UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES
COOPERATIVE EXTENSION
AGRICULTURAL ISSUES CENTER
UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

SAMPLE COSTS TO PRODUCE WINE GRAPES

USING BIODYNAMIC FARM STANDARD-PRINCIPLES

RED & WHITE VARIETIES

North Coast Mendocino County-2016

Crush District 2

Glenn McGourty	UC Cooperative Extension Farm Advisor, Lake and Mendocino Counties
Daniel A. Sumner	Director, UC Agricultural Issues Center, Professor, Department of Agricultural and Resource Economics, UC Davis
Christine Gutierrez	Staff Research Associate, UC Agricultural Issues Center
Donald Stewart	Staff Research Associate, UC Agricultural Issues Center and Department of Agricultural and Resource Economics, UC Davis

UC AGRICULTURE AND NATURAL RESOURCES
COOPERATIVE EXTENSION
AGRICULTURAL ISSUES CENTER
UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

SAMPLE COST TO PRODUCE WINEGRAPES

RED & WHITE VARIETIES

USING BIODYNAMIC FARM STANDARD-PRINCIPLES

North Coast-Mendocino County-2016

CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Relationship to National Organic Program	3
Principles of Biodynamic-Farm Standard Methods	4
Biodynamic Preparations (500-508)	4
Production Cultural Practices and Material Inputs	4
Labor, Interest and Equipment	8
Cash Overhead	9
Non-Cash Overhead	10
REFERENCES	12
Table 1-A. COSTS PER ACRE TO PRODUCE WINE GRAPES-Red	14
Table 1-B. COSTS PER ACRE TO PRODUCE WINE GRAPES-White	16
Table 2-A. COSTS AND RETURNS PER ACRE TO PRODUCE WINE GRAPES-Red	18
Table 2-B. COSTS AND RETURNS PER ACRE TO PRODUCE WINE GRAPES-White	20
Table 3-A. MONTHLY CASH COSTS PER ACRE TO PRODUCE WINE GRAPES-Red	22
Table 3-B. MONTHLY CASH COSTS PER ACRE TO PRODUCE WINE GRAPES-White	23
Table 4. RANGING ANALYSIS	24
Table 5. WHOLE FARM EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD COSTS	27
Table 6. WHOLE FARM HOURLY EQUIPMENT COSTS	28
Table 7. WHOLE FARM OPERATIONS WITH EQUIPMENT AND MATERIALS	29

INTRODUCTION

Sample costs to produce wine grapes under Demeter Association, INC. Biodynamic Farm Standard-Principles, in the North Coast Region of Mendocino County are presented in this study. *For a complete understanding of the requirements and practices for certification one must contact the Demeter Association and be familiar with the Biodynamic Farm Standard Principles,* http://www.demeter-usa.org/index.asp. This study is intended as a guide only, and can be used to guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Practices described are based on the Biodynamic-Farm Standard production practices for this crop in this area, but will not apply to every situation. Sample costs for labor, materials, equipment and custom services are based on January-2016 figures. A blank column, "Your Cost", in Tables 1 and 2 is provided to enter your estimated costs.

For an explanation of calculations used in the study refer to the section titled Assumptions. For more information contact Donald Stewart; University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651 or destewart@ucdavis.edu. The local extension office can be contacted through; Glenn McGourty, UC Cooperative Extension Mendocino County Farm Advisor, at 707-463-4495 or email gtmcgourty@ucanr.edu.

Sample Cost of Production studies for many commodities are available and can be down loaded from the website, http://coststudies.ucdavis.edu. Archived studies are also available on the website.

ASSUMPTIONS

The assumptions refer to Tables 1 to 7 and pertain to sample costs to produce wine grapes – a white variety and a red variety - in Mendocino County. The cultural practices described represent production operations and materials of a well-managed vineyard in this region using Biodynamic Principles-Farm Standard. The costs, materials, and practices shown in this study will not apply to all farms. Timing of and types of production cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure. The practices and inputs used in this study are intended as a guide only. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

Farm. The vineyard is located on fairly level land less than 10 percent slope of Mendocino County. The hypothetical biodynamic-farm is comprised of 60 contiguous acres, 20 acres of bottom ground which are planted with white wine grapes. 20 acres of alluvial fan soils are planted to red wine grapes. 10 acres are planted with trees or other marketable crops. 4 other acres are roads, irrigation system, livestock housing and farmstead. There are 6 acres that are a biodiversity reserve, which represents a required minimum of 10 percent of the farm's effective land base. This preserves wildlife diversity, potential habitat for endangered species pollinators and beneficial insects, and provides an overall reserve of diverse life forms to inoculate and inhabit the farm organism. This can include riparian areas along streams, remnant forests and rangeland, hedgerows or even perennial cover crops incorporated within the farming system. This study assumes the land was purchased and the vineyard was already established. The farm is owned and operated by the land owner/grower and the vines are expected to be productive for at least 30 years.

Relationship to National Organic Program (NOP) Certification Requirements

We present the following farming system description based on the Demeter Association, Inc. Farm Standard for informational purposes, and this does not represent an endorsement for these practices by the University of California Cooperative Extension. These practices are used by the growers who provided information for this study, and they are able to successfully grow and market high quality fruit using this production system. For all the requirements of dual certification (Biodynamic and Organic) one must review the Demeter Farm Standard from the Associations' website and NOP requirements for organic certification.

Biodynamic farming is free of synthetic pesticides and fertilizers in the same manner as certified organic farming. In order to qualify for Demeter Biodynamic status a farm must first meet the requirements of NOP as a base line standard. Demeter USA also requires a careful examination and eventual reduction of the volume of imported materials necessary to sustain the life of the farm. Based on the concept of the farm as a living organism, there are seven principles- biodiversity, on-farm fertility and pest control, water conservation, Biodynamic preparations, livestock integration and product processing- that must be followed to be a Demeter certified farm.

The Demeter Farm Standard applies to the certification of farms and ranches for the purpose of allowing their farms and ranches duel certification which allows the agricultural products to carry the Demeter certification marks "Biodynamic®", "Demeter®" and Aurora Certified Organic®, and the related logos using these marks.

Principles of Biodynamic-Farm Standard Methods

In day-to-day practice the goal is to create a farm system that is minimally dependent on imported materials, and instead meets its needs from the living dynamics of the farm itself. It is the biodiversity of the farm, organized so that the waste of one part of the farm becomes the energy for another, that results in an increase in the farm's capacity for self-renewal and ultimately makes the farm sustainable.

An important social value of Biodynamic farming is that it does not depend on the mining of the earth's natural resource base but instead emphasizes contributing to it. A Demeter certified farm must have a minimum of 10 percent of its total effective land base-clearly documented in a calculated acreage figure--- set aside as a biodiversity reserve. This preserves wildlife diversity, endangered species habitat, and provides an overall reserve of diverse life forms to inoculate and inhabit the farm organism. For all botanical species established (natural or planted) at a minimum it needs to be allowed to develop through the flowering stage to be counted towards the 10 percent. Some examples include insectory plantings, hedgerows, flowering cover crops, perennial plantings along fence lines and roadways, and wildlife corridors consisting of trees and woody shrubs.

Biodynamic Preparations
500-508

The use of the preparations is a requirement of the Biodynamic Farm Standard. There are nine in all, made from herbs, mineral substances and animal manures, that are utilized in field sprays and compost inoculants applied in minute doses, much like homeopathic remedies are for humans. Timely applications revitalize the soil and stimulate root growth, enhance the development of microorganisms and humus formation, and aid in photosynthetic activity.

Preparation 500 is made from fermented cow manure and is used as a soil spray to stimulate root growth, humus formation, and microorganism development. Preparation 501 is made from powdered quartz and applied as a foliar spray to encourage photosynthesis. Preparations 502 to 507 are herb based compost inoculants. Preparation 508 is created from dried Equisetum (Horse Tail) and is utilized for disease control. As much as possible the Biodynamic preparations should be made on the farm or within the farm's community, with ingredients from the farm or region.

The preparations are added to water and mixed to create vortexes in opposite directions for a prescribed time to energize the solution. When mixing the preparations, hand stirring is preferred and should be done consciously. Flow forms and stirring machines may also be used for but the farmer should still maintain conscious contact with the stirring process.

The compost preparations need to be applied to acreage to be harvested either via applications of Biodynamic compost or via an approved field spray such as the Pfeiffer field spray or barrel compost. At a minimum, either Biodynamic compost or an approved field spray needs to be applied at least once every three years.

Preparations 500 and 501 need to be applied at least annually to all harvested crops. Preparation 500 should be applied in the later part of the day in the form of droplets that come in contact with the earth. Preparation 501 should be applied in the early morning hours as a fine mist that settles down onto crop foliage.

Production Cultural Practices and Material Inputs
Tables 1 - 7

Trellis System. The vines are planted on 5' X 8' spacing equaling 1,089 vines per acre. The modified vertical trellis system (VSP) is designed to support a bilateral, cordon-trained, and spur- pruned vineyard. The

trellis system was installed by a commercial trellis company beginning in the first year after the field is marked for planting and installation completed in the second year. The trellis system is considered part of the vineyard since it will be removed at the time of vine removal and is included in the vineyard establishment costs.

Vines. To maintain a complete stand, individual vines are replaced each year as needed because of poor vine performance or loss due to due problems such as gopher damage or trunk disease. In this study, a total of 40 vines, (20/variety) are replanted every year in February. Vine purchases and planting costs are included in Tables 1 & 3. The labor costs for the replanting and vine training is under general farm laborer.

Pruning/Suckering/Canopy/Vine Management, (CM/VM). The vines are hand pruned in late February/early March. The prunings are placed in row middles without planted cover crop and shredded during the first mowing in March. Then, in a separate pass, the cordons are tied to the fruit wire. The trunks and cordons are suckered after bud break in April. In late May/early June, the foliage wires are moved up and the shoots are tucked. Wire adjustment and tucking is done a second time in July. Leaf removal and cleanup is done by hand, (red cultivar) and by machine, (white cultivar) in late June/early July. Crop adjustment is done by hand, once in June and again in July. This operation will remove the second setting of fruit, which would have a different sugar content at harvest, and to also insure that vines are cropped at an appropriate tonnage.

Irrigation. Irrigation needs are met based on strategies that emphasize water conservation. The performance of irrigation system equipment is routinely monitored to verify motors, pumps and delivery systems are performing well and according to specifications. Irrigation scheduling takes into consideration crop requirements, annual rainfall amounts, soil types and evapotranspiration rates for the area. Soil moisture is monitored to improve irrigation efficiency in order to avoid excessive water application. Water is pumped to the vineyard after running through a filtration station into the drip lines in the vine rows. The cost includes the water pumping cost and labor. Beginning in mid-June, the vines are typically irrigated weekly through late September. Time is also required to flush the lines at the beginning and end of the irrigation season.

Frost Protection. The vineyard will need frost protection during the months of March, April, and possibly May. The bottom ground, planted with white wine grape variety may require more frost protection than the alluvial fan soils planted to red wine grapes variety-which may not require frost protection every year. The charges are for water and pumping costs.

Fertilization. The Farm Standard instructs that the foundation of the fertility system, and strategies for disease, insect, and weed control, must originate from the farm itself. Fertility is generated via the integration of livestock, compost and green manure, nutrient catch crops, and careful crop rotation. When applicable, the following techniques need to be demonstrably utilized to their maximum potential in order for a farm to import allowed fertility materials; Livestock integration, green manure, legumes/nutrient catch crops, biodynamic preparations and crop rotation. There are also limitations on the amount of fertility that can be imported and applied. Cover crops are planted and maintained within the row middles. Biodynamic Compost (made from manure and recycled grape pomace) may be applied bi-annually to the established vineyards at a rate of 2 to 3 tons per acre. There may be other cases where the soil is adequately fertile, and only cover crops and biodynamic preparations are required.

Pest Management. Disease and insect control are assisted through practices that emphasize botanical species diversity, predator habitat, balanced crop nutrition, and attention to light and air penetration into the vine canopy. Crop protectants are used as needed, and must be permissible under the Demeter Farm Standard.

The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Wine Grapes*. For information on other pesticides available, pest identification, monitoring,

and management visit the UC IPM website at www.ipm.ucdavis.edu. **Although growers commonly use the pesticides mentioned, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** To purchase pesticides for commercial use, a grower must be a Certified Private Applicator to obtain a Pesticide Identification number. For information and pesticide use permits, contact the local county agricultural commissioner's office. Pesticides with different active ingredients, mode of action, and sites of action should be rotated as needed to combat species shift and resistance. Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included in this study.

Note: The Organic Materials Review Institute (OMRI) and Washington State Department of Agriculture Organic Program lists are used as a standard reference for brand name materials. The National Organic Program (NOP) "National List of Allowed and Prohibited Substances" is the standard reference for generic name materials. Not all materials approved by OMRI and the NOP are allowed in the Farm Standard. Use of off-list products could result in de-certification. **It is the owner/growers' responsibility to insure that all products/inputs used or applied on the farm are acceptable through NOP and the Demeter Biodynamic Farm Standard.**

Use of prohibited measures may lead to a loss of certification of the whole farm for a period of up to three years. This situation compromises the whole farm concept by creating a parallel production issue. Demeter guidelines do not allow parallel production or partial farm certification. Therefore, this situation is viewed very seriously. **It is the owner/growers' responsibility to educate field workers regarding acceptable pest management practices and those applications of materials that would compromise certification.**

The foundation of weed control needs to be based on strategies that emphasize prevention located within the life of the farm. Weed control emphasizes prevention, including timing of planting, mulching, and identifying and avoiding the spread of invasive weed species. Understanding the life cycle of a weed species is a very important tool in controlling a weed species. By knowing when a weed species is the most competitive, loss can be avoided by the timing of planting and also by breaking the life cycle of the weed.

Cover Crop/Vineyard Floor/Weeds. Beneath the vines, three times a year the soil is worked and pushed/hilled to the vines creating a small berm, burying emerging weeds. These passes are made in spring and early summer. Uncontrolled weeds under the vines are hand hoed in July if needed. Mowing begins in March, when alternate row middles, without planted to annual green manure cover crops, are mowed, which also shreds the prunings left on top of the soil. These rows are left to re-grow and the biomass is mowed and disced into the soil in May. In the alternate rows, which are planted to an annual self-reseeding cover crop, is allowed to grow and reseed itself. In April, the cover crop rows are mowed and disced into the soil. In October the self-reseeding cover crop is replanted every three years to alternate rows. The other alternate rows are planted to an annual green manure cover crop mix. In June, July and August 50 percent of the entire vineyard (planted to annual clovers) is mowed each time.

Livestock. Sheep grazing is used to control weeds within the vine rows and surrounding non-crop areas. The sheep are brought onto the farm in November and again in February and managed by the herdsman. The grower owns and maintains one portable chicken coop which houses 25-30 chickens. The coops are moved periodically through the vineyard with an ATV to allow for under vine feeding by the chickens. The chickens will pull out small weeds while scratching the ground and also feed on crawling insects. Bee hives are maintained on the farm. They are used for pollination of cover crops in the vineyard, riparian and biodynamic areas and other crops on the farm. Livestock and livestock by products, (eggs, and honey) can be harvested for a source of nutrition for the farm personnel and may be marketed off farm under the biodynamic guidelines for livestock. The labor to support the livestock operations is provided by the general farm laborer.

Insects. Mites are controlled at bud break in mid-April with a Stylet oil spray applied to all rows. Western Predatory Mites (Galendromus occidentalis) are purchased from an insectory and applied at the rate of 6,000 mites per acre by placing bean plants with mites on them in the vines in June. Bat boxes are constructed and placed around the farm. The bats will feed on insects throughout the vineyard and the biodynamic areas of the farm.

Diseases. Powdery mildew is treated typically at 5 to 14 day intervals depending upon fungicide applied. Applications are made with a tractor mounted air-blast sprayer at bud break in mid-April using Stylet Oil followed with wettable sulfur in late April/early May, and with sulfur dust in early May and early June. Three applications with a different biological fungicide and with a different mode of action are made – Serenade, (Bacillus subtilus QST 713) in mid-May and Mid-June and Sonata, (Bacillus pumilus QST 2808) at verasion, in Mid-July. One late sulfur dusting in early July may be required. Eutypa can occur in vineyards that are over 10 years old. The disease is controlled by late pruning in July. The prunings are hauled from the field and burned. No costs of control are included in this study for this disease.

Vertebrate Pests. Gophers and squirrels are controlled with predators and if necessary, traps. Owl boxes are constructed and erected in various locations around the vineyards and farm, or may inhabit areas set aside for biodiversity. Owls are expected to suppress the vertebrate pests including mice. Predatory raptors are allowed to proliferate. These predators will assist with vertebrate pest control. No cost is shown in this study for bird or vertebrate control, but it is not unusual for biodynamic winegrowers to also use trapping or other control measures if any vertebrate pest populations become problematic.

Harvest. For this study, The Red variety is hand harvested and the cost is assumed to be $275 per ton for the labor to pick the fruit and haul it to the winery. The White variety is machine harvested by a custom operator at the rate of $115 per ton, which includes hauling to the winery. The grower supplies two tractors, two drivers, fifteen 2.5 ton bins and four bin trailers. The grower also has a forklift which is used to load and unload the bins on and off the trailers and loads the truck for hauling to the winery. The crop is typically picked during early morning (6AM to 12 PM). The pickers work for 5 or 6 hours most days and stop when temperatures are considered too warm for incoming fruit to the winery.

Yields. For this study, an assumed yield of 6.0 tons per acre for the white grapes and 3.0 tons per acre for the red grapes, based on grower consensus is used to calculate returns.

Returns. Return prices per ton for white and red wine grapes are determined by variety and percent sugar. An average of $2,000 for the white and $2,500 for the red, based on grower consensus, is used for calculating net returns for this study.

Ranging Analysis. Tables 4-A & 4-B are separate analysis of each variety which has a range of return prices used for calculating net returns per acre at different yields. Table 4-C is a combined comparison of prices and yields of both varieties over production costs divided by 2 to get a combined return per acre.

Wine grape producers target yield and prices such that lower yields tend to be associated with higher prices. Therefore the ranging analysis's do not show the cases of very high yields with very high return prices or very low yields with very low return prices.

Pickup and ATV/Gator. The study assumes business use only for the pickup, picking up supplies, moving equipment and such. The ATV is used by the general farm laborer for irrigation system maintenance and checking the irrigation drip lines, moving livestock around the farm, transporting supplies and such.

Labor, Equipment, and Interest

Labor. Hourly wages for workers are $17.00 for machine operators and $12.00 per hour non-machine labor. Adding 39 percent for the employer's share of federal and state payroll taxes, workers compensation insurance for vine crops and other possible benefits gives the labor rates shown of $23.66 and $16.68 per hour for machine labor and non-machine labor, respectively. The overhead includes the employer's share of federal and California state payroll taxes, workers' compensation insurance for vineyards and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair. The cost is based on the average industry rate as of January 2016.

General Laborer. The vineyard employs one general laborer at 25 percent time over ten months. Typical tasks performed by the employee: replant, train perpetually replanted vines, repair broken trellis wires, and maintain the irrigation system and reservoir, assist with canopy and vine management. This employee would assist with habitat restoration and maintenance, and would not supervise other employees or operate equipment.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO horsepower, and fuel type. The cost includes a 9.25 percent sales tax (effective January 2016) on diesel fuel and 2.25 percent sales tax on gasoline. Prices for on-farm delivery of diesel and gasoline are $2.49 and $2.77 per gallon, respectively. The costs are based on January 2016, Energy Information Administration (EIA), monthly data. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax.

Fuel Lube & Repair. The fuel, lube, and repair costs per acre for each operation in Table 1 are determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10 percent higher than implement time for a given operation to account for setup, travel and down time.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 4.25 percent per year. A nominal interest rate is the typical market cost of borrowed funds. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2016.

Risk. The risks associated with crop production should not be minimized. While this study makes every effort to model a production system based on typical, real world "Biodynamic farming practices", it cannot fully represent financial, agronomic and market risks, which affect profitability and economic viability of wine grape production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner and in various combinations for a sustainable operation. Moreover, Table 5 of this study reflects a ranging analysis of returns based on various assumptions which are therefore hypothetical in nature. It is important to realize that actual results may differ from the returns contained in this study. Any returns above total costs are considered returns on risk and investment to management, (or owners).

Cash Overhead

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation.

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

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage.

Property Insurance. This provides coverage for property loss and is charged 0.843 percent of the average value of the assets over their useful life.

Liability Insurance. A standard farm liability insurance policy will help cover the expenses for which you become legally obligated to pay for bodily injury claims on your property and damages to another person's property as a result of a covered accident. Common liability expenses covered under your policy include attorney fees and court costs, medical expenses for people injured on your property, injury or damage to another's property. In this study, liability insurance costs $638 annually for the entire farm.

Crop Insurance. This is available to wine grape growers for any unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50 to 85 percent of the approved average yield as established by verifiable production records from the vineyard. Actual insurance coverage is by unit, not by acre. A significant number of growers purchase crop insurance in this area. Due to variability in coverages no level is specified in this study.

Office Expense. Office and business expenses are estimated at $250 per producing acre. These expenses include office supplies, internet access, telephones, bookkeeping, accounting, utilities, and miscellaneous administrative charges.

Sanitation Services. A sanitation service provides one portable toilet for the vineyard which is serviced four times during the growing season and costs the farm $280 annually over the 40 acres. This cost includes delivery and servicing the toilets.

Assessments/Certification Fees. Co-certification fee programs for organic and biodynamic production requirements are available through Demeter USA. Organic registration through the local county Ag Commissioners office is $25 per year. NOP does not have a certification fee. These fees would be calculated and spread across the acreage of all of the certified marketable crops. For this study, the fees are calculated and based on the wine grapes only.

Investment Repairs. Annual maintenance is calculated as two percent of the purchase price, except for vine replacement in the orchard. The average vine replacement cost over the life of the vineyard is assumed to be 0.10 percent of the establishment costs.

Non-Cash Overhead

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

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

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in the tables.

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

Interest Rate. The interest rate of 3.25 percent is used to calculate capital recovery. The rate will vary depending upon size of loan and other lending agency conditions, but is a suggested rate by a farm lending agency in January 2016.

Irrigation System. The 15 hp motor, pump, filtration station, main lines, drip lines and the labor to install these components are included in the irrigation system cost. Water is pumped from the holding pond to the vineyard after running through a filtration station into the drip lines in the vine rows. The irrigation costs are the electricity costs for pumping and labor.

Frost Control System. The frost control system is connected to the irrigation system. The system includes the lines, connectors and overhead sprinklers. Water is pumped from the holding pond through the sprinklers which cover the entire vineyard. A larger electrical motor is used to pump the water. The pumping costs are included in the frost protection costs.

Reservoir. The reservoir is located on the property and has 15 acre feet storage capacity. Rain water runoff is collected in the holding pond. Water is filtered and pumped from the reservoir for use on the farm for livestock, frost control and irrigation. The farm has a separate domestic well that supplies the residential areas of the farm.

Well. For this study, an existing irrigation well is in place with the infrastructure to deliver the water to the pond and frost protection system in case of booster pump failure. The well is used mainly to keep the pond full after rain water has been exhausted. The well maintenance costs are under cash overhead investment

repairs.

Water. Irrigation water should be free of chemical contamination and may require periodic testing if there are obvious potential sources of measurable contamination. If the source is chlorinated municipal water, it is recommended that the water be aerated either by creating a basin or pool, or through the use of flow forms or overhead sprinklers.

Land. Based on industry standards and grower input, bare ground with irrigation availability plantable to wine grape vineyards is valued at $30,000 per acre. For this study, the producing acreage estimated worth is; $65,000 per acre. It is the bare land value plus the establishment cost, ($30,000 + $35,000 = $65,000) Established wine grape vineyards range in value from $65,000 to $100,000 per acre in this region.

Buildings. The shop is 2,000 square feet with an attached 3,000 pole barn for parking equipment under.

Shop/Field Tools. This includes shop tools and equipment, hand tools, and miscellaneous field tools including pruning equipment. The cost is assumed and not based on any collected data.

Fuel Tanks. One 1000-gallon fuel tank and one 500 gallon fuel tank using gravity feed are on metal stands. The tanks are set up in a cement containment pad that meets federal, state, and county regulations.

Vineyard Establishment Costs. The establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead, and production expenses for growing vines through the first year that grapes are harvested. It is used to determine the non-cash overhead expense, capital recovery cost, during the production years. For this study, the total accumulated net cash cost in the third year represents the establishment cost and is estimated at $35,000 per planted acre. The cost is amortized over the remaining 27 years of vineyard production to estimate the annual capital recovery cost.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60 percent to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Tables 6 and 7. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

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

Acknowledgements. The authors thank the many individuals who furnished information for this study. Additional thanks go to the growers and industry people who gathered to provide their support and input: Dave Koball; Fetzer/Bonterra Vineyards, Hopland, CA. Paul Dolan; Dark Horse Vineyards, Ukiah, CA, Tyler Rodrigue; Haiku Vineyards, Ukiah, CA.

REFERENCES

American Society of Agricultural and Biological Engineers (ASABE). *2013 ASABE Standards Book with 2015 Standards Supplement*. St. Joseph, MI: Curran Associates, Inc.

BDANC, Biodynamic Association of Northern California, http://www.bdanc.org/#about-meetings

Boehlje, Michael D., and Vernon R. Eidman. *Farm Management*. New York: John Wiley and Sons, 1984.

California Chapter of the American Society of Farm Managers and Rural Appraisers. *Trends in Agricultural Land & Lease Values*. Woodbridge, CA: American Society of Farm Managers and Rural Appraisers, 2015.

California Certified Organic Farmers, CCOF, http://ccof.org/

Demeter Association, INC. "Biodynamic Farm Standard". February, 2014. www.demeter-usa.org.

"Economic Research Service - Publications." United States Department of Agriculture. www.ers.usda.gov/data-products.aspx.

2015-JPI, Josephine Porter Institute for Applied Biodynamics, Newsletters. https://www.jpibiodynamics.org/

"National Agricultural Statistics Service." United States Department of Agriculture. www.nass.usda.gov/Quick_Stats/.

Sonoma Compost Company, http://www.sonomacompost.com/

"U.S. Gasoline and Diesel Retail Prices." U.S. Energy Information Administration (EIA). Last modified January 2016. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_m.htm.

"Workers' Compensation Rate Comparison." California Department of Insurance. http://www.insurance.ca.gov/01-consumers/105-type/9-compare-prem/wc-rate/index.cfm

USDA, Agricultural Marketing Service, National Organic Program. http://www.ams.usda.gov/AMSv1.0/NOP

University of California Statewide Integrated Pest Management Program. *UC Pest Management Guidelines, Grapes*. University of California, Davis, CA. http://www.ipm.ucdavis.edu.

Ingels, C., R. Bugg, G. McGourty, P. Christensen, 1998. Cover Cropping in Vineyards, A Grower's Handbook. University of California Division of Agriculture and Natural Resources Publication 3338

Glenn T. McGourty, Karen M. Klonsky, Richard L. De Moura, *"Sample Costs to Establish a Vineyard and Produce Wine Grapes",* Red Varieties – Cabernet Sauvignon, North Coast – Lake County, 2008. University of California Cooperative Extension, and the Department of Agricultural and Resource Economics. Davis, CA. http://coststudies.ucdavis.edu/en/current/

REFERENCES

Glenn T. McGourty, Karen M. Klonsky, Richard L. De Moura, *"Sample Costs to Establish a Vineyard and Produce Wine Grapes"*, White Varieties – Sauvignon Blanc, North Coast – Lake County, 2008. University of California Cooperative Extension, and the Department of Agricultural and Resource Economics. Davis, CA. http://coststudies.ucdavis.edu/en/current/.

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1-A. COSTS PER ACRE TO PRODUCE WINE GRAPES –RED VARIETY
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

Operation	Equipment Time (Hrs/A)	Cash and Labor Costs per Acre						
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
1/1-1:00AM BD508 Mixed/Stored	0.00	8	0	0	0	0	8	
1/6-4:00PM BD508 Applied	0.00	8	0	0	0	0	8	
Sheep-Grazing 2X	0.00	0	0	0	0	35	35	
VM-Dormant Prune	0.00	200	0	0	0	0	200	
Plant Replacement Vines (20)	0.00	0	0	0	0	75	75	
Mow-Shred Prunings 50% Ac	0.17	5	1	1	0	0	7	
VM-Tie Cordons	0.00	167	0	0	0	0	167	
Weeds-Hill Vine Rows 3X	0.87	25	7	2	0	0	33	
Frost Protection-Sprinklers 3X	0.00	0	0	0	17	0	17	
VM-Sucker Cordons/Heads/Trunks	0.00	133	0	0	0	0	133	
VM-Sucker Cordons/Thin Shoots	0.00	133	0	0	0	0	133	
Disease/Insects-Bud Break	0.46	13	4	3	10	0	30	
Mow-Cover Crop Rows 50% Ac	0.17	5	1	1	0	0	7	
Disc-Cover Crop Rows 50% Ac	0.17	5	1	0	0	0	6	
Disease-Sulfur-Wettable 2X	0.69	19	6	2	5	0	32	
Disease Pre-Bloom-Serenade QST 713	0.46	13	4	3	3	0	22	
Disease-Dust 3X	1.38	39	11	9	8	0	67	
Weeds-Mow Middles 50% Ac 4X	0.69	19	4	3	0	0	27	
Disc Non-Cover Crop Rows 50% Ac	0.17	5	1	0	0	0	6	
BD501-Prep Application 2X	0.92	26	7	6	0	0	39	
Disease-Post Bloom-Serenade QST 713	0.46	13	4	3	3	0	22	
Release Beneficial Mites	0.00	0	0	0	50	0	50	
CM-Leaf Removal/Cleanup-Hand Crew	0.00	100	0	0	0	0	100	
CM-Tuck Wires 2X	0.00	200	0	0	0	0	200	
CM-Crop Adjustment 2X	0.00	133	0	0	0	0	133	
Irrigation 12X	0.00	75	0	0	17	0	92	
Weeds-Hand Hoe Under Vines	0.00	67	0	0	0	0	67	
Disease/Insects-Verasion-Sonata QST 2808	0.46	13	4	3	19	0	39	
BD502-507 Applied To Compost	0.17	13	0	0	2	0	16	
BD Compost Applied 50% Ac	0.33	9	2	1	38	0	49	
Cover Crop Planting 50% Ac (1/3 Yrs.)	0.11	3	1	1	21	0	25	
BD500 Prep Application 2X	0.64	35	4	1	0	0	40	
General Labor	0.00	334	0	0	0	0	334	
Pickup Truck 1/2 Ton-Farm Use	1.00	28	7	3	0	0	38	
ATV4WD-Farm Use	0.75	21	2	0	0	0	24	
TOTAL CULTURAL COSTS	10.04	1,869	70	42	191	110	2,283	
Harvest:								
Harvest/Hauling-Hand Crew	2.00	57	14	4	0	825	899	
TOTAL HARVEST COSTS	2.00	57	14	4	0	825	899	
Interest on Operating Capital at 4.25%							40	
TOTAL OPERATING COSTS/ACRE	12	1,926	84	45	191	935	3,222	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1-A. CONTINUED
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

Operation	Equipment Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Liability Insurance							11	
Office Expense							250	
Demeter USA Co-Certification Fee							12	
County Organic Registration Fee							25	
Field Sanitation							5	
Property Taxes							504	
Property Insurance							42	
Investment Repairs							108	
TOTAL CASH OVERHEAD COSTS/ACRE							956	
TOTAL CASH COSTS/ACRE							4,178	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Shop Tools		167		10			10	
Bins 2.5 Tons (15)		125		7			7	
Building, Shop/Pole Barn		750		45			45	
Fuel Tanks		273		21			21	
Fork Lift		208		18			18	
Backhoe/Front End Loader		277		24			24	
Land 40 Acres		30,000		1,275			1,275	
Reservoir 15 AcFt		2,000		119			119	
Drip Irrigation System-Biodynamic		1,600		95			95	
Vineyard Establishment-Biodynamic		35,000		2,204			2,204	
Equipment		777		76			76	
TOTAL NON-CASH OVERHEAD COSTS		71,176		3,894			3,894	
TOTAL COSTS/ACRE							8,072	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1-B. COSTS PER ACRE TO PRODUCE WINE GRAPES-WHITE VARIETY
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

Operation	Equipment Time (Hrs/A)	Cash and Labor Costs per Acre						
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
1/1-1:00AM BD508 Mixed/Stored	0.00	8	0	0	0	0	8	
1/6-4:00PM BD508 Applied	0.00	8	0	0	0	0	8	
Sheep-Grazing 2X	0.00	0	0	0	0	35	35	
VM-Dormant Prune	0.00	200	0	0	0	0	200	
Plant Replacement Vines (20)	0.00	0	0	0	0	75	75	
Mow-Shred Prunings 50% Ac	0.17	5	1	1	0	0	7	
VM-Tie Cordons	0.00	167	0	0	0	0	167	
Weeds-Hill Vine Rows 3X	0.87	25	7	2	0	0	33	
Frost Protection-Sprinklers 5X	0.00	0	0	0	33	0	33	
VM-Sucker Cordons/Heads/Trunks	0.00	133	0	0	0	0	133	
VM-Sucker Cordons/Thin Shoots	0.00	133	0	0	0	0	133	
Disease/Insects-Bud Break	0.46	13	4	3	10	0	30	
Mow-Cover Crop Rows 50% Ac	0.17	5	1	1	0	0	7	
Disc-Cover Crop Rows 50% Ac	0.17	5	1	0	0	0	6	
Disease-Sulfur-Wettable 2X	0.69	19	6	2	5	0	32	
Disease Pre-Bloom-Serenade QST 713	0.46	13	4	3	3	0	22	
Disease-Dust 3X	1.38	39	11	9	8	0	67	
Weeds-Mow Middles 50% Ac 4X	0.69	19	4	3	0	0	27	
Disc Non-Cover Crop Rows 50% Ac	0.17	5	1	0	0	0	6	
BD501-Prep Application 2X	0.92	26	7	6	0	0	39	
Disease-Post Bloom-Serenade QST 713	0.46	13	4	3	3	0	22	
Release Beneficial Mites	0.00	0	0	0	50	0	50	
CM-Leaf Removal/Cleanup-Hand Crew	0.00	117	0	0	0	0	117	
CM-Tuck Wires 2X	0.00	200	0	0	0	0	200	
CM-Crop Adjustment 2X	0.00	133	0	0	0	0	133	
Irrigation 12X	0.00	75	0	0	17	0	92	
Weeds-Hand Hoe Under Vines	0.00	67	0	0	0	0	67	
Disease/Insects-Verasion-Sonata QST 2808	0.46	13	4	3	19	0	39	
BD502-507 Applied to Compost	0.17	13	0	0	2	0	16	
BD Compost Applied 50% Ac	0.33	9	2	1	38	0	49	
Cover Crop Planting 50% Ac (1/3 Yrs.)	0.11	3	1	1	21	0	25	
BD500 Prep Application 2X	0.64	35	4	1	0	0	40	
General Labor	0.00	334	0	0	0	0	334	
Pickup Truck 1/2 Ton-Farm Use	1.00	28	7	3	0	0	38	
ATV4WD-Farm Use	0.75	21	2	0	0	0	24	
TOTAL CULTURAL COSTS	10.04	1,886	70	42	208	110	2,316	
Harvest:								
Harvest/Hauling-Mechanical	3.00	85	21	5	0	690	802	
TOTAL HARVEST COSTS	3.00	85	21	5	0	690	802	
Interest on Operating Capital at 4.25%							40	
TOTAL OPERATING COSTS/ACRE	13	1,971	92	47	208	800	3,158	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1-B. CONTINUED
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

Operation	Equipment Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Liability Insurance							11	
Office Expense							250	
Demeter USA Co-Certification Fee							12	
County Organic Registration Fee							25	
Field Sanitation							5	
Property Taxes							504	
Property Insurance							42	
Investment Repairs							108	
TOTAL CASH OVERHEAD COSTS/ACRE							956	
TOTAL CASH COSTS/ACRE							4,114	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Shop Tools		167		10			10	
Bins 2.5 Tons (15)		125		7			7	
Building, Shop/Pole Barn		750		45			45	
Fuel Tanks		273		21			21	
Fork Lift		208		18			18	
Backhoe/Front End Loader		277		24			24	
Land 40 Acres		30,000		1,275			1,275	
Reservoir 15 AcFt		2,000		119			119	
Drip Irrigation System-Biodynamic		1,600		95			95	
Vineyard Establishment-Biodynamic		35,000		2,204			2,204	
Equipment		805		78			78	
TOTAL NON-CASH OVERHEAD COSTS		71,205		3,896			3,896	
TOTAL COSTS/ACRE							8,010	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2-A. COSTS AND RETURNS PER ACRE TO PRODUCE WINE GRAPES –RED VARIETY

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Red	3	Ton	2500.00	7,500	
TOTAL GROSS RETURNS	3	Ton		7,500	
OPERATING COSTS					
Fertilizer:				**38**	
Compost	1.50	Ton	25.00	38	
Biodynamic Preparations:				**2**	
Compost Preparations 502-507	1.00	Acre	2.40	2	
Fungicide:				**47**	
Stylet-Oil	4.00	Pint	2.50	10	
Sulfur DF	3.00	Lb	1.57	5	
Serenade (QST 713)	2.00	Pint	2.50	5	
Microthiol Disperss Sulfur	6.00	Lb	1.38	8	
Sonata (QST 2808)	4.00	Pint	4.76	19	
Irrigation:				**34**	
Water-Pumped-Frost Protection	1.00	AcIn	16.50	17	
Water-Pumped-Drip	3.00	AcIn	5.70	17	
Custom:				**75**	
Vines	20.00	Each	3.75	75	
Contract:				**860**	
Sheep Grazing	1.00	Acre	35.00	35	
Harvest/Hauling-Hand Crew	3.00	Ton	275.00	825	
Miscellaneous:				**71**	
Beneficial Mites	1.00	Acre	50.00	50	
Legume/Small Grain Mixture	16.67	Lb	0.50	8	
Clover Seed-Mixture	5.00	Lb	2.49	12	
Labor				**1,926**	
Equipment Operator Labor	14.45	hrs	23.63	341	
Biodynamic Preparations Labor	2.50	hrs	16.68	42	
Vine Management/Pruning Labor	38.00	hrs	16.68	634	
Canopy Management Labor	26.00	hrs	16.68	434	
Irrigation Labor	4.50	hrs	16.68	75	
Non-Machine Labor	24.00	hrs	16.68	400	
Machinery				**130**	
Fuel-Gas	3.42	gal	2.77	9	
Fuel-Diesel	30.12	gal	2.48	75	
Lube				13	
Machinery Repair				33	
Interest on Operating Capital @ 4.25%				40	
TOTAL OPERATING COSTS/ACRE				3,222	
TOTAL OPERATING COSTS/TON				1,074	
NET RETURNS ABOVE OPERATING COSTS				4,278	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2-A. CONTINUED –RED VARIETY

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Liability Insurance				11	
Office Expense				250	
Demeter USA Co-Certification Fee				12	
County Organic Registration Fee				25	
Field Sanitation				5	
Property Taxes				504	
Property Insurance				42	
Investment Repairs				108	
TOTAL CASH OVERHEAD COSTS/ACRE				956	
TOTAL CASH OVERHEAD COSTS/TON				319	
TOTAL CASH COSTS/ACRE				4,178	
TOTAL CASH COSTS/TON				1,393	
NET RETURNS ABOVE CASH COSTS				3,322	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Shop Tools				10	
Bins 2.5 Tons (15)				7	
Building, Shop/Pole Barn				45	
Fuel Tanks				21	
Fork Lift				18	
Backhoe/Front End Loader				24	
Land 40 Acres				1,275	
Reservoir 15 AcFt				119	
Drip Irrigation System-Biodynamic				95	
Vineyard Establishment-Biodynamic				2,204	
Equipment				76	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				3,894	
TOTAL NON-CASH OVERHEAD COSTS/TON				1,298	
TOTAL COST/ACRE				8,072	
TOTAL COST/TON				2,691	
NET RETURNS ABOVE TOTAL COST				-572	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2-B. COSTS AND RETURNS PER ACRE TO PRODUCE WINE GRAPES-WHITE VARIETY

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
White	6	Ton	2000.00	12,000	
TOTAL GROSS RETURNS	6	Ton		12,000	
OPERATING COSTS					
Fertilizer:				**38**	
Compost	1.50	Ton	25.00	38	
Biodynamic Preparations:				**2**	
Compost Preparations 502-507	1.00	Acre	2.40	2	
Fungicide:				**47**	
Stylet-Oil	4.00	Pint	2.50	10	
Sulfur DF	3.00	Lb	1.57	5	
Serenade (QST 713)	2.00	Pint	2.50	5	
Microthiol Disperss Sulfur	6.00	Lb	1.38	8	
Sonata (QST 2808)	4.00	Pint	4.76	19	
Irrigation:				**50**	
Water-Pumped-Frost Protection	2.00	AcIn	16.50	33	
Water-Pumped-Drip	3.00	AcIn	5.70	17	
Custom:				**75**	
Vines	20.00	Each	3.75	75	
Contract:				**725**	
Sheep Grazing	1.00	Acre	35.00	35	
Harvest/Hauling-Machine	6.00	Ton	115.00	690	
Miscellaneous:				**71**	
Beneficial Mites	1.00	Acre	50.00	50	
Legume/Small Grain Mixture	16.67	Lb	0.50	8	
Clover Seed-Mixture	5.00	Lb	2.48	12	
Labor				**1,971**	
Equipment Operator Labor	15.65	hrs	23.63	370	
Biodynamic Preparations Labor	2.50	hrs	16.68	42	
Vine Management/Pruning Labor	38.00	hrs	16.68	634	
Canopy Management Labor	27.00	hrs	16.68	450	
Irrigation Labor	4.50	hrs	16.68	75	
Non-Machine Labor	24.00	hrs	16.68	400	
Machinery				**139**	
Fuel-Gas	3.42	gal	2.77	9	
Fuel-Diesel	32.95	gal	2.49	82	
Lube				14	
Machinery Repair				33	
Interest on Operating Capital @ 4.25%				40	
TOTAL OPERATING COSTS/ACRE				3,158	
TOTAL OPERATING COSTS/TON				526	
NET RETURNS ABOVE OPERATING COSTS				8,842	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2-B. CONTINUED-WHITE VARIETY
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Liability Insurance				11	
Office Expense				250	
Demeter USA Co-Certification Fee				12	
County Organic Registration Fee				25	
Field Sanitation				5	
Property Taxes				504	
Property Insurance				42	
Investment Repairs				108	
TOTAL CASH OVERHEAD COSTS/ACRE				956	
TOTAL CASH OVERHEAD COSTS/TON				159	
TOTAL CASH COSTS/ACRE				4,114	
TOTAL CASH COSTS/TON				686	
NET RETURNS ABOVE CASH COSTS				7,886	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Shop Tools				10	
Bins 2.5 Tons (15)				7	
Building, Shop/Pole Barn				45	
Fuel Tanks				21	
Fork Lift				18	
Backhoe/Front End Loader				24	
Land 40 Acres				1,275	
Reservoir 15 AcFt				119	
Drip Irrigation System-Biodynamic				95	
Vineyard Establishment-Biodynamic				2,204	
Equipment				78	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				3,896	
TOTAL NON-CASH OVERHEAD COSTS/TON				649	
TOTAL COST/ACRE				8,010	
TOTAL COST/TON				1,335	
NET RETURNS ABOVE TOTAL COST				3,990	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 3-A. MONTHLY COSTS PER ACRE TO PRODUCE WINE GRAPES –RED VARIETY

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

	JAN 16	FEB 16	MAR 16	APR 16	MAY 16	JUN 16	JUL 16	AUG 16	SEP 16	OCT 16	NOV 16	Total
Cultural:												
1/1-1:00AM BD508 Mixed/Stored	8											8
1/6-4:00PM BD508 Applied	8											8
Sheep-Grazing 2X		18									18	35
VM-Dormant Prune		200										200
Plant Replacement Vines (20)		75										75
Mow-Shred Prunings 50% Ac			7									7
VM-Tie Cordons			167									167
Weeds-Hill Vine Rows 3X			8			8	17					33
Frost Protection-Sprinklers 3X			8	8								17
VM-Sucker Cordons/Heads/Trunks				133								133
VM-Sucker Cordons/Thin Shoots				133								133
Disease/Insects-Bud Break				30								30
Mow-Cover Crop Rows 50% Ac				7								7
Disc-Cover Crop Rows 50% Ac				6								6
Disease-Sulfur-Wettable 2X					15	17						32
Disease Pre-Bloom-Serenade QST 713					22							22
Disease-Dust 3X					22	22	22					67
Weeds-Mow Middles 50% Ac 4X					7	7	7	7				27
Disc Non-Cover Crop Rows 50% Ac					6							6
BD501-Prep Application 2X						39						39
Disease-Post Bloom-Serenade QST 713						22						22
Release Beneficial Mites						50						50
CM-Leaf Removal/Cleanup-Hand Crew						100						100
CM-Tuck Wires 2X						100	100					200
CM-Crop Adjustment 2X						67	67					133
Irrigation 12X						22	24	24	22			92
Weeds-Hand Hoe Under Vines							67					67
Disease/Insects-Verasion-Sonata QST 2808							39					39
BD502-507 Applied To Compost										16		16
BD Compost Applied 50% Ac										49		49
Cover Crop Planting 50% Ac (1/3 Yrs.)										25		25
BD500 Prep Application 2X											40	40
General Labor	30	30	30	30	30	30	30	30	30	30	30	334
Pickup Truck 1/2 Ton-Farm Use	3	3	3	3	3	3	3	3	3	3	3	38
ATV4WD-Farm Use	2	2	2	2	2	2	2	2	2	2	2	24
TOTAL CULTURAL COSTS	53	329	226	354	109	490	378	67	58	127	93	2,283
Harvest:												
Harvest/Hauling-Hand Crew									899			899
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	899	0	0	899
Interest on Operating Capital @4.25%	0	1	2	3	4	6	7	7	10	-1	0	40
TOTAL OPERATING COSTS/ACRE	53	330	228	357	113	496	385	74	967	126	93	3,222

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 3-B. MONTHLY COSTS PER ACRE TO PRODUCE WINE GRAPES-WHITE VARIETY

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

	JAN 16	FEB 16	MAR 16	APR 16	MAY 16	JUN 16	JUL 16	AUG 16	SEP 16	OCT 16	NOV 16	Total
Cultural:												
1/1-1:00AM BD508 Mixed/Stored	8											8
1/6-4:00PM BD508 Applied	8											8
Sheep-Grazing 2X		18									18	35
VM-Dormant Prune		200										200
Plant Replacement Vines (20)		75										75
Mow-Shred Prunings 50% Ac			7									7
VM-Tie Cordons			167									167
Weeds-Hill Vine Rows 3X			8			8	17					33
Frost Protection-Sprinklers 5X			8	8	17							33
VM-Sucker Cordons/Heads/Trunks				133								133
VM-Sucker Cordons/Thin Shoots				133								133
Disease/Insects-Bud Break				30								30
Mow-Cover Crop Rows 50% Ac				7								7
Disc-Cover Crop Rows 50% Ac				6								6
Disease-Sulfur-Wettable 2X					15	17						32
Disease Pre-Bloom-Serenade QST 713					22							22
Disease-Dust 3X					22	22	22					67
Weeds-Mow Middles 50% Ac 4X					7	7	7	7				27
Disc Non-Cover Crop Rows 50% Ac					6							6
BD501-Prep Application 2X						39						39
Disease-Post Bloom-Serenade QST 713						22						22
Release Beneficial Mites						50						50
CM-Leaf Removal/Cleanup-Hand Crew						117						117
CM-Tuck Wires 2X						100	100					200
CM-Crop Adjustment 2X						67	67					133
Irrigation 12X						20	27	27	20			92
Weeds-Hand Hoe Under Vines							67					67
Disease/Insects-Verasion-Sonata QST 2808							39					39
BD502-507 Applied to Compost										16		16
BD Compost Applied 50% Ac										49		49
Cover Crop Planting 50% Ac (1/3 Yrs.)										25		25
BD500 Prep Application 2X											40	40
General Labor	30	30	30	30	30	30	30	30	30	30	30	334
Pickup Truck 1/2 Ton-Farm Use	3	3	3	3	3	3	3	3	3	3	3	38
ATV4WD-Farm Use	2	2	2	2	2	2	2	2	2	2	2	24
TOTAL CULTURAL COSTS	53	329	226	354	125	505	380	69	55	126	93	2,316
Harvest:												
Harvest/Hauling-Mechanical									802			802
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	802	0	0	802
Interest on Operating Capital @4.25%	0	1	2	3	4	6	7	7	10	-1	0	40
TOTAL OPERATING COSTS/ACRE	53	330	228	357	129	510	387	76	867	126	93	3,158

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4-A. RANGING ANALYSIS - WINE GRAPES –RED VARIETY
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

COSTS PER ACRE AND PER TON AT VARYING YIELDS TO PRODUCE WINE GRAPES –RED VARIETY

	YIELD (TONS)						
	1.50	2.00	2.50	3.00	3.50	4.00	4.50
OPERATING COSTS/ACRE:							
Cultural	2,283	2,283	2,283	2,283	2,283	2,283	2,283
Harvest	487	624	762	899	1,037	1,174	1,312
Interest on Operating Capital @ 4.25%	38.29	38.78	39.26	39.75	40.24	40.72	41.21
TOTAL OPERATING COSTS/ACRE	2,808	2,946	3,084	3,222	3,360	3,498	3,636
TOTAL OPERATING COSTS/TON	1,872.03	1,473.01	1,233.61	1,074.00	960.00	874.49	807.99
CASH OVERHEAD COSTS/ACRE	956	956	956	956	956	956	956
TOTAL CASH COSTS/ACRE	3,764	3,902	4,040	4,178	4,316	4,454	4,592
TOTAL CASH COSTS/TON	2,509.60	1,951.20	1,616.15	1,392.79	1,233.24	1,113.59	1,020.52
NON-CASH OVERHEAD COSTS/ACRE	3,894	3,894	3,894	3,894	3,894	3,894	3,894
TOTAL COSTS/ACRE	7,658	7,796	7,934	8,072	8,210	8,348	8,486
TOTAL COSTS/TON	5,105.00	3,898.00	3,174.00	2,691.00	2,346.00	2,087.00	1,886.00

Net Return per Acre above Operating Costs for Wine Grapes –Red Variety

PRICE ($/ton)	YIELD (Tons/acre)						
Red	1.50	2.00	2.50	3.00	3.50	4.00	4.50
1900.00	42	854	1,666	2,478	3,290	4,102	4,914
2100.00	342	1,254	2,166	3,078	3,990	4,902	5,814
2300.00	642	1,654	2,666	3,678	4,690	5,702	6,714
2500.00	942	2,054	3,166	4,278	5,390	6,502	7,614
2700.00	1,242	2,454	3,666	4,878	6,090	7,302	8,514
2900.00	1,542	2,854	4,166	5,478	6,790	8,102	9,414
3100.00	1,842	3,254	4,666	6,078	7,490	8,902	10,314

Net Return per Acre above Cash Costs for Wine Grapes –Red Variety

PRICE ($/ton)	YIELD (Tons/acre)						
Red	1.50	2.00	2.50	3.00	3.50	4.00	4.50
1900.00	-914	-102	710	1,522	2,334	3,146	3,958
2100.00	-614	298	1,210	2,122	3,034	3,946	4,858
2300.00	-314	698	1,710	2,722	3,734	4,746	5,758
2500.00	-14	1,098	2,210	3,322	4,434	5,546	6,658
2700.00	286	1,498	2,710	3,922	5,134	6,346	7,558
2900.00	586	1,898	3,210	4,522	5,834	7,146	8,458
3100.00	886	2,298	3,710	5,122	6,534	7,946	9,358

Net Return per Acre above Total Costs for Wine Grapes –Red Variety

PRICE ($/ton)	YIELD (Tons/acre)						
Red	1.50	2.00	2.50	3.00	3.50	4.00	4.50
1900.00	-4,808	-3,996	-3,184	-2,372	-1,560	-748	64
2100.00	-4,508	-3,596	-2,684	-1,772	-860	52	964
2300.00	-4,208	-3,196	-2,184	-1,172	-160	852	1,864
2500.00	-3,908	-2,796	-1,684	-572	540	1,652	2,764
2700.00	-3,608	-2,396	-1,184	28	1,240	2,452	3,664
2900.00	-3,308	-1,996	-684	628	1,940	3,252	4,564
3100.00	-3,008	-1,596	-184	1,228	2,640	4,052	5,464

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4-B. RANGING ANALYSIS - WINE GRAPES-WHITE VARIETY
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

COSTS PER ACRE AND PER TON AT VARYING YIELDS TO PRODUCE WINE GRAPES-WHITE VARIETY

	YIELD (TONS)						
	3.00	4.00	5.00	6.00	7.00	8.00	9.00
OPERATING COSTS/ACRE:							
Cultural	2,316	2,316	2,316	2,316	2,316	2,316	2,316
Harvest	457	572	687	802	917	1,032	1,147
Interest on Operating Capital @ 4.25%	38.71	39.12	39.52	39.93	40.34	40.75	41.15
TOTAL OPERATING COSTS/ACRE	2,811	2,927	3,042	3,158	3,273	3,388	3,504
TOTAL OPERATING COSTS/TON	937.10	731.68	608.43	526.26	467.56	423.54	389.31
CASH OVERHEAD COSTS/ACRE	956	956	956	956	956	956	956
TOTAL CASH COSTS/ACRE	3,768	3,883	3,999	4,114	4,229	4,345	4,460
TOTAL CASH COSTS/TON	1,255.91	970.79	799.71	685.66	604.19	543.10	495.58
NON-CASH OVERHEAD COSTS/ACRE	3,896	3,896	3,896	3,896	3,896	3,896	3,896
TOTAL COSTS/ACRE	7,664	7,779	7,894	8,010	8,125	8,241	8,356
TOTAL COSTS/TON	2,555.00	1,945.00	1,579.00	1,335.00	1,161.00	1,030.00	928.00

Net Return per Acre above Operating Costs for Wine Grapes-White Variety

PRICE ($/ton)	YIELD (Tons/acre)						
White	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1400.00	1,389	2,673	3,958	5,242	6,527	7,812	9,096
1600.00	1,989	3,473	4,958	6,442	7,927	9,412	10,896
1800.00	2,589	4,273	5,958	7,642	9,327	11,012	12,696
2000.00	3,189	5,073	6,958	8,842	10,727	12,612	14,496
2200.00	3,789	5,873	7,958	10,042	12,127	14,212	16,296
2400.00	4,389	6,673	8,958	11,242	13,527	15,812	18,096
2600.00	4,989	7,473	9,958	12,442	14,927	17,412	19,896

Net Return per Acre above Cash Costs for Wine Grapes-White Variety

PRICE ($/ton)	YIELD (Tons/acre)						
White	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1400.00	432	1,717	3,001	4,286	5,571	6,855	8,140
1600.00	1,032	2,517	4,001	5,486	6,971	8,455	9,940
1800.00	1,632	3,317	5,001	6,686	8,371	10,055	11,740
2000.00	2,232	4,117	6,001	7,886	9,771	11,655	13,540
2200.00	2,832	4,917	7,001	9,086	11,171	13,255	15,340
2400.00	3,432	5,717	8,001	10,286	12,571	14,855	17,140
2600.00	4,032	6,517	9,001	11,486	13,971	16,455	18,940

Net Return per Acre above Total Costs for Wine Grapes-White Variety

PRICE ($/ton)	YIELD (Tons/acre)						
White	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1400.00	-3,464	-2,179	-894	390	1,675	2,959	4,244
1600.00	-2,864	-1,379	106	1,590	3,075	4,559	6,044
1800.00	-2,264	-579	1,106	2,790	4,475	6,159	7,844
2000.00	-1,664	221	2,106	3,990	5,875	7,759	9,644
2200.00	-1,064	1,021	3,106	5,190	7,275	9,359	11,444
2400.00	-464	1,821	4,106	6,390	8,675	10,959	13,244
2600.00	136	2,621	5,106	7,590	10,075	12,559	15,044

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4-C. RANGING ANALYSIS - WINE GRAPES-COMBINED
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

Cost Comparison
This table shows returns of both Varieties-Combined over various yields and prices.
[(Combined prices)-(Combined costs)]/2 equals combined returns per acre.

Price ($/ton)		YIELD (Tons/acre)												
	White	4.00	6.00	4.00	5.00	6.00	5.00	6.00	8.00	6.00	7.00	8.00	7.00	8.00
Red		2.00	2.00	2.50	2.50	2.50	3.00	3.00	3.00	3.50	3.50	3.50	4.00	4.00
2100.00	1600.00	-2,488	-1,003	-2,032	-1,289	-547	-833	-91	1,394	365	1,108	1,850	1,564	2,306
2100.00	1800.00	-2,088	-403	-1,632	-789	53	-333	509	2,194	965	1,808	2,650	2,264	3,106
2300.00	1600.00	-2,288	-803	-1,782	-1,039	-297	-533	209	1,694	715	1,458	2,200	1,964	2,706
2300.00	1800.00	-1,888	-203	-1,382	-539	303	-33	809	2,494	1,315	2,158	3,000	2,664	3,506
2300.00	2000.00	-1,488	397	-982	-39	903	467	1,409	3,294	1,915	2,858	3,800	3,364	4,306
2500.00	1800.00	-1,688	-3	-1,132	-289	553	267	1,109	2,794	1,665	2,508	3,350	3,064	3,906
2500.00	2000.00	-1,288	597	-732	211	1,153	767	1,709	3,594	2,265	3,208	4,150	3,764	4,706
2500.00	2200.00	-888	1,197	-332	711	1,753	1,267	2,309	4,394	2,865	3,908	4,950	4,464	5,506
2700.00	2200.00	-688	1,397	-82	961	2,003	1,567	2,609	4,694	3,215	4,258	5,300	4,864	5,906
2700.00	2000.00	-1,088	797	-482	461	1,403	1,067	2,009	3,894	2,615	3,558	4,500	4,164	5,106
2700.00	2400.00	-288	1,997	319	1,461	2,603	2,067	3,209	5,494	3,815	4,958	6,100	5,564	6,706
2900.00	2200.00	-488	1,597	169	1,211	2,253	1,867	2,909	4,994	3,565	4,608	5,650	5,264	6,306
2900.00	2400.00	-88	2,197	569	1,711	2,853	2,367	3,509	5,794	4,165	5,308	6,450	5,964	7,106

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Total
16	Duster-3 Point-PTO 100 Gallon	8,000	10	1,415	882	4	47	933
16	Pickup Truck 1/2 Ton	28,000	10	8,271	2,814	15	181	3,011
16	Flail Mower 6'	7,515	10	1,329	829	4	44	877
16	60HP4WD-Cab Tractor	27,063	16	4,847	2,148	13	160	2,321
16	45HP4WD Tractor	22,097	16	3,958	1,754	11	130	1,895
16	Disc 6'	6,375	10	1,127	703	3	38	744
16	Manure Spreader	2,000	12	277	198	1	11	210
16	No-Till Grain Drill	18,200	15	1,747	1,580	8	100	1,688
16	2 Bottom Blade Plow	8,500	20	473	624	4	45	673
16	#1 Bin Trailer	2,090	25	59	136	1	11	148
16	#2 Bin Trailer	2,090	25	59	136	1	11	148
16	#3 Bin Trailer	2,090	25	59	136	1	11	148
16	#4 Bin Trailer	2,090	25	59	136	1	11	148
16	ATV4WD	8,500	10	2,511	854	5	55	914
16	Air-Blast PTO	25,000	10	4,421	2,757	12	147	2,916
16	ATV Boom Sprayer	1,825	15	175	158	1	10	169
	TOTAL	171,435	-	30,787	15,845	85	1,011	16,942
	60% of New Cost*	102,861	-	18,472	9,507	51	607	10,165

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Cash Overhead Repairs	Total
INVESTMENT								
Shop Tools	10,000	30	1,000	579	5	55	200	839
Bins 2.5 Tons (15)	7,500	30	750	434	3	41	150	629
Building, Shop/Pole Barn	45,000	30	0	2,682	19	225	900	3,826
Fuel Tanks	16,375	20	0	1,232	7	82	328	1,648
Fork Lift	12,500	15	1,250	1,083	6	69	250	1,407
Backhoe/Front End Loader	16,599	15	1,660	1,438	8	91	332	1,869
Land 40 Acres	1,200,000	30	1,200,000	51,000	1,012	12,000	0	64,012
Reservoir 15 AcFt	120,000	30	0	7,152	51	600	2,400	10,202
Drip Irrigation System-Biodynamic	64,000	30	0	3,814	27	320	1,280	5,441
Vineyard Establishment-Biodynamic	1,400,000	27	0	88,154	590	7,000	0	95,744
TOTAL INVESTMENT	2,891,974	-	1,204,660	157,568	1,727	20,483	5,839	185,617

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	60	Acre	10.63	638
Office Expense	60	Acre	250.00	15,000
Demeter USA Co-Certification Fee	40	Acre	11.66	466
County Organic Registration Fee	40	Acre	25.00	1,000
Field Sanitation	40	Acre	7.00	280

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. WHOLE FARM HOURLY EQUIPMENT COSTS-COMBINED
BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

		Wine Grapes Hours Used		Total Hours	Capital			Lube &		Total Operating	Total Costs/
		Red	White	Used	Recovery	Insurance	Taxes	Repair	Fuel	Costs	Hour
16	Duster-3 Point-PTO	14	14	200	2.65	0.01	0.14	1.39	0	1.39	4.19
16	Pickup Truck 1/2 Ton	20	20	100	16.89	0.09	1.09	2.60	6.93	9.52	27.59
16	Flail Mower 6'	21	21	200	2.49	0.01	0.13	3.19	0	3.19	5.82
16	60HP4WD-Cab Tractor	149	160	1000	1.29	0.01	0.10	1.79	7.34	9.13	10.52
16	45HP4WD Tractor	73	84	1000	1.05	0.01	0.08	1.39	5.50	6.89	8.03
16	Disc 6'	7	7	200	2.11	0.01	0.11	1.06	0	1.06	3.29
16	Manure Spreader	7	7	100	1.19	0.01	0.07	0.77	0	0.77	2.03
16	No-Till Grain Drill	2	2	100	9.48	0.05	0.60	4.86	0	4.86	14.99
16	2 Bottom Blade Plow	17	17	250	1.50	0.01	0.11	0.18	0	0.18	1.79
16	#1 Bin Trailer	20	30	200	0.41	0	0.03	0	0	0	0.44
16	#2 Bin Trailer	20	30	200	0.41	0	0.03	0	0	0	0.44
16	#3 Bin Trailer	20	30	200	0.41	0	0.03	0	0	0	0.44
16	#4 Bin Trailer	20	30	200	0.41	0	0.03	0	0	0	0.44
16	ATV4WD	18	18	300	1.71	0.01	0.11	0.57	2.77	3.34	5.17
16	Air-Blast Sprayer-PTO	83	83	200	8.27	0.04	0.44	4.33	0	4.33	13.08
16	ATV Boom Sprayer	16	16	100	0.95	0.01	0.06	0.49	0	0.49	1.50

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 7. WHOLE FARM OPERATIONS WITH EQUIPMENT & MATERIALS

BIODYNAMIC WINEGRAPES-MENDOCINO COUNTY-2016

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
1/1-1:00AM BD508 Mix	Jan			Biodynamic Preparations Labor	0.50	hour
1/6-4:00PM BD508 Appl.	Jan			Biodynamic Preparations Labor	0.50	hour
Sheep-Grazing 2X	Feb			Sheep Grazing	0.50	Acre
	Nov			Sheep Grazing	0.50	Acre
VM-Dormant Prune	Feb			Vine Management/Pruning Labor	12.00	hours
Plant Replacement Vines	Feb			Vines	20.00	Each
Mow-Shred Prunings	Mar	45HP4WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.21	hour
VM-Tie Cordons	Mar			Vine Management/Pruning Labor	10.00	hours
Weeds-Hill Vine Rows	Mar	60HP4WD-Cab Tractor	2 Bottom Blade Plow	Equipment Operator Labor	0.26	hour
	June	60HP4WD-Cab Tractor	2 Bottom Blade Plow	Equipment Operator Labor	0.26	hour
	July	60HP4WD-Cab Tractor	2 Bottom Blade Plow	Equipment Operator Labor	0.52	hour
Frost Protection-Sprinklers	Mar			Water-Pumped-Frost Protection	0.50	AcIn
	Apr			Water-Pumped-Frost Protection	0.50	AcIn
VM-Sucker Cordons	Apr			Vine Management/Pruning Labor	8.00	hours
VM-Sucker Cordons	Apr			Vine Management/Pruning Labor	8.00	hours
Disease/Insects-Bud	Apr	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Stylet-Oil	4.00	Pint
Mow-Cover Crop Rows	Apr	45HP4WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.21	hour
Disc-Cover Crop Rows	Apr	45HP4WD Tractor	Disc 6'	Equipment Operator Labor	0.21	hour
Disease-Sulfur Dust	May	60HP4WD-Cab Tractor	Duster-3 Point-PTO 100 Gallon	Equipment Operator Labor	0.41	hour
				Sulfur DF	1.00	Lb
	June	60HP4WD-Cab Tractor	Duster-3 Point-PTO 100 Gallon	Equipment Operator Labor	0.41	hour
				Sulfur DF	2.00	Lb
Disease Pre-Bloom	May	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Serenade (QST 713)	1.00	Pint
Disease-Sulfur 3X	May	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Microthiol Disperss Sulfur	2.00	Lb
	June	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Microthiol Disperss Sulfur	2.00	Lb
	July	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Microthiol Disperss Sulfur	2.00	Lb
Weeds-Mow Middles	May	45HP4WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.21	hour
	June	45HP4WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.21	hour
	July	45HP4WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.21	hour
	Aug	45HP4WD Tractor	Flail Mower 6'	Equipment Operator Labor	0.21	hour
Disc Non-Cover Crop	May	45HP4WD Tractor	Disc 6'	Equipment Operator Labor	0.21	hour
BD501-Prep Application	June	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	1.10	hours
Disease-Post Bloom	June	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Serenade (QST 713)	1.00	Pint
Release Beneficial Mites	June			Beneficial Mites	1.00	Acre
CM-Leaf Removal	June			Canopy Management Labor	6.00	hours
CM-Tuck Wires 2X	June			Canopy Management Labor	6.00	hours
	July			Canopy Management Labor	6.00	hours
CM-Crop Adjustment 2X	June			Canopy Management Labor	4.00	hours
	July			Canopy Management Labor	4.00	hours
Irrigation 12X	June			Irrigation Labor	1.13	hours
				Water-Pumped-Drip	0.50	AcIn
	July			Irrigation Labor	1.13	hours
				Water-Pumped-Drip	1.00	AcIn
	Aug			Irrigation Labor	1.13	hours
				Water-Pumped-Drip	1.00	AcIn
	Sept			Irrigation Labor	1.13	hours
				Water-Pumped-Drip	0.50	AcIn
Weeds-Hand Hoe	July			Non-Machine Labor	4.00	hours
Disease/Insects-Verasion	July	60HP4WD-Cab Tractor	Air-Blast PTO	Equipment Operator Labor	0.55	hour
				Sonata (QST 2808)	4.00	Pint
BD502-507 Application	Oct		ATV4WD	Biodynamic Preparations Labor	0.50	hour
				Compost Preparations 502-507	1.00	Acre
			ATV Boom Sprayer	Biodynamic Preparations Labor	1.00	hour
BD Compost Spread	Oct	45HP4WD Tractor	Manure Spreader	Equipment Operator Labor	0.39	hour
				Compost	1.50	Ton
Cover Crop Planting	Oct	60HP4WD-Cab Tractor	No-Till Grain Drill	Equipment Operator Labor	0.13	hour
				Legume/Small Grain Mix	16.67	Lb
				Clover Seed-Mixture	5.00	Lb
BD500 Prep Application	Nov	45HP4WD Tractor	ATV Boom Sprayer	Biodynamic Preparations Labor	1.00	hour
General Labor	Nov			Non-Machine Labor	20.00	hours
Pickup Truck 1/2 Ton	Nov		Pickup Truck 1/2 Ton	Equipment Operator Labor	1.20	hours
ATV4WD-Farm Use	Nov		ATV4WD	Equipment Operator Labor	0.90	hour
Harvest/Hauling	Sept	60HP4WD-Cab Tractor	#1 & #2 Bin Trailers	Equipment Operator Labor	3.00	hours
Harvest/Hauling	Sept	45HP4WD-Cab Tractor	#3 & #4 Bin Trailers	Equipment Operator Labor	3.00	hours