
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2006

SAMPLE COSTS TO PRODUCE GRAPES FOR
RAISINS



CONTINUOUS TRAY DRIED RAISINS
[Harvest Equipment Purchased New](#)
SAN JOAQUIN VALLEY

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UC COOPERATIVE EXTENSION

SAMPLE COST TO PRODUCE RAISINS Continuous Tray – Harvest Equipment Purchased New San Joaquin Valley - 2006

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INTRODUCTION

Sample costs to produce raisins 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 3 and 4 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 for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-4424. Current studies can be downloaded from the department website at <http://coststudies.ucdavis.edu> or obtained from selected county UC Cooperative Extension offices.

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ASSUMPTIONS

The assumptions refer to Tables 1 to 9 and pertain to sample costs to produce raisin grapes using the continuous tray drying method in the 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 establishment and 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 raisin production are on 100 acres and 15 acres are mature vines for wine or possibly raisin 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 previously farmed using hand labor for traditional tray dried raisin production.

Production Operating Costs

Vines. Thompson Seedless vines are planted on 7 x 12-foot spacing with 519 vines per acre. Fiesta is a Thompson-like cultivar and is often considered for conversion from traditional single tray-dried to continuous tray raisin production. Establishment and production costs for Thompson Seedless and the other cultivars are similar when tray drying. The life of the vineyard is expected to be 40 years and is currently 20 years old.

Trellis System. The trellis system is a two-wire 24-inch crossarm design that was installed by a custom trellis company in year two. Trellis repairs and grapevine replacement of \$25,000 or \$125 per acre are shown in Table 7 (Annual Investment Costs) and included in Investment Repairs under Cash Overhead in the various tables. The cost occurs mostly in the first two years of conversion, where wood stakes are broken and replaced with metal t-stakes. The cost is distributed over the remaining 20 years of vineyard life.

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 cane pruned with renewal spurs in January; canes are tied in February to the trellis wire(s) by twisting around the trellis wire and attaching with twist-ems. The canes are mechanically cut (skirted) in June and August to open the canopy and prevent canes from crossing rows.

Irrigation. The vineyard is drip irrigated using 28 acre-inches of applied water during the growing season from April through September. During June, July, and August, irrigations are applied frequently with no more than four days between irrigations. Daily irrigations during this period are preferable. Deficit irrigation (50% ET) is applied during the three week period in late August to mid September when fruit is drying on the trays. Drip irrigation may be withheld completely during this period if there is a risk of dripline hoses rupturing or water running on the trays. After raisins are removed from the field, irrigation resumes at full ET (Evapotranspiration) to replenish the soil profile. 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 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.

Fertilization. Nitrogen (N) at 40 pounds per acre as UN32 is applied incrementally through the irrigation drip system during April to mid June (applied in April in this study). Neutral zinc is foliar applied to prevent zinc deficiencies and is combined with the late April mildew (Microthiol, Rally) application.

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 PCA and/or the UC IPM website for current recommendations.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvant and their costs 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 PCA are not included in this study.

Weeds (Vineyard Floor Management). Vineyard middles are disked two times each season: March and May. (See Vineyard Floor Management for harvest for additional disking) Surflan and Roundup herbicides are applied to the vine row in January or early February. Roundup, a contact herbicide, is applied as a spot spray to the vine row in April, June and July.

Insects. Mealybugs (*Pseudococcus and Planococcus spp.*) are treated at delayed dormant with Lorsban insecticide in early March (dormant vines). Omnivorous leafroller (OLR) (*Platynota stultana*) are treated with Kryocide (mixed with a GA and/or sulfur application) during the bloom spray in May. Grape leafhoppers (*Erythroneura elegantula*) are controlled with Provado insecticide (mixed with Ethrel application) in late June or early July. An effective alternative material for mealybugs is to apply Admire insecticide through the drip system, but at a higher cost than a Lorsban application. It may be necessary to use multiple insecticides to control some mealybug species.

Diseases. Diseases treated in this study are phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Erysiphe necator*). Phomopsis and powdery mildew are both treated in late March (shoot length 2 inches) with Microthiol (micronized sulfur) and Abound (strobilurin). Mildew is controlled during the season with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used.

Table A. PESTICIDE PROGRAM– Production Years

MONTH	MILDEW	PHOMOP	LEAF HOPPER		MEALY BUG	
			OLR	OTHER	OTHER	OTHER
March					Lorsban	
March	Microthiol	Abound				
April	Dusting Sulfur					
April	Microthiol + Rally					Zinc
May	Microthiol + Flint			Kryocide		ProGibb (GA)
June	Microthiol + Rally					
June			Provado			Ethrel
June	Dusting Sulfur					
June	Dusting Sulfur					

In this study, Microthiol and Rally, an SI (mixed with zinc application) are applied in late April. Microthiol and Flint (mixed with Kryocide and GA application) are applied with the spray in May. Microthiol

and Rally, an SI are applied in June. Dusting Sulfur is applied once in early April and two times in June. Growers have the option of using sterol inhibitors (SI), quinolins, strobilurins, or sulfur (micronized, wettable, dust, flowable), as well as other fungicides to control powdery mildew. Materials that represent classes of fungicides with different modes of action should be incorporated into your powdery mildew program to avoid resistance problems.

Fruit Management (FM). Gibberellic acid (GA), a plant growth regulator, is applied one time in May during bloom for thinning. Ethrel is applied at veraison in late June or early July to accelerate grape maturity. GA is applied with the mildew/OLR spray in May and Ethrel with the leafhopper spray in June.

Vineyard Floor Management for 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, 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 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. Machine harvest onto continuous tray usually takes place five days to two weeks later, depending on weather conditions and equipment availability. The grower may purchase his own equipment either new or used or have the crop custom harvested.

Grower Owned New Equipment. 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 Harvest. 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) of \$1,150 per ton. 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. In addition to spot spraying for weed control, 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 34% for the employer's share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of \$14.74 and \$11.05 per hour for machine labor and non-machine labor, respectively. 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 ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum 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 \$2.00 and \$2.55 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 2005 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 7 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 9.25% per year. A nominal interest rate is the typical market cost of borrowed funds. Interest in years one and two are calculated for the entire year; beginning in the third year, interest is calculated through harvest. Interest in year one in this study begins with the first operation

in the fall of the previous year – total accumulated interest is for 15 months. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge.

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 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. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.70% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$661 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 \$1,900 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.

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

Investment Repairs. Annual maintenance is calculated as 2% of the purchase price, except for the vineyard establishment which is calculated as 0.50% to cover vine and trellis repairs and/or replacement.

Non-Cash Overhead Costs

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

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

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 8.

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 in January 2006. 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. For this study the cost of \$6,746 per acre or \$674,600 for the 100-acre vineyard is taken from the publication, *Sample Costs to Establish a Vineyard and Produce Grapes for Raisins, 2006, Tray Dried, San Joaquin Valley*. The establishment cost is spread over the remaining 37 years of the 40 years the vineyard is in production. The vineyard is 20 years old at the time of conversion to mechanical harvesting.

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 40 established acres and to other acres on the ranch. Another 40 horsepower pump and irrigation set-up supplies the rest of the ranch, but is not included. The irrigation system is considered an improvement to the property and has a 25-year life. An alternative is to include the drip system in the establishment costs because it will be removed when the vineyard is removed.

Land. The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land for raisin production is valued at \$5,500 per acre. This study assumes the land was purchased. Because only 115 of the 120 acres are planted to grapes, land is valued at \$5,739 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.

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 6. 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.

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UC COOPERATIVE EXTENSION
Table 1. COSTS PER ACRE TO PRODUCE CONTINUOUS TRAY DRIED RAISINS
 SAN JOAQUIN VALLEY - 2006

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
Cultural:								
Prune: Vines	24.00	265	0	0	0	265		
Prune: Brush Disposal (Every Middle)	0.26	5	3	0	0	8		
Prune: Tie Canes	4.50	50	0	8	0	58		
Weed: Winter Strip (Surflan, Roundup)	0.49	9	4	46	0	59		
Insect: Mealybug (Lorsban)	0.50	9	6	27	0	42		
Disease: Phomopsis (Abound)/Mildew (Sulfur)	0.50	9	6	33	0	48		
Weed: Disk Middles 2X	0.57	10	5	0	0	16		
Disease: Mildew (Dusting Sulfur) 3X (alternate rows)	0.75	13	7	3	0	23		
Disease: Mildew (Rally, Sulfur). Fertilize: Foliar Zinc (Neutral Zinc)	0.50	9	6	26	0	41		
Fertilize: N through drip system (UN32)	0.00	0	0	16	0	16		
Irrigate: (Water)	5.50	61	0	159	0	220		
Weed: Spot Spray (Roundup)	1.59	28	3	13	0	43		
Disease: Mildew (Sulfur, Flint). Insect: OLR (Kryocide). Bloom Thin (GA)	0.50	9	6	63	0	77		
Disease: Mildew (Rally, Sulfur)	0.50	9	6	21	0	36		
Prune: Skirt Vines (Mechanical)	0.57	10	5	0	0	15		
Insect: Leafhopper (Provado). FM: Fruit Set (Ethrel)	0.50	9	6	51	0	66		
Disk & Roll Middles: Prepare for harvest: Disk & Roll Middles	0.29	5	3	0	0	8		
Disk Middles: Incorporate trash	0.29	5	3	0	0	8		
Pickup: Business Use	2.39	42	37	0	0	79		
ATV Use	2.00	35	3	0	0	38		
TOTAL CULTURAL COSTS/ACRE	46.20	591	109	466	0	1,166		
Harvest								
Cut Canes (Hand) for drying grapes	4.70	52	0	0	0	52		
Harvest: Pick (Mechanical)	0.45	8	11	0	0	19		
Harvest: Traylayer (tractor, traylayer, paper, labor)	0.45	13	5	104	0	122		
Pickup Raisins (Tractors, Pickup Machine, Bin Trailers, Labor, Forklift)	1.83	43	16	0	0	59		
Haul Raisins to Dehydrator or Processor (Custom)	0.00	0	0	0	26	26		
TOTAL HARVEST COSTS/ACRE	7.42	116	32	104	26	278		
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	0	332		
Interest on operating capital @ 9.25%						57		
TOTAL OPERATING COSTS/ACRE		707	141	602	326	1,833		
CASH OVERHEAD:								
Office Expense						80		
Liability Insurance						6		
Sanitation Fees						17		
Property Taxes						111		
Property Insurance						38		
Investment Repairs						283		
TOTAL CASH OVERHEAD COSTS						534		
TOTAL CASH COSTS/ACRE						2,367		
NON-CASH OVERHEAD:								
		Per producing		-- Annual Cost --				
Investment		Acre		Capital Recovery				
Land		5,739		359		359		
Drip Irrigation System		800		64		64		
Building		696		52		52		
Tools-Shop/Field		104		11		11		
Fuel Tanks 2-300G		30		2		2		
Vineyard Establishment Costs		6,746		472		472		
Equipment		1,998		249		249		
TOTAL NON-CASH OVERHEAD COSTS		16,114		1,208		1,208		
TOTAL COSTS/ACRE						3,575		

UC COOPERATIVE EXTENSION
Table 2. COSTS AND RETURNS to PRODUCE CONTINUOUS TRAY DRIED RAISINS
 SAN JOAQUIN VALLEY - 2006

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Raisins	2.00	ton	1,150.00	2,300	
OPERATING COSTS					
Vine Aids:					
Twist-ems	2,000.00	each	0.00	8	
Herbicide:					
Surflan 4 AS	2.40	pint	16.96	41	
Roundup Ultra Max	2.10	pint	8.56	18	
Fungicide:					
Abound (Strobilurin)	12.00	floz	2.70	32	
Microthiol Disperss (micronized wettable sulfur)	7.00	lb	0.80	6	
Dusting Sulfur	15.00	lb	0.18	3	
Rally 40W (Sterol Inhibitor)	8.00	oz	4.89	39	
Flint (Strobilurin)	2.00	oz	16.49	33	
Insecticide:					
Lorsban 4E	4.00	pint	6.86	27	
Kryocide	6.00	lb	3.00	18	
Provado 1.6 Solupak	1.00	oz	43.96	44	
Fertilizer:					
Neutral Zinc 50% (foliar)	5.00	lb	0.92	5	
UN 32	40.00	lb N	0.41	16	
Water:					
Water Pumped SJV	28.00	acin	5.67	159	
Growth Regulator:					
Pro-Gibb 4% (Gibberellic Acid) 1oz=1g*	6.00	floz	1.67	10	
Ethrel	1.00	pint	7.00	7	
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:					
Haul Raisins to Processor/Dryer	2.00	ton	13.00	26	
Dehydrator (dry raisins)	2.00	ton	150.00	300	
Labor (machine)	17.90	hrs	14.74	264	
Labor (non-machine)	40.11	hrs	11.05	443	
Fuel - Gas	12.14	gal	2.55	31	
Fuel - Diesel	28.18	gal	2.00	56	
Lube				13	
Machinery repair				40	
Interest on operating capital @ 9.25%				57	
TOTAL OPERATING COSTS/ACRE				1,833	
NET RETURNS ABOVE OPERATING COSTS				467	
CASH OVERHEAD COSTS:					
Office Expense				80	
Liability Insurance				6	
Sanitation Fees				17	
Property Taxes				111	
Property Insurance				38	
Investment Repairs				283	
TOTAL CASH OVERHEAD COSTS/ACRE				534	
TOTAL CASH COSTS/ACRE				2,367	

UC COOPERATIVE EXTENSION
Table 2. CONTINUED
 SAN JOAQUIN VALLEY - 2006

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Land				359	
Drip Irrigation System				64	
Building				52	
Tools-Shop/Field				11	
Fuel Tanks 2-300G				2	
Vineyard Establishment Costs				472	
Equipment				249	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,208	
TOTAL COSTS/ACRE				3,575	
NET RETURNS ABOVE TOTAL COSTS				-1,275	

*Gibberellic acid applied on Thompson Seedless only

UC COOPERATIVE EXTENSION
Table 3. MONTHLY CASH to PRODUCE CONTINUOUS TRAY DRIED RAISINS
 SAN JOAQUIN VALLEY - 2006

Beginning JAN 06 Ending DEC 06	JAN 06	FEB 06	MAR 06	APR 06	MAY 06	JUN 06	JUL 06	AUG 06	SEP 06	OCT 06	NOV 06	DEC 06	TOTAL
Cultural:													
Prune: Vines	265												265
Prune: Brush Disposal (Every Middle)	8												8
Prune: Tie Canes		58											58
Weed: Winter Strip (Surflan, Roundup)		59											59
Insect: Mealybug (Lorsban)			42										42
Disease: Phomopsis (Abound)/Mildew (Sulfur)			48										48
Weed: Disk Middles 2X			8		8								16
Disease: Mildew (Dusting Sulfur) 3X (alternate rows)				8		15							23
Disease: Mildew (Rally, Sulfur). Fertilize: Foliar Zinc (Neutral Zinc)				41									41
Fertilize: N through drip system (UN32)				16									16
Irrigate: (Water)				15	29	43	51	41	40				220
Weed: Spot Spray (Roundup)				14		14	14						43
Disease: Mildew (Sulfur, Flint). Insect: OLR (Kryocide). Bloom Thin (GA)					77								77
Disease: Mildew (Rally, Sulfur)						36							36
Prune: Skirt Vines (Mechanical)						8		7					15
Insect: Leafhopper (Provado). FM: Fruit Set (Ethrel)						66							66
Disk & Roll Middles: Prepare vineyard floor for harvest								8					8
Disk Middles: Incorporate trash									8				8
Pickup: Business Use	7	7	7	7	7	7	7	7	7	7	7	7	79
ATV Use	3	3	3	3	3	3	3	3	3	3	3	3	38
TOTAL CULTURAL COSTS	283	126	108	104	124	192	76	66	58	10	10	10	1,165
Harvest:													
Cut Canes (Hand) for drying grapes								52					52
Harvest: Pick (Mechanical)									19				19
Harvest: Traylayer (tractor, traylayer, paper, labor)									122				122
Pickup Raisins (Tractors, Pickup Machine, Bin Trailers, Labor, Forklift)									59				59
Haul Raisins to Dehydrator or Processor (Custom)									26				26
TOTAL HARVEST COSTS								52	226				278
Other Harvest Costs													
Dehydrator (Dry Raisins)									300				300
Assessment Fees									32				32
TOTAL OTHER HARVEST COSTS									332				332
Interest on operating capital @ 9.25%	2	3	4	5	6	7	8	9	13	0	0	0	57
TOTAL OPERATING COSTS/ACRE	285	130	112	108	129	200	83	127	629	10	10	10	1,833
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				16
Property Taxes	56						56						111
Property Insurance	19						19						38
Investment Repairs	24	24	24	24	24	24	24	24	24	24	24	24	283
TOTAL CASH OVERHEAD COSTS	107	32	32	32	32	32	107	32	38	30	30	30	534
TOTAL CASH COSTS/ACRE	392	162	144	141	161	232	190	159	667	40	40	40	2,367

UC COOPERATIVE EXTENSION

Table 4. COSTS PER ACRE TO PRODUCE CONTINUOUS TRAY DRIED RAISINS – OPERATING & EQUIPMENT COSTS
SAN JOAQUIN VALLEY - 2006

Operation	Hours	Fuel, Lube, Repair	Materials/ Service	Labor	Operating Interest	Total Operating	Equipment Overhead*	Total
Cultural:								
Prune: Vines	24.00	0	0	265.20	18.40	284	0.00	284
Prune: Brush Disposal (Every Middle)	0.26	3	0	4.56	0.54	8	1.82	10
Prune: Tie Canes	4.50	0	8	49.73	3.56	61	0.00	61
Weed: Winter Strip (Surflan, Roundup)	0.49	4	46	8.68	3.64	63	1.82	64
Insect: Mealybug (Lorsban)	0.50	6	27	8.84	2.28	45	4.11	49
Disease: Phomopsis (Abound)/Mildew (Sulfur)	0.50	6	33	8.84	2.59	51	4.10	55
Weed: Disk Middles 2X	0.57	5	0	10.12	0.72	16	2.88	19
Disease: Mildew (Dusting Sulfur) 3X (alternate rows)	0.75	7	3	13.27	0.82	24	4.06	28
Disease: Mildew (Rally, Sulfur). Fertilize: Foliar Zinc (Neutral Zinc)	0.50	6	26	8.84	1.88	42	4.10	47
Fertilize: N through drip system (UN32)	0.00	0	16	0.00	0.75	17	0.00	17
Irrigate: (Water)	5.50	0	159	60.77	5.27	225	0.00	225
Weed: Spot Spray (Roundup)	1.59	3	13	28.07	1.45	45	3.03	48
Disease: Mildew (Sulfur, Flint). Insect: OLR (Kryocide). Bloom Thin (GA)	0.50	6	63	8.84	2.99	80	4.10	85
Disease: Mildew (Rally, Sulfur)	0.50	6	21	8.84	1.11	37	4.10	41
Prune: Skirt Vines (Mechanical)	0.57	5	0	10.12	0.36	16	2.14	18
Insect: Leafhopper (Provado). FM: Fruit Set (Ethrel)	0.50	6	51	8.84	2.03	68	4.10	72
Disk & Roll Middles: Prepare for harvest: Disk & Roll Middles	0.29	3	0	5.06	0.12	8	1.61	10
Disk Middles: Incorporate trash	0.29	3	0	5.06	0.06	8	1.44	9
Pickup: Business Use	2.39	37	0	42.22	1.98	81	19.31	100
ATV Use	2.00	3	0	35.38	0.96	39	3.46	43
TOTAL CULTURAL COSTS/ACRE	46.20	109	466	591.29	51.50	1,217	66.34	1,283
Harvest								
Cut Canes (Hand) for drying grapes	4.70	0	0	51.94	0.80	53	0.00	53
Harvest: Pick (Mechanical)	0.45	11	0	7.89	0.15	19	144.12	163
Harvest: Traylayer (tractor, traylayer, paper, labor)	0.45	5	104	12.86	0.94	123	18.65	142
Pickup Raisins (Tractors, Pickup Machine, Bin Trailers, Labor, Forklift)	1.83	16	0	43.01	0.45	59	40.48	100
Haul Raisins to Dehydrator or Processor (Custom)	0.00	0	26	0.00	0.20	26	0.00	26
TOTAL HARVEST COSTS/ACRE	7.42	32	130	115.70	2.54	280	203.25	484
Other Harvest Costs								
Dehydrator (Dry Raisins)	0.00	0	300	0	2.31	302	0.00	302
Assessment Fees	0.00	0	32	0	0.25	33	0.00	33
TOTAL OTHER HARVEST COSTS	0.00	0	332	0	2.56	335	0	335
TOTAL OPERATING COSTS/ACRE	53.61	141	928	706.99	26.60	1,833	270	2,102

* Equipment Overhead includes capital recovery, taxes, & insurance

UC COOPERATIVE EXTENSION
Table 5. RANGING ANALYSIS
 SAN JOAQUIN VALLEY - 2006

COSTS PER ACRE AT VARYING YIELD TO PRODUCE CONTINUOUS TRAY DRIED RAISINS

	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
OPERATING COSTS:							
Cultural Cost	1,166	1,166	1,166	1,166	1,166	1,166	1,166
Harvest (cut canes, pick, lay, pickup)	238	245	252	259	266	273	280
Haul to Dehydrator/Processor	20	23	26	29	33	36	39
Dehydrator	225	263	300	338	375	413	450
Assessment	24	28	32	36	41	45	49
Interest on operating capital @ 9.25%	56	56	57	57	57	58	58
TOTAL OPERATING COSTS/ACRE	1,729	1,781	1,833	1,885	1,938	1,991	2,042
Total Operating Costs/ton	1,153	1,018	916	838	775	724	681
CASH OVERHEAD COSTS/ACRE	534	534	534	534	534	534	534
TOTAL CASH COSTS/ACRE	2,263	2,315	2,367	2,419	2,472	2,525	2,576
Total Cash Costs/ton	1,509	1,323	1,183	1,075	989	918	859
NON-CASH OVERHEAD COSTS/ACRE	1,207	1,208	1,208	1,209	1,209	1,210	1,210
TOTAL COSTS/ACRE	3,470	3,523	3,575	3,628	3,681	3,735	3,786
Total Costs/ton	2,313	2,013	1,787	1,612	1,472	1,358	1,262

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
850	-454	-293	-133	28	187	347	508
950	-304	-118	67	253	437	622	808
1,050	-154	57	267	478	687	897	1,108
1,150	-4	232	467	703	937	1,172	1,408
1,250	146	407	667	928	1,187	1,447	1,708
1,350	296	582	867	1,153	1,437	1,722	2,008
1,450	446	757	1,067	1,378	1,687	1,997	2,308

NET RETURN PER ACRE ABOVE CASH COST

PRICE \$/ton	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
850	-988	-827	-667	-506	-347	-187	-26
950	-838	-652	-467	-281	-97	88	274
1,050	-688	-477	-267	-56	153	363	574
1,150	-538	-302	-67	169	403	638	874
1,250	-388	-127	133	394	653	913	1,174
1,350	-238	48	333	619	903	1,188	1,474
1,450	-88	223	533	844	1,153	1,463	1,774

NET RETURNS PER ACRE ABOVE TOTAL COST

PRICE \$/ton	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
850	-2,195	-2,035	-1,875	-1,715	-1,556	-1,397	-1,236
950	-2,045	-1,860	-1,675	-1,490	-1,306	-1,122	-936
1,050	-1,895	-1,685	-1,475	-1,265	-1,056	-847	-636
1,150	-1,745	-1,510	-1,275	-1,040	-806	-572	-336
1,250	-1,595	-1,335	-1,075	-815	-556	-297	-36
1,350	-1,445	-1,160	-875	-590	-306	-22	264
1,450	-1,295	-985	-675	-365	-56	253	564

UC COOPERATIVE EXTENSION
Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT & OVERHEAD
 SAN JOAQUIN VALLEY – 2006

ANNUAL EQUIPMENT COSTS

Yr Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
					Insur- ance	Taxes	
06 30 HP 4WD Tractor	19,305	15	3,758	1,862	81	115	2,058
06 50 HP 2WD Tractor	26,000	15	5,062	2,508	109	155	2,772
06 60 HP 4WD Narrow Tractor	36,000	15	7,009	3,472	151	215	3,838
06 ATV 4WD	6,700	5	3,003	1,071	34	49	1,154
06 Bin Trailer	2,100	20	109	184	8	11	203
06 Bin Trailer	2,100	20	109	184	8	11	203
06 Cane Cutter 12'	2,500	20	130	219	9	13	241
06 Disk - Tandem 8'	6,800	10	1,203	845	28	40	913
06 Duster - 3 Pt 12'	5,000	10	884	621	21	29	671
06 Float 8'	1,500	20	78	131	6	8	145
06 Forklift Nissan 50	19,500	15	3,796	1,881	82	116	2,079
06 Harvester Korvan (picker) (SP)	180,000	10	33,954	22,201	749	1,068	24,017
06 Mower-Flail 8'	9,600	15	922	966	37	53	1,056
06 Orchard/Vine Sprayer 500 gal	20,378	5	6,638	3,699	95	135	3,928
06 Pickup Truck 1/2 T	26,000	7	9,863	3,533	126	179	3,837
06 Sprayer ATV 20 gal	350	10	79	49	2	2	53
06 KCI Tray Layer (pull type)	22,000	10	3,891	2,733	91	129	2,953
06 KCI Pickup Machine (pull type)	42,700	10	7,551	5,304	176	251	5,731
06 Weed Sprayer 3 PT 100 gal	3,500	10	619	435	14	21	470
TOTAL	432,033		88,658	51,897	1,822	2,602	56,321
60% of New Cost *	259,220		53,195	31,138	1,093	1,561	33,793

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

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
Building 2400 sqft	80,000	20		5,968	280	400	1,600	8,248
Drip Irrigation System 115 acres	92,000	25		7,369	322	460	1,840	9,991
Vineyard Establishment	674,600	22		47,168	2,361	3,373	25,000	77,902
Fuel Tanks 2-300 gal	3,500	30	350	257	13	19	70	360
Land	660,000	25	660,000	41,250	0	6,600	0	47,850
Tools-Shop/Field	12,000	15	1,133	1,208	46	66	240	1,560
TOTAL INVESTMENT	1,522,100		661,483	103,220	3,023	10,918	28,750	145,910

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	115	acre	5.75	661
Office Expense	115	acre	80.00	9,200
Sanitation Fees	115	acre	16.51	1,899

UC COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY - 2006

Yr Description	COSTS PER HOUR							Total Costs/Hr.
	Actual	Cash Overhead			Operating			
	Hours Used	Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
06 30 HP 4WD Tractor	800	1.40	0.06	0.09	0.83	3.59	4.22	5.77
06 50 HP 2WD Tractor	800	1.88	0.08	0.12	1.12	5.65	6.77	8.85
06 60 HP 4WD NarrowTractor	1,066	1.95	0.08	0.12	0.88	6.78	7.66	9.81
06 ATV 4WD	400	1.61	0.05	0.07	0.50	0.98	1.48	3.21
06 Bin Trailer	150	0.74	0.03	0.04	0.31	0.00	0.31	1.12
06 Bin Trailer	150	0.74	0.03	0.04	0.31	0.00	0.31	1.12
06 Cane Cutter 12'	100	1.31	0.06	0.08	0.95	0.00	0.95	2.40
06 Disk - Tandem 8'	200	2.53	0.08	0.12	1.10	0.00	1.10	3.83
06 Duster - 3 Pt 12'	120	3.11	0.10	0.15	0.70	0.00	0.70	4.06
06 Float 8'	150	0.53	0.02	0.03	0.22	0.00	0.22	0.80
06 Forklift Nissan 50	222	5.07	0.22	0.31	0.23	6.10	6.33	11.93
06 Harvester Korvan (picker) (SP)	49	271.51	9.16	13.08	12.94	9.60	22.54	316.29
06 Mower-Flail 8'	133	4.36	0.17	0.24	4.30	0.00	4.30	9.07
06 Orchard/Vine Sprayer 500 gal	400	5.55	0.14	0.20	3.58	0.00	3.58	9.47
06 Pickup Truck 1/2 T	285	7.45	0.26	0.38	1.91	13.44	15.35	23.44
06 Sprayer ATV 20 gal	187	0.16	0.00	0.01	0.10	0.00	0.10	0.27
06 KCI Tray Layer (pull type)	45	36.76	1.22	1.74	3.35	0.00	3.35	43.07
06 KCI Pickup Machine (pull type)	46	69.49	2.30	3.29	6.67	0.00	6.67	81.75
06 Weed Sprayer 3 PT 100 gal	200	1.30	0.04	0.06	0.61	0.00	0.61	2.01

UC COOPERATIVE EXTENSION
Table 8. OPERATIONS PRODUCTION YEAR FOR CONTINUOUS TRAY DRIED RAISINS
 SAN JOAQUIN VALLEY 2006

MONTH	OPERATION	TRACTOR	IMPLEMENT	LABOR HRS/acre	MATERIAL	RATE/AC	UNIT
Jan	Prune			24.00			
Jan	Brush Disposal/Shred	60 HP	Shredder 6'				
Feb	Tie Canes			4.50	Twist-ems	2,000.00	each
Feb	Weed: Winter Strip	60 HP	Sprayer		Surflan	2.40	pt
					Roundup	0.60	pt
March	Insect: Mealybug	60 HP	Vine Sprayer		Lorsban	4.00	pt
March	Disease: Mildew/Phomopsis	60 HP	Vine Sprayer		Abound	12.00	floz
					Microthhiol	1.00	lb
March	Disc Middles	60 HP	Disc 8'				
April	Disease: Mildew Alternate Rows	60 HP	Duster		Dusting Sulfur	5.00	lb
April	Disease: Mildew. Fert: Zinc	60 HP	Vine Sprayer		Microthhiol	2.00	lb
					Rally	4.00	oz
					Neutral Zinc	5.00	lb
April	Fertilize				UN32	40.00	lb N
April	Irrigate			0.50	Water	1.67	acin
April	Spot Spray	ATV	ATV Sprayer		Roundup	0.50	pt
May	Disc Middles	60 HP	Disc 8'				
May	Disease: Mildew. Insect: OLR. FM: Thin	60 HP	Vine Sprayer		Microthhiol	2.00	lb
					Flint	2.00	oz
					Kryocide	6.00	lb
					ProGibb	6.00	grams
May	Irrigate			1.00	Water	3.11	acin
June	Mildew	60 HP	Vine Sprayer		Rally	4.00	oz
					Microthiol	2.00	lb
June	Skirt Vines	60 HP	Cane Cutter				
June	Insect: Leafhopper. FM: Maturity	60 HP	Vine Sprayer		Ethrel	1.00	pt
					Provado	1.00	oz
June	Irrigate			1.00	Water	5.70	acin
June	Spot Spray	ATV	ATV Sprayer		Roundup	0.50	pt
June	Disease: Mildew Alternate Rows	60 HP	Duster		Dusting Sulfur	10.00	lb
June	Disease: Mildew Alternate Rows	60 HP	Duster		Dusting Sulfur	10.00	lb
July	Weed: Disc Middles 3X	60 HP	Disc 8'				
July	Spot Spray	ATV	ATV Sprayer		Roundup	0.50	pt
July	Irrigate			1.00	Water	7.11	acin
Aug	Irrigate			1.00	Water	5.36	acin
Aug	Cane Cutting	60 HP	Cane Cutter				
Aug	Harvest: Cut Canes (hand) for drying			4.70			
Aug	Weed: Disc Middles & float	60 HP	Disc 8' Float 8'				
Sept	Harvest Pick		Picker				
Sept	Harvest: Lay paper & grapes	50 HP	Traylayer	0.50	Paper	1.55	rolls
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	ton
Sept	Dry Raisins (dehydrator)	Custom			Dry @ \$150	2.00	ton
Sept	Incorporate Debris: Disk Middles	60 HP	Disc 8'				
Sept	Irrigate			0.50	Water	5.05	acin