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SAMPLE COSTS TO ESTABLISH AND PRODUCE ALFALFA HAY

In the Sacramento Valley and Northern San Joaquin Valley Flood Irrigation

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INTRODUCTION

Sample costs to establish and produce alfalfa hay are shown in this study. This study is intended as a guide only. It can be used to help guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Sample costs for labor, materials, equipment, and custom services are based on January 2020 figures. Practices described are based on production practices considered typical for the crop and region, but will not apply to every situation. "Your Costs" columns in Tables 2, 3, 5 and 6 are provided for entering your farm costs. Table 1 shows a summary of annual costs including the establishment period and the four production years. Tables 2-4 show costs per acre for establishing an alfalfa stand. Tables 5-11 show costs for producing alfalfa.

For an explanation of calculations used in the study, refer to the section titled Assumptions. For more information contact Jeremy Murdock, University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651, jmmurdock@ucdavis.edu. The local UC Cooperative Extension offices can be contacted through Michelle Leinfelder-Miles, mmleinfeldermiles@ucanr.edu, Sarah Light, selight@ucanr.edu, and Rachael Long, rflong@ucanr.edu.

Costs and Returns Study Program/Acknowledgements. A costs and returns study is a compilation of specific crop production data collected from meetings with professionals working on alfalfa hay from the study area. The authors thank farmer cooperators, UC Cooperative Extension, and other industry representatives who provided information, assistance, and expert advice. **The use of trade names and farming 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

The assumptions refer to Tables 1 through 11 and pertain to sample costs to establish an alfalfa stand, and produce alfalfa for hay in the Sacramento Valley and northern San Joaquin Valley using flood irrigation. Practices described are not recommendations by the University of California, but rather represent production procedures considered typical of a well-managed farm for the Sacramento Valley and northern San Joaquin Valley. Costs and practices detailed in this study may not be applicable to all situations. Cultural practices and varieties for the production of alfalfa vary by grower and region, so differences in costs may occur. The practices and inputs used in this cost study serve only as a sample or guide. These costs are represented on an annual, per acre basis.

Farm. The hypothetical farm consists of 3,500 non-contiguous acres of field, row, and tree crops of which 300 acres are in alfalfa (220 in production and 80 being established). This study is based on the 80 establishment acres. The 300 acres of alfalfa are rented by the farmer. The remaining 3,200 acres are planted to other crops such as almonds, corn, wheat, processing tomatoes, sunflowers and dry beans.

Table 1 summarizes cost for establishment and production costs for each of the four years of operation. The establishment cost of $773 includes operating and overhear costs. Establishment cash costs are included as non-cash overhead in the annual costs of production for each of the four year. Therefore, to calculate the overall costs of the four-year alfalfa stand it is appropriate to add the costs and revenue across the four operational years. Note that costs differ across the year. Year three in particular has fertilizer and weed control costs that are substantially higher than the other years and larger net losses per ton than the other years. To keep the number of tables in the study more manageable we present detailed costs in Tables 5 and 6 only for year 3. Detailed costs for the other years can be calculated bases on those tables and the information in Table 1.

Stand Establishment Costs
(Tables 2-4)

Tables 2 to 4 show the costs associated with land preparation, fertilizer, planting, weed control, equipment, and labor for establishing a flood irrigated alfalfa stand. Land preparation, and planting are done early fall. The establishment year ends after the herbicide application late fall at the 3-5 trifoliate leaf stage. While some spring planting is done in this region, fall planting is more common, and UCCE recommends an early fall planting window (Sept.-October). It is assumed that a crop was harvested prior to establishing alfalfa in that same year, therefore no land cost and property taxes for that year was assigned to the alfalfa establishment. The reasoning is that the land would not have been planted to any other crop in the fall and thus there was no cost to be assigned to the land in the fall.

Land Preparation. Stand establishment begins with a stubble disc and roller to incorporate the residue from the previous crop. The ground is chiseled to a depth of 18 to 24 inches to fracture the soil to improve water infiltration and root growth. The field is disced to break up large clods, creating better seed-to-soil contact at planting for good seed germination. A GPS (Global Positioning System) drag scraper levels and smooths

the field. Borders/checks are pulled every 50 feet down the length of the field. Costs for tractor mounted GPS systems are used for field operations and the costs are included in this study. Healthy alfalfa stands compete well against weeds, insects, and diseases, so it is important to spend time on land preparation to ensure a dense and vigorous stand.

Fertilization. Nitrogen (N) and phosphorus (P) as 11-52-0 at 200 pounds per acre of material and sulfur (S) at 200 pounds per acre is typically applied by a custom operator in September during field work. Prior to planting, the PCA/CCA collects one composite soil sample per 20 acres and has it analyzed by a lab for phosphorous (P) and potassium (K). This is especially important when alfalfa follows a crop like processing tomatoes, where there may be high residual levels of phosphorus left over in the soil after harvest, affecting P application rate. The amount of sulfur given is sufficient to supply crop needs for four to six years, and the amount of phosphorus for two years. In this cost study the pre-plant fertilizer costs are charged to the establishment year and amortized over the 4 year life of the stand.

Planting. Select an alfalfa variety with specific characteristics that are best adapted to your region, including fall dormancy (FD) rating and pest and disease resistance levels needed for your production field. Varieties can be found at **NAFA,** National Alfalfa and Forage Alliance website and the UC ANR Alfalfa website, **Alfalfa and Forages.** Alfalfa seed is planted with a Brillion seeder, air seeder or calibrated grain drill at ¼ inch depth, at 20 pounds of seed per acre. For this study, seeding occurs in September and the stand life is four years starting the following year. Roundup Ready seed is used at a cost of $8.00 per pound, of which $3.50 is a Roundup-Ready technology fee and $4.50 is the cost of seed itself. Note: an additional trait is available in alfalfa (HarvXtra) which confers higher-quality hay. This trait is stacked with Roundup-Ready and currently is marketed $6.00/lb (in addition to the seed cost). The seed often comes coated with a specific Rhizobial bacteria (Sinorhizobium meliloti) inoculant needed for nitrogen fixation if not, inoculation is recommended. Approximately 35% of the weight of the seed is typically accounted for by clay seed coatings. The field is rolled before and sometimes after planting to firm the seed bed.

Irrigation. In this study, a combination of district irrigation water and pumped ground water is used. Three acre-inches of water is flood irrigated as a pre-irrigation prior to planting. After planting three acre-inches of water is applied by sprinklers during three separate irrigation events (one acre-inch per irrigation). One hour of irrigation labor per acre has been included for moving the irrigation pipe. Water is pumped into lines and through a booster pump into the main lines that are attached to the sprinkler lines running the length of the field every 50-60 feet apart. Water and pumping costs are estimated at $100 per acre foot, ($8.33 per acre inch).

Pest Management. The pesticides, rates, and application practices mentioned in this cost study are listed in the *UC IPM Pest Management Guidelines – Alfalfa.* **Pesticides mentioned in this study are not recommendations, but those commonly used in the region**. For information and pesticide use permits, contact the local county Agricultural Commissioner's office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at http://ipm.ucanr.edu/. **Pest control costs can vary considerably each year depending upon local conditions and pest populations in any given year.**

Pest Control Adviser. Written recommendations are required for all pesticides and are available from licensed pest control advisors (PCA) that monitor fields for agronomic practices, including irrigation and nutrition needs. Growers may hire a private PCA or receive production services as part of a service agreement with an agricultural chemical and fertilizer company. For costs, it is assumed in this study that PCA and certified crop advisor (CCA) services are provided by an Agricultural Company.

Weeds. With Roundup Ready alfalfa planted, the broad spectrum post-emergent herbicide Roundup

PowerMax is used for weed control. Weed control with Roundup PowerMax is used late fall, at the 3-5 trifoliate leaf stage, when weeds are less than 4 inches tall. In year 3, Velpar is tank mixed with Roundup for control of problematic weeds, like those with Roundup tolerance or resistance.

Conventional Stand Establishment. Although this sample budget is based upon Roundup-ready seed with Roundup applied at planting, conventional planting would include lower-cost conventional seed (at $4.50/lb.), and use of higher-cost conventional herbicides for establishment as well as during the life of the stand. See UC IPM website at http://ipm.ucanr.edu/ for review of stand establishment methods and weed control strategies.

Equipment for Establishment. Table 4 lists the equipment used during establishment of the alfalfa and overhead costs of ownerships. This equipment is used on other crops and only a small portion of these overhead costs (shown in Table 2) are attributed to alfalfa establishment on these 80 acres.

Production Costs

(Tables 5-11)

Production costs, after the alfalfa hay is established, are shown in Tables 5-11. Tables 5 and 6 show the production costs associated with equipment, pest control, irrigation, labor, and harvesting alfalfa. As noted above, the detailed numbers differ in some particulars across years in Table 1, and the Tables 5-11 apply specifically to year 3.

Irrigation. Irrigation costs include water costs, pumping and labor expenses. From April to September, (twice in July) 7 irrigations totaling 3.5 acre-feet, (42 inches) of water are applied through a gravity-powered flood irrigation system. The actual water needed will vary each year based on soil type, rainfall, and plant growth. Water is pumped into a ditch and syphon tubes are used to pull water from the ditch into the alfalfa checks, flooding them. The head ditch and tail levees for drainage water are cleaned and restored in April before the first irrigation.

Fertilization. Once the stand is established, plant tissue samples are taken from the fourth or fifth cutting toward the end of the second production year to determine nutrient needs (P, K, S, and micronutrients) for the following 2-years of the stand life. Costs shown in Tables 5 and 6 are for the analysis based on plant samples collected by the PCA/CCA. In this study, after year two (beginning of year three), 11-52-0 at 200 pounds per acre is applied in January for a total of 400 pounds of P per acre for the total life of the four-year stand. Subsequent micro-nutrient fertilizers are applied as needed from tissue analysis and PCA/CCA recommendations. Summer tissue samples are omitted in year three and four (year 4, end of the stand life).

Pest Management during Production Years

Weeds. In Year 1 of the production stage, Roundup PowerMax is used in February. In year 2, Roundup is applied in December. In year 3, Roundup is tank mixed with the herbicide Velpar (to get a broader spectrum of weeds that Roundup may miss) and applied in December. In year 4, Roundup is applied in June for controlling summer grasses. All herbicides are applied with an ATV pulled sprayer. Pre-emergence or contact herbicides with different active ingredients should be rotated with Roundup as needed during production years to combat weed species shift and resistance.

Insects. Alfalfa weevil, aphids, alfalfa caterpillar, and armyworms are the key pests of alfalfa that cause the most economic damage. Weevils and aphids are assumed to reach population levels requiring a single treatment for control for which the insecticide (Warrior II) is applied in March. Worms, alfalfa caterpillar and armyworms are controlled in July and August with insecticides (Coragen and Intrepid).

Vertebrate Pest Control. Pocket gophers and meadow mice are the main vertebrate pests that can cause damage in alfalfa stands. Control is usually trapping or poison bait, depending on the pest causing the damage, applied by hand or mechanically. Flood irrigations deter rodents and most growers do not treat unless the populations are severe enough to cause economic loss. Rodent pests control measures are not included in this study.

Harvest. In this study, alfalfa is harvested for hay by the grower seven times per year with four field operations per harvest. Harvest months are April, May, June, July (twice), August, and September. Alfalfa for hay is cut with a self-propelled swather and left to dry for several days before it is turned and windrowed using a rake. All harvest operations are performed inside of the head ditch and tailwater drain. Once the hay has dried to the correct moisture content, it is baled into 100 pound to 125 pound small bales or 1,300 pounds for large bales. The bales are picked up with a bale wagon that moves them from the field and roadsides them (picks up bales and puts in stacks), using the grower's equipment, at a cost of $37/ton including roadsiding. For this study we are using 1,300-pound bales. The moisture content of alfalfa growing in the field is generally between 75% and 83%. Optimum moisture for raking is 35% to 40%. The optimum moisture content for baling large 1,300-pound bales is 14%.

Custom Harvest. Some hay harvesting companies swath, rake, bale, and roadside (haul and stack bales near field) for a fee based upon tonnage. Current prices are $40/ton in the Central Valley for this service.

Yields. The crop is assumed to yield 7.0 tons of hay per acre at 90% dry matter (DM). Annual yields range from 5.0 to 12.0 tons of hay per acre in this region when flood irrigation is used.

Returns. A price of $225 per ton for premium hay is based on current USDA California 2019-2020 averages over all grades for the Sacramento and Northern San Joaquin Valley market districts. Hay prices and hay quality will vary during the season and by district. Prices are largely determined by supply and demand factors and quality. USDA alfalfa hay quality standards are Supreme, Premium, Good, Fair, and Utility, with Supreme garnering the highest price. Price may vary in any given year by $50-100/ton (from high to low quality) based upon quality and season. For this study Table 7 shows grower returns compared to costs over a range of yields and prices.

Pickups/ATV. The ½ ton pickup is used for irrigation, on road transportation and farm work. The ¾ ton pickup is for business purposes as needed. The ATV is used for pesticide applications, in-field gopher scouting and off-road transportation.

Labor, Equipment and Interest

Labor. Hourly wages for workers are $16.00 per hour for machine operators and $13.50 per hour non-machine labor. Adding 46 percent for the employer's share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of $23.36 and $19.71 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 field crops and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers. The cost is based on the average industry rate as of January 2020. Labor for operations involving machinery are 20 percent higher than the operation time given to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

California Minimum Wage and Overtime Rules. In 2016, The California State Government passed new legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate (for 2020 is $13.00 per hour) for companies with more than 25 employees and will rise

each year by $1.00 per hour until it reaches $15.00 per hour in 2022. Businesses with 25 or fewer employees are given an additional year to comply with the changes. For businesses with 25 or fewer employees, the minimum wage rate is $12 per hour for 2020; thereafter, their minimum wage rate increases by $1.00 per hour each year to $15.00 per hour in 2023.

Recent California regulations also decrease the overtime threshold—the number of hours required to be worked before overtime benefits are received—for agricultural workers. The regulations decrease the overtime threshold for agricultural workers from 50 hours per week and 9 hours per day in 2020 by 5.0 hours per week and 0.5 hours per day each year until it reaches 40 hours per week and 8.0 hours per day in 2022. Businesses with 25 or fewer employees are given an additional three years to comply with the regulation's changes. In 2020 (2022 for employers with 25 or fewer employees) employees are also entitled to overtime for 8 hours on the seventh consecutive day of work.

These regulations may cause increased cost of labor used on farms, whether as direct hires, as farm labor contractor employees or as a component of custom services. The 'Your Cost' column allows for adding in additional labor costs.

Equipment Operating Costs. Equipment 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 and Biological Engineers (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum power takeoff (PTO) horsepower and fuel type. Average prices for on-farm delivery of diesel and gasoline based on January 2020 data from the Energy Information Administration are $3.73 and $3.46 per gallon, respectively. The cost includes a 13.0 percent sales tax and $0.36/gal excise tax on diesel fuel, and a 10.17 percent sales tax and $0.42/gal excise tax on gasoline. It is noted that federal and state excise taxes are refundable for on-farm use when filing the farm income tax return. The fuel, lube, and repair cost per acre for each operation is determined by multiplying the total hourly operating cost 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 5.25 percent per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post-harvest operations is discounted back to the last harvest month using a negative interest charge. The rate will vary depending upon various factors, but the rate is considered a typical lending rate by a farm lending agency as of January 2020.

Risk. Production risks should not be minimized. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks, which affect the profitability and economic viability of alfalfa hay production.

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 can include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, equipment repairs, and management.

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. County taxes are calculated as one percent of the average value of the property. Average value equals new cost plus salvage value divided by two on a per acre basis.

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

Property Insurance. This cost provides coverage for property loss and is charged at 0.886 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 an employer becomes legally obligated to pay for bodily injury claims on the property and damages to another person's property as a result of a covered accident. Common liability expenses covered under the policy include attorney fees and court costs, medical expenses for people injured on the property, and injury or damage to another's property. Liability insurance costs $1,841 per year for the entire farm or 0.53 cents per acre.

Office Expense. Office and business expenses are estimated at $20 per acre. The total cost is $1,600 for the 80 acres of alfalfa production. These expenses include office supplies, telephones, bookkeeping, accounting, office utilities, and miscellaneous administrative charges.

Field Supervisors' Salary. Supervisor salaries for alfalfa include insurance, payroll taxes, benefits and bonuses. About two percent of a full time supervisor salary ($136,000) is allocated to this 80 acre stand of alfalfa. The costs used in this study are $34.00 per acre, or $2,720 for the 80 acres of alfalfa.

Land Rent. In this study the land for the alfalfa operation is rented for $300 per acre, which is for moderate quality land with acceptable access to irrigation water. In recent years, alfalfa has not been competitive for land in this region that is suitable for tree nuts.

Water Quality Coalition Fees. Central Valley Water Quality Coalitions were established within defined districts to help irrigated agriculture meet the requirements of the California Regional Water Quality Control Board's (RWQCB) Irrigated Lands Regulatory Program (ILRP). The fees vary by district, averaging $3.75 per acre, a cost used in this study.

Investment Repairs. Annual repairs on investments or capital recovery items that require maintenance are calculated as 2% of the purchase price. Repairs are not calculated for land and establishment costs.

Non-Cash Overhead

Non-cash overhead costs, shown on an annual per-acre basis, are calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman 1984). 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 and Biological Engineers (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 the operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 5.

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

Interest Rate. An interest rate of 5.50 percent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2020.

Shop Building. A shop building is used for equipment maintenance and repair, parts and supply storage, a bathroom, and houses the farm's office. The building encompasses 8,000 square feet, has a concrete floor, and is wired and plumbed as needed to meet building codes.

Hay Barn. The open barn with a metal roof covers 5,000 square feet and is 20 feet high. The building's ten support poles are on concrete piers with a natural dirt floor.

Tools. This includes shop tools, hand tools, and miscellaneous field tools. The tools are an estimated value and not taken from any specific data.

Irrigation System. The established permanent irrigation system consists of wells, pumps, buried mainline and valves which are included in the value of the land. A ditch is pulled using a tractor and ditcher (3-point blade), at the head of the field and syphon tubes are used to flood the checks. A similar ditch is made at the ends of fields to drain irrigation tail water.

The sprinkler irrigation system consists of pipes & risers, main and laterals lines, valve openers/bonnets and booster pumps owned by grower and shown under non-cash overhead.

Land. Cropland with district water suitable for alfalfa production typically ranges in value among counties from $10,000 to $22,000 per acre. As noted, land in this study is rented by the grower for $300 per acre.

Fuel Tanks. Two 5,000-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

Establishment Costs. Costs to establish the alfalfa stand are used to determine capital recovery expenses, depreciation, and interest on investment, during the production years. The establishment cost is the sum of cash costs for land preparation, planting, and cash overhead for establishing the alfalfa. The Total Cash Costs and Non-Cash Overhead Costs shown in Table 2 represents the establishment cost per acre. Establishment costs include non-cash overhead for equipment used in establishment as a share of the whole farm equipment overhead. For this study, the cost is $721 per acre or $57,680 for the 80 acres. The alfalfa stand establishment cost is amortized over the 4-year stand life.

Equipment. Farm equipment is purchased new or used, 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 non-cash overhead includes the share of equipment used for production on this 80-acre alfalfa stand of the total equipment cost for the full 3,500 acre operation. 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. SUMMARY OF COSTS FOR ALFALFA HAY- PER ACRE OVER YEARS
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

Operations	Establishment-Year	Year-1	Year-2	Year-3	Year-4
Cultural:					
Land Prep	114				
Soil Sample	4				
Fertilizer	146			86	
Pre-Irrigate (Flood)	45				
Cultivate- Harrow	9				
Plant-Roll-Cover Seed	179				
Irrigate-Sprinkler 3X	83				
Irrigate-Flood 7X		527	527	527	527
Ditch/tail drain		34	34	34	34
Weed Control	9	9	9	67	9
Insect Control		34	41	41	41
Tissue Samples			11		
Farm Trucks	43	44	44	44	44
TOTAL CULTURAL COSTS	631	648	665	798	655
Harvest:					
Harvest (All operations)		290	290	290	290
TOTAL HARVEST COSTS		290	290	290	290
Interest on Operating Capital at 5.25%	9	13	13	19	13
TOTAL OPERATING COSTS/ACRE	640	950	968	1,107	956
CASH OVERHEAD COSTS/ACRE	81	385	385	385	385
TOTAL CASH COSTS/ACRE	**721**	1,335	1,352	1,491	1,341
NON-CASH OVERHEAD COSTS/ACRE	52	353	353	353	353
TOTAL COSTS/ACRE	773	1,687	1,705	1,844	1,694
TOTAL COSTS/TON		241	244	263	242
GROSS RETURN/TON		225	225	225	225
NET RETURN /TON		-16	-19	-38	-17

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TABLE 2. COSTS PER ACRE TO ESTABLISH AN ALFALFA STAND
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Stubble Disc (previous crop residue)	0.13	4	8	4	0	0	16	
Rip 18-24 inches	0.13	4	8	4	0	0	16	
Stubble Disc & Ring Roll 2X	0.27	8	17	8	0	0	32	
Drag Scraper (GPS level & smooth)	0.15	4	9	3	0	0	17	
Soil Samples	0.00	0	0	0	0	4	4	
Fertilize 11-52-0	0.00	0	0	0	122	24	146	
Finish Disc & Roll 2X	0.19	5	10	5	0	0	20	
Pull Border/Checks	0.14	4	7	2	0	0	13	
Pre-Irrigate (Flood)	0.00	20	0	0	25	0	45	
Cultivate- Harrow (weed control, break crust)	0.08	2	5	2	0	0	9	
Plant-Roundup Ready Seed	0.33	9	6	3	160	0	179	
Sprinkler Irrigate 3X	1.00	48	8	1	25	0	83	
Weed Control-Roundup PowerMax	0.05	1	0	0	8	0	9	
Service Truck	0.25	7	3	1	0	0	11	
1/2 Ton Pickup	0.37	10	3	2	0	0	15	
3/4 Ton Pickup (Farm use)	0.40	11	4	2	0	0	17	
TOTAL CULTURAL COSTS	3.49	138	89	37	339	28	631	
Interest on Operating Capital at 5.25%							9	
TOTAL OPERATING COSTS/ACRE	3	138	89	37	339	28	640	
CASH OVERHEAD:								
Office Expense							20	
Supervisor Salary							34	
Liability Insurance							1	
Miscellaneous Costs							20	
GPS Annual Activation Fee							2	
Water Quality Coalition Fees							4	
Investment Repairs							1	
TOTAL CASH OVERHEAD COSTS/ACRE							81	
TOTAL CASH COSTS/ACRE							721	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Fuel Tanks Overhead		3		0			0	
Shop Tools		6		0			0	
GPS Sending Unit		2		0			0	
GPS Receivers (2)		1		0			0	
Sprinkler Pipe		10		1			1	
Pipe Main Line 10" 1/2 Mile		8		1			1	
Syphon Tubes 1.5" (400)		1		0			0	
Equipment		397		49			49	
TOTAL NON-CASH OVERHEAD COSTS		427		52			52	
TOTAL COSTS/ACRE							773	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. MATERIAL AND INPUT COSTS TO ESTABLISH ALFALFA
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Hay	0	Ton	225.00	0	
TOTAL GROSS RETURNS	0	Ton		0	
OPERATING COSTS					
Fertilizer:				**122**	
11-52-0	200.00	Lb	0.37	74	
Elemental Sulfur	200.00	Lb	0.24	48	
Custom:				**28**	
Soil Test P	1.00	Acre	2.00	2	
Soil Test K	1.00	Acre	2.00	2	
Ground Fertilizer Application	2.00	Acre	12.00	24	
Seed:				**160**	
Alfalfa Seed RR	20.00	Lb	4.50	90	
Seed Tech Fee	20.00	Lb	3.50	70	
Herbicide:				**8**	
Roundup PowerMax	2.00	Pint	3.75	8	
Irrigation:				**50**	
Water- District & Pumped	6.00	AcIn	8.33	50	
Labor				**118**	
Equipment Operator Labor	4.19	hrs	23.36	98	
Irrigation Labor	2.00	hrs	19.71	19	
Machinery				**126**	
Fuel-Gas	2.17	gal	3.40	7	
Fuel-Diesel	21.68	gal	3.75	81	
Lube				13	
Machinery Repair				24	
Interest on Operating Capital @ 5.25%				9	
TOTAL OPERATING COSTS/ACRE				640	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4. WHOLE FARM ANNUAL EQUIPMENT COSTS-ESTABLISHMENT YEAR
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
19	205HP Crawler	233,353	10	68,929	25,605	134	1,511	27,250
19	Disc - Stubble 18'	45,000	5	14,658	7,912	26	298	8,236
19	Border-Ridger	19,625	10	3,702	2,316	10	117	2,443
19	Disc - Finish 25'	65,000	10	11,495	7,731	34	382	8,147
19	Ringroller - 25'	29,000	10	5,128	3,449	15	171	3,635
19	95HP2WD Tractor	60,035	10	17,733	6,587	34	389	7,011
19	Brillion Seeder 12'	17,235	7	4,397	2,501	10	108	2,619
19	Booster Pump #1	11,000	10	1,945	1,308	6	65	1,379
19	ATV	8,500	5	3,809	1,308	5	62	1,375
19	Irrigation Pipe Trailer #1	2,141	25	65	158	1	11	170
19	Service Truck	47,000	5	21,064	7,232	30	340	7,603
19	Pickup 3/4 Ton	42,000	5	18,823	6,463	27	304	6,794
19	Pickup 1/2 Ton	32,000	5	14,342	4,924	21	232	5,176
19	260HP4WD Tractor	341,906	10	100,994	37,516	196	2,214	39,927
19	Rice Roller-18'	15,552	10	2,750	1,850	8	92	1,949
19	ATV Sprayer System	9,700	10	1,715	1,154	5	57	1,216
19	Laser Plane Bucket & GPS System	24,000	10	4,244	2,854	13	141	3,008
19	Chisel - Heavy 25'	51,218	10	9,057	6,092	27	301	6,420
19	Spring Tooth Harrow- 18’	18,300	10	3,236	2,176	10	108	2,294
	TOTAL	1,072,565	-	308,088	129,135	612	6,903	136,650
	60% of New Cost*	643,539	-	184,853	77,481	367	4,142	81,990

*Used to reflect a mix of new and used equipment

Note: The list of equipment is used for alfalfa establishment. The equipment is used on a total of 3,500 acres. Costs listed apply to the whole farm. The 80 acres of alfalfa in this cost study are allocated a small share of these equipment costs as shown in Table 2.

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 5. COSTS PER ACRE TO PRODUCE ALFALFA HAY
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

Operation	Operation Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
			Cash and Labor Costs per Acre					
Cultural:								
Weeds-Roundup PowerMax	0.05	1	0	0	65	0	67	
Fertilizer 11-52-0	0.00	0	0	0	74	12	86	
Insects-Aphids/Weevil-Warrior II	0.05	1	0	0	5	0	7	
Irrigation-Ditch/Tail Levee	0.38	11	17	5	0	0	33	
Irrigate-Flood 6X	0.00	0	0	0	350	0	350	
Insects-Worms Coragen	0.05	1	0	0	14	0	16	
Insects-Worms Intepid	0.05	1	0	0	16	0	18	
Irrigation Labor	0.00	177	0	0	0	0	177	
Pickup 1/2 Ton	0.47	13	4	2	0	0	19	
Pickup 3/4 Ton	0.40	11	4	2	0	0	17	
Service Truck	0.20	6	2	1	0	0	8	
TOTAL CULTURAL COSTS	1.65	224	28	11	524	12	798	
Harvest:								
Harvest-Swathing	0.75	21	25	16	0	0	62	
Harvest-Raking	0.60	17	5	4	0	0	25	
Harvest-Baling	0.93	26	34	39	7	0	105	
Harvest-Roadsiding	0.93	26	32	39	0	0	97	
TOTAL HARVEST COSTS	3.22	90	95	98	7	0	290	
Interest on Operating Capital at 5.25%							19	
TOTAL OPERATING COSTS/ACRE	5	314	122	108	531	12	1,107	
CASH OVERHEAD:								
Office Expense							20	
Miscellaneous Costs							20	
Supervisor Salary							34	
Liability Insurance							1	
Water Quality Coalition Fees							4	
Land Rent							300	
Property Taxes							4	
Property Insurance							0	
Investment Repairs							2	
TOTAL CASH OVERHEAD COSTS/ACRE							385	
TOTAL CASH COSTS/ACRE							1,491	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Fuel Tanks Overhead		3		0			0	
Shop Tools		6		0			0	
Hay Barn/Pole Barn		21		2			2	
GPS Sending Unit		2		0			0	
GPS Receivers (2)		1		0			0	
Sprinkler Pipe		10		1			1	
Pipe Main Line 10" 1/2 Mile		8		1			1	
Shop 8,000 sqft		46		4			4	
Establishment- Alfalfa		721		206			206	
Irrigation Pipe Trailer (5)		3		0			0	
Syphon Tubes 1.5" (400)		1		0			0	
Equipment		1,103		138			138	
TOTAL NON-CASH OVERHEAD COSTS		1,924		353			353	
TOTAL COSTS/ACRE							1,844	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA HAY
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Hay	7	Ton	225.00	1,575	
TOTAL GROSS RETURNS	7	Ton		1,575	
OPERATING COSTS					
Fertilizer:				**74**	
11-52-0	200.00	Lb	0.37	74	
Custom:				**12**	
Ground Application	1.00	Acre	12.00	12	
Herbicide:				**65**	
Roundup PowerMax	2.00	Pint	3.75	8	
Velpar L	4.00	Pint	14.41	58	
Insecticide:				**35**	
Warrior II	1.50	floz	3.35	5	
Coragen	2.00	floz	7.03	14	
Intrepid DF	8.00	floz	2.03	16	
Irrigation:				**350**	
Water- District & Pumped	42.00	AcIn	8.33	350	
Miscellaneous:				**7**	
Bale Twine	0.98	Acre	7.00	7	
Labor				**314**	
Equipment Operator Labor	5.84	hrs	23.36	136	
Irrigation Labor	9.00	hrs	19.71	177	
Machinery				**231**	
Fuel-Gas	2.56	gal	3.40	9	
Fuel-Diesel	30.31	gal	3.75	114	
Lube				18	
Machinery Repair				90	
Interest on Operating Capital @ 5.25%				19	
TOTAL OPERATING COSTS/ACRE				1,107	
TOTAL OPERATING COSTS/TON				158	
NET RETURNS ABOVE OPERATING COSTS				468	
CASH OVERHEAD COSTS					
Office Expense				20	
Miscellaneous Costs				20	
Supervisor Salary				34	
Liability Insurance				1	
Land Rent				300	
Property Taxes				4	
Property Insurance				0	
Water Quality Coalition Fees				4	
Investment Repairs				2	
TOTAL CASH OVERHEAD COSTS/ACRE				385	
TOTAL CASH OVERHEAD COSTS/TON				55	
TOTAL CASH COSTS/ACRE				1,491	
TOTAL CASH COSTS/TON				213	
NET RETURNS ABOVE CASH COSTS				84	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Fuel Tanks Overhead				0	
Shop Tools				0	
Hay Barn/Pole Barn				2	
GPS Sending Unit				0	
GPS Receivers (2)				0	
Sprinkler Pipe				1	
Pipe Main Line 10" 1/2 Mile				1	
Shop 8,000 sq. ft.				4	
Establishment- Alfalfa				206	
Irrigation Pipe Trailer (5)				0	
Syphon Tubes 1.5" (400)				0	
Equipment				138	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				353	
TOTAL NON-CASH OVERHEAD COSTS/TON				50	
TOTAL COST/ACRE				1,844	
NET RETURNS/ACRE ABOVE TOTAL COST				-269	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 7. MONTHLY COSTS PER ACRE TO PRODUCE ALFALFA HAY
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

	DEC 19	JAN 20	FEB 20	MAR 20	APR 20	MAY 20	JUN 20	JUL 20	AUG 20	SEP 20	Total
Cultural:											
Weeds-Roundup PowerMax & Velpar	67										67
Fertilizer 11-52-0		86									86
Insects-Aphids/Weevil-Warrior II				7							7
Irrigation-Head Ditch/Tail Drain					12			8		13	33
Irrigate-Flood 7X					50	50	50	100	50	50	350
Insects-Worms Coragen								16			16
Insects-Worms Intrepid									18		18
Irrigation Labor										177	177
Pickup 1/2 Ton	2	2	2	2	2	2	2	2	2	2	19
Pickup 3/4 Ton	2	2	2	2	2	2	2	2	2	2	17
Service Truck	1	1	1	1	1	1	1	1	1	1	9
TOTAL CULTURAL COSTS	71	91	5	11	67	55	55	129	73	244	798
Harvest:											
Harvest-Swathing					9	9	9	18	9	9	62
Harvest-Raking					4	4	4	7	4	4	25
Harvest-Baling					15	15	15	30	15	15	105
Harvest-Roadsiding					14	14	14	28	14	14	97
TOTAL HARVEST COSTS	0	0	0	0	41	41	41	85	41	41	290
Interest on Operating Capital @5.25%	0	1	1	1	1	2	2	3	4	5	19
TOTAL OPERATING COSTS/ACRE	71	92	6	12	110	98	99	217	119	291	1,107
CASH OVERHEAD											
Office Expense										20	20
Miscellaneous Costs										20	20
Supervisor Salary	3	3	3	3	3	3	3	3	3	3	34
Liability Insurance										1	1
Water Quality Coalition Fees										4	4
Land Rent		300									300
Property Taxes		2						2			4
Property Insurance		0						0			0
Investment Repairs	0	0	0	0	0	0	0	0	0	0	2
TOTAL CASH OVERHEAD COSTS	4	306	4	4	4	4	4	6	4	48	385
TOTAL CASH COSTS/ACRE	75	397	9	16	114	102	102	195	126	339	1,491

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 8. RANGING ANALYSIS – ALFALFA HAY
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

COSTS PER ACRE AND PER TON AT VARYING YIELDS TO PRODUCE ALFALFA HAY

	YIELD (TON)						
	4.00	5.00	6.00	7.00	8.00	9.00	10.00
OPERATING COSTS/ACRE:							
Cultural	798	798	798	798	798	798	798
Harvest	165	207	248	290	331	372	414
Interest on Operating Capital @ 5.25%	17	18	18	19	19	20	21
TOTAL OPERATING COSTS/ACRE	981	1,023	1,064	1,107	1,148	1,190	1,232
TOTAL OPERATING COSTS/TON	245.13	204.50	177.42	158.08	143.56	132.27	123.24
CASH OVERHEAD COSTS/ACRE	385	385	385	385	385	385	385
TOTAL CASH COSTS/ACRE	1,365	1,407	1,449	1,491	1,533	1,575	1,617
TOTAL CASH COSTS/TON	341.34	281.47	241.56	213.05	191.66	175.03	161.73
NON-CASH OVERHEAD COSTS/ACRE	353	353	353	353	353	353	353
TOTAL COSTS/ACRE	1,718	1,760	1,802	1,844	1,886	1,928	1,970
TOTAL COSTS/TON	430.00	352.00	300.00	263.00	236.00	214.00	197.00

Net Return per Acre above Operating Costs for Alfalfa Hay

PRICE ($/ton)	YIELD (ton/acre)						
Hay	4.00	5.00	6.00	7.00	8.00	9.00	10.00
150.00	-381	-273	-164	-57	52	160	268
175.00	-281	-148	-14	118	252	385	518
200.00	-181	-23	136	293	452	610	768
225.00	-81	102	286	468	652	835	1,018
250.00	19	227	436	643	852	1,060	1,268
275.00	119	352	586	818	1,052	1,285	1,518
300.00	219	477	736	993	1,252	1,510	1,768

Net Return per Acre above Cash Costs for Alfalfa Hay

PRICE ($/ton)	YIELD (ton/acre)						
Hay	4.00	5.00	6.00	7.00	8.00	9.00	10.00
150.00	-765	-657	-549	-441	-333	-225	-117
175.00	-665	-532	-399	-266	-133	0	133
200.00	-565	-407	-249	-91	67	225	383
225.00	-465	-282	-99	84	267	450	633
250.00	-365	-157	51	259	467	675	883
275.00	-265	-32	201	434	667	900	1,133
300.00	-165	93	351	609	867	1,125	1,383

Net Return per Acre above Total Costs for Alfalfa Hay

PRICE ($/ton)	YIELD (ton/acre)						
Hay	4.00	5.00	6.00	7.00	8.00	9.00	10.00
150.00	-1,118	-1,010	-902	-794	-686	-578	-470
175.00	-1,018	-885	-752	-619	-486	-353	-220
200.00	-918	-760	-602	-444	-286	-128	30
225.00	-818	-635	-452	-269	-86	97	280
250.00	-718	-510	-302	-94	114	322	530
275.00	-618	-385	-152	81	314	547	780
300.00	-518	-260	-2	256	514	772	1,030

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 9. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

ANNUAL EQUIPMENT COSTS (3,500 ACRES)

						Cash Overhead		
Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
20	ATV	8,500	5	3,809	1,308	5	62	1,375
20	ATV Sprayer System	9,700	10	1,715	1,154	5	57	1,216
20	Pickup 3/4 Ton	42,000	5	18,823	6,463	27	304	6,794
20	Bale Wagon 1300# Attm	148,625	8	31,320	20,241	80	900	21,220
20	150HP4WD Tractor	163,954	10	48,429	17,990	94	1,062	19,146
20	Baler1300# PTO	145,000	10	25,642	17,245	76	853	18,174
20	37HP 4WD Tractor	19,697	10	5,818	2,161	11	128	2,300
20	Rake 20'	32,500	10	5,747	3,865	17	191	4,073
20	Swather 16'	148,000	10	26,173	17,602	77	871	18,550
20	Service Truck	47,000	5	21,064	7,232	30	340	7,603
20	Pickup 1/2 Ton	32,000	5	14,342	4,924	21	232	5,176
20	Rear Blade - 8'	8,000	15	768	763	4	44	810
20	205HP Crawler	233,353	10	68,929	25,605	134	1,511	27,250
20	Ditcher - V	8,631	12	1,195	928	4	49	982
	TOTAL	1,046,960	-	273,776	127,481	585	6,604	134,670
	60% of New Cost*	628,176	-	164,266	76,489	351	3,962	80,802

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Repairs	Total
INVESTMENT								
Fuel Tanks Overhead	10,975	20	0	918	5	55	220	1,198
Shop Tools	20,000	20	2,000	1,616	10	110	400	2,136
Hay Barn/Pole Barn	75,000	20	0	6,276	33	375	1,500	8,184
GPS Sending Unit	5,895	10	413	750	3	32	118	902
GPS Receivers (2)	3,990	10	279	508	2	21	80	611
Sprinkler Pipe	33,865	20	3,387	2,737	17	186	677	3,616
Pipe Main Line 10" 1/2 Mile	26,892	10	2,690	3,359	13	148	250	3,770
Shop 8,000 sq. ft.	160,000	20	0	13,389	71	800	3,200	17,460
Establishment- Alfalfa	57,680	4	0	16,456	26	288	0	16,770
Irrigation Pipe Trailer (5)	10,705	10	2,500	1,226	6	66	200	1,498
Syphon Tubes 1.5" (400)	2,400	20	100	198	1	13	25	237
TOTAL INVESTMENT	407,402	-	11,369	47,432	186	2,094	6,670	56,382

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Office Expense	80	Acre	20.00	1,600
Miscellaneous Costs	80	Acre	20.00	1,600
Supervisor Salary	80	Acre	34.00	2,720
Liability Insurance	80	Acre	0.53	42
Water Quality Coalition Fees	80	Acre	3.75	300
Land Rent	80	Acre	300.00	24,000

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 10. HOURLY EQUIPMENT COSTS
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

Yr.	Description	Alfalfa Hay Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating			Total Costs/Hr.
					Insurance	Taxes	Lube& Repairs	Fuel	Total Oper.	
20	ATV	16	400	1.96	0.01	0.09	1.14	3.40	4.54	6.60
20	ATV Sprayer System	16	150	4.61	0.02	0.23	2.60	0.00	2.60	7.46
20	Pickup 3/4 Ton	32	400	9.69	0.04	0.46	4.65	10.20	14.85	25.04
20	Bale Wagon 1300# Attm	82	250	48.58	0.19	2.16	38.23	31.12	69.35	120.28
20	150HP4WD Tractor	97	1600	6.75	0.04	0.40	9.20	32.65	41.85	49.03
20	Baler1300# PTO	75	300	34.49	0.15	1.71	31.57	0.00	31.57	67.92
20	37HP 4WD Tractor	53	1600	0.81	0.00	0.05	1.54	6.81	8.35	9.22
20	Rake 20'	48	250	9.28	0.04	0.46	4.57	0.00	4.57	14.35
20	Swather 16'	66	300	35.20	0.15	1.74	19.08	30.00	49.08	86.18
20	Service Truck	16	1000	4.34	0.02	0.20	3.12	11.25	14.37	18.93
20	Pickup 1/2 Ton	37	400	7.39	0.03	0.35	4.42	8.50	12.92	20.69
20	Rear Blade - 8'	13	200	2.29	0.01	0.13	1.20	0.00	1.20	3.63
20	205HP Crawler	19	1600	9.60	0.05	0.57	12.82	44.61	57.44	67.66
20	Ditcher - V	17	166	3.36	0.02	0.18	2.37	0.00	2.37	5.92

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 11. OPERATIONS WITH EQUIPMENT & MATERIALS
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2020

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Weeds-Herbicide	Dec		ATV	Equipment Operator Labor	0.06	hour
				Roundup PowerMax	2.00	Pint
			ATV Sprayer System	Velpar L	4.00	Pint
Fertilizer 11-52-0	Jan			11-52-0	200.00	Lb
				Ground Application	1.00	Acre
Insects-Aphids/Weevil	Mar		ATV	Equipment Operator Labor	0.06	hour
				Warrior II	1.50	floz
			ATV Sprayer System			
Irrigation-Ditch/Tail	Apr	205HP Crawler	Ditcher - V	Equipment Operator Labor	0.16	hour
	July	205HP Crawler	Ditcher - V	Equipment Operator Labor	0.10	hour
	Sept	150HP4WD Tractor	Rear Blade - 8'	Equipment Operator Labor	0.20	hour
Irrigate-Flood 6X	Apr			Water- District & Pumped	6.00	AcIn
	May			Water- District & Pumped	6.00	AcIn
	June			Water- District & Pumped	6.00	AcIn
	July			Water- District & Pumped	12.00	AcIn
	Aug			Water- District & Pumped	6.00	AcIn
	Sept			Water- District & Pumped	6.00	AcIn
Insects-Worms Coragen	July		ATV	Coragen	2.00	floz
			ATV Sprayer System			
Insects-Worms Intrepid	Aug		ATV	Intrepid	8.00	FlOz
			ATV Sprayer System			
Irrigation Labor	Sept			Irrigation Labor	9.00	hours
Pickup 1/2 Ton	Sept		Pickup 1/2 Ton			
Pickup 3/4 Ton	Sept		Pickup 3/4 Ton	Equipment Operator Labor	0.48	hour
Service Truck	Sept		Service Truck	Equipment Operator Labor	0.24	hour
Harvest-Swathing	Apr		Swather 16'	Equipment Operator Labor	0.13	hour
	May		Swather 16'	Equipment Operator Labor	0.13	hour
	June		Swather 16'	Equipment Operator Labor	0.13	hour
	July		Swather 16'	Equipment Operator Labor	0.13	hour
	July		Swather 16'	Equipment Operator Labor	0.13	hour
	Aug		Swather 16'	Equipment Operator Labor	0.13	hour
	Sept		Swather 16'	Equipment Operator Labor	0.13	hour
Harvest-Raking	Apr	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
	May	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
	June	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
	July	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
	July	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
	Aug	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
	Sept	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour
Harvest-Baling	Apr	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
	May	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
	June	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
	July	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
	July	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
	Aug	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
	Sept	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour
				Bale Twine	0.14	Acre
Harvest-Roadsiding	Apr		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour
	May		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour
	June		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour
	July		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour
	July		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour
	Aug		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour
	Sept		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour