UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES COOPERATIVE EXTENSION

AGRICULTURAL ISSUES CENTER

UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

2020 SAMPLE COSTS TO ESTABLISH Blue Elderberry



High-density Hedgerow with TillageSacramento Valley

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Sacramento Valley - 2020

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INTRODUCTION

Sample costs to establish an elderberry tree hedgerow are presented in this study. It can be used to help guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on January 2020 figures. A blank column titled Your Costs is provided in Tables 1 and 2 for your convenience.

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. For more information contact Sonja Brodt, Academic Coordinator, UC SAREP at 530-754-8547 or sbbrodt@ucdavis.edu. UC Davis, Agricultural Sustainability Institute. elderberry.ucdavis.edu

Sample Cost of Production studies for many commodities are available and can be downloaded from the Department website, coststudies.ucdavis.edu. Archived studies are also available on the website.

Costs and Returns Study Program/Acknowledgements. A "costs and returns" study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the region the study is based. The authors thank the farmer cooperators, UC Cooperative Extension and other industry representatives who provided information, assistance and expert advice. 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**. The University is an affirmative action/equal opportunity employer.

ASSUMPTIONS

This study explains the annual costs associated with an ongoing operation, under the assumptions that the farm was operated this way in prior years and will continue in subsequent years. The costs, materials, and practices will not apply to all farms. Timing of and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, insect and disease pressure.

Farm. The LA farm consists of 10 contiguous acres owned by the operator. Three acres are planted in diversified vegetable crops and two acres in fruit crops primarily sold via direct market channels. All soil is Class I and II agricultural soil. Elderberry are being established on approximately 1/4 acre in a 1,000 linear foot (LF), single-species habitat strip bordering a cropped field.

Establishment: Cultural Practices and Material Inputs

Crop. Blue elderberry (Sambucus nigra ssp. cerulea) is a California native plant commonly included in habitat hedgerows, planted for their various ecological and environmental benefits. This study refers to blue elderberry as trees, although prolific shoots that originate at the root crown commonly result in a bushy growth habit. Harvest of elderberry from such hedgerows for commercial sale or processing is not yet a common practice in California, but represents opportunity for an additional revenue stream which can contribute to overall farm economic sustainability, but also specifically to help recuperate costs of establishing hedgerows which can be costly to install.

Hedgerows are commonly irrigated for three to four summer growing seasons to establish plants, after which point irrigation is removed completely. Mature blue elderberry thrives and yields prolifically with this type of management, assuming other environmental conditions are favorable. No formal data on the productive life span of blue elderberry exist, but a 2018/2019 UC SAREP study found that unirrigated blue elderberry trees 11 years old were highly productive (Table A). Observations by the author suggest that blue elderberry may be highly productive for at least 20 years in unirrigated hedgerows.

The establishment cost is the sum of cash costs for land preparation, planting, trees, production

expenses, and cash overhead for growing the trees through the first year after planting. Establishment costs are based on typical basic operations, but can vary considerably, depending upon terrain, soil type, local regulations, and other factors.

Soil Preparation. The planting site was disced and rototilled. An informal raised bed was formed by hilling rototilled soil. No soil amendments were added.

Mulch. Water-permeable woven black plastic landscape fabric was laid over the raised bed and secured with ground staples. Elderberry seedlings were planted through small planting holes (approx. 6" diameter) cut through the landscape fabric using a utility knife. One shovel-full of compost was placed in each planting hole as mulch around the base of each seedling at planting time.

Trees. No blue elderberry cultivars exist. The price of wild-type blue elderberry plants depends on the source and number of plants purchased. For this study, the price per wild-type seedling (\$2.40 each) is based on prices for a bulk contract grow by a native plant restoration nursery with a minimum contract order of \$1,000. Excess seedlings are resold to other farmers.

Planting. Planting can take place in autumn, winter, or spring. California native plants such as blue elderberry trees are commonly planted in winter, when cool temperatures and winter rains increase the likelihood of successful establishment (especially for no-till plantings). For this study, planting occurs in late April. The irrigation system is installed prior to planting, with drip lines laid on top of mulch. Each seedling was planted directly next to an irrigation emitter, and a plastic tree protection tube with bamboo stake installed immediately after planting.

Planting densities may range from 33 (30-foot spacing) to 167 (6-foot spacing) trees per 1,000LF. For this study, 167 trees are planted on a 6-foot spacing, and the entire hedgerow (with mulched area) is 10 feet wide). The life of the hedgerow at the time of planting is estimated at 25 years.

Irrigation. A drip irrigation system is installed prior to planting. The water is pumped from a well and passes through a filtration system into the above ground drip system. Water is applied to the hedgerow from April into October averaging every other week over the 25-week period. Irrigations early and late in the season may be less than every other week. Water is applied through 3/4" poly tube with a single 1 gallon per hour woodpecker emitter per plant.

Irrigation costs are based on pumping costs. Pumping costs are \$0.003 per gallon, (\$77 per 1,000 LF). Price of water will vary by grower depending on water source – well or district water and water district. It is assumed soil-stored water from rainfall will supply a portion of the early season water requirements (this is not included in the applied water amounts). Irrigation begins at planting time in late April, continuing into October and applied bi-weekly or as needed by the trees, depending on weather.

Production: Cultural Practices and Material Inputs

Pruning. Elderberry trees are allowed to grow without pruning for at least one year after planting. In subsequent years, elderberry responds well to pruning. Throughout the Central Valley, however, there are restrictions on pruning blue elderberry due to possible presence of the endangered Valley Elderberry Longhorn Beetle. Farms below 500 ft elevation in the Central Valley must not prune any woody shoots larger than 1" diameter or damage or kill any trees once established (US FWS 2017). Programmatic Safe Harbor Agreements allow more leniency in managing elderberry on private land, and are available for landowners to join in counties throughout the Sacramento Valley (Sacramento River Forum).

Fertilization. Dr. Earth 3-6-2 organic foliar fruit tree fertilizer (diluted concentrate) was applied once each in May, June, and August using a 5-gallon backpack sprayer.

Irrigation. Habitat hedgerows including drought tolerant California native species such as blue elderberry should be irrigated for three to four growing seasons to successfully establish plants. Irrigation frequency in year 3 and/or 4 is decreased relative to previous years to help plants acclimate to less frequent summer water. After 3 to 4 years, irrigation can generally be completely removed. In extremely dry years, occasional deep irrigation during fall/winter/spring months may be beneficial to maintain yields and plant vigor. Ongoing irrigation may be necessary in areas where the water table is especially deep.

Pest Management. The only pest management activity assumed is weed management. Hand weeding was not necessary for the duration of this study, beyond negligible effort pulling occasional weeds from planting holes. The landscape fabric chosen as mulch was extremely effective for weed suppression.

Harvest, Yields and Revenue

Harvest. Blue elderberry harvest begins in mid-June and extends through September. No mechanical elderberry harvesters are available. Ripe fruit is harvested using hand labor by cutting or pinching entire cymes from the tree. Harvest is not included in this study, as blue elderberry begins to yield in the second growing season.

Yields. Yields and returns over time are not included as part of this study; insufficient information exists on when blue elderberry reaches mature yield potential, or how much yield can be expected at maturity, especially at closer spacing like that in the system represented in this study. Results from a 2018/2019 study suggest that un-irrigated blue elderberry in Sacramento Valley hedgerows may reach maximum mature yield approximately 7-10 years after planting at wide spacing (15-30') in favorable conditions. Results from this study are shown in Table A, which shows the average yield of destemmed berries per tree by planting year in 2018 and 2019 (n=3 for each planting year).

Blue elderberry seedlings in this study yielded an average of 2 lbs. of destemmed berries per tree in their second growing season. Because trees are spaced relatively closely (6 feet apart), mature yield is likely to be lower than reported in Table A, and may be achieved earlier.

Table A.

Yields per Tree per Year							
	Yield (Lb	s.) per					
	Tree						
Planting Year	<u>2018</u>	<u>2019</u>					
2014	36	63					
2012	77	105					
2008	108	119					

Revenue. Revenue from first harvest in this system range from \$1,336 (\$4/Lb. destemmed) to \$2,004 (\$6/lb. destemmed). Revenue over time is difficult to predict accurately at this time (as stated above).

Ranging Analysis. Table 4 shows a range of yields for the first harvest season, 0.5-3.5 pounds destemmed berries per tree (304 – 364 Lbs. per 1,000LF) over a range of prices, \$3.95 - \$6.05 per pound.

Equipment, Labor and Operating Interest

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agricultural & Biological Engineers (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are \$3.75 and \$3.40 per gallon, respectively. The cost includes a 13.0 percent sales tax on diesel and 2.25 percent sales tax on gasoline. Federal and state excise taxes on diesel (\$0.36/gal) and gasoline (\$0.42/gal) are refunded for on-farm use when filing the farm income tax return.

Lube and Repairs. The fuel, lube, and repair cost per acre (1,000LF) for each operation in Table 1 is 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 (1,000LF). Tractor time is 10 percent higher than implement time for a given operation to account for setup, travel and down time.

Labor. Labor rates of \$20.67 per hour for machine operators and \$17.82 for irrigation and general labor includes payroll overhead of 42.56 percent. The basic hourly wages are \$14.50 for machine operators and \$12.50 for irrigation and general labor. The overhead includes the employer's share of federal and California state payroll taxes (14.85%), workers' compensation insurance (11.29%) for truck crops, and a percentage for other possible benefits (16.42%).

Workers' compensation costs will vary among growers, but the cost is based upon the average

industry final rate as of January 2020. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate. There is no operating loan, cash expenses were paid as received.

Cash Overhead

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

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.

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 at 0.866 percent of the average value of the assets over their useful life.

Investment Repairs. Annual maintenance except land is calculated as two percent of the purchase price.

Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. The tractor and disc are the only investments included in the hedgerow establishment costs. Capital investments would be charged to other crops on the farm.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is ((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 by ASABE based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASABE 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 6.0 percent used to calculate capital recovery cost is the effective long-term interest rate in January 2020. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Land. Land costs are not included in this study since it a hedgerow planting.

Irrigation System. The landlord maintains the irrigation system which includes the pump, filters and the lateral lines that connect to the emitters. These costs are distributed between other crops on the farm.

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 the Whole Farm Annual Equipment, Investment, and Business Overhead Costs table. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

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

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TABLE 1. COSTS PER 1,000LF TO ESTABLISH BLUE ELDERBERRY

High-density Hedgerow with Tillage - 2020

	Cash and Labor Costs per 1,000LF							
Operation	Equipment Time (Hrs.)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Pre-Plant: Land Prep: Disc/Hill/Rototill	2.49	66	11	12	0	0	89	
TOTAL PRE-PLANT COSTS	2.49	66	11	12	0	0	89	
Planting: Plant Trees (167) Layout Irrigation Lines/Emitters	0.00	665 221	0	0	775 130	0	1,440 351	
TOTAL PLANTING COSTS	0.00	885	0	0	905	0	1,791	
Cultural: Irrigation 10x	0.00	0	0	0	77	0	77	
Fertilizer: Backpack 3-6-2 3x	0.00	88	0	0	36	0	124	
Plant Replacement Trees (10)	0.00	71	0	0	24	0	95	
TOTAL CULTURAL COSTS	0.00	159	0	0	137	0	296	
TOTAL OPERATING COSTS/1,000LF	2.49	1,110	11	12	1,043	0	2,176	
CASH OVERHEAD: Property Taxes Property Insurance							2	
TOTAL CASH OVERHEAD COSTS/1,000LF							3	
TOTAL CASH COSTS/1,000LF							2,179	
NON-CASH OVERHEAD:		Per Producing 1,000LF		Annual Capital Re				
Equipment		278		26			26	
TOTAL NON-CASH OVERHEAD COSTS		278		26			26	
TOTAL COSTS/1,000LF							2,204	

TABLE 2. COSTS AND RETURNS PER 1,000LF TO ESTABLISH BLUE ELDERBERRY

High-density Hedgerow with Tillage – 2020

Fruit 334,00 Lbs. 5.00 1,670 TOTAL GROSS RETURNS 1,700 Each 1,670 TOTAL GROSS RETURNS 177.00 Each 2,400 425 TOTAL GROSS RETURNS 167.00 Each 2,400 425 TOTAL OPERATING COSTS 1,000 Roll 99,000 99 TOTAL OPERATING COSTS 1,000 Roll 99,000 1,000		Quantity/		Price or	Value or	Your
TOTAL GROSS RETURNS	GROSS RETURNS	1,000LF	Unit	Cost/Unit	Cost/1,000LF	Cost
OPERATING COSTS Trees: 879 Trees: Blue Elderberry 177.00 Each 2.40 425 Landscape Fabric 1.00 Roll 99.00 99 Plant Tubes 167.00 Each 1.35 225 Drip Emitters (Woodpecker) 167.00 Each 0.18 30 Poly Tubing 3/4" 1,000.00 Foot 0.10 100 Fertilizer: 86 Planting Compost 167.00 Tree 0.30 50 Dr. Earth 3-6-2 30.00 FIOZ 1.19 36 Irrigation: 77 Treet (Strail) 36 77 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.11 1.10 1	Fruit	334.00	Lbs.	5.00	1,670	
Trees: 879 Trees: Blue Elderberry 177.00 Each 2.40 425 Landscape Fabric 1.00 Roll 99.00 99 Plant Tubes 167.00 Each 1.35 225 Drip Emitters (Woodpecker) 167.00 Each 0.18 30 Poly Tubing 3/4" 1,000.00 Foot 0.10 100 Fertilizer: 86 Planting Compost 167.00 Tree 0.30 50 Dr. Earth 3-6-2 30.00 FlOz 1.19 36 Irrigation: "77 Tree (S/Gal) 2.9 hs 0.003 77 Vator (S/Gal) 2.5,801.50 Gal 0.003 77 Vator (S/Gal) 2.5,801.50 Gal 0.003 77 Vator (S/Gal) 2.5,801.50 Fal 0.003 77 Vator (S/Gal) 2.5,801.50 Fal 0.003 77 Vator (S/Gal) 2.5,801.50 Fal 1.7.72 735	TOTAL GROSS RETURNS				1,670	
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Landscape Fabric 1.00 Roll 99.00 99 Plant Tubes 167.00 Each 1.35 225	Trees:				879	
Plant Tubes 167.00 Each 1.35 225 Drip Emitters (Woodpecker) 167.00 Each 0.18 30 Poly Tubing 3/4" 1,000.00 Foot 0.10 100 Fertilizer: 86 Planting Compost 167.00 Tree 0.30 50 Dr. Earth 3-6-2 30.00 FlOz 1.19 36 Irrigation: "77 "78 "77 "77 "78 "77 "78 "77 "78 "77 "78 "79 "78 "78 "79 "78 "78 "79 "78 "78 "79 "78 "78 "79 "78 "78 "79 "79 "78 "79 "79 "79 "78<	Trees: Blue Elderberry	177.00	Each	2.40	425	
Drip Emitters (Woodpecker)	Landscape Fabric	1.00	Roll	99.00	99	
Poly Tubing 3/4" 1,000.00 Foot 0.10 100 Fertilizer: 86 Planting Compost 167.00 Tree 0.30 50 Dr. Earth 3-6-2 30.00 FIOz 1.19 36 Irrigation: 77 77 77 77 77 1.10 77 1.10	Plant Tubes	167.00	Each	1.35	225	
Fertilizer: 86 Planting Compost 167.00 Tree 0.30 50 Dr. Earth 3-6-2 30.00 FIOz 1.19 36 Irrigation: 77 Water (\$/Gal) 25,801.50 Gal 0.003 77 Labor: 1,110 1.10 1.10 1.10 Equipment Operator Labor 2.99 hrs 21.97 66 Planting Labor 41.50 hrs 17.72 735 Irrigation Labor 12.45 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 88 Machinery: 23 17.72 88 Machinery: 23 0 17.72 88 Fuel-Gas 0.00 gal 3.52 0 0 Fuel-Diesel 3.09 gal 3.66 11 1 Lube 2 2.176 1 2.176 1 NET RETURNS ABOVE OPERATING COSTS 2.176 <td< td=""><td>Drip Emitters (Woodpecker)</td><td>167.00</td><td>Each</td><td>0.18</td><td>30</td><td></td></td<>	Drip Emitters (Woodpecker)	167.00	Each	0.18	30	
Planting Compost 167.00 Tree 0.30 50 Dr. Earth 3-6-2 30.00 FlOz 1.19 36 Irrigation:	Poly Tubing 3/4"	1,000.00	Foot	0.10	100	
Dr. Earth 3-6-2 30.00 FIOZ 1.19 36 Irrigation: 77 Water (\$/Gal) 25,801.50 Gal 0.003 77 Labor: 1,110 Equipment Operator Labor 2.99 hrs 21.97 66 Planting Labor 41.50 hrs 17.72 735 Irrigation Labor 12.45 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 221 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 2 2 Machinery Repair 10 2 2 NET RETURNS ABOVE OPERATING COSTS (1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS (2,000LF 3 3 TOTAL CASH OVERHEAD COSTS/1,000LF 3 3 TOTAL CASH OVERHEAD COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS 3 3	Fertilizer:				86	
Nater (\$/Gal) 25,801.50 Gal 0.003 77 1.10 Labor: 1,110 Equipment Operator Labor 2.99 hrs 21.97 66 Planting Labor 41.50 hrs 17.72 735 Irrigation Labor 12.45 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 88 Machinery: 23 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 2 Machinery Repair 10 TOTAL OPERATING COSTS /1,000LF 5.06 CASH OVERHEAD COSTS /1,000LF 5.06 TOTAL CASH OVERHEAD COSTS /1,000LF 5 2 TOTAL CASH OVERHEAD COSTS /1,000LF 5 3 TOTAL CASH OVERHEAD COSTS /1,000LF 5 5.09 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS /1,000LF 5 5.09 TOTAL NON-CASH OVERHEAD COSTS /1,000LF 5 5.00 TOTAL NO	Planting Compost	167.00	Tree	0.30	50	
Water (\$/Gal) 25,801.50 Gal 0.003 77 Labor: 1,110 Equipment Operator Labor 2.99 hrs 21.97 66 Planting Labor 41.50 hrs 17.72 735 Irrigation Labor 12.45 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 88 Machinery: 23 23 0 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 2 Machinery Repair 10 10 TOTAL OPERATING COSTS/1,000LF 2,176 2,176 2,176 NET RETURNS ABOVE OPERATING COSTS 2 2 2 Property Taxes 2 2 2 Property Insurance 1 3 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 3 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 2 TOTAL NON-CASH OVERHE	Dr. Earth 3-6-2	30.00	FlOz	1.19	36	
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Equipment Operator Labor 2.99 hrs 21.97 66 Planting Labor 41.50 hrs 17.72 735 Irrigation Labor 12.45 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 88 Machinery: 23 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 Machinery Repair 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 26	Water (\$/Gal)	25,801.50	Gal	0.003	77	
Planting Labor 41.50 hrs 17.72 735 Irrigation Labor 12.45 hrs 17.72 221 Fertilizer Labor 4.98 hrs 17.72 88 Machinery: 23 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 2 Machinery Repair 10 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Labor:				1,110	
Irrigation Labor	Equipment Operator Labor	2.99	hrs	21.97	66	
Fertilizer Labor 4.98 hrs 17.72 88 Machinery: 23 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 2 Machinery Repair 10 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Planting Labor	41.50	hrs	17.72	735	
Machinery: 23 Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 Machinery Repair 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 26	Irrigation Labor	12.45	hrs	17.72	221	
Fuel-Gas 0.00 gal 3.52 0 Fuel-Diesel 3.09 gal 3.66 11 Lube 2 Machinery Repair 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 26 TOTAL COST/1,000LF 26	Fertilizer Labor	4.98	hrs	17.72	88	
Fuel-Diesel 3.09 gal 3.66 11 Lube 2 Machinery Repair 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Machinery:				23	
Lube 2 Machinery Repair 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 26 TOTAL COST/1,000LF 2,204	Fuel-Gas	0.00	gal	3.52	0	
Machinery Repair 10 TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Fuel-Diesel	3.09	gal	3.66	11	
TOTAL OPERATING COSTS/1,000LF 2,176 NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Lube				2	
NET RETURNS ABOVE OPERATING COSTS -506 CASH OVERHEAD COSTS 2 Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Machinery Repair				10	
CASH OVERHEAD COSTS Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	TOTAL OPERATING COSTS/1,000LF				2,176	
Property Taxes 2 Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	NET RETURNS ABOVE OPERATING COSTS				-506	
Property Insurance 1 TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	CASH OVERHEAD COSTS					
TOTAL CASH OVERHEAD COSTS/1,000LF 3 TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Property Taxes				2	
TOTAL CASH COSTS/1,000LF 2,179 NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	Property Insurance				1	
NET RETURNS ABOVE CASH COSTS -509 NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	TOTAL CASH OVERHEAD COSTS/1,000LF				3	
NON-CASH OVERHEAD COSTS (Capital Recovery) 26 TOTAL NON-CASH OVERHEAD COSTS/1,000LF 26 TOTAL COST/1,000LF 2,204	TOTAL CASH COSTS/1,000LF				2,179	
TOTAL NON-CASH OVERHEAD COSTS/1,000LF26TOTAL COST/1,000LF2,204	NET RETURNS ABOVE CASH COSTS				-509	
TOTAL NON-CASH OVERHEAD COSTS/1,000LF26TOTAL COST/1,000LF2,204	NON-CASH OVERHEAD COSTS (Capital Recovery)		· · · · · · · · · · · · · · · · · · ·		26	
TOTAL COST/1,000LF 2,204					26	
NET RETURNS ABOVE TOTAL COST -534	TOTAL COST/1,000LF				2,204	
	NET RETURNS ABOVE TOTAL COST				-534	

TABLE 3. MONTHLY CASH COSTS PER 1,000LF TO ESTABLISH BLUE ELDERBERRY

 $High-density\ Hedgerow\ with\ Tillage-2020$

	APR	MAY	JUN	JUL	AUG	SEP	OCT	Total
Pre-Plant:								
Land Prep: Disc/Hill/Rototill	89							89
TOTAL PRE-PLANT COSTS	89							89
Planting:								
Plant Trees (167)	1,440							1,440
Layout Irrigation Lines/Emitters	351							351
TOTAL PLANTING COSTS	1,791							1,791
Cultural:								
Irrigation: 10x		8	15	15	15	15	8	77
Fertilizer: Backpack 3-6-2 3x		41	41		41			124
Plant Replacement Trees (10)		95						95
TOTAL CULTURAL COSTS	0	144	57	15	57	15	8	296
TOTAL OPERATING COSTS PER 1,000LF	1,880		57	1.5	57	1.5	0	2,176
,		144	57	15	57	15	8	
CASH OVERHEAD								
Property Taxes						1		2
Property Insurance						1		1
TOTAL CASH OVERHEAD COSTS	0	0	0	0	0	1	0	3
TOTAL CASH COSTS/1,000LF	1,880	144	57	15	57	17	8	2,179

TABLE 4. RANGING ANALYSIS

 $High-density\ Hedgerow\ with\ Tillage-2020$

COSTS PER 1,000LF AT VARYING YIELDS TO PRODUCE BLUE ELDERBERRY

				YIELI	O (Lbs./1,00	OLF)		
		304.00	314.00	324.00	334.00	344.00	354.00	364.00
OPERATING COS	TS/1,000LF:	00	00	00	00	00	00	0.0
Pre-Plant Planting		89 1,791	89 1,791	89 1,791	89 1,791	89 1,791	89 1,791	89 1,791
Cultural		296	296	296	296	296	296	296
	NG COSTS/1,000LF	2,176	2,176	2,176	2,176	2,176	2,176	2,176
CASH OVERHEA	,	3	3	3	3	3	3	3
TOTAL CASH CO	STS/1,000LF	2,179	2,179	2,179	2,179	2,179	2,179	2,179
NON-CASH OVER	RHEAD COSTS/1,000I	LF 26	26	26	26	26	26	26
TOTAL COSTS/1,	000LF	2,204	2,204	2,204	2,204	2,204	2,204	2,204
	Net 1	Return Per 1,000Ll	F Above Opera	ting Costs for Bl	ue Elderberi	Ţ		
PRICE (\$/Lb.)			*	YIELD (Lbs./	1,000LF)			
Fruit	304.00	314.00	324.00	334.00		344.00	354.00	36
3.95	-975	-936	-896	-857		-817	-778	
4.30	-869	-826	-783	-740		-697	-654	
4.65	-762	-716	-669	-623		-576	-530	
5.00	-656	-606	-556	-506		-456	-406	
5.35	-549	-496	-442	-389		-335	-282	
5.70	-443	-386	-329	-272		-215	-158	
6.05	-337	-276	-216	-155		-95	-34	
		Net Return Per 1,00			e Elderberry	7	-	
PRICE (\$/Lb.)				YIELD (Lbs	s./1,000LF)			
Fruit	304.00	314.00	324.00	334.00		344.00	354.00	36
3.95	-978	-938	-899	-859		-820	-780	
4.30	-872	-829	-786	-743		-700	-657	
4.65	-765	-719	-672	-626		-579	-533	
5.00	-659	-609	-559	-509		-459	-409	
5.35	-552	-499	-445	-392		-338	-285	
5.70	-446	-389	-332	-275		-218	-161	
6.05	-340	-279	-219	-158		-98	-37	
	N	et Return Per 1,000	LF Above Tot	al Costs for Blue	e Elderberry			
PRICE (\$/Lb.)				YIELD (Lbs	s./1,000LF)			
Fruit	304.00	314.00	324.00	334.00		344.00	354.00	36
3.95	-1,003	-964	-924	-885		-845	-806	
4.30	-897	-854	-811	-768		-725	-682	
4.65	-791	-744	-698	-651		-605	-558	
5.00	-684	-634	-584	-534		-484	-434	
5.35	-578	-524	-471	-417		-364	-310	
5.70	-471	-414	-357	-300		-243	-186	
	-365	-305	-244	-184		-123	-63	

TABLE 5. WHOLE FARM ANNUAL EQUIPMENT OVERHEAD COSTS

High-density Hedgerow with Tillage – 2020

ANNUAL EQUIPMENT COSTS

					Cash Overhead			
Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total	
Kubota B9200	28,000	20	3,593	2,344	140	158	2,641	
Disc	8,000	15	768	791	39	44	873	
TOTAL	36,000	-	4,361	3,134	179	202	3,515	

ANNUAL INVESTMENT COSTS

NONE

ANNUAL BUSINESS OVERHEAD COSTS

NONE

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 6. HOURLY EQUIPMENT COSTS

High-density Hedgerow with Tillage - 2020

	Elderberry		Cash Overl	nead	(Operating		=
Description	Hours Used	Capital Recovery	Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	Total Costs/Hr
Kubota B9200	3	3.91	0.23	0.26	2.53	4.13	6.66	11.06
Disc	2	5.95	0.29	0.33	2.07	0.00	2.07	8.64

TABLE 7. OPERATIONS WITH EQUIPMENT & MATERIALS

High-density Hedgerow with Tillage - 2020

	Operation			Labor Type/	Rate/	
Operation	Month	Tractor	Implement	Material	1,000LF	Unit
Land Prep: Disc/Hill	Apr	Kubota B9200	Disc	Equipment Operator Labor	2 99	hours
Plant Trees	Apr			Planting Labor	37.50	hours
				Trees: Blue Elderberry	167.00	Each
				Landscape Fabric	1.00	Roll
				Plant Tubes	167.00	Each
				Planting Compost	167.00	Tree
Layout Irrigation Lines	Apr			Irrigation Labor	12.45	hours
				Drip Emitters (Woodpecker)	167.00	Each
				Poly Tubing 3/4"	1,000.00	Foot
Irrigation 10x	May			Water	2,580.15	Gal
	June			Water	5,160.30	Gal
	July			Water	5,160.30	Gal
	Aug			Water	5,160.30	Gal
	Sept			Water	5,160.30	Gal
	Oct			Water	2,580.15	Gal
Fertilizer: Backpack	May			Fertilizer Labor	1.66	hours
				Dr. Earth 3-6-2	10.00	FlOz
	June			Fertilizer Labor	1.66	hours
				Dr. Earth 3-6-2	10.00	FlOz
	Aug			Fertilizer Labor	1.66	hours
				Dr. Earth 3-6-2	10.00	FlOz
Plant Replacement Trees	May			Planting Labor	4.00	hours
				Trees: Blue Elderberry	10.00	Each