

BUSINESS TOOLS *FOR* TOUGH TIMES

# USING UC COST & RETURN STUDIES *TO* IDENTIFY COST SAVING POTENTIALS

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# COSTS *PER* ACRE TO PRODUCE A CROP

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## Operating Costs

- Cultural Costs
- Harvest Costs
- Postharvest Costs
- Interest on Operating Costs

## Cash Overhead

## Noncash Overhead

# 1. OPERATING COSTS

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- Cultural Costs
  - Ground preparation
  - Planting
  - Pruning
  - Pest control
  - Weed control
  - Irrigation
  - Fertilization
- Harvest Cost
- Postharvest Costs

# 1. OPERATING COSTS

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- Cultural Costs
- Harvest Costs
  - Harvest operations
  - Hauling
  - Hulling/Drying
  - Marketing fees
- Postharvest Costs
  - Residue management
  - Weed control
  - Disease control

## 2. CASH OVERHEAD

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- Liability insurance
- Property insurance
- Property taxes
- Office expenses
- Field sanitation
- Repairs on investments
- Land Rent

# 3. NONCASH OVERHEAD (CAPITAL RECOVERY)

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- Irrigation system
- Fuel tanks and pumps
- Trucks/forklifts/ATVs
- Tractors
- Implements
- Harvest equipment

# EXAMPLE COST AND RETURN STUDY

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- Table olives
- Manzanillo variety
- San Joaquin Valley
- Micro Sprinkler irrigation
- 2005

**Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH OLIVES**

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
<b>Tons Per Acre</b>			1.0	2.0	3.5	4.0
<b>Planting Costs:</b>						
Land Preparation - Subsoil: contract	\$185					
Land Preparation - Disc 3X: contract	72					
Land Preparation - Float	3					
Survey, Mark, Dig, & Plant Orchard	282	\$2				
Trees: 151 Per Acre (4% Replant In 2nd Year)	763	\$5				
Wrap, Stake, & Tie Trees	<u>226</u>	<u>34</u>				
<b>TOTAL PLANTING COSTS</b>	<b>1,531</b>	<b>41</b>				
<b>Cultural Costs:</b>						
Prune, Train, & Sucker	14	21	\$21	\$189	\$280	\$378
Brush Disposal		9	15	15	15	15
Weed Control - Spot Spray 4X: yr 1, 2X: Yr 2+	52	26	26	26	26	26
Fertilize - Nitrogen	2	4	9	9	17	17
Irrigate	43	78	107	153	183	183
Leaf Analysis	25	25	25	25	25	25
Insect Control - Olive Fruit Fly 8X			73	73	73	73
Pickup Truck Use	51	51	51	51	51	51
ATV Truck Use	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>
<b>TOTAL CULTURAL COSTS</b>	<b>230</b>	<b>257</b>	<b>370</b>	<b>584</b>	<b>713</b>	<b>811</b>

**Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH OLIVES**

Year	Cost per Acre					
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>
Tons per Acre			1	2	3.5	4
<b>TOTAL PLANTING COSTS</b>	<b>1,531</b>	<b>41</b>				
<b>TOTAL CULTURAL COSTS</b>	<b>230</b>	<b>257</b>	<b>370</b>	<b>584</b>	<b>713</b>	<b>811</b>
<b>TOTAL HARVBST COSTS</b>			<b>300</b>	<b>600</b>	<b>1,050</b>	<b>1,200</b>
<b>TOTAL POSTHARVEST COSTS</b>	<b>72</b>	<b>66</b>	<b>58</b>	<b>60</b>	<b>62</b>	<b>65</b>
<b>TOTAL CASH OVERHEAD COST</b>	<b>312</b>	<b>314</b>	<b>344</b>	<b>344</b>	<b>344</b>	<b>344</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>2,285</b>	<b>695</b>	<b>1,084</b>	<b>1,611</b>	<b>2,200</b>	<b>2,457</b>
<b>INCOME/ACRE FROM PRODUCTION</b>			<b>450</b>	<b>900</b>	<b>1,575</b>	<b>1,800</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	<b>2,285</b>	<b>695</b>	<b>634</b>	<b>711</b>	<b>625</b>	<b>657</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>	<b>2,285</b>	<b>2,980</b>	<b>3,614</b>	<b>4,325</b>	<b>4,950</b>	<b>5,607</b>

Value used for Orchard Establishment Capital Recovery calculation

Table 2. Costs per Acre to Produce Table Olives

Operation	Operation	----- Cash and Labor Costs per Acre -----					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
Cultural:								
Pruning & Sucker	35.00	490	0	0	0	490		
Shred Prunings	0.29	6	3	0	0	8		
Fertilizer - Nitrogen	0.00	0	0	17	0	17		
Irrigate	0.70	10	0	155	0	165		
PCA Activities	0.00	0	0	0	12	12		
Thinning Spray (1 Out Of 2 Years)	0.00	0	0	44	31	75		
Weed Control - Spot Spray 2X	0.29	6	2	17	0	25		
Insect Control - Olive Fly 8X	0.40	8	1	64	0	73		
Pickup Truck Use	1.90	38	13	0	0	51		
ATV Use	1.90	38	5	0	0	43		
<b>TOTAL CULTURAL COSTS</b>	40.48	595	24	297	43	959		
<b>TOTAL HARVEST COSTS</b>	0.00	0	0	0	1,500	1,500		
Postharvest:								
Weed Control - Fall Residual Spray	0.25	5	2	21	0	27		
Pest Control - Black Scale (1 year in 3)	0.00	0	0	24	10	34		
Disease Control - Fall Fungicide Spray	0.00	0	0	16	31	47		
<b>TOTAL POSTHARVEST COSTS</b>	0.25	5	2	60	41	108		
Interest on operating capital @ 7.65%							47	
<b>TOTAL OPERATING COSTS/ACRE</b>		600	26	357	1,584	2,614		

**Table 3. COSTS AND RETURNS TO PRODUCE TABLE OLIVES**

		Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Fertilizer	UN-32	45.00	Lb N	0.375	17	
Water:	Water	37.20	AcIn	4.17	155	
Custom:	PCA Fees	1.00	Acre	12.00	12	
	Harvest Olives	5.00	Ton	300.00	1,500	
Thinning Agent:	Liqua-stik	36.00	Oz	1.23	44	
	Contract:					
	Ground Application	2.33	Acre	31.00	72	
Herbicide:	Roundup Ultra Max	2.00	Pint	8.58	17	
	Princep Caliber 90	2.00	Lb	4.69	9	
	Karmex DF	2.00	Lb	5.59	11	
Insecticide	Spinosad	112.00	Oz	0.57	64	
	Supracide 2E	0.33	Gal	72.29	24	
Fungicide:	Kocide	8.00	Lb	1.94	16	
	Labor (machine)	6.04	Hrs	16.59	100	
	Labor (non-machine)	35.70	Hrs	13.99	500	
	Fuel - Gas	6.11	Gal	2.05	13	
	Fuel - Diesel	2.45	Gal	1.51	4	
	Lube				2	
	Machinery repair				7	
	Interest on operating capital				47	
<b>TOTAL OPERATING COSTS/ACRE</b>					<b>\$2,614</b>	

**Table 2. COSTS PER ACRE TO PRODUCE TABLE OLIVES**

Operation	Operation	----- Cash and Labor Costs per Acre -----					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
<b>Cultural:</b>								
Pruning & Sucker	35.00	490	0	0	0	490		
Shred Prunings	0.29	6	3	0	0	8		
Fertilizer - Nitrogen	0.00	0	0	17	0	17		
Irrigate	0.70	10	0	155	0	165		
PCA Activities	0.00	0	0	0	12	12		
Thinning Spray (1 Out Of 2 Years)	0.00	0	0	44	31	75		
Weed Control - Spot Spray 2X	0.29	6	2	17	0	25		
Insect Control - Olive Fly 8X	0.40	8	1	64	0	73		
Pickup Truck Use	1.90	38	13	0	0	51		
ATV Use	<u>1.90</u>	<u>38</u>	<u>5</u>	<u>0</u>	<u>0</u>	<u>43</u>		
<b>TOTAL CULTURAL COSTS</b>	<b>40.48</b>	<b>595</b>	<b>24</b>	<b>297</b>	<b>43</b>	<b>959</b>		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,500</b>	<b>1,500</b>		
<b>Postharvest:</b>								
Weed Control - Fall Residual Spray	0.25	5	2	21	0	27		
Pest Control - Black Scale (1 year in 3)	0.00	0	0	24	10	34		
Disease Control - Fall Fungicide Spray	<u>0.00</u>	<u>0</u>	<u>0</u>	<u>16</u>	<u>31</u>	<u>47</u>		
<b>TOTAL POSTHARVEST COSTS</b>	<b>0.25</b>	<b>5</b>	<b>2</b>	<b>60</b>	<b>41</b>	<b>108</b>		
<b>Interest on operating capital @ 7.65%</b>						<b>47</b>		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>600</b>	<b>26</b>	<b>357</b>	<b>1,584</b>	<b>2,614</b>		

**Table 4. MONTHLY CASH COST PER ACRE TO PRODUCE TABLE OLIVES**

<b>Beginning MAR 05</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>JAN</b>	<b>FEB</b>	<b>TOTAL</b>
<b>Cultural:</b>													
<b>Pruning &amp; Sucker</b>	<b>490</b>												<b>490</b>
<b>Shred Prunings</b>	<b>8</b>												<b>8</b>
<b>Fertilizer - Nitrogen</b>		<b>17</b>											<b>17</b>
<b>Irrigate</b>		<b>14</b>	<b>20</b>	<b>25</b>	<b>29</b>	<b>27</b>	<b>26</b>	<b>23</b>					<b>165</b>
<b>PCA Activities</b>			<b>12</b>										<b>12</b>
<b>Thinning Spray</b>			<b>75</b>										<b>75</b>
<b>Weed Control - Spot Spray 2X</b>				<b>13</b>			<b>13</b>						<b>25</b>
<b>Insect Control - Olive Fly 8X</b>				<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>						<b>73</b>
<b>Pickup Truck Use</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>51</b>
<b>ATV Use</b>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>4</b></u>	<u><b>43</b></u>
<b>TOTAL CULTURAL COSTS</b>	<b>506</b>	<b>39</b>	<b>115</b>	<b>64</b>	<b>55</b>	<b>54</b>	<b>65</b>	<b>31</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>959</b>
<b>TOTAL HARVEST COSTS</b>	<b>1,500</b>												<b>1,500</b>
<b>Postharvest:</b>													
<b>Weed Control - Fall Residual</b>								<b>27</b>					<b>27</b>
<b>Pest Control - Black Scale</b>								<b>34</b>					<b>34</b>
<b>Disease Control - Fall</b>								<u><b>47</b></u>					<u><b>47</b></u>
<b>POSTHARVEST COSTS</b>								<b>108</b>					<b>108</b>
<b>Interest on operating capital</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>47</b>
<b>OPERATING COSTS</b>	<b>509</b>	<b>42</b>	<b>119</b>	<b>69</b>	<b>60</b>	<b>59</b>	<b>71</b>	<b>1,655</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>2,614</b>

**Table 5. RANGING ANALYSIS  
COSTS PER ACRE AT VARYING YIELDS TO PRODUCE TABLE OLIVES**

	YIELD (TON/ACRE)						
	3.5	4.0	4.5	5.0	5.5	6.0	6.5
<b>OPERATING COSTS/ACRE:</b>							
Cultural Cost	959	959	959	959	959	959	959
Harvest Cost	1,050	1,200	1,350	1,500	1,650	1,800	1,950
Postharvest Cost	108	108	108	108	108	108	108
Interest on operating capital	44	45	46	47	48	49	50
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>2,161</b>	<b>2,312</b>	<b>2,463</b>	<b>2,614</b>	<b>2,765</b>	<b>2,916</b>	<b>3,067</b>
<b>TOTAL OPERATING COSTS/TON</b>	<b>618</b>	<b>578</b>	<b>547</b>	<b>523</b>	<b>503</b>	<b>486</b>	<b>472</b>
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>344</b>	<b>344</b>	<b>344</b>	<b>344</b>	<b>344</b>	<b>344</b>	<b>344</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>2,506</b>	<b>2,657</b>	<b>2,808</b>	<b>2,959</b>	<b>3,110</b>	<b>3,261</b>	<b>3,411</b>
<b>TOTAL CASH COSTS/TON</b>	<b>716</b>	<b>664</b>	<b>624</b>	<b>592</b>	<b>565</b>	<b>543</b>	<b>525</b>
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>921</b>	<b>921</b>	<b>921</b>	<b>921</b>	<b>921</b>	<b>921</b>	<b>921</b>
<b>TOTAL COSTS/ACRE</b>	<b>3,427</b>	<b>3,578</b>	<b>3,729</b>	<b>3,880</b>	<b>4,030</b>	<b>4,181</b>	<b>4,332</b>
<b>TOTAL COSTS/TON</b>	<b>979</b>	<b>894</b>	<b>829</b>	<b>776</b>	<b>733</b>	<b>697</b>	<b>667</b>

**TABLE 5. RANGING ANALYSIS  
NET RETURNS PER ACRE ABOVE OPERATING COSTS**

PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
	3.5	4.0	4.5	5.0	5.5	6.0	6.5
<b>TABLE OLIVE</b>							
300	-1,184	-1,185	-1,186	-1,187	-1,188	-1,189	-1,190
350	1,009	-985	-961	-937	-913	-889	-865
400	-834	-785	-736	-687	-638	-589	-540
450	-659	-585	-511	-437	-363	-289	-215
500	-484	-385	-286	-187	-88	11	110
550	-309	-185	-61	63	187	311	435
600	-134	15	164	313	462	611	760

# DATA COLLECTION SHEET

Crop: Almonds      County: Fresno      Yield: 2000 lbs.

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Date	Operation	Labor Hours	Tractor & Equip.	Equip. hours
5-15	Spot spray weeds	.6	2WD 62 HP tractor Weed sprayer, 100 gal	.5

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Date	Operation	Rate / Acre	Material Used
5-15	Spot spray weeds	1 pint	Roundup

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# OPERATION: SPOT SPRAY WEEDS

**Table 1. Costs per Acre to Produce Almonds**

Hours / Acre	Labor Cost	Fuel, Lube & Repairs	Material	Total Cost
.5	\$6	\$3	\$7	\$16

**Table 2. Costs and Returns to Produce Almonds**

	Quantity / Acre	Unit	Cost / Unit	Cost / Acre
Labor	.6	Hours	\$10.72	\$6
Fuel	.2	Gallons	\$.97	1
Repairs				2
Roundup	1	Pint	6.88	7
Total				\$16

# HOURS *PER* ACRE ASSUMPTIONS

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- **Operating hours per acre** means operating time in the field.
- **Tractor hours per acre** are 1.1 times the operating hours to account for time to and from the field.
- **Labor hours per acre** are 1.2 times the operating hours to allow for setup time and refueling.

# HOURS *PER* ACRE EXAMPLE

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Operation: Spray insecticide

Operating hours per acre .25

Tractor hours per acre .28

Labor hours per acre .30

# REPAIR COSTS *FOR* EQUIPMENT

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$$\text{Repair costs per hour} = \frac{\text{List price} \times \text{TAR \%}}{\text{Hours of Use}}$$

TAR % = total accumulated repairs over the life of the equipment as a percentage of the list price

# REPAIR COST EXAMPLE

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2WD tractor

4,000 hours of use

List price \$30,000

TAR % = 23.1

Repair cost =  $\frac{\$30,000 \times .231}{4,000 \text{ hours}} = \$1.73 \text{ per hour}$

# ALLOCATING CASH OVERHEAD COSTS TO A CROP

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Method 1. Divide the total cost for the farm by the total number of acres.

Method 2. Allocate cash costs to a crop in the same proportion as the revenue for that crop to the total farm revenue.

# INTEREST CALCULATION

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Interest of operating capital bring all operating costs to the same point in time, the harvest month.

It is equivalent to interest paid on an operating loan paid back at the time of harvest.

It is also equivalent to the opportunity cost of self financing production at an interest rate equal to the loan rate.

# CAPITAL RECOVERY *ON* EQUIPMENT *AND* INVESTMENTS

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Capital recovery is the amount of money required each year to recover the difference between the purchase price and the salvage value of the investment.

It is equivalent to the annual payment on a loan with the down payment equal to the present value of the salvage value.

# ALLOCATING EQUIPMENT COSTS *TO A CROP*

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The proportion of the capital recovery cost for a piece of equipment allocated to a crop is equal to the percentage of hours used on the farm dedicated to that crop.

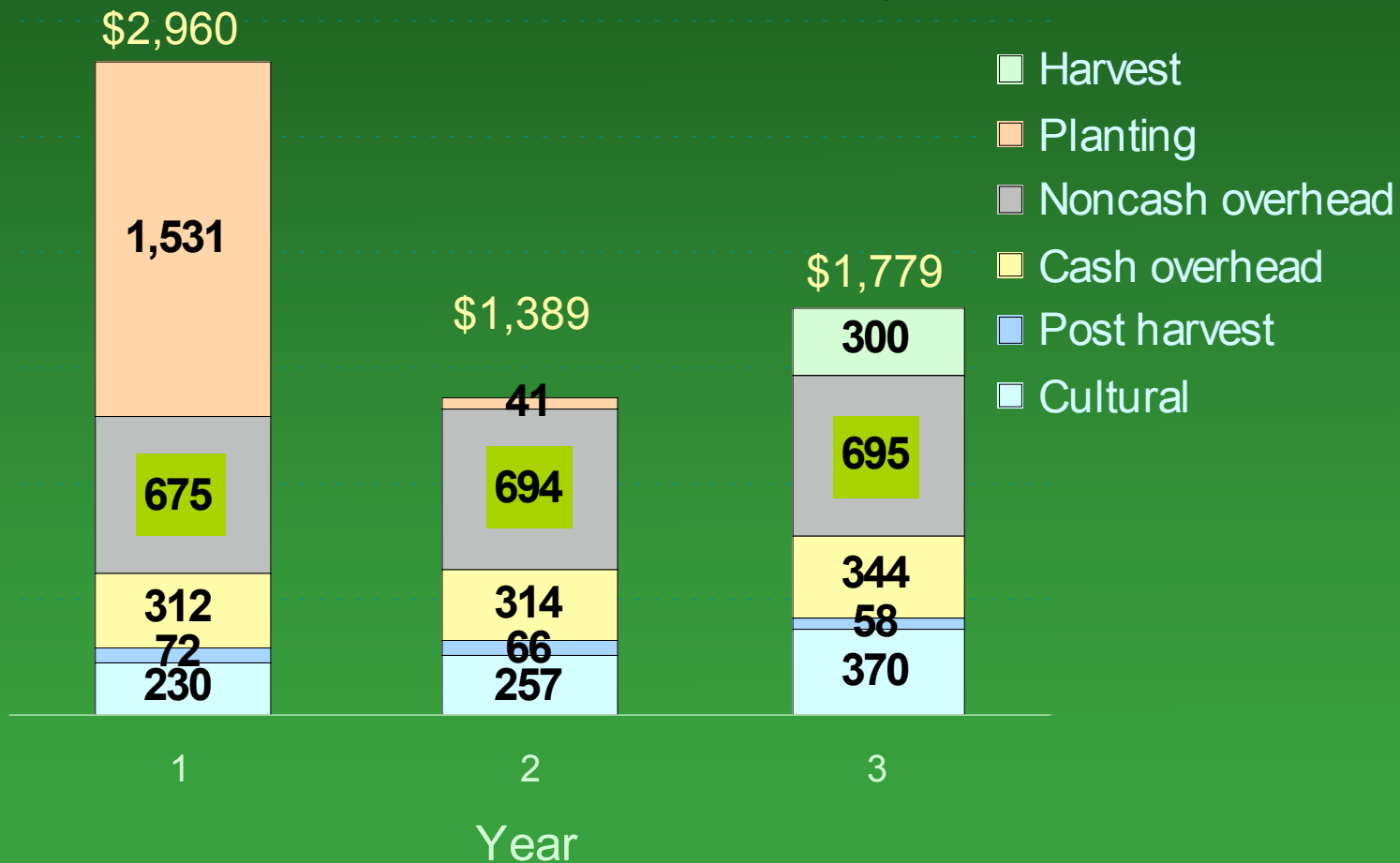
$$\frac{\text{Hours used on the crop}}{\text{Hours used on the farm}}$$

# HOURLY EQUIPMENT COSTS

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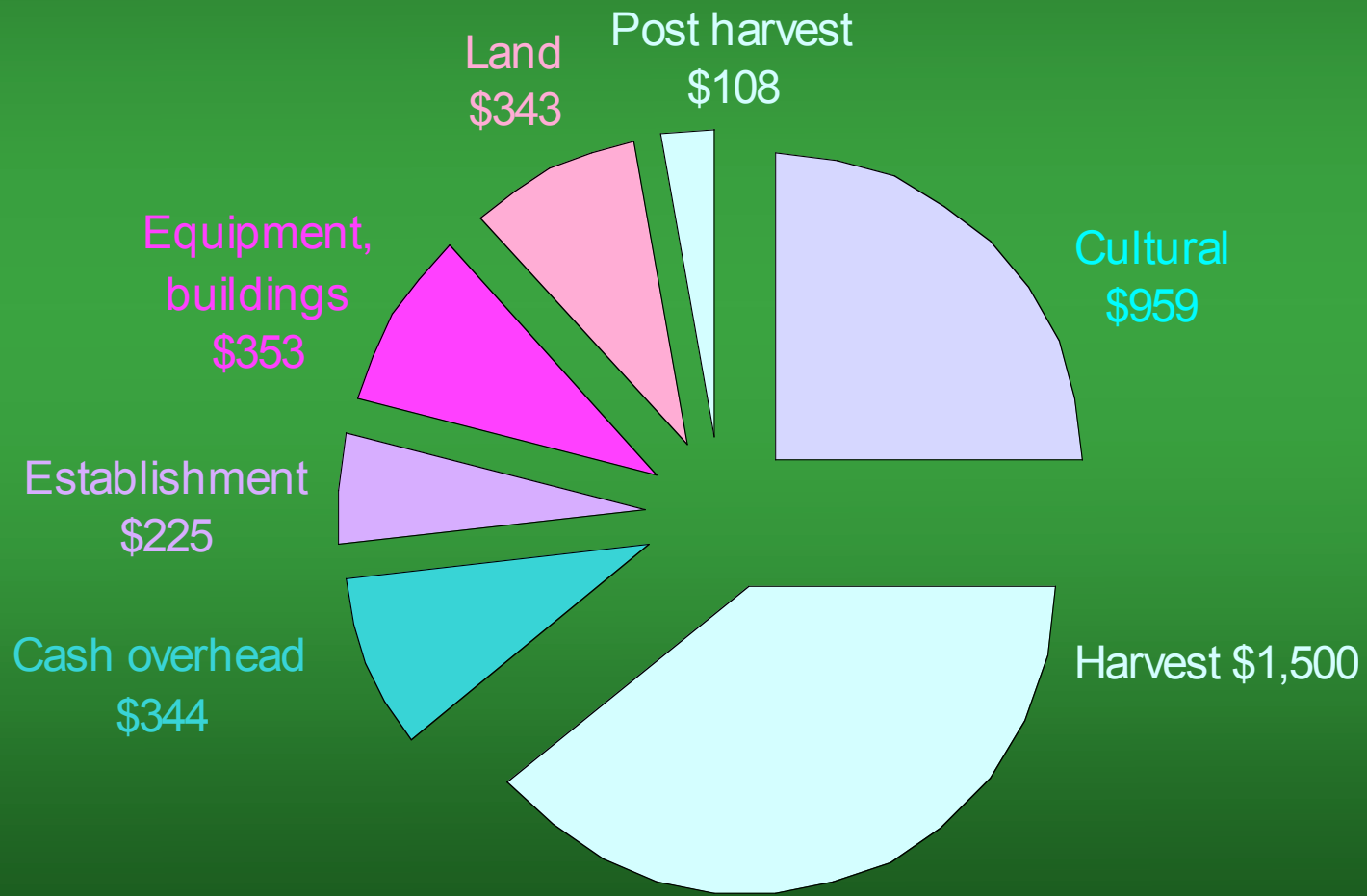
- Noncash overhead  
Capital recovery
- Cash overhead  
Insurance  
Taxes
- Operating costs  
Repairs  
Fuel and lube

# TOTAL COSTS *per* ACRE to ESTABLISH OLIVES



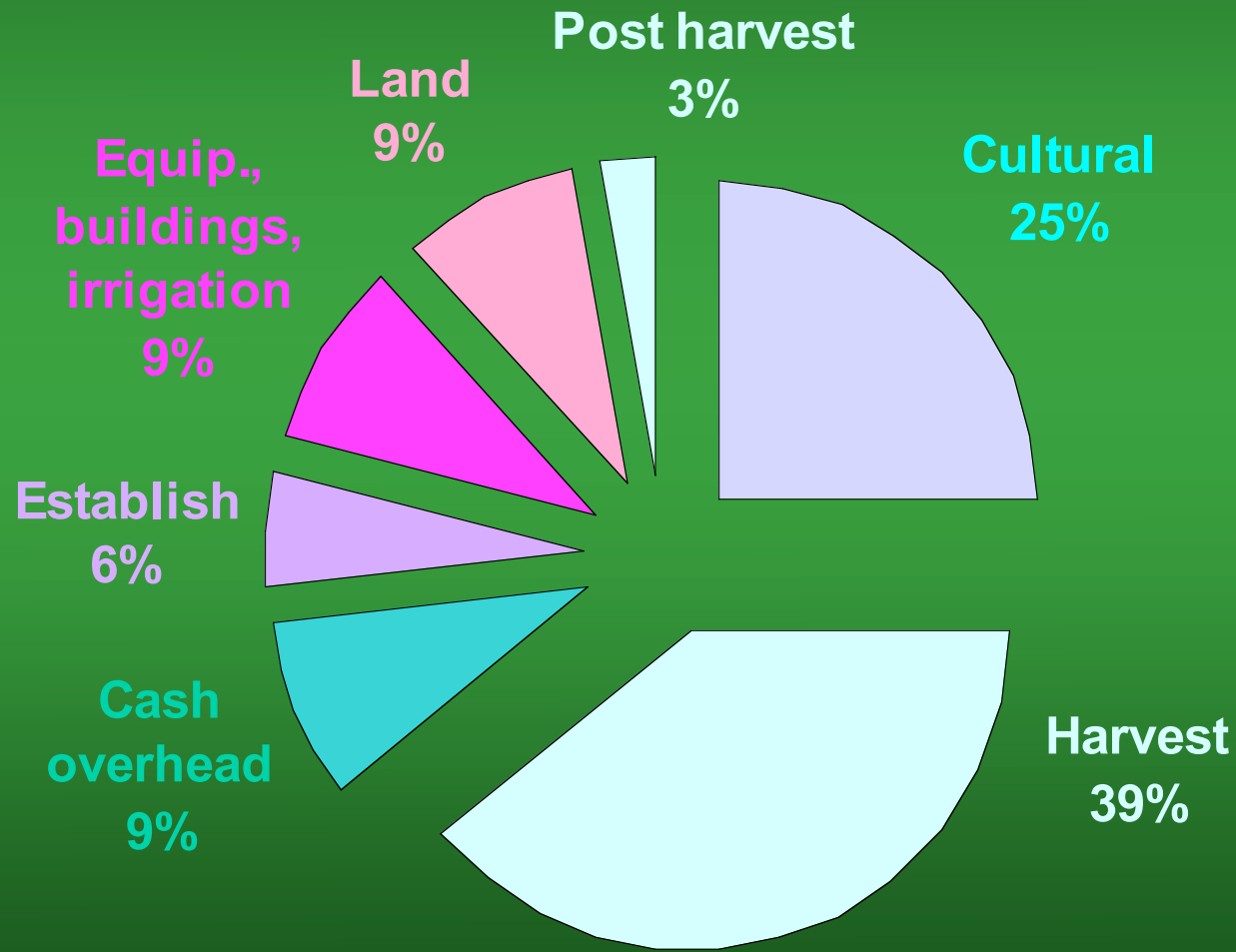
# COSTS *to* PRODUCE TABLE OLIVES

## \$ 3,880 per Acre



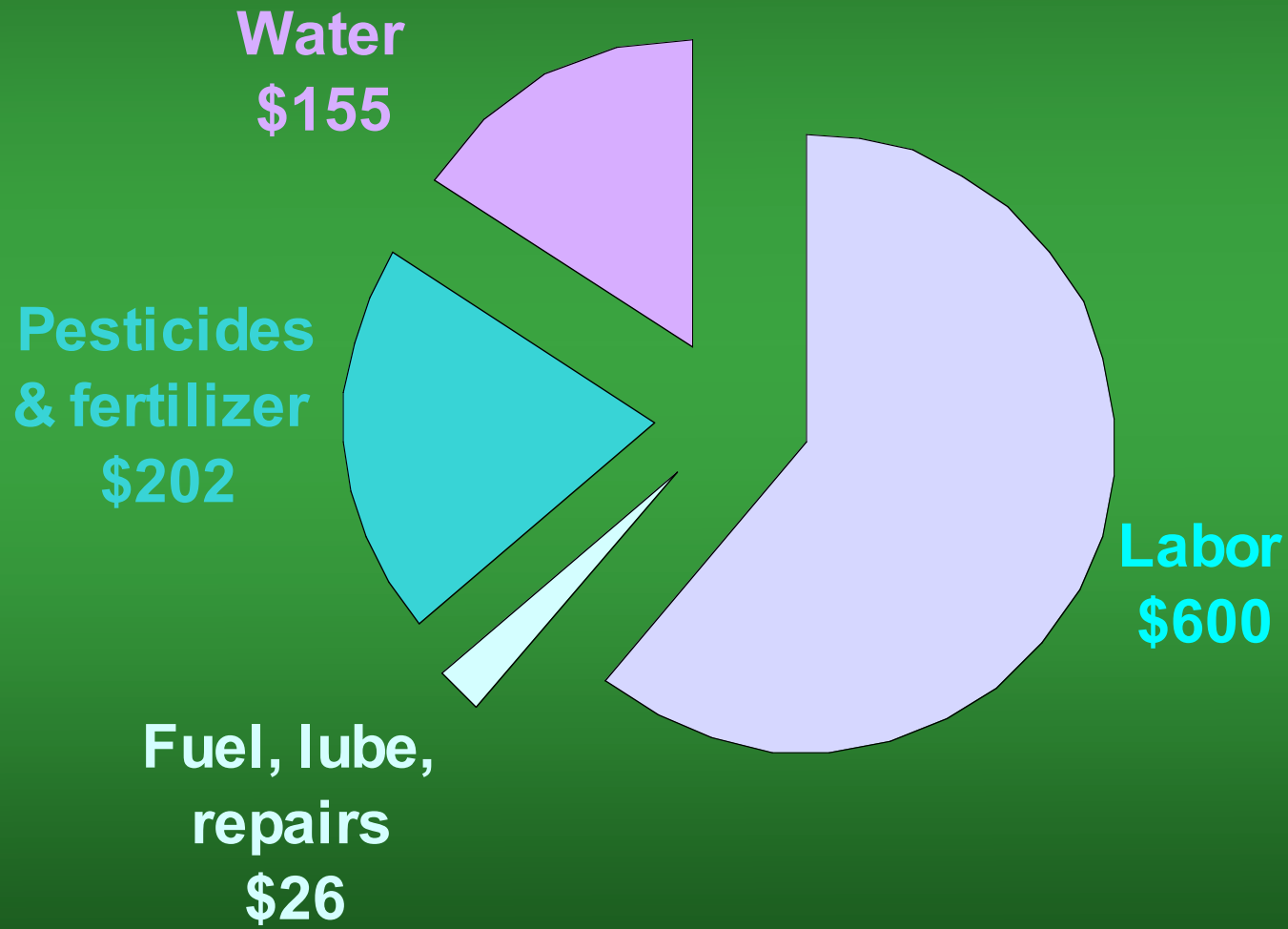
# COSTS *to* PRODUCE TABLE OLIVES

## \$ 3,880 per Acre

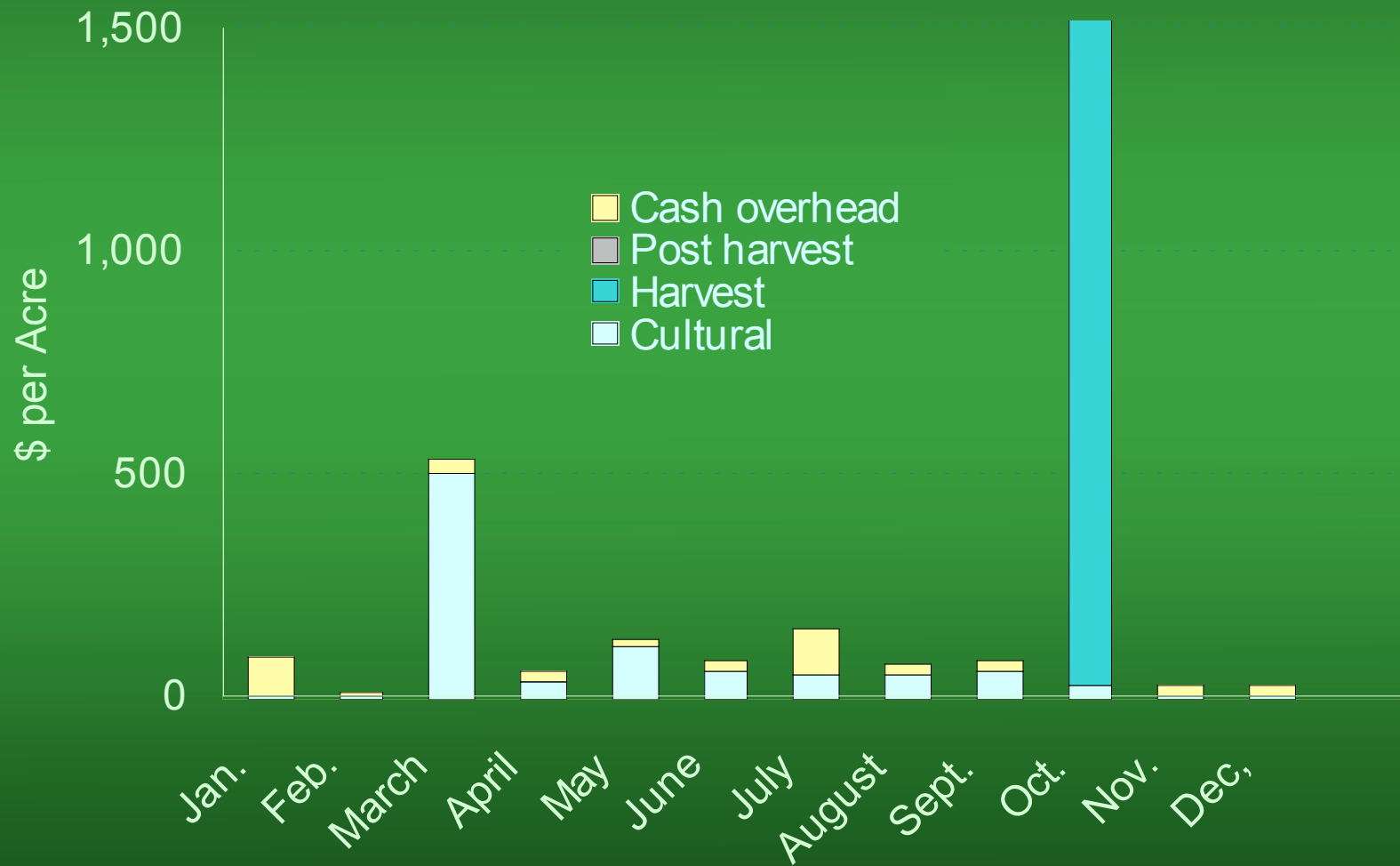


# OPERATING COSTS *to* PRODUCE OLIVES

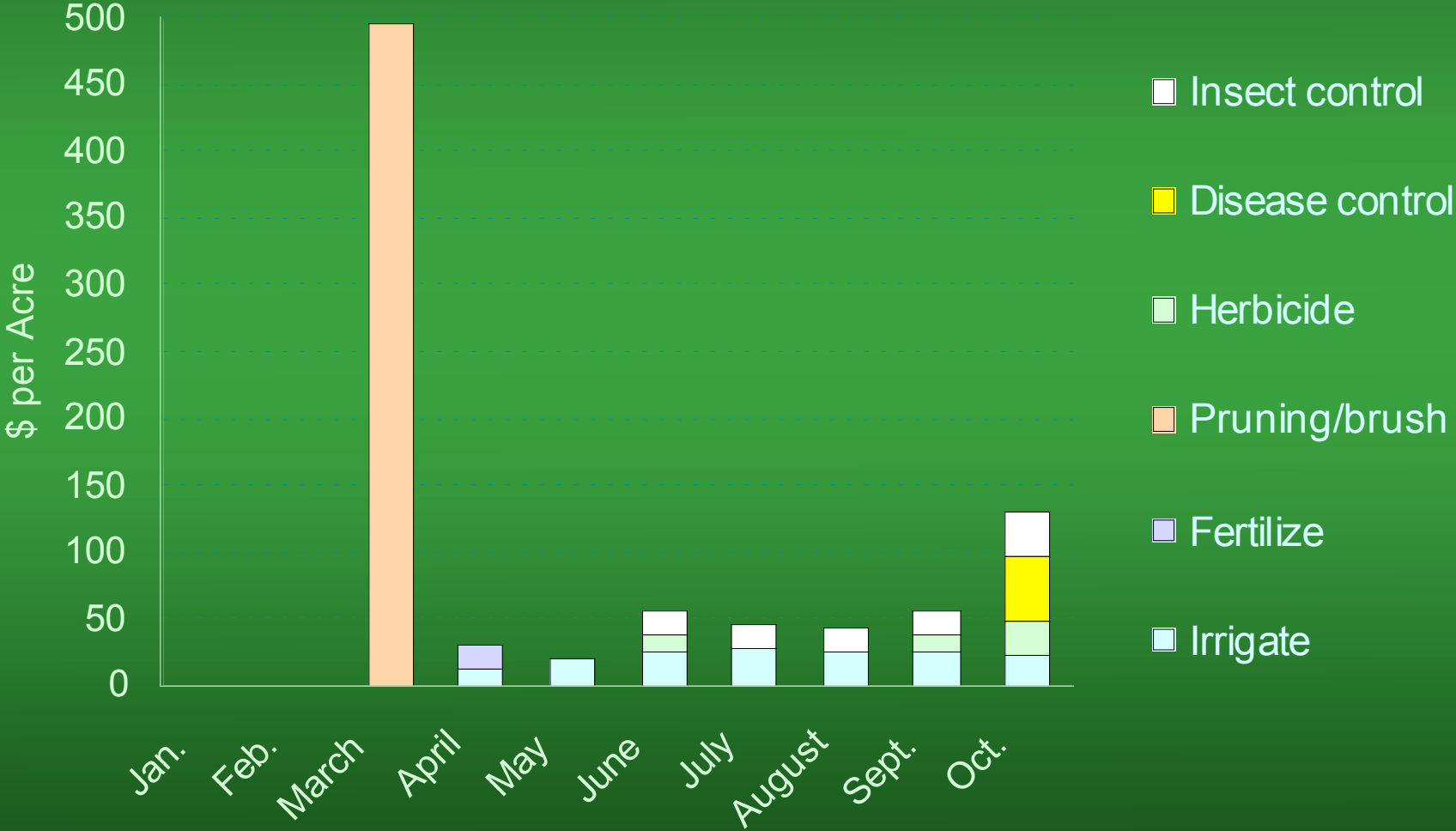
\$ 1,067 per Acre (Excluding Harvest)



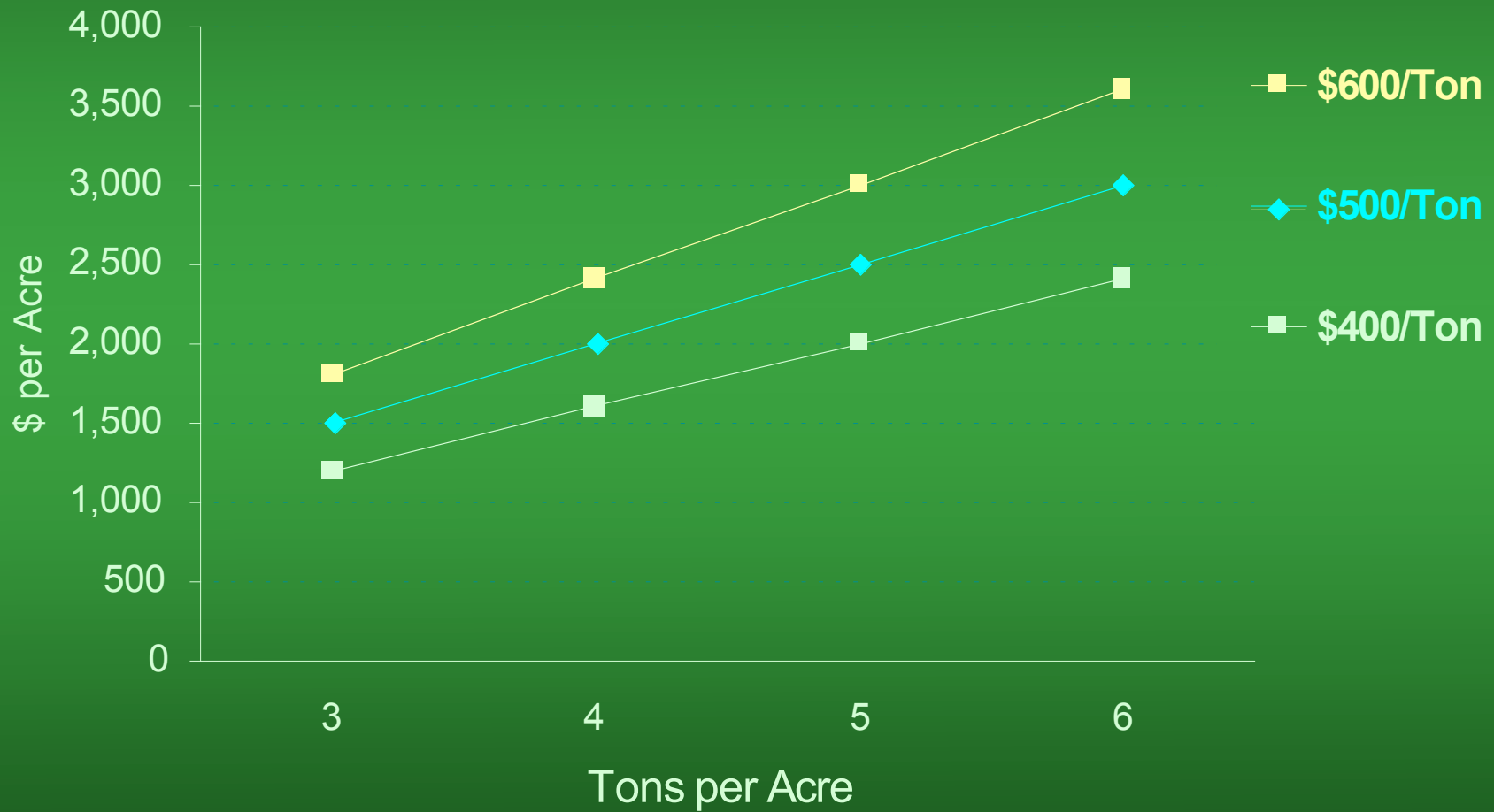
# MONTHLY CASH COSTS *per* ACRE



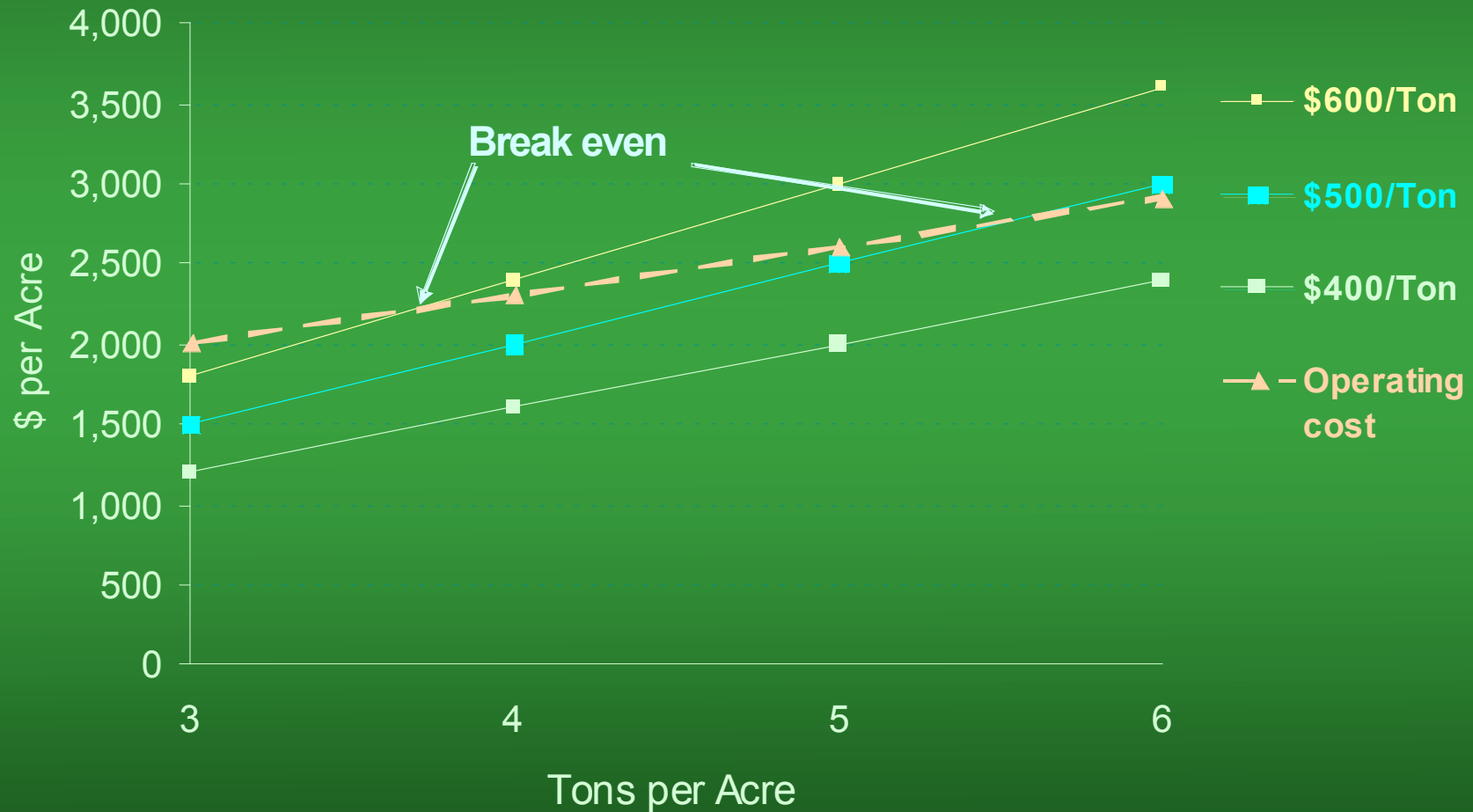
# MONTHLY CULTURAL COSTS *per ACRE*



# REVENUE *per* ACRE at VARYING PRICES



# REVENUE and OPERATING COST



# PRODUCTION EFFICIENCY

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*Rule 1: A dollar saved is a dollar earned.*

Reduce costs where possible.

Profit = Revenue – Cost

\$100 = \$2,000 - \$1,900 starting point

\$200 = \$2,000 - \$1,800 reduce costs

\$200 = \$2,200 - \$2,000 increase revenue

# PRODUCTION EFFICIENCY

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*Rule 2: Don't be dollar wise and pound foolish.*

Choose inputs so that the increase in revenue generated from that input is more than the money spent (increase in cost).

The Revenue increase can be either from quantity or quality improvements.

# OLIVE ORCHARD EXAMPLES

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- Alternate bearing
- Reduce water costs
- Reduce pruning costs
- Reduce fertilizer costs
- Proper timing of harvest

# ALTERNATE BEARING

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- Heavy crop means small fruit, low oil content, late maturing, and lack of new shoot growth for the next year.
- Light crop expensive to pick.
  - Pruning
  - Chemical Fruit Thinning
  - Pollination

# REDUCING WATER COSTS

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- Deficit irrigation from early June through mid August
- Switch from flood irrigation to low – volume systems (e.g. drip, mini – sprinkler).

# REDUCING PRUNING COSTS

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- Wait until bloom (April, May) to assess crop load.
- Prune heavy crop heavily and light-bloom lightly.
- Well pruned, open trees reduce black scale and fungi.

# RETURNS *from* PROPER PRUNING

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- Well pruned, open trees reduce black scale and fungi - reduce pesticide costs.
- Reduce alternate bearing.
- Stimulates new growth for next year's crop.
- Minimizes winter freeze damage when done in spring.
- Reduces tree size for ease of harvest.

# REDUCE FERTILIZER COSTS

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- Excessive nitrogen results in excessive vegetation, fruit quality problems, and is an unneeded expense.
- Potassium and boron are only needed where deficiencies occur.
- Fertilizer mixes often contain costly elements unneeded by olive trees.
- ON THE OTHER HAND nutrition levels must be maintained for tree growth good fruit development.
- Annual leaf – tissue samples should be used.

# HARVEST TIMING

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- At least 1/3 of the olive's weight is obtained during the last 6 weeks of the season.
- Plan harvest timing to obtain the maximum tonnage and value **EVEN IF** it includes additional cost to maximize income.

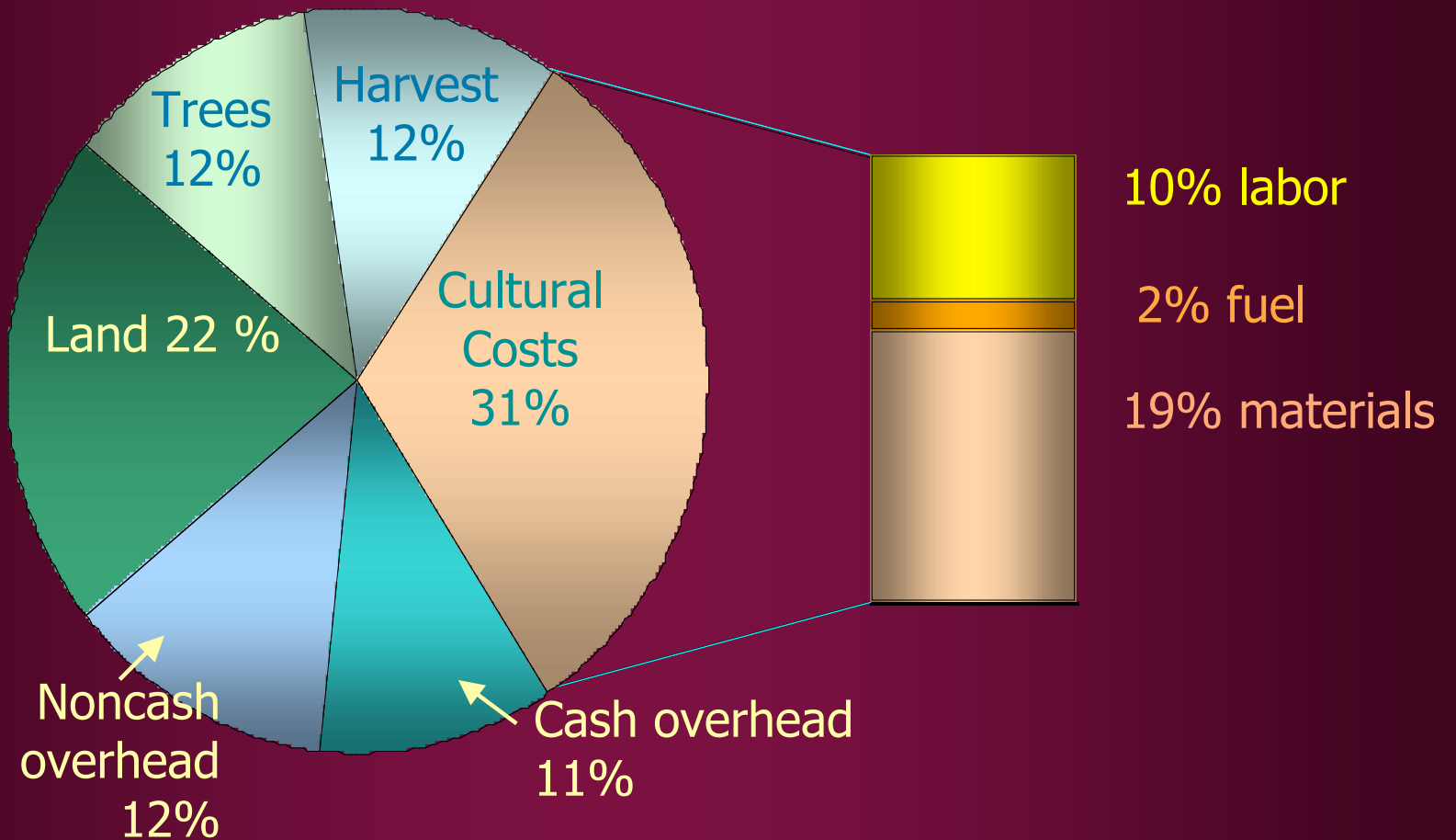
# ALMOND EXAMPLE

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- Costs of production
- Trend analysis
- Breakeven price

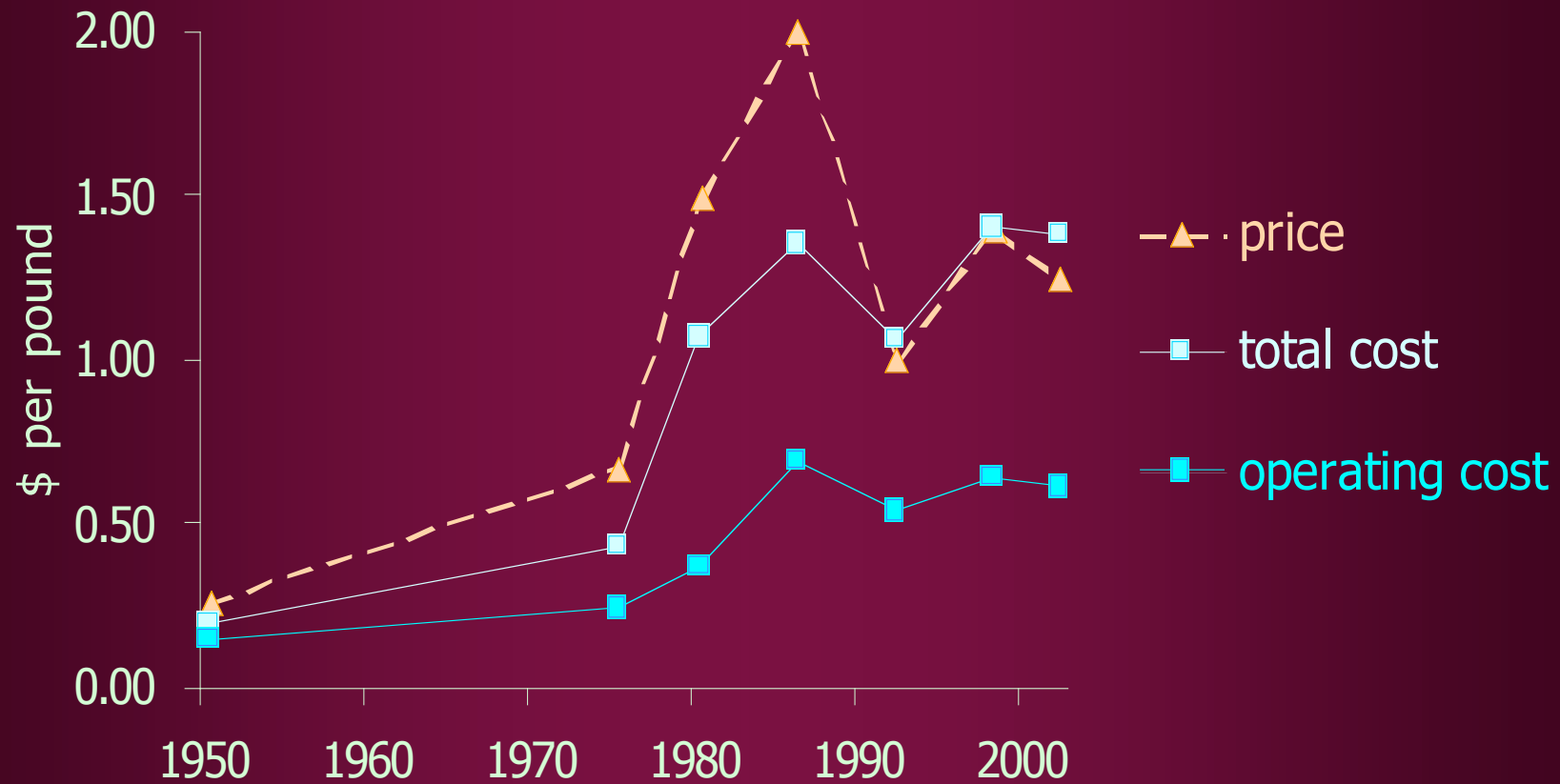
# Costs per Acre to Produce Almonds

## San Joaquin Valley 2002 - \$3,028





# Cost per pound to Produce Almonds



# ADVERTISEMENT

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Cost and return studies are available for downloading in pdf format and Excel spreadsheets at :

<http://coststudies.ucdavis.edu>