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1994

**U.C. COOPERATIVE EXTENSION**

**SAMPLE COSTS  
TO ESTABLISH AN APPLE ORCHARD AND PRODUCE  
~APPLES~**



***Sprinkler Irrigated* - IN SONOMA COUNTY**

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## U.C. COOPERATIVE EXTENSION

### GENERAL INFORMATION FOR ESTABLISHING AN APPLE ORCHARD AND PRODUCING APPLES *Sprinkler Irrigated - Sonoma County - 1994*

Detailed costs of establishing an apple orchard and production of apples under irrigated conditions in Sonoma County are presented in this study. The hypothetical farm used in this report is 50 acres, 45 of which are being planted to apples.

This study consists of General Assumptions for Establishing an Apple Orchard and Producing Apples and eight tables. It is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described in this study are based on those production procedures considered typical for Sonoma County. Occasionally, additional practices, not listed, may be required. Sample costs given for labor, materials, equipment and contract services are based on current figures. Some costs and practices detailed in this study may not be applicable to every situation. A blank, *Your Cost*, column is provided to enter your actual costs on **Table 2, Sample Costs To Produce Apples** and **Table 3, Costs And Returns Per Acre to Produce Apples**.

This study consists of General Assumptions for Establishing An Apple Orchard And Producing Apples, Dryland, and seven tables. Tables included:

<b>Table 1.</b>	<b>Costs Per Acre to Establish An Apple Orchard</b>
<b>Table 2.</b>	<b>Costs Per Acre to Produce Apples</b>
<b>Table 3.</b>	<b>Costs and Returns Per Acre to Produce Apples</b>
<b>Table 4.</b>	<b>Monthly Cash Costs Per Acre to Produce Apples</b>
<b>Table 5.</b>	<b>Whole Farm Annual Equipment, Investment and Business Overhead</b>
<b>Table 6.</b>	<b>Hourly Equipment Costs</b>
<b>Table 7.</b>	<b>Ranging Analysis</b>

For an explanation of calculations used for the study refer to the attached General Assumptions or call the Department of Agricultural Economics, Cooperative Extension, University of California, Davis, California, (530) 752-3589 or the Sonoma County apple farm advisor.

A cost of production study for dryland apples in Sonoma County is also available and entitled, "Sample Costs to Establish An Apple Orchard and Produce Apples, Dryland Orchard, Sonoma County - 1994".

Additionally a companion study entitled, "Production Practices And Sample Costs For Fresh Market Organic Apples, North Coast, 1993 - 1994" is available for those interested in organic apple production on the North Coast.

The studies mentioned above can be requested through the Department of Agricultural Economics, U.C. Davis, or from selected county Cooperative Extension offices.

## U.C. COOPERATIVE EXTENSION

### GENERAL ASSUMPTIONS FOR ESTABLISHING AN APPLE ORCHARD AND PRODUCING APPLES *Sprinkler Irrigated - Sonoma County - 1994*

The following is a description of some general assumptions pertaining to sample costs to establish an apple orchard and produce apples in Sonoma County. Practices described should not be considered recommendations by the University of California, but rather represent production procedures considered typical for this crop and area. Some of these costs and practices may not be applicable to your situation nor used during every production year. Additional ones not indicated may be needed. Establishment and cultural practices for the production of apples vary by grower and region. Variations can be significant. The practices and inputs used in this cost study serve only as a sample or guide. These costs are represented on an annual, per acre basis. *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.*

#### **1. LAND:**

The whole farm consists of 50 acres of land. Of that, 45 acres are planted with apples and five acres are occupied by roads, irrigation systems, fencing, and farmstead. The orchard is situated on uneven hillsides with poorly drained low spots that will require removal of excess water. Property costs \$11,000 per acre. Because only 45 of the 50 acres are planted to apples, land is valued at \$12,222 per producing acre.

#### **2. TREES:**

The apple cultivars planted in this study are late harvested varieties; either Golden Delicious or Rome. Both are dual purpose, utilized for either fresh market or processing. Most orchards will include two varieties in which pollen shedding and bloom periods coincide so that adequate pollination is insured. The trees are planted at 18' X 12' spacing, 202 trees per acre. The life of the orchard at the time of planting in this study is estimated to be 25 years.

When selecting varieties to plant, growers should consider not only whether they can be successfully grown on the North Coast, but also if there is a market that will bring an adequate return for these particular cultivars. Other older cultivars that are already grown in Sonoma County include Jonathan, Macintosh, Gravenstein, Winesap, and Granny Smith. Newer varieties also need to be scrutinized for potential planting; these would include Fuji, Gala, Jonagold, and Braeburn. Some varieties fit into a speculative category and are potentially sold at significantly higher prices. **Table 7** indicates the returns above operating, cash, and total costs at various yields and with prices ranging from that received for traditionally grown cultivars to the more speculative varieties.

#### **3. IRRIGATION AND DRAINAGE SYSTEMS:**

**Irrigation System:** Pumped water (plus labor) is the irrigation cost. The cost is based on using a 15 - 20 hp motor to pump 18 acre-inches 250 feet in a 350 foot well over 45 acres. Water is pumped to the orchard after running through a filtration station into an underground, permanent sprinkler system in the tree rows. Since an older orchard was removed at this location, a pump and well already exist and the cost of the irrigation system is for the recasing of the well, refurbishment of the pump and motor in addition to the installation of a new filtration system and underground, permanent sprinklers. The new irrigation system is installed after the orchard has been laid out and prior to planting. The life of the irrigation system is estimated at 25 years. The irrigation system is an improvement to the property and is found in **Table 5** as an investment. Since it is an investment its cost appears as non-cash overhead, depreciation and interest on investment, and is separate from the orchard cash cost.

Price per acre foot of water will vary by grower in this region depending on power source, cost, various well characteristics, and other irrigation factors. In this study, water is calculated to cost \$55.20 per acre foot. No assumption is made about effective rainfall. The amount of water applied to the orchard period varies annually and is shown in **Table A**.

**Table A. Applied Irrigation Water**

Year	AcIn/Year	\$/Acre
1	0.83	46.00
2	1.0	55.20
3	1.0	55.20
4	1.0	55.20
5	1.3	73.60
6	1.3	73.60
7	1.3	73.60
8+	1.5	82.80

**Drainage System:** The drainage system is designed to remove excess water deposited from the low areas of the orchard where it accumulates. Since only a portion of the orchard consists of these low lying areas, only those places will have the tile drains installed. It is assumed that 25% of the orchard will require this drainage system. The tile drains are installed prior to planting.

#### **4. ESTABLISHMENT CULTURAL PRACTICES:**

This orchard is established on ground that has been previously planted to other tree crops. The land is assumed to be on rolling hillsides and poorly drained in areas. The orchard site requires the need for a pressurized irrigation system (i.e. sprinkler or drip irrigation) and a tile drainage system. Both systems are considered an improvement to the property and are not found as preplant operations in **Table 1**, establishment costs; rather they are shown in the non-cash overhead section of various tables.

**Site Preparation:** Land preparation begins with removal of the old orchard. Deep ripping of the soil profile to 5 to 6 feet breaks up any underlying hardpan to improve root and water penetration. Following ripping, lime is added to amend soil pH and a company is contracted to fumigate the orchard site to control soil-borne pathogens and pests. Ripping prior to fumigation opens the soil for better diffusion of the fumigant through a larger area of the soil. The ground is then disced several times once fumigation has been completed. Discing helps break up large clods of soil and smooth the ground in advance of leveling and planting the trees. Ground is leveled so high and low spots are removed in order to allow for efficient irrigation and better drainage, though this does not alleviate the need for a drainage system. Orchard removal, ripping, lime spreading, fumigation, and landplaning are performed by contract operators. All operations that prepare the orchard for planting are done in the year prior to planting, but costs are shown in the first year.

**Planting:** Planting the orchard starts by laying out and marking tree sites with a small stake. Holes are dug at each stake using a tractor mounted post hole digger and auger. After the trees are planted their trunks are treated with white, water-based paint to protect them from sunburn. New trees are cut back soon after planting so that trunk development is encouraged. In the second year, 2% of the trees or 4 trees per acre will have to be replaced.

**Pruning:** Regular pruning begins in the first year during the dormant season. For the first four years, young trees are pruned to promote a structurally strong framework to provide support for fruit and ease of cultural and harvest operations. Time required for pruning increase annually. By the fourth year, the volume of prunings require them to be placed into the row middles, pushed out of the orchard, and burned.

**Fertilization:** Nitrogen is the major nutrient required for proper tree growth and optimum yields. It is applied by hand at the base of the young tree and broadcast by the fourth year in the form of granular calcium nitrate (15.5-0-0-24). Annual rates of applied N are shown in **Table B**.

**Table B. Annual Applied Nitrogen**

Year	Lbs Of N/Tree	Lbs Of N/Acre
1	0.25	50
2	0.37	75
3	0.5	100
4	0.5	100
5+	0.5	100

Potassium is also determined to be deficient in the study. It is sidedressed or banded in the form of potash along the tree rows at a rate of 0.75 tons per acre. Trees treated with potassium generally do not show any response for one to two years after the application. In this study, potash is not applied until the seventh or eighth year so it is not shown as a cost in **Table 1**, establishment costs.

Calcium is used to control bitter pit in apples and is supplied to the trees as foliar calcium nitrate sprayed at several intervals throughout the growing season. It is applied in combination with other pest sprays to lower application costs. In the first three years calcium nitrate is not sprayed. Beginning in the third year it is mixed and applied with three other pest applications. A rate of 10 pounds of calcium nitrate per acre is used each time for a total of 30 pounds annually.

**Orchard Floor Management:** Control of weeds is important in young orchards so that trees are not stressed due competition for water and nutrients by weeds. Management of the orchard floor uses several techniques to control weeds: application of herbicides, cultivation, and in the first two years, hoeing around the trees by hand.

Tillage of rows and middles helps manage vegetation on the orchard floor. Discing is the mechanical weed control practice used in this study, though orchard cultivators or other tillage equipment might also be used. Mechanical cultivation begins the year that the trees are planted and continue through the life of the orchard. Cultivating consists of cross discing four times annually until the tree row fills in (third year). After the third year discing is performed only in the tree row middles leaving a strip of uncultivated soil at the tree base.

Chemical weed control for the orchard begins in the fall/winter of the first year with a mix of residual, pre-emergent herbicides which are sprayed along the tree rows. This mixture of Roundup- and a pre-emergent herbicide controls a wide range of annual and perennial weeds. In spring and summer a contact herbicide, Roundup- is used to control emerged weeds as spot sprays where needed.

**Insect, Arthropod, and Disease Management:** Apples have many insect, mite, and disease pests; codling moth (*Cydia (Laspeyresia) pomonella*), several species of mites (*Tetranychus sp.* and *Panonychus ulmi*), various aphids (*Dysaphis Plantaginea*, *Aphis pomi*, and *Eriosoma lanigerum*), pear thrip (*Taeniothrips incosequens*), and apple scab (*Venturia inaequalis*) are managed with cultural practices and treatment of various pesticides. Many of the pesticides are mixed and applied together controlling a combination of insects, mites, and diseases.

Pesticide sprays used to manage insects and mites start in the first year and all are continued, to some degree, each year throughout the life of the orchard. A delayed dormant spray of a horticultural oil and Diazinon- is applied in February for control of overwintering aphids, mites and scale. Thrips are also treated for with Cygon- applied with the last apple scab spray. Codling moths have three additional

insecticide applications in May, July, and August beginning in the fourth year. In the July codling moth spray, Omite- is mixed with Guthion- for control of different mites. All of the pest control sprays are applied by a tractor and orchard sprayer.

During the developmental years diseases are present and are treated, beginning with fumigation of the field before planting. Methyl bromide is used to fumigate for control of many soil born pathogens as well as insect and nematode pests. After planting apple scab (*Venturia inaequalis*) is the major disease that requires treatment. Early spring scab causes flower drop and can dramatically reduce yield. Affected fruit develop an exterior scab which misshapens fruits and renders them unsuitable for fresh market sale. In this study, three applications of various fungicides are used to combat this disease. Lime sulfur is used at greentip and the last two treatments use Rally-. In the last scab treatment, Cygon is mixed with Rally- for control of thrips.

**Thinning:** Fruit thinning is needed once apples begin setting fruit in large quantities. Thinning improves fruit size, quality, uniformity, prevents limb breakage, and promotes regular bearing each year. It is accomplished through an assortment of chemicals and cultural practices. Chemical thinning is usually performed before the June drop so that return bloom is improved for the following season. A combination of NAA and Sevin are mixed and sprayed in April. Hand thinning supplements the use of thinning agents by selectively removing fruits that are damaged or clustered too close together. In this study, hand thinning occurs in May. Thinning, both chemical and by hand, begins in the fifth season.

**Harvest and Yields:** Depending on variety, apples grown in the North Coast region start bearing a commercial crop in the fourth or fifth year after planting. Though most trees will bear fruit in the second or third years, it is usually removed so that young tree growth is not stunted. In this study, a commercial crop is produced by the fifth year. **Table C** indicates the assumed yields for the two varieties used in this study; Golden Delicious and Rome.

Year	Tons/Acre			
	Total Yield	Fresh Market	Peelers	Juicers
5	2.5	1.7	0.7	0.1
6	6.5	4.5	1.8	0.2
7	10.4	7.3	2.8	0.3
8	14.3	10.0	3.9	0.4
9	18.2	12.7	4.9	0.6
10	22.1	15.4	6.0	0.7
11	26.0	18.2	7.0	0.8
12	30.0	21.0	8.1	0.9

**Establishment Cost:** The cost to establish the orchard is used to determine the non-cash overhead expenses: depreciation and interest on investment for production years. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing apple trees through the first year fruit is harvested minus any returns from production. The *Total Accumulated Net Cash Cost* in the fifth year shown in **Table 1**, represents the establishment cost per acre. For this study, this cost is \$9,428 per acre or \$424,260 for the 45 acre orchard. Establishment cost is depreciated beginning in the fifth year over the remaining 20 years of the 25 years that the orchard is assumed to be in production.

## **5. PRODUCTION CULTURAL PRACTICES:**

**Pruning:** There are two basic pruning strategies for apple trees; central and multiple leader systems. Choice of pruning regime is dependent on several factors such as use of size controlling or normal rootstock, varieties that are susceptible to sunburn, or high density plantings. In this study, pruning is done in the winter months by hand. Prunings are placed into the row middles and pushed out of the orchard by a tractor equipped with a front loader and brush rake and burned.

**Fertilization:** Tree nitrogen status is determined by leaf analysis; sampling for analysis is important for proper applications of nitrogen. Over fertilization of trees can cause excessive shoot growth and undesirable characteristics for fresh market apples. Multiple applications of nitrogen are made to provide trees with N when needed. These occur twice in May and once in July. In this study, nitrogen is supplied in the form of calcium nitrate ( $\text{Ca}(\text{NO}_3)_2 = 15.5\%$  nitrogen) at a rate of 0.5 pounds of N per tree which is equivalent to approximately 100 pounds of N and 650 pounds of calcium nitrate per acre. A granular formulation is broadcast dry along the tree rows.

Bitter pit is an abiotic disorder caused by low calcium levels. Symptoms on fruit appear as small spots or depressions on the skin while the tissue underneath dies and turns brown. Treatment for bitter pit consists of foliar calcium sprays. In this study, three applications of foliar calcium nitrate are made. These are mixed and applied with greentip, scab, and codling moth sprays. A total of 30 pounds per acre of calcium nitrate are applied annually.

While other nutrients can occur in insufficient quantities in Sonoma County apple orchards, the most commonly deficient is zinc. Leaf analysis should be used to determine if zinc levels are adequate. Zinc deficiency symptoms appear first in young branches near tree tops. Lateral buds on these shoots tend to develop more slowly than the terminal buds and have small, stiff, narrow leaves. Eventually fruit size becomes smaller on these branches, especially near the tip. A foliar application of chelated zinc and copper is made just prior to leaf fall using a rate of 5 pounds per acre.

**Weed Management:** Weeds in mature orchards are controlled with the same combination of chemical and cultural (discing) practices as when being established. Pre-emergent weeds are controlled in the tree row during the fall by a strip spray of residual and contact herbicide (Roundup- and Princep-). A tractor and disc are used to cultivate the orchard floor down the tree middles four times from April through July. Persistent weeds that are not controlled by the fall residual spray or cultivation receive spot sprays of a contact herbicide (Roundup-)

**Insect, Arthropod, and Disease Management:** Several insect, arthropod, and disease pests are treated each year. Pests dealt with in this study include codling moth, aphids, thrips, mites, and apple scab.

Codling moth is the most economically significant insect pest of apples because of damage that makes the fruit unmarketable. Multiple generations occur annually and are controlled with timed insecticide treatments based on careful monitoring of the population. The first generation usually begin hatching in May and, in this study, is controlled with Imidan-. The second and third normally occur in July and August on the North Coast. Guthion- is used to control both of these hatches. Treatments for codling moths also help to control other lepidopteran pests.

Mites can cause damage in apples if populations build to significant levels. Dormant oil sprays during the winter control most mites before damage occurs. However, use of certain insecticides can suppress mite predators and create outbreaks of harmful mites during the growing season. For this reason Omite- is mixed in with Guthion- in the second codling moth spray and applied to control harmful species of mite.

Rosy apple aphid, green apple aphid, and woolly apple aphid are the most damaging aphids in apples. All three can cause significant losses in Sonoma County if they are not properly managed for. Control is accomplished in part with the use of Diazinon- and horticultural oil in the delayed dormant spray. Additional management strategies relies on the use of natural predators to contain aphid populations at low levels. Use of certain pesticides can suppress aphids' natural enemies and disrupt biological control creating sudden increases in aphid populations. If this occurs an additional spray of Diazinon- or Lorsban- is usually applied.

Flower thrip (*Frankliniella occidentalis*) can be a economically significant pest by causing a blemish known as pansy spot on the fruit if not managed. A mix of Cygon- in the greentip spray will usually control thrips in this region.

Apple scab is caused by a fungus which first attacks young leaves as they are growing. Lesions will appear on lower leaf surfaces and inhibit normal leaf growth. If the fungus infects flowers during bloom, blossoms usually drop causing yield reductions and scabbing of young fruit. Apple scab is a serious disease in the cool, moist growing region of the North Coast. Management begins with winter sanitation by destruction/decomposition of leaves and other residue that provide an overwintering site for fungal spores. Pesticide applications are used to combat this disease. In this study, three fungicide treatments are made before infections occur in the spring. Temperature and moisture monitoring are used to pinpoint timing for application of these chemicals. The material used in the first treatment is lime sulfur applied in the green tip spray during March. The last two both are made in April with an application of Rally-.

**Vertebrate Pest Management:** Two vertebrates require control in apple orchards for this region; Columbia Blacktail Deer (*Odocoileus hemionus columbianus*) and pocket gophers (*Thomomys sp.*). Damage by deer is managed by a fence surrounding the orchard that is installed at the time of planting. By fencing the orchard and excluding deer, growers offset their cost by lowering losses from deer damage and spending for other control measures that would be undertaken if it was not in place. The fence is designed to last the life of the orchard and is considered an investment. As such, it does not appear as a cash cost in the planting section of **Table 1**, establishment costs, but rather emerges as a non-cash overhead costs through all of the establishment and production years. Total cost of the fence is found in **Table 5**.

Gophers present a constant management problem. Since there is no way to exclude gophers from the orchard other control measures such as trapping or baiting must be used instead. Gophers, in this study, are managed with the use of poison bait applied in the spring while populations are still low. The bait is placed underground in an artificial burrow built by a mechanical bait applicator attached to a tractor. Gophers intersecting these tunnels will explore them and eat the bait.

**Thinning:** Thinning fruit is accomplished in the same manner for a mature tree as for young ones, with a combination of hand fruit removal and chemical agents. In this study, an application of Sevin and NAA occurs in May and selective hand thinning is done during June.

Pesticides, rates, and cultural practices mentioned in this cost study are a few of those listed in the UC IPM Apple Pest Management Guidelines and Integrated Pest Management For Apples And Pears. Written recommendations are required for many pesticides and are made by licensed pest control advisors. For information and pesticide use permits, contact the local county Agricultural Commissioner's office.



## **6. HARVEST:**

Harvest starts in the fourth or fifth year after the orchard is planted depending on variety and other factors. In the first 12 years the orchard is harvested with a single picking. After that size picking for apples commences and trees are picked twice. Growers are paid for fruit based on gross field tons for different grades. In this cost study, the crop is harvested and hauled by the grower, although a contracted harvesting company may be hired to harvest apples. Cleaning, sorting, and packing costs are paid by the packing shed. The harvest season for Golden Delicious and Rome is in September.

Mature apple orchards are harvested twice. The first pick usually collects 50% of the fruit. The second pick gathers the remaining apples about a week or two later. Labor required for harvesting the second pick is only half of the first since fruit is not selectively chosen. Harvest crews use ladders and picking bags to hand pick fruit which is placed into field bins. Tractors with forklift attachments on both the front loader and 3 point hitch pick up the filled bins, move them from the orchard, and place the bins on a flatbed truck which transports them to a packing shed for cleaning, sorting, and packing. For growers that contract their harvest, the equipment and labor used for harvest operations should be removed from Harvest costs in **Tables 2, 3, and 4**, and custom harvest charges should be added to Harvest costs in the same tables.

## **7. YIELDS & RETURNS:**

**Yields:** Typical annual yields for Golden Delicious and Rome varieties are measured in tons per acre and are shown in **Table C**. Yields fall into three categories; fresh market, peelers, and juicers. The latter two categories are apples that will not make fresh market grades for cosmetic, size, or other damage factors, but can be used for processing into juice, sauce or other processed apple products. Apples that go to processing receive lower prices than fresh market fruit so grower incentive is to produce for the fresh fruit trade.

An assumed yield of 30 gross tons per acre is used to calculate cost per ton. A typical yield range is 20 to 40 tons per acre. Yields for the three different categories in this study, break out from the gross tonnage as follows: fresh market - 70%, peelers - 27%, and juicers - 3%. Yield maturity is reached in the eighth year.

**Returns:** Estimated return prices per ton for these same categories are: fresh market - \$250.00, peelers - \$152.50, and juicers - \$122.50. Prices may currently range for fresh market: \$200 to \$300 per ton, peelers; \$150 to \$155, and juicers; \$120 to \$125. Use of return prices for apples is to calculate ranging analysis for different yields and price. Returns, shown in **Table 7**, will vary and the yields and prices used in this cost study are an estimate taking into consideration varieties produced, fruit quality, and current market conditions. Speculative varieties might reach prices as high as \$500 to \$1000 per ton for fresh fruit.

## **8. RISK:**

Risk is caused by various sources of uncertainty which include production, price, and financial. Examples of these are insect damage, a decrease in price, and increase in interest rates. The risks associated with producing apples in Sonoma County should not be underestimated. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks which affect the profitability and economic viability of apple production. Additionally, establishment of apple orchards and the equipment required to properly handle the fruit is very capital intensive. Growers should consider all of the agronomic and economic risks before committing resources to establishing an apple orchard and apple production in the Sonoma County.

## **9. LABOR:**

Hourly wages for workers are \$6.00 and \$4.70 per hour for machine and non-machine workers, respectively. This is based on wages paid by the growers in this study. Adding 34% for Workers Compensation, Social Security, Medicare, insurance, and other possible benefits gives the labor rates shown of \$8.04 and \$6.30 per hour for machine labor and non-machine labor, respectively. Almost all of the growers supplied health insurance, housing and a truck in their benefits package. Some of the labor supplied to the farms is from family members, but they are still paid the same rates used in this study. Labor for operations involving machinery are 20% higher than the operation time given in **Table 2** to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and repair. Wages for management is not included as a cash cost. Any return above total costs is considered a return to management and risk.

## **11. CASH OVERHEAD:**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, and equipment repairs.

**Property Taxes:** Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

**Interest On Operating Capital:** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 7.89% per year. A nominal interest rate is the going market cost of borrowed funds.

**Insurance:** Insurance for farm investments vary depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.713% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$336 for the entire farm.

**Office Expense:** Office and business expenses are estimated at \$106 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

**Sanitation Services:** Sanitation services provide portable toilets for the orchard and cost the farm \$766 annually. The cost for this includes delivery and servicing of toilets. Cash overhead costs are found in **Tables 1, 2, 3, 4, and 5.**

## **12. NON-CASH OVERHEAD:**

Non-cash overhead is comprised of depreciation and interest charged on equipment and other investments. Although farm equipment on typical apple farm in the Sonoma County is often purchased used, this study shows the current purchase price for new equipment adjusted to 60% of new value to indicate a mix of new and used equipment. Annual equipment and investments costs are shown in **Tables 1, 2, 3, and 5.** They represent depreciation and opportunity cost for each investment on an annual per acre basis.

Depreciation is a reduction in market value of investments due to wear, obsolescence, and age, and is on a straight line basis. Annual depreciation is calculated as purchase price minus salvage value divided by years the investment is held. The purchase price and years of life are shown in **Table 5.**

Interest is charged on investments to account for income foregone (opportunity cost) that could be received from an alternative investment. The investments are assumed to be owned outright. Therefore, interest on investments is a non-cash cost. Investments include land, orchard establishment, buildings, and equipment. Interest is calculated as the average value of the investment during its useful life, multiplied by 3.72% per year. Average value for equipment and buildings equals new cost plus salvage value divided by 2 on a per acre basis.

The average value for land is equal to the purchase price because land does not depreciate. The interest rate used to calculate opportunity cost is estimated as a ten year average of the agricultural sector longrun rate of return to production assets from current income. It is used to reflect the long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector.

### **13. EQUIPMENT CASH COSTS:**

Equipment costs are composed of three parts; non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of fuel, lubrication, and repairs.

In allocating the equipment costs on a per acre basis, the following hourly charges are calculated first and shown in **Table 6**. 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 hp, and type of fuel used. The fuel and repair cost per acre for each operation in **Table 2** is determined by multiplying the total hourly operating cost in **Table 6** for each piece of equipment used for the cultural practice by the number of hours per acre for that operation. Tractor time is 10% higher than implement time for a given operation to account for setup time. Prices for on-farm delivery of diesel and gasoline are \$0.85 and \$1.17 per gallon, respectively.

### **REFERENCES**

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U.C. COOPERATIVE EXTENSION  
 Table 1. SAMPLE COST PER ACRE TO **ESTABLISH** AN APPLE ORCHARD  
 SPRINKLER IRRIGATED  
 SONOMA COUNTY - 1994

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
Tons Per Acre					1.75	4.55
<b>Planting Costs:</b>						
Remove Old Orchard	\$350					
Land Preparation - Rip 3X	\$225					
Land Preparation - Apply Lime	\$203					
Land Preparation - Fumigate	\$1,400					
Land Preparation - Disc 3X	\$18					
Land Preparation - Landplane Field 2X	\$100					
Layout Orchard	\$101					
Auger Tree Holes	\$199	\$4				
Plant Trees	\$101	2				
Trees: 121 Per Acre @ \$3.95 ea., (2%	\$1,067	21				
Paint & Cut Back	\$53	1				
<b>TOTAL PLANTING COSTS</b>	<b>\$3,816</b>	<b>\$28</b>				
<b>Cultural Costs:</b>						
Hoe Around Trees	\$64	\$64				
Pruning	\$24	51	\$85	\$127	\$255	\$509
Brush Disposal				\$6	9	15
Fertilizer - Nitrogen	\$76	62	85	85	85	85
Weed Control - Spot Spray		\$2	2	2	2	2
Weed Control - Disc 4X	\$43	43	43	43	43	43
Weed Control - Winter Strip		\$24	24	24	24	24
Pest Control - Dormant	\$19	19	19	19	19	19
Pest Control - Greentip Spray	\$13	13	13	13	14	14
Pest Control - Gophers	\$13	13	13	13	13	13
Pest Control - Pinkbud Spray	\$13	13	13	13	13	13
Pest Control - Scab, Thrip Spray & Ca	\$20	20	20	20	21	21
Pest Control - Codling Moth Spray & C				\$31	45	45
Pest Control - Codling Moth, Mites Sp				\$57	51	51
Irrigate	\$53	63	63	63	84	84
Thin Fruit - Chemical					\$59	59
Thin Fruit - Hand					\$53	138
Pickup Truck Use	\$216	216	216	216	216	216
<b>TOTAL CULTURAL COSTS</b>	<b>\$553</b>	<b>\$539</b>	<b>\$596</b>	<b>\$732</b>	<b>\$1,006</b>	<b>\$1,351</b>
<b>Harvest Costs:</b>						
Pick Fruit					\$72	\$186
Haul to Shed					\$17	45
<b>TOTAL HARVEST COSTS</b>					<b>\$89</b>	<b>\$231</b>
<b>Interest On Operating Capital @ 7.89%</b>	<b>\$314</b>	<b>\$22</b>	<b>\$20</b>	<b>\$24</b>	<b>\$52</b>	<b>\$56</b>
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>\$4,683</b>	<b>\$588</b>	<b>\$616</b>	<b>\$756</b>	<b>\$1,147</b>	<b>\$1,638</b>
<b>Cash Overhead Costs:</b>						
Office Expense	\$118	\$118	\$118	\$118	\$118	\$118
Sanitation Fees	\$17	17	17	17	17	17
Liability Insurance	\$7	7	7	7	7	7
Property Taxes	\$150	150	150	150	150	150
Property Insurance	\$107	107	107	107	107	107
Investment Repairs	\$16	16	16	16	16	16
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>\$415</b>	<b>\$415</b>	<b>\$415</b>	<b>\$415</b>	<b>\$415</b>	<b>\$415</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>\$5,098</b>	<b>\$1,004</b>	<b>\$1,031</b>	<b>\$1,171</b>	<b>\$1,562</b>	<b>\$2,053</b>
<b>INCOME/ACRE FROM PRODUCTION</b>					<b>\$438</b>	<b>\$1,138</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	<b>\$5,098</b>	<b>\$1,004</b>	<b>\$1,031</b>	<b>\$1,171</b>	<b>\$1,124</b>	<b>\$915</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>	<b>\$5,098</b>	<b>\$6,102</b>	<b>\$7,133</b>	<b>\$8,304</b>	<b>\$9,428</b>	<b>\$10,344</b>

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO **ESTABLISH** AN APPLE ORCHARD  
 Table 1. continued  
 SPRINKLER IRRIGATED  
 SONOMA COUNTY - 1994

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
Tons Per Acre					1.75	4.55
<b>Depreciation:</b>						
Shop Building	\$30	\$30	\$30	\$30	\$30	\$30
Fuel Tanks & Pumps	\$6	6	6	6	6	6
Shop Tools	\$15	15	15	15	15	15
Irrigation System	\$57	57	57	57	57	57
Deer Fence	\$17	17	17	17	17	17
Tile Drainage System	\$12	12	12	12	12	12
Ladders - 10 Each	\$3	3	3	3	3	3
Picking Bags	\$1	1	1	1	1	1
ATV	\$28	28	28	28	28	28
Pruning Tools	\$3	3	3	3	3	3
Hand Tools	\$5	5	5	5	5	5
Equipment	\$133	133	133	133	133	133
<b>TOTAL DEPRECIATION</b>	<b>\$311</b>	<b>\$311</b>	<b>\$311</b>	<b>\$311</b>	<b>\$311</b>	<b>\$311</b>
<b>Interest On Investment @ 3.72%</b>						
Land @ \$12,222/Producing Acre	\$455	\$455	\$455	\$455	\$455	\$455
Shop Building	\$17	17	17	17	17	17
Fuel Tanks & Pumps	\$3	3	3	3	3	3
Shop Tools	\$5	5	5	5	5	5
Irrigation System	\$26	26	26	26	26	26
Deer Fence	\$13	13	13	13	13	13
Tile Drainage System	\$6	6	6	6	6	6
Ladders - 10 Each	\$1	1	1	1	1	1
Picking Bags	\$1	1	1	1	1	1
ATV	\$3	3	3	3	3	3
Pruning Tools	\$1	1	1	1	1	1
Hand Tools	\$2	2	2	2	2	2
Equipment	\$29	29	29	29	29	29
<b>TOTAL INTEREST ON INVESTMENT</b>	<b>\$561</b>	<b>561</b>	<b>561</b>	<b>561</b>	<b>561</b>	<b>561</b>
<b>TOTAL COST/ACRE FOR THE YEAR</b>	<b>\$5,970</b>	<b>\$1,875</b>	<b>\$1,902</b>	<b>\$2,043</b>	<b>\$2,433</b>	<b>\$2,924</b>
<b>INCOME/ACRE FROM PRODUCTION</b>					<b>\$438</b>	<b>\$1,138</b>
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>	<b>\$5,970</b>	<b>\$1,875</b>	<b>\$1,902</b>	<b>\$2,043</b>	<b>\$1,996</b>	<b>\$1,787</b>
<b>TOTAL ACCUMULATED NET COST/ACRE</b>	<b>\$5,970</b>	<b>\$7,845</b>	<b>\$9,747</b>	<b>\$11,790</b>	<b>\$13,786</b>	<b>\$15,573</b>

Table 2.

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO **PRODUCE** APPLES  
 SPRINKLER IRRIGATED  
 SONOMA COUNTY - 1994

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total		
<b>Cultural:</b>								
Prune	65.00	409.50	0.00	0.00	0.00	409.50		
Brush Removal	0.25	24.46	1.37	0.00	0.00	25.83		
Pest Control - Dormant	0.41	3.96	5.40	10.05	0.00	19.41		
Pest Control - Greentip	0.41	3.96	5.40	4.70	0.00	14.06		
Disc - 4X	2.58	24.85	17.87	0.00	0.00	42.72		
Leaf Analysis	0.00	0.00	0.00	0.00	4.00	4.00		
Fertilize - Nitrogen	1.23	11.87	6.32	66.60	0.00	84.79		
Pest Control - Gophers	0.50	4.82	2.62	5.48	0.00	12.93		
Weed Control - Spot Spray	0.10	0.96	0.64	0.54	0.00	2.15		
Pest Control - Pinkbud	0.41	3.96	5.40	3.52	0.00	12.88		
Pest Control-Scab,Thrip,& Ca	0.41	3.96	5.40	11.59	0.00	20.95		
Thin Fruit - Chemical	0.41	57.00	5.40	51.24	0.00	113.64		
Pest Control-Codling Moth&Ca	0.41	3.96	5.40	35.60	0.00	44.96		
Thin Fruit - Hand	20.20	127.26	0.00	0.00	0.00	127.26		
Pest Control - Moth, Mites&Ca	0.20	1.98	2.70	46.00	0.00	50.68		
Irrigate	1.62	10.21	0.00	82.80	0.00	93.01		
Weed Control - Winter Strip	0.26	2.47	1.64	22.35	0.00	26.46		
Fertilize - Potash	0.41	3.97	2.12	37.05	0.00	43.14		
Pickup Truck Use	<u>7.92</u>	<u>76.43</u>	<u>54.17</u>	<u>0.00</u>	<u>0.00</u>	<u>130.60</u>		
<b>TOTAL CULTURAL COSTS</b>	<b>102.73</b>	<b>775.57</b>	<b>121.84</b>	<b>377.52</b>	<b>4.00</b>	<b>1278.94</b>		
<b>Harvest:</b>								
1st Pick	136.60	860.58	0.00	0.00	0.00	860.58		
Haul To Shed	25.20	243.17	152.23	0.00	0.00	395.40		
2nd Pick	<u>68.30</u>			<u>0.00</u>				
		<u>430.29</u>	<u>0.00</u>		<u>0.00</u>	<u>430.29</u>		
<b>TOTAL HARVEST COSTS</b>	<b>230.10</b>	<b>1534.04</b>	<b>152.23</b>	<b>0.00</b>	<b>0.00</b>	<b>1686.27</b>		
Int on operating capital@ 7.89%						60.84		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2309.61</b>	<b>274.07</b>	<b>377.52</b>	<b>4.00</b>	<b>3026.05</b>		
<b>TOTAL OPERATING COSTS/TON</b>						<b>144.10</b>		
<b>CASH OVERHEAD:</b>								
Office Expense						117.78		
Liability Insurance						7.47		
Sanitation Fees						17.24		
Property Taxes						199.92		
Property Insurance						142.54		
Investment Repairs						<u>15.81</u>		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>500.76</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>3526.81</b>		
<b>TOTAL CASH COSTS/TON</b>						<b>167.94</b>		

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO **PRODUCE** APPLES  
 Table 2. continued  
 SPRINKLER IRRIGATED  
 SONOMA COUNTY - 1994

NON-CASH OVERHEAD:

Investment	Per producing	<u>Annual Costs</u>		
	<u>Acres</u>	<u>Depreciation</u>	<u>Interest @ 3.72%</u>	
Land	12222.22		454.67	454.67
Sprinkler Irrigation System	1422.44	56.90	26.46	83.36
Deer Fence	688.71	17.22	12.81	30.03
Tile Drainage System	298.62	11.94	5.55	17.50
Ladders - 10 each	27.89	2.51	0.57	3.08
Picking Bags	4.11	0.82	0.08	0.90
ATV - 4WD	157.27	28.31	3.22	31.52
Pruning Equipment	28.60	2.57	0.59	3.16
Hand Tools	91.56	5.49	1.87	7.37
Orchard Establishment	9428.00	471.40	175.36	646.76
Equipment	<u>1816.50</u>	<u>168.81</u>	<u>37.17</u>	<u>205.98</u>
TOTAL NON-CASH OVERHEAD COSTS	27425.81	817.92	743.71	1561.63
TOTAL COSTS/ACRE				5088.44
TOTAL COSTS/TON				242.31

Table 3.

U.C. COOPERATIVE EXTENSION  
 COSTS AND RETURNS PER ACRE TO **PRODUCE** APPLES  
 SPRINKLER IRRIGATED  
 SONOMA COUNTY - 1994

	Quantity/Acr	Unit	Price or Cost/Uni	Value or Cost/Acr	Your Cost
<b>GROSS RETURNS</b>					
Fresh	21.0	Ton	250.00	5250.00	
Peelers	8.1	Ton	152.50	1235.25	
Juicers	0.9	Ton	122.50	110.25	
<b>TOTAL GROSS RETURNS FOR APPLES</b>				<b>6595.50</b>	
<b>OPERATING COSTS</b>					
<b>Acaracide:</b>					
Dormant Oil	2.00	Gal	2.75	5.50	
Cygon 400	1.33	Pint	5.09	6.77	
Omite 30 WP	6.00	Lb	6.15	36.90	
<b>Insecticide:</b>					
Diazinon 50 W	1.00	Lb	4.55	4.55	
Sevin 80S	4.00	Lb	5.10	20.40	
Imidan 50WP	6.00	Lb	4.20	25.20	
Guthion 50W	2.00	Lb	9.10	18.20	
<b>Fungicide:</b>					
Lime Sulfur	1.00	Gal	3.40	3.40	
Rally	1.34	Oz	5.26	7.05	
<b>Fertilizer:</b>					
Ca(NO <sub>3</sub> ) <sub>2</sub> Foliar	30.00	Lb	0.13	3.90	
Ca(NO <sub>3</sub> ) <sub>2</sub> Granular	666.00	Lb	0.10	66.60	
Potash	0.19	Ton	195.00	37.05	
<b>Contract:</b>					
Leaf Analysis	1.00	Acre	4.00	4.00	
<b>Rodenticide:</b>					
Rodent Bait	2.00	Lb	2.74	5.48	
<b>Herbicide:</b>					
Roundup	1.05	Qt	10.83	11.37	
Princep 4L	2.00	Qt	5.76	11.52	
<b>Thinning Agent:</b>					
Fruitone 200	0.25	Lb	123.34	30.84	
<b>Irrigation:</b>					
Water - Pumped	18.00	AcIn	4.60	82.80	
Labor (machine)	49.34	Hrs	8.04	396.68	
Labor (non-machine)	303.64	Hrs	6.30	1912.93	
Fuel - Gas	28.47	gal	1.17	33.31	
Fuel - Diesel	84.68	gal	0.85	71.98	
Lube				15.77	
Machinery repair				153.14	
Interest on operating capital @ 7.89%					
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>3026.05</b>	
<b>TOTAL OPERATING COSTS/TON</b>				<b>144.10</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>3569.45</b>	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				117.78	
Liability Insurance				7.47	
Sanitation Fees				17.24	
Property Taxes				199.92	
Property Insurance				142.54	
Investment Repairs					
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>500.76</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>3526.81</b>	
<b>TOTAL CASH COSTS/TON</b>				<b>167.94</b>	



Table 4.

U.C. COOPERATIVE EXTENSION  
MONTHLY CASH COSTS PER ACRE TO PRODUCE APPLES  
SPRINKLER IRRIGATED  
SONOMA COUNTY - 1994

Beginning	JAN 94	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending	DEC 94	94	94	94	94	94	94	94	94	94	94	94	94	
Cultural:														
Prune		410												410
Brush Removal		26												26
Pest Control - Dormant			19											19
Pest Control - Greentip				14										14
Disc - 4X					21	11	11							43
Leaf Analysis					4									4
Fertilize - Nitrogen						57		28						85
Pest Control - Gophers					13									13
Weed Control - Spot Spray					2									2
Pest Control - Pinkbud					13									13
Pest Control-Scab,Thrip & Ca					21									21
Thin Fruit - Chemical					114									114
Pest Control-Codling						31		14						45
Moth&Ca														
Thin Fruit - Hand						127								127
Pest Control-Moth, Mite&Ca								51						51
Irrigate							31	31	31					93
Weed Control - Winter Strip												26		26
Fertilize - Potash												43		43
Pickup Truck Use		<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>131</u>
TOTAL CULTURAL COSTS		446	30	25	199	237	103	84	42	11	11	80	11	1279
Harvest:														
1st Pick										861				861
Haul To Shed										395				395
2nd Pick														
										<u>430</u>				<u>430</u>
TOTAL HARVEST COSTS										1686				1686
Interest on operating capital		3	3	3	5	6	7	7	8	19				61
TOTAL OPERATING COSTS/ACRE		449	33	28	203	243	110	91	50	1716	11	80	11	3026
TOTAL OPERATING COSTS/TON		21	2	1	10	12	5	4	2	82	1	4	1	144
OVERHEAD:														
Office Expense		10	10	10	10	10	10	10	10	10	10	10	10	118
Liability Insurance		7												7
Sanitation Fees		2	2	2	2	2	2	2	2	2	2	2		17
Property Taxes		100						100						200
Property Insurance		143												143
Investment Repairs		<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>16</u>
TOTAL CASH OVERHEAD COSTS		263	13	13	13	13	13	113	13	13	13	13	11	501
TOTAL CASH COSTS/ACRE		712	46	41	216	255	123	204	62	1729	24	93	22	3527
TOTAL CASH COSTS/TON		34	2	2	10	12	6	10	3	82	1	4	1	168

U.C. COOPERATIVE EXTENSION  
WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

Table 5.

SPRINKLER IRRIGATED  
SONOMA COUNTY - 1994

ANNUAL EQUIPMENT COSTS

Yr Description	Price	Yrs Life	Non-Cash Over.		Cash Overhead		Total
			Depre- ciation	Interest	Insur- ance	Taxes	
93 3 Point Forks	670	15	40.20	13.71	2.63	3.69	60.23
93 55 HP 2WD Tractor	26782	12	2008.67	547.96	105.02	147.30	2808.95
93 55 HP 4WD Tractor	31102	12	2332.67	636.34	121.97	171.06	3262.04
93 Bait Applicator	1046	10	94.20	21.39	4.10	5.75	125.44
93 Brush Rake - 10'	1453	25	52.32	29.72	5.70	7.99	95.73
93 Disc - Offset 8'	8066	10	725.90	165.04	31.63	44.37	966.94
93 Front End Loader	4440	15	266.40	90.84	17.41	24.42	399.07
93 Loader Forks	730	15	43.80	14.94	2.86	4.01	65.61
93 Orchard Sprayer - 500	17055	10	1534.90	348.95	66.88	93.81	2044.54
93 Pickup Truck - 1/2 Ton	17160	7	2206.29	351.09	67.29	94.38	2719.05
93 Spinner Spreader - 3 Pt	878	20	39.50	17.97	3.44	4.83	65.74
93 Truck - 2 Ton	23306	7	2996.43	476.85	91.40	128.19	3692.87
93 Weed Sprayer - 100 Gal	3550	10	319.50	72.63	13.92	19.52	425.57
<b>TOTAL</b>	<b>136238</b>		<b>12660.78</b>	<b>2787.43</b>	<b>534.25</b>	<b>749.32</b>	<b>16731.7</b>
60% of New Cost *	81743		7596.47	1672.46	320.55	449.59	10039.0

\* Used to reflect a mix of new and used

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Non-Cash Over.		Cash Overhead		Total	
			Depre- ciation	Interest	Insur- ance	Taxes Repairs		
<b>INVESTMENT</b>								
Orchard Establishment	424260	20	21213.00	7891.24	1512.49	2121.30	0.00	32738.03
Irrigation System	64010	25	2560.40	1190.59	228.20	320.05	128.00	4427.24
ATV - 4WD	7077	5	1273.80	144.80	27.75	38.93	50.00	1535.28
Buildings	38110	25	1371.96	779.73	149.45	209.61	152.40	2663.15
Deer Fence	30992	40	774.80	576.45	110.49	154.96	68.00	1684.70
Fuel Tanks & Pumps	6355	20	285.95	130.03	24.92	34.96	125.00	600.86
Hand Tools	4120	15	247.20	84.30	16.16	22.66	50.00	420.32
Ladders - 10 each	1255	10	112.90	25.69	4.92	6.90	0.00	150.41
Land	550000		20460.00	3921.50	5500.00	0.00	0.00	29881.50
Picking Bags	185	5	37.00	3.44	0.66	0.93	0.00	42.03
Pruning Equipment	1287	10	115.80	26.34	5.05	7.08	25.00	179.27
Shop Tools	11330	15	679.80	231.81	44.43	62.32	113.00	1131.36
Tile Drainage System	13438	25	537.52	249.95	47.91	67.19	0.00	902.57
<b>TOTAL INVESTMENT</b>	<b>1152419</b>		<b>29210.13</b>	<b>31794.37</b>	<b>6093.93</b>	<b>8546.89</b>	<b>711.40</b>	<b>76356.72</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	50	acre	6.72	336
Office Expense	50	acre	106	5300
Sanitation Fees	50	acre	15.52	776

Table 6.

U.C. COOPERATIVE EXTENSION  
 HOURLY EQUIPMENT COSTS  
 SPRINKLER IRRIGATED  
 SONOMA COUNTY - 1994

Yr	Description	COSTS PER HOUR								Total Costs/ Hr
		Actual Hours Used	Non-Cash Over. Depre- ciation	Interes t	Cash Overhead. Insur- ance	Taxes	Repair s	Operating Fuel & Lube	Total Oper.	
93	3 Point Forks	920.7	0.03	0.01	0.00	0.00	0.10	0.00	0.10	0.14
93	55 HP 2WD Tractor	1012.8	1.19	0.32	0.06	0.09	1.61	2.64	4.25	5.91
93	55 HP 4WD Tractor	395.5	3.54	0.97	0.19	0.26	1.55	2.64	4.19	9.14
93	Bait Applicator	22.5	2.51	0.57	0.11	0.15	0.63	0.00	0.63	3.98
93	Brush Rake - 10'	11.3	2.79	1.59	0.30	0.43	0.21	0.00	0.21	5.32
93	Disc - Offset 8'	115.9	3.76	0.85	0.16	0.23	2.32	0.00	2.32	7.33
93	Front End Loader	931.9	0.17	0.06	0.01	0.02	0.64	0.00	0.64	0.90
93	Loader Forks	920.7	0.03	0.01	0.00	0.00	0.11	0.00	0.11	0.15
93	Orchard Sprayer- 500 Gal	119.9	7.68	1.75	0.33	0.47	8.56	0.00	8.56	18.79
93	Pickup Truck- 1/2 Ton	285.0	4.64	0.74	0.14	0.20	3.11	3.36	6.47	12.20
93	Spinner Spreader- 3 Pt	73.9	0.32	0.15	0.03	0.04	0.53	0.00	0.53	1.06
93	Truck - 2 Ton	285.0	6.31	1.00	0.19	0.27	5.60	2.69	8.29	16.06
93	Weed Sprayer - 100 Gal	16.0	11.97	2.72	0.52	0.73	1.78	0.00	1.78	17.72

Table 7.

U.C. COOPERATIVE EXTENSION  
RANGING ANALYSIS  
SPRINKLER IRRIGATED  
SONOMA COUNTY - 1994

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE APPLES							
	FRESH MARKET YIELD (TON/ACRE)						
	10.5	14.0	17.5	21.0	24.5	28.0	31.5
<b>OPERATING COSTS/ACRE:</b>							
Cultural Cost	1279	1279	1279	1279	1279	1279	1279
Harvest Cost	843	1124	1405	1686	1967	2248	2529
Interest on operating capital	55	57	59	61	63	65	66
TOTAL OPERATING COSTS/ACRE	2177	2460	2743	3026	3309	3592	3875
TOTAL OPERATING COSTS/TON	207.37	175.73	156.75	144.10	135.06	128.28	123.01
CASH OVERHEAD COSTS/ACRE	501	501	501	501	501	501	501
TOTAL CASH COSTS/ACRE	2678	2961	3244	3527	3810	4093	4375
TOTAL CASH COSTS/TON	255.06	211.50	185.37	167.94	155.50	146.16	138.90
NON-CASH OVERHEAD COSTS/ACRE	1562	1562	1562	1562	1562	1562	1562
TOTAL COSTS/ACRE	4240	4523	4806	5088	5371	5654	5937
TOTAL COSTS/TON	403.79	323.05	274.60	242.31	219.24	201.94	188.48

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR IRRIGATED APPLES									
PRICE (Dollars/Tons)			YIELD (Tons/Acre)						
Fresh			10.5	14.0	17.5	21.0	24.5	28.0	31.5
	Slicers		4.1	5.4	6.8	8.1	9.5	10.8	12.2
	Juicers		0.5	0.6	0.8	0.9	1.1	1.2	1.4
100	120	90	-601	-358	-116	127	370	612	855
150	130	100	-30	402	835	1,267	1,417	1,849	2,565
200	140	110	540	1,162	1,785	2,407	2,747	3,369	4,275
250	150	120	1,110	1,922	2,735	3,547	4,077	4,889	5,985
300	150	120	1,635	2,622	3,610	4,597	5,302	6,289	7,560
350	150	120	2,160	3,322	4,485	5,647	6,527	7,689	9,135
400	150	120	2,685	4,022	5,360	6,697	7,752	9,089	10,710
500	150	120	3,735	5,422	7,110	8,797	10,202	11,889	13,860
600	150	120	4,785	6,822	8,860	10,897	12,652	14,689	17,010
700	150	120	5,835	8,222	10,610	12,997	15,102	17,489	20,160
800	150	120	6,885	9,622	12,360	15,097	17,552	20,289	23,310
900	150	120	7,935	11,022	14,110	17,197	20,002	23,089	26,460
1,000	150	120	8,985	12,422	15,860	19,297	22,452	25,889	29,610

U.C. COOPERATIVE EXTENSION  
RANGING ANALYSIS  
Table 7. continued  
SPRINKLER IRRIGATED  
SONOMA COUNTY - 1994

NET RETURNS PER ACRE ABOVE CASH COSTS FOR IRRIGATED APPLES									
PRICE (Dollars/Tons)			YIELD (Tons/Acre)						
Fresh			10.5	14.0	17.5	21.0	24.5	28.0	31.5
	Slicers		4.1	5.4	6.8	8.1	9.5	10.8	12.2
		Juicers	0.5	0.6	0.8	0.9	1.1	1.2	1.4
100	120	90	-1,102	-859	-617	-374	-132	111	355
150	130	100	-532	-99	334	766	1,199	1,349	2,065
200	140	110	39	661	1,284	1,906	2,529	2,869	3,775
250	150	120	609	1,421	2,234	3,046	3,859	4,389	5,485
300	150	120	1,134	2,121	3,109	4,096	5,084	5,789	7,060
350	150	120	1,659	2,821	3,984	5,146	6,309	7,189	8,635
400	150	120	2,184	3,521	4,859	6,196	7,534	8,589	10,210
500	150	120	3,234	4,921	6,609	8,296	9,984	11,389	13,360
600	150	120	4,284	6,321	8,359	10,396	12,434	14,189	16,510
700	150	120	5,334	7,721	10,109	12,496	14,884	16,989	19,660
800	150	120	6,384	9,121	11,859	14,596	17,334	19,789	22,810
900	150	120	7,434	10,521	13,609	16,696	19,784	22,589	25,960
1,000	150	120	8,484	11,921	15,359	18,796	22,234	25,389	29,110

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR IRRIGATED APPLES									
PRICE (Dollars/Tons)			YIELD (Tons/Acre)						
Fresh			10.5	14.0	17.5	21.0	24.5	28.0	31.5
	Slicers		4.1	5.4	6.8	8.1	9.5	10.8	12.2
		Juicers	0.5	0.6	0.8	0.9	1.1	1.2	1.4
100	120	90	-2,664	-2,421	-2,179	-1,935	-1,693	-1,450	-1,208
150	130	100	-2,094	-1,661	-1,229	-795	-363	70	502
200	140	110	-1,524	-901	-279	345	968	1,590	2,213
250	150	120	-954	-141	672	1,485	2,298	3,110	3,923
300	150	120	-429	559	1,547	2,535	3,523	4,510	5,498
350	150	120	97	1,259	2,422	3,585	4,748	5,910	7,073
400	150	120	622	1,959	3,297	4,635	5,973	7,310	8,648
500	150	120	1,672	3,359	5,047	6,735	8,423	10,110	11,798
600	150	120	2,722	4,759	6,797	8,835	10,873	12,910	14,948
700	150	120	3,772	6,159	8,547	10,935	13,323	15,710	18,098
800	150	120	4,822	7,559	10,297	13,035	15,773	18,510	21,248
900	150	120	5,872	8,959	12,047	15,135	18,223	21,310	24,398
1,000	150	120	6,922	10,359	13,797	17,235	20,673	24,110	27,548