EVALUATION OF A WALNUT ORCHARD AND A COST STUDY OF THE REDEVLOPMENT OF A WALNUT ORCHARD

Presented to the

Faculty of the Agri-Business Department

California Polytechnic State University

In Partial Fulfillments

of the Requirements for the Degree

Bachelor of Science

by

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Winter 2011

Approval Page

TITLE: EVALUATION OF A WALNUT ORCHARD AND A COST STUDY OF THE REDEVLOPMENT OF A WALNUT ORCHARD

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Chapter One

Introduction

Juglans regia, or walnuts as we know them today, as named in Latin by the Romans date back to over 7000 B.C. Juglans regia was known to the Romans as "Jupiter's royal acorn," for its large shell and explicit dark to light color which was made known to be called "royal nut." Being that they were often reserved for the highest of authority. They were traded along the Silk Road between Asia and the Middle East. Soon the English found these delicate nuts and traded the walnut through ports around the world, thus making the "English Walnut" known throughout the world. (walnuts.org:2008)

It is said to be that the first walnuts were cultivated by Franciscan Fathers in the late 1700's here in California. Given that the California climate is much like that of the Middle East, Mediterranean, the walnuts flourished here. The first commercial plantings of orchards were in Southern California town of Goleta in the 1870's by Joseph Sexton. For many years walnut production flourished in the Southern part of the state, until it moved north. Finding that better growing conditions existed elsewhere because of the availability of water and better pest management practices and an ideal climate, the walnut industry migrated into the central valley. This gave farmers better production and higher yields than in the Southern California area. Today, the San Joaquin Central Valley is the primary growing region for walnuts. The state accounts for 99 % of US supply of the walnuts and accounts for 2/3 of the world's production. It is a continuously growing industry with great economic potential for all involved. (walnuts.org:2008)

Since WWII the family farm number has decreased over the years well over 2 million farms (US Ag Census, 2007). The category of Fruit and Nut crops are in the middle of the

number of farm spectrum with around 100,000 farms and increasing. (US Ag Census: 2007) In Figure 1-2 the US Agriculture Census reports an increase number of walnut acreage throughout the nation which also includes an increase in crop yield. As the number of walnut acreage increase so does the demand for accurate and efficient farming to keep up with the demand for walnuts. The California Walnut Commission has been continuing its research on walnuts and advertising its health benefits (walnuts.org:2008). Therefore a walnut farmer in today's industry cannot miss the opportunity to have a healthy producing orchard. It is predicted that the acreage and tonnage of walnuts will increase but with the increase in supply there is an increase in demand. This is all the more reason for a farmer to improve his orchards.

Problem Statement:

To determine the profitability of a poor producing walnut orchard and make a judgment on whether to continue farming the walnut orchard or redevelop the walnut orchard.

Hypothesis:

In the long-run, it is more feasible to redevelop the poor producing orchard once it is no longer a productive orchard.

Objectives:

- 1. Create an enterprise budget both for farming a walnut orchard for a general walnut orchard and a poor producing orchard.
- 2. Create a projection budget for removal and redevelopment of a walnut orchard.
- Determine if the poor producing orchard can be continued to be farmed into a producing orchard.

Chapter Two

The Review of Literature

The sole purpose of a history lesson is to learn what has been accomplished or destroyed in the past. It is the responsibility of a future walnut farmer to research accurately enough in order that they do not make the same mistakes as those did before them. In walnut production, there are endless amounts of information that can be utilized to prevent the same mishaps that have been routinely displayed in today's industry. These mishaps are not necessarily occurring on a day to day basis but are prevalent. Thus the adequate study of history and practices that are used in today's walnut industry are a must to study. The main concepts of farming walnuts today can be clearly defined into three separate sections so that the information can be used later: (I)management, (II) site preparation and (III) walnut cultural practices.

I. <u>Management 101</u>

A good manager must have all the basic tools to be successful. These tools are ones that someone won't find in a Craftsman's tool box. These tools are those that are possessed by the individual and his knowledge of the industry and product. The tools that the basic manager needs are budgets, the principles of supply and demand, investment analysis, and financial statements. There is a wide variety of tools to use in making good sound decisions of farm management.

The manager in any industry of business is a crucial factor in the success of that business. The concept applies for farm and ranch management. The first step in being a good manager is to "test it out on paper" or create an enterprise budget. An enterprise budget shows the possibilities of growing a particular crop such as cotton, corn, figs or cow and hog operations. Enterprise budgets provide a specific estimate to the farm manager on the possible expenses and expected revenues of the particular crop.

The enterprise budget is the foundation of the managers decision and can help formulate other decisions. The Enterprise Budget is broken down into three parts, revenues, variable expenses, and fixed expenses (costs), as shown in figure 1-1.

Revenues are the sales that the farm will generate according to the specific output per acre or per animal. Income or revenue is determined based on the quantity produced, the price sold, and the units of the crop (acres). Revenue, also known as income, is also the generation of money used to pay the expenses accumulated during the calendar year. The revenue can come from all aspects of the farm from the sale of equipment to outside income from a spouse. Typically, the revenue is from the sale of the crop.

Expenses are the expected costs that it will take to grow the crop. These expenses are at the discretion of the manager. The manager ultimately decides on what to include in his cultural practices of producing a commercially viable crop. Commercially viable is a meaning used by the manager when he/she must grow the crop efficiently enough in order to make a sale on the crop at a price to bring the investors any returns to their money.

Expenses can and are typically broken down into two categories: variable expenses and fixed expenses. Variable expenses (costs) are those that vary per acre or input used to get the number desired. Fixed expenses (costs) are those that are not dependant on a variable where as these costs remain constant throughout the year. Variable costs are those that vary on usage or application per acre, such as: fertilizer, spray applications, rodent control, irrigation, ect. These cost are either by the acre unless if its material that is used on a per acre basis by the pound or

gallon or acre feet (water). Some managers prefer to separate the variable costs into two parts; pre-harvest costs, and harvest costs. This helps differentiate the costs prior to harvest and the costs that occur directly after harvesting. The fixed costs that are used are those that need not to change throughout the course of the season or year, such as: tractor use, managers fee, depreciation, land payments or rent just to name a few.

After the expenses have been calculated, both the variable and fixed, there is a crucial equation used to help aid the manager's decision in the harvest process. As stated above, the section in the budget containing the expenses is dived into two sections. The variable costs are further sectioned into pre harvest and harvest expenses. This is due to the fact that there are, at times where the market is at an exceptionally low price. Thus, it does not become economically logical for the manager to harvest the crop.

An equation is used in the budget to help find this number for the manager and is called the break-even-point. This break-even-point is found by adding all the expenses, pre-harvest and harvest, and then dividing that number by the number of expected pounds per acre. It is by pounds per acre since all sales are made and sold by the amount of pounds per acre, as well as the total amount of expenses on a per acre basis. If the price the manager is receiving is less than the breakeven price, than it is not worth the manager's time, and money and effort to harvest the crop. When the price per pound paid by the processors is above the break-even point than the manager can make a sound decision to harvest the crop. (Kay, Edwards, Duffy; 2008)

Walnuts are not different than any typical crop. In order to find the profit made by the walnut orchard, the gross income is subtracted by the total expenses and thus the final value of the crop is presented in whole dollars. This net value of the crop is used to determine if the walnut

orchard can turn enough money over to the farm for the following year and turn a profit to the farmer himself. (Kay, Edwards, Duffy; 2008)

It is important for the manager to remember that it is at his/her discretion at what the budget reflects on the price of expenses and the forecast on pounds per acre for that particular crop. Enterprise budgets help define to the manager which enterprise is more profitable and which should be included in the whole farm operation. (Kay, Edwards, Duffy; 2008)

The purpose of this study is to determine the profitability of the walnut orchard. In order to be profitable the orchard must produce enough income from the sale of the crop to exceed the cost of production. Profitability is the measure of the efficiency of the farm and its operations to produce a profit. The farmer may determine this measure of profitability by three measures: net farm income, and the rate of returns to management and land, and operating profit margin ratio.

Net farm income is determined after all expenses have been tabulated and the revenues have been received as income. This number is the amount in which the revenue exceeds the expenses plus any gain or loss in the sale of assets. This number can also be thought of as the amount available for returns to the operator of labor and management and equity capital used to produce that farm income. Therefore this is thought of what can be returned to the farmer after all expenses are made.

Returns to farm management is often considered the residual of the net farm income. A return to farm management measures how well the manager organized their resources to generate a profit. The equation for returns to farm management is the net farm income less the management opportunity costs equals the returns to farm management. The management opportunity costs are the costs of a salary to the farmer if he were to be managing the orchard.

Therefore the management cost in the budget is the cost to which the farmer would receive as a salary. It is common here that the returns to farm management be negative, which would indicate that, the farm cannot support a full income. However if positive the farm is suitable to support a full income to the farmer. (Kay, Edwards, Duffy; 2008)

Returns to farm land is found after the returns to farm management is acquired. This number is meant to determine the farms ability to pay off its debt to land if any. If the land debt is owed to the bank then the orchard must produce enough revenues to make this payment and retain enough revenue for the cultural practices in the following year. This return is in the form of a percentage. A negative percentage shows that there is not enough return to the farm land to pay off any existing debt. A positive is the opposite, meaning that the farm has enough revenue to pay off debt and carry enough capital over for the following year. (Kay, Edwards, Duffy; 2008)

Operating profit margin ratio is expressed as a percent of the total revenue. It is calculated by adding the interest expense (if any) to the net farm income less opportunity cost of unpaid labor less the cost of management equals the operating profit. Then the operating profit is divide by the total revenue times 100 (to express as a percent). A high value here would indicate the farm is making more profit per dollar of revenue. A low values shows the farmer that the farm needs to concentrate on improving the orchards revenues. With the aid of these measurements the farmer and or manager shall be able to accurately make a decision on the profitability of the orchard.

II. <u>Site Preparation</u>

There are multiple ways to set up the land for the planting of an orchard. Every farmer will have his own preferred way on how to plant an orchard. Fifty years ago, before there was a real prominence of orchards planted, the primary step to begging the orchard was land leveling.

Today, the issue lies in the removal of the original orchard is the place to start. This can be done by a professional orchard removal company where the company removes the orchard with loaders and grind the remainder of tree into mulch. Not long ago removal would be done by chainsaws and burning the remainder or keeping it for fire wood (Coates, Edstrom, and Sibbett, 1998).

After the trees are no longer present, the roots must be cleaned out of the field by hand. This is typically done after a deep rip of the soil is completed. The deep rip can range anywhere from 3-6 feet, this is for the new roots to have an easy path through the soil their first years of development. (Buchner, et al., 2007) Once the field is deep ripped, it must be disked twice (depending on the soil) and land planned to level out the soil. Once the soil is leveled and disked, by the preference of the grower, ridges can be made for where the trees will be planted. The idea behind this is that it generally helps the tree not drown of water (known as water logging) and also helps for the set up of an irrigation system (Buchner, and Conell, 2008).

Some growers leave the field fallow (let the field be bare) or plant a legume crop (a Nitrogen fixating plant) for a period of time, typically a year or two. Others use a fumigation technique which attacks and eliminates any soil borne pathogens, pests, and diseases in the soil that may harm the newly planted trees. There are few options to use in fumigating the field, thus for the last few years methyl bromide has been the desired option to. Until recently, there has been a decrease in use of methyl bromide due to its recent quarantine and findings of potential harm to the environment. Therefore there have been alternative resources that have been explored and tested. For instance; the use of 1,3-dichloropropene + chloropicrin, a fumigant agent, was applied to the leveled ground via ground shank into the soil. It proved to be good if not better than the use of methyl bromide, since it didn't harm the natural properties of the soil. Although

the use of methyl bromide has not been completely banned; the application that this also used for fumigation is 1-3D with chloropicrin (Bull, et al., 2003).

The varieties used today are predominately Chandler, Howard, and Tulare (Buchner, et al., 2007). Others varieties that have been used in the past are: Vinas, Franquettes, Pains, Serrs, and Hartley. Although 75% of the plantings today are of Chandler because of the large nut, like in size, and easy to crack. (walnuts.org, 2008) The nurseries graft these varieties onto a rootstock that is resistant to most pathogens and pest in the soil, typically a Paradox or Black walnut. The use of black walnut root stocks are used occasionally since the Paradox is resistant to Phythophthora root rot and more tolerant to nematodes. Paradox also is a good root stock since it provides vigorous growth for the tree and helps keep a healthy tree. (Goodhue, et al., 2005) The tree spacing's to be 24x28 which makes 65 trees per acre (Buchner, et al., 2007). Other growers use even further spacing's of 30x30 because the farmers planted another crop in between the young walnut trees and later removed the crop once the walnuts came into production (Coates, Edstrom, and Sibbett, 1998).

Planting occurs in the spring of the following year. After fumigation and land level and preparation has occurred, it is best to wait a year after removal of the previous orchard. Planting should occur in February. Some growers hire this done by a company, but the process begins by surveying and marking the place for the trees to go. This can be done one of two ways, by a GPS slip plow, or a crew of fifty men and a tree line. Although planting has recently been done by GPS due to the cost effectiveness and accuracy the system provides. Once the trees are planted in the specified spot, the top 2-3 feet of the scion (the upper most part of the tree) is cut off to promote tree vigor. A wood or metal stake (depends on cost) is placed adjacent to the tree for

training. The trees are painted white to prevent sunburn, and milk cartons are placed around the tree for rodent protection. (Coates, Edstrom, and Sibbett, 1998) Its assumed that there are 2% of replants in the orchard the second year and should be accounted for (Caprile, et. al., 2007).

Irrigation is an important part in the development and preparation of the orchard. Many options can be taken here depending on a few vital items. It is up to the location of the orchard based on the limitations of the given water source and soil properties. There is no right method of irrigation since surface, sprinkler and low volume (drip or microsprinkler) can be used effectively. It is possible to surface irrigate (flood) the orchard where the entire field is covered in water. Other options are placement of an in ground sprinkler system, where sprinklers cover the same area or by using low emitter system with the same in ground concept. All systems however, should be in place to meet all water requirements during peak use times, maintain salt balance, and compensate for inefficiencies. (Pricahrd, 1998) Whatever the system to be used, a decision must be made prior to planting to ease the installation any sort of an irrigation system.

III. Cultural Practices of Walnuts

The establishment of the orchard is the most critical first years of the life of the orchard. If one were to want the orchard to last, the first three years are crucial that everything possible is done to help the trees become established.

Fertilization – Nitrogen is one of the most essential elements needed for tree growth along with Phosphorus and Potassium (NPK). In the first three years of orchard development the application of granular fertilizer is applied around the trunk of the tree by hand which calculates to roughly 20 -50 pounds per acre. (Buchner, et al., 2007)

Irrigation System – The system used in this orchard will be a sprinkler system and its costs will be assed in the first year of planting. It is crucial that the roots of the young tree are established and thus water application needs to be frequent. Sprinkler systems are used in lands of special soils and water supply conditions are favorable for such a system. . (Pricahrd, 1998) The system is energy efficient and requires low sprinkler volume sprinkler nozzles minimize the size of the pump. The application of the sprinkler system should be used not more than at a rate not to exceed 1.5 acre feet for the year (Buchner, et al., 2007).

Training Young Trees - It is essential for the survival of the tree to be trained in order for it to develop certain scaffolds and allow for fruit-bearing laterals. There are two concepts behind the training of the young trees; to develop a strong structure for a heavy crop, and to open up the canopy to ensure constant light throughout the canopy. This makes for easier management and allows for the tree to create maximum growth and maximum production. Not one tree is identical and thus requires different techniques and involves time. This is crucial in developing the budget and considering these techniques. (Hassey, Kelley, Freeman, 1998)

Complete Cultivation – The concept behind complete cultivation of the orchard floor is to increases water penetrability and decrease weed outbreak. This is occasionally done by farmers in the beginning years to help the trees establish without becoming stressed and losing growth. (Walnut Production Manual, pg 93, 1998) Also the cultivated soil releases heat which minimizes the frost damage where as the frost can damage new growth. (Coates, and Sibbett, 1998)

Weed Control – There are two practices used in weed control: complete weed control and strip weed control. When practicing the cultivation method it is common to use the strip weed control method since the strips (nearest the tree row) is all that is left unturned after cultivation. This method is well adapted to sprinkler irrigation systems and assures even water distribution. This is an efficient method since it limits pesticide use and adapts to the other cultivation methods of the orchard floor. This method should remain in practice until the canopy shades the orchard floor and weeds are no longer an issue within the strips. (Coates, and Sibbett, 1998)

Once the trees begin to form their roots and trunks are more stable, they have become young adults. At this point other steps can be taken to make the trees more prominent and forthcoming.

Fertilization – The amount required for the tree at this point in time is increased from 50 pounds per acre in year three to 100-150 pounds per acre by years four through six. It's in these years that the farmer moves from a granular application, which requires an incorporation into the soil, to a liquid form where its applied by a tank mix and spread near the tree. (Buchner, et al., 2007)

Irrigation – With a nut bearing tree, it is crucial that the tree receives adequate water application. This is usually done during the months of June through September, and not to exceed 2.5 acre feet for the year. (Caprile, et. al., 2007)

Training to Pruning – As soon as the tree scaffolds are established and the tree structure is developed, training is no longer needed but pruning is. Pruning the mature walnut trees is to control tree size, maintain vigor and fruitfulness of spurs and increase nut size. Controlling tree size is crucial since walnuts are mechanically harvested and need to be handled properly. As well as the use of pesticide sprays can become costly if the trees are too tall and the sprayer is covering the same place at a constant rate. The concept of maintaining the tree fruitfulness is by limiting the amount of new growth the tree the produces more spur wood, or wood that develops nuts. This increases the yield of the crop and helps production remain constant. Pruning can be

done by hand or mechanically. Pruning by hand can is needed to maintain the spur wood, and mechanical pruning helps maintain the shape of the tree and is efficent. All these factors make tree pruning very crucial in budget development and each method should be taken into consideration. (DeJong, et. al., 1998)

Cover Crop – At this point the cultivation method is no longer needed, since the trees are more established and their canopies shade the orchard floor. A sod culture method is practiced in that the orchard floor is covered in existing weeds or planted to a cover crop. This is commonly used since the sprinkler system adheres to this method, it minimizes pest problems, allows beneficial insects to exist in the vegetation and it makes the orchard floor easily accessible in the winter and leaves a level floor for harvest time. (Coates, and Sibbett, 1998)

Integrated Pest Management – There are certain pests that need to be attended to as soon as there are bearing fruit on the tree. The codling moth is a key insect that affects the hull and shell of the walnut. This is crucial since the insecticides that treat the codling moth usually kill the beneficial insects that control other key pests such as the walnut aphid and mites. However there are other mites and aphids that are treated to prevent damage to the vegetative growth, which these pests attack. (Barnett and Van Steenwyk, 1998) The insects are treated with various applications and monitored throughout the growing season by detecting the pest in the orchard via traps or by using degree days. The necessity to treat these insects is too prevent damage to the tree and crop which can lower the productivity of the orchard. (UC IPM Website)

Harvest – Walnut harvest begins when there are mature nuts on the tree. This is when the green hull separates itself from the edible kernel and shell which indicates maturity. (Beede, et. al., 1998) This typically takes place in the fifth year after planting. (Caprile, et. al., 2007)

At this point in the trees lives, they have reached full adulthood. It is obvious when the tree is fully grown when it is nearly 60 feet high and grows very little in the spring and summer months.

Fertilize – After the 7th of 8th year the application of NPK is used when needed. It said to use 150 pounds to the acre, as a rule of thumb every other year. This can be done at this time in the trees life through the irrigation system by UN32, another form of nitrogen. (Caprile, et. al., 2007)

Irrigation – The irrigation system that was installed upon the planting of the orchard may need some upkeep at this point. Although there should not be any major problems. At this age of 7 years, the trees should be getting about 3.5 acre feet or more per acre. (Buchner, et. al., 2007)

Pruning Requirements – At the peak of the tree production, about 10 years, shot vigor is sufficient in 30 x 30 foot space or less. When the tree canopy begins to enclose the sunlight allotted to the leaf surface can lead to leaf drop and loss in the production of photosynthesis. The idea here is that changes are needed from tree development to tree management. The canopy needs to be trimmed for not only new growth vigor but the preservation of fruit wood in the inner canopy. This is crucial since the loss of fruit wood results in a loss of production, which can decrease profits drastically. (DeJong, et. al., 1998)

Mow – The maintenance of the cover crop that is now in place is essential for a few reasons. A flail mower or chopper is used to maintain the annual weeds that sprout up. Mowing is used to control the weeds in the center of the rows and should be done before the weeds set seed. (Buchner, Cudney, Elmore, 1998) Keeping a low grass or bare surface on the orchard floor in the winter months will help minimize frost damage (Caprile, et. al., 2007). Mowing the cover

crop will also help keep a clean crop during the harvest. A cover crop also helps harbor beneficial insects. Therefore the timing of this practice is crucial since some pests are susceptible at certain times and minimizing the creation of dust helps minimize mite issues considering they begin their egg stages in the soil. (Barnett and Van Steenwyk, 1998)

Weed Control – The same practice shall be used here as in the past. Usage may depend on the canopy coverage, because the weed plants do depend on the sun for photosynthesis. However proper management should be practiced and strip spray should be continued. The management system here will need to be in association with the cover crop, in order that the cover crop is not damaged.

Integrated Pest Management – The same practices should be used from the last few years of the trees life. Although now after year six or seven when the tree begins to produce a very prominent nut crop, blight becomes an issue. Walnut blight is a bacterium that invades the leaves and new growth openings. The nuts are also susceptible to blight as soon as the flowers are present up until mid summer. The blight looks more like a bruise that develops from a soft wet spot on the hull, this blight decreases the kernel size of the walnut. This in turn decreases the overall weight of the kernel in turn the production of the orchard. The blight also potentially damages new growth as well from the infection of the bacteria. This is just cause to monitor and treat whenever necessary to prevent the bacteria from damaging the crop and tree. (Schroth, and Teviotdale, 1998)

Harvest – Once the tree has become prominent and establishes its root and vegetative systems it can produce at its peak production. The crop yields range from variety to variety although the average is well around 6,000 pound per acre.

Chapter 3

Methodology

I. <u>Procedures for Data Collection</u>

In determining whether or not the redevelopment of a poor producing walnut orchard is more profitable, there are certain parameters that must be examined prior to any affirmative management decisions. It is a common concept to develop a management plan with the use of crop yields and numbers to use for the specified budgets. In order to collect this data, multiple steps must be taken to verify that the data is accurate and credible. In order to collect and analyze this data, development of an enterprise budget is the first and foremost important step. As soon as the budget template is formatted, collection of price data and cultural practices can be collected. This can be done by the conduction of interviews from various professionals from the agricultural and walnut industry and the University of Davis Cooperative Extension. Collection of walnut crop yield reports along with various examples of walnut budgets is also a good source.

i. <u>Budget Criterion</u>

When creating a template to use for the walnut orchard budget, the poor producing orchard budget and the redevelopment budget; it is crucial that the math is accurate and presentation is proper. There are various resources to use when producing a budget. The University of Davis Cooperative Extension (UC Coop) is an excellent source to use; the website contains an Microsoft Excel spreadsheet that can be used with given prices and the generic cultural practices. One would have to be aware that these numbers are not accurate to location nor are the prices up to date. Another source is from a professional accountant. Accountants are

skilled in the use of Microsoft Excel worksheets and development, thus they would be a good consultant. These options may be used or one may embark on the task of creating a budget from scratch.

As stated in the Review of Literature, the author will use the cultural practices stated in order to price out the budget. The time frame to be used for the enterprise budget will be an orchard that is eight years or older, that is in the adult stage of production. This will help keep the units for crop yields, rates and pricing of the cultural practices at a common value. This is in order to help compare results between both budgets. In using the general cultural practices that were stated in the Review of Literature and with the various recommendations made by the interviews; the author will be able to keep the budgets in a comparable form.

The poor producing orchard budget will accommodate additional information that will be added into the budget. This budget will be used to show that it is not profitable to keep farming the orchard as is. Use of the same enterprise budget will be used; however additional practices will need to be added in order to improve the orchard. Some of the additional practices that may be added are fertilizer applications of macro and micro nutrients, additional application and monitoring of pests (vertebrate and insect), pruning techniques to encourage growth, and replanting of dead trees. There are various areas to be examined and added to the cultural practices to treat a poor producing orchard. (Buchner, Connel; 2008)

When creating the re-development budget, the same numbers can be assumed and used. Although a larger portion will need to be added for the preparation and planting of the new crop. The topics discussed in the Review Literature section of site preparation will be used in this portion of the re-development budget. Pricing can be found through the various contacts

conducted during the following interviews and University of California Cooperative Extension (UC Coop) budgets (Figure 1-1).

The redevelopment budget is based on a 25 year life cycle. This is because of the loan needed to redevelop the orchard is amortized over a 25 year period. Consulting two different banks, specifically Farmers & Merchants Bank and American Ag Credit, on this matter can help analyze the duration of the loan, interest rates and payments. This is needed since the initial cost to redevelop an orchard shall be distributed over a period in order for it to attribute to the cash flows.

There are various procedures in collecting pricing for development of a budget. These price indexes are available online at the UC Coop. However, typically the prices are out of date thus needing to be made current by a simple procedure of price indexing. Being that there is a base year, typically 1985, and correlates with today's inflation and ever changing technology. From the use of interviews that will be conducted, prices can be found in such a fashion that price indexing may not be needed.

ii. <u>Interviews</u>

In the central valley of California, there are many prominent leaders in the walnut industry. It would be useful to speak with some of these leaders and develop an idea of what they have done in their own operations, what has worked for them in the past, and hopefully a sample of their budget from their walnut operation(s). Table 1-1 gives an example of other questions to ask. Such as: potential reasons for trees that are not growing to their full potential as well as cultural practices to improve those certain trees. The answers found from speaking with these

professionals can be used for the development of a budget for use in improving a poor producing walnut orchard.

The local Pest Control Advisor (PCA) from Mid Valley Agriculture or Simplot, who are the local chemical companies in the San Joaquin Valley, is a knowledgeable source on pesticide use and prices for walnut pest management. Consulting the PCA on the use of certain practices used and the individual pricing can be used in the creation of the each budget. The PCA can provide valuable information on which practices are being used amongst walnut growers and provide those costs. For example; the walnut husk fly is a major pest that affects the aesthetics of the walnut which can decrease the value of the crop, thus the farmer uses a pesticide to help minimize the damage (UC IPM, 2009) . The farmer uses a pesticide called Malathion with bait known as NuLure which costs \$55 an acre (Buchner, et al., 2007). In correlation with the industry growers and consultation of the PCA can lead to an accurate perception in developing an enterprise budget for walnuts.

iii. Crop Yield Collection

In order to determine what the proper averages are for the walnut industry, yield reports from various processing plants will help accurately depict and solidify the averages. As well as data collected from the California Walnut Commission and the U.S Department of Agriculture. These numbers are displayed and calculated each year and available to the public. These averages are available after the season has been completed and the industry reports them to the National Agricultural Statistic Service at the USDA. These reports are mailed out to growers and processors each year through the University of California Cooperative Extension office, in cooperation with the USDA. They can also be found on the California Walnut Commission

Board's website, by looking in the industry news tab under Crop Outlook. These numbers are used for the development of the budget in the revenue section. All processors pay on a per pound basis so it seems fit to determine the industry average to help determine what to base the budget revenues.

In collecting yields of a poor producing orchard, where as the orchard produces less than that of the industry average, if possible to locate an orchard that has shown a decline in production. The processor will pay on a dry in-shell per pound basis (Buchner, et al., 2007), which makes this collection necessary to help determine potential revenues from the orchard. Once located, a crop estimate can be taken and observed accordingly. A sample of ten random trees is sufficient in collecting the estimated yield. Collect all the nuts that have fallen from that specific tree and make a note of which tree the nuts came from and keep them separate from the other trees. Then weigh the nuts from the tree, multiply that amount by the number of trees per acre. This number will then be the pounds per acre. For a crack out percentage (processed walnut meat) take a sample size of 100 nuts, weigh the nuts in the shell. Crack the nuts and separate the meat from the shell. Weigh the meat and shell again then divide the meat weight by the shell weight. This number will be the crack out percentage, for that orchard. This is important to know since most of the industry process their walnuts. Also, and the most important, the processors pay on a per pound basis of a ratio meats to in-shell. For example, if the crack out percentage of particular growers' walnuts was at 50%, then the processor will take out his costs and pay the grower accordingly. If the crack out percentage was lower than 50%, then the grower will receive a smaller check since it cost the processor more to crack and sell the walnuts. If the growers crack out percentage was higher than 50%, then the grower will receive a higher pay out since it took the processor less time to process the walnuts.

II. Procedures for Data Analysis

In any type of analysis the key idea is the data that was collected previously in order that the data may be analyzed in accordance to the objectives: study the crop yields, creation of an enterprise budget, and the creation of a re-development budget.

i. Budget Analysis

When deciphering a budget and its contents it's typical to directly look whether there is a gain or loss after costs. This is a common tool farmer's use when depicting if their enterprise is stable enough to carry on farming the enterprise. Other techniques to analyze budgets, as described in the Review of Literature section of Management 101, are developed by measuring the returns to investments and the breakeven points.

The three measurements that will be used are typically determined by using the farms Income Statement. However since the author is using a hypothetical situation, an income statement would be difficult to develop. Therefore the budget will take the place of the income statement considering it maintains the revenues as income and operating expenses the same.

By assessing the returns to investments, the famer can clearly see if he will be getting a strong return to the enterprise. As stated in the Review of Literature, there are multiple return equations that can be used to analyze such investments; such as the rate of returns to management and rate of returns to land and the operating profit margin ratio can be investigated thoroughly. Given the specific management costs that were specified through the conduction of the various interviews, the farmer should be able to see if his management fees are sufficient. With these the farmer can help define if his management costs are too high or too low, which

ultimately defines his or her salary. The rate of returns to land should be analyzed carefully. This rate of return shall help the farmer determine if the price he paid for the land is actually being paid for given the returns from the walnut orchard revenues. If the return is below the standards set by the banks and/or the farmer, then the orchard is unable to financially sustain the farmer and the operation. The operating profit margin ratio is ultimately the decision if the orchard has the capability to either expand or bring a profit back to the ranch. As stated in the Review of Literature, the higher the ratio the better off the orchard will be. However, the lower the margin then the least capable the orchard can expand, where as the manager would need to focus on the production of the orchard. Ultimately, the decision might be to redevelop the orchard.

The breakeven points are those that show the farmer specify what price is needed to make all payments and continue farming. As stated in the Review of Literature, these points are determined after the pre-harvest costs (variable) and post-harvest costs are addressed. The breakeven point will be used to distinguish to the farmer if the walnut prices are sufficient enough for him to make all of his payments. The equation also shows the farmer if he will either lose or make any money (profit or loss). If the current price for walnuts is less than that of the breakeven price than the orchard is unable to be financially stable. If the current price for walnuts is greater than that of the breakeven price than the walnut orchard is able to pay off all expenses and turn a profit.

ii. <u>Crop Analysis</u>

The information made available for yield per acre is needed to help accurately calculate revenues in the budget. Production per acre contains numerous assumptions throughout the industry. The USDA reports a yield of 1.93 tons per acre in 2009, and a16% increase for 2010 at

2.25 tons per acre (USDA: 2010). As for the typical generality of a producing orchard at 8 years and thereafter, the orchard is expected to produce 5,400 pounds per acre, or 2.7 tons to the acre. (Buchner, et al., 2007) This information aids the revenues in the budget considering that the processors pay the farmers on a dry in-shell per pound basis so it's crucial to understand the industry averages.

In extending all the budgets to fit the re-development budget time span, the author can analyze each at a comparable manor. With each budget on a 25 year extension, the author shall be able to compare the revenues, the rates of returns, and break-even points of each year. This can be easily calculated and carried out by using Microsoft Excel. With each budgets profits, rates of returns, and breakeven points visible; the author will be able to determine that it is economically profitable to re-develop the poor producing orchard in the long run.

Assumptions

For the sake of this project, we will assume that the numbers obtained for the budget are current and credible. For use in the budget we will use 30 acres for the production studies and projection budget. The yield average per acre forecasted by the USDA for 2010 will be assumed accurate and used in the budget studies. It will also be assumed that all equipment is owned by the management company including all tools and office necessities which are assessed into the management fee.

Limitations

For the sake of this project and the walnut industry, we will limit the findings and results of this study to the San Joaquin Central Valley. The methodology developed may be used throughout the state but is specific for the central valley. For the purpose of this study the value of the land will be limited to the San Joaquin and Central Valley values according to the San Joaquin County Appraisers Office.

Chapter 4

Development of the Study

Within this chapter the author will be presenting the findings from the project. The walnut orchard budgets, as well as the redevelopment budgets will be explained in detail. Key points that are to be noted in this chapter are the growth over time from the redevelopment budgets and the additional cultural practices to the poor producing orchard. Any surprising data (data that is of insignificance) will be presented as well.

I. <u>Data Collection Problems</u>

A change that the author made in the collection of data was acquiring common cultural practices from the San Joaquin County area. It appeared to be that from the University of California Integrated Pest Management (UC IPM) web site and the University of California Davis suggestions for walnut IPM were very similar. Thus contacting a number of walnut growers in the San Joaquin area would be inefficient for the author, since each walnut IPM is similar. The only differences noted were the application rates of chemicals and fertilizers, and frequency of certain applications. Therefore the author used the IPM suggestions from the UC IPM website and the suggestions made by Mr. Jim Colyn of Mid Valley Agriculture, a chemical and fertilizer company in the San Joaquin area.

In creating the template for the redevelopment budget, the author noticed that there were two crucial equations that needed to be added into the spreadsheet and project as a whole. This spreadsheet was obtained by Mr. Kevin Jones, a Certified Public Accountant at Croce & Company, which was created in 2006 for redevelopment of a walnut orchard. One of the additional equations needed for evaluation of the profitability of the walnut orchard is the Internal Rate of Return on the walnut orchard. The other equation used in the redevelopment

spreadsheet was the Net Present Value. This spreadsheet contains a 25 year lifespan of the orchard, and all cultural practices in a simplified way.

II. <u>Analysis of Project</u>

The author was able to obtain a sample budget (Figure 1-1) from the University of California Davis Cooperative Extension. The author then created a walnut orchard enterprise budget spreadsheet using Microsoft Excel, by using the sample from the UC Davis Coop Extension. This spreadsheet included: the approximate units of each cultural practice, costs per unit of each cultural practice, the cost per acre of each cultural practice, and the overall cost of each cultural practice for the entire walnut orchard enterprise. The UC Co-op budgets units and prices are useful references; however they too needed to be updated, to fit the format of the author's spreadsheets. The author also obtained pricing and units per acre on the various cultural practices to be used in farming the orchard from Samuel Farms Incorporated of Linden California. The author also developed a spreadsheet that would give a price per acre for the use of machinery that is owned by the management company. This spreadsheet was very useful since it accommodated for the use of the tractor such as: fuel, lube, repair costs, labor, and deprecation of the tractor. These equipment rates were added into the spreadsheet for the cultural practices such as Disking, Mowing, Tree Spraying, Weed Spraying, and Fertilizer Application.

The Enterprise Budget

The author created two separate enterprise budgets. The first budget is of an orchard with production of 6,000 pounds per acre (Figure 2-1). This budget contained all the required cultural practices to farm a walnut orchard according to the data gathered from the UC Coop and Samuel Farms Incorporated. The second budget is of lesser production per acre at 4,500 pounds per acre

(Figure 2-2). This budget contains the same cultural practices of the previous budget however with certain additions to the cultural practices. These additions include: additional pounds per acre of fertilizer, monitoring of pests, pruning, and rodent control. These additions came by recommendation by Mr. Albert DalPorto and Mr. Jim Colyn.

The author consulted with Mr. Albert DalPorto, Field Manager for Foppiano Farms of Morada California, in regards to improvements to a poor producing orchard. Mr. DalPorto suggested that additional fertilizer may be applied (macro and micro) along with additional pruning practices in the winter to encourage growth. Mr. DalPorto also suggested planting additional trees, where within the row there is a vacant space for a tree, in order to increase density for an increase in production. The author also consulted with Mr. Colyn in regards to the Integrated Pest Management for walnuts. Mr. Colyn provided the author with the recommended IPM treatments and rates per acre for those treatments along with their pricing (each varied in weighted units) for each chemical or fertilizer (Table 1-2). With the newly created budgets, and the input from the various sources, the author was able to make these findings.

As stated in the Review of Literature, the author will use: break even points, net farm income, return to farm management, and operating profit margin will be used to analyze the profit ability. The breakeven point that is of concern for this project is the price per pound needed to meet all costs. The orchard with 4,500 lbs. per acre has a breakeven of \$0.71 cents/lb., where as the orchard with 6,000 lbs. per acre has a breakeven of \$0.51 cents/lb. This shows that the more pounds per acre produced the easier it is to make the payments on all the cultural practices. With fewer pounds per acre the orchard requires a higher price to meet its costs. If the orchard produces more pounds per acre than the orchard is better able to be spread its costs over the entire orchard. By looking at net farm income the 6,000 lbs per acre has a total of \$84,265.05

versus the 4,500 lbs per acre which accumulates \$52,139.10. A difference of \$32,125.95 which is essentially the opportunity cost of not producing at a higher level. The difference between the returns to farm management and land are: 6,000 pounds per acre at \$97,765.05 and \$52,139.10 for 4,500 pounds per acre. Both enterprises will be able to support the farmer and provide him with a salary however the difference in the two enterprises, \$45,625.95 represents the opportunity cost to the farmer if he were to manage a different orchard. The operating profit margin was calculated for each orchard. There was no interest on the capital used, so interest doesn't need to be added into the income of the orchard. The management costs and unpaid labor has already been removed, and thus the net revenue was divided by the gross revenue. The 6,000 pound per acre orchard has a margin of 48.8%, which means that only 51.2% of revenue is being used for cultural practices. The 4,500 pounds per acre orchard has a margin of 28.6%, meaning that a greater portion of its sales are for cultural practices (approximately 72.4%).

With all these figures in mind, the farmer would be more profitable if he were to produce 6,000 pounds per acre. With 48.8% of the revenues being profit and having a \$45,625.95 difference in returns to management between the two orchards seems evident that the best decision is to be producing 6,000 pounds per acre. The orchard does not pay the farmer off sufficiently enough to continue farming an orchard that requires 72.4% of your revenue to be going towards the cultural practices.

The Redevelopment Budget

After consulting Mr. Kevin Jones for the redevelopment spreadsheet, the author was able to modify the spreadsheet in accordance to current costs and pricing over the life of the orchard.

This spreadsheet needed to be updated to current year pricing for 2011, by adding a 2.5% inflation rate over a 6 year period considering the spreadsheet was created in 2005.

The spreadsheets reflect the same practices used above. With the contrary to additional practices made to the 4,500 pound per acre orchard. This is because in order to maintain accurate depictions of the scenario, the author must compare like terms to like terms. The spreadsheet might also appear that there are missing items, however this is a projection for the future not a snap shot in time. In projection one will want to be simple, whereas for a current budget the farmer will want to include everything he or she could possibly think of. Although for the sake of remaining constant with the previous budgets, the author added a row in the spreadsheet for "Other Cultural Practices." This includes rodent control, parts and supplies, tree staking, weeding, and other miscellaneous labor.

For purposed in this section the author consulted an Agricultural Loan Officer. This is due to the fact that the initial cost of establishment is so great there needs to be an account of interest over time of that initial cost. Mrs. Kim Kathrein, Vice-President of Agricultural Loans at Farmers & Merchants Bank, suggested a 6% rate on inflation. She suggested this over a rate of time plus 2 (inflation) equaling 6%. This is highly variable because of the amount of risk that the farmer has from the past, and the amount of variables there are in the process. These variables are how much of the establishment cost the farmer will be able to provide up front along with the time of the operating loan. The 6% interest cost was incorporated to the spreadsheet and reflects that amount of time that it takes to pay off the initial operating cost of establishment. In the case of the 6,000 pound per acre orchard, it was able to do so in 10 years where the 4,500 pounds per acre orchard did so in 13 years. This shows that the 6,000 pounds per acre orchard is less risky and able to pay off its initial investment sooner, thus being able to turn more of a profit sooner.

The author began the production in year three as described in the Review of Literature. The author also incriminated the amounts according to the Walnut Production Manual on the average amounts of production for walnuts. The first 6 years are essentially the same, until years 7 and 8 where the production amount changes. One budget again has 6,000 pounds per acre (on average) and the other has 4,500 pounds per acre (hypothetical average).

The expenses created for each year also remain the same. The only difference here is the revenues over disbursements. This is where the author looks at the difference in revenue to expenses over time. The author created a visual graph of the productivity of the orchard and the revenues of each year combined over a 25 year period. Figure 3-1 shows the total receipts of the orchard for each year and compared the two production pounds per acre.



This graph model depicts that over time the orchard with good production of 6,000 pounds per acre will be more profitable. This is because there is an increase in production in years 7 and 8 where then the blue line (6000 pounds per acre) crosses at 12 years. This is showing that in 12 years the orchard will pay for itself and any income thereafter will be returns to the farmer. The red line (4,500 pounds per acre) crosses at 20 years showing that it takes

longer to pay off the initial planting costs. It also shows that there is not nearly as much revenue received over the course of the orchard, 25 years, for the farmer to receive adequate returns. Therefore if the orchard is performing poorly now, it is better to redevelop as soon as possible in order to have adequate production and receive adequate returns.

The Internal Rate of Return (IRR) was also calculated for this project. The IRR is an equation which calculates the returns to investments over a course of time. With the added total of cash over disbursements, the author was able to use the Microsoft Excel equation to calculate the IRR. The IRR for the 6,000 pounds per acre orchard was 10.79% where as the IRR for the 4,500 pound per acre orchard was much lower at 3.54%. This shows that over the course of time the return to your investment will be greater with higher production and quicker returns. With a 3.54% return to your investment, the orchard will be slower on its returns as well as being lower.

If the manager were to meet his set requirement of returns to the investment then the orchard will be sufficient in production. However, according to Mrs. Kathrein the bank requires a 1.25 to 1 ratio on returns in order for the bank to continue its operating loan with the farmer. This means that the ranch must have 25% increase of revenue over the cultural costs, or total variable costs. In the case of the 4,500 pounds per acre orchard, it would have to produce 1.25 times the amount of what the operating loan is. If the loan is the total variable cost per acre, \$2,924, than the orchard would have to have an income per acre of \$3,665. The orchard only has a gross income of \$4,500 per acre, which is above the requirements of the bank. However, if prices were to fall in the sale of walnuts or if prices were to rise in cultural practices, then the farmer will have less leeway with the 1.25 ratio.

The author also examined the Net Present Value (NPV) of the orchards. This equation discounts the overall income of the orchard with an annual rate of 2.5%, as recommended by Mr. Jones. This is a financial tool to measure alternative cash flows in today's dollar amount. So in this case, the author is comparing the two cash flows inflows and outflows of the 6,000 pounds per acre, and 4,500 pounds per acre. The 6,000 pound orchard has an accumulated cash flow of \$703,627 per acre, where the 4,500 pound orchard has a value of \$29,894. The 6,000 pounds per acre orchard is in favor here since it has a much greater value amount over the 25 year period.

The author also examined the nature of the orchard if it were to improve over time. In Figure 3-2, the budget has a additions to certain recommended cultural practices. If these additions were to improve the orchard health and productivity and increase the yields, it still would not meet the revenue of the 6,000 pounds per acre orchard.



Figure 3-2 is a hypothetical situation of the 4,500 pounds per acre orchard were to increase its production. As seen here the orchard will increase its overall accumulated cash, but still is suffering a loss compared to the 6,000 pounds per acre orchard. The orchard turns a positive cash

flow after 16 years vs. the 6,000 pounds per acre at 12 years. It still does not pay off for the farmer to continue this operation given that the orchard can do better.

Chapter 5

Summary, Conclusions, and Recommendations

I. <u>Summary</u>

Throughout this project the author was able to determine the profitability of a walnut orchard. The author used budgets of walnut orchards and certain management equations to determine the orchards profitability. There were two budgets that were created, one being a yearly enterprise budget for farming walnuts, and the other being a redevelopment budget for planting and farming walnuts. The goal of this project was to determine that the current status of the orchard is not profitable. In the long run, it will be more profitable to redevelop the orchard that is poor in production.

There are two budgets as the base for this project. There was an enterprise budget created for farming walnuts from cultural costs to harvest. There were two scenarios used in these budgets: a good producing orchard and poor producing orchard. Both scenarios were then analyzed by using break even points, net farm income, return to farm management, and operating profit margins all in order to determine the profitability of the walnut orchard scenarios. The second budget that was created was a redevelopment budget, giving a 25year outlook on both scenarios of the orchard. The analysis of this budget came down to the use of net present values and internal rate of returns to the initial investments of redeveloping the walnut orchard.

There were multiple differences between these two scenarios. The overall significance of these differences poses the answer to the question of redevelopment. As of now the poor producing orchard can sustain itself as an orchard. If overtime it does increase its production then it may be logical to leave the orchard in production. However, if the orchard does not increase production given the increases to certain practices, and the manager has exhausted all other options of improvements, than the orchard should be replanted. It should be up to the manager's discretion of how long this trial period should be. This is on the condition that it is known to the manager that overtime the orchard will not have the same cash flow as if it were producing at capacity. This project shows that it will not be profitable to keep the orchard producing at the status quo. Therefore if the orchard does not make an increase to production with the additions to cultural practices, then the manager should ultimately decide to redevelop the orchard.

II. <u>Recommendations for the Study</u>

The recommendations that the author will make to this study and for anyone who wishes to use these contents are as follows: cost of management, variation in pricing, and vertical integration. These recommendations came to the attention of the author throughout the project and should be taken into to consideration for this project.

The cost of management in both the enterprise budget and redevelopment budget is subjective to change. This is because that the management costs assume all additional fixed costs such as: depreciation of equipment, office and staff costs, equipment ownership and any other costs associated with managing an orchard. It may be appropriate for the farmer to assume these costs if he or she is farming this single orchard. The University of California Cooperative Extension gives an excellent example of these costs in association with all the cultural practices of the orchard. In regards to pricing of the various cultural practices, one may wish to change them to fit their needs. Reason being that some firms charge more or less for certain chemicals, as well as the application of these chemicals. Vertically integrating any operation means taking all operations that are included in making that operation successful and managing each operation from start to finish. In the instance of this project, one may wish to integrate into their program the harvesting, hulling and hauling of the walnuts. In doing this, the farmer and or manager may be able to milk some of the profits harvesting his own crop. This can be beneficial for the orchard and farmer being that the farmer is harvesting the crop at cost. Considering this the orchard will be receiving any added benefit per pound than if he or she were to outsource the harvesting of the crop. If the farmer were to also ultimately work all his or her own orchards with his or her own equipment then the operation may be vertically integrated. Even though the processing of the walnuts is also an aspect of vertical integrating, it is usually contracted to custom processors because of the huge initial cost of doing so.

III. <u>Recommendation to Extended Research</u>

There are multiple aspects that may be explored beyond the research conducted in this project. One may explore the science behind the orchard, where as why the trees are not producing to full capacity. There are many theories that may exist for reasons of poor production in orchards. However pin pointing of whether the issue is biological or managerial is the biggest question. The issues could lie in the biological factors of the tree to where it's not healthy and productive. In knowing the faulty management practices at hand, one may make adjustments to their management plans and budget. This can perhaps save money for the farm and alter the overall production of the orchard.

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<u>Appendix</u>

Figure 1-1

UC COOPERATIVE EXTENSION Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH AN ENGLISH WALNUT ORCHARD SAN JOAQUIN VALLEY – NORTH 2007

	Cost Per Acre						
Year:	1st	2nd	3rd	4th	5th	6th	7th
Yield - Pounds Per Acre:				600	1,200	2,400	5,000
Planting Costs:							
Land Prep: Orchard Removal & Field Cleanup	384						
Land Prep: Subsoil 2X	300						
Land Prep: Disc 2X	10						
Land Prep: Triplane (smooth & level)	125						
Fumigation: Nematode Sample (1/20 acres)	4						
Fumigation: (Telone II CA)	600						
Land Prep: Make Berms	4						
Weed: Preplant (Goal, Surflan)	48						
Plant: Survey, Mark, Dig Holes & Plant	112	2					
Trees: (late leafing 3/4 inch @ \$16.50 each)	924	18					
Plant: Stake & Paint Trees	197	3					
TOTAL PLANTING COSTS	2.708	24					
Cultural Costs:	2,700					· ·	
Prune/Sucker: (Yrs 1-2 prune & sucker, Yrs 3+ prune.)	22	27	27	49	70	120	120
Irrigate: (water & labor) Fertilize: N (UN32)	111	116	195	204	227	255	278
Weed: Yrs 1-4 Disc 3X, Yrs 5+ Mow 5X)	16	16	16	16	24	24	24
Vertebrate: Gopher (bait)	12	12	12	12	12	12	12
Weed: Snot Spray (Roundup) (Yr 1, 1X, Yrs 2-3, 2X, Yrs 4+, 3X)	7	15	15	20	21	21	21
Weed: Winter Strin Spray (Surflan Goal)	56	56	56	56	56	56	56
Insect: Mites (Omite) (Vrs 2.3 reduced spray volume)	50	27	27	60	60	60	60
Prine: Shred Prinings (Vrs 3-5, alternate middles)		21	14	14	14	27	27
Disease: Walnut Blight (Kocida Manay)			14	14	193	193	193
Insease: Walling Moth (Insiden)					105	04	105
Factilizer: Leaf Samples/Tiggue Apalysis						24	24
Insect: Welent Hugh Ely (Melethion, Ny Luce heit)						26	26
ATV	42	42	42	42	42	40	42
Dielen wee	42	42	42	42	42	42	42
	270	112	510	504	020	1055	1 0 7 0
IOTAL CULTURAL COSTS	3/9	423	510	394	830	1,055	1,078
Chales Diele Courses Hard				45	00	100	275
Shake, Pick, Sweep, Hau				45	90	180	375
Dry and Hull				39	12	156	325
California Walnut Commission Assessment	· · ·				10	255	40
IOTAL HARVEST COSTS	245		26	89	172	500	/40
Interest On Operating Capital (a) 10.00%	345	22	20	18	30	41	45
TOTAL OPERATING COSTS/ACRE	3,432	469	542	/01	1,032	1,451	1,863
Cash Overnead Costs:	50	50	50	50	50	50	50
Office Expense	50	50	50	50	50	50	50
Liability Insurance	0	0	0	0	0	0	0
Sanitation Service	5	5	5	5	5	5	3
Regulatory Fees	2	2	5	5	2	5	5
Property Taxes	142	141	142	141	141	141	141
Property Insurance	12	11	11	11	11	11	11
Investment Repairs	51	51	51	51	51	51	51
TOTAL CASH OVERHEAD COSTS	269	267	268	267	267	267	267
TOTAL CASH COSTS/ACRE	3,701	737	809	968	1,299	1,719	2,130
INCOME/ACRE FROM PRODUCTION				510	1,020	2,040	4,250
NET CASH COSTS/ACRE FOR THE YEAR	3,701	373	809	458	279		
PROFIT/ACRE ABOVE CASH COSTS						321	2,119
ACCUMULATED NET CASH COSTS/ACRE	3.701	4.438	5.247	5,705	5,984	5.663	3.543

This is a sample cost study to establish and produce a walnut orchard. This study includes a comprehensive list of planting costs and cultural costs over a seven year period that can serve as a template for both the enterprise budget and redevelopment budget. The variables and prices are out of date and need to be updated but are applied to walnuts production in the San Joaquin Valley, which suits the purpose of this study. (Grant, et. al., 2007)

Figure 1-2

This figure gives a detailed description of the forecasted year (2010) walnut harvest. The graph also shows a visual example of the increasing amount of tonnage and acres each year.



California walnut production and acreage, 2000-10





Table 1-1

A comprehensive list of questions to ask the industry professionals on issues addressing walnut production.

- 1. How long have you been producing/involved with walnuts?
- 2. What are your biggest costs in the production process?
- 3. What problems have you found that affect the growth of young walnut trees?
 - a. Are there any cultural practices you have used to improve these situations to help mature the tree quicker and sustain the tree's longevity?
- 4. Would it be possible to obtain a sample budget from your operation?
- 5. What have your average crop yields been?
- 6. What have been the average prices over the last ten years for walnuts?
- 7. When developing a new orchard, what methods do you use (ie. Methyl bromide, deep ripping, cover crops, irrigation systems)?

Table 1-2

This table is from Mr. Jim Colyn at Mid Valley Agriculture. It is a comprehensive list of the (in order of appearance) chemical/fertilizer, cost per unit, and rate per acre.

Potash. Muriate 0.65/unit, 100-150lbs/acre

UN32. 0.68/unit. 50gal/acre. Or CAN17 0.95/unit. 85gal/acre.

Roundup Powermax \$64.10/2.5 gal. 3pt/a

Gramaxone \$108.33/2.5 gal. 2.7pt/acre

Orchard Master \$85/2.5 gal. 2pt/acre

Activator pro90 \$28.33/gal. 4pt/100gal

Surround \$20/25 lbs. 50lbs./acre

Omite30. \$30/5lbs. 6lbs./acre

NufilmP \$38.60/gal. 6oz./acre

Lorsban Advanced \$116.67/2.5gal. 4pt/acre

Brigade \$65/2.5gal. 1lbs./acre

SquirrelBait 480/50lbs. 10lbs./acre

PMZ nutrient \$60/25lbs. 10lbs./acre