UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION

2014

SAMPLE COSTS TO PRODUCE ORGANIC PROCESSING

APPLES

Various Varieties

CENTRAL COAST – SANTA CRUZ COUNTY

Freedom Region-Pajaro Valley

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CONTENTS

INTRODUCTION

Sample costs to produce organic processing apples in the Freedom Region of the Pajaro Valley in Santa Cruz County are presented in this study. The study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. The practices described are based on production procedures considered typical for this crop and area, and will not apply to every farm. Sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, "Your Cost", is provided to enter your costs on Tables 1 and 2.

The hypothetical farm operations, production practices, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study, contact Karen Klonsky in the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3563 or klonsky@primal.ucdavis.edu. An additional cost of production study for processing apples grown in this region is also available: ("*Sample Costs to Produce Apples for Processing, Central Coast-Freedom Region-Pajaro Valley, Santa Cruz County - 2014*"). The major differences between the two companion studies are in fertilizer, pest control, yield and price received for the crop.

Sample Cost of Production Studies for many commodities are available at http://coststudies.ucdavis.edu/.

ASSUMPTIONS

The following assumptions refer to Tables 1 to 7 and pertain to sample costs to produce organic processing apples in the Freedom Region of Santa Cruz County. The cultural practices described and materials used are considered typical for organic apple production in the region. The costs, practices, and materials will not be applicable to all situations or every production year. Cultural practices, materials, and production costs vary by grower and region, and differences can be significant. The practices and inputs used in the cost study serve 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 orchard is located in the Freedom Region of Santa Cruz County. The farm is comprised of 100 acres, 20 acres planted to apples in full production. The other 75 acres are planted with apples, cane berries, strawberries and vegetables, with 5 acres occupied by roads, irrigation systems and farmstead. Land values in this region for an established apple orchard are based on historic sales and valued at $20,000 per acre. There are no establishment costs included in this study.

Cultural Practices and Material Inputs

Trees. No specific variety is chosen for this study. Varieties grown in this region are pippin, red delicious, Fuji, pink lady and many heirloom varieties. Apples in this area are harvested from September to early November with hand crews, there is no mechanical harvesting. The life of the orchard in this study is assumed to be 25 years.

Cover Crop. In November of the first establishment year a permanent cover crop (orchard mix) is planted. The field is disced and the seed is sown with a tractor pulled grain/seed drill. The crop reseeds itself and is maintained over the years by mowing and discing the biomass into the soil.

Planting. The trees are planted on a 10 x 16 foot spacing (tree x row) with 272 trees per acre on normal/standard rootstocks. Rootstocks are important part of the orchard establishment, (Different rootstocks, standard vs dwarf can affect the size and growth of the tree throughout the life of the tree). In the second year 5% or 14 trees per acre are replanted for those lost in the first year. In the following years trees are replanted as needed when lost to disease, mechanical/environmental injury and age.

Training/Pruning/Thinning. Training is the manipulation (tie down) of branches to develop the tree structure during the establishment years.

Hand pruning of the established/producing trees is done in the winter months (December to February) to allow light into the tree canopy for fruit wood production and to remove shoots affected with disease and overwintering fire blight cankers. Prunings are placed in the row middles and mulched with a flail mower and eventually disced into the soil. Severely diseased prunings are carried out of the orchard and burned. Minimal summer pruning (July) is done to remove disease, insect, mechanically or weather damaged wood. Summer pruning is also used to keep the inner tree canopy open and producing fruit wood. There are several pruning strategies for apple trees; central, perpendicular V and open vase systems. Choice of pruning is dependent on several factors such as the use of size controlling rootstocks, varieties susceptible to sunburn, and high density plantings.

Organic apples are thinned by hand usually in June or July to increase fruit size, removal of poor quality fruit, reduce areas of pest habitat around fruit clusters, protection against limb breakage and to combat alternate bearing in some varieties. Fuji and pippin normally require thinning for a more consistent and uniform yield. Apples for processing may not be thinned. The increase in cultural costs is not necessarily beneficial from an economic perspective. Thinning costs are incorporated into this study at 50% of total costs to thin an acre.

Fertilization. The main source of nitrogen is from the cover crop. An orchard mix is planted during the establishment years. The cover crop is allowed to make seed before discing into the soil in late May or early June. Soil samples taken in the fall after harvest can help in nutrient management and to amend soil Ph. Solubor (boron fertilizer) is sometimes strip sprayed onto the soil in the spring before a rainfall event. Foliar nutrient sprays are not common in organic apples in this region. Material costs outweigh the short-term economic benefits. However, calcium sprays are used periodically in some orchards to boost calcium levels if there is a deficiency. Leaf sample analysis are taken only when there is evidence of a deficiency problem. Composted manures are not used in this study. The cost of quality compost and the distance of transportation to the orchard make it economically unfeasible.

Irrigation. The pump, metering system, main lines, five horsepower booster pump, filtration station, and micro sprinkler system was installed prior to planting. The irrigation system is considered an improvement to the property and has a 25 year lifespan. Those costs are included in the establishment costs, which is not included in this study.

The orchard is irrigated 1 or 2 times per growing season, (July-September) with micro sprinkler emitters located between every fourth tree, in row. 3 to 4 inches of water is applied every irrigation which helps increase the size of the fruit. Irrigation is not normally required during the spring due the amount of rainfall and fog. After each irrigation the orchard floor is mowed, disced and rolled/smoothed. The Pajaro Water Management Agency monitors the wells and amounts of water pumped. Water costs are $172/acre foot, ($14.33/acre inch) plus $13/acre foot, ($1.10/acre inch) pumping costs. Some orchards are dry-farmed, (not irrigated). These are older orchards on normal root stocks for processing.

Pest Management. For pest identification, monitoring, management and pesticide information, visit the UC IPM website at www.ipm.ucdavis.edu. Written recommendations are required for many commercially applied pesticides, and are available from licensed pest control advisers (PCAs). For information on 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.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants 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. For additional information on organically accepted pesticides refer to OMRI, (Organic Materials Review Institute) & WSDA, (Washington State Department of Agriculture) lists of acceptable materials.

Weeds. The grower using a tractor and flail mower with a side attachment mows the middles and partially in between the trees, in row. First mowing is in late May/early June of the cover crop. The cover crop in then disked into the soil. Mowing and discing occurs after every irrigation to incorporate the biomass and conserve moisture.

Diseases. The main diseases affecting apples grown in this region are apple scab, (*Venturia inaequalis*) and powdery mildew, (*Podosphaera leucotricha*). The number of treatments required each year will depend on the annual rainfall and foggy conditions, which are conducive to scab and mildew development. A very rainy season may require multiple scab/mildew sprays, but at least two sprays per season are anticipated. Control begins at green tip with a delayed dormant oil or lime sulfur spray followed by a second spray of either lime sulfur or micronized sulfur at pink bud. Different materials are used in rotation to prevent fungicide resistance development. Fire blight, (Erwinia amylovora) bacterial disease is of low concern on apples in this area. Mowing and discing prunings into the soil helps to combating the over wintering pathogens. Early sprays for mildew and scab can have a detrimental effect on these pathogens also. No direct control is included in this study. Fuji apples are especially susceptible to blight and may require additional control.

Insects. Dormant oils are sprayed during the winter months to aid in control of various overwintering pests such as aphids, leaf rollers, mites and scale insects. A delayed dormant oil spray at green tip for disease control also aids in control of overwintering insects. The oils are used to smother eggs, larvae and increase adult mortality. In general, dormant oil sprays are not harmful to beneficial insects. However, if oils are used in the warmer spring and summer months when insect activity increases, beneficial insects within the orchard can be killed if sprayed directly.

Codling moth (*Cydia pomonella*) is the key insect pest requiring management. Trapping and monitoring is critical. In this study, we assume a relatively low codling moth population requiring 2 hangings of pheromone-based mating disruptor traps per year, (a species-specific female sex odor). The traps last about 120 days depending on weather and the number of traps per acre will vary depending on the orchard crop history, insect pressure and grower experience. First hanging is in April and the second hanging in late July which should last through September harvest. No pesticide applications are expected for codling moths. Typically, the longer an orchard has been using mating disruption the lower the codling moth population and need for additional supplemental treatments.

Apple skin worm complex-Leafroller insects also require control. Apple pandemis, (*Pandemis pyrusana*) and orange tortix, (*Argyrotaenia citrana*) are two insects that cause damage. The apple pandemis overwintering larvae feed on the surface of young fruit during and just after bloom, causing fruit to drop, become scarred and distorted. The orange tortix overwintering larvae feed on alternate hosts and usually does not appear in apple trees until June, when eggs from the first summer generation are laid. Primarily a leaf feeder its greatest damage is to the fruit as well. Both insects, and other leafrollers feed on the surface of the leaves and fruit. Bacterium, *Bacillus thuringiensis*, (Bt) is used to control these pests. The Bt must be ingested to be effective. Timing of sprays is critical and must be applied during or soon after egg hatch and is most effective during the warm, dry weather when larvae are actively feeding. The first applications begin in mid to late June and are repeated 3-4 times coinciding with larvae feeding up to harvest. These applications can have a detrimental effect on codling moth as well. Early sprays for mildew and scab can have a detrimental effect on insects also.

Snails. Snails can be a significant pest in organic apple orchards in certain areas with high moisture or standing water and years with above average rainfall or fog. Sluggo snail bait is applied around the base of the trees or broadcast with a mechanical spreader. The bait is only used in areas of high infestation, rates are from 20-45 pounds per acre. 20 lbs. of bait per acre plus labor and equipment costs are included in this study. Some growers use hand crews to remove the snails from the trees, this operation is not included in this study.

Vertebrates. Gophers are controlled in the spring or early summer and in the fall after harvest. Traps are used, eight to 10 traps per acre are put in the field. Monitoring of the traps and cost of the traps are included in this study. Deer can also be a significant pest in apples in this area, no control is included in this study. The cost for some organically acceptable pest control methods may also be cost prohibitive. Therefore, orchard sanitation, pest identification, monitoring and prevention are essential elements of successful organic apple production. Also, timing of material applications is critical for effective insect, and disease control in apples.

Apple growers in this region rarely augment the populations of beneficial insects with release of purchased insects. Parasitic wasps, and predaceous arthropods including spiders, lacewings and lady beetles can lessen overall pest damage within orchards and should be encouraged to proliferate by providing appropriate habitat and avoiding detrimental insect and oil sprays whenever possible. (*Growers should be certain that any materials used are in compliance with the rules and regulations of state and federal agencies and of certifying organizations*).

Pollination. Apples require bees for pollination. Central coast organic growers contract to bring hives into their orchards on an annual basis. One hive per acre at $50 per hive is charged for this study. This practice improves pollination rates, increasing fruit set and in turn increases yields. Also, cross pollinating varieties are interplanted at the time of orchard establishment to insure adequate pollination. Some growers have their own bee hives that they use in their orchards and some rent bee hives to their neighbors.

Frost protection. The average minimum temperature for January and February, (2012-2014) from CIMIS Station Pajaro-Monterey Bay Station #129 is 39`F. No frost protection charges are in this study.

Propping-tying branches. Propping or tying of branches with heavy fruit load is common in this region and done in June and/or July to support fruit load and decrease limb breakage. Younger trees require more propping than the older trees with stronger branches. Properly trained and pruned trees require less propping. Tying and propping charges are $78 per acre for labor. The cost of propping boards is under cash overhead.

Harvest. Harvest begins in mid-September and goes through early November, depending on variety. Harvest crews use ladders to hand pick fruit from the trees which is put into harvest bags and then dumped into field bins. Tractors with attachments on both the front loader and rear 3-point hitch pick up the filled bins, move them from the orchard to a staging area. A forklift places the bins on a flatbed truck and the grower hauls the fruit to the processor. Growers pay hauling costs, which is normally a short distance in this area. The harvest and hauling costs for this study are $50/ton.

Sanitizing the orchard after harvest is very important to aid prevention of pests that overwinter in the biomass. The fruit that is stuck in the trees is knocked to the ground, and the dropped fruit already on the ground is mowed and disced into the soil.

Yields. The expectations for an organic apple orchard for processing in full production are between 10 & 20 tons per acre. Yields will vary among varieties, production practices and over years. The entire orchard is harvested one time for processing only, no harvesting for fresh packing. For this study we are using 15 tons per acre.

Returns. For this study a price of $325 per ton is used for organic processing apples. The price per ton reflects what growers received in 2014 for processing apples.

Assessment fees. The California State Organic Program, (SOP) has an annual fee based on percentage of gross sales. The Organic Program is responsible for enforcement of the federal Organic Foods Production Act of 1990, and the California Organic Products Act of 2003. These statutes protect consumers, producers, handlers, processors and retailers by establishment of standards under which fresh agricultural products/foods may be labeled and/or sold as "organic". The California Department of Public Health enforces laws pertaining to processed products marketed as "organic".

It is assumed that the grower is certified through California Certified Organic Farmers, (CCOF). The fees from this organizing body are a one-time application fee of $325. Annual certification fees are based on gross sales, and an inspection fee based on two separate hourly charges for the inspection and travel to the ranch. The charges are based on the 20 acre of apples only and calculated per acre.

California Apple Commission does not charge fees for organic or conventionally produced apples for processing.

Labor. Hourly wages for workers are $12.00 and $9.50 per hour for machine and non-machine workers, respectively. Adding 36% for the employers' share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of $16.32 and $12.92 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers. Labor time for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Cash Overhead

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, field sanitation, crop insurance, and investment repairs. Employee benefits, insurance, and payroll taxes are included in labor costs and not in overhead. Cash overhead costs are shown in Tables 1, 2, 3, 4 and 5.

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.

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 5.75% per year. A nominal interest rate is the typical market cost of borrowed funds.

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 0.740% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs $360 for the 20 acres or $18 per acre.

Office Expense. Office and business expenses are estimated to be $50.00 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, office and shop utilities, and miscellaneous administrative expenses.

Field Sanitation. Sanitation services provide portable toilet and washing facilities for the ranch during the crop season. The cost includes delivery and weekly service. Costs will vary depending upon the crops and number of portable units required.

Crop Insurance. The insurance protects the grower from crop losses due to adverse weather conditions, fire, unusual diseases and/or insects, wildlife, earthquake, volcanic eruption, and failure of the irrigation system. The grower can choose the protection level at 50% to 75% of production history or county yields. In this study, no level is specified.

Shop/Field Tools. This includes shop tools and equipment. Hand tools, miscellaneous field tools, shovels and pruning equipment.

Harvesting Equipment. The grower owns and uses 500, (4'X4') wooden bins for transporting apples to processor, twenty 10-foot aluminum tripod ladders and twenty picking bags for hand harvesting.

Fuel Tanks. Two 500-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.

Miscellaneous Costs. Included expenses are employee safety training as well as pesticide use and regulatory continuing education training, employee bonuses and additional materials for unique fields or special conditions.

Investment Repairs. Annual repairs on investment or capital recovery items that require maintenance are calculated as two percent of the purchase price.

Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Although farm equipment used for organic processing apples may be purchased new or used, this study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to reflect a mix of new and used equipment. Annual ownership costs (equipment and investments) are shown in Tables 1, 2, and 5. They represent the capital recovery cost for investments on an annual per acre basis.

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 values (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 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 for this study. The salvage value for land is equal to the purchase price because land does not depreciate. The purchase price and salvage value for certain 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 and the life of the equipment.

Interest Rate. The interest rate of 4.75% used to calculate capital recovery cost is the effective long-term interest rate in January 2014. The interest rate is used to reflect the long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector.

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.

Repairs, Fuel and Lube. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum Power-Take-Off horsepower, and fuel type. Prices for on-farm delivery of diesel and unleaded gasoline are $3.88 and $3.39 per gallon, respectively.

Risk. Risks associated with organic processing apple production are not assigned a production cost. All acres are contracted prior to harvest and all tonnage-time delivery contracts are assumed to have been met. While this study makes an effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks which affect the profitability and economic viability of organic apple production. Any returns above total costs are considered returns on risk and investment to management (or owners).

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 ORGANIC PROCESSING APPLES

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre						
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Dormant Pruning	59.00	762	0	0	0	0	762	
Mow Prunings	0.34	7	3	2	0	0	12	
Disc Prunings	0.26	5	2	1	0	0	9	
Dormant Oil Spray	0.46	9	4	2	10	0	25	
Delayed Dormant Spray-Green Tip	0.46	9	4	2	15	0	30	
Vertebrate Pest Control 2X	1.50	19	0	0	85	0	104	
Bee Hives (1)	0.00	0	0	0	0	50	50	
Disease/Insect Control-Pink Bud	0.46	9	4	2	3	0	17	
Set Pheromone Traps 2X	5.00	65	0	0	200	0	265	
Mow Cover Crop	0.34	7	3	2	0	0	12	
Disc Cover Crop	0.26	5	2	1	0	0	9	
Snail Bait Application	0.26	5	2	1	99	0	108	
Insect Control 3X	1.38	27	13	5	46	0	91	
Thinning Fruit 50% Ac	11.00	142	0	0	0	0	142	
Tie/Prop Branches	6.00	78	0	0	0	0	78	
Irrigate 2X	2.00	26	0	0	93	0	118	
Mow Orchard 2X	0.69	13	6	3	0	0	23	
Disc-Smooth Orchard Floor 2X	0.52	10	5	2	0	0	17	
Sanitize Field Equipment	1.75	23	0	0	0	0	23	
1/2 Ton Pickup (2)	1.07	21	9	3	0	0	33	
Bobtail Truck	0.20	4	4	1	0	0	10	
Back Hoe	0.17	3	1	0	0	0	5	
TOTAL CULTURAL COSTS	93.11	1,249	66	26	550	50	1,941	
Harvest:								
Harvest- Haul Apples	0.00	0	0	0	0	900	900	
TOTAL HARVEST COSTS	0.00	0	0	0	0	900	900	
Post-Harvest:								
Disc-Smooth Orchard Floor	0.26	5	2	1	0	0	9	
Soil Samples (Ph, Calcium)	0.00	0	0	0	60	0	60	
Irrigation System Maintenance	1.50	19	0	0	25	0	44	
TOTAL POST-HARVEST COSTS	1.76	24	2	1	85	0	113	
Assessment:								
CCOF Inspection Fee	0.00	0	0	0	11	0	11	
CCOF Certification Fee	0.00	0	0	0	29	0	29	
California Organic Program Fee	0.00	0	0	0	10	0	10	
TOTAL ASSESSMENT COSTS	0.00	0	0	0	50	0	50	
Interest on Operating Capital at 5.75%							64	
TOTAL OPERATING COSTS/ACRE	95	1,273	68	28	685	950	3,068	

TABLE 1. CONTINUED

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Office Expense							50	
Field Sanitation							60	
Miscellaneous Cost-Training							50	
Liability Insurance							18	
Property Taxes							206	
Property Insurance							152	
Investment Repairs							18	
TOTAL CASH OVERHEAD COSTS/ACRE							554	
TOTAL CASH COSTS/ACRE							3,622	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Bins 500		263		18			18	
Shop Tools		211		14			14	
Harvest Bin Trailer-3 Bin (2)		44		3			3	
Fork Lift		132		12			12	
Fuel Tanks (2)		231		17			17	
Wood Props 6'		21		3			3	
Tripod Harvesting Ladders (20)		26		2			2	
Harvest Shoulder Bags (20)		9		1			1	
Land 20 Acres Established Apples		20,000		950			950	
Equipment		478		50			50	
TOTAL NON-CASH OVERHEAD COSTS		21,415		1,069			1,069	
TOTAL COSTS/ACRE							4,691	

UC COOPERATIVE EXTENSION
TABLE 2. COSTS AND RETURNS PER ACRE TO PRODUCE ORGANIC PROCESSING APPLES

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Apples	15	Ton	325.00	4,875	
TOTAL GROSS RETURNS	15	Ton		4,875	
OPERATING COSTS					
Insecticide:				**246**	
Pheromone Traps	2.00	Acre	100.00	200	
Entrust	4.00	Oz	5.36	21	
Grandevo	1.00	Lb	25.00	25	
Fungicide:				**27**	
440 Superior Spray Oil	2.00	Gal	5.00	10	
Rex-Lime Sulfur	2.00	Gal	7.31	15	
Golden Micronized Sulfur	10.00	Lb	0.25	3	
Irrigation:				**118**	
Pajaro Water Costs	6.00	AcIn	15.42	93	
Irrigation System-Parts	0.50	Acre	50.00	25	
Contract:				**900**	
Harvesting-Hauling	15.00	Ton	60.00	900	
Miscellaneous:				**244**	
Gopher Traps	10.00	Each	8.50	85	
Sluggo Snail Bait	20.00	Lb	4.97	99	
Soil Samples	1.00	Acre	60.00	60	
Rent:				**50**	
Bee Hives	1.00	Each	50.00	50	
Assessment :				**50**	
CCOF Annual Inspection Fee	1.00	Acre	11.00	11	
CCOF Annual Certification Fee	1.00	Acre	28.75	29	
Cal State Organic Program Fee	1.00	Acre	9.75	10	
Labor				**1,273**	
Equipment Operator Labor	8.54	Hrs	16.32	139	
Non-Machine Labor	84.25	Hrs	12.92	1,089	
Irrigation Labor	3.50	Hrs	12.92	45	
Machinery				**96**	
Fuel-Gas	3.03	Gal	3.39	10	
Fuel-Diesel	14.93	Gal	3.88	58	
Lube				10	
Machinery Repair				17	
Interest on Operating Capital @ 5.75%				64	
TOTAL OPERATING COSTS/ACRE				3,068	
TOTAL OPERATING COSTS/TON				205	
NET RETURNS ABOVE OPERATING COSTS				1,807	

TABLE 2. CONTINUED

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Office Expense				50	
Field Sanitation				60	
Miscellaneous Cost-Training				50	
Liability Insurance				18	
Property Taxes				206	
Property Insurance				152	
Investment Repairs				18	
TOTAL CASH OVERHEAD COSTS/ACRE				554	
TOTAL CASH OVERHEAD COSTS/TON				37	
TOTAL CASH COSTS/ACRE				3,622	
TOTAL CASH COSTS/TON				241	
NET RETURNS ABOVE CASH COSTS				1,253	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Bins 500				18	
Shop Tools				14	
Harvest Bin Trailer-3 Bin (2)				3	
Fork Lift				12	
Fuel Tanks (2)				17	
Wood Props 6'				3	
Tripod Harvesting Ladders (20)				2	
Harvest Shoulder Bags (20)				1	
Land 20 Acres Established Apples				950	
Equipment				50	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,069	
TOTAL NON-CASH OVERHEAD COSTS/TON				71	
TOTAL COST/ACRE				4,691	
TOTAL COST/TON				313	
NET RETURNS ABOVE TOTAL COST				184	

UC COOPERATIVE EXTENSION
TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE ORGANIC PROCESSING APPLES

	DEC 13	JAN 14	FEB 14	MAR 14	APR 14	MAY 14	JUN 14	JUL 14	AUG 14	SEP 14	OCT 14	Total
Cultural:												
Dormant Pruning	762											762
Mow Prunings	12											12
Disc Prunings	9											9
Dormant Oil Spray		25										25
Delayed Dormant Spray-Green Tip			30									30
Vertebrate Pest Control 2X				52							52	104
Bee Hives (1)				50								50
Disease/Insect Control-Pink Bud					17							17
Set Pheromone Traps 2X					132			132				265
Mow Cover Crop							12					12
Disc Cover Crop							9					9
Snail Bait Application							108					108
Insect Control 3X							26	40	26			91
Thinning Fruit 50% Ac							142					142
Tie/Prop Branches							78					78
Irrigate 2X								59	59			118
Mow Orchard 2X								12	12			23
Disc-Smooth Orchard Floor 2X								9	9			17
Sanitize Field Equipment									23			23
1/2 Ton Pickup (2)	3	3	3	3	3	3	3	3	3	3	3	33
Bobtail Truck										10		10
Back Hoe	0	0	0	0	0	0	0	0	0	0	0	5
TOTAL CULTURAL COSTS	786	28	33	106	153	3	377	255	131	13	56	1,941
Harvest:												
Harvest- Haul Apples										900		900
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	0	900	0	900
Post-Harvest:												
Disc-Smooth Orchard Floor										9		9
Soil Samples (Ph, Calcium)											60	60
Irrigation System Maintenance											44	44
TOTAL POST-HARVEST COSTS	0	0	0	0	0	0	0	0	0	9	104	113
Assessment:												
CCOF Inspection Fee										11		11
CCOF Certification Fee										29		29
California Organic Program Fee										10		10
TOTAL ASSESSMENT COSTS	0	0	0	0	0	0	0	0	0	50	0	50
Interest on Operating Capital @5.75%	4	4	4	5	5	5	7	8	9	14	-1	64
TOTAL OPERATING COSTS/ACRE	790	32	37	110	158	9	384	264	140	985	159	3,068

TABLE 3. CONTINUED

	DEC 13	JAN 14	FEB 14	MAR 14	APR 14	MAY 14	JUN 14	JUL 14	AUG 14	SEP 14	OCT 14	Total
CASH OVERHEAD												
Office Expense										50		50
Field Sanitation										60		60
Miscellaneous Cost-Training										50		50
Liability Insurance										18		18
Property Taxes			103					103				206
Property Insurance			76					76				152
Investment Repairs	2	2	2	2	2	2	2	2	2	2	2	18
TOTAL CASH OVERHEAD COSTS	2	2	181	2	2	2	2	181	2	180	2	554
TOTAL CASH COSTS/ACRE	791	34	218	112	160	10	386	444	142	1,165	161	3,622

UC COOPERATIVE EXTENSION
TABLE 4. RANGING ANALYSIS - ORGANIC PROCESSING APPLES

COSTS PER ACRE AND PER TON AT VARYING YIELDS TO PRODUCE APPLES

	YIELD (TON)						
	9.00	11.00	13.00	15.00	17.00	19.00	21.00
OPERATING COSTS/ACRE:							
Cultural	1,941	1,941	1,941	1,941	1,941	1,941	1,941
Harvest	540	660	780	900	1,020	1,140	1,260
Post-Harvest	113	113	113	113	113	113	113
Assessment	50	50	50	50	50	50	50
Interest on Operating Capital @ 5.75%	62	63	64	64	65	65	66
TOTAL OPERATING COSTS/ACRE	2,706	2,827	2,948	3,068	3,189	3,309	3,430
TOTAL OPERATING COSTS/TON	300.71	257.00	226.73	204.54	187.57	174.17	163.32
CASH OVERHEAD COSTS/ACRE	558	558	558	558	558	558	558
TOTAL CASH COSTS/ACRE	3,265	3,385	3,506	3,626	3,747	3,868	3,988
TOTAL CASH COSTS/TON	362.75	307.76	269.68	241.77	220.41	203.56	189.91
NON-CASH OVERHEAD COSTS/ACRE	1,069	1,069	1,069	1,069	1,069	1,069	1,069
TOTAL COSTS/ACRE	4,334	4,454	4,575	4,695	4,816	4,936	5,057
TOTAL COSTS/TON	482.00	405.00	352.00	313.00	283.00	260.00	241.00

Net Return per Acre above Operating Costs for Apples

PRICE ($/ton)	YIELD (Ton/acre)						
Apples	9.00	11.00	13.00	15.00	17.00	19.00	21.00
250.00	-456	-77	302	682	1,061	1,441	1,820
275.00	-231	198	627	1,057	1,486	1,916	2,345
300.00	-6	473	952	1,432	1,911	2,391	2,870
325.00	219	748	1,277	1,807	2,336	2,866	3,395
350.00	444	1,023	1,602	2,182	2,761	3,341	3,920
375.00	669	1,298	1,927	2,557	3,186	3,816	4,445
400.00	894	1,573	2,252	2,932	3,611	4,291	4,970

Net Return per Acre above Cash Costs for Apples

PRICE ($/ton)	YIELD (Ton/acre)						
Apples	9.00	11.00	13.00	15.00	17.00	19.00	21.00
250.00	-1,015	-635	-256	124	503	882	1,262
275.00	-790	-360	69	499	928	1,357	1,787
300.00	-565	-85	394	874	1,353	1,832	2,312
325.00	-340	190	719	1,249	1,778	2,307	2,837
350.00	-115	465	1,044	1,624	2,203	2,782	3,362
375.00	110	740	1,369	1,999	2,628	3,257	3,887
400.00	335	1,015	1,694	2,374	3,053	3,732	4,412

TABLE 4. RANGING ANALYSIS CONTINUED

Net Return per Acre above Total Costs for Apples

PRICE ($/ton)	YIELD (Ton/acre)						
Apples	9.00	11.00	13.00	15.00	17.00	19.00	21.00
250.00	-2,084	-1,704	-1,325	-945	-566	-186	193
275.00	-1,859	-1,429	-1,000	-570	-141	289	718
300.00	-1,634	-1,154	-675	-195	284	764	1,243
325.00	-1,409	-879	-350	180	709	1,239	1,768
350.00	-1,184	-604	-25	555	1,134	1,714	2,293
375.00	-959	-329	300	930	1,559	2,189	2,818
400.00	-734	-54	625	1,305	1,984	2,664	3,343

UC COOPERATIVE EXTENSION
TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Total
14	45 HP2WD Tractor	18,745	20	2,405	1,398	78	106	1,582
14	Bobtail Truck	45,000	15	8,761	3,849	199	269	4,316
14	Back Hoe	16,599	15	1,594	1,497	67	91	1,655
14	Ring Roller 8'	3,028	15	291	273	12	17	302
14	Offset Disc 8'	13,209	10	2,336	1,502	58	78	1,637
14	Airblast Sprayer 3 PT, 100 Gal	7,971	10	1,410	906	35	47	988
14	Flail Mower 6'	5,764	10	1,019	655	25	34	714
14	Spreader-Double Spinner	3,600	10	679	406	16	21	443
14	#1 1/2 Ton Pickup	24,000	7	9,104	2,983	122	166	3,271
14	#2 1/2 Ton Pickup	24,000	7	9,104	2,983	122	166	3,271
	TOTAL	161,916	-	36,702	16,453	735	993	18,181
	60% of New Cost*	97,150	-	22,021	9,872	441	596	10,909

*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
INVESTMENT								
Bins 500	25,000	25	2,500	1,675	102	138	500	2,415
Shop Tools	20,000	25	2,000	1,340	81	110	400	1,932
Harvest Bin Trailer-3 Bin (2)	4,180	25	418	280	17	23	84	404
Tripod Harvesting Ladders (20)	2,500	25	250	168	10	14	50	241
Harvest Shoulder Bags (20)	900	25	0	62	3	5	18	88
Land 20 Acres Established Apples	400,000	25	400,000	19,000	2,960	4,000	0	25,960
Fuel Tanks (2)	21,949	20	2,195	1,656	89	121	439	2,305
Fork Lift	12,500	15	1,250	1,125	51	69	250	1,495
Wood Props 6'	2,000	10	0	256	7	10	0	273
TOTAL INVESTMENT	489,029	-	408,613	25,562	3,321	4,488	1,741	35,113

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Office Expense	20	Acre	50.00	1,000
Field Sanitation	20	Acre	60.00	1,200
Miscellaneous Cost-Training	20	Acre	50.00	1,000
Liability Insurance	20	Acre	18.00	360

UC COOPERATIVE EXTENSION
TABLE 6. HOURLY EQUIPMENT COSTS

Yr	Description	Apples Hours Used	Total Hours Used	Capital Recovery	Cash Overhead Insur-ance	Cash Overhead Taxes	Operating Lube& Repairs	Operating Fuel	Operating Total Oper.	Total Costs/Hr.
14	45 HP2WD Tractor	125	600	1.40	0.08	0.11	2.09	8.57	10.66	12.24
14	Back Hoe	4	400	2.25	0.10	0.14	1.40	6.78	8.18	10.66
14	Airblast Sprayer 3 PT, 100 Gal	55	200	2.72	0.10	0.14	1.37	0.00	1.37	4.34
14	Flail Mower 6'	27	200	1.97	0.08	0.10	2.43	0.00	2.43	4.57
14	Offset Disc 8'	26	200	4.51	0.17	0.23	2.18	0.00	2.18	7.09
14	Spreader-Double Spinner	5	200	1.22	0.05	0.06	0.00	0.00	0.00	1.33
14	Ring Roller 8'	21	130	1.26	0.06	0.08	0.34	0.00	0.34	1.73
14	Bobtail Truck	4	120	19.24	0.99	1.34	7.36	21.83	29.18	50.77
14	#1 1/2 Ton Pickup	11	100	17.90	0.73	0.99	2.44	8.48	10.91	30.54
14	#2 1/2 Ton Pickup	11	100	17.90	0.73	0.99	2.44	8.48	10.91	30.54

UC COOPERATIVE EXTENSION
TABLE 7. OPERATIONS WITH EQUIPMENT & MATERIALS

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Dormant Pruning	Dec			Non-Machine Labor	59.00	hours
Mow Prunings	Dec	45 HP2WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.41	hour
Disc Prunings	Dec	45 HP2WD Tractor	Offset Disc 8'	Equipment Operator Labor	0.31	hour
			Ring Roller 8'			
Dormant Oil Spray	Jan	45 HP2WD Tractor	Airblast Sprayer 3 PT, 100 Gal	Equipment Operator Labor	0.55	hour
				440 Superior Spray Oil	2.00	Gal
Delayed Dormant Spray	Feb	45 HP2WD Tractor	Airblast Sprayer 3 PT, 100 Gal	Equipment Operator Labor	0.55	hour
				Rex-Lime Sulfur	2.00	Gal
Vertebrate Pest Control 2X	Mar			Non-Machine Labor	0.75	hour
				Gopher Traps	5.00	Each
	Oct			Non-Machine Labor	0.75	hour
				Gopher Traps	5.00	Each
Bee Hives (1)	Mar			Bee Hives	1.00	Each
Disease/Insect Control	Apr	45 HP2WD Tractor	Airblast Sprayer 3 PT, 100 Gal	Equipment Operator Labor	0.55	hour
				Golden Micronized Sulfur	10.00	Lb
Set Pheromone Traps 2X	Apr			Non-Machine Labor	2.50	hours
				Pheromone Traps	1.00	Acre
	July			Non-Machine Labor	2.50	hours
				Pheromone Traps	1.00	Acre
Mow Cover Crop	June	45 HP2WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.41	hour
Disc Cover Crop	June	45 HP2WD Tractor	Offset Disc 8'	Equipment Operator Labor	0.31	hour
			Ring Roller 8'			
Snail Bait Application	June	45 HP2WD Tractor	Spreader-Double Spinner	Equipment Operator Labor	0.32	hour
				Sluggo Snail Bait	20.00	Lb
Insect Control 3X	June	45 HP2WD Tractor	Airblast Sprayer 3 PT, 100 Gal	Equipment Operator Labor	0.55	hour
				Entrust	2.00	Oz
	July	45 HP2WD Tractor	Airblast Sprayer 3 PT, 100 Gal	Equipment Operator Labor	0.55	hour
				Grandevo	1.00	Lb
	Aug	45 HP2WD Tractor	Airblast Sprayer 3 PT, 100 Gal	Equipment Operator Labor	0.55	hour
				Entrust	2.00	Oz
Thinning Fruit 50% Ac	June			Non-Machine Labor	11.00	hours
Tie/Prop Branches	June			Non-Machine Labor	6.00	hours
Irrigate 2X	July			Irrigation Labor	1.00	hour
				Pajaro Water Costs	3.00	AcIn
	Aug			Irrigation Labor	1.00	hour
				Pajaro Water Costs	3.00	AcIn
Mow Orchard 2X	July	45 HP2WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.41	hour
	Aug	45 HP2WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.41	hour
Disc-Smooth Orchard 2X	July	45 HP2WD Tractor	Offset Disc 8'	Equipment Operator Labor	0.31	hour
			Ring Roller 8'			
	Aug	45 HP2WD Tractor	Offset Disc 8'	Equipment Operator Labor	0.31	hour
			Ring Roller 8'			
Sanitize Field Equipment	Aug			Non-Machine Labor	1.75	hours
1/2 Ton Pickup (2)	Aug		1/2 Ton Pickup	Equipment Operator Labor	0.64	hour
	Aug		1/2 Ton Pickup	Equipment Operator Labor	0.64	hour
Bobtail Truck	Sept		Bobtail Truck	Equipment Operator Labor	0.24	hour
Back Hoe	Sept		Back Hoe	Equipment Operator Labor	0.20	hour
Harvest- Haul Apples	Sept			Harvesting-Hauling	15.00	Ton
Disc-Smooth Orchard	Sept	45 HP2WD Tractor	Offset Disc 8'	Equipment Operator Labor	0.31	hour
Soil Samples (Ph, Ca)	Oct			Soil Samples	1.00	Acre
Irrigation System Maint	Oct			Irrigation Labor	1.50	hours
				Irrigation System-Parts	0.50	Acre