

Project Proposal and Development Plan for a New Almond Orchard Including the New
Variety of Supareil

A Senior Project

presented to

the faculty of The Agriculture Education and Communication Department

California Polytechnic State University, San Luis Obispo

In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science

by

Ellen “Rosebud” Brumley

Spring 2014

© 2014 Ellen “Rosebud” Brumley

Abstract

The purpose of this project was to develop an almond orchard proposal plan for P&G Brumley Farms in Escalon, CA. The new almond orchard will include a new almond variety, Supareil, and is set to be planted in the year 2015. The data and research provided is based on the specific location, in which the orchard will be planted. The design and format of this project are focused towards the desires and goals that P&G Brumley Farms requested in order to obtain a certain outcome. This project provides an outline of what needs to be done in order to produce a beneficial and profitable almond orchard in the San Joaquin Valley. By creating this outline any individual has the ability to create their own proposal that is specific to their own location.

Acknowledgements

Without the direction, support, and unconditional love of my parents, Phil and Gail Brumley, the completion of this project would not have been possible. Thank you for your continuous guidance and countless hours of encouragement. I hold the utmost respect and deepest gratitude for each of you, from the bottom of my heart, thank you.

I wish to express truly sincere and grateful appreciate to Dr. Kellogg; you have been an incredible mentor to me. I appreciate your dedication and guidance throughout the project. Your constant motivation tremendously contributed to the completion of this project and for that I am forever grateful.

Table of Contents

| | |
|---|-----|
| Abstract | i |
| Acknowledgements | ii |
| Table of Contents | iii |
| List of Tables | v |
| | |
| Chapter One: Table of Contents | 1 |
| Statement of the Problem..... | 1 |
| Importance of the Project..... | 2 |
| Objectives of the Project..... | 2 |
| Purpose of the Project..... | 3 |
| Definition of Important Terms..... | 4 |
| Summary..... | 5 |
| | |
| Chapter Two: Review of Literature | 6 |
| Economic Return..... | 6 |
| Historical Production..... | 7 |
| Selecting Cultivars and Rootstock..... | 9 |
| Orchard Management..... | 10 |
| Summary..... | 10 |
| | |
| Chapter Three: Methods and Materials | 11 |
| Procedures for Data Collection..... | 11 |
| Updates with the Grower..... | 12 |
| Evaluating Available Resources..... | 13 |
| Soil and Soil Preparation..... | 13 |
| Water Allowances/ Irrigation Installation..... | 14 |
| Planting of Trees..... | 15 |
| Orchard Management..... | 16 |
| Summary..... | 16 |
| | |
| Chapter Four: Results and Discussion | 18 |
| | |
| Chapter Five: Summary, Recommendations, and Conclusion | 26 |
| Summary..... | 26 |
| Recommendations..... | 26 |
| Conclusions..... | 27 |

Reference List29

Appendices.....31

 Appendix A Pacific SouthWest Irrigation Cost Estimate31

 Appendix B Burchell Nursery Almond Tree Cost Estimate33

 Appendix C San Joaquin County District Viewer35

 Appendix D Supareil.....37

List of Tables

| | |
|--|----|
| Table 1. Fertilization Schedule for Almond (lbs/acre)..... | 24 |
| Table 2. Nutrient Concentrations in August Leaf Samples..... | 24 |
| Table 3. Specific Climate Requirements..... | 25 |

Chapter 1

Introduction

“Almonds are California’s top agricultural export and largest tree nut crop in both total dollar value and acreage. They also rank as the largest U.S. specialty crop export” (Almond Board of California, 2013). California is the only state that has the necessary climate to produce almonds on a commercial basis. Therefore, in order to meet the ever-growing worldwide demand, California growers must continue to develop new almond orchards. As California farmers continue to plant new almond acreage they must do so with the understanding of new water restraints, and environmental restrictions.

“Almond production has continued to increase over time. Improvements in efficiency and technology have had a dramatic effect on increasing almonds yields. Overall yields for California orchards continue to increase. Advances in tree varieties, planting patterns, mechanization and orchard agronomy have been responsible for some of the increased yields per acre” (Agriculture Marketing Resource Center, 2013). With the continuation of increased population to 9 million (currently at 7 million) people by 2025, almonds are not only vital to California’s economy, however perhaps more important, vital to people throughout the world, as a viable means of essential protein.

Statement of the Problem

“California’s family farmers and ranchers are a vital part of the statewide economy and local communities. In the course of providing people with the finest quality

and most affordable food, fiber and foliage in the world, we also support more than 2.5 million jobs statewide and more than \$43.5 billion in crop value alone—all while acting as stewards of California soil, water, air and open space” (California Farm Bureau Federation, 2013. P&G Brumley Farms currently producing almonds and walnuts recently completed their last season as rice growers in Escalon, CA. Both individuals, who practice progressive agriculture, P&G Brumley Farms see the constant demand for almonds, not only in the United States, but also across the globe. Having available land, that was once rice fields, Phil and Gail Brumley need as much current and accurate information as possible to plant and develop a productive and profitable almond orchard.

Importance of the Project

Almonds are a permanent crop, meaning long term. If planted in suitable conditions, almond trees have the ability to maintain profitability roughly 20-25 years. The proposal and development plan for P&G Brumley Farms is particularly important, due to the fact that almonds, like most nut crops are not harvested until they have reached 4th or 5th leaf. With this being said, the economic commitment and investment of planting almonds is much greater than other agriculture commodities. This project proposal outlines each action that needs to take place in order to develop an almond orchard that will produce a return on investment, along with meeting the specific needs and demands in which the almond orchard will be planted. Researching and gathering the most up to date information, that is both accurate and practical, will assist in the success of this orchard.

Purpose of the Project

The purpose of this project to was develop a proposal plan for a new almond orchard located in the San Joaquin Valley, near Escalon, CA. The almond orchard will consist of three Burchell Nursery varieties Supareil, Nonpareil, and Wood Colony. This proposal plan was created and designed explicitly for this exact location based on the current soil and crop needs. This proposal plan for a new almond orchard will show the appropriate measures that need to be taken in order to produce a fully functional and profitable almond orchard.

Objectives of the Project

The objectives for this project are as follows:

- Discuss historical review of both trees and economics.
- Design and create an almond orchard proposal for P&G Brumley Farms.
- Introduce a new variety of almond, Supareil.
- Identify the proper steps needed in order to plant a fully functional and profitable almond orchard.
- Illustrate the costs associated with planting and producing a new almond orchard in the San Joaquin Valley.
- Elaborate on the future of the almond industry, specifically relating towards this proposal.

Definitions of Important Terms

Cultivar: “Any variety of a plant, originating through cloning or hybridization (*see* clone, hybrid), known only in cultivation. In asexually propagated plants, a cultivar is a clone considered valuable enough to have its own name; in sexually propagated plants, a cultivar is a pure line (for self-pollinated plants) or, for cross-pollinated plants, a population that is genetically distinguishable.” (Merriam-Webster)

Nonpareil: “Most widely planted variety in California. Large paper-thin shell, flat kernel. Has high market demand. Nut removal is relatively easy. Tree is large and upright to spreading. Supareil is a great pollinator that is a Nonpareil look alike” (Burchell Nursery, 2014)

Supareil: “An attractive, good flavored nut whose kernel shows promise of being blended with Nonpareil. It blooms with or slightly ahead of the Nonpareil. The new Supareil pollinates with Nonpareil and other various popular varieties” (Burchell Nursery, 2014).

University of California, Davis Extension: (UC Davis Ext.) University of California, Davis Extension provides mass amounts of information and studies that significantly express years of research, data, and analysis in order to improve plant/crop growth, care, and success.

Variety: “There are approximately 30 almond varieties produced in California orchards. Ten varieties represent over 70% of production. Varieties are grouped into broad classifications for marketing purposes based on distinguishing characteristics such as size, shape, and “blanchability.” The majority of almond production in

California falls into the following three major classifications: Nonpareil, California, and Mission. Some varieties may fall under more than one classification because they have characteristics of one type (such as Mission) but are also blanchable (a characteristic of the California classification). All California Almonds are developed using traditional methods; genetically modified almond varieties are not planted or available in California.” (Almond Board of California, n.d.)

Wood Colony: “Introduced in 1985 by Burchell Nursery. High production potential. Shell semi-soft with good seal. Kernel is medium size and plump. Tree is small and somewhat spreading like Carmel. Outstanding heavy production has been the hallmark of Wood Colony since its introduction in 1985. Prolonged bloom coincides with Carmel, but has a similar scaffold structure. Because of its compact size, the tree is suitable for close plantings. Wood Colony is successfully pollinated by varieties such as Carmel and Nonpareil” (Burchell Nursery, 2014).

Summary

This almond orchard proposal plan is an excellent guide for others to design and create their own agriculture commodity plan. Many times individuals are over-whelmed with the mass amounts of information pertaining to agriculture planting and production; when this occurs it can then be difficult to outline what information is actually needed. Due to the fact that there are many different variables one must consider when planting an almond orchard, it is crucial that the proper research is completed prior to planting.

Chapter Two

Review of Literature

With any type of project involving time and money, there are questions to be asked and answers to be found. Prior to planting 53 acres of almonds there are numerous questions to be answered, regarding soil type, varieties, nutrient levels, and the future economic outlook of the almond industry. Planting an orchard takes a great deal of time and capital, with this being said, the grower needs to be assured that the varieties, as well as the selected crop is best suited for the given property. The grower needs to have some certainty that the demand for his crop from the consumers will still stand strong 4-10 years down the road, when the almond orchard is in full production.

Economic Return

“U.S. production is forecast 3 percent higher to 953,000 MT on slight gains in bearing acres and yield. Warm, dry weather in February created favorable bloom conditions, while losses from disease and insects were minimal. Exports are forecast to rise 12 percent to 690,000 MT on continued growth to new markets such as China, Hong Kong, India and the United Arab Emirates, while the EU has been flat for the last several years”(United States Department of Agriculture, Foreign Agricultural Service, 2012). For many years there has been great discussion among almond producers regarding, “How many is too much?” in regards to the almond production in the San Joaquin Valley. Nearly 35 years ago growers were very concerned that their production of almonds, when reaching the near ½ million pounds, could “Flood the Market,” causing

a huge decline in price. History has now shown that even as we continue to plant tens of thousands of acres of almonds the market is strong, sound, and still flourishing. World almond consumption demands nearly 1.25 billion pounds yearly, with California exporting roughly 70% internationally (Almond Board of California, 2013).

“The earliest varieties of almonds are native to western Asia. Spanish explorers brought almonds to the United States, but commercial almond production did not begin to flourish until the 1900s, primarily in California. By 1977, the United States had surpassed Spanish production, and by 2000, the country had become the leading supplier of almonds worldwide” (Agriculture Marketing Resource Center, 2013). Almonds have been planted on a commercial basis in San Joaquin County for decades. In the early 1960’s an average production statistic was approximately 1800 pounds per acre. In fact, according to Gail Brumley, there was a bumper sticker in 1972 that states, “Happiness is a ton of meats, at \$1.00 per pound!” By today’s standards this would be considered below average both in tonnage and price, for an orchard in its “prime” of production.

Historical Production

“California’s central valley has ideal conditions for growing almonds with its mild climate, rich soil and abundant sunshine. California Almonds make up about 80% of the global and virtually 100% of the domestic supply. According to the 2007 USDA Ag Census, there are around 6, 500 California Almond farms. Of those, 72% are family owned and 51% are less than 50 acres. During the 2012/2013 crop year California Almonds produced the second largest crop on record at 1.88 billion pounds of almonds on 790,000 bearing acres. In the same year, 106 handlers shipped 1.87 billion pounds of

almonds, a 1.7% decrease from the prior year” (Almond Board of California, 2013). In reviewing the historical factors of almond production in San Joaquin County, it was discovered that although almonds in San Joaquin County are just slightly lower than the state’s average in production, growers in this region are known to have higher quality of almonds with a lower percentage of rejects. “San Joaquin County yields tend to be less than those in the southern San Joaquin Valley and to the north in the Sacramento Valley. Production in those areas can range from 3,000 to 4,000 meat pounds per acre. “The almond crop here is influenced by the cooler air from the Delta,” Verdegaal says. “Good growers in this county can usually reach their goals of producing 2,500 to 3,000 meat pounds of almonds per acre. However, overall, county yields average between about 2,000 to 2,500 pounds.” While they may not harvest as much tonnage from their orchards as growers in other areas of the state, San Joaquin County producers are known for the quality of their almonds. “We tend to have a much lower rate of reject nuts from insect damage compared to other counties,” Verdegaal says. “So, the quality of nuts grown here is always pretty good” (Western Farm Press, n.d.). Almonds have always required good drainage and are recommended to be planted on a sandy loam soil. The rich Class 1 soil of Sandy Loam was a perfect match for almonds and those fortunate to own it knew that an almond orchard would be a perfect match. However, with the help of technology and large D11 Rippers, almonds have been planted in areas that were once thought of just as pasture on the hillside. Soils, that for hundreds of years were known for nothing more than grazing lands are now producing almonds. These large rippers are able to help convert, the once just average use ground, to a field of a high producing orchard with the potential of high incomes for the grower.

Selecting Cultivars and Rootstock

After reviewing and appreciating the fact that there is still a demand, coupled with the many types of soils that can produce a solid almond crop, one must consider the plethora of almond varieties in which to plant. In order to choose the best variety for the greatest production, the grower must know exactly what type of soil the orchard is being planted. For instance, in this example of orchard development P& G Brumley Farms is located in Escalon, CA, where the soil is a clay loam, Class 4 series; until recently, almonds never would have been a viable option. The benefit of knowing the soil is a clay base, not only when selecting the varieties must be carefully analyzed, however the root stock as well.

“The selection of an appropriate almond rootstock is very important to establish a successful orchard. There is no single best rootstock. A careful analysis of the traits of those available should be done with regard to the unique soil, pest, and weather conditions of the orchard site. Almond rootstocks currently available include Nemaguard, Nemared, and Lovell peach; Marianna 2624 plum; various peach and almond hybrids” (University of California, Davis Fruit & Nut Research & Information, 2011).

Historically, 99% of the almonds were planted on the aforementioned Sandy Loam soil with good drainage. Now, when selecting a rootstock it must be considered that the soil is clay. Therefore, it makes sense for P&G Brumley Farms to select a Nemaguard (peach) rootstock in order to coincide with the given soil.

Orchard Management

“In preparing a site for planting, proper soil testing and exploration by digging pits or core samples should be the first step. Depending on the results, soil modification in preparation for planting can be as simple as ripping the plowpan in deep, uniform soils. Select and design an irrigation system before planting. Tree spacing varies depending on location, variety of almond and orchard design. Wider tree spacing permits vigorously growing trees to spread with less crowding. Trees are planted closer in areas where trees grow less vigorously. Most orchards are planted in the square or offset square pattern” (University of California, Davis Fruit & Nut Research & Information, 2011).

Based on the research that UC Davis has completed using almonds as their main commodity, the management that needs to take place in order for an almond orchard to be profitable and healthy depends on many different factors. These factors vary depending on location and the proper research and analysis needs to be done in order to properly prepare the correct almond orchard proposal plan.

Summary

With the information the author has provided above, it is apparent that the almond industry has played a vital role in sustaining the livelihoods of many individuals for quite some time. Coupled with this, the research, planning, preparation, and execution of a successful almond orchard has progressed over time in order to produce the most efficient and profitable crop. There are many key elements that must be taken in to consideration with careful thought and research.

Chapter Three

Methods and Materials

Procedures for Data Collection:

In determining the viable options for developing a new almond orchard or not, there are many factors that must be researched before coming to a conclusion of whether or not to plant the orchard. One must review the various cost study analysis, as well as field test trials in order to make the most informed decision as possible. In this particular case, the author initially met with the farmer to acquire information regarding the facts of the property, where the orchard was to be planted. The first meeting also offered the grower an opportunity to express his desire and goals for creating a successful and profitable orchard. Following this initial meeting, the author was better equipped in understanding the information that would be needed to be acquired in order to provide the farmer enough accurate information so that he could make an informed decision. Also during this initial meeting, the farmer shared the soil type and water availability with the author, which would help in selecting irrigation systems and tree varieties at the appropriate time.

The author, realizing the importance of focusing on the design and format that the grower desired, began her research starting with information from the University of California at Davis. She reviewed the UCD Fruit and Nut information that has identified procedure and measures that are needed to complete the almond orchard proposal plan. What was discovered was that in order to produce successful orchard, initial tests must be completed and analyzed regarding the current soil type, pests present, and common

weather conditions of the field location that has been selected to plant. This information and data, coupled with identifying the climate for the said region, allowed the author the necessary information to select and declare the specific cultivar. The genetics and traits of the particular cultivar, along with the growth characteristics in a particular location will in turn create the foundation of a new almond orchard.

The University of California, Davis Extension Centers, as well as the County Agriculture Commissioner office is great help in interpreting the results that have been published.

After the initial research is performed and the specific cultivar is identified, the rootstock needs to be selected. It must be remembered that almond trees are not grown on almond rootstock but carefully developed for the many soil types throughout the San Joaquin Valley. According to the University of California, Davis Fruit and Nut Research and Information Center, “There is not a single best rootstock. A careful analysis of the traits of those available should be done with regard to the unique soil, pest, and weather conditions of the orchard site.”

Updates With The Grower

It is imperative that the author kept the grower updated with the information that she has collected. Currently, with the continued upswing in new plantings of almond orchards a strong demand for young trees has been created. Sharing the information regarding cultivars allowed the grower the opportunity to order trees from his local nursery well in advance of planting. The ordering of trees needs to be done up to two years prior to the expected planting date.

Evaluating Available Resources

It cannot be stressed enough that prior to planting an almond orchard a great deal of data regarding the property must not only be collected, but deciphered by the consultant and the grower. In the property, which is being studied, along with determining the soil type other property issues must be considered. One of these considerations is that of the site location and adjoining properties. This particular said piece of property has public frontage on the north side, with almonds to the west, walnuts to the south and a private roadway to the east. The prospective grower owns the commodities. It is important to understand the site, as access to the property being proposed for development is critically important. This property will not have any issues with access.

The site location, soils and their capability status, including hazards, available water supply, (quality and quantity), climate information, variety and root selection, irrigation options, soil prep work, selection of trees and physical requirements for planting are all factors that must have detailed explanations before one shovel of soil is tilled.

Soil and Soil Preparation

The selected field has been used for growing rice for the past 60 years. As rice requires a strong water holding capacity, almonds need good strong drainage. Therefore this particular soil, which is hardpan by nature, will have be transformed in order to have a productive almond orchard. The author informed the grower that the field must be dip ripped with a D11 tractor. This tractor has a 7-foot shank with a 3-foot slip plow (toe)

that has the ability to rip to 7 feet breaking through the hardpan and creating the necessary soil type for a healthy almond orchard. After the soil has been ripped it will need to be disked, lasered, and marked for planting. Berms can be installed in the fall after marking so that they are ready for spring planting. Early installation of the berms will also allow winter storms to mellow them and settle any loose soil. Applying a winter herbicide and pre-emergent can be applied to the berms to keep them clean for the spring planting. In determining the soil type, even after the soil has been ripped, the clay loam soil type is heavier than the original sandy loam that most orchards were previously planted and must be considered when the rootstock decision is made.

Water Allowances/Irrigation Installation

Proper distribution of water on crops, in the San Joaquin Valley during the blistering summer months is critical. The semi-arid climate is perfect for growing almonds however with hot temperatures throughout the summer months requires a solid irrigation system. A more recent important factor when considering developing an almond orchard is the future of water availability and accessibility. California is undergoing major water right issues and although this property is irrigated with deep wells owned by the grower and on his property, it is highly probable the Department of Water Resources will meter the water, and this fact must be taken into consideration when irrigation type is selected. Water will continue to be a scarce commodity, and selecting an appropriate irrigation system is critical to the development of this orchard.

However, though the benefit of the many studies over the years by the UC Extension and the many private irrigation companies, there are numerous options

available. In making this costly and important decision the author must share the advantages and disadvantages of each system considered for this field. The pumping plant, filters, etc. can be installed at anytime, so that they are complete at the time of planting. (Seeing that this is PG&E territory, they need to be contacted a minimum of six months in advance of the water being needed in order to have new service installed) For this particular proposal the author selected Pacific Southwest Irrigation Company as the irrigation provider. It was determined it would be more advantageous to the grower if the major irrigation parts such, as the filter systems and pumping stations be installed prior to planting followed by hose and emitters after the trees have been planted.

Planting of Trees

In taking into consideration all the facts at hand that the author discovered through her research of the growers properties, his desired outcome, the almond research studies regarding varieties, irrigation management, pest control and market analysis, it was determined that the Nonpareil, Supareil, and Wood Colony varieties on the Nemaguard rootstock would be planted using a 18" x 21" square orchard planting layout.

The trees are to be planted beginning in late January or February depending on the winter weather. Mechanical planting is the best option; this is the most cost efficient and effective. Should wet weather prevail and time constraints become an issue, a hand crew will be employed to plant the trees. Planting density will be dependant on variety selection, expected growth relative to soils and underlying conditions. With the information that has been collected, analyzed, and discussed the most financially

beneficial decision is to plant using a square orchard on an 18' x 21' row and tree spacing.

Once the trees are pruned back and covered with a protector tank, watering will take place to settle the planting zone and eliminate any air pockets. It will also be recommended to the grower to take soil samples at this time as the soil has been churned from the soil prep work and it is now in its final form.

Orchard Management

In one of the final meetings that the author had, the prospective grower focused on the importance of solid orchard management. Young trees will require specific pruning in order to establish the correct canopy and ensure proper sunlight is obtained. Young trees may also need to be staked where winds are a concern, where as wind is a concern in this area. The author explained the benefits to staking including eliminating wind damage, leaning and loosening of the seal around the base of the trunks and roots. As the trees mature and are well established, a constant and solid orchard management schedule must be in place. Constant monitoring for weed and pest control, nutrients and proper irrigation will contribute to the success of the newly planted almond orchard.

Summary

It is essential when working with other individuals to ensure communication between both parties is clear and concise. Working with P&G Brumley Farms, it was expressed that updates and further information would be shared on a regular basis. Full disclosure of any new information that may arise would be discussed and deliberated.

When properly creating an almond orchard proposal plan, one must be sure to complete the extensive research needed, in order to have the proposal plan meet the accepted criteria, not only for the grower, but for the particular location as well. Outside resources play a key role as well; with having other information available that will assist in the continuous success of the final proposal.

Chapter Four

Results and Discussion

Included in this chapter the author will be presenting the findings from the project proposal. The tables, charts, and graphs demonstrated below will illustrate the factors that need to be completed in order to develop and produce a practical, yet profitable almond orchard. Information that will be covered is as follows:

- Necessary groundwork that needs to be done prior to planting along with costs associated with the task.
- The irrigation installation labor, materials, as well as costs.
- Burchell Nursery's contract for tree supply
- Accurate orchard management practices associated with successful almond orchards.
- A proper nutrient program outlining basic crop needs for this specific location.

Almond Orchard Proposal for P&G Brumley Farms

I. Ground Work Preparation

“Almonds, like other nut crops, are ideally grown on deep, uniform, loam soils that provide an optimal combination of permeability, water retention, and root zone aeration” (University of California, Davis Fruit & Nut Research & Information, 2011). In order to properly prepare the ground for planting, certain cultural practices must be done in order to ensure that the ground will be suitable to support a young almond orchard through maturity.

2014-2015 Groundwork Preparation Cost

| Ground Work: | | Cost: | 53 Total Acres |
|------------------------------------|-------|---------------|----------------|
| Ground Ripping | | \$500.00/Acre | \$26,500.00 |
| | | | |
| Stubble Disk (2 times) | | \$100.00/Acre | \$5,300.00 x2 |
| | | | \$10,600.00 |
| Regular Disk (2 times) | | \$50.00/Acre | \$2,650.00 x2 |
| | | | \$5,300.00 |
| Laser Level | | \$200.00/Acre | \$10,600.00 |
| | | | |
| Mark location using GPS system of: | | \$100.00/Acre | \$5,300.00 |
| | Trees | | |
| | Berms | | |
| | Rows | | |
| | | Total: | \$58,300.00 |

Pacific SouthWest Irrigation Cost Estimate

Pacific SouthWest Irrigation, located in Stockton, CA, has been contracting with P&G Brumley Farms for roughly 16 years. The two parties have a strong relationship and were previously selected to install the irrigation system for the new almond orchard. The information below portrays the irrigation quote specific for P&G Brumley Farms, consisting of 53 acres of Almonds Materials and installation of pump and filter station, along with the materials to be included, the installation procedures, and total cost of final project. To be noted below, the quote did not include applicable sales taxes and was already accepted due to the validity of the quote for fifteen days.

Pacific SouthWest Irrigation Quote

| <u>Materials to include:</u> | <u>Dual Line Drip System</u> |
|-------------------------------------|--|
| 227,000ft | 18mm 1.0 gph @ 36" Spacing Dripperline |
| 720ft | 2" CL 125 PVC Pipe |
| 2,080ft | 3" CL 100 PVC Pipe |
| 1,140ft | 4" CL 100 PVC Pipe |
| 1,320ft | 6" CL 100 PVC Pipe |
| 2,200ft | 8" 80# PIP PVC Pipe |
| 40ft | 10" 80# PIP PVC Pipe |
| 4 | 3" Gate Valve assembly |
| 2 | 8" Butterfly Valve assembly |
| 1 | 50 HP Centrifugal Pump |
| 1 | 50 HP pump panel |
| 3 | 4'x4'x4' Concrete box |
| 1 | Loss of Prime Switch |
| 1 | Hardie Timer |
| 1 | Lakos 48"- 5 Tank Sand Media Filter |
| 1 | 2" Pressure relief valve |
| | Glue, primer, wire, conduit & fittings |

Installation to include:

Trench, install & backfill all mainlines and submains as per design. Concrete pad at pump and filter station. Set Agricultural electrical pole, install weather head, meter can and pump panel. Install and wire pump, panel, and filter station. String tubing, flush, and test system.

| | | | |
|--|--|---------------|---------------------|
| Irrigation System Materials | | | \$31, 849. 03 |
| Irrigation System Installation | | | \$19, 766.70 |
| Filter Station Materials | | | \$28,818.17 |
| Filter Station Installation | | | \$13, 926.40 |
| <u>Pump & Electrical (Materials & Install)</u> | | | <u>\$12, 671.03</u> |
| | | Total: | \$107,031.33 |
| | | | |
| | | | |
| | | | |

Burchell Nursery Almond Tree Cost Estimate

Burchell Nursery Contract for Sale

| QTY | CODE | VARIETY | ROOT | SIZES | PRICE | ROYALTY |
|--------|--------|---------------------------------------|------|---------------------------------------|----------|-----------------------|
| 3,134 | 219 30 | NONPAREIL ALMOND | NCM | 1/2" 5/8" | 5.3 5.45 | |
| 1, 567 | 584 30 | SUPAREIL ALMOND CROCKER BILL | NCM | Same as Above (Tree Royalty) | | \$1.00 for variety |
| 1, 567 | 234 30 | WOOD COLONY ALMOND | NCM | Same as Above | | |

54.5 ACRES @ 21 X 18= 115 TREES/ACRE Healthy Start Program (tm) 6, 268
TREES

Deposit: \$5, 400.00

Total: \$33, 220.40

Total with Royalty: \$34, 787.40

Nutrient and Fertilization Requirements based on Climate

“Application Program: Nutrients are best applied to the root zone when the tree can use it efficiently and in amounts that will not be leached past the root zone. Apply the first application of fertilizer during spring when rapid growth occurs followed by smaller amounts throughout the growing season and post harvest. Nutrient demand is determined by crop demand — a heavy crop year removes more nutrients from the system than a light crop year. General fertilization schedules for nitrogen (N), potassium (K), boron (B), and zinc (Zn) below should be modified for extremes in soil type. On sandy soils, nitrogen applications should be made more frequently at smaller doses, while in heavy soils, monthly applications can be made. Interactive models ([link](#)) have been developed to customize a fertilization program to a specific site. The schedules below provide a generic fertilization schedule, applicable for mature orchards in most almond growing areas in California” (University of California, Davis Fruit & Nut Research & Information, 2011). University of California, Davis Fruit & Nut Research & Information Extension performs a widespread amount of data testing and analysis; with this, providing a strong foundation for an almond orchard nutrient plan pertaining to soils exceedingly similar to the Class 4 soil in Escalon, CA. See Table 1. Fertilization Schedule for Almond (lbs/acre) and Table 2. Nutrient Concentrations in August Leaf Samples below for more information pertaining to proper nutrient application for a young almond orchard in Escalon, CA.

University California, Davis Extension

Table 1. Fertilization Schedule for Almond (lbs/acre)

| Nutrient | Date (lbs/acre) | Date (lbs/acre) | Date (lbs/acre) | Total lbs/acre for year |
|----------|-----------------|-----------------------------|---|-------------------------|
| N | Mid-March (85) | Early May (90) | Postharvest (75) | 250 |
| K | May (25) | June (50) | Postharvest (75) | 150 |
| B | | | Dormant (2 - 5) | 2-5 |
| Zn | | Dormant - Broadcast (10-15) | Postharvest - Foliar (10-15 lbs/100 gallon) | 10-15 |

Table 2. Nutrient Concentrations in August Leaf Samples

| Nutrient | Critical Value (CV) | Suggested Range |
|----------------|---------------------|-----------------|
| Nitrogen (N) | 2.0% | 2.2 - 2.5% |
| Phosphorus (P) | 0.14% | 0.1 - 0.3% |
| Potassium (K) | 1.0% | 1.4 - 2.0% |
| Calcium (Ca) | 1.9% | 2.0 - 4.0% |
| Magnesium (Mg) | 0.25% | 0.6 - 1.2% |
| Chlorine (Cl) | | 0.1-0.3% |
| Manganese (Mn) | 20 ppm | 30 - 80 ppm |
| Boron (B) | 80 ppm | 80 - 150 ppm |
| Zinc (Zn) | 15 ppm | 15 - 20 ppm |
| Copper (Cu) | 4 ppm | 6 - 10 ppm |

Table 3. Specific Climate Requirements

| Almond Climatic Requirements | |
|---|---|
| Elevation Range | Ideal: 10-300 ft (3 - 91 m); Maximum: 1500 ft. (457 m) |
| Frost Damage Threshold for Fruit | Freezes destroy young fruit. Damage increases as temperatures drop below 29 ⁰ F |
| Frost Damage Threshold for Tree | Increasingly susceptible to damage during bud swell (<25 ⁰ F), bloom (<28 ⁰ F) and small nut formation (<29 ⁰ F) |
| Winter Chill Requirement | 400-900 chilling hrs below 45 ⁰ F |
| Heat Unit Requirement | 5942-7577 heat units |
| Water Requirement | Varies upon environmental conditions. Ranges from 40-50 inches of water. Extensive root system, especially of peach-almond hybrids, allows survival during periods of drought. Irrigation is critical to crop production. |

Chapter Five

Summary, Recommendations, and Conclusions

Summary

This almond orchard proposal and development plan was designed in order to create an accurate outline for the establishment of a quality almond orchard, with superior income potential located in San Joaquin County near Escalon, CA. In view of the many different facets that must be considered when planting an almond orchard, one must take a structured approach to address as many of the variables as possible. The specific plan that is being proposed is based on the conclusions reached during the discovery process. This plan covers the start to finish process of correctly and efficiently developing an almond orchard.

Recommendations

The following are recommendations one should take prior to completing a proposal plan for an agriculture commodity:

1. Contact an individual familiar with the almond industry, for advice and insight on the current issues involving almond orchard planting and production.
 - This recommendation is based on the fact that with this individual as a useful source the author is able to create a proposal that is realistic and accurate in today's market. With research, coupled with industry knowledge, the proposal will serve as a strong foundation for a successful and profitable almond orchard.

2. Understand the specific location where the almond orchard will be planted.
 - Throughout this paper the reader will discover that there are many different factors that must be taken in to consideration when planting an almond orchard. Knowing and understanding the history and background of the location will help when selecting the correct ground work needed before planting, the cultivars/rootstock that will be chosen, the irrigation method that will be selected, and the nutrient plan that will be practiced.
3. Research resources and tools that will assist in creating the proposal plan.
 - There are many online tools that are available in order to suggest thoughts and ideas when completing this project. The University of California, Davis Extension has done extensive research for many agriculture commodities that shares and explains data within many locations. Other resources that are extremely beneficial would include the Almond Board of California, Agricultural Marketing Resource Center, and the most current issue of *Almond Almanac*.

Conclusion

Creating, developing, and implementing this almond orchard proposal plan was a success. The proposal plan not only met the objectives outlined in Chapter One, but also met the desires and goals for P&G Brumley Farms. Each aspect that needed to be adequately addressed and developed was reached in a way that made the orchard proposal profitable, realistic, and feasible. The almond orchard proposal plan is set up in

a way where it may be altered in order to fit the needs of other growers in different locations, which makes it diverse when working with other agricultural commodities.

Reference List

- Agriculture Marketing Resource Center (2013, July). Almond Profile - Agricultural Marketing Resource Center. Retrieved March 10, 2014, from http://www.agmrc.org/commodities__products/nuts/almond-profile/
- Almond Board of California (2013). 2013 Almond Almanac. Retrieved April 15, 2014, from <http://www.almondboard.com/AboutTheAlmondBoard/Documents/2013%20Almanac%20-%20Final.pdf>
- Almond Board of California (2013). History of Almonds | Almond Board of California. Retrieved April 12, 2014, from <http://www.almonds.com/consumers/about-almonds/history-of-almonds>
- Almond Board of California (n.d.). Varieties. Retrieved April 18, 2014, from <http://www.almondboard.com/Handlers/Documents/Almond-Varieties.pdf>
- Almond Board of California (2013). Global Usage | Almond Board of California. Retrieved March 20, 2014, from <http://www.almonds.com/consumers/about-almonds/global-almond-usage>
- Burchell Nursery (2014). Almonds - Nut Trees. Retrieved December 10, 2013, from <http://www.burchellnursery.com/store/nut-trees/almonds.html?p=2>
- California Farm Bureau Federation (2013). Protecting California Family Farms and Ranches. Retrieved April 20, 2014, from http://www.cfbf.com/CFBF/About_Us/What_We_Do/Protecting_Family_Farms/CFBF/AboutUs/Protecting_Family_Farms.aspx?hkey=4aa9c56e-e252-4e18-82f6-77210560ced8
- United States Department of Agriculture, Foreign Agricultural Service (2012, October). Tree Nuts: World Markets and Trade. Retrieved April 12, 2014, from <http://usda01.library.cornell.edu/usda/fas/treenutwm//2010s/2012/treenutwm-10-26-2012.pdf>
- University of California, Davis Fruit&Nut Research&Information (2011, July 28). Almond Nutrients & Fertilization - Fruit & Nut Research and Information Center. Retrieved March 12, 2014, from <http://fruitsandnuts.ucdavis.edu/almondpages/AlmondNutrientsFertilization/>

University of California, Davis Fruit&Nut Research&Information (2011, July 28).
Almond Rootstocks - Fruit & Nut Research and Information Center.
Retrieved February 10, 2014, from
http://fruitsandnuts.ucdavis.edu/almondpages/Almond_Rootstocks/

Western Farm Press (n.d.). San Joaquin County growers shaking average size almond
crop | Western Farm Press. Retrieved April 21, 2014, from
[http://westernfarmpress.com/san-joaquin-county-growers-shaking-average-size-
almond-crop](http://westernfarmpress.com/san-joaquin-county-growers-shaking-average-size-almond-crop)

Appendices

Appendix A

Pacific SouthWest Irrigation Cost Estimate

QuickTime™ and a
decompressor
are needed to see this picture.

Appendix B
Burchell Nursery Almond Tree Cost Estimate

QuickTime™ and a
decompressor
are needed to see this picture.

Appendix C
San Joaquin County District Viewer

QuickTime™ and a
decompressor
are needed to see this picture.

Appendix D
Supareil



Burchell Nursery Introduces The Supareil (PP# 21934) Almond *A Burchell Nursery Exclusive*



- Supareil is a large, high quality, Nonpareil type nut
- Supareil pollinates Nonpareil, Carmel, Aldrich, Fritz, Price and Wood Colony
- Supareil is approximately 90% the size of Nonpareil
- Supareil blooms about 1 day before Nonpareil
- Supareil harvests approximately 10 day to 2 weeks after Nonpareil

The Supareil has been called many things when compared to Nonpareil including: Look Alike, Double, and Imitator. Growers and handlers state how the Supareil resembles the Nonpareil. Supareil has a shape, color and taste similar to Nonpareil.

2011 Yield Data

2,585 lbs. per acre Escalon, CA. 110 trees per acre. Trees 10 years old.

2,888 lbs. per acre Wasco, CA. 105 trees per acre. Trees 10 years old.

Price Comparison

| Variety | Nut Buyer 1 * Purchase Price 2010 | Nut Buyer 2** Purchase Price 2010 | Nut Buyer 1* Purchase Price 2011 |
|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Nonpareil type (Supareil)* | \$2.22 | \$2.15 | \$2.00 |
| California | \$1.62 | \$1.70 | \$1.60 |
| * Providing you get Nonpareil pricing | | | |
| | Pounds per acre | Price per pound | Dollars per acre |
| Nonpareil Types | 2000.00 | \$2.20 | \$4,400.00 |
| California Types | 2666.00 | \$1.65 | \$4,400.00 |

In this example, with Supareil production at 2,000 lbs. / acre you could potentially make \$1,100 more per acre than if you were selling a California type at \$1.65 / lb. price. To generate the same gross dollars per acre from your California type, you would have to produce 666 more lbs. / acre (a yield of 2,666 lbs. / acre) more than Supareil

* HT **VH

Burchell Nursery has gathered this information to assist you with your selection of varieties. While all tests and evaluations have been positive, this is still an experimental variety and Burchell Nursery can not guarantee the results in your orchard based upon the information above that was provided to us by others.

| | | |
|---|--|---|
| <p>Main Office: 12000 State Highway 120 Oakdale, CA 95361-8857 (800) 828-TREE • (209) 845-8733 • Fax: (209) 847-1972</p> | | <p>Fresno Office: 6705 S. Crovis Ave., Fowler, CA 93825 (559) 834-1661 • Fax: (559) 834-1509 Chicago Office: (530) 345-0691</p> |
|---|--|---|

Website: www.burchellnursery.com • E-Mail: Info@burchellnursery.com