1992

U.C. COOPERATIVE EXTENSION

SAMPLE COSTS TO PRODUCE ORGANIC ALMONDS IN THE NORTHERN SAN JOAQUIN VALLEY

Flood Irrigation

by

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ORGANIC ALMOND COST OF PRODUCTION STUDY
GENERAL INFORMATION

The detailed costs for organic almond production in the northern San Joaquin Valley are presented in this study. The hypothetical farm used in this report consists of 45 producing acres. The orchard floor is planted to a cover crop.

The practices described in this cost study are considered common for this crop and area. Sample costs given for labor, materials, equipment and contract services are based on current figures. The use of trade names is not an endorsement or a recommendation. Some costs and practices detailed in this study may not be applicable to your situation. A blank Your Cost column is provided to enter your actual costs on T**able 1, Costs Per Acre To Establish A Cover Crop - Operations** and **Table 2, Detail Of Costs Per Acre To Establish A Cover Crop - Inputs**. A blank Your Cost column is also provided to enter your actual costs on **Table 3, Costs Per Acre To Produce Organic Almonds - Operations** and **Table 4, Detail of Costs Per Acre To Produce Organic Almonds - Inputs**. This study is only intended as a guide and can be used in making production decisions, determining potential returns, preparing budgets and evaluating production loans.

This study consists of an Overview of Organic Almond Production, Assumptions for Producing Organic Almonds and eight tables.

Table 1. Costs Per Acre To Establish A Cover Crop - Operations
Table 2. Detail Of Costs Per Acre To Establish A Cover Crop - Inputs
Table 3. Costs Per Acre To Produce Organic Almonds - Operations
Table 4. Detail of Costs Per Acre To Produce Organic Almonds - Inputs
Table 5. Monthly Cash Costs Per Acre To Produce Organic Almonds
Table 6. Annual Equipment, Investment And Business Overhead Costs For Organic Almond Production
Table 7. Hourly Equipment Costs For Organic Almond Production
Table 8. Ranging Analysis

For an explanation of calculations used for the study refer to the attached General Assumptions, call the Department of Agricultural Economics, Cooperative Extension, University of California, Davis, California, (530) 752-9376 or call the farm advisor in the county of interest.

A companion study entitled "Sample Costs To Establish And Produce Almonds In The Northern San Joaquin Valley, Flood Irrigated With Mowed Centers" is available for those interested in orchard establishment costs and for production costs of conventionally grown almonds.

OVERVIEW OF ORGANIC ALMOND PRODUCTION IN THE NORTHERN SAN JOAQUIN VALLEY

Introduction:

This study reflects the practices and costs associated with a production system for organically grown almonds. Factors to consider for cultivar selection include productivity, optimum cross pollination, resistance to insects, diseases and genetic disorders, and nut quality for marketing purposes. In this region cultivars commonly grown include, but are not limited to, Nonpareil, Carmel, Butte, Price, and Mission. Total farm size in this study is 45 acres. Orchard spacing is 24' x 24' for a total of 75 trees per acre. The orchard floor is planted to a cover crop.

The orchard in this report is assumed to have been established as a conventional almond orchard. Changing a farming system from conventional to organic practices requires a transition period. Rules and regulations which are specific to organic commodities must be adhered to during this time period. Crops grown in transition years may not be sold or labeled as organic. Therefore, growers cannot take advantage of potential organic pricing premiums. The orchard in this report is considered to have completed the transition period and is certified as organic. Please refer to the Regulations of Organically Grown Commodities section for additional information.

Cover Crops:

Cover crops are an essential element of organic almond production. Depending on the type of cover crop planted and maintained, numerous benefits can be derived. They include: increased availability of soil nitrogen through nitrogen fixation (legumes) and increased soil organic matter. A direct result of increased soil organic matter is improved water infiltration and water holding capacity. Taller growing and densely planted cover crops may also suppress some weed growth. In addition, cover crops within the orchard can help control dust and reduce some pest populations such as spider mites. Cover crops increase the plant diversity of the orchard and can provide nectar to attract and sustain beneficial arthropods (insects, mites and spiders). The vegetation can also attract non-pest arthropods which can serve as alternate prey for beneficials.

There are also some disadvantages in using cover crops. Competition between trees and cover crops for water and nutrients may increase the need for additional inputs. Furthermore, cover crop growth may slow water movement across the orchard floor in flood irrigation systems. A greater amount of debris on the orchard floor may slow operations at harvest and increase costs. Cover crops may also attract arthropod pests to the orchard. Also, if the cover crop blooms during the period of almond bloom bees may preferentially visit flowers of the cover crop over the almonds, thus reducing pollination. However, most common cover crop species bloom later than almonds. Another disadvantage of cover cropping may be that air and soil temperatures are lowered by substantial vegetative growth on the orchard floor. This could increase the possibility of frost damage.

Because soil temperatures on the orchard floor may be lower due to the vegetative growth, almond flowering and leafout may occur later in the season. Some growers see this as an advantage rather than a disadvantage, since blooms and small nuts may escape frost damage. During critical frost periods, however, growers may choose to mow cover crops close to the ground. This practice can increase air and soil temperatures within the orchard. Reducing the above ground biomass at this time is considered a standard practice with cover crops such as grasses, clovers and resident vegetation. Late winter and early spring mowing of most cover crops does not usually interfere with seed set and self-reseeding of the species. Vetch cover crops are often not mowed until mid or late spring to insure seed set and self-reseeding of the species.

Selection of a particular cover crop species should take into account the yearly production cycle, the soil type and the irrigation system. In this production region, commonly planted orchard cover crops include, but are not limited to, 'Lana' woollypod vetch, crimson clover and subterranean clovers (subclovers). These species are well suited to the soils and growth cycles of almond trees in the northern San Joaquin Valley. Because clovers are low growing, they generally do not compete well with taller growing vetch cover crops. Therefore, growers may choose to plant the orchard floor to one species only or to separate different cover crop species into alternate row plantings to obtain benefits unique to each species. Vetch cover crops may also interfere with sprinkler systems not only because of their height, but also because of their tendency to climb and wrap around sprinkler heads during the growth period. Often, the most appropriate cover crop in each orchard is based on years of observation and experimentation.

Cover crops are often not planted until the fourth or fifth year of orchard establishment. Orchard floors are generally kept clean before this time to decrease competition for water and nutrients with young trees. In this study, a cover crop mix of crimson clover and subclovers is assumed for the sprinkler irrigated system, with a seeding rate of 17 pounds per acre. A cover crop of 'Lana' woollypod vetch is assumed for the flood irrigated system, with a seeding rate of 40 pounds per acre. These seeding rates are estimates only and may be modified for each individual situation.

Cover crop establishment in this study begins with discing the orchard floor twice after harvest in the fall of year five of tree establishment. The cover crop is then broadcast seeded, worked in with a spring-tooth harrow and finished with a ring roller. A 3 or 4 inch postharvest irrigation also germinates the cover crop. After the postharvest irrigation, cover crop growth is dependent on moisture in the soil profile, rains, and any surface water applied to irrigate the trees.

Cover crop growth continues throughout the fall, winter and spring. Seed set generally occurs in mid-May, but can also occur early in June depending upon the species. During the physiological process of seed set some nitrogen is transferred from vegetative growth and accumulates in the seed itself. Because of this, and because some cover crop residues are left on top of the soil rather than incorporated, some sacrifice of nitrogen for crop production will occur. Cover crop mowing regimes detailed in the Production Practices section are such that they should not interfere with seed set and reseeding of the crop.

Because the legumes in this study are self-reseeding winter annuals, they do not require yearly planting under ideal conditions. Benefits from this system include decreased costs for seed, labor, and equipment use. Soil compaction may also be lessened with fewer machine passes over the orchard floor. However, certain factors such as poor stand establishment and weed infestations may affect the grower's ability to maintain the system on a yearly basis without some reseeding. The projected cover crop life is, at best, an estimate of what might be possible in the field. In this study, cover crop life is assumed to be 10 years. Costs for cover crop establishment are shown in **Tables 1** and **2**. These costs are included in **Tables 3**, **4**, and **6** as an investment and depreciated over ten years.

Growers in some areas may find that some cover crop species and mixes are not appropriate to their soils and conditions. In addition, planting, tillage, and management techniques may vary. Contact the farm advisor in your area for specific advice.

Pest Management:

Pesticides that are currently employed by conventional almond producers are often not approved for use by certified organic almond growers. In this study the incidence of disease, as well as invertebrate and vertebrate pest damage are assumed to be low. However, rainy and wet springs may increase the incidence of disease within the orchard. Individual situations may vary.

There are no significant winter sanitation operations in this report. Many growers of organic almonds find that resident birds remove a portion of the mummy nuts. Also, the parasitic insects, *Goniozus legneri* and *Pentalitomastix plethoricus*, are often present in organic orchards and provide additional control of navel orangeworm overwintering in mummies. Generally, reject levels in organically grown almonds are at one percent or less in well monitored and maintained orchards.

A custom charge of $12 per acre for the release, management and monitoring of beneficial arthropods is included in this study as an operational cost. This cost is an estimate of inoculation, augmentation and observation of beneficials over a period of years and will vary depending upon the level of grower participation. Also included in this per acre charge are lures and traps for peach twig borer. Beneficials include predators such as lacewings (*Chrysoperla carnea* and *Chrysoperla comanche*) and the western orchard predatory mite (*Metaseiulus occidentalis*). Parasites include trichogramma wasps, and as mentioned in the previous paragraph, navel orangeworm parasites. Costs may increase in years of transition from conventional to organic production to reflect a more concentrated release program. Once established, conservation of beneficial populations within the orchard could decrease this figure.

Rodent control by means of hand trapping is included as a yearly operational cost. No specific means of ant control is included in this report. Timeliness of harvest can decrease the incidence of ant and navel orangeworm infestations. Methods used to control weeds within the orchard understory include cover cropping for weed suppression and timely mowing regimes. For in-row weed management, hand or string trimmer weedings are used.

Production Practices:

Detailed in this report are two representative methods of organic almond production in the northern San Joaquin Valley. They are: 1) flood irrigation and 2) sprinkler irrigation. In the flood irrigated orchard, levees are pulled three times during the year for irrigation purposes. Levees are also knocked down three times yearly so that growers can enter the orchard to cross mow and perform other operations. In the sprinkler irrigated system, a solid set underground sprinkler design is assumed. Differences between the two irrigation systems occur in total water applied and in weed management practices. Differences also occur in the species of cover crop planted; 'Lana' vetch is assumed in the flood irrigated system and a clover mix is assumed for the sprinkler irrigated system (see cover crop section for additional information). Variation in cover crop species often exists in actual practice.

Practices utilized by individual growers are those which are most effective in any given situation. Because of this, procedures can vary from year to year and from orchard to orchard. This study reflects practices which are commonly used, and may not be an exact model of any one situation. The seasonal flow of operations is described in this section.

Yields in organic almond production are often limited by insufficient nitrogen. Depending on management practices, leguminous cover crops can act as a major source of nitrogen within the orchard. However, additional inputs may be necessary to increase yields. Sources of nitrogen include manures, grape pomace, and composts of manures and other materials. Compost is commonly used and is assumed in this study. A composted poultry manure is applied in the fall. Generally, it is spread on the soil surface after a postharvest irrigation and germination of the cover crop. It is not incorporated. The rate of application for this custom operation is 3.25 tons per acre. Winter rains may assist in moving nutrients from this compost into the soil profile. However, it is still unclear as to whether composts spread and incorporated into soils in spring are more effective for nitrogen availability and uptake. Orchard systems with a cover crop usually prevent this practice because it is impossible to incorporate composts without destroying the cover crop.

In organic agriculture, additions of certain minerals and nutrients may be used to alleviate deficiencies within orchards; however, these deficiencies often need to be documented before applications are made. Growers should be certain that any materials used are in compliance with the rules and regulations of state and third party organic certification agencies. Applications are generally dependent on leaf analyses and soil sampling which are used to determine nutrient needs. A $0.50 per acre charge for a leaf analysis is included in this study. Soil tests are generally performed in conjunction with inspections by organic certification agencies.

In this study, sulfate of potash is applied in the fall every third year to boost potassium levels. In the relatively sandy soils of the northern San Joaquin Valley, application rates can range from 7 to 10 pounds per tree. A rate of 10 pounds per tree is used in this report. On heavier soils, the rate of application may need to be increased.

Winter orchard pruning in both conventional and organic practices are similar. In conventional culture, prunings are generally removed from the orchard and burned. In organic culture, some growers glean larger sized prunings to sell as firewood and then shred, chop and spread smaller brush in the orchard. This practice improves soil tilth and fertility by replenishing and/or increasing organic matter in soils. Alternatively, organic growers may first choose to glean and chip larger sized prunings, then shred, chop and spread wood chips and small brush to further increase soil organic matter. This study assumes the latter. Grower experience indicates that decomposition of this mulch occurs with moisture and soil contact, and is dependent on the type of irrigation system. Sprinkler irrigation increases the rate of decomposition due to an even distribution of moisture and soil contact throughout the orchard. During flood irrigation, mulches tend to float and settle, resulting in uneven saturation and air space between the organic matter and soil. This decreases soil contact, microbial action and decomposition rates. Debris which has not decomposed sufficiently before harvest can impede harvest operations and increase harvest costs. Incorporation of mulches by discing or rototilling in flood irrigation systems may be necessary to overcome this problem. Costs for mulch incorporation are not included in this report.

In this study, zinc is applied in the spring as a foliar nutrient. This report assumes that a zinc chelate spray is used at the rate of one gallon per acre. Zinc formulations and application rates may vary depending upon individual situations. Alternatively, a zinc sulfate spray may be used in the fall as a foliar nutrient. Although it has not been scientifically proven, this fall application may also accelerate leaf fall and help control shot hole fungus. The rate of application in this case would be 10 pounds per

100 gallons dilute or 10-20 pounds per acre concentrate. Costs to perform this fall operation are not included in this study.

Hand labor for weed control increases under sprinkler irrigation due to inaccessibility of machine mowers in the proximity of the sprinklers. This is unlike flood irrigation, where cross mowing of orchard floors can effectively control most weeds as well as cover crop growth. In both methods, and with each mowing, some rows (alternate or every third) are left standing to act as a habitat for beneficial arthropods. To insure that seed set and reseeding of the cover crop occurs, little or no mowing takes place in March and April. A progressive mowing and weed control regime is used in late spring and throughout the summer months to gradually reduce the above ground biomass in preparation for harvest. Accordingly, costs for mowing and weed control are increased throughout this period. The greatest amount of mowing and weed control occurs in July and August.

Harvest operations are identical in both flood and sprinkler systems. Due to orchard size and the expense of nut harvesting equipment, custom harvesting is assumed in this study. Although legume-rich cover crops will generally decompose sufficiently, some residue (see above) may be present at harvest in organic systems. The operation time is therefore increased for hand raking and sweeping and may be increased for picking up and hauling nuts. Should rains occur during harvest, residue swept with nuts into windrows may trap moisture and increase the incidence of mold. Under these conditions, the following techniques may be useful in limiting crop damage:

1. for light rains, nothing is generally done.
2. for moderate rains, the harvester should be run over the orchard to scatter and separate nuts from the residue when the orchard is dry enough to enter with equipment. Additional harvest costs would then be incurred.
3. in extreme situations, nuts should be picked up as soon as possible and put through a dehydrator. Costs for this practice will vary depending on nut and residue saturation levels, and are not considered in this study.

In this study, variation exists in total water usage between flood and sprinkler irrigated systems. Because flood irrigation systems are not as efficient as sprinkler systems, the amount of surface water applied with flood irrigation is greater. This does not mean that actual crop water use differs. Total surface water applied per year for the flood irrigated orchard is 40 acre inches per acre. This includes nine 4" applications beginning in March and ending in August, and a 4" postharvest irrigation in October. Total applied surface water for the sprinkler irrigated system is 33 acre inches per acre. This includes 3" total water for frost protection, nine 3" applications during the growing season, and a 3" postharvest irrigation in October.

The total amount of surface water applied each year is dependent on rainfall and stored moisture in the soil profile. The ability of the soil to retain and store moisture is often enhanced by the level of humus found in soils. In addition, soil texture, or the percentage of sand, silt and clay must be taken into account. Water usage in this study is therefore an estimate only and may vary from grower to grower. District water costs for flood irrigation are included at $19 per acre. Water costs for sprinkler irrigation are based on the system design and current electrical rates to pump water and are included at $54.24 per acre foot. These figures are within a range of use and costs for this production region.

Marketing and Associated Risks of Organically Grown Almonds:

Marketing presents one of the greatest challenges to producers of organic almonds and is crucial to the success of each operation. At present no bulk commodity market exists for organically grown almonds. Because of this, market fluctuations and pricing of conventionally grown almonds do not directly affect the market for organically grown almonds. However, the price received by organic growers depends on the grade of the almond and what market is available on a year to year basis.

Yields in organic and conventional almond orchards are determined by a number of factors. Generalizations between production systems should be avoided, as yield fluctuations may be more dependent on weather and pollination, than on a particular culture. Yields in the subject orchards can range from 800 to 2,300 meat pounds per acre.

The price currently received by producers of organic almonds ranges from $2.05 to $2.70 per meat pound for a 25 pound packaged box. In contrast, the average price received by producers of conventionally grown almonds over the last ten years ranges from $0.78 to $1.92 per meat pound in bulk. The figures for organic almonds reflect a pricing premium for organic commodities. They do not, however, take into account marketing and handling costs which are absorbed directly by organic growers

and which growers of conventionally produced almonds do not have. Marketing and handling of organic almonds includes grading, sorting, packaging (for both packaging materials and labor), storage and transportation costs. In addition, costs are incurred for a cold treatment of organic nut meats to destroy navel orangeworm eggs and larvae as well as other pests of stored products. A carbon dioxide treatment may be used as an alternative to a cold treatment, however, it is not considered in this study. To account for marketing and handling costs absorbed by growers, a $0.45 per pound charge has been added to harvest costs. The cost of organic almond production is therefore more accurately represented. These costs could increase should longer storage of the product be necessary. Nut bins are often purchased by growers to maintain control of their product. Costs for nut bins have been included in investments to reflect this.

The risks associated with the production of organic almonds should not be minimized. Markets are not guaranteed on a year to year basis. Production and marketing strategies should be developed prior to undertaking an organic almond enterprise. A realistically planned farming system may be able to compensate for yield fluctuations and the challenges associated with marketing of organic almonds.

Regulations of Organically Grown Commodities:

As of January 1, 1992 all growers of organic commodities must register on a yearly basis with the State of California under the California Organic Foods Act of 1990, AB 2012. Enforced under this act are the provisions of Article 4.5 (commencing with Section 26569.20) of Chapter 5 of Division 21 of the California Health and Safety Code. These provisions contain rules and regulations which must be adhered to by all producers and handlers of organic commodities.

Registration fees are levied by the State of California and are based on the previous year's gross sales. These fees are payable before any sales of the commodity occur. In this study a stepped scale fee of $300 is assessed on a gross sales amount of $164,000. This is calculated by multiplying a yield of 1,550 meat pounds per acre by a price of $2.35 per meat pound and the number of acres (45). This is only an estimate of potential fees and will vary depending on yields and returns. Contact the County Agricultural Commissioner in your area for further details.

In addition to state registration, some growers may choose to be certified by a third party certification agency. Third party agencies were formed to set forth and monitor standards for organic production. Before state laws began to govern organic commodities, third party agencies were often the only means to verify that products were, in fact, organically grown. California Certified Organic Farmers (CCOF) is one of a number of third party organizations in the United States and is not the only option for certification within the State of California. Differences between organizations may occur in the certification process, associated costs, standards and procedures. Farm advisors in your area of interest may be able to provide additional information or assistance.

This study assumes that growers participate in and are certified by CCOF. CCOF adheres to the standards of the California Organic Foods Act of 1990 as well as its own specific procedures and standards. Certification by CCOF is voluntary. Before January 1, 1992, CCOF required a one year certification transition period when converting from conventional production practices to organically acceptable methods. The requirement is now three years. Annual membership, inspection and assessment fees are charged as cash overhead costs. Annual membership fees in this study are $125. Inspection fees are $115. An assessment fee of 0.5% of gross sales, or $820, is also shown as a cash overhead cost. These fees are specific to this study. Fees are based on the number of acres and parcels contained in an operation as well as whether or not the farm is totally organic. Therefore, individual situations may vary.

ASSUMPTIONS FOR PRODUCING ORGANIC ALMONDS
Northern San Joaquin Valley - 1992
U.C. Cooperative Extension

The following is a description of some general assumptions pertaining to sample costs of organic almond production in the northern San Joaquin Valley. These costs are represented on a per acre basis.

1. LAND:

This cost of production study is based on a 45 acre organic almond operation. Land in this study is owned by the grower and is valued at $5,263 per acre. Land is not depreciated.

2. CULTURAL PRACTICES:

Cultural practices for the production of organic almonds vary from grower to grower and region to region. The practices and inputs used in this cost study serve only as a sample or guide.

Two representative methods of organic almond production occur in the northern San Joaquin Valley. They are: (1) flood irrigation and (2) sprinkler irrigation. In the flood irrigated orchard, levees are pulled three times during the year for irrigation purposes. Levees are also knocked down three times yearly so that growers can enter the orchard to cross mow and perform other operations. In the sprinkler irrigated system, a solid set underground sprinkler design is assumed. Variation between the two methods occurs not only in the irrigation system and the amount of applied water, but in cover crops and weed management practices as well. Hand labor costs increase in sprinkler irrigation to reflect additional hand and/or string trimmer weedings in the proximity of the sprinklers. Pruning practices, mulching, mineral and nutrient additions, pest management, and harvest practices are identical in both methods. Please refer to the overview section of this study for additional information or contact the farm advisor in the county of interest.

3. COVER CROP:

In this production region, commonly planted orchard cover crops are 'Lana' woollypod vetch, crimson clover, and subclovers. In this study, planting occurs in the fifth year of tree establishment. Orchard floors are generally kept clean before this time to decrease competition for water and nutrients with young trees. The cover crop life is assumed to be 10 years. Orchard life is assumed to be 25 years. Subtracting five years for tree establishment, the cover crop will need to be planted twice during the orchard life.

This study assumes a cover crop mix of crimson clover and subclovers for the sprinkler irrigated system, with a seeding rate of 17 pounds per acre. A cover crop of 'Lana' woollypod vetch is assumed for the flood irrigated system, with a seeding rate of 40 pounds per acre. These seeding rates are estimates only and may be modified for each individual situation.

To establish the cover crop in this study, the orchard floor is disced twice in the fall after harvest in year five of tree establishment. The cover crop is then broadcast seeded, worked in with a spring-tooth harrow and finished with a ring roller. A yearly postharvest irrigation of the orchard also germinates the cover crop and is shown as a cultural cost. Costs to establish the cover crop are shown in **Tables 1** and **2**. These costs are also shown in investments in **Tables 3**, **4**, and **6**.

4. YIELD & RETURN RANGES FOR ORGANIC ALMONDS:

Depending on yearly growing conditions, yields for organic almonds in the subject orchards range from 800 to 2,300 meat pounds per acre. The range of prices received by growers for organic almonds is $2.05 to $2.70 per meat pound for a 25 pound packaged box depending on market conditions. Table 8 Ranging Analysis shows net returns above operating costs, cash costs, and total costs for various price and yield levels.

At an average price of $2.35 per meat pound, organic almond production under flood irrigation shows positive net returns above total costs when yields are at or above 1,050 meat pounds per acre. At a low price of $2.05 per meat pound the breakeven yield is 1,123 meat pounds per acre. At a high price of $2.70 per meat pound the breakeven yield is 764 meat pounds per acre.

Under sprinkler irrigation, and at an average price of $2.35 per meat pound, net returns above total costs are positive when yields are at or above 1,300 meat pounds per acre. At a low price of $2.05 per meat pound the breakeven yield is 1,328 meat pounds per acre. At a high price of $2.70 per meat pound the breakeven yield is 902 meat pounds per acre.

5. HARVEST:

This cost study assumes harvest operations will be performed by a custom harvest company. Custom harvest charges are generally based on hourly costs. Hours for sweeping and hand raking are increased slightly in organic harvest operations due to a greater amount of debris on the orchard floor. Pick up costs are charged at $65.00 per hour. In this study, hauling costs are incurred at $0.02 per pound. Hulling and shelling is charged at $0.05 per pound. These costs assume the orchard floor to be properly prepared and reasonably clean for harvest operations.

For more information on custom harvesting contact the farm advisor or companies contracting for almonds in the area of interest. If growers choose to do their own harvesting, equipment for the required operations should be inventoried and labor, fuel, repairs, depreciation and interest on investment should be added as a cost of production. Custom charges, then, would not be included.

6. MARKETING OF ORGANICALLY GROWN ALMONDS:

No bulk commodity channels and markets exist to handle organically produced almonds. To better represent the actual cost of organic almond production, in this report a $0.45 per pound marketing and handling charge is added to harvest costs. This custom charge reflects the cost borne directly by growers of organic almonds for all the associated costs of grading, sorting, packaging (both packaging materials and labor), storage, cold treatments, and transportation costs.

In this study, an Almond Board of California (ABC) assessment fee of $0.0225 per meat pound is included as a cash overhead cost. This fee covers charges for administration, research and marketing levied by the ABC.

7. LABOR:

Basic hourly wages for workers are $8.00 and $5.00 per hour for machine operators and non-machine labor, respectively. Adding 34% for SDI, FICA, insurance and other benefits increases the labor rates shown to $10.72 per hour for machine labor and $6.70 per hour for non-machine labor. The labor hours for operations involving machinery are 10% higher than the machine hours to account for extra labor involved in equipment set-up, moving, maintenance and repair. On a farm of this size, growers will often perform the majority of machine operations themselves. Machine labor is included in this study as a cash cost. However, wages for management are not included as a cash cost. Any returns above total costs are considered returns to management and risk.

8. INVESTMENT:

The investments shown in **Table 6** are those that are allocated to the organic almond operation. Annual investments shown in **Tables 3** and **4** represent depreciation and opportunity cost for each investment on an annual per acre basis.

9. OVERHEAD:

County taxes are calculated as 1% of the average value of equipment, buildings and improvements. Insurance is charged at 0.5% of the average value of the equipment over its useful life. Office and business costs are estimated at $50 per acre for the farm. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road preparation and maintenance, etc.

10. INTEREST:

Interest on operating capital is based on cash costs and is calculated monthly from October to September, or from postharvest to harvest, at the rate of 9% per year. Interest is also charged on investment at a real interest rate of 4% per year to account for income foregone that could be received from an alternative investment (opportunity cost) and is based on the average value of the buildings and equipment. The real interest rate indicates the return for the use of capital and does not include any adjustment for inflation.

11. EQUIPMENT COSTS:

In allocating the equipment costs per acre, the following calculations were made and shown in **Table 6**: (a) **Original Cost** of equipment is the cost of the new equipment plus sales tax. (b) **Depreciation** is straight line with a 10% salvage value. (c) **Interest** on investment is calculated as the average value per acre of the equipment during its useful life multiplied by a real interest rate of 4%. Average value per acre equals new cost plus salvage value divided by 2 divided by the number of acres. (d) The **Total Investment Costs** are calculated as 60% of the depreciation and the interest costs for all new equipment to reflect a mix of the new and used equipment. These values are also used in **Table 3**. All of this equipment is used on the entire 45 acre farm.

Organic growers often modify standard farm machinery to meet their own specific needs in orchard situations. Innovative farming techniques and practices may require implements not currently available for purchase through traditional channels. Therefore, equipment costs in this study should be used as a guideline only.

12. FUEL & REPAIR:

The fuel and repair cost per acre for each operation in **Table 3** is determined by multiplying the total hourly operating cost for each piece of equipment in **Table 7** by the number of hours per acre for that operation. Prices for on-farm delivery of gasoline and diesel are $0.98 and $0.71 per gallon respectively.

13. ACKNOWLEDGEMENT:

Appreciation is expressed to those growers and other individuals who provided information and assistance for this study.

This study was funded by the U.C. Sustainable Agriculture Research and Education Program (SAREP), University of California, Davis.

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U.C. COOPERATIVE EXTENSION

Table 1. COSTS PER ACRE TO ESTABLISH A COVER CROP - OPERATIONS
ORGANIC ALMONDS - FLOOD IRRIGATION

Labor Rate: $10.72/hr. machine labor
$6.70/hr. non-machine labor

Interest Rate: 9.00%
Yield per Acre:

Operation	Operation Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
		---------- Cash and Labor Costs per Acre ----------					
Cover Crop:							
Land Prep - Disc 2X	0.86	11.06	5.14	0.00	10.00	26.21	
Cover Crop Seeding	0.11	1.48	0.29	30.00	2.00	33.77	
Spring-Tooth Harrow	0.33	4.30	2.00	0.00	5.25	11.54	
Ring Roller - Finish Seedbed	0.23	2.95	0.58	0.00	2.85	6.37	
TOTAL COVER CROP COSTS	1.54	19.78	8.00	30.00	20.10	77.89	
Interest on operating capital @ 9.0%						7.01	
TOTAL OPERATING COSTS/ACRE		19.78	8.00	30.00	20.10	84.90	

U.C. COOPERATIVE EXTENSION

Table 2. DETAIL OF COSTS PER ACRE TO ESTABLISH A COVER CROP - INPUTS
ORGANIC ALMONDS - FLOOD IRRIGATION

Labor Rate: $10.72/hr. machine labor
$6.70/hr. non-machine labor

Interest Rate: 9.00%

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cos
OPERATING COSTS					
Rent:					
Offset Disc - 8'	1.00	acre	10.00	10.00	
Broadcast Seeder	1.00	acre	2.00	2.00	
Spring-Tooth Harrow	1.00	acre	5.25	5.25	
Ring Roller	1.00	acre	2.85	2.85	
Seed:					
'Lana' woollypod vetch	40.00	lb	0.75	30.00	
Labor (machine)	1.85	hrs	10.72	19.78	
Labor (non-machine)	0.00	hrs	0.00	0.00	
Fuel - Diesel	5.72	gal	0.71	4.06	
Lube				0.61	
Machinery repair				3.33	
Interest on operating capital @ 9.00%				7.01	
TOTAL OPERATING COSTS/ACRE				84.90	

U.C. COOPERATIVE EXTENSION

Table 3. COSTS PER ACRE TO PRODUCE ORGANIC ALMONDS - OPERATIONS
FLOOD IRRIGATION

Labor Rate: $10.72/hr. machine labor
$6.70/hr. non-machine labor

Interest Rate: 9.00%
Yield per Acre: 1,550.00 lb

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Disc - Prepare Ground for Levees	0.30	3.86	2.40	0.00	0.00	6.26	
Pull Levees for Irrigation	0.30	3.86	2.19	0.00	0.00	6.05	
Cover Crop/Postharvest Irrigation	0.25	1.67	0.00	1.92	0.00	3.60	
Knock Down Levees	0.30	3.86	1.92	0.00	0.00	5.78	
Compost Application	0.00	0.00	0.00	104.59	5.49	110.08	
Potassium Application 1 of 3 years	0.21	2.64	1.23	35.00	0.00	38.86	
Pruning - 75 Trees/Acre	11.00	73.70	0.00	0.00	0.00	73.70	
Stack Brush	2.00	13.40	0.00	0.00	0.00	13.40	
Glean and Chip Brush	1.00	12.86	3.83	0.00	0.00	16.70	
Shred/Chop/Spread Brush	1.00	12.86	7.96	0.00	0.00	20.82	
Tree Replacement - 1/Acre	1.25	8.38	0.00	3.85	14.25	26.47	
Pollination	0.00	0.00	0.00	0.00	60.00	60.00	
Boron/Zinc Spray Application	0.20	2.64	2.17	7.71	0.00	12.51	
Irrigation	2.25	15.08	0.00	17.28	0.00	32.36	
Mowing/Weed Control	2.80	36.02	22.29	0.00	0.00	58.31	
Manage & Monitor Beneficials	0.00	0.00	0.00	0.00	12.00	12.00	
Replants - Miscellaneous Care	0.25	1.67	0.00	2.25	0.00	3.92	
Rodent Control	0.20	1.34	0.00	0.00	0.00	1.34	
Broken Limbs - Miscellaneous Care	0.10	1.29	0.38	0.00	0.00	1.67	
Leaf Analysis	0.10	0.67	0.00	0.00	0.50	1.17	
Miscellaneous	2.00	13.40	0.00	10.00	0.00	23.40	
Pickup Use	1.67	21.44	9.69	0.00	0.00	31.13	
TOTAL CULTURAL COSTS	27.18	230.64	54.06	182.60	92.24	559.53	
Harvest:							
Shake	0.00	0.00	0.00	0.00	90.00	90.00	
Pole	1.75	11.72	0.00	0.00	0.00	11.72	
Sweep	0.00	0.00	0.00	0.00	35.00	35.00	
Hand Rake	0.60	4.02	0.00	0.00	0.00	4.02	
Pickup Nuts	0.00	0.00	0.00	0.00	97.50	97.50	
Haul Nuts	0.00	0.00	0.00	0.00	31.00	31.00	
Hull & Shell	0.00	0.00	0.00	0.00	77.50	77.50	
Marketing and Handling	0.00	0.00	0.00	697.50	0.00	697.50	
TOTAL HARVEST COSTS	2.35	15.74	0.00	697.50	331.00	1,044.24	
Interest on operating capital @	0.09					42.76	
TOTAL OPERATING COSTS/ACRE		246.38	54.06	880.09	423.24	1,646.54	
TOTAL OPERATING COSTS/LB						1.06	

U.C. COOPERATIVE EXTENSION
ORGANIC ALMONDS - FLOOD IRRIGATION
Table 3. continued

			---------- Cash and Labor Costs Per Acre ----------	
			Total Cost	Your Cost
CASH OVERHEAD:				
Office Expense			50.00	
CCOF Membership Fees			2.78	
CCOF Inspection Fees			2.56	
Ca. State Organic Registration Fees			6.67	
CCOF 0.5% of Gross Sales			18.22	
ABC Assessment Fees			34.87	
Property Taxes			41.84	
Equipment Insurance			83.68	
Investment Repairs			26.67	
TOTAL CASH OVERHEAD COSTS			267.29	
TOTAL CASH COSTS/ACRE			1,913.83	
TOTAL CASH COSTS/LB			1.23	
NON-CASH OVERHEAD:				
Investment	Per producing Acre	Annual Cost Depreciation	Interest @ 4.00%	
Buildings	822.22	24.67	18.09	42.76
Fuel tanks & pumps	180.00	8.10	3.96	12.06
Shop tools	244.44	14.67	5.38	20.04
Land - Almonds	5,263.00		210.52	210.52
Tree Establishment - Flood	1,802.00	94.84	36.04	130.88
Nut Bins	155.56	14.00	3.42	17.42
Pruning Equipment	26.67	2.40	0.59	2.99
Irrigation System Flood	911.11	32.80	20.04	52.84
ATV - 4WD	144.44	26.00	3.18	29.18
Cover Crop Establishment - Flood	85.00	8.50	1.70	10.20
Equipment	1,445.77	114.08	31.81	145.89
TOTAL NON-CASH OVERHEAD COSTS	11,080.22	340.06	334.72	674.79
TOTAL COSTS/ACRE				2,588.61
TOTAL COSTS/LB				1.67

Table 4.

U.C. COOPERATIVE EXTENSION
DETAIL OF COSTS PER ACRE TO PRODUCE ORGANIC ALMONDS - INPUTS
FLOOD IRRIGATION

Labor Rate: $10.72/hr. machine labor
$6.70/hr. non-machine labor

Interest Rate: 9.00%

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
OPERATING COSTS					
Water:					
Water - District	40.00	acin	0.48	19.20	
Compost:					
Compost	3.25	ton	32.18	104.59	
Custom:					
Spread Compost	3.25	ton	1.69	5.49	
Remove Tree - Almond	1.00	acre	14.25	14.25	
Pollination	2.00	hive	30.00	60.00	
Management of Beneficials	1.00	acre	12.00	12.00	
Leaf Analysis	1.00	appl	0.50	0.50	
Shake Nuts	1.50	hr	60.00	90.00	
Sweep Nuts	1.00	hr	35.00	35.00	
Pickup Nuts	1.50	hr	65.00	97.50	
Haul Nuts	1,550.00	lb	0.02	31.00	
Hull/Shell	1,550.00	lb	0.05	77.50	
Mined Mineral:					
Sulfate of Potash	250.00	lb	0.14	35.00	
Tree Replant:					
Replace Tree - Almond	1.00	acre	3.80	3.80	
Carton Tree	1.00	acre	0.05	0.05	
Replants - Misc.	1.00	acre	2.25	2.25	
Foliar Spray:					
Boron	1.00	lb	0.74	0.74	
Zinc	1.00	gal	6.97	6.97	
Miscellaneous:					
Materials	1.00	acre	10.00	10.00	
Marketing:					
Marketing/Handling	1,550.00	lb	0.45	697.50	
Labor (machine)	9.45	hrs	10.72	101.33	
Labor (non-machine)	21.65	hrs	6.70	145.06	
Fuel - Gas	4.17	gal	0.98	4.08	
Fuel - Diesel	25.11	gal	0.71	17.83	
Lube				3.29	
Machinery repair				28.86	
Interest on operating capital @ 9.00%				42.76	
TOTAL OPERATING COSTS/ACRE				1,646.54	
TOTAL OPERATING COSTS/LB				1.06	

U.C. COOPERATIVE EXTENSION
ORGANIC ALMONDS - FLOOD IRRIGATION
Table 4. continued

	Cost/ Acre	Your Cost
CASH OVERHEAD COSTS:		
Office Expense	50.00	
CCOF Membership Fees	2.78	
CCOF Inspection Fees	2.56	
California State Organic Registration Fees	6.67	
CCOF 0.5% of Gross Sales	18.22	
ABC Assessment Fees	34.87	
Property Taxes	41.84	
Equipment Insurance	83.68	
Investment Repairs	26.67	
TOTAL CASH OVERHEAD COSTS/ACRE	267.29	
TOTAL CASH COSTS/ACRE	1,913.83	
TOTAL CASH COSTS/LB	1.23	
NON-CASH OVERHEAD COSTS (DEPRECIATION & INTEREST):		
Buildings	42.76	
Fuel tanks & pumps	12.06	
Shop tools	20.04	
Land - Almonds	210.52	
Tree Establishment - Flood	130.88	
Nut Bins	17.42	
Pruning Equipment	2.99	
Irrigation System Flood	52.84	
ATV - 4WD	29.18	
Cover Crop Establishment - Flood	10.20	
Equipment	145.89	
TOTAL NON-CASH OVERHEAD COSTS/ACRE	674.79	
TOTAL COSTS/ACRE	2,588.61	
TOTAL COSTS/LB	1.67	

U.C. COOPERATIVE EXTENSION

Table 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE ORGANIC ALMONDS
FLOOD IRRIGATION

Begining OCT 91 Ending SEP 92	OCT 91	NOV 91	DEC 91	JAN 92	FEB 92	MAR 92	APR 92	MAY 92	JUNE 92	JUL 92	AUG 92	SEP 92	TOTAL
Cultural:													
Disc - Prepare for Levees	2.09					2.09					2.09		6.26
Pull Levees for Irrigation	2.02					2.02					2.02		6.05
Cover Crop/Postharvest Irrigation	3.60												3.60
Knock Down Levees	1.93										3.86		5.78
Compost Application	110.08												110.08
Potassium Application 1 of 3 yrs.	38.86												38.86
Pruning - 75 Trees/Acre		73.70											73.70
Stack Brush		13.40											13.40
Glean and Chip Brush		16.70											16.70
Shred/Chop/Spread Brush		20.82											20.82
Tree Replacement - 1/Acre				26.47									26.47
Pollination					60.00								60.00
Boron/Zinc Spray Application						12.51							12.51
Irrigation						3.60	3.60	3.60	7.19	7.19	7.19		32.36
Mowing/Weed Control							6.25	6.25	9.37	15.62	20.82		58.31
Manage & Monitor Beneficials							12.00						12.00
Replants - Miscellaneous Care									3.92				3.92
Rodent Control									0.67		0.67		1.34
Broken Limbs - Miscellaneous Care										1.67			1.67
Leaf Analysis										1.17			1.17
Miscellaneous											23.40		23.40
Pickup Use											31.13		31.13
TOTAL CULTURAL COSTS	158.57	124.62		26.47	60.00	20.21	21.84	9.84	21.16	25.65	91.17		559.53
Harvest:													
Shake												90.00	90.00
Pole												11.72	11.72
Sweep												35.00	35.00
Hand Rake												4.02	4.02
Pickup Nuts												97.50	97.50
Haul Nuts												31.00	31.00
Hull & Shell												77.50	77.50
Marketing and Handling												697.50	697.50
TOTAL HARVEST COSTS												1,044.24	1,044.24
Interest on oper. capital	1.19	2.12	2.12	2.32	2.77	2.92	3.09	3.16	3.32	3.51	4.20	12.03	42.76
TOTAL OPERATING COSTS/ACRE	159.75	126.75	2.12	28.80	62.77	23.13	24.93	13.00	24.48	29.16	95.37	1,056.27	1,646.54
TOTAL OPERATING COSTS/LB	0.10	0.08	0.00	0.02	0.04	0.01	0.02	0.01	0.02	0.02	0.06	0.68	1.06

U.C. COOPERATIVE EXTENSION
ORGANIC ALMONDS - FLOOD IRRIGATION
Table 5. continued

Beginning OCT 91 Ending SEP 92	OCT 91	NOV 91	DEC 91	JAN 92	FEB 92	MAR 92	APR 92	MAY 92	JUN 92	JUL 92	AUG 92	SEP 92	TOTAL
OVERHEAD:													
Office Expense	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	50.00
CCOF Membership Fees				2.78									2.78
CCOF Inspection Fees				2.56									2.56
CA State Organic Registration Fees												6.67	6.67
CCOF 0.5% of Gross Sales												18.22	18.22
ABC Assessment Fees												34.87	34.87
Property Taxes			20.92						20.92				41.84
Equipment Insurance				83.68									83.68
Investment Repairs	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	26.67
TOTAL CASH OVERHEAD COSTS	6.39	6.39	27.31	95.40	6.39	6.39	6.39	6.39	27.31	6.39	6.39	66.15	267.29
TOTAL CASH COSTS/ACRE	166.14	133.13	29.43	124.20	69.16	29.52	31.32	19.39	51.79	35.55	101.76	1,122.43	1,913.83
TOTAL CASH COSTS/LB	0.11	0.09	0.02	0.08	0.04	0.02	0.02	0.01	0.03	0.02	0.07	0.72	1.23

U.C. COOPERATIVE EXTENSION

Table 6. ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS ORGANIC ALMOND PRODUCTION
FLOOD IRRIGATION

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	- Non-Cash Over. - Depre-ciation	Interest	- Cash Overhead - Insur-ance	Taxes	Total
92	30 HP 2WD Tractor	18,100	15	1,086.00	398.20	99.55	49.78	1,633.53
92	80 HP 2WD Tractor	37,100	15	2,226.00	816.20	204.05	102.02	3,348.27
92	Chipper - 3PT	2,075	10	186.70	45.66	11.41	5.71	249.48
92	Disc Ridger	4,600	15	276.00	101.20	25.30	12.65	415.15
92	Mower/Chopper - 8'	5,500	10	495.00	121.00	30.25	15.13	661.38
92	Offset Disc - 8'	7,000	10	630.00	154.00	38.50	19.25	841.75
92	Orchard Sprayer - 500 Gal.	16,050	10	1,444.50	353.10	88.28	44.14	1,930.02
92	Pickup - 1/2 ton	16,500	7	2,121.43	363.00	90.75	45.37	2,620.55
92	Scraper Blade	1,500	15	90.00	33.00	8.25	4.13	135.38
TOTAL		108,425		8,555.63	2,385.36	596.34	298.18	11,835.51
60% of New Cost *		65,055		5,133.38	1,431.22	357.80	178.91	7,101.31

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

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	- Non-Cash Over. - Depre-ciation	Interest	--------- Cash Overhead --------- Insur-ance	Taxes	Repairs	Total
INVESTMENT								
ATV - 4WD	6,500	5	1,170.00	143.00	35.75	17.88	50.00	1,416.63
Buildings	37,000	30	1,110.00	814.00	203.50	101.75	100.00	2,329.25
Cover Crop Establishment	3,825	10	382.50	76.50	19.13	9.56	0.00	487.69
Fuel Tanks & Pumps	8,100	20	364.50	178.20	44.55	22.28	125.00	734.53
Irrigation System Flood	41,000	25	1,476.00	902.00	225.50	112.75	750.00	3,466.25
Land - Almonds	236,835			9,473.40	2,368.35	1,184.18	0.00	13,025.93
Nut Bins	7,000	10	630.00	154.00	38.50	19.25	50.00	891.75
Pruning Equipment	1,200	10	108.00	26.40	6.60	3.30	25.00	169.30
Shop Tools	11,000	15	660.00	242.00	60.50	30.25	100.00	1,092.75
Tree Establishment	81,090	19	4,267.89	1,621.80	405.45	202.72	0.00	6,497.86
TOTAL INVESTMENT	433,550		10,168.89	13,631.30	3,407.83	1,703.92	1,200.00	30,111.94

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
ABC Assessment Fees	697.50	cwt	2.25	1,569.37
California State Organic Registration Fees	1.00	year	300.00	300.00
CCOF 0.5% of Gross Sales	1.00	year	820.00	820.00
CCOF Inspection Fees	1.00	year	115.00	115.00
CCOF Membership Fees	1.00	year	125.00	125.00
Office Expense	45.00	acre	50.00	2,250.00

Table 7.

U.C. COOPERATIVE EXTENSION
HOURLY EQUIPMENT COSTS FOR ORGANIC ALMOND PRODUCTION
FLOOD IRRIGATION

			COSTS PER HOUR							
			-Non-Cash Over.-		- Cash Overhead -		Operating			
Yr	Description	Actual Hours Used	Depre-ciation	Interest	Insur-ance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
92	30 HP 2WD Tractor	64.6	10.09	3.70	0.92	0.46	1.09	1.20	2.29	17.46
92	80 HP 2WD Tractor	242.8	5.50	2.02	0.50	0.25	2.23	3.21	5.44	13.71
92	Chipper - 3PT	54.4	2.06	0.50	0.13	0.06	0.00	1.20	1.20	3.95
92	Disc Ridger	13.5	12.27	4.50	1.12	0.56	1.32	0.00	1.32	19.77
92	Mower/Chopper - 8'	171.0	1.74	0.42	0.11	0.05	1.98	0.00	1.98	4.30
92	Offset Disc - 8'	13.5	28.00	6.84	1.71	0.86	2.02	0.00	2.02	39.43
92	Orchard Sprayer - 500 Gal.	9.2	94.00	22.98	5.74	2.87	8.05	0.00	8.05	133.65
92	Pickup - 1/2 ton	75.0	16.97	2.90	0.73	0.36	2.99	2.82	5.81	26.78
92	Scraper Blade	13.5	4.00	1.47	0.37	0.18	0.43	0.00	0.43	6.45

Table 8.

U.C. COOPERATIVE EXTENSION
RANGING ANALYSIS
ORGANIC ALMONDS - FLOOD IRRIGATION

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ORGANIC ALMONDS

	YIELD (LB/ACRE)						
	800	1,050	1,300	1,550	1,800	2,050	2,300
OPERATING COSTS/ACRE:							
Cultural Cost	560	560	560	560	560	560	560
Harvest Cost	547	712	878	1,044	1,210	1,376	1,542
Interest on operating capital	39	40	42	43	44	45	46
TOTAL OPERATING COSTS/ACRE	1,145	1,312	1,479	1,647	1,814	1,981	2,148
TOTAL OPERATING COSTS/LB	1.43	1.25	1.14	1.06	1.01	0.97	0.93
CASH OVERHEAD COSTS/ACRE	267	267	267	267	267	267	267
TOTAL CASH COSTS/ACRE	1,412	1,580	1,747	1,914	2,081	2,248	2,415
TOTAL CASH COSTS/LB	1.77	1.50	1.34	1.23	1.16	1.10	1.05
NON-CASH OVERHEAD COSTS/ACRE	675	675	675	675	675	675	675
TOTAL COSTS/ACRE	2,087	2,254	2,421	2,589	2,756	2,923	3,090
TOTAL COSTS/LB	2.61	2.15	1.86	1.67	1.53	1.43	1.34

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ORGANIC ALMONDS - FLOOD IRRIGATION

PRICE	YIELD (LB/ACRE)						
(DOLLARS PER LB)	800	1,050	1,300	1,550	1,800	2,050	2,300
2.05	495	840	1,186	1,531	1,876	2,222	2,567
2.15	575	945	1,316	1,686	2,056	2,427	2,797
2.25	655	1,050	1,446	1,841	2,236	2,632	3,027
2.35	735	1,155	1,576	1,996	2,416	2,837	3,257
2.45	815	1,260	1,706	2,151	2,596	3,042	3,487
2.55	895	1,365	1,836	2,306	2,776	3,247	3,717
2.70	1,015	1,523	2,031	2,538	3,046	3,554	4,062

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ORGANIC ALMONDS - FLOOD IRRIGATION

PRICE	YIELD (LB/ACRE)						
(DOLLARS PER LB)	800	1,050	1,300	1,550	1,800	2,050	2,300
2.05	228	573	918	1,264	1,609	1,954	2,300
2.15	308	678	1,048	1,419	1,789	2,159	2,530
2.25	388	783	1,178	1,574	1,969	2,364	2,760
2.35	468	888	1,308	1,729	2,149	2,569	2,990
2.45	548	993	1,438	1,884	2,329	2,774	3,220
2.55	628	1,098	1,568	2,039	2,509	2,979	3,450
2.70	748	1,255	1,763	2,271	2,779	3,287	3,795

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ORGANIC ALMONDS - FLOOD IRRIGATION

PRICE	YIELD (LB/ACRE)						
(DOLLARS PER LB)	800	1,050	1,300	1,550	1,800	2,050	2,300
2.05	-447	-102	244	589	934	1,280	1,625
2.15	-367	3	374	744	1,114	1,485	1,855
2.25	-287	108	504	899	1,294	1,690	2,085
2.35	-207	213	634	1,054	1,474	1,895	2,315
2.45	-127	318	764	1,209	1,654	2,100	2,545
2.55	-47	423	894	1,364	1,834	2,305	2,775
2.70	73	581	1,089	1,596	2,104	2,612	3,120