UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

SAMPLE COSTS TO ESTABLISH A MANDARIN ORCHARD AND PRODUCE

MANDARINS

VENTURA COUNTY
2005

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CONTENTS

INTRODUCTION

Sample costs to establish an orchard and produce mandarins in Ventura County are presented in this study. Operations described are based on production practices considered typical for the areas and may not apply to every situation. The study is intended as a guide for making production decisions, estimating potential returns, preparing budgets and evaluating production loans. A blank "Your Costs" column in Tables 2 and 4 is provided for entering and evaluating your farm costs.

The hypothetical farm operations (size, production practices and cost calculations) are described in the assumptions section. For additional information or explanations of the assumptions and calculations used in this study, please contact Eta Takele, the Farm Management advisor, University of California Cooperative Extension or your local UC Cooperative Extension advisor Ben Faber at the addresses given at the end of this study. This cost study will be available at the Farm Management Website of the University of California Cooperative Extension Program for southern California at: http://groups.ucanr.org/farmgt, the University of California Hansen Trust website at: http://groups.ucanr.org/Hansen/index.cfm and University of California, Department of Agricultural and Resource Economics websites at Davis at: http://coststudies.ucdavis.edu.

ASSUMPTIONS: BASIS AND METHODS OF COST CALCULATIONS

Costs for labor, materials, equipments and custom services are based on 2005 figures.

The use of trade names 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.

Farm Size: The hypothetical farm consists of 25 acres of orchard. The orchard is established on land of no more than 15% slope and suitable for mandarin production.

Land Preparation. This operation is usually done by a custom operator to rip, disc and level the ground to 36 to 48 inches deep. All land preparation operations such as tree and root removal are done the year prior to planting, but costs are shown in the first year.

Planting, Tree rows are marked and holes are dug using a soil auger. Most growers indicated they rented the soil auger. It is assumed 2% of the trees may need to be replanted in the second year. Most growers use contract or hired labor to perform the planting operation. Trees cost $12.00 each.

Mandarin varieties in this county include Pixie, Gold Nugget, W. Murcott (Afourer). Depending on variety, the type of planting – square, hedgerow, and triangle – planting densities may range from 100 to 300 trees per acre. In this study, we used an example of W. Murcott production with planting space of 14 feet x 18 feet with 170 trees per acre. We consider the cost of production estimates will apply to all varieties with some variation.

Training and Pruning: Trees are suckered annually through year three. Beginning from year four maintenance pruning with light topping and hedging are performed every year. The labor time required for pruning increases as the trees get bigger in size. In this study, the suckering cost is

estimated at $1.65/tree during the first three years of establishment and pruning at $2.10/tree every year during production (mature orchard).

Fertilization. The only fertilizer applied during the first year is an Agriform starter tablet (20-10-05) placed in the tree hole at planting. Nitrogen (N) application from the second through the third year is at one-quarter pound per tree, increasing to one-half pound in the fourth year and to one-pound beginning the seventh year. Low Biruet Urea is commonly used as a source of N. It is applied through the irrigation system once per month during the irrigation period. Foliar application of potassium sulphate and manganese sulphate are also applied by using 25 lbs/acre of SulPolMeg once in April beginning in year four.

Leaf Analysis is done every year for nutrient levels. Leaf samples are analyzed beginning in the fourth year. One sample per 10 acres at 40 spots or locations is taken for N, P, K, Zn and B analysis. The cost of leaf analysis is approximated at $100 per year. Also, for well water irrigation, an analysis should be done periodically to determine nitrate availability, salinity, chloride and sodium pH.

Irrigation. Growers in Ventura County use both district water or have on site wells. Well water provides the majority of the growers' needs. Growers purchasing acreage for a new farm will likely have an established well on site or access to water mutual that shares wells. District water may be delivered, stored and pumped from a reservoir through a filtration system. In this area, new plantings use micro-sprinklers for irrigation. Water costs are calculated based upon the use of both well and district sources. Water cost for this study is assumed to cost $12.50/acre inch.

Water application by age of trees is shown in Table A. Water application ranges from 6 acre inches/acre during the first year to 24 acre inches/acre for the mature orchard. No assumption is made about effective rainfall, evaporation, or runoff. Information on evapotranspiration and rainfall are available from various sources. In Ventura county evapotranspiration information can be obtained from the Fox Canyon Groundwater Management Agency (http://www.foxcanyongma.org and from California Irrigation Management Information System (CIMIS) at www.cimis.water.ca.gov/cimis. Irrigation labor is estimated at 15 minutes/acre/irrigation.

TABLE A. AMOUNT OF WATER USE BY AGE OF TREES
MANDARIN ORCHARD
VENTURA COUNTY, 2005

Year	Acre Inches/Year
Year 1-2	6
Year 3-4	12
Year 5-6	18
Year 7+	24

Pest Management. Pesticides mentioned in the study are those commonly used in mandarin production in Ventura County. The pesticides and rates mentioned are listed in *UC Integrated Pest Management Guidelines for Citrus*. For more 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 or a *Pest Control Adviser (PCA).* Written recommendations are required for many pesticides and are made by licensed pest control advisers. In addition PCAs can be hired to monitor fields for pests and nutrition.

Weeds. Beginning the first year alleys are disced in early spring and then mowed after the second year. In addition, during establishment period, a post-emergent herbicide such as Roundup is applied to the tree rows four times between April and October and spot applied to the alleys.

During production (mature orchards) alleys *are* mowed two times. Six strip spays of post-emergent herbicides are also applied to the tree row between April and October.

Insects. Thrips may occasionally be a problem and are controlled with an application of 415 Oil in October beginning in the second year of establishment.

Scale is not a problem every year, but on average will occur once every two years starting from the third year. Therefore, one-half of the treatment cost such as Lorsban 4E is charged to the operation each year beginning in the third year. Earwig treatments may be required if they appear under the tree wrap, but these pests have not been a major problem in the area. Earwig treatments of carbaryl are applied once per year for the first two years only. Snails are a problem for both the young and the bearing orchard. Snail bait is applied in the winter.

Diseases. No disease treatment is necessary during the establishment period. In mature orchards, brown rot may occasionally be a problem at which time a Copper/Zinc Sulfate spray may be needed for mature orchards.

Vertebrates. Gophers can cause major losses to tree roots. Gophers are managed with the use of poison bait and traps monitored once per week from April to October. Growers drive through the orchard on ATVs and place baits.

Harvesting, Hauling and Marketing: Fruit produced in the second and third years may not be marketable. Beginning the fourth year, the fruit is picked into lugs or bins mostly using hired or contract labor. Growers hope to take advantage of a harvest season that is earlier or later than the San Joaquin Valley for marketing and labor use. Mandarin fruit is usually picked from late January to April.

Harvesting is done using labor that is either hired by the grower or obtained through labor contractors. Picking is estimated at 120 pounds (4.8 cartons) per hour. Bins are collected and transported by a tractor to a collection site for transport to the packing house. The overall cost of picking and hauling to an onsite shade is calculated at a combined rate of $2.60 per carton. Hauling and unloading at a local packing facility is approximated to take one hour roundtrip and is estimated at $0.50 per carton.

Marketing costs include the fees assessed by the packer and local marketing organizations. The Citrus Research Board charges assessment fees to fruit shipped to a packer or processor. Most growers market their own citrus, so no assessment is paid. Also most of the growers in the area

market a portion of their produce at various farmers' markets. It is assumed that approximately 8% of the crop will be sold through farmers' markets. Selling or marketing costs will include the farmer market's daily fee, delivery and/or shipping costs, bookkeeping and other related costs. Costs figures for these activities varied widely. Our cost estimate included an overall average fee of $1 per carton for all marketing activities.

Production: Yield and Grades*:* During year two and three, the fruit is picked and discarded or sold at the farmer's market. Table B. provides yield estimates for *W. Murcott* mandarin production in Ventura County. The estimated yields and grading percents were calculated from local grower yield information. The effects of alternate bearing are seen beginning in the fifth or sixth year, but may not be true in all situations. Growers also indicated that most of the crop during production (mature orchard) goes to Number One as shown in Table B.

The fruit, based upon texture, appearance, size, and number of seeds is graded into Number One (Afourer Type 1) and Number Two (Afourer Type 2). Although number of seeds is not a criteria identified in the USDA standards for grading mandarins/tangerines, marketing associations use it as one of the basic differences between the two grades. The size classifications for mandarins include small, medium, large, jumbo, mammoth and colossal. However, the industry currently accepts all these sizes and mixed sizes in packing cartons. Fruit appearance and size are not consistent during the third to fifth year; therefore most of the fruit is usually classified as Number Two.

Growers' yield estimate of mature orchards ranged significantly with about 200 pounds/tree during heavy production and a possible reduction of 50% or more during the second or alternate year. In this study, an average yield of 135 pounds per tree over the two years is considered the typical yield for mature orchards.

TABLE B. ESTIMATED ANNUAL YIELD FOR W. MURCOTT VENTURA COUNTY, 2005

Year	Ibs/tree	Ibs/acre	Cartons*/acre	% of Number One (Afourer Type 1)
4	30	5100	204	20
5	88.5	15045	600	40
6	125	21250	850	60
7	100	17000	680	70
8	175	29750	1190	80
9	110	18700	748	85
10	200	34000	1360	85
11	100	17000	680	85
12+	210	35700	1428	85
Average (year 5-12)	135	22950	918	70

*A carton is 25 lbs

Crop Returns: Crop values vary depending on the variety. In this study, we used W. Murcott (Afrourer) yield and prices as sample of our analysis. Crop values during the production years are estimated using yield level of 135 lbs/tree with approximately 70% of the crop graded as type Number One and 30% as type Number Two at average prices of $1.00/lb and $0.50/lb for Number One (Afourer Type 1) and Number Two (Afourer Type 2), respectively. We also provided returns at various prices and yields as shown in Table 8 for growers to choose the yield and price scenario that

best reflects their specific situation. Crop values during the establishment years are used to offset costs.

Labor Costs. Labor wages for both the owner and hired are estimated at an hourly wages of $11.00/hour for machine operators and $10.00/hour for 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 we used in this study of $14.63/hour and $13.30/hour for machine labor and non-machine labor, respectively. Labor hours are calculated at 20% higher than the equipment time given in Table 2 and Table 3 to account for the extra time involved in activities such as equipment set up, moving, maintenance, work breaks and field repair.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are $2.18 and $2.44 per gallon, respectively. The fuel, lube, and repair costs per acre for each operation in Table 2 and Table 3 are determined by multiplying the total hourly operating cost for each equipment (Table 7) by the hours per acre needed to perform the operation. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time. Formulas for calculating equipment operating costs can be referenced from farm many management books including the one we used for our reference (Boelje, Michael D., and Vernon R. Eidman. 1984. Farm Management, John Wiley and Sons. New York, New York).

Cash Overhead Costs: Cash overhead costs consist of all cash expenses that are not accounted for in the production practices. These costs include interest on operating capital (capital for cultural operations and cash overhead), property taxes, office expenses, liability and property insurances, sanitation services, equipment repairs, and management.

*Interest on Operating Capital***.** This is the cost of borrowing or the opportunity cost for the money used in the business of producing mandarins. Interest on operating capital is charged for all expenses at the nominal rate of 7.65% per year from the time the expenses are incurred until harvest. A nominal interest is the rate charged by financial institutions for operating loans.

*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 properties including equipment, buildings, and improvements. For this study, annual property taxes are calculated at 1.0 % of the value of land. For depreciable assets, annual property taxes are calculated at the base county rate of 1.0% of the average value of the property. Average value equals value or cost of the investment plus salvage value divided by two. Property taxes are then divided by the number of acres to obtain the per acre costs.

Insurance. Insurance for farm investments varies depending on the assets used in production and the amount of coverage. Property insurance provides coverage for property loss and is charged annually at 0.70% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm. The cost for liability insurance for the 25 acres farm size is about $1075 per year ($43/acre).

*Office Expense***.** Growers' estimated $200/acre for their office expenses including rent, supplies, telephone, bookkeeping, accounting, legal fees, shop and utilities, and miscellaneous administrative expenses.

*Investment Repairs***.** Annual repair and maintenance costs for farm buildings, fuel tanks and pumps and tools are calculated at 2% of the price/value of the investment. For the irrigation system, annual maintenance and repair is calculated at 5% of the cost of the system.

*Management/Supervisor Salaries***.** Management charges are not included in this study. We suggest that growers divide the returns after all costs between management and profit as they see fit.

Non-Cash Overhead Costs: Non-cash overhead costs also referred as ownership or fixed costs include depreciation and interest on capital investments. These costs for farm equipment, farm buildings, irrigation system, farm tools and fuel pumps are calculated using the capital recovery method, a method that captures the combined cost of interest on investment and depreciation.

*Capital Recovery Costs***.** This method allows calculating an annual amount of money required to recover the difference between the purchase prices and salvage value (unrecovered capital) of capital investments. It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This method is more complex than the individual calculation of depreciation and interest on investment, but more accurately represents the annual costs of ownership because it takes the time value of money into account. 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).

Where:

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 values are calculated as a percentage of the new cost. For this study, equipment salvage values were calculated at 10% of purchase prices. Other investments including irrigation systems, buildings, and miscellaneous equipments (fuel tanks and pumps) are assumed to depreciate fully with no remaining values.

Capital Recovery Factor. Capital recovery factor is the amortization factor or the repayment factor for loans or mortgages taken to purchase long term farm assets (machinery, buildings, irrigations system, etc). The factor reflects a payment for $1.00 discounted to the present value using the period of the loan and an interest charge. In this case, the length of the loan corresponds to the life of the asset. Capital recovery factors for several years and interest rates can be found from any standard farm management books including the one we used for our reference (Boelje, Michael D., and Vernon R. Eidman. 1984. Farm Management. John Wiley and Sons. New York, New York). Simply locate the interest rate and number of years of your asset (loan) to determine the capital recovery factor.

The interest rate we used to calculate capital recovery is 6.01%, the ten year average of California's agricultural sector long-run rate of return of agricultural assets to current income provided by USDA-ERS's (Economic Research Services).

Equipment and Investment: Capital recovery costs for the various machineries, equipments and investments used in this study are shown in Table 6. Farm equipment may be purchased new or used. In this study, we used 60% of the new cost in order to account for the mix of old and new equipment in the farm.

Irrigation System: The Irrigation system investment includes the costs to build a reservoir (built on the site to store water from the water district) as well as the costs of pumps (a new 15 horsepower booster pump), filtration station, fertilizer injector system, micro-sprinklers and the labor to install the components. The pump lifts the water to about 20-feet. The filtration/injector station is installed at planting. The micro-sprinkler lines are laid out after planting. The irrigation system has a life of 36 years.

Building: The farm shed is assumed to be 1,800 square feet of metal buildings and sheds on cement slab. It includes a packing shed area.

Shop tools: This category includes pruning and picking clips and lug boxes. Approximate values for these tools are provided on Table 6. Also a 100-gallon fuel tank is considered to service the farm. The tank is usually set on a cement containment pad that meets federal, state, and county regulations.

Land rent: Land does not depreciate, therefore, only the rental value is calculated to reflect the opportunity cost of using the land for production of mandarin instead of other alternative uses. The opportunity cost of land is calculated at the 6.01% (the long-run rate of return of agricultural assets to current income) of its value. Land in this study is valued at $ 45,000 per acre according to the American Society of Farm Managers and Rural Appraisers (http://www.asfmra.org).

Establishment Costs. The cumulative net costs incurred to establish/develop the trees into the production period are referred as the establishment cost. Net costs include gross returns obtained minus all costs during the establishment period. In this study, the Total Accumulated Net Cash Cost on Table 1 in the fourth year ($27,856 per acre or $696,400 for the twenty-five acres) represents the establishment cost. This value is amortized over 36 years, the expected useful life of the orchard to determine an annual charge for depreciation of trees and the opportunity cost of the investment.

Establishment and production costs in this study are based on the most common or typical operations expressed in the county, but can vary considerably, depending upon terrain, soil type, local regulations, and other factors. For example, development on marginal soils will require additional land preparation and soil amendments. Management/Development companies will have additional labor costs.

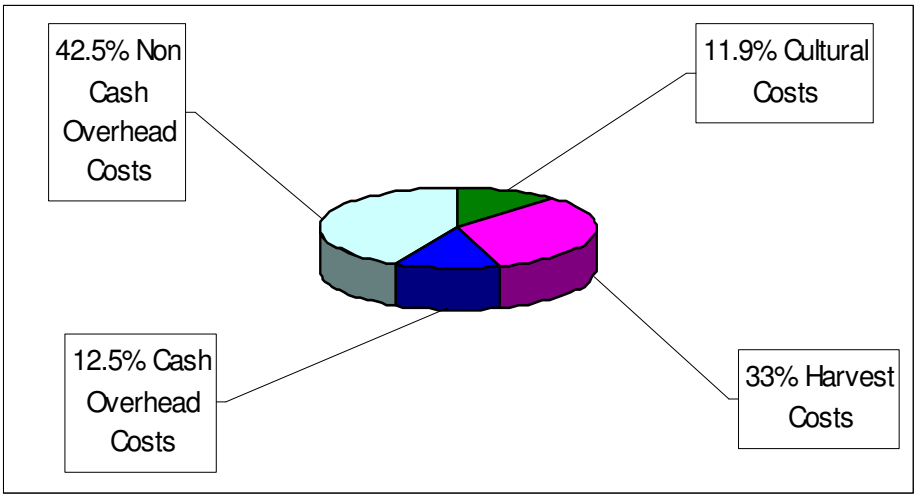
SUMMARY

Our estimate of the total cost during the four years of establishment period of a mandarin orchard in Ventura County is $27,856 /acre. The costs include $9,589/acre during the first year, $6,312/acre during the second year, $6,738/acre during the third year and $5,217 /acre during the fourth year.

The annual production cost is $11,962/acre (Table 2, table 3 and Table 4). Table 2 shows costs by type of costs, Table 3 by type of operation and Table 4 by type of production input. Due to rounding off, the totals may be slightly different from the sum of the components.

The pie graph that follows shows the proportion of production costs by category. It consists of about 11.9 % for cultural costs such as pruning, weed control, brown rot fungus control, fertilization, irrigation and rodent control. Harvesting costs of picking, hauling, marketing and inspection account for 33%. The proportion for cash overhead costs including liability insurance, root analysis, leaf analysis, sanitation fee, office expenses, property taxes, property insurance and investment repairs account about 12.5 %. Non-cash overhead or annual ownership costs of land rent, equipments, buildings, tools, and irrigation system accounts for 42.5 %.

FIGURE 1. PROPORTION OF PRODUCTION COSTS FOR MANDARIN IN VENTURA COUNTY, 2005



PROFIT ANALYSIS

We analyzed profitability using break-even costs per carton as well as using gross and economic margins.

Crop yield and prices received by growers vary from individual to individual. In order to give growers choices from which they can choose their possible scenario, we calculated break-even costs at several yields. We also calculated gross and economic margins at various prices and yield levels (Table 8).

Break-even costs allow growers to compare expected market prices with a unit cost of production. Unit costs of production are calculated as the cost of production per acre divided by yield per acre.

Gross margin (or returns above cash costs) is what growers often refer to as profit if there is no debt on the farming operation. It approximates the return to management and investment. If you deduct depreciation, it also approximates the taxable income of the investment. Gross margin is calculated as gross returns (price times yield) minus cash costs of production.

Economic profit (or returns above all total cost including management) is a measure of how attractive the enterprise is for potential investors. Economic profit can be zero or positive. A zero economic profit should not be alarming if all costs including the owners' labor and management fees are included in the production cost. In this study we didn't include management charges. The return after all costs are deducted can be allocated to management and profit determined by the grower.

ACKNOWLEDGEMENTS

The authors thank the many researchers, agricultural associates and Ventura county growers, who provided input into the study.

TABLE 1. SAMPLE COSTS PER ACRE TO ESTABLISH A MANDARIN ORCHARD IN VENTURA COUNTY, 2005

Year	Cost per Acre ($)			
	1st	**2nd**	**3rd**	**4th**
Operations				
PRE -PLANTING: (Contract)				
Tree Removal (Remove & Pile)	325			
Root Removal & Burn Debris	450			
Criss rip soil to 36", disc and level	350			
TOTAL PRE -PLANTING COSTS	1125			
LAND PREPARATION: (Contract, Labor, Material and Equipment operating costs)				
Flag field for tree location	42			
Drill holes using auger	170			
Fumigate - Endozone	431			
TOTAL LAND PREPARATION COSTS	643			
PLANTING: (Labor, Material and Equipment operating costs)				
Plant trees (plant, wrap, fertilize)	2542			
Plant trees - 2% replacement		83		
TOTAL PLANTING COSTS	2542	83		
CULTURAL: (Contract, Labor, Material and Equipment operating costs)				
Irrigate*	361	317	343	343
Earwig treatment 1x (Carbaryl)	45	45		
Thrips, Ants and Scale Control (415 oil year 2,3,4 & Lorsban 4E year 3,4)		23	46	46
Snail Control - Sluggo Snail Bait		35	35	35
Gopher control - Wilco 1.8 and ATV used	210	249	249	249
Fertilizer - Low Biuret Urea 41% N		39	39	78
Fertilizer - SulPoMag (0-0-22)				18
Fertilizer - Zinc Sulphate 36%				15
Fertilizer - (agriform 1st year)	50			
Disc : (Alleys) 2x	31	31		
Mow : (Alleys) 2x			22	22
Weed : Spray tree rows 25% acre (Roundup)		50	50	50
Weed : Spot applied in Alleys (Roundup)		30	30	30
Fungicide - Brown Rot (Copper sulpate and Lime)			52	52
Trim Tree Suckers @$1.65/tree		281	281	281
TOTAL CULTURAL COSTS	697	1100	1147	1219

Year	Cost per Acre ($)			
	1st	2nd	3rd	4th
Operations (Con'd)				
HARVEST:				
Pick				548
Haul				137
Pack & Market				227
TOTAL HARVEST COSTS	0	0	0	912
Interest on operating Capital @7.65%	221	35	34	-15
TOTAL OPERATING COSTS/ACRE	5228	1218	1181	2116
CASH OVERHEAD:				
Office Expenses	200	200	200	200
Liability Insurance	43	43	43	43
Leaf Analysis				10
Field Sanitation	15	15	15	15
Property Taxes	475	475	474	477
Property Insurance	333	332	333	334
Investment Repairs	128	128	128	128
Interest-Cash Overhead costs	46	46	46	46
Interest- Establishment costs (Trees)		734	1216	1732
TOTAL CASH OVERHEAD COSTS	1240	1973	2454	2984
TOTAL CASH COSTS/ACRE	6468	3191	3635	5100
INCOME FROM PRODUCTION	0	0	0	3063
NET CASH COST FOR THE YEAR	6468	3191	3635	2037
ACCUMULATED NET CASH COSTS	6468	9659	13294	15331
NON-CASH OVERHEAD:				
Fuel Tanks & Pumps	26	26	26	26
Irrigation System	123	123	123	123
Land Rent	2704	2704	2704	2704
Shop Buildings	105	105	105	105
Shop Tools	22	22	22	22
Equipment	141	141	123	200
TOTAL NON-CASH OVERHEAD COSTS	3121	3121	3103	3180
TOTAL COSTS/ACRE	9589	6312	6738	8280
INCOME/ACRE FROM MANDARIN	0	0	0	3063
TOTAL NET COST FOR THE YEAR	9589	6312	6738	5217
TOTAL ACCUMULATED NET COST	9589	15901	22639	**27856**

*Irrigation is applied twice a week in year one and once a week in years two to four. It takes 15 minute per acre to check and monitor irrigation.

TABLE 2. COST PER ACRE TO PRODUCE MANDARINS BY TYPE OF COSTS IN VENTURA COUNTY, 2005

Operation	Operation Time (Hrs/A)	Costs per Acre ($) Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CULTURAL: (Contract, Labor, Material and Equipment operating costs)							
Irrigate 1x/month	4	70	18	300	0	388	
Thrips, Ants and Scale Control -415 oil and Lorsban	1	18	6	23	0	46	
Snail Control - Sluggo Snail Bait	1	18	4	13	0	35	
Gopher control - Wilco 1.8 and ATV used	9.5	167	44	38	0	249	
Mow : (Alleys) 2x	1	18	4	0	0	22	
Weed : Spray 6x tree rows 25% acre-Roundup	3.5	61	20	6	0	87	
Fungicide (Brown Rot) - Copper sulphate & Lime	0.5	9	3	41	0	52	
Fertilizer - Low Biuret Urea 41% N	0	0	0	156	0	156	
Fertilizer - SulPoMag (0-0-22)	0.5	9	3	7	0	18	
Fertilizer - Zinc Sulphate 36%	0.5	9	3	4	0	15	
Pruning (light topping& hedging) @$2.10 /tree	0	0	0	0	357	357	
TOTAL CULTURAL COSTS	**21.5**	**377**	**105**	**588**	**357**	**1425**	
HARVEST:							
Picking	1.5	26	17	0	2387	2430	
Hauling	3	53	34	0	459	545	
Packing & Marketing	2	35	23	918	0	976	
TOTAL HARVEST COSTS	**6.5**	**114**	**73**	**918**	**2846**	**3951**	
Interest on operating capital @ 7.65%						4	
TOTAL OPERATING COSTS/ACRE	**28**	**492**	**178**	**1505**	**3203**	**5379**	
TOTAL OPERATING COSTS/CARTON						**6**	
CASH OVERHEAD:							
Office Expenses						200	
Liability Insurance						43	
Leaf Analysis						10	
Field Sanitation						15	
Property Taxes						616	
Property Insurance						431	
Investment Repairs						128	
Interest- Cash overhead costs						55	
TOTAL CASH OVERHEAD COSTS						**1498**	
TOTAL CASH COSTS/ACRE						**6877**	

			Total Cost ($)	Your Cost ($)
NON-CASH OVERHEAD:				
Investment	**Unit price $/Acre**	**Capital Recovery Cost Per year ($)**		
Fuel Tanks & Pumps	250	26	26	
Irrigation System	1800	123	123	
Land Rent	45000	2704	2704	
Shop Buildings	1440	105	105	
Shop Tools	220	22	22	
Establishment Cost (trees)	27856	1907	1907	
Equipment	1412	198	198	
TOTAL NON-CASH OVERHEAD COSTS	**77978**	**5085**	**5085**	
TOTAL COSTS/ACRE			**11962**	
TOTAL COSTS/CARTON			**13**	

TABLE 3. COSTS PER ACRE TO PRODUCE MANDARINS BY TYPE OF OPERATIONS IN VENTURA COUNTY, 2005

Operation	Operation time (Hours)	Labor Costs	Equipment Operating (fuel, lube, repair) Costs	Material Costs	Custom/ Rent Costs	Equipment Cash Overhead (Insurance& Tax) Costs	Equipment Capital Recovery Costs	Total Costs
Irrigate 1x/month	4	70	18	300	0	0.31	6	394
Thrips, Ants and Scale Control-415 Oil and Lorsban	1	18	6	23	0	0.09	1	47
Snail Control - Sluggo Snail Bait	1	18	4	13	0	0.09	1	37
Gopher control - Wilco 1.8 and ATV used	9.5	167	44	38	0	0.75	13	263
Mow : (Alleys) 2x	1	18	4	0	0	0.78	15	38
Weed : Spray 6x tree rows 25% acre Roundup	3.5	61	20	6	0	0.31	4	91
Fungicide (Brown Rot)-Copper sulphate & Lime	0.5	9	3	41	0	0.04	1	53
Fertilizer - Low Biuret Urea 41% N	0	0	0	156	0		0	156
Fertilizer - SulPoMag (0-0-22)	0.5	9	3	7	0	0.04	1	19
Fertilizer - Zinc Sulphate 36%	0.5	9	3	4	0	0.04	1	16
Pruning - (light topping& hedging) @$2.10/tree	0	0	0	0	357	0	0	357
TOTAL CULTURAL COSTS	**21.5**	**377**	**105**	**588**	**357**	**3**	**42**	**1469**
Picking	1.5	26	17	0	2387	6	79	2515
Hauling	3	53	34	0	459	2	46	594
Packing and Marketing	2	35	23	918	0	2	31	1008
TOTAL HARVEST COSTS	**6.5**	**114**	**73**	**918**	**2846**	**10**	**155**	**4116**
Interest on Operating Cost @7.65%								4
TOTAL OPERATING COSTS	28	492	178	1505	3203	13	198	5589
CASH OVERHEAD:								
Office Expenses								200
Liability Insurance								43
Leaf Analysis								10
Field Sanitation								15
Investment Property Taxes								608
Investment Property Insurance								426
Investment Repairs								128
Interest- Cash overhead costs								55
TOTAL CASH OVERHEAD COSTS								**1486**
TOTAL CASH COSTS/ACRE								**7075**

NON-CASH OVERHEAD:	Unit Price ($/Acre)	Capital Recovery Costs Per year	Total Costs
Fuel Tanks & Pumps	250	26	26
Irrigation System	1800	123	123
Land -Rent	45000	2704	2704
Shop Buildings	1440	105	105
Shop Tools	220	22	22
Establishment Cost (Tree)	27856	1907	1907
TOTAL NON-CASH OVERHEAD COSTS	**76566**	4887	**4887**
TOTAL COSTS/ACRE			**11962**
TOTAL COSTS/CARTON			**13**

TABLE 4. COSTS AND RETURNS PER ACRE TO PRODUCE MANDARINS IN VENTURA COUNTY, 2005

	Quantity/Acre	Unit	Price or Cost/Unit ($)	Value or Cost/Acre ($)	Your Cost ($)
GROSS RETURNS (W. Murcott Example)					
Afourer 1(70% of the total)	643	crtn	25	16075	
Afourer 2 (30% of the total)	275	crtn	12.5	3438	
Total Mandarin Yield	918				
TOTAL GROSS RETURNS FOR MANDARIN				**19513**	
OPERATING COSTS					
Water:					
Water	24	AcIn	12.5	300	
Insecticide:					
415 Oil	4.5	gals	2.5	11	
Lorsban 4 E	0.5	lbs	23	12	
Rodenticide:					
Sluggo Snail Bait	2.5	lbs	5	13	
Wilco 1.8 gopher	10.5	lbs	3.6	38	
Fungicide:					
Copper Sulphate	3	lbs	4.23	13	
Lime	4.5	lbs	6.24	28	
Herbicide:					
Roundup	0.91	Pint	6.75	6	
Fertilizer:					
Low Biuret Urea 41% N	415	Lbs	0.374	155	
SulPoMag (0-0-22)	25	lbs	0.264	7	
Zinc Sulphate 36%	5	lbs	0.71	4	
Contract:					
Picking	918	crtn	2.6	2387	
Hauling	918	crtn	0.5	459	
Pruning	170	tree	2.1	357	
Marketing: (Packers fee, marketing organization, etc)	918	crtn	1	918	
Labor (machine)	33.6	hrs	14.63	492	
Labor (non-machine)	0	hrs	13.3	0	
Fuel - Gasoline	36.4		2.44	89	
Fuel - Diesel	24.27	gal	2.18	53	
Lube				21	
Machinery repair				15	
Interest on operating capital @ 7.65%				4	
TOTAL OPERATING COSTS/ACRE				**5379**	
NET RETURNS ABOVE OPERATING COSTS/ACRE				**14133**	

	Value or Cost/Acre ($)	Your Cost ($)
CASH OVERHEAD COSTS:		
Office Expenses	200	
Liability Insurance	43	
Leaf Analysis	10	
Field Sanitation	15	
Property Taxes	616	
Property Insurance	431	
Investment Repairs	128	
Interest - Cash Overhead Costs	55	
TOTAL CASH OVERHEAD COSTS/ACRE	**1498**	
TOTAL CASH COSTS/ACRE	**6877**	
NET RETURNS ABOVE CASH COSTS/ACRE	**12635**	
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):		
Fuel Tanks & Pumps	26	
Irrigation System	123	
Land Rent	2704	
Shop Buildings	105	
Shop Tools	22	
Establishment Cost (Trees)	1907	
Equipment	198	
TOTAL NON-CASH OVERHEAD COSTS/ACRE	**5085**	
TOTAL COSTS/ACRE	**11962**	
TOTAL COSTS/CARTON	**13**	
NET RETURNS ABOVE TOTAL COSTS	**7550**	

TABLE 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE MANDARINS IN VENTURA COUNTY, 2005

	Costs per Acre ($)												
Beginning OCT 2004	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOT**
Ending SEP 2005	**2004**	**2004**	**2004**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**AL**
CULTURAL: (Contract, Labor, Material and Equipment operating costs)													
Irrigate 2x/month	49	49					49	49	49	49	49	49	392
Thrips, Ants and Scale Control -415 oil and Lorsban	23								23				46
Snail Control - Sluggo Snail Bait				35									35
Gopher control - Wilco 1.8 and ATV used	39						33	39	33	33	39	33	249
Mow (Alleys) 2x						11				11			22
Weed: Spray tree rows -Roundup 6x	12						12	12	12	12	12	12	84
Pruning - light topping & hedging							357						357
Fertilizer - SulPoMag 0-0-20							18						18
Fertilizer - Zinc sulphate							15						15
Fertilizer - Urea 46% N	19	19					19	19	19	19	19	19	152
Fungicide (Brown Rot) - Copper sulphate & Lime												52	52
TOTAL CULTURAL COSTS	**142**	**68**		**35**		**11**	**503**	**119**	**136**	**124**	**119**	**165**	**1425**
HARVESTING:													
Picking					2430								2430
Hauling					976								976
Packing & Marketing					545								545
TOTAL HARVEST COSTS					3951								3951
Interest on operating capital	1	1	1	2	27	-8	-7	-4	-3	-3	-2	-1	4
TOTAL OPERATING COSTS/ACRE	**143**	**69**	**1**	**37**	**27**	**3**	**496**	**115**	**133**	**121**	**117**	**164**	**5379**
CASH OVERHEAD:													
Office Expenses												200	200
Liability Insurance												43	43
Leaf Analysis						10							10
Field Sanitation						15							15
Property Taxes		308					308						616
Property Insurance		216					215						431
Investment Repairs	11	11	11	11	11	11	11	11	11	11	11	11	128
Interest-Cash Overhead												55	55
TOTAL CASH OVERHEAD COSTS	11	535	11	11	11	36	534	11	11	11	11	309	1498
TOTAL CASH COSTS/ACRE	**154**	**604**	**12**	**48**	**38**	**39**	**1030**	**126**	**144**	**132**	**128**	**473**	**6877**

TABLE 6. WHOLE FARM EQUIPMENTS, INVESTMENTS AND BUSINESS OVERHEAD COSTS BASED ON 25 ACRES MANDARIN ORCHARD IN VENTURA COUNTY, 2005

EQUIPMENTS

Year	Description	Price ($)	Life Year	Capital Recovery ($)	Cash Overhead Costs ($)		Total
					Insurance	Taxes	
2005	70 HP 2WD Tractor	28850	12	3272	111	159	3542
2005	ATV 4WD 20 HP	4500	7	760	17	24	802
2005	Bin Trailer #1	1000	15	99	4	5	108
2005	Mower - Rotary 5'	3000	5	624	12	18	653
2005	Pickup Truck 1/2 T	18500	7	3111	71	101	3283
2005	Power Sprayer	3000	10	368	12	18	398
	TOTAL COST	58850		8234	227	325	8786
	60% OF THE EQUIPMENT COSTS	35310		4940	136	195	5272

INVESTMENTS

Description	Price ($)	Life Year	Capital Recovery ($)	Cash Overhead Costs ($)			Total
				Insurance	Taxes	Repairs	
INVESTMENT							
Establishment Cost (Trees)	696400	36	47687	2437	3482	0	53606
Fuel Tanks & Pumps	6250	15	644	22	31	125	822
Irrigation System	45000	36	3081	158	225	2250	5714
Land Rent	1125000	40	67613	7875	11250	0	86738
Shop Buildings	36000	30	2618	126	180	720	3644
Shop Tools	5500	15	543	21	30	110	704
TOTAL INVESTMENT COSTS	1914150		122186	10639	15198	3205	151228

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit ($)	Total Cost ($)
Field Sanitation	25	Acre	15	375
Interest - Cash Overhead	25	Acre	55	1375
Leaf Analysis	25	Acre	10	250
Liability Insurance	25	Acre	43	1075
Office Expenses	25	Acre	200	5000

TABLE 7. HOURLY EQUIPMENT COSTS* TO PRODUCE MANDARINS IN VENTURA COUNTY, 2005

			Costs per hours ($)							
				Cash Overhead Costs		Total Cash	Operating Costs		Total	Total
Year	Description	Actual Hours Used	Capital Recovery (a)	Insurance	Taxes	Overhead Costs (b)	Repairs	Fuel & Lube	Operating Costs (C)	Costs/Hr (a+b+c)
2005	70 HP 2WD Tractor	41.3	47.59	1.62	2.31	3.93	1.28	8.62	9.9	61.42
2005	ATV 4WD 20 HP	350.6	1.3	0.03	0.04	0.07	0.4	3.67	4.07	5.44
2005	Bin Trailer #1	162.5	0.36	0.01	0.02	0.03	0.18	0	0.18	0.57
2005	Mower - Rotary 5'	25	14.97	0.29	0.42	0.71	0.29	3.89	4.18	19.86
2005	Pickup Truck 1/2 T	137.5	13.57	0.31	0.44	0.75	0.88	9.19	10.07	24.39
2005	Power Sprayer	213.1	1.03	0.03	0.05	0.08	0.09	5.01	5.1	6.21

*Note: Costs are based on 60% of the values of asses to reflect the mix of old and new equipment complements.

TABLE 8. RANGING ANALYSIS: COSTS AND RETURNS

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE MANDARINS IN VENTURA COUNTY, 2005

	Yield in Carton/Acre						
Afourer 1 (70% of the total produce)	450	514	579	643	707	772	836
Afourer 2 (30% of the total produce)	193	220	248	275	303	331	358
Total Mandarin Yield	643	735	827	**918**	1010	1102	1194
OPERATING COSTS/ACRE:							
Cultural Cost ($)	1425	1425	1425	1425	1425	1425	1425
Harvest Cost ($)	3619	3730	3840	3951	4061	4172	4282
Interest on operating capital ($)	2	2	3	4	4	5	6
TOTAL OPERATING COSTS/ACRE ($)	**5046**	**5157**	**5268**	**5379**	**5490**	**5602**	**5713**
TOTAL OPERATING COSTS/CARTON ($)	8	7	6	**6**	5	5	5
CASH OVERHEAD COSTS/ACRE ($)	1498	1498	1498	1498	1498	1498	1498
TOTAL CASH COSTS/ACRE ($)	**6544**	**6655**	**6766**	**6877**	**6988**	**7100**	**7211**
TOTAL CASH COSTS/CARTON ($)	10	9	8	**7**	7	6	6
NON-CASH OVERHEAD COSTS/ACRE ($)	5085	5085	5085	5085	5085	5085	5085
TOTAL COSTS/ACRE ($)	**11629**	**11740**	**11851**	**11962**	**12073**	**12185**	**12296**
TOTAL COSTS/CARTON ($)	**18**	**16**	**14**	**13**	**12**	**11**	**10**

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR MANDARINS IN VENTURA COUNTY, 2005

Prices ($ per Carton)		Yield (Carton /Acre)						
Afourer 1		450	514	579	643	707	772	836
	Afourer 2	193	220	248	275	303	331	358
17.5	8.75	4515	5770	7025	8279	9534	10789	12043
20	10	5881	7331	8781	10231	11680	13130	14580
22.5	11.25	7247	8892	10537	12182	13827	15472	17117
25	12.5	8613	10453	12293	**14133**	15973	17813	19653
27.5	13.75	9979	12014	14049	16084	18120	20155	22190
30	15	11345	13575	15805	18036	20266	22496	24727
32.5	16.25	12711	15136	17561	19987	22412	24838	27263

NET RETURNS PER ACRE ABOVE CASH COSTS FOR MANDARINS IN VENTURA COUNTY, 2005

Prices ($/ Carton)		Yield (Carton /Acre)						
Afourer 1		450	514	579	643	707	772	836
	Afourer 2	193	220	248	275	303	331	358
17.5	8.75	3017	4272	5527	6781	8036	9291	10545
20	10	4383	5833	7283	8733	10182	11632	13082
22.5	11.25	5749	7394	9039	10684	12329	13974	15619
25	12.5	7115	8955	10795	**12635**	14475	16315	18155
27.5	13.75	8481	10516	12551	14586	16622	18657	20692
30	15	9847	12077	14307	16538	18768	20998	23229
32.5	16.25	11213	13638	16064	18489	20914	23340	25765

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR MANDARINS IN VENTURA COUNTY, 2005

Prices ($/Carton)		Yield (Carton /Acre)						
Afourer 1		450	514	579	643	707	772	836
	Afourer 2	193	220	248	275	303	331	358
17.5	8.75	-2068	-813	442	1696	2951	4206	5460
20	10	-702	748	2198	3648	5097	6547	7997
22.5	11.25	664	2309	3954	5599	7244	8889	10534
25	12.5	2030	3870	5710	**7550**	9390	11230	13070
27.5	13.75	3396	5431	7466	9501	11537	13572	15607
30	15	4762	6992	9222	11453	13683	15913	18144
32.5	16.25	6128	8553	10978	13404	15829	18255	20680

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