UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION (UCCE)

SAMPLE COSTS TO ESTABLISH A DATE PALM ORCHARD AND PRODUCE DATES IN THE COACHELLA VALLEY, RIVERSIDE COUNTY, 2005-2006

Etaferahu Takele, UCCE Area Farm Advisor, Ag. Economics/Farm Management, Southern California

Peggy Mauk, UCCE Horticulture Farm Advisor, Riverside County

Ihab Sharabeen, Staff Research Associate, Farm Management, Southern California

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INTRODUCTION

Sample costs to establish an orchard and produce dates in the Coachella Valley of Riverside County are presented in this study. Operations described are based on production practices considered typical for the area 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 is provided in the cost tables for entering and comparing your farm costs with ours.

The study is based upon on a hypothetical farm size and production practices which are described in the assumption section. For additional information or explanations of the assumptions and cost calculations used in this study, please contact Eta Takele, the Agricultural Economist/Farm Management Advisor, University of California Cooperative Extension-Riverside County (address given at the end of this study).

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.

ASSUMPTIONS: BASIS AND METHODS OF COST CALCULATION

Farm Size: We based this study on a hypothetical farm size of 25 acres. However, long term assets such as machinery and equipment may be used over more acres, hence costs per acre could be slightly lower than stated.

Land Preparation: Land preparation is usually done on custom/contract basis. The contractor usually perform the following ground preparation operations including shredding plant residues and mixing with the soil, discing (~5 times), and fumigation using methyl bromide. Coachella Valley is characterized by stratified soils that are eroded by water and wind forces from the San Jacinto Mountain and the Indio hills. Breaking up the strata can be achieved by using a slip plow. All these operations are done prior to planting, but costs are shown in the first year. Land preparation and fumigation operations are estimated to cost $500 and $1,200 per acre, respectively.

Irrigation System Installation: Some growers use a drip system at the beginning to irrigate young plants up to the age of 6 years and then convert to flood system in the 7th year. For the drip system, a basin will be prepared around the palm to prevent water run-off and to ensure a sufficient supply of water to the plant. The basin should have a slight downward slope towards the plant to allow the water to reach the root system of the young plant Nurseries also use drip irrigation system. In this study, we used flood irrigation system throughout the establishment and production periods. A reservoir is

used to store water and supply the flood irrigation. The cost of irrigation system including the reservoir in this study is assumed to be $1,500 per acre.

Planting: Planting may be done at any time of the year, but most often in spring or fall. Planting spaces in most cases consist of 30 feet x 30 feet (30 feet between rows and 30 feet between palms within the row) allowing approximately 49 palm trees planted per acre, one of which is a male plant enough to pollinate 48 female date palms.

Planting depth is generally 3 feet. Holes are dug and the soils are mixed with organic material and gypsum and put back into the holes and irrigated 2 to 3 times before planting. Offshoots, for planting, ranging in age from 3 to 5 years old are purchased at about $125 per shoot (price includes to cut the offshoot, transport, and plant). Some farm operators have their own offshoots, while others buy them from nearby farms. It is assumed that 30% of the palm trees may need to be replanted in the second year.

The major variety in the Coachella Valley is *Deglet Noor* which constitutes about 75% of the date palm acres. Other varieties are *Medjool* constituting about 20% of the acres, and the remaining 5% includes *Khadrawi,* and *Zahidi*.

Cost of production estimates will be different by variety. In this study, production practices and costs of Deglet Noor are the basis of our assumptions and estimates.

Cover Crop: Cover crops are planted in alternate rows for improving organic matter, nitrogen (N) fixation and also for suppressing weeds. Vetch is the most common cover crop used in the palm orchards of the Coachella Valley. The cover crop is usually seeded in October. It becomes dormant in the spring and grows back in the fall. A one time seeding of cover crop would last for five years with alternate rows seeded for the next round.

Protection: During the fruit-bearing stage, paper covers (resembling lamp shades) are used to protect the dates from possible rain damage during the fall months and from infestation by sooty black mold during the fall ripening months.

Fertilization: The desert soils of the Coachella Valley are sandy with low water holding capacity. Consequently, leaching of nutrients from drainage is very high, especially in flood irrigation. Leaf nutrient level is analyzed every year. Ten percent of the palm trees per acre are randomly selected for analysis of N, P, K, calcium (Ca), magnesium (Mg), sulfur (S), sodium (Na), chlorine (Cl), iron (Fe), copper (Cu), manganese (Mn), boron (B), zinc (Zn), and molybdenum (Mo). At least 2 lbs of fresh leaf material per palm is needed for the analysis. Leaf analysis costs about $10 per acre. Periodical analysis of well water is also done to check for nitrate, salinity, chloride, and sodium pH.

Fertilizer application and nutrients consumption by age of date palm trees is shown in Table A. The sources of the nutrients can vary. Some use organic fertilizers like composted chicken and steer manure as sources of nutrients. Some growers use organic fertilizers mainly composted chicken manure.

Fertilizer spikes are applied in the first year of establishment. One spike per offshoot is inserted using a probe to manually open a hole in the root zone of the palm.

N fertilizer applications for flood irrigation would be 2 to 3 times per year in February, March, and mid-May. N amounts include 1 pound per tree in the second year and increases every year by half a pound per tree. The maximum N rate application at maturity approximates 5 lbs/tree. Application rates for other nutrients including phosphorus, potassium, and magnesium sulphate are given in Table A.

Table A. Fertilizer Application Rates in Dates Production in the Coachella Valley, Riverside County

	Pounds Per Acre				
Year	**Urea**	**Actual Nitrogen (N)**	**Actual Phosphorus (P2O5)**	**Actual Potassium (K2O)**	**Magnesium Sulfate**
1	Fertilizer* Spike				
1			5	5	8
2	98	49	15	15	25
3	147	73.5	15	15	25
4	196	98	35	35	25
5	245	122.5	35	35	25
6	294	147	50	50	25
7	343	171.5	50	50	
8	392	196	65	65	
9	441	220.5	65	65	
Production	490	245	65	65	

*Fertilizer spikes contain nitrogen (N), plus soluble manganese (Mn), magnesium (Mg), potassium (K), iron (Fe), and copper sulphates ($CuSo_4$).

Irrigation: Irrigation water for date palms in the Coachella Valley is supplied either by the district or on-site wells. Water use by age of date palm trees is shown in Table B.

Each year plants are irrigated for 9 months at an 11-day interval during the summer months (May to September) and once a month (October to November and March to April). The amount of irrigation water applied varies by age of the palm trees starting at 1 acre-foot/acre/year in year 1 and doubling every year till it reaches approximately 8 acre-feet/acre/year. The cost of water is approximated at $23 per acre-foot, the average rate charged by the district. Labor to monitor and maintain irrigation is assumed at 15 minutes per acre per irrigation.

Table B. Amount of Water Use by Age of Date Palm Trees in the Coachella Valley, Riverside County

Year	Acre-Feet/ Year
1	1
2	2
3	4
4+	8

Pest Management: Pesticide application rates in this study are based on manufacturer recommendation labels. Many of the labels are obtained from http://www.cdms.net/manuf/manufact.asp. Percent of acres treated, average number of applications, median application rate, and total lb a.i. applied are from the California Department of Pesticide Regulation http://www.cdpr.ca.gov/. Chemical application rates by age of date palm trees are shown in Table C.

Banks Grass Mite: Savey is applied to mature orchards one time per year in early summer (generally in June) at a rate of 6 ounces per acre to control banks grass mites. Banks grass mite causes damage by feeding on green, immature fruit resulting in a scarred fruit that are hardened, shriveled, and cracked. Savey is sprayed into the fruit bunches using hand guns. This procedure requires two workers, one directing the spray into bunches and the other driving a tractor. Sulfur dusting is an alternative practice that may be used by some growers for controlling banks grass mite; however, this is not a typical practice due to a high level of sulfur resistance in the mite population.

Table C. Pesticide Application Rates in Date Palm Orchards in the Coachella Valley, Riverside County

Year	Roundup (Quart Per Acre)	Savey (Ounce Per acre)	Malathion (Pound Per Acre)	Strychnine (Pound Per Acre)
1	2			2
2	4			2
3	4			2
4	4			2
5	4			2
6	8	6	232.5	2
7	8	6	232.5	2
8	8	6	232.5	2
9	8	6	232.5	2
Production	8	6	232.5	2

Carob Moth and Nitidulid Beetles: Malathion Dust is used to control carob moth and nitidulid beetles that cause damage to dates by directly feeding on the fruit. Malathion Dust is applied 3 times per year (August through September) at an annual rate of 232.5 pounds per acre. Malathion is applied using a specialized spray rig designed to deliver dust into the date bunches. This practice requires two workers, one to direct the dust into bunches and another to drive a tractor.

Weeds: Most weed growth in date orchards is kept under control by discing the soil three times a year and spraying Roundup® (glyphosate) using a back pack sprayer or a tractor-pulled herbie. Discing is done only to the rows that are not planted with cover crop and includes one time in the first year and 3 times per year from the second year on. Spot spray of Roundup is applied 2 times a year (in February and April) at the rate of 1 gallon per acre per year for young palms and 2 gallons per acre per year for mature orchards.

Tamarisk, a common perennial weed, aggressively competing for water and nutrients in date palm orchards must be removed mostly mechanically, and some of it by hand hoeing, as it is not effectively controlled using herbicides. The weed must be cut down and the roots removed.

Vertebrates: Vertebrates problems include most commonly gophers and occasionally ground squirrels and rats. Strychnine is applied 2 times at an annual rate of 2 pounds per acre. The bait is dropped below ground into the gopher runs using an applicator tool to control gophers as well as squirrels and rats.

Dethorning: Spines (thorns) from the base of new leaves of the palm trees are removed in order to facilitate pollination and handling of fruit bunches. It is done once a year in January-February and costs approximately $5 per tree.

Pollination: Date palm trees are dioecious, i.e. male and female flowers are in separate trees. Pollination is done manually as there is no natural means of transferring pollen from male plants to female plants. Some growers purchase the pollen and it is estimated that 0.4 gallon of pollen needed per acre at $250 per gallon. In this study, we assumed pollen is purchased. For growers who extract their own pollen from the male palm, the process takes place in March-April which includes that male flowers are harvested and dried. Pollen from the male flowers is separated using specialized equipment (pollen extractor). The pollen is dusted on cotton balls which are stored in sealed containers at low temperatures (between 0^{o} F to 25^{o} F) until the female flowers are open. Once the female flowers are open, bunches around the flowering spike will be thinned and the dusted cotton balls will be inserted manually in the flowering spike. Then the flowering spike will be closed using a rubber band and paper bags are placed over the entire spike. The use of paper bags is recommended to preserve the pollen and also to avoid losses of the pollen. Labor cost for applying pollen to the female plant is charged at $8 per tree. Bags and twine costs are estimated at $0.40 per tree.

Fruit Bunch Tie Down: When the fruit has set, bunches are pulled through the leaves and tied to the mid-rib of a lower frond (large compound leaf) using sisal twine. This operation is done once a year in May-June to support the size and weight of the fruit bunch, and to increase the size and quality of fruit. As the dates mature, the weight of the bunch will increase and a second operation is done where either the number of fruits per strand is reduced, or the total number of strands per bunch is reduced, or a combination. Labor for fruit bunch tie down is estimated at a custom cost of approximately $5.25 per tree. Sisal twine material costs approximately $0.23 per tree.

Pruning and Bagging: Pruning to remove old dry fronds (large compound leaves) is done in July-August. These leaves are pruned off to allow access to the fruit and to the crowns of the palm trees to make sure that pesticide and nutrient treatments can reach young leaves in the crown. Old fruit stalks and undesirable offshoots are pruned off as well.

Rain could coincide with the ripening season and consequently cause severe loss of fruit. Light-brown craft paper is used to cover the bunch to provide protection during the ripening season. Fruit bagging also provides protection against birds and insects. Labor for pruning and bagging is estimated at $10.50 per tree, and craft paper bags and wires at $2.85 per tree.

Harvesting-Picking and Hauling: The offshoots may begin to bloom in year 3 and fruit a year later but a substantial crop is not expected until about year 5 or 6 with full production attained at about year 10. Date palms stay in production for many years even though productivity generally begins to decline at around 40 years of age.

Dates fruit ripen from late September through December. Harvesting, using saddles, extension ladders, or mobile steel towers with catwalks for pickers, is now a standard practice in the Coachella Valley. This process involves harvesters (*palmeros*) ascending the palm trees and cutting off mature bunches, dropping them into containers that are mechanically shaken to separate the ripe dates from the bunches or by lowering the bunches on a rope to a worker on the ground for manually removing the dates from the bunches. Dates are fumigated with methyl bromide, dry brushed and graded by hand in the packing house. Unless intended for immediate consumption, dates with very high moisture content will be dried and stored at low temperatures (0^{o} F)**.**

In this study we estimate picking cost at $0.03 per pound and hauling to a local packing house at $0.02 per pound.

Production:

Yield: Fruit bearing for *Deglet Noor* is assumed to begin at age 5 with 47 pounds per tree. Yield per tree increases at a rate of approximately 45 pounds per year. Yield may reach 272 pounds per tree in year 10 (Table D) and remain the same till the end of the productive period (at around age 40 assumed in our study).

Table D. Estimated Annual Yield of Date Palm Trees in the Coachella Valley, Riverside County

Year	Pounds Per Tree	Pounds Per Acre
5	47	2,256
6	92	4,416
7	137	6,576
8	182	8,736
9	227	10,896
Production (10+)	272	13,056

*Crop Grading***:** Based on a total of 100 points, USDA rating factors include: color, 20 points; uniformity of size, 10 points; absence of defect, 30 points; and character**,** 40 points. Following is the description of grades (Table E).

a. U.S. Grade A or U.S. Fancy is the quality of whole or pitted dates that are of one variety, possess a good color, practically uniform in size, practically free from defects, possess a good character, and score not less than 90 points when scored in accordance with the scoring system.
b. U.S. Grade B or U.S. Choice is the quality of whole or pitted dates, **other than whole dry dates** for processing that are of one variety, possess a reasonably good color, reasonably uniform in size, reasonably free from defects, possess a reasonably good character, and score not less than 80 points when scored in accordance with the scoring system.
c. U.S. Grade B (Dry) or U.S. Choice (Dry) is the quality of whole dry dates for processing that are of one variety, possess a reasonably good color, reasonably uniform in size, reasonably free from defects, possess a reasonably good character, and score not less than 80 points when scored in accordance with the scoring system.
d. U.S. Grade C or U.S. Standard is the quality of whole or pitted dates other than whole dry dates for processing that are of one variety or of date pieces or macerated dates that possess a fairly good color, fairly uniform in size except for date pieces or macerated dates, fairly free from defects, possess a fairly good character, and score not less than 70 points when scored in accordance with the scoring system.
e. U.S. Grade C (Dry) or U.S. Standard (Dry) is the quality of whole dry dates for processing that are of one variety, possess a fairly good color, fairly uniform in size, fairly free from defects, possess a fairly good character, and score not less than 70 points when scored in accordance with the scoring system.
f. Substandard is the quality of dates that fail to meet the requirements of U.S. Grade C or U.S. Standard or U.S. Grade C (Dry) or U.S. Standard (Dry), whichever is applicable.

Table E. United States Department of Agriculture (USDA) Dates Grading Scores

Grades	Factor			
	Color	Uniformity of size	Absence of defects	Character
Maximum Score Points	20	10	30	40
Grade A or Fancy	18 - 20	9 - 10	27 - 30	36 - 40
Grade B or Choice	16 - 17*	8*	24 - 26*	32 - 35*
Grade B (dry) or Choice (dry)	16 - 17*	8*	24 - 26*	32 - 35*
Grade C or Standard	14 - 15*	7*	21 - 23*	28 - 31*
Grade C (dry) or Standard (dry)	14 - 15*	7*	21 - 23*	28 - 31*
Substandard	0 - 13*	0 - 6*	0 - 20*	0 - 27*

* Limiting rule

For more information about limiting rules and further clarification about grading of the date crop, please refer to http://www.hpschmid.com/products/fruitsandnuts/Dates.html

Labor Costs: Wage rates for both owned and hired labor are estimated as $10.50 per hour for machine operator and $8.80 per hour for non-machine labor. Benefits are added at 43% of the wages, bringing the hourly wage rates to $15.00/hour and $12.60 per hour for machine operator and non-machine labor, respectively.

Labor man hours are calculated at 20% higher than equipment time to allow for the extra time involved in activities such as equipment set up, moving around, maintenance, work breaks, and field repairs.

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. According to the data from USDA- NASS, Prices for on-farm delivery of diesel and gasoline are $2.00 and $2.55 per gallon, respectively. The fuel, lube, and repair costs per acre for each operation are determined by multiplying the total hourly operating cost of equipment use 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 many farm management books including the one we frequently use for our studies (Boehlje, Michael D., and Vernon R. Eidman. 1984. Farm Management, John Wiley and Sons. New York, New York).

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

*Interest on Operating Capital***.** The cost of borrowing or the opportunity cost for the money used in the business of producing dates is calculated at a nominal interest rate of 9.25% per year for 2005-2006 from the time the expenses are incurred until harvest. A nominal interest is the rate charged by financial institutions for operating loans.

*Property Taxes***.** Real estate property taxes differ depending on time of purchase and local zoning ordinances. For this study, we calculated property taxes at 1.0% (the rate most counties commonly charge) of the value of the property. For non-real estate property, taxes are calculated on the average value of the property which equals its cost plus salvage value divided by two. Property taxes are then divided by the number of acres to obtain the per acre costs.

Property Insurance. Property loss coverage insurance premiums are charged annually at 0.70% of the average value of the property.

Liability Insurance. Liability insurance coverage for accidents on the farm varies by size of farm. The cost for liability insurance for the 25 acres farm size is approximately $429 per year ($17 per acre).

Field Sanitation. A single trailer mounted sanitation facility at a rental rate of $140 per month is assumed to be sufficient for 25 acres. The facility is to be used for only three months-during the busiest period of operation including harvest. Thus sanitation cost is estimated at $17 per acre per year.

*Office Expense***.** Expenses for office rent, supplies, telephone, fax, internet, accounting, legal fees, utilities and miscellaneous administrative expenses are estimated by growers at $200 per acre per year.

*Investment Repairs***.** Annual repair and maintenance costs for farm buildings, tools and reservoir are calculated at 2% of the price (value) of the investment.

*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 to as ownership or fixed costs, including depreciation and interest on capital investments of farm equipments, farm buildings, irrigation systems, and farm tools are calculated using the capital recovery method.

The capital recovery method captures the combined cost of interest on investment and depreciation. It 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 used to purchase the investment with the down payment equal to the discounted salvage value.

The capital recovery method calculation is more complex than the other methods of calculating 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. In this study, the remaining values for farm machinery are 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 is the amortization factor or the repayment factor for investments made on capital. The factor depends on the life of the investment and interest charge on investment discounted to the present value.

Capital recovery factors for several years and interest rates are available in many farm management books including the one we used in 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.

Interest for capital investments are calculated at the long-run rate of return of agricultural assets to current income. In this study, we used a ten year average (6.25%) of the most current years (data provided by USDA-ERS--Economic Research Services).

Capital recovery costs for the various equipments, machines and investments used in this study are provided in Table 6. Assumptions about values and use of capital assets follow:

Equipments and machines: In this study equipment and machines costs are based on the assumption that the farm has both old and new equipment with the overall complement value approximated at 60% of the new cost.

Irrigation System. The irrigation system includes the costs for building a reservoir (built on the farm site to store water supplied by the district) as well as the costs of a pump (a new 15 horsepower booster pump), filtration station, fertilizer injector system, and the labor to install the system. The pump lifts the water to approximately 20-feet. The filtration/injector station is installed at planting. The irrigation system has a life of 50 years.

Building. The farm shed consists of 1,800 square feet of metal buildings and sheds built on cement slab. It includes a packing shed area. In this study, the cost of the farm shed/ building is approximated at $25,000 for a 25-acre farm.

Shop Tools. Other farm tools included in this study are fuel tanks, pruning and picking clips, and lug boxes. 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. The cost of shop tools is assumed to be $2,000 for a 25-acre farm.

Land Rent. Land rent is a significant cost. In many cases, especially in California the value of land is influenced by fast growing urban development in which case the price of land is driven not by its agricultural use but by its speculative value of future use.

Some cost studies exclude land rent in which case the bottom line figure of net returns can be referred as returns to management and land. Growers can allocate the net returns between management and land rent as they see fit.

In this study, land rent is estimated at an opportunity cost of 6.25% (a ten year average of the most current years (data provided by USDA-ERS--Economic Research Services) of $30,000 per acre of the value of land.

Establishment Costs. The cumulative cash costs incurred to establish (develop)a date palm orchard is referred as the establishment cost. The establishment period of date palm trees is considered to be ~9 years or the period when the trees are assumed to reach full production. Therefore, the establishment cost is the sum of all cash costs less the returns obtained during the 9 year period. This value is amortized approximately over 40 years, (the expected useful life of the orchard) to determine an annual charge for depreciation of trees and the opportunity cost of the investment in tree establishment.

Crop Returns: Our analysis is based upon the *Deglet Noor variety* in which case crop returns for establishment and production are estimated based on our yield estimate given on Table D and prices at $0.65 per pound for Grade A and B and $0.27 for Grade C. No returns are included for culls. Crop pack out distributions used in our study includes 65% Grade A and B, 30% Grade C, and 5% cull.

Crop prices and grower returns may, however, vary depending on variety grown, the time of selling and the supply and demand condition of the market. Therefore, returns using various scenarios of prices and yields are provided in Table 8. Growers may choose the returns that best reflect their specific situation. Crop values of the establishment years are used to offset costs incurred during the period.

SUMMARY

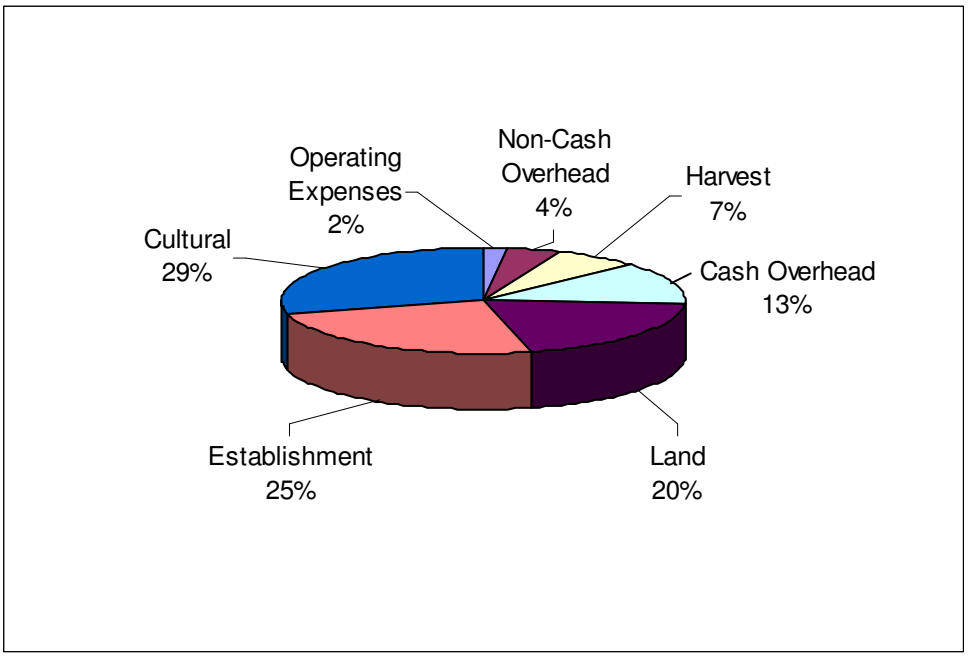
This study of date palm orchard establishment and production costs in the Coachella Valley is based on the most common or typical operations expressed by growers, but can

vary among growers depending upon location, management and cultural practices. Growers should adjust our costs in areas where they differ from it.

Our estimate of the accumulated cash cost during the 9 years period of a date palm orchard establishment in the Coachella Valley of Riverside county is $33,637 per acre (Table 1). The annual production cost including harvesting (assuming 13,056 lbs per acre yield) is estimated to be $9,235 per acre or $0.71 per pound. Annual costs of production estimates are given in Tables 2, 3 and 4 (costs presented in various forms). Due to rounding, the totals may be slightly different between tables.

The pie graph that follows shows the proportion of production costs by category. It shows that 29% of the cost is accounted for by cultural practices such as pruning, weed control, pest control, fertilization, and irrigation, 7% by harvesting (picking and hauling). Cash overhead costs including liability insurance, leaf analysis, sanitation fee, office expenses, property taxes, property insurance and investment repairs account for about 13%; land rent for 20%; non-cash overhead or annual ownership costs of equipments, buildings, tools, and irrigation system for 4% and interest on operating capital for 2%. The amortization or the distribution of the tree establishment cost during the production period accounts for 25%.

Figure 1. Proportion of Production Costs for Dates in the Coachella Valley, Riverside County, 2005-2006



PROFIT ANALYSIS

We analyzed profitability by calculating break-even prices (the costs per pound) as well as using gross and economic margins. The break-even price (Table 9) using the yield assumption of 13,056 pounds per acre in this study includes $0.36 for cash costs and $0.71 per pound for total costs (not including management). Break-even prices (costs per unit of production) compared with market prices provide the margin of profit. Break-even levels are calculated as the cost of production per acre divided by yield per acre.

Gross margin (or returns above total cash costs) is what growers often refer to as profit if there is no debt on the farming operation. Gross margin is calculated as gross returns (price times yield) minus cash costs of production. In this study, gross margin estimate is $1,910 per acre (using 13,056 pound per acre and a price of $0.504). It approximates the return to management and investment. If you deduct depreciation, it also approximates the taxable income of investment. Gross margin is calculated as gross returns (price times yield) minus cash costs of production.

Economic profit compares returns to all costs of production. Economic profit can be negative, zero or positive. A zero economic profit should not be alarming if all costs including the owner's labor and management fees are included in the production cost. In this study, the cost of the owner's labor is included; however, we did not include management charges. Information was not available for it.

Crop yield and prices received by growers may vary. To accommodate such variation, we calculated and provided a range of break-even levels. We also calculated gross and economic margins at various prices and yield levels (Table 8). From these ranges, growers can pick what is most likely to their operation and analyze the performance of their enterprises.

ACKNOWLEDGEMENTS

The authors extend their appreciation to the California Date Commission for helping fund this study. We thank the Coachella Valley growers who have been the main source of information for this study. We also thank those who participated in the review of this study and appreciate the secondary sources (research papers) that enhanced our understanding of the date production practices.

Table 1. Sample Costs Per Acre to Establish a Date Palm Orchard in the Coachella Valley, Riverside County, 2005-2006

Year	Cost per Acre ($)								
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
OPERATIONS									
PRE-PLANTING: (Contract)									
Ground Preparation: Discing	500								
Fumigation (methyl bromide)	1200								
Pre-Plant Discing (1x)	8								
TOTAL PRE-PLANTING COSTS	1708								
PLANTING: (Contract, Labor, Material and Equipment Operating Costs)									
Plant Trees [offshoots + (cut, transport & plant)]	6125								
Re-Plant Trees [offshoots + (cut, transport & plant)]		1875							
TOTAL PLANTING COSTS	6125	1875							
CULTURAL: (Contract, Labor, Material and Equipment Operating Costs)									
Cover Crop	9	9	9	9	9	9	9	9	9
Irrigation	63	86	132	225	225	225	225	225	225
Fertilizer - Fertilizer Spike	144								
Fertilizer - Urea		17	25	33	42	50	58	67	75
Fertilizer - Phosphorus (Super Phosphate) (1x yr.1 and 3x after that)	9	27	27	33	33	38	38	44	44
Fertilizer - Potassium (Potassium Chloride) (1x yr.1 and 3x after that)	8	23	23	26	26	28	28	30	30
Fertilizer - Magnesium Sulfate (1x yr.1 and 3x after that)	10	31	31	31	31	31	0	0	0
Discing: 3x		23	23	23	23	23	23	23	23
Herbicide - Roundup (Glyphosate 2x)	34	54	54	54	54	94	94	94	94
Insecticide - Banks Grass Mite (Savey 1x)						129	129	129	129
Insecticide - Carob Moth (Malathion 3x)						360	360	360	360
Vertebrate Pest Control - Strychnine (2x)	22	22	22	22	22	22	22	22	22
Dethorning 1x					245	245	245	245	245
Pollination (Including Thinning 2x)					503	503	503	503	503
Fruit Bunch Tiedown 1x					263	263	263	263	263
Pruning & Bagging 1x					641	641	641	641	641
TOTAL CULTURAL COSTS	299	292	346	456	2117	2661	2638	2655	2663
HARVEST:									
Picking					68	133	197	262	327
Hauling					45	88	132	175	218
TOTAL HARVEST COSTS					113	221	329	437	545
Interest on Operating Capital @ 9.25%	449	114	15	19	127	153	153	156	158
TOTAL OPERATING COSTS	8581	2281	361	475	2357	3035	3120	3248	3366
CASH OVERHEAD:									
Office Expenses	200	200	200	200	200	200	200	200	200
Liability Insurance	17	17	17	17	17	17	17	17	17
Leaf Analysis	0	10	10	10	10	10	10	10	10
Field Sanitation	0	0	0	0	17	17	17	17	17
Property Tax	321	321	321	321	321	323	323	323	323
Property Insurance	225	225	225	225	225	226	226	226	226
Investment Repairs	52	52	52	52	52	52	52	52	52
Interest-Cash Overhead Costs	38	38	38	38	39	39	39	39	39
Interest-Establishment Costs (Trees)	0	872	1244	1471	1731	2085	2434	2723	2949
TOTAL CASH OVERHEAD COSTS	853	1735	2107	2334	2612	2969	3318	3607	3833
TOTAL ALL CASH COSTS	9434	4016	2468	2809	4969	6004	6438	6855	7199
INCOME FROM PRODUCTION	0	0	0	0	1,136	2,223	3,311	4,399	5,486
NET CASH COSTS FOR THE YEAR	9434	4016	2468	2809	3833	3781	3127	2456	1713
ACCUMULATED NET CASH COSTS	9434	13450	15918	18727	22560	26341	29468	31924	33637
NON-CASH OVERHEAD (CAPITAL RECOVERY):									
Shop Buildings	66	66	66	66	66	66	66	66	66
Shop Tools (fuel tanks, pruning and picking clips, and lug boxes)	6	6	6	6	6	6	6	6	6
Irrigation System	99	99	99	99	99	99	99	99	99
Equipment	170	170	170	170	170	226	226	226	226
Land Rent	1875	1875	1875	1875	1875	1875	1875	1875	1875
TOTAL NON-CASH OVERHEAD COSTS	2216	2216	2216	2216	2216	2272	2272	2272	2272
TOTAL ALL COSTS	11650	6232	4684	5025	7185	8276	8710	9127	9471
RETURNS/ INCOME FROM PRODUCTION	0	0	0	0	1,136	2,223	3,311	4,399	5,486
TOTAL NET COST FOR THE YEAR	11650	6232	4684	5025	6049	6053	5399	4728	3985
TOTAL ACCUMULATED NET COST	11650	17882	22566	27591	33640	39693	45092	49820	53805

Table 2. Costs Per Acre by Category to Produce Dates in the Coachella Valley, Riverside County, 2005-2006

OPERATION	Operation Time Hrs/Acre	Costs Per Acre ($) Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CULTURAL: (Contract, Labor, Material and Equipment Operating Costs)							
Cover Crop	0.14	3	2	4	0	9	
Irrigation	1.9	34	6	184	0	224	
Fertilizer - Urea 46%N (3x)	0	0	0	83	0	83	
Fertilizer - Phosphorus (Super Phosphate) (3x)	0.75	14	8	22	0	44	
Fertilizer - Potassium (Potassium Chloride) (3x)	0.75	14	8	9	0	31	
Discing: 3x	0.75	14	9	0	0	23	
Herbicide - Roundup (Glyphosate 2x)	0.5	9	5	79	0	93	
Insecticide - Banks Grass Mite (Savey 1x)	0.63	19	10	100	0	129	
Insecticide - Carob Moth (Malathion 3x)	1.88	58	29	274	0	361	
Vertebrate Pest Control - Strychnine (2x)	0.83	15	3	5	0	23	
Dethorning 1x	0	0	0	0	245	245	
Pollination (Including Thinning 2x)	0	0	0	0	503	503	
Fruit Bunch Tiedown 1x	0	0	0	0	263	263	
Pruning & Bagging 1x	0	0	0	0	641	641	
TOTAL CULTURAL COSTS	8.13	180	80	760	1652	2672	
HARVEST:							
Picking					392	392	
Hauling					261	261	
TOTAL HARVEST COSTS						653	
Interest on Operating Capital @ 9.25%						160	
TOTAL OPERATING COSTS						3485	
CASH OVERHEAD:							
Office Expenses						200	
Liability Insurance						17	
Leaf Analysis						10	
Field Sanitation						17	
Property Tax						492	
Property Insurance						344	
Investment Repairs						52	
Interest-Cash Overhead Costs						53	
TOTAL CASH OVERHEAD COSTS						1185	
TOTAL ALL CASH COSTS						4670	

			Total Cost ($)	Your Cost ($)
NON-CASH OVERHEAD:				
Investment	**Unit Price $/Acre**	**Capital Recovery Per Year ($)**		
Shop Buildings	1000	66	66	
Shop Tools	80	6	6	
Irrigation System	1500	99	99	
Equipment	1904	226	226	
Land Purchase	30000	1875	1875	
Establishment Cost (Trees)	33637	2293	2293	
TOTAL NON-CASH OVERHEAD COSTS			4565	
TOTAL ALL COSTS			9235	

Table 3. Costs Per Acre by Operation to Produce Dates in the Coachella Valley, Riverside County, 2005-2006

OPERATION	Operation Time Hrs/Acre	Costs Per Acre ($)								
		Labor Cost	Material Cost	Custom/ Rent Cost	Equipment			Operating Interest Cost	Total Cost	Your Cost
					Capital Recovery Cost	Cash Overhead (Tax & Insurance) Cost	Operating (Fuel, Lubricant & Repair) Cost			
CULTURAL: (Contract, Labor, Material and Equipment Operating Costs)										
Cover Crop	0.14	2.52	4.20	0	30.58	2.25	1.81	0.20	42	
Irrigation	1.90	34.20	184.42	0	12.67	0.70	6.21	10.40	249	
Fertilizer - Urea 46%N (3x)	0.00	0.00	83.30	0	0.00	0.00	0.00	6.21	90	
Fertilizer - Phosphorus (Super Phosphate) (3x)	0.75	13.50	22.10	0	13.23	1.21	7.99	3.25	61	
Fertilizer - Potassium (Potassium Chloride) (3x)	0.75	13.50	8.67	0	13.23	1.21	7.99	2.25	47	
Discing: 2x	0.75	13.50	0.00	0	38.63	3.04	9.04	1.45	66	
Herbicide - Roundup (Glyphosate 2x)	0.50	9.00	79.44	0	14.47	1.21	5.47	7.24	117	
Insecticide - Banks Grass Mite (Savey 1x)	0.63	19.19	100.02	0	24.52	1.98	9.52	6.95	162	
Insecticide - Carob Moth (Malathion 3x)	1.88	57.56	274.35	0	73.16	5.92	28.57	12.97	453	
Strychnine - Vertebrate Pests (2x)	0.83	15.00	4.64	0	5.54	0.31	2.72	0.78	29	
Dethorning 1x	0	0	0	245	0	0	0	20.77	266	
Pollination (Including Thinning 2x)	0	0	0	503	0	0	0	38.79	542	
Fruit Bunch Tiedown 1x	0	0	0	263	0	0	0	14.19	277	
Pruning & Bagging 1x	0	0	0	641	0	0	0	24.70	666	
TOTAL CULTURAL	8.13	177.97	761.14	1652	226.02	17.84	79.32	150.15	3064	
HARVEST:										
Picking and Hauling	0	0	0	653	0	0	0	10.06	663	
TOTAL HARVEST	0	0	0	653	0	0	0	10.06	663	
TOTAL OPERATING	8.13	177.97	761.14	2305	226.02	17.84	79.32	160.21	3727	
CASH OVERHEAD:										
Office Expenses									200	
Liability Insurance									17	
Leaf Analysis									10	
Field Sanitation									17	
Investment Property Tax									481	
Investment Property Insurance									337	
Investment Repairs									52	
Interest-Cash Overhead Costs									53	
TOTAL CASH OVERHEAD COSTS									1167	
NON-CASH OVERHEAD:										
	Unit Price $ Per Acre			**Capital Recovery Per Year ($)**						
Shop Buildings	1000			66					66	
Shop Tools	80			6					6	
Irrigation System	1500			99					99	
Land Purchase	30000			1875					1875	
Establishment Cost (Trees)	33637			2293					2293	
TOTAL NON-CASH OVERHEAD COSTS									4339	
TOTAL ALL COSTS									9233	

Table 4. Costs and Returns Per Acre to Produce Dates in the Coachella Valley, Riverside County, 2005-2006

	Quantity Per Acre	Unit*	Price or Cost/Unit ($)	Value or Cost/Acre ($)	Your Cost ($)
GROSS RETURNS					
Grade B (65% of Total)	8486	lb	0.65	5516	
Grade C (30% of Total)	3917	lb	0.27	1058	
Culls (5% of Total)	653	lb	0.00	0	
Total	13056	lb	0.504	6574	
RETURNS/INCOME FROM PRODUCTION				**6574**	
OPERATING COSTS					
Cover Crop					
Lana Vetch	4	lb	1.05	4	
Water:					
Water	96	AF	1.92	184	
Fertilizer					
Urea 46%N	490	lb	0.17	83	
Phosphorus (Super Phosphate)	130	lb	0.17	22	
Potassium (Potassium Chloride)	108	lb	0.08	9	
Herbicide					
Roundup (Glyphosate)	8	qt	9.93	79	
Insecticide					
Savey	6	oz	16.67	100	
Malathion	232.5	lb	1.18	274	
Rodenticide					
Strychnine	2	lb	2.32	5	
Contract					
Dethorning	1	acre	245	245	
Pollination & Thinning	2	acre	503	503	
Fruit Bunch Tiedown	1	acre	263	263	
Pruning & Bagging	1	acre	641	641	
Picking	13056	lb	0.03	392	
Hauling	13056	lb	0.02	261	
Labor (Machine)	9.75	hrs	15.00	146	
Labor (Non-Machine)	2.52	hrs	12.60	32	
Fuel - Gas	2.73	gal	2.55	7	
Fuel - Diesel	20.40	gal	2.00	41	
Lube				7	
Machinery Repair				24	
Interest on Operating Capital @ 9.25%				160	
TOTAL OPERATING COSTS				**3483**	
NET RETURNS ABOVE OPERATING COSTS				**3090**	
CASH OVERHEAD COSTS:					
Office Expenses				200	
Liability Insurance				17	
Leaf Analysis				10	
Field Sanitation				17	
Property Tax				492	
Property Insurance				344	
Investment Repairs				52	
Interest-Cash Overhead Costs				53	
TOTAL CASH OVERHEAD COSTS				**1185**	
TOTAL ALL CASH COSTS				**4668**	
NET RETURNS ABOVE CASH COSTS				**1905**	
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):					
Shop Buildings				66	
Shop Tools				6	
Irrigation System				99	
Equipment				226	
Land Rent				1875	
Establishment Cost (Trees)				2293	
TOTAL NON-CASH OVERHEAD COSTS PER ACRE				**4565**	
TOTAL ALL COSTS				**9233**	
NET RETURNS ABOVE TOTAL ALL COSTS				**-2660**	

Table 5. Monthly Cash Costs Per Acre to Produce Dates in the Coachella Valley, Riverside County, 2005-2006

	Costs Per Acre ($)												
Beginning February 2005 Ending January 2006	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**Total**
CULTURAL: (Contract, Labor, Material and Equipment Operating Costs)													
Cover Crop									9				9
Irrigation every 11 days (May-Sep.) and 1x/month (Oct.-Nov. & March-April)		13	13	28	39	39	39	28	13	13			225
Fertilizer - Urea 46%N (3x)	28	28		28									84
Fertilizer - Phosphorus (Super Phosphate) (3x)	15	15		15									45
Fertilizer - Potassium (Potassium Chloride) (3x)	10	10		10									30
Discing 3x	8			8		8							24
Herbicide - Roundup (Glyphosate 2x)	47		47										94
Insecticide - Banks Grass Mite (Savey 1x)					129								129
Insecticide - Carob Moth (Malathion 3x)							240	120					360
Rodenticide - Vertebrate Pests (Strychnine 2x)						11			11				22
Dethorning 1x	245												245
Pollination (Including Thinning 2x)		503											503
Fruit Bunch Tiedown 1x					263								263
Pruning & Bagging 1x							641						641
TOTAL CULTURAL COSTS	353	569	60	89	431	58	920	148	33	13	0	0	2674
HARVEST:													
Picking									131	131	131		393
Hauling									87	87	87		261
TOTAL HARVEST COSTS									218	218	218		654
Interest on Operating Capital @ 9.25%	3	7	8	8	12	12	19	20	22	24	26		160
TOTAL OPERATING COSTS	356	576	68	97	443	70	939	168	273	255	244		3488
CASH OVERHEAD:													
Office Expenses								200					200
Liability Insurance								17					17
Leaf Analysis											10		10
Field Sanitation									6	6	6		18
Property Tax			246							246			492
Property Insurance			172							172			344
Investment Repairs	4	4	4	4	4	4	4	4	4	4	4	4	48
Interest-Cash Overhead Costs								53					53
TOTAL CASH OVERHEAD COSTS	4	4	422	4	4	4	4	274	10	428	20	4	1182
TOTAL CASH COSTS	360	580	490	101	447	74	943	442	283	683	264	4	4670

Table 6. Whole Farm Equipment, Investment and Business Overhead Costs Based on a-25 Acre Date Palm Orchard in the Coachella Valley, Riverside County, 2005-2006

EQUIPMENT

Year	Description	Price ($)	Life (Year)	Capital Recovery ($)	Cash Overhead Costs ($)		Total Cost ($)
					Insurance	Taxes	
2005-2006	70 HP 4WD Tractor	36,800	15	3696	142	202	4040
2005-2006	ATV 4WD	4,500	7	760	17	25	802
2005-2006	Disc-Offset 11'	10,000	10	1300	38	55	1393
2005-2006	Herbie Sprayer	2,000	10	260	8	11	279
2005-2006	Seed Drill	7,490	10	974	29	41	1044
2005-2006	Spreader	569	10	74	2	3	79
2005-2006	Duster Sprayer	18,000	10	2340	69	99	2508
TOTAL COSTS		**79,359**		**9,404**	**305**	**436**	**10,145**
60% OF THE EQUIPMENT COSTS*		**47,615**		**5,642**	**183**	**262**	**6,087**

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

INVESTMENT

Description	Price ($)	Life (Year)	Capital Recovery ($)	Cash Overhead Costs ($)			Total Cost ($)
				Insurance	Taxes	Repairs	
Shop Buildings	25,000	50	1642	88	125	500	2355
Shop Tools	2,000	25	160	7	10	40	217
Irrigation System	37,500	50	2463	131	188	750	3532
Land Value	750,000	50	46875	5250	7500	0	59625
Establishment (Trees)	840,925	41	57332	2943	4205	0	64480
TOTAL INVESTMENT COSTS	**1,655,425**		**108,472**	**8,419**	**12,028**	**1,290**	**130,209**

ANNUAL BUSINESS OVERHEAD

Description	Units Per Farm	Unit	Price Per Unit ($)	Total Cost ($)
Office Expenses	25	acre	200	5000
Liability Insurance	25	acre	17.16	429
Leaf Analysis	25	acre	10.00	250
Field Sanitation	25	acre	16.80	420
Interest - Cash Overhead	25	acre	52.91	1323

Table 7. Hourly Equipment Costs to Produce Dates in the Coachella Valley, Riverside County, 2005-2006

			Costs per Hour ($)*							
				Cash Overhead			Operating Expenses			
Year	Description	Actual Hours Used	Capital Recovery	Insurance	Taxes	Total Cash Overhead	Repairs	Fuel & Lube	Total Operating Expenses	Total Costs Per Hour
2005-2006	70 HP 4WD Tractor	148.2	14.96	0.57	0.82	1.39	1.58	7.91	9.49	25.84
2005-2006	ATV 4WD	68.3	6.67	0.15	0.22	0.37	0.34	2.93	3.27	10.31
2005-2006	Disc-Offset 11'	22.2	35.05	1.04	1.48	2.52	1.62	0.00	1.62	39.19
2005-2006	Herbie Sprayer	12.5	12.48	0.37	0.53	0.90	0.5	0.00	0.5	13.88
2005-2006	Seed Drill	3.5	166.90	4.94	7.06	12.00	0.85	0.00	0.85	179.75
2005-2006	Spreader	37.5	1.18	0.04	0.05	0.09	0.22	0.00	0.22	1.49
2005-2006	Duster Sprayer	62.5	22.46	0.67	0.95	1.62	4.8	0.00	4.8	28.88

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

Table 8. Range Analysis: Analysis of Costs and Returns for Producing Dates at Varying Yield and Prices in the Coachella Valley, Riverside County, 2005-2006

Harvesting Costs	**$ per pound**
Picking & hauling	0.05

COSTS PER ACRE AND PER POUND AT VARYING YIELDS

	Yield (Pounds Per Acre)						
	9,139	10,445	11,750	**13,056**	14,362	15,667	16,973
OPERATING COSTS:							
Cultural Costs ($)	2672	2672	2672	2672	2672	2672	2672
Harvest Cost ($)	457	522	588	653	718	783	849
Interest on Operating Capital ($)	139	146	153	160	167	174	181
TOTAL OPERATING COSTS PER ACRE ($)	**3268**	**3340**	**3413**	**3485**	**3557**	**3629**	**3702**
TOTAL OPERATING COSTS PER POUND ($)	**0.36**	**0.32**	**0.29**	**0.27**	**0.25**	**0.23**	**0.22**
CASH OVERHEAD COSTS PER ACRE ($)	1185	1185	1185	1185	1185	1185	1185
TOTAL CASH COSTS PER ACRE ($)	**4453**	**4525**	**4598**	**4670**	**4742**	**4814**	**4887**
TOTAL CASH COSTS PER POUND ($)	**0.49**	**0.43**	**0.39**	**0.36**	**0.33**	**0.31**	**0.29**
NON-CASH OVERHEAD COSTS PER ACRE ($)	4565	4565	4565	4565	4565	4565	4565
TOTAL ALL COSTS PER ACRE ($)	**9018**	**9090**	**9163**	**9235**	**9307**	**9379**	**9452**
TOTAL ALL COSTS PER POUND ($)	**0.99**	**0.87**	**0.78**	**0.71**	**0.65**	**0.60**	**0.56**

NET RETURNS PER ACRE ABOVE OPERATING COSTS AT VARYING YIELD AND PRICES

			Yield (Pounds Per Acre)						
			9,139	10,445	11,750	**13,056**	14,362	15,667	16,973
Price ($ Per Pound)									
Grade B	Grade C	Weighted Average ($ Per Pound)	Net Returns Per Acre Above Operating Costs ($)						
0.45	0.19	0.35	-42	347	735	1124	1513	1901	2290
0.52	0.22	0.40	415	869	1323	1777	2231	2684	3138
0.58	0.24	0.45	881	1402	1922	2443	2963	3483	4004
0.65	0.27	0.50	1338	1924	2510	**3095**	3681	4267	4853
0.72	0.30	0.55	1795	2446	3097	3748	4399	5050	5701
0.78	0.32	0.61	2261	2979	3696	4414	5132	5849	6567
0.84	0.35	0.66	2718	3501	4284	5067	5850	6633	7416

NET RETURNS PER ACRE ABOVE ALL CASH COSTS AT VARYING YIELD AND PRICES

			Yield (Pounds Per Acre)						
			9,139	10,445	11,750	**13,056**	14,362	15,667	16,973
Price ($ Per Pound)									
Grade B	Grade C	Weighted Average ($ Per Pound)	Net Returns Per Acre Above All Cash Costs ($)						
0.45	0.19	0.35	-1227	-838	-450	-61	328	716	1105
0.52	0.22	0.40	-770	-316	138	592	1046	1499	1953
0.58	0.24	0.45	-304	217	737	1258	1778	2298	2819
0.65	0.27	0.50	153	739	1325	**1910**	2496	3082	3668
0.72	0.30	0.55	610	1261	1912	2563	3214	3865	4516
0.78	0.32	0.61	1076	1794	2511	3229	3947	4664	5382
0.84	0.35	0.66	1533	2316	3099	3882	4665	5448	6231

NET RETURNS PER ACRE ABOVE TOTAL COSTS AT VARYING YIELD AND PRICES

			Yield (Pounds Per Acre)						
			9,139	10,445	11,750	**13,056**	14,362	15,667	16,973
Price ($ Per Pound)									
Grade B	Grade C	Weighted Average ($ Per Pound)	Net Returns Per Acre Above Total Costs ($)						
0.45	0.19	0.35	-5792	-5403	-5015	-4626	-4237	-3849	-3460
0.52	0.22	0.40	-5335	-4881	-4427	-3973	-3519	-3066	-2612
0.58	0.24	0.45	-4869	-4348	-3828	-3307	-2787	-2267	-1746
0.65	0.27	0.50	-4412	-3826	-3241	**-2655**	-2069	-1483	-897
0.72	0.30	0.55	-3955	-3304	-2653	-2002	-1351	-700	-49
0.78	0.32	0.61	-3489	-2771	-2054	-1336	-618	99	817
0.84	0.35	0.66	-3032	-2249	-1466	-683	100	883	1666

Note: Prices shown in the tables are rounded to the nearest two digits (two decimal places), but calculations may have been on three digits (three decimal places).

Table 9. Break-Even Prices ($ Per Pound), Dates Production in the Coachella Valley, Riverside County, 2005-2006

Break-Even Price ($ Per Pound) to Cover Costs Using Our Yield Assumption			
Yield (Pounds Per Acre)	Operating Costs	Cash Costs	Total Costs
13,056	0.27	0.36	0.71

Table 10. Break-Even Yield (Pounds Per Acre), Dates Production in the Coachella Valley, Riverside County, 2005-2006

Break-Even Yield (Pounds Per Acre) to Cover Costs Using Our Price Assumption			
Price ($ Per Pound)	Operating Costs	Cash Costs	Total Costs
0.504	6,912	9,261	18,318

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Etaferahu Takele
Area Farm Advisor, Agricultural Economics/Farm Management
University of California Cooperative Extension
21150 Box Springs Road
Moreno Valley, CA 92557
Tel. (951) 683-6491 Ext. 243
Fax (951) 788-2615
e-mail: ettakele@ucdavis.edu
website: http://groups.ucanr.org/farmgt

Peggy Mauk
Subtropical Horticulture Farm Advisor
Now Regional Director
University of California Cooperative Extension
21150 Box Springs Road
Moreno Valley, CA 92557
e-mail: pamauk@ucdavis.edu
website:http://ceriverside.ucdavis.edu/

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