32	0.00	0.32	0.91

UC COOPERATIVE EXTENSION

Table 7. OPERATIONS WITH MATERIALS & EQUIPMENT FOR ORGANIC RAISINS

SAN JOAQUIN VALLEY-SOUTH 2008

MONTH	OPERATION	TRACTOR	IMPLEMENT	LABOR HRS/acre	MATERIAL	RATE/AC
Jan	Prune			24.00		
Jan	Brush Disposal/Shred	60 HP	Mower -Flail			
Jan	Trellis Repair			0.80	Misc. Material	15.00
Feb	Tie Canes			4.50	Twist-ties	2,000.00
Feb	Weed: Winter Strip	60 HP	French Plow			
March	Disease: Mildew/Phomopsis	60 HP	Vine Sprayer		Kumulus	3.00
					Nordox	1.25
March	Vine Row: Remake Berms	60 HP	Border Disk			
March	Mow Middles	60 HP	Mower-Flail			
April	Disease: Mildew. Alternate Rows	60 HP	Vine Sprayer		Kumulus	5.00
April	Disease: Mildew. Alternate Rows	60 HP	Vine Sprayer		Kumulus	5.00
April	Disease: Mildew. Alternate Rows	60 HP	Vine Sprayer		Kumulus	5.00
April	Irrigate			0.50	Water	1.67
April	Weed: Vine Row	60 HP	Bezzeridi			
May	Disc Middles	60 HP	Disc			
May	Disease: Mildew. Alternate Rows	60 HP	Vine Sprayer		Kumulus	5.00
May	Disease: Mildew. Alternate Rows	60 HP	Vine Sprayer		Kumulus	5.00
May	Disease: Mildew. Insect: OLR. Alternate Rows	60 HP	Vine Sprayer		Kumulus	5.00
May	Irrigate			1.00	Water	3.11
June	Weed: Disc Middles 3X	60 HP	Disc			
June	Mildew	60 HP	Duster		Dusting Sulfur	10.00
June	Mildew	60 HP	Duster		Dusting Sulfur	10.00
June	Mildew	60 HP	Duster		Dusting Sulfur	10.00
June	Cane Cutting	60 HP	Cane Cutter			
June	Irrigate			1.00	Water	5.70
June	Weed: Vine Row	60 HP	Bezzeridi			
July	Insect: Mites	60 HP	Vine Sprayer		Ecotrol	4.00
July	Weed: Disc Middles 3X	60 HP	Disc			
July	Weed: Vine Row	60 HP	Bezzeridi			
July	Irrigate			1.00	Water	7.11
Aug	Irrigate			1.00	Water	5.29
Aug	Cane Cutting	60 HP	Cane Cutter			
Aug	Harvest: Cut Canes (hand) for drying			4.70		
Aug	Weed: Disc Middles & float	60 HP	Disc '			
			Float			
Sept	Harvest Pick	Picker				
Sept	Harvest: Lay paper & grapes	50 HP	Traylayer	0.50	Paper	1.55
Sept	Harvest: Pickup Raisins/Dump in Bins	50 HP	Tray Pickup	3.00		
		60 HP	Bin Trailer	0.25		
		30 HP	Bin Trailer	0.25		
		Forklift				
Sept	Haul	Custom			Haul @ $13	2.00
Sept	Dry Raisins (dehydrator)	Custom			Dry @ $150	2.00
Sept	Incorporate Debris: Disk Middles	60 HP	Disc '			
Sept	Irrigate			0.50	Water	5.05
Oct	Plant Cover Crop	60 HP	Seeder		Multiplex Mix	100.00
Dec	Layer Vines			0.80		