
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2012

**SAMPLE COSTS TO
ESTABLISH AND PRODUCE
PEARS**

Green Bartlett



NORTH COAST REGION

Lake and Mendocino Counties

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Green Bartlett - Sprinkler Irrigated

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INTRODUCTION

Sample costs to establish a pear orchard and produce Bartlett pears using sprinkler irrigation, in the North Coast Region, are presented in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described are based on production practices considered typical for the crop and area, but the same practices will not apply to all situations. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column titled, “*Your Costs*”, in Table 3 and Table 4 is provided to enter your costs.

The hypothetical farm operations, production practices, overhead costs, and calculations are described in the “Assumptions” section. For additional information or explanation of calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis at (530) 752-3589, or the Lake County UC Cooperative Extension office at (707) 263-6838.

Sample Cost of Production Studies for current and archived commodities are available at <http://coststudies.ucdavis.edu>, or can be requested from the Department of Agricultural and Resource Economics at UC Davis by phone at (530) 752-1515, or obtained from selected county UC Cooperative Extension offices.

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ASSUMPTIONS

The assumptions refer to Tables 1 through 9 and pertain to sample costs to establish and produce Bartlett pears in the North Coast Region – Lake and Mendocino Counties. Practices described represent production practices and materials considered typical of a well-managed orchard in the region. The costs, materials, and practices shown in this study will not be applicable to all situations. Orchard establishment, types of cultural practices, and timing may vary significantly among growers within the region, as well as from season to season, due to variables such as weather, soil, and insect and disease pressure. The practices and inputs used in the study are intended to serve as a guide only. **The use of trade names and cultural practices 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 or cultural practices.**

Farm. The farm consists of 75 acres of land; 25 acres are pear trees being established, 45 acres are producing pear trees, and five acres are occupied by roads, irrigation systems, fencing, and farmstead. The farm is on alluvial bottomland, common in the North Coast region of Lake and Mendocino Counties. The establishment and production costs in this study are based on the 25 acres being established.

Orchard Establishment Operating Costs

Site/Land Preparation. Soil samples to determine presence of nematodes and nutrient problems should be taken prior to final planting decisions. Costs for soil sampling and mitigating problems prior to planting are not included in this study. Land preparation begins with removing the old orchard. The trees are pushed out with a large bulldozer, piled and burned. The soil is ripped twice, three feet deep. The ripping breaks up underlying hardpan to improve root and water penetration, pulls up roots from the previous orchard that could harbor nematodes and diseases, and opens up the soil profile. Afterwards the ground is disced two times to break up large clods, and to smooth the surface. Following discing, the orchard site is fumigated with Telone 2 and Chloropicrin to control soil-borne pathogens and pests. Contract or custom operators do the orchard removal, ripping, and fumigation. The orchard site is sprayed with a contact herbicide (Roundup is used in this study) and disced prior to planting. All operations that prepare the orchard for planting are done in the summer or fall of the year prior to planting, but costs are shown in the first year. An alternative to fumigation is to fallow and cover crop the field for several years prior to planting.

Planting. Planting is done as soon as the soil is suitably dry in late winter or early spring. It consists of laying out and marking tree sites with a small stake, and then digging holes at each stake using a tractor mounted posthole digger. Trees are planted and a tree wrap is placed around the trunk to protect from vertebrate pests, chemical, and sunburn damage. The planting crew consists of a tractor driver and two men planting. New trees are cut back to 24 to 28 inches immediately after planting to encourage trunk development and painted white with a 50/50 mixture of water-based latex paint on the south and west sides to prevent sunburn. In the second year about 2% of the trees, or 5 trees per acre, are replaced.

Trees. The pear cultivar planted in this study is Green Bartlett on Winter Nelis rootstock—a common combination in Lake and Mendocino Counties. Bartlett is a dual-purpose pear, utilized for both fresh market and processing. Other cultivars grown include Bosc, Red Bartlett, Red Clapp's Favorite (Starkrimson, Super Red) and Comice. Of the six rootstocks used in commercial California orchards, Winter Nelis has a history of successful use for Bartlett planted on sandy loam to loam soils. This rootstock gives uniformity in size and growth as well as adequate vigor for commercial production. The trees are planted with 10 X 18-foot spacing, 242 trees per acre. Other common spacings are 12' x 24', 12' x 12', 9' x 15', and 9' x 14'. Pear trees have a long production life if they are well maintained. Some pear orchards with trees over 100 years old are still producing a commercial crop. The life of the orchard at the time of planting in this study is estimated to be 30 years.

Irrigation. The irrigation cost includes pumped water plus labor. The cost is based on two 25 to 30 horsepower motors pumping 48 acre-inches from depths of 60 to 90 feet. The water is pumped through a filtration station, then into the permanent underground sprinkler system in the tree rows. The per acre-foot price for water will vary by grower in this region depending on power source, power cost, various well characteristics, and other irrigation factors. In this study, water costs \$63.24 per acre-foot (\$5.27/acre-inch). Normal winter and early spring rainfall of 25 to 35 inches is assumed. The amount of water applied to the orchard increases as the trees mature. The average amount of annually applied water is shown in Table A.

Year	Frost Protection		Total Water
	Irrigation	Protection	
Acre inches/year			
1	24	0	24
2	24	0	24
3	30	0	30
4	30	0	30
5+	30	18	48

Frost Protection. Protecting the orchard from frost begins in the fifth year when fruit is set. Trees may be protected from low temperatures by using wind machines, orchard heaters, and/or sprinkler applied water. This study uses water to prevent frost damage. Water is sprinkled onto the orchard floor using the existing irrigation system. To protect against frost damage, one acre-inch of water is applied in six hours each night for approximately 18 nights from April through May, however it may begin as early as March and extend as late as June. The amount of water applied for frost protection is 18 acre-inches, shown in Table A.

Ground cover or resident vegetation cause a cooling affect in the orchard and can increase the chance of frost damage by lowering the orchard temperature. To avoid or reduce injury to the pear buds, blossoms and small fruit, applying herbicides or close mowing during this period should suppress the orchard vegetation. Ground cover, especially grasses, can also increase russetting during the early stages of fruit growth.

Training/Pruning. Training and pruning begin in the first year of the dormant season (December through February). During the first four years, young trees are trained and pruned to develop a structurally strong framework. Bartlett pear trees are pruned to a multiple leader system, which reduces the risk of losing a tree to fire blight (*Erwinia amylovora*). Pruning is done by grower labor and pruning time increases each year until the orchard reaches full production. Prunings are shredded in the spring during a regular mowing, or left on the ground to break down naturally. Fire blight-infected wood is removed from the orchard and burned.

Fertilization. Nitrogen is the major nutrient required for proper tree growth and optimum yields. Two ounces of urea fertilizer (46-0-0)—about one ounce of actual nitrogen—is hand applied around the base of each newly-planted tree. After shoots have grown out about 6 inches, urea is immediately incorporated or irrigated into the soil. In the remaining years granular urea is dissolved in irrigation water and applied in June. Annual rates of applied N are shown in Table B.

Year	Lbs. N/acre	Lbs. urea/acre
1	35	76
2	45	98
3	65	141
4 - 6	75	163
7+	150	326

Pest Management. The pesticides and rates mentioned in this cost study as well as other materials available are listed in *UC IPM Pest Management Guidelines: Pear* (<http://ipm.ucdavis.edu/PDF/PMG/pmgpear.pdf>). Pesticides mentioned in the study are commonly used, but are not considered to be recommendations.

Weeds. Weed control is the most important cultural practice in young orchards, so trees will not be stressed due to competition for water and nutrients. A combination of practices — discing, cultivation, mowing, and chemical control — are used to manage weeds. Prior to planting, existing weeds are killed with a post-emergent herbicide glyphosate (Roundup) and then the orchard is disced. During the first year the middles are disced four times – March, April, May, and June. In the second through the fourth year, the resident vegetation in the row middles is left to grow and mowed seven times from March through July. In the fifth and subsequent years, the

row middles are sprayed with Roundup in March, and mowed five times from May through July. Chemical weed control in the tree row begins in the fall/winter (November to February), or dormant season of the first year, with a tank mixture of the contact herbicide, Paraquat, and the residual herbicide, Prowl. This combination is repeated in the second, third and fourth years. In the fifth and subsequent years, a tank mix of Roundup and the pre-emergent herbicide, Chateau, is applied to the tree row in December. In-season weed control in the tree row begins in the second year. Roundup is applied to the tree row in April and July. All sprays are applied by the grower.

Insects. Pears have many insect and mite pests: codling moth (*Cydia [Laspeyresia] pomonella*), pear psylla (*Cacopsylla pyricola*), and several species of mites (*Tetranychus spp.*, *Epitrimerus pyri*, *Phytoptus pyri*, and *Panonychus ulmi*). Dormant oil sprays for insects start in January of the second year and continue throughout the life of the orchard. The spray is targeted at pear psylla, but also provides some control for aphids, mites and scale (mainly San Jose). Beginning in the first year of commercial crop set (5th year in this study) additional applications of horticultural oil, pheromones, and other pesticides are added as needed to control codling moth, pear psylla, mites and other pests. Pear psylla and mites are controlled with an oil spray in February (delayed dormant), Kumulus (sulfur) in March (budbreak), Agrimek and oil in April, and oil in September (postharvest). Codling moth is controlled by hanging Isomate CTT pheromone ties in late March. Codling moth and other moth pests (cucumber beetles, katydids, and pear slugs) are treated in May with Intrepid insecticide mixed with antibiotics (Agri-Mycin, Mycoshield)—for fire blight control—and Delegate applied in June. A half-rate of the pyrethroid Asana is applied pre-bloom, in early April, to control Western flower thrips. Pesticide applications are made with the grower's tractor and orchard sprayer.

Diseases. Many diseases can affect pears in the North Coast Region, but the two major diseases are pear scab (*Venturia pirina*) and fire blight (*Erwinia amylovora*).

Pear scab can infect blossoms and leaves, but causes significant damage only to fruit. The infected fruit develops an exterior scab causing the fruit to be misshapen and unsuitable for fresh market. Disease management begins in the first year of significant crop set at bud break, but slightly later (prior to cluster bud) for pear scab and pear psylla control. Pear scab is controlled according to predictive weather models. In this study, Ziram and Syllit are applied once each in March. In addition, Manzate (or another protectant) is applied with the second fire blight spray in April, and Ziram is applied with first fire blight spray in May.

Fire blight symptoms in the spring can appear in blossom clusters and shoot tips. If allowed to begin, the infection can move into twigs, stems, and branches. Severe infections may not only cause loss of fruit for the year, but may kill entire branches or trees. Conditions ideal for rapid fire blight infection and spread are rainy or humid weather following periods of temperatures ranging from 75° to 85°F (24° to 29°C). Fire blight management includes applications of antibiotics or copper compounds, avoiding excessive tree vigor, and elimination of infected branches well below any visible infection. During years of heavy disease pressure, fire blight may require 10 or more chemical applications, which result in 3 to 5 day spray cycles. In this report fire blight treatment begins in the third year with five applications: one of Badge X2 and two of Mycoshield and Agri-Mycin tank mixed in April, and twice again in May. This increases to 12 treatments in the fourth year and continues through the production years. In the fourth year Badge X2 is applied three times in April and again in May, Agri-Mycin is applied twice in April and twice in May, and Mycoshield is applied once in April and once in May. In the fifth and continuing years, Agri-Mycin and Mycoshield are combined and applied six times in April and six times again in May. One treatment in April and in May is combined with a pear scab treatment, another application is combined with a codling moth treatment. The applications for the nine blight only treatments are applied to alternate rows.

Vertebrate. Gopher bait is applied to the orchard in March, beginning in the first year. The grower uses a tractor and bait applicator to move around the field.

Harvest. Pears produce a commercial crop in the fourth or fifth year after planting. Some trees will produce fruit in the second or, more likely the third year, but it is usually removed so that early tree growth is not stunted. In this study, a commercial crop is produced and harvested in the fifth year. Growers are paid for fruit based on gross field tons for different grades. A custom harvester company is hired to harvest the crop. Cleaning, sorting, and packing costs are paid by the grower. The harvest season for Green Bartlett in this study is in August. Four and five year old orchards are harvested once, and older pear orchards are harvested twice.

Yields. Typical annual yields for Green Bartlett pears are measured in tons per acre; Table C indicates the assumed yields for the variety used in this study from the first yield to maturity. Yields fall into three categories: fresh market, processed, and off-grade. Processed is also referred to as canning or unrestricted grade, and off-grade as restricted grade. Off-grade pears are used in juice, and in concentrated, fermented, dried, and frozen products. Pears that go to processing or off-grade normally receive lower prices than fresh market fruit so the incentive for the grower is to produce for the fresh market, although from year to year, fresh market prices tend to fluctuate more than processed prices. Prices for large fruit (100 or larger box size) are generally significantly higher than prices for smaller fruit (110 or smaller box size).

Table C. Assumed Annual Yields of Bartlett Pears

Year	Total Yield	Fresh		
		Market	Processed	Off-grade
Tons/Acre				
5	4.0	2.08	1.32	0.60
6	7.0	3.64	2.31	1.05
7	10.0	5.20	3.30	1.50
8	13.0	6.76	4.29	1.95
9	16.0	8.32	5.28	2.40
10+	20.0	10.40	6.60	3.00

Production Operating Costs

Pruning. In this study, a contract hand crew prunes mature trees in January (pruning range is late November through February). Small prunings are left in the orchard and will break down over the season with irrigations. Large prunings such as scaffolds and fire blight cuttings are removed from the orchard and burned. It is assumed that the prunings are small, therefore no removal cost is incurred, although substantial cost can be incurred to prune out fire blight infected wood through the growing season in some years.

Fertilization. Tree nitrogen (N) composition is determined by visual observation (shoot vigor and leaf color) and validated by leaf analysis. Over-fertilization of trees can cause excessive shoot growth, which results in increased susceptibility to fire blight and reduced fruit set due to shading. One hundred fifty (150) pounds of actual N are applied per acre as urea (46-0-0, 326 lbs. per acre total). The urea is dissolved in water and split equally into two applications of 75 pounds actual N (163 lbs. urea) each, applied through the irrigation system in late June and again immediately after harvest, in September. Two leaf samples for nutrient analysis per the 25 acres are taken in July. It is assumed that it takes one hour using an ATV to collect the samples and one hour to package the samples for a total of 0.08 hours per acre.

Pest Management. Pesticides, rates, and cultural practices mentioned in this cost study, among others, are listed in the *UC IPM Pest Management Guidelines: Pear*, and *Integrated Pest Management for Apples and Pears*. For more information on pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. For information on pesticide use permits, contact the local County Agricultural Commissioner's office. Adjuvants are recommended for use with many pesticides for effective control, but adjuvants and their costs are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are shown as full retail.

Pest Control Adviser (PCA). Written recommendations are required for many pesticides and are made by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests and nutrition. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. The private PCA in this study monitors the field for agronomic problems, pest, and diseases, and hangs and checks pheromone traps during the season.

Weeds. Weeds in the orchard middles are controlled with one Roundup application in March, and five mowings from May through July. Weeds in the tree row (strip) are controlled with a dormant strip spray (November to February) of residual and contact herbicides (Chateau and Roundup). In this study the dormant strip spray is in December. During the growing season, weeds are controlled with two in-season strip sprays in April and July using Roundup.

Insects. Several insect and arthropod pests are treated each year. Pests controlled in this study are codling moth, pear psylla, and mites. The grower does all pest management operations with his own equipment.

Codling moth is considered the primary pear pest because it makes fruit unmarketable. Its control largely determines subsequent control of other pests. Since multiple generations occur annually, control with insecticide treatments based on careful monitoring of the population and degree-days is essential. The PCA hangs the codling moth traps in late March or early April and checks them on a regular basis through September. The traps and lures are included in the PCA costs. Pheromone ties for mating disruption (Isomate CTT) are placed in the trees in March by the grower. The first generation usually begins hatching in late April or early May, and the second and third generations normally occur in July and August. In this study, Intrepid is applied once in May with a blight spray, and Delegate once in June. Additional applications may be required depending on moth populations.

Pear psylla is also a significant insect pest. It injects a toxin into the tree, produces honeydew, and vectors pear decline disease (caused by a mycoplasma). Pear decline is not considered a major problem if trees are grafted to a resistant rootstock. Toxin from pear psylla also results in a condition referred to as psylla shock. Once in the tissue, the toxin causes burning of the foliage, which can cause yield reductions, smaller fruit size, and loss of tree vigor. Honeydew excreted by pear psylla can cause russetting on fruit and sooty mold on leaves, reducing photosynthesis. Pear psylla is primarily controlled with horticultural oil (415 oil) and Agrimek. Treatments in this study include a dormant spray (dormant oil) in January or early February, a delayed dormant spray (415 or 440 oil) in late February, and oil and Agrimek in April. In addition, Delegate is applied in May, which controls for pear psylla and codling moth.

Mites can cause damage in pears even at low population levels (even as few as two per leaf). Dormant oil sprays during the winter control some mites before damage occurs. However, use of certain insecticides can suppress mite predators and create outbreaks of harmful mites during the growing season. Mating disruption and natural predators help control mite populations. Mites are controlled with the same materials and applications as the pear psylla. In addition, lime sulfur and micronized sulfur (Kumulus) are applied in September (postharvest) to control blister mite.

Obliquebanded leafroller (OBLR) (*Choristoneura rosaceana*) larvae may feed on flower parts or young fruit causing rough or russeted fruit. Intrepid is applied in May for OBLR control.

Diseases. Fire blight, previously described in the “Establishment” section, can cause the loss of complete branches or trees. Twelve (12) treatments of antibiotics are made from April (6 treatments) through May (6 treatments) using an Agri-Mycin and Mycoshield tank mix. Three of the blight sprays are combined with other pest applications: two with pear scab treatments - one in April, one in May - and one with the second codling

moth spray in May. Fire blight sprays that include only antibiotics are made to every other, or alternate rows. The combined fire blight/pear scab or fire blight/codling moth treatments are applied to every row. The biological control *Pseudomonas fluorescens* A506 (Blight Ban A506) is also used for fire blight as well as a frost and russet management tool by many growers, but is not included in this study.

Pear scab is a serious disease in the cool, moist growing North Coast region. It is a fungus that first attacks young fruit, appearing as dark velvety spots on the fruit exterior, often causing young pears to drop. If fruit does not drop, scabbing and deformities occur causing reductions in quality. In this study, lime sulfur is applied just prior to green-tip in March. Temperature and moisture monitoring are then used to pinpoint timing for the following fungicide applications. Two applications are made in March—one with Ziram and one with Syllit. Two additional pear scab sprays are combined with the fire blight treatments, one in April using Manzate and one in May using Ziram.

Vertebrate Pests. The major vertebrate pest in pear orchards in the region is the pocket gopher (*Thomomys sp.*). Trapping and/or baiting controls gophers. In this study, gophers are managed by applying poison bait in the spring when populations are still low. The bait is placed underground in an artificial burrow made by a mechanical bait applicator and tractor. Gophers intersecting the tunnels will explore them and eat the bait.

Harvest. Mature pear orchards are harvested twice. The first pick, in August, is selective and usually collects 33% of the fruit, most of which will go for fresh market. The second pick gathers the remaining pears about 10 days to two weeks later. Harvest crews use ladders and picking bags to hand pick fruit that is placed into one-half ton field bins. Two tractors with bin trailers and bins move the filled bins from the orchard, and place them on a flatbed truck or drop-trailers for transport to a packing shed for cleaning, sorting, and packing. The grower also rents a forklift for loading and unloading the bins. The grower uses a contract harvesting company.

Yields. Typical annual yields for Green Bartlett pears are measured in tons per acre. Yields fall into three categories as shown in Table D: fresh market, processed, and off-grade. Processed is also referred to as canning or unrestricted grade, and off-grade as restricted grade.

Table D. Tonnage & Percent Packout – Lake / Mendocino Counties Bartlett Pears 2007- 2011¹

Year	Lake County				Mendocino County			
	Tons	Fresh	Process	Off-grade	Tons	Fresh	Process	Off-grade
		%				%		
2007	36,060	49	41	10	34,412	38	52	10
2008	35,453	45	37	16	28,683	32	57	11
2009 ²	36,473	48	41	12	23,234	27	67	6
2010	34,959	55	32	10	19,243	25	67	8
2011	44,125	51	33	16	24,425	23	68	9
Avg	37,414	50	37	13	25,999	29	62	9

¹Agricultural Commissioner Annual Reports, Lake County & Mendocino County, 2007-2011 ²Excludes Red Bartlett Pears

Off-grade pears are used in juice, baby food, and in concentrated, fermented, dried, and frozen products.

An assumed average yield over the remaining life of the orchard is 20 tons per acre, which is used to calculate returns and costs per ton. A typical yield range is 15 to 35 tons per acre. Yield maturity is reached in the tenth year. This report separates yields for the three different categories from gross tonnage as follows: fresh market, 52%; processed, 33%; and off-grade, 15%.

Returns. Gross F.O.B. (freight-on-board) return prices per ton for the Bartlett pear categories described above are: fresh market, \$665.00; processed, \$250.00; and off grade, \$70.00. The return prices are approximated from 5-year volume-weighted averages derived from Lake and Mendocino Agricultural Commissioner’s Annual Crop Reports and current market conditions. Fresh market prices are often reported by the grower less packing house costs and may appear much lower than reported in this study. The return prices for pears are used to calculate a ranging analysis for a range of yields and prices found on Table 6, page 24.

Assessments. Under a state marketing order, mandatory assessment fees are collected and administered by the California Pear Advisory Board (CPAB). The assessment is charged to growers to pay for pear promotion and research. Rates are set for pears bound for both fresh and processed markets. This report uses CPAB assessments for the categories: Fresh Market-tight-fill carton, Fresh Market-standard box, Processed-unrestricted, and Processed-restricted grades, shown in Table E.

Table E. California Pear Advisory Board Assessments Bartlett Pears

Category	Unit Price	Unit
<u>Fresh Market</u>		
Tight-fill carton	\$0.0042	lb.
Standard box	\$0.15	36 lb.
Metric box	\$0.18	44 lb.
LA lug	\$0.17	40 lb.
	\$0.12	28 lb.
<u>Processed</u>		
Unrestricted grades	\$4.00	ton
Restricted grade	\$1.50	ton
Other products	\$1.50	ton

Additionally, growers may pay a voluntary assessment to the California Pear Growers (CPG). The CPG uses these funds to negotiate a price for growers who sell their pears to proprietary processors, and to foster markets for processed pears. CPG charges members \$2.00 per ton of processed fruit.

Packinghouse. The packinghouse receives the pears delivered by the grower. The fees charged vary by packinghouse and include the sorting, grading, storage, packaging materials and selling costs. In this study 50% of the fresh market pears are hand wrap packed in 40 or 44 pound boxes at a cost of \$8.60 per box and 50% are packed in tight fill 36 pound boxes at \$6.70 per box. The packinghouse sells the processing pears to the cannery and receives the revenue. The grower receives payment from the packinghouse less packinghouse charges. The grower pays the cleaning, sorting and packing costs.

Labor, Equipment and Interest

Labor. Labor rates of \$14.70 per hour for machine operators and \$11.20 for general labor includes payroll overhead of 40%. The basic hourly wages are \$10.50 for machine operators and \$8.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for orchard/fruit crops, and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of May, 2012 (personal email from California Department of Insurance, May 2012, unreferenced). Labor for operations involving machinery are 20% higher than the operation time given, to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Wages for management are not included as a cash cost. Any return above total costs is considered a return to management and risk. However, growers wanting to account for management may wish to add a fee. The manager makes all production decisions including cultural practices, action to be taken on pest management recommendations, and labor.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum Power Take Off (PTO) horsepower, and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are \$3.43 (excludes excise tax) and \$3.82 per gallon, respectively. Fuel costs are derived from the Energy Information Administration, 2011 January to December monthly data. The cost includes a 2.50% local sales tax on diesel fuel and 7.50% sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax.

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 5.75% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post-harvest operations is discounted back to the last harvest month using a negative interest charge.

Risk. The risks associated with producing and marketing pears should be minimized. 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 pear production. When selecting varieties to plant, growers should consider not only whether they can be successfully grown in the North Coast Region, but if there is a market that will provide adequate returns.

Cash Overhead Costs

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.

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.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.70% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$608 for the entire farm.

Office Expense. Office and business expenses are estimated at \$50 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, etc.

Sanitation Services. Sanitation services provide single portable toilets and washbasin for the orchard and cost the farm \$153 per month or \$1,224 for the entire season. This cost includes delivery and 8 months of weekly service.

Investment Repairs. Annual repairs on investments or capital recovery items that require maintenance are calculated as two percent of the purchase price, except for the orchard establishment costs which are calculated at 0.50% to cover tree replacement each year.

Non-Cash Overhead Costs

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is $(\text{Purchase Price} - \text{Salvage Value}) \times (\text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$.

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation.

For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 7.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

Interest Rate. An interest rate of 4.75% is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2011.

Fuel Tanks. Two 500-gallon fuel tanks are placed on stands in cement containment meeting Federal, State, and local regulations. Fuel is delivered to equipment by gravity feed.

Tools. Includes shop tools/equipment, hand tools, and field tools such as pruning equipment.

Irrigation System. Because an older orchard was removed at this location, pumps and wells already existed. The cost of the irrigation system is for re-casing of the wells, refurbishing the pumps and motors, installing underground, permanent sprinklers and a new filtration system. The new irrigation system was installed after the orchard had been laid out, but prior to planting. The life of the irrigation system is estimated to be 25 years. The irrigation system is considered to be an improvement to the property. The irrigation system cost shown in the Investment Tables is the cost for the 70 acres.

Land. Bare land and pear land values in the North Coast Region range from \$6,000 to \$10,000 per acre. Land in this study is valued at \$8,000 per acre or \$8,571 per producing acre. Smaller parcels, 30 acres and under, may have a home site value of \$150,000 to \$200,000 per acre and the remaining acreage an agricultural value. For example, 15 acres purchased for \$280,000 less the home site value of \$150,000 per acre yields an agricultural value of \$9,285 on the remaining 14 acres.

Establishment Cost. Costs to establish the orchard are used to determine the non-cash overhead expenses, capital recovery, and interest on investment for the production years. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing pear trees through the first year fruit is harvested less 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 \$15,051 per acre or \$376,275 for the 25-acre orchard. Establishment cost is amortized beginning in the sixth year over the remaining 25 years of production.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. 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 repairs, fuel, and lubrication and are discussed under operating costs.

Table Values. Due to rounding, the totals may be slightly different from the sum of the components.

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UC COOPERATIVE EXTENSION
 Table 1. COSTS PER ACRE TO ESTABLISH A PEAR ORCHARD
 NORTH COAST - Lake & Mendocino Counties 2012

	Cost Per Acre						
	Year:	1	2	3	4	5	6
Tons Per Acre:						4.0	7.0
Planting Costs:							
Remove old orchard	1,000						
Land prep: Rip 2X	350						
Land prep: Disc 2X	27						
Land prep: Fumigate	2,300						
Land prep: Apply herbicide (Roundup)	13						
Land prep: Disc 1X	13						
Plant: Layout orchard	224						
Plant: Auger tree holes	211						
Plant: Trees	284	6					
Tree: 242/acre @ \$6.55 each. (2% in 2nd yr.)	1,585	34					
Plant: Tree guard & urea fertilizer	326	10					
Plant: Head back trees	45						
TOTAL Planting COSTS	6,378	49					
Cultural Costs:							
Train and prune trees	45	101	302	605	806	806	
Fertilize - Nitrogen (urea)	38	41	58	67	67	67	
Weed: Disc middles 4X, year 1, mow 7X, years 2-4, spray 1X (Roundup) + mow 5X, years 5+	51	103	103	103	86	86	
Weed: Strip spray	36	67	67	67	117	117	
Insects: Pear psylla/mites, dormant spray (oil)		58	104	104	104	104	
Insects: Pear psylla/mites, delayed dormant spray (oil)					37	37	
Insects: Pear psylla/mites (Kumulus, Agrimek, oil)					82	82	
Insects: Thrips (Asana)					19	19	
Insects: Codling moth/Pear psylla (Delegate)					61	61	
Disease: Fire blight (Badge X2, Mycoshield, Agrimycin) alternate rows			108	224	167	167	
Disease: Pear scab (Ziram, Syllit, Manzate)					71	71	
Disease: Blight/scab/codling moth (Badge 2X, Agrimycin, Mycoshield, Syllit, Intrepid, Ziram)					97	97	
Vertebrate: Gophers (bait)	27	27	27	27	27	27	
Growth regulator: Fruit retention (LiquiStik)					55	55	
Irrigate: Water (includes post-harvest & frost protection, years 5+)	171	167	209	209	321	321	
Insect: Codling moth (pheromone traps/lures), monitored by PCA					146	146	
Leaf analysis				4	5	5	
PCA fees			60	60	60	60	
Pickup truck use	109	109	109	109	109	109	
ATV use	80	80	80	80	80	80	
TOTAL Cultural COSTS	556	752	1,227	1,658	2,517	2,517	
Harvest:							
Harvest fruit (including forklift rental)					331	531	
Haul to shed (truck)					43	43	
Packing shed pack/store/sell					697	1,471	
TOTAL Harvest COSTS					1,071	2,045	
Assessment:							
California Pear Advisory Board (CPAB) (restricted & unrestricted)					20	41	
California Pear Growers (CPG)					4	7	
TOTAL Assessment COSTS					24	48	
Interest on operating capital at 5.75%	465	28	44	60	65	70	
TOTAL OPERATING COSTS/ACRE	7,399	830	1,271	1,719	3,677	4,680	

UC COOPERATIVE EXTENSION

Table 1. Continued

	Cost Per Acre						
	Year:	1	2	3	4	5	6
Tons Per Acre:						4.0	7.0
CASH OVERHEAD:							
Liability insurance	9	9	9	9	9	9	9
Office expense	50	50	50	50	50	50	50
Sanitation fee	44	44	44	44	44	44	44
Property taxes	110	111	111	111	115	115	115
Property insurance	88	89	89	89	92	92	92
Investment repairs	78	78	78	78	80	80	80
TOTAL CASH OVERHEAD COSTS/ACRE	379	381	381	381	390	390	390
TOTAL CASH COSTS/ACRE	7,778	1,210	1,652	2,100	4,067	5,069	5,069
INCOME/ACRE FROM PRODUCTION					1,755	3,072	3,072
NET CASH COSTS/ACRE FOR THE YEAR	7,778	1,210	1,652	2,100	2,312	1,998	1,998
PROFIT/ACRE ABOVE CASH COSTS					-2,312	-1,998	-1,998
ACCUMULATED NET CASH COSTS/ACRE	7,778	8,988	10,640	12,739	15,051	17,049	17,049
NON-CASH OVERHEAD:							
Shop building (1,800 sq.ft.)	54	54	54	54	54	54	54
Electric deer fence	24	24	24	24	24	24	24
Fuel Tanks: 500 gallons (2)	3	3	3	3	3	3	3
Ladders					16	16	16
Land	407	407	407	407	407	407	407
Shop tools	19	19	19	19	19	19	19
Sprinkler irrigation system	148	148	148	148	148	148	148
Worker housing	9	9	9	9	9	9	9
Establishment cost							1,041
Equipment	210	268	268	268	408	407	407
TOTAL NON-CASH OVERHEAD COSTS	875	933	933	933	1,089	2,130	2,130
TOTAL COSTS/ACRE	8,653	2,143	2,585	3,033	5,156	7,335	7,335
INCOME FROM PRODUCTION					1,755	3,072	3,072
NET TOTAL COSTS FOR THE YEAR	8,653	2,143	2,585	3,033	3,401	4,263	4,263
NET PROFIT FOR THE YEAR					-3,401	-4,263	-4,263
ACCUMULATED NET TOTAL COST	8,653	10,797	13,381	16,414	19,815	24,078	24,078

UC COOPERATIVE EXTENSION
 Table 2. COSTS AND RETURNS PER ACRE TO ESTABLISH A PEAR ORCHARD
 NORTH COAST - Lake & Mendocino Counties 2012

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
			Units	\$	Units	\$								
GROSS RETURNS														
Fresh	Ton	665.00									2.08	1,383	3.64	2,421
Processing	Ton	250.00									1.32	330	2.31	578
Off-grades	Ton	70.00									0.60	42	1.05	74
TOTAL GROSS RETURNS												1,755		3,072
OPERATING COSTS														
Herbicide:														
Roundup Power Max	Pint	3.50	1.60	6	1.80	15	1.80	15	1.80	15	5.80	20	5.80	20
Chateau	Oz	8.49									4.00	34	4.00	34
Paraquat	Pint	6.16	3.00	18	3.00	18	3.00	18	3.00	18				
Prowl 3.3EC	Pint	3.91	2.40	9	2.40	9	2.40	9	2.40	9				
Insecticide:														
Dormant Oil Plus	Gal	7.75			6.00	47	12.00	93	12.00	93	12.00	93	12.00	93
415 oil	Gal	7.60									3.00	23	3.00	23
Kumulus DF	Lb	1.57									20.00	31	20.00	31
Agri-Mek	Fl Oz	1.36									15.00	20	15.00	20
Asana	Fl Oz	1.08									7.25	8	7.25	8
Intrepid 2F	Fl Oz	2.19									16.00	35	16.00	35
Delegate	Oz	10.00									5.00	50	5.00	50
Fungicide:														
Badge X2	Lb	7.50					3.15	24	18.90	142				
Ziram Granuflo	Lb	5.43									6.00	33	6.00	33
Syllit SC	Pint	6.12									3.00	18	3.00	18
Manzate (Dithane)	Lb	7.95									6.00	48	6.00	48
Rodenticide:														
Gopher Getter Ag	Lb	20.00	1.00	20	1.00	20	1.00	20	1.00	20	1.00	20	1.00	20
Antibiotic:														
Mycoshield	Lb	20.00					2.00	40	0.50	10	3.75	75	3.75	75
Agri-mycin 17	Lb	19.00					0.60	11	0.30	6	1.12	21	1.12	21
Fertilizer:														
46-0-0 (urea)	Lb	0.40	76.00	30	98.00	39	163.00	65	217.00	87	217.00	87	217.00	87
Water:														
Irrigation	Ac-in	5.27	24.00	126	24.00	126	30.00	158	30.00	158	30.00	158	30.00	158
Frost protection	Ac-in	5.27									18.00	95	18.00	95

UC COOPERATIVE EXTENSION

Table 2. Continued

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
			Units	\$	Units	\$	Units	\$	Units	\$	Units	\$	Units	\$
Growth Regulator:														
Liqui-Stik	Fl Oz	1.83									24.00	44	24.00	44
Lures/Confusion:														
Isomate CTT	Acre	145.34									1.00	145	1.00	145
Tree:														
Tree - pear	Each	6.55	242.00	1,585	5.00	33								
Tree Aids:														
Tree guards	Each	0.15	242.00	36	5.00	1								
Custom:														
Orchard removal	Acre	1,000.00	1.00	1,000										
Pack 36 # box	Box	6.70									94.00	630	202.00	1,353
Shed cost - Processing	Ton	35.00									1.92	67	3.36	118
Leaf analysis	Each	35.00								0.08	3	0.08	3	0.08
PCA	Acre	60.00					1.00	60	1.00	60	1.00	60	1.00	60
Ripping	Acre	175.00	2.00	350										
Fumigate	Acre	2,300.00	1.00	2,300										
Hand pick	Ton	58.00									4.00	232	4.00	232
Assessment:														
CPAB fresh	Box	0.15									94.00	14	202.00	30
CPAB processing (unrestricted)	Ton	4.00									1.32	5	2.31	9
CPAB processing (restricted)	Ton	1.50									0.60	1	1.05	2
CPG	Ton	2.00									1.92	4	3.36	7
Rent:														
Forklift	Ac/Month	25.72									1.00	26	1.00	26
Labor:														
Equipment operator labor	Hrs.	14.70	32.91	484	13.94	205	14.88	219	16.03	236	20.42	346	23.53	346
Non-machine labor	Hrs.	11.20	53.86	603	4.10	46	27.15	304	54.23	607	72.33	810	72.33	810
Irrigation labor	Hrs.	11.20			9.65	108	4.51	51	4.51	51	6.04	68	6.04	68
Machinery:														
Fuel: Gas	Gal	3.82	10.13	39	10.13	39	10.13	39	10.16	39	10.16	39	10.16	39
Fuel: Diesel	Gal	3.43	64.26	220	13.02	45	15.56	53	18.54	64	38.30	131	34.63	131
Lube				39		13		14		15		26		26
Machinery repair				68		37		42		47		70		70
Interest on operating capital at 5.75%				465		28		44		60		65		70
TOTAL OPERATING COSTS/ACRE				7,399		830		1,271		1,719		3,677		4,680
NET RETURNS ABOVE OPERATING COSTS/ACRE				-7,399		-830		-1,271		-1,719		-1,922		-1,608

UC COOPERATIVE EXTENSION
 Table 3. COSTS PER ACRE TO PRODUCE PEARS
 NORTH COAST REGION - Lake and Mendocino Counties 2012

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:								
Weed: Strip spray dormant (Roundup, Chateau)	0.24	4	3	1	87	0	95	
Prune: Trees	0.00	0	0	0	0	1,331	1,331	
Insects: Dormant spray (oil)	0.31	5	6	2	93	0	104	
Insects: Delayed dormant spray (oil)	0.31	5	6	2	15	0	26	
Disease: Pear scab (lime sulfur)	0.31	5	6	2	40	0	51	
Vertebrate: Gophers (bait)	0.20	4	3	1	20	0	27	
Insect: Codling moth (Isomate CTT), hang pheromones	0.10	1	0	0	145	0	146	
Weed: Spray middles 3X (Roundup)	0.24	4	3	1	5	0	12	
Weed: Mow middles 5X	1.91	34	40	19	0	0	74	
Insect: Budbreak, Pear psylla/mites (Kumulus)	0.31	5	6	2	31	0	42	
Disease: Pear scab (Ziram)	0.31	5	6	2	31	0	42	
Disease: Pear scab (Syllit)	0.31	5	6	2	18	0	29	
Weed: Strip spray 2X (Roundup)	0.47	8	5	2	4	0	20	
Insect: Thrips (Asana)	0.31	5	6	2	8	0	19	
Insect: Pear psylla/mites (AgriMek, oil)	0.31	5	6	2	28	0	39	
Frost protection: Water & labor	1.54	17	0	0	95	0	112	
Disease: Fire blight (Agri-Mycin, Mycoshield) 9X, alt. rows	1.38	24	25	10	58	0	108	
Disease: Fire blight/pear scab (Agri-Mycin, Mycoshield, Manzate)	0.31	5	6	2	61	0	72	
Insect: Codling moth/Pear psylla (Delegate)	0.31	5	6	2	50	0	61	
Disease: Fire blight/pear scab (Agri-Mycin, Mycoshield, Ziram)	0.31	5	6	2	15	0	26	
Disease/insect: Fire blight/codling moth (Agri-Mycin, Mycoshield, Intrepid)	0.31	5	6	2	48	0	59	
Irrigate: Water & labor (includes post-harvest)	4.50	50	0	0	158	0	209	
Fertilize: Nitrogen (urea)	0.30	3	0	0	130	0	134	
Fertilizer: Leaf analysis (ATV, labor, analysis)	0.04	2	0	0	0	3	5	
Growth regulator: Fruit retention (Liqui-Stik)	0.31	5	6	2	44	0	55	
Insect: Blister mite (lime sulfur, Kumulus)	0.31	5	6	2	71	0	82	
PCA fees	0.00	0	0	0	0	60	60	
Pickup truck use	3.80	67	42	13	0	0	109	
ATV use	3.80	67	13	3	0	0	80	
TOTAL Cultural COSTS	22.79	361	136	82	1,255	1,394	3,229	
Harvest:								
Harvest fruit: 1st pick	0.89	16	11	3	0	391	418	
Harvest fruit: 2nd pick	0.89	16	11	3	0	794	821	
Haul to packinghouse	5.72	101	112	39	0	0	213	
TOTAL Harvest COSTS	7.50	132	134	44	0	1,185	1,451	
Packing:								
Sort, pack, sell	0.00	0	0	0	0	4,508	4,508	
TOTAL Packing COSTS	0.00	0	0	0	0	4,508	4,508	
Assessment:								
CPAB: Fresh market	0.00	0	0	0	90	0	90	
CPAB: Unrestricted	0.00	0	0	0	26	0	26	
CPAB: Restricted	0.00	0	0	0	5	0	5	
CPG	0.00	0	0	0	19	0	19	
TOTAL Assessment COSTS	0.00	0	0	0	140	0	140	
Interest on operating capital at 5.75%							118	
TOTAL OPERATING COSTS/ACRE	30.29	494	225	126	1,396	7,088	9,446	
TOTAL OPERATING COSTS/TON	1.51	25	11	6	70	354	472	

UC COOPERATIVE EXTENSION

Table 3. Continued

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
CASH OVERHEAD:								
Liability insurance							9	
Office expense							50	
Sanitation fee							44	
Property taxes							190	
Property insurance							155	
Investment repairs							69	
TOTAL CASH OVERHEAD COSTS/ACRE							517	
TOTAL CASH OVERHEAD COSTS/TON							26	
TOTAL CASH COSTS/ACRE							9,963	
NON-CASH OVERHEAD:								
		Per producing						
		Acre		Capital Recovery				
Building: 1,800 sq. ft.		857		54			54	
Pear establishment cost		15,051		1,041			1,041	
Fuel tanks: 500 gallons (2)		50		3			3	
Ladders - 16		61		8			8	
Land		8,571		407			407	
Shop tools		214		19			19	
Sprinkler system		2,141		148			148	
Worker housing		117		9			9	
Equipment		5,038		537			537	
TOTAL NON-CASH OVERHEAD COSTS							2,227	
TOTAL COSTS/ACRE							12,190	
TOTAL COSTS/TON							610	

UC COOPERATIVE EXTENSION
 Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE PEARS
 NORTH COAST REGION - Lake and Mendocino Counties 2012

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Fresh	10.40	Ton	665.00	6,916	
Processing	6.60	Ton	250.00	1,650	
Off-grades	3.00	Ton	70.00	210	
TOTAL GROSS RETURNS	20.00	Ton		8,776	
OPERATING COSTS					
Herbicide:				96	
Roundup Power Max	3.15	Pint	3.50	11	
Chateau	10.00	Oz	8.49	85	
Insecticide:				292	
Dormant oil Plus	12.00	Gal	7.75	93	
415 oil	3.00	Gal	7.60	23	
Kumulus DF	40.00	Lb	1.57	63	
Asana	7.25	Fl oz	1.08	8	
Agri-Mek	15.00	Fl oz	1.36	20	
Delegate	5.00	Oz	10.00	50	
Intrepid 2F	16.00	Fl oz	2.19	35	
Fungicide:				179	
Lime sulfur solution	20.00	Gal	4.00	80	
Ziram Granuflo	6.00	Lb	5.43	33	
Syllit SC	3.00	Pint	6.12	18	
Manzate (Dithane)	6.00	Lb	7.95	48	
Rodenticide:				20	
Gopher Getter Ag.	1.00	Lb	20.00	20	
Antibiotic:				96	
Mycoshield	3.75	Lb	20.00	75	
Agri-Mycin 17	1.12	Lb	19.00	21	
Fertilizer:				130	
46-0-0 (urea)	326.00	Lb	0.40	130	
Water:				253	
Irrigation	30.00	Ac-in	5.27	158	
Frost protection	18.00	Ac-in	5.27	95	
Growth Regulator:				44	
Liqui-Stik	24.00	Fl oz	1.83	44	
Lures/Confusion:				145	
Isomate CTT	1.00	Acre	145.34	145	
Rent:				25	
Forklift rental	0.99	Acre/month	25.72	25	
Custom:				7,062	
Prune (mature trees)	242.00	Tree	5.50	1,331	
Leaf analysis	0.08	Each	35.00	3	
Harvest - Hand	20.00	Ton	58.00	1,160	
Pack - 36# box	289.00	Box	6.70	1,936	
Pack - 40/44# box	260.00	Box	8.60	2,236	
Shed cost - Processing	9.60	Ton	35.00	336	
PCA fee	1.00	Acre	60.00	60	

UC COOPERATIVE EXTENSION

Table 4. Continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Fresh	10.40	Ton	665.00	6,916	
Processing	6.60	Ton	250.00	1,650	
Off-grades	3.00	Ton	70.00	210	
TOTAL GROSS RETURNS	20.00	Ton		8,776	
Assessment:				140	
CPAB tight-fill	289.00	Box	0.15	43	
CPAB standard box	260.00	Box	0.18	47	
CPAB processed - unrestricted	6.60	Ton	4.00	26	
CPAB processed - restricted	3.00	Ton	1.50	5	
CPG assessment	9.60	Ton	2.00	19	
Labor:				494	
Equipment operator labor	28.62	Hrs.	14.70	421	
Non-machine labor	0.48	Hrs.	11.20	5	
Irrigation labor	6.04	Hrs.	11.20	68	
Machinery:				352	
Fuel: Gas	10.16	Gal.	3.82	39	
Fuel: Diesel	54.37	Gal.	3.43	186	
Lube				34	
Machinery repair				93	
Interest on operating capital at 5.75%				117	
TOTAL OPERATING COSTS/ACRE				9,446	
TOTAL OPERATING COSTS/TON				472	
NET RETURNS ABOVE OPERATING COSTS				-670	
CASH OVERHEAD COSTS					
Liability insurance				9	
Office expense				50	
Sanitation fee				44	
Property taxes				190	
Property insurance				155	
Investment repairs				69	
TOTAL CASH OVERHEAD COSTS/ACRE				517	
TOTAL CASH OVERHEAD COSTS/TON				26	
TOTAL CASH COSTS/ACRE				9,963	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building 1,800 sq. ft.				54	
Establishment cost				1,041	
Fuel Tanks: 500 gallons (2)				3	
Ladders - 16				8	
Land				407	
Shop tools				19	
Sprinklers system				148	
Worker housing				9	
Equipment				537	
TOTAL NON-CASH OVERHEAD COSTS				2,227	
TOTAL COST/ACRE				12,190	
TOTAL COST/ TON				610	
NET RETURNS ABOVE TOTAL COST				-3,414	

UC COOPERATIVE EXTENSION
 Table 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE PEARS
 NORTH COAST REGION - Lake and Mendocino Counties 2012

Beginning 12-11	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
Ending 11-12	11	12	12	12	12	12	12	12	12	12	12	12	
Cultural:													
Weed: Strip spray dormant (Roundup, Chateau)	95												95
Prune: Trees		1,331											1,331
Insects: Dormant spray (oil)		104											104
Insects: Delayed dormant spray (oil)			26										26
Disease: Pear scab (lime sulfur)				51									51
Vertebrate: Gophers (bait)				27									27
Insect: Codling moth (Isomate CTT), hang pheromone ties				146									146
Weed: Spray middles (1X)				12									12
Insect: Budbreak, Pear psylla/mites (Kumulus)				42									42
Disease: Pear scab (Ziram)				42									42
Disease: Pear scab (Syllit)				29									29
Weed: Strip spray 2X (Roundup)					10			10					20
Insect: Thrips (Asana)					19								19
Insect: Pear psylla/mites (AgriMek, oil)					39								39
Frost protection: Irrigate					56	56							112
Disease: Fire blight (Agri-Mycin, Mycoshield) 9X, alternate rows					60	48							108
Disease: Fire blight/pear scab (Agri-Mycin, Mycoshield, Manzate)					72								72
Disease: Fire blight/pear scab (Agri-Mycin, Mycoshield, Ziram)						26							26
Disease/insect: Fire blight/codling moth (Agri-Mycin, Mycoshield, Intrepid)						59							59
Weed: Mow middles 5X						15	29	29					74
Insect: Codling moth/pear psylla (Delegate)						61							61
Irrigate: Water & labor (includes post-harvest)							70	70	35	35			209
Fertilize: Nitrogen (urea)							67			67			134
Fertilizer: Leaf analysis (ATV, labor, analysis)								5					5
Growth regulator: Fruit retention (Liqui-Stik)									55				55
Insect: Blister mite (lime sulfur, Kumulus)										82			82
PCA fees	6	6	6	6	6	6	6	6	6	6			60
Pickup truck use	9	9	9	9	9	9	9	9	9	9	9	9	109
ATV use	7	7	7	7	7	7	7	7	7	7	7	7	80
TOTAL Cultural COSTS	117	1,457	48	372	277	286	188	135	112	206	16	16	3,229
Harvest:													
Harvest fruit: 1st pick								418					418
Harvest fruit: 2nd pick								821					821
Haul to packinghouse								213					213
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	1,451	0	0	0	0	1,451

UC COOPERATIVE EXTENSION

Table 5. Continued

Beginning 12-11	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
Ending 11-12	11	12	12	12	12	12	12	12	12	12	12	12	
Packing:													
Sort, pack and selling cost								4,508					4,508
TOTAL Packing COSTS								4,508					4,508
Assessments:													
CPAB fresh market									90				90
CPAB processed - unrestricted									26				26
CPAB processed - restricted									5				5
CPG assessment									19				19
TOTAL Assessment COSTS									140				140
Interest on operating capital at 5.75%	1	8	8	10	11	12	13	14	44	-1	0	0	118
TOTAL OPERATING COSTS/ACRE	117	1,464	56	382	288	298	201	149	6,255	205	16	16	9,446
TOTAL OPERATING COSTS/TON	6	73	3	19	14	15	10	7	313	10	1	1	472
CASH OVERHEAD:													
Liability insurance													9
Office expense													50
Sanitation fee													44
Property taxes													190
Property insurance			155										155
Investment repairs	6	6	6	6	6	6	6	6	6	6	6	6	69
TOTAL CASH OVERHEAD COSTS/ACRE	6	6	161	6	6	6	6	6	6	6	6	6	517
TOTAL CASH COSTS/ACRE	123	1,470	217	387	294	304	207	155	6,261	210	21	21	9,963
TOTAL CASH COSTS/TON	6	74	11	19	15	15	10	8	313	11	1	1	498

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS
NORTH COAST REGION - Lake and Mendocino Counties 2012

COST PER ACRE AT VARYING YIELDS TO PRODUCE PEARS

	YIELD (tons/acre)						
	14.00	16.00	18.00	20.00	22.00	24.00	26.00
OPERATING COSTS:							
Cultural	3,229	3,229	3,229	3,229	3,229	3,229	3,229
Harvest	886	1,008	1,129	1,451	1,372	1,493	1,614
Packing	3,156	3,607	4,057	4,508	4,959	5,410	5,861
Assessments	139	139	140	140	141	141	142
Interest on operating capital at 5.75%	110	112	115	118	121	123	126
TOTAL OPERATING COSTS/ACRE	7,519	8,094	8,670	9,446	9,821	10,396	10,971
Total operating costs/ton	537	506	482	472	446	433	422
CASH OVERHEAD COSTS/ACRE	517	517	517	517	517	517	517
TOTAL CASH COSTS/ACRE	8,036	8,611	9,186	9,963	10,337	10,913	11,488
Total cash costs/ton	574	538	510	498	470	455	442
NON-CASH OVERHEAD COSTS/ACRE	2,227	2,227	2,227	2,227	2,227	2,227	2,227
TOTAL COSTS/ACRE	10,263	10,838	11,414	12,190	12,564	13,140	13,715
Total costs/ton	733	677	634	610	571	547	528

NET RETURNS PER ACRE ABOVE OPERATING COSTS

F.O.B. PRICE (\$/ton)			YIELD (tons/acre)						
Fresh	Processing	Off-grades	7.28	8.32	9.36	10.40	11.44	12.48	13.52
			4.62	5.28	5.94	6.60	7.26	7.92	8.58
			2.10	2.40	2.70	3.00	3.30	3.60	3.90
465.50	175.00	40.00	-3,238	-3,201	-3,165	-3,330	-3,093	-3,057	-3,020
532.00	200.00	50.00	-2,617	-2,492	-2,367	-2,444	-2,118	-1,993	-1,868
598.50	225.00	60.00	-1,996	-1,783	-1,569	-1,557	-1,142	-929	-715
665.00	250.00	70.00	-1,376	-1,074	-771	-670	-167	135	437
731.50	275.00	80.00	-755	-364	27	216	808	1,199	1,590
798.00	300.00	90.00	-135	345	824	1,103	1,784	2,263	2,743
864.50	325.00	100.00	486	1,054	1,622	1,989	2,759	3,327	3,895

NET RETURNS PER ACRE ABOVE CASH COSTS

F.O.B. PRICE (\$/ton)			YIELD (tons/acre)						
Fresh	Processing	Off-grades	7.28	8.32	9.36	10.40	11.44	12.48	13.52
			4.62	5.28	5.94	6.60	7.26	7.92	8.58
			2.10	2.40	2.70	3.00	3.30	3.60	3.90
465.50	175.00	40.00	-3,754	-3,718	-3,682	-3,847	-3,609	-3,573	-3,537
532.00	200.00	50.00	-3,134	-3,009	-2,884	-2,960	-2,634	-2,509	-2,384
598.50	225.00	60.00	-2,513	-2,300	-2,086	-2,074	-1,659	-1,445	-1,232
665.00	250.00	70.00	-1,892	-1,590	-1,288	-1,187	-684	-381	-79
731.50	275.00	80.00	-1,272	-881	-490	-300	292	682	1,073
798.00	300.00	90.00	-651	-172	308	586	1,267	1,746	2,226
864.50	325.00	100.00	-31	538	1,106	1,473	2,242	2,810	3,379

NET RETURNS PER ACRE ABOVE TOTAL COSTS

F.O.B. PRICE (\$/ton)			YIELD(tons/acre)						
Fresh	Processing	Off-grades	7.28	8.32	9.36	10.40	11.44	12.48	13.52
			4.62	5.28	5.94	6.60	7.26	7.92	8.58
			2.10	2.40	2.70	3.00	3.30	3.60	3.90
465.50	175.00	40.00	-5,981	-5,945	-5,909	-6,074	-5,837	-5,800	-5,764
532.00	200.00	50.00	-5,361	-5,236	-5,111	-5,187	-4,861	-4,736	-4,612
598.50	225.00	60.00	-4,740	-4,527	-4,313	-4,301	-3,886	-3,673	-3,459
665.00	250.00	70.00	-4,120	-3,817	-3,515	-3,414	-2,911	-2,609	-2,306
731.50	275.00	80.00	-3,499	-3,108	-2,717	-2,528	-1,936	-1,545	-1,154
798.00	300.00	90.00	-2,878	-2,399	-1,919	-1,641	-960	-481	-1
864.50	325.00	100.00	-2,258	-1,690	-1,121	-754	15	583	1,151

UC COOPERATIVE EXTENSION
 Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 NORTH COAST REGION - Lake and Mendocino Counties 2012

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
12	55 HP 2WD tractor #1	41,233	12	10,309	3,930	207	258	4,394
12	55 HP 2WD tractor #2	41,233	12	10,309	3,930	207	258	4,394
12	ATV 4WD	7,099	7	2,693	882	39	49	971
12	Bait applicator	1,965	10	347	223	9	12	244
12	Bin trailer #1	1,500	15	144	135	7	8	150
12	Bin trailer #2	1,500	15	144	135	7	8	150
12	Mower - Flail 9'	14,470	10	2,559	1,645	68	85	1,799
12	Orchard sprayer 500 gal #1	21,200	10	3,749	2,411	100	125	2,636
12	Orchard sprayer 500 gal #2	21,200	10	3,749	2,411	100	125	2,636
12	Pickup truck - 3/4 ton	31,730	7	12,036	3,944	176	219	4,339
12	Truck - 10 ton	50,000	10	14,769	5,209	260	324	5,793
12	Weed sprayer 100 gal	1,900	10	336	216	9	11	236
TOTAL		235,030		61,145	25,072	1,189	1,481	27,742
60% of new cost*		141,018		36,687	15,043	713	889	16,645

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Buildings 1,800 sq. ft.	60,000	30	0	3,793	241	300	1,200	5,533
Establishment cost	376,275	25	0	26,033	1,581	1,881	0	29,495
Fuel tanks: 500 gal (2)	3,500	25	350	235	15	19	70	339
Ladders - 16	3,057	10	0	391	12	15	61	480
Land	600,000	95	600,000	28,500	4,818	6,000	0	39,318
Shop tools	15,000	15	1,500	1,350	66	83	300	1,799
Sprinklers system	149,855	25	0	10,368	602	749	2,997	14,716
Worker housing	8,217	20	0	645	33	41	164	884
TOTAL INVESTMENT	1,215,904		601,850	71,314	7,369	9,089	4,792	92,564

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability insurance	70	Acre	8.69	608
Office expense	70	Acre	50.00	3,500
Sanitation fee	70	Acre	44.40	3,108

UC COOPERATIVE EXTENSION
 Table 8. HOURLY EQUIPMENT COSTS
 NORTH COAST REGION - Lake and Mendocino Counties 2012

Year	Description	COSTS PER HOUR								
		Pear	Total	Cash Overhead			Operating			Total
		Hours	Hours	Capital	Insur-		Lube &	Fuel	Total	
Used	Used	Recovery	ance	Taxes	Repairs		Oper.	Costs/Hr.		
12	55 HP 2WD tractor #1	146.00	1,000.00	2.36	0.12	0.15	3.40	10.11	13.51	16.15
12	55 HP 2WD tractor #2	128.00	1,000.00	2.36	0.12	0.15	3.40	10.11	13.51	16.15
12	ATV 4WD	96.00	285.00	1.86	0.08	0.10	0.91	2.55	3.45	5.50
12	Bait applicator	5.00	120.00	1.12	0.05	0.06	0.76	0.00	0.76	1.98
12	Bin trailer #1	16.00	158.00	0.51	0.03	0.03	0.23	0.00	0.23	0.80
12	Bin trailer #2	16.00	158.00	0.51	0.03	0.03	0.23	0.00	0.23	0.80
12	Mower - Flail 9'	48.00	200.00	4.94	0.21	0.26	6.10	0.00	6.10	11.50
12	Orchard sprayer 500 gal #1	76.00	200.00	7.23	0.30	0.37	3.65	0.00	3.65	11.56
12	Orchard sprayer 500 gal #2	65.00	200.00	7.23	0.30	0.37	3.65	0.00	3.65	11.56
12	Pickup truck - 3/4 ton	95.00	285.00	8.30	0.37	0.46	3.49	7.64	11.13	20.27
12	Rented field forklift	-	-	0.00	0.00	0.00	0.51	3.43	3.94	3.94
12	Truck - 10 ton	143.00	200.00	15.63	0.78	0.97	6.76	12.86	19.63	37.00
12	Weed sprayer 100 gal	24.00	139.00	0.94	0.04	0.05	0.55	0.00	0.55	1.58

UC COOPERATIVE EXTENSION
 Table 9. PRODUCTION OPERATIONS WITH EQUIPMENT AND MATERIALS
 NORTH COAST REGION - Lake and Mendocino Counties 2012

Operation	Operation		Material	Rate/ acre	Unit	
	Month	Tractor				Implement
Weed: Strip spray dormant	Dec	55 HP 2WD tractor	Weed sprayer 100 gal	Roundup Power Max	0.60 pint	
			Chateau	10.00 oz		
Prune: Trees	Jan			Prune (mature trees)	242.00 tree	
Insects: Dormant spray	Jan	55 HP 2WD tractor	Orchard sprayer 500 gal.	Dormant Oil Plus	12.00 gal	
Insects: Delayed dormant spray	Feb	55 HP 2WD tractor	Orchard sprayer 500 gal.	415 Oil	2.00 gal	
Disease: Pear scab	Mar	55 HP 2WD tractor	Orchard sprayer 500 gal.	lime sulfur solution	10.00 gal	
Vertebrate: Gophers (bait)	Mar	55 HP 2WD tractor	Bait applicator	Gopher Getter Ag	1.00 lb	
Insect: Codling moth, hang pheromones	Mar			Isomate CTT	1.00 acre	
Weed: Spray middles 1X	Mar	55 HP 2WD tractor	Weed sprayer 100 gal.	Roundup Power Max	1.35 pint	
Weed: Mow middles 5X	May	55 HP 2WD tractor	Mower - Flail 9'			
	June	55 HP 2WD tractor	Mower - Flail 9'			
	July	55 HP 2WD tractor	Mower - Flail 9'			
Insect: Budbreak, psylla/mites	Mar	55 HP 2WD tractor	Orchard sprayer 500 gal.	Kumulus DF	20.00 lb	
Disease: Pear scab	Mar	55 HP 2WD tractor	Orchard sprayer 500 gal.	Ziram Granuflo	6.00 lb	
Disease: Pear scab	Mar	55 HP 2WD tractor	Orchard sprayer 500 gal.	Syllit SC	3.00 pint	
Weed: Strip spray 2X	Apr	55 HP 2WD tractor	Weed sprayer 100 gal.	Roundup Power Max	0.60 pint	
	June	55 HP 2WD tractor	Weed sprayer 100 gal.	Roundup Power Max	0.60 pint	
Insect: Thrips	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Asana	7.25 floz	
Insect: Pear psylla/mites	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Agri-Mek	15.00 floz	
				415 Oil	1.00 gal	
Frost protection: Irrigate	Apr			Water	9.00 acin	
	May			Water	9.00 acin	
Disease: Fire blight 9X, alternate rows	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Mycoshield	0.25 lb	
				Agri-mycin 17	0.075 lb	
				Mycoshield	0.25 lb	
	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Agri-mycin 17	0.075 lb
					Mycoshield	0.25 lb
					Agri-mycin 17	0.075 lb
	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb
					Agri-mycin 17	0.075 lb
					Mycoshield	0.25 lb
	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb
					Agri-mycin 17	0.075 lb
					Mycoshield	0.25 lb
	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb
					Agri-mycin 17	0.075 lb
					Mycoshield	0.25 lb
	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb
					Agri-mycin 17	0.075 lb
					Mycoshield	0.25 lb
	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb
Agri-mycin 17					0.075 lb	
Mycoshield					0.25 lb	
Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb	
				Agri-mycin 17	0.075 lb	
				Mycoshield	0.25 lb	
Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb	
				Agri-mycin 17	0.075 lb	
				Mycoshield	0.25 lb	
Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb	
				Agri-mycin 17	0.075 lb	
				Mycoshield	0.25 lb	
Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Orchard sprayer 500 gal.	Mycoshield	0.25 lb	
				Agri-mycin 17	0.075 lb	
				Mycoshield	0.25 lb	
Disease: Fire blight/pear scab	Apr	55 HP 2WD tractor	Orchard sprayer 500 gal.	Mycoshield	0.50 lb	
				Agri-mycin 17	0.15 lb	
				Manzate (Dithane)	6.00 lb	
Disease: Fire blight/pear scab	May	55 HP 2WD tractor	Orchard sprayer 500 gal.	Mycoshield	0.50 lb	
				Agri-mycin 17	0.15 lb	
				Ziram Granuflo	0.33 lb	
Disease/insect: Fire blight/codling moth	May	55 HP 2WD tractor	Orchard sprayer 500 gal.	Mycoshield	0.50 lb	
				Intrepid 2F	16.00 floz	
				Agri-mycin 17	0.15 lb	
Insect: Codling moth/pear psylla	June	55 HP 2WD tractor	Orchard sprayer 500 gal.	Delegate	5.00 oz	

UC COOPERATIVE EXTENSION

Table 9. Continued

Operation	Operation Month	Tractor	Implement	Material	Rate/ acre	Unit
Irrigate	June			Water - pumped	10.00	acin
	July			Water - pumped	10.00	acin
	Aug			Water - pumped	5.00	acin
	Sept			Water - pumped	5.00	acin
Fertilize: Nitrogen	June			46-0-0 (urea)	163.00	lb
	Sept			46-0-0 (urea)	163.00	lb
Fertilizer: Leaf analysis	July		ATV 4WD	Leaf analysis	0.08	each
Growth regulator: Fruit retention	Aug	55 HP 2WD tractor	Orchard sprayer 500 gal.	Liqui-Stik	24.00	floz
Insect: Blister mite	Sept	55 HP 2WD tractor	Orchard sprayer 500 gal.	Lime sulfur solution	10.00	gal
				Kumulus DF	20.00	lb
				PCA	1.00	acre
PCA fees	Sept					
Pickup truck use	Sept		Pickup truck - ¾ ton			
ATV use	Sept		ATV 4WD			
Harvest fruit: 1st pick	Aug	55 HP 2WD tractor	Bin trailer	Harvest - hand	6.60	ton
	Aug	55 HP 2WD tractor	Bin trailer			
	Aug	Rented field forklift		Forklift rental	0.33	acre/month
Harvest fruit: 2nd pick	Aug	55 HP 2WD tractor	Bin trailer	Harvest - hand	13.40	ton
	Aug	55 HP 2WD tractor	Bin trailer			
	Aug	Rented field forklift		Forklift rental	0.66	acre/month
Haul to packinghouse	Aug		Truck - 10 ton			
Sort, pack and sell	Aug			Pack 36# box	289.00	box
				Pack 40/44# box	260.00	box
				Shed cost processing	9.60	ton
Assessment: Fresh market	Aug			CPAB tight-fill	289.00	box
				CPAB standard box	260.00	box
				CPAB process unrestr.	6.60	ton
Assessment: Processing	Aug			CPAB process restrict.	3.00	ton
	Aug			CA Pear Grower Assn.	9.60	ton
Assessments: CPG	Aug					