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

2018
SAMPLE COSTS TO PRODUCE GARBANZO BEANS
(Chickpeas)

IN THE SACRAMENTO VALLEY
AND THE
NORTHERN SAN JOAQUIN VALLEY

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In the Sacramento Valley and the Northern San Joaquin Valley – 2018

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INTRODUCTION

Sample costs to produce garbanzo beans (chickpeas) in the Sacramento Valley and the northern San Joaquin Valley are presented in this document. 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 given for labor, materials, equipment, and custom services are based on January 2018 figures. Practices described are based on production practices considered typical for the crop and region, but will not apply to every situation. A blank column titled Your Costs is provided in Tables 1 and 2 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, destewart@ucdavis.edu. The local extension office can be contacted through; Sarah Light, selight@ucanr.edu, Rachael Long, rflong@ucanr.edu, or Michelle Leinfelder-Miles, mmleinfeldermiles@ucanr.edu.

Sample Cost of Production studies for many commodities are available and can be downloaded from the website, http://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 area 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**

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 following assumptions refer to Tables 1 to 7 and pertain to sample costs to produce garbanzo beans in the Sacramento and San Joaquin Valleys. Cultural practices and costs for garbanzo beans vary considerably among growers within the region; therefore, many of the costs, practices, and materials will not be applicable to every farm.

Farm. This report is based on a 3,500 non-contiguous acre farm on which 200 acres of rented land are producing garbanzo beans. The remaining acreage is rented and grower-owned land that is planted to alfalfa hay, field corn, safflower, sunflowers, tomatoes, wheat, and orchard crops such as almonds. The grower maintains an equipment yard and shop on a portion of the owned land.

Production Cultural Practices and Material Inputs

Land Preparation and Planting. Garbanzo beans (*Cicer arietinum)* are a fall or winter-planted crop generally planted with three seed rows on 60-inch beds. The garbanzo beans are grown on sub-surface drip irrigation with a single tape down the center at a 10-12 inch depth. Every 5-10 years the drip tape is scheduled for complete removal. Annually, 20 percent of the drip system acreage has the tape removed, primary tillage performed and new tape re-inserted underground. Beds are re-shaped in the same operation. Drip tape is reconnected after hand-digging and water supply hoses connected to underground PVC main lines. Drip lines at the terminal ends are trimmed and plugged with in-line valves. Depending on the tape, pest pressure and irrigation system, drip tape can last longer than five years. This operation is not listed or performed on the garbanzo crop. Extra irrigation labor is included to perform the expected increase in maintenance on the buried tape.

In the fall, a 3-row Performer® bed tillage implement shallowly chisels, tills, and re-shapes the beds while avoiding disturbance of the drip tape left in place. Planting occurs in December using a three-bed, 15', 9-row air-planter, (3 planted rows on 60-inch beds). The beans are planted into moisture following rainfall, with starter fertilizer. The seed is planted at a rate of 85 lbs. per acre, 1-2 inches deep.

Garbanzo bean varieties for this area include public and private varieties. Refer to the 2017 *Garbanzo Bean Production in California* manual for seed variety characteristics such as resistance to Ascochyta blight. Fungicide treated garbanzo bean seed is purchased. At planting, seed is inoculated with 5-10 lbs. of granules per acre with a Cicer (garbanzo) specific Rhizobium strain for nitrogen fixation.

Irrigation. The beans are irrigated through the buried drip system. Three irrigations from April to May are shown (see irrigation tables for water needs in the 2017 *Garbanzo Bean Production in California* manual).

Water costs $90 per acre-foot (or $7.50 per acre-inch). The grower uses a combination of district canal water and ground water pumped from a depth of less than 250 feet. The irrigation costs itemized and shown in Tables 1 and 3 are for labor, pumping, and water.

Although garbanzo beans require 24 acre-inches, total applied water was calculated at 12 acre-inches. Rainfall is relied upon for the other 12 acre-inches. All the irrigation water is applied through the drip system to match

crop evapotranspiration and to account for 85 percent irrigation system efficiency. The drip system requires chemical flushing to retard calcium buildup and emitter clogging. This operation is performed after harvest with N-pHuric acid applied through the drip system with 0.16 acre-inches of water.

Fertilization. Nitrogen (N) recommendations range from 0 to 100 lbs/acre, depending on existing nitrogen levels in the soil, irrigation water and nitrogen fixation by the plants. In October along with the annual pump test a laboratory analysis of the water and soil is performed to determine nitrate availability and to maintain regulatory records. Assuming low residual soil nitrogen and low-nitrogen in the irrigation water, pre-plant nitrogen (N) using aqua ammonia (20-0-0) at 75 lbs. of N per acre (recommended rate is 50-100 lbs./ac) is applied in November. The fertilizer is banded with a shank eight to twelve inches to the side and four to six inches deep from the seed row, avoiding sub-surface drip (SDI) irrigation lines. At planting, a starter fertilizer (8-24-6 with 1% Zn or similar material) is applied at 10 gallons per acre. Although not included, soil amendments like gypsum or sulfur products are a routine practice and may be necessary every three to four years. Fertigation may occur in areas where garbanzos are dependent on SDI in areas with limited rainfall.

Pest Management. The pesticides and rates mentioned in this report are listed in *UC Integrated Pest Management Guidelines, Dry Beans*. 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 Pest Control Advisor (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, modes 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.

Weeds. Both chemical and mechanical weed control are utilized. In December, post planting and prior to crop emergence a tank mix of pre-emergent herbicides (Chateau and Prowl) are applied to the beds and furrows. Before row closure in early March, the field is cultivated to control weeds. This operation may be timed with the disease control application.

Herbicide note. Check the labels of all herbicides before applying to a garbanzo bean field. Certain environmental conditions, application methods, and timing have led to crop injury. Also be aware of crop rotation intervals following the application of these herbicides.

Insects and Mites. The major pests in garbanzo beans are aphids (*Aphidadae)* because they vector serious viral diseases. Garbanzo beans naturally produce oxalic acid which can kill aphids and keep them from reproducing, however not before they transmit viruses. Lygus bugs and stinkbugs can cause considerable damage to seeds when the pods are in the green or immature stage of development and should be treated if causing damage. No insect controls are included in this report.

Diseases. Ascochyta blight, (*Ascochyta rabiei*) is a fungal disease that can cause significant yield and stand losses if left uncontrolled. The garbanzo seed comes treated for disease control, including seedling diseases (*Rhizoctonia* and *Pythium*) as well as *Ascochyta* and for seedling insect pests like seed corn maggot. The pesticide seed protectants are applied to the seed by the bean warehouse, and the cost is $.10/lb. and included in the seed price. An application of Quadris is made in March for *Ascochyta* blight control. Planting disease

resistant seed and crop rotation are additional recommended control measures. Avoid planting garbanzo beans near alfalfa fields due to potential problems with aphids and diseases such as alfalfa mosaic virus, and keep field edges clean of weeds to eliminate hosts for aphids and viruses.

Vertebrate Pests. Rodents and gophers can be a serious problem with SDI systems depending on soil type and environmental conditions. No bait or traps are used. Extra labor is included for repairs to the underground lines from vertebrate damage during the drip irrigations.

Pest Control Advisor/Certified Crop Advisor (PCA/CCA). Written recommendations are required for commercially applied pesticides by licensed pest control advisers. The PCA will monitor the field for problems including pests, diseases, and nutritional status. Growers may hire private consultants or receive this service as part of an agreement with an agricultural chemical and fertilizer company. Separate costs for a PCA are not included.

Marketing/Harvest/Revenue

Marketing. California varieties are mainly sold for the canning industry, such as soups and salad garnishes, which requires high quality, large seed size (54 beans per ounce) and a uniform light golden or cream-color for the canning industry such as soups and salad garnishes. Garbanzos are also sold as packaged beans and for processing into hummus and other nutritional products. Canning quality beans command a premium price compared to milled garbanzos for processing. Garbanzo beans must be stored at a moisture content of 8 to 10 percent to prevent the seed from discoloring and turning grey, as well as disease and insect outbreaks.

Harvest. Garbanzo beans mature in June and are direct harvested using a self-propelled duel-rotor combine in July. Beans are ready for harvest when they reach 10-12 percent moisture. Threshing/harvesting/roadsiding costs $10.94/ton based on field/dirt weight plus $5.00/ton for hauling to the warehouse. Other post-harvest bean costs include warehouse charges of $5.75 per cwt for cleaning, storage and insurance. The grower owns the combine, tractor, and bankout wagon. This equipment is used to harvest other field crops and the costs are allocated across the entire farm.

Yields. Garbanzo bean yield used in this study is 2,650 pounds (26.5 cwt) per acre of cleaned beans at 12 percent moisture. A typical cleanout rate for field run beans is 5-10 percent.

Revenue. Based on the Dry Bean Council Market Reports a price of $49 per cwt is used to calculate income.

Ranging Analysis. Table 4 has a range of return prices used for calculating net returns per acre with different yields. For this analysis, selected yields ranged from 20.5 – 32.5 cwt per acre, and crop prices ranged from $43 - $55 per cwt.

Government Payments. The federal government provides payments to farm operators when specific commodity prices or revenues are below targets set in legislation.

The 2014 Farm Bill created two alternatives for large and small chickpea producers: the Agriculture Risk Coverage (ARC) program and Price Loss Coverage (PLC) program. A participating farm must choose between the ARC, which provides payments based on shortfalls in revenue (most commonly on a county-wide basis) and the PLC, which provides payments based on shortfalls in national average market price. For more information on these and other programs, or on meeting minimum requirements to comply with the programs please contact the USDA Farm Service Agency (FSA), or visit the websites:

http://www.usda.gov/wps/portal/usda/usdahome?navid=farmbill
https://www.fsa.usda.gov/programs-and-services/arcplc_program/arcplc-program-data/index

The U.S. Department of Agriculture's (USDA) Commodity Credit Corporation announces marketing assistance loan rates by county each year. The 2016 average National Loan Rate for large chickpeas is $0.11 per pound. Marketing assistance loans provide interim financing to producers so that commodities can be stored after harvest, when market prices are typically low, to be sold later, when price conditions are more favorable. The rates are posted on the FSA website at:
www.fsa.usda.gov/programs-and-services/price-support/commodity-loan-rates/index

No revenue is reported from these government programs. In the ranging analysis, (Table 4) some of the low prices would most likely trigger payments.

Assessments. The California Dry Bean Advisory Board (CDBAB) assesses $0.29 per hundredweight (cwt) to all bean varieties (general assessment). Additional assessments are made by varietal councils formed for specific research on that variety. The garbanzo council assesses $0.09 per cwt. The CDBAB promotes marketing and research in dry beans.

Environmental Assessments. Certain areas have local assessments to fund state regulatory programs, including the Irrigated Lands Regulatory Program (ILRP) of the State Water Resources Control Board. The landowner is responsible for maintaining these records and paying the annual fees, which vary by watershed region.

Pickup/ATV. Costs for a 1/2-ton pickup and ATV are included. The pickup and ATV are used by the irrigator, field foreman and/or the grower. The pickup travels 15,000 miles per year and the ATV 3,000 miles per year. The miles are not based on any actual data, but the assumptions are used to calculate vehicle cost.

Risk. The risks associated with crop production should not be underestimated. 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 profitability and economic viability of agricultural production. Because of many potential risk factors, effective risk management must combine specific tactics in a detailed manner, in various combinations for a sustainable operation. Moreover, Table 4 reflects a ranging analysis of returns based on various assumptions which is therefore hypothetical in nature. **It is important to realize that actual results may differ from the returns reported in this study**. Any returns above total costs are considered returns on risk and investment to management (or owners).

Labor, Equipment, and Interest

Labor. Hourly wages for workers are $16.00 per hour for machine operators and $12.00 per hour for 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 $17.52 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 2018. Labor for operations involving machinery are 20 percent higher than the operation time given in to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Irrigation labor. Labor is involved in drip system operation and maintenance. Charges include the manual labor required for re-hookup to main lines, sub-main lines, in-season irrigation, maintenance of the drip tape, and time for flushing the system and adding chemicals to reduce drip emitter clogging.

Drip tape system maintenance costs are lowest in the first year and continually increase over the life expectancy of the drip tape.

Farm Management Costs. Farm management wages and/or costs vary based on how the owner chooses to operate the farm. A management salary is not provided even though the operation is performed by the owner or an assistant manager. Returns above costs are considered payment for the management of the operation.

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 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 2018 data from the Energy Information Administration are $2.92 and $3.20 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 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 2018.

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 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 at 0.846 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 $1,756 per year for the entire farm.

Crop Insurance. This is available to garbanzo bean 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 50-85 percent of the approved average yield as established by verifiable production records from the field. Actual insurance coverage is by unit, not by acre. A significant number of growers purchase crop insurance in this region. An estimate at 75 percent of crop revenue is shown under cash overhead at $36.75 per acre. A garbanzo bean insurance program is administered by the Risk Management Agency of the USDA. http://www.rma.usda.gov/policies/2016policy.html.

Office Expense. Office and business expenses are estimated at $50 per acre. The total cost is $10,000 for the 200 acres of garbanzo bean production. These expenses include office supplies, telephones, bookkeeping, accounting, office utilities, and miscellaneous administrative charges.

Sanitation Services. Sanitation services provide portable toilets for the farm and costs $.56 per acre or $1,960 for the entire farm. The cost includes two double toilet units with wash basins, shade structure, delivery and pickup, and five months of weekly servicing. Costs also include soap or other suitable cleansing agent, and single use towels. Separate potable water and single-use drinking cups are also supplied.

Land Rent. Leasing practices and rental rates for agricultural property are continually being adjusted due to production changes, market economics, land values, and relative bargaining positions of the landlord and tenant. The recent plantings of orchard crops have effected land lease and rental rates. Land used for row crop production in the two Valleys is commonly rented on a tenant-landowner basis with the landowner receiving 15-25 percent of the gross income from the crop.

The 200 acres are leased on a share-rent basis with the land owner receiving 15 percent of the gross returns from the dry garbanzo bean crop. Therefore, land rent is based on the yield and the price. The yield is 26.50 cwt/acre valued at $49/cwt which equals a gross return of $1,299/acre. The land rent in this scenario would be $195/acre. The rented land includes developed wells, drip irrigation, and filter system that are maintained by the landlord. The drip tape is not included in the land rent and is purchased, inserted, and maintained by the grower.

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

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). 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 5.5 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 farm lending agencies as of January 2018.

Buildings. The metal building is constructed on a cement slab totaling 2,400 square feet and is used for shop and/or storage.

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 land owner is responsible for the maintenance costs of the well, irrigation equipment including booster pumps, filters and main lines. The drip tape is purchased and maintained by the grower. Grower costs include connections to the main and sub-main lines, drip tape installation, and maintenance. Multi-year rental agreements are needed to spread these expenses over years.

An annual pump test is performed in October to monitor pumping level and efficiency (gallons/minute) at a cost of $200 for each pump. The costs of the tests are spread across the entire acreage of the pumps' capacity. The annual water laboratory analysis is performed at the same time and the charges are combined.

Drip Tape. The drip tape is considered an investment and is amortized over the minimum five-year life expectancy of the tape. There are no recycling revenue or disposal fees for the drip tape.

Fuel Tanks. The farm has two fuel storage tanks. One 5,000-gallon diesel tank and one 1,000-gallon gasoline tank using gravity-feed. The tanks are setup horizontally on metal stands in a cement containment pad that meets federal, state, and county regulations.

Land Values. Beans are planted on rented land; therefore, the purchase of land is not included. Cropland in the Central Valley of California ranges in value from $10,000 to $22,000 per acre (2017 Trends & Leases).

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 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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UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 1. COSTS PER ACRE TO PRODUCE GARBANZO BEANS (Chickpeas)

Sacramento & Northern San Joaquin Valleys - 2018

Operation	Equipment Time (Hrs/A)	Cash and Labor Costs per Acre						
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Pre-Plant:								
Well Test/Water Analysis	0.00	0	0	0	1	0	1	
Soil Test: (NPK)	0.00	0	0	0	1	0	1	
Condition Beds: Performer 2x	0.32	9	26	10	0	0	44	
Fertilizer: Pre-Plant (20-0-0)	0.14	4	3	2	61	0	69	
Attach Mainlines to Drip Tape	0.00	53	0	0	25	0	78	
TOTAL PRE-PLANT COSTS	0.46	66	29	11	88	0	193	
Planting:								
Plant Beans/Starter Fertilizer (8-24-6, 1% Zn)	0.20	6	8	6	136	0	155	
TOTAL PLANTING COSTS	0.20	6	8	6	136	0	155	
Cultural:								
Shape Beds/Apply Herbicides	0.28	8	11	4	39	0	62	
Disease: Blight/Weeds: Cultivate	0.28	8	6	3	18	0	35	
Irrigate 3x	0.00	44	0	0	90	0	134	
Pickup ½ Ton	1.25	35	11	4	0	0	51	
ATV	0.75	21	1	1	0	0	22	
TOTAL CULTURAL COSTS	2.56	116	29	12	147	0	303	
Harvest:								
Harvest: Combine/30' Header	0.20	6	8	9	0	0	22	
Roadside: Bankout	0.08	2	3	1	0	0	7	
Hauling/Transporting	0.00	0	0	0	0	13	13	
Clean/Bag/Store/Insurance	0.00	0	0	0	0	152	152	
Assessments	0.00	0	0	0	10	0	10	
TOTAL HARVEST COSTS	0.28	8	11	10	10	166	205	
Post-Harvest:								
Irrigate: Drip Acid Flush	0.00	9	0	0	6	0	15	
TOTAL POST-HARVEST COSTS	0.00	9	0	0	6	0	15	
Interest on Operating Capital at 5.00%							19.75	
TOTAL OPERATING COSTS/ACRE	3.51	204	77	39	386	166	891	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 1. CONTINUED

Sacramento & Northern San Joaquin Valleys - 2018

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							1	
Office Expense							50	
Sanitation Services							1	
Land Rent							195	
Crop Insurance (75%)							37	
Property Taxes							2	
Property Insurance							0	
Investment Repairs							1	
TOTAL CASH OVERHEAD COSTS/ACRE							285	
TOTAL CASH COSTS/ACRE							1,177	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Building 2400 sqft		24		2			2	
Fuel Storage Tanks & Pumps		11		1			1	
Shop Tools		6		0			0	
Drip Tape		288		67			67	
Equipment		809		81			81	
TOTAL NON-CASH OVERHEAD COSTS		1,138		152			152	
TOTAL COSTS/ACRE							1,329	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2. COSTS AND RETURNS PER ACRE TO PRODUCE GARBANZO BEANS (Chickpeas)

Sacramento & Northern San Joaquin Valleys - 2018

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Garbanzo Beans	26.50	Cwt	49.00	1,299	
TOTAL GROSS RETURNS				1,299	
OPERATING COSTS					
Fertilizer:				**117**	
Soil Test (NPK)	1.00	Acre	1.00	1	
NH_4NO_3 (20-0-0)	75.00	Lb N	0.81	61	
8-24-6-1% Zn	10.00	Gal	5.50	55	
Herbicide:				**39**	
Chateau	3.00	Oz	5.50	17	
Prowl EC	3.00	Pint	7.38	22	
Seed:				**81**	
Garbanzo Bean Seed (treated)	85.00	Lb	0.95	81	
Irrigation:				**122**	
Well Test/Water Analysis	1.00	Acre	1.00	1	
Fittings & Valves	1.00	Acre	25.00	25	
Water- Well and District	12.16	AcIn	7.50	91	
Acid Flush	0.10	Gal	47.54	5	
Custom:				**166**	
Hauling (Ton)	2.65	Ton	5.00	13	
Cleaning/Storage/Insurance	26.50	Cwt	5.75	152	
Assessment:				**10**	
CA Dry Bean Advisory Board	26.50	Cwt	0.29	8	
Dry Bean Advisory Council	26.50	Cwt	0.09	2	
Fungicides:				**18**	
Quadris	14.00	FlOz	1.29	18	
Labor				**204**	
Equipment Operator Labor	4.21	hrs	23.36	98	
Irrigation Labor	6.00	hrs	17.52	105	
Machinery				**116**	
Fuel-Gas	3.74	gal	3.20	12	
Fuel-Diesel	22.25	gal	2.92	65	
Lube				12	
Machinery Repair				28	
Interest on Operating Capital @ 5.00%				20	
TOTAL OPERATING COSTS/ACRE				891	
TOTAL OPERATING COSTS/CWT				33.64	
NET RETURNS ABOVE OPERATING COSTS				407	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2. CONTINUED

Sacramento & Northern San Joaquin Valleys - 2018

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Liability Insurance				1	
Office Expense				50	
Sanitation Services				1	
Land Rent				195	
Crop Insurance (75%)				37	
Property Taxes				2	
Property Insurance				0	
Investment Repairs				1	
TOTAL CASH OVERHEAD COSTS/ACRE				285	
TOTAL CASH OVERHEAD COSTS/CWT				10.77	
TOTAL CASH COSTS/ACRE				1,177	
TOTAL CASH COSTS/CWT				44.41	
NET RETURNS ABOVE CASH COSTS				122	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building 2400 sqft				2	
Fuel Storage Tanks & Pumps				1	
Shop Tools				0	
Drip Tape				67	
Equipment				81	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				152	
TOTAL NON-CASH OVERHEAD COSTS/CWT				5.72	
TOTAL COST/ACRE				1,329	
TOTAL COST/CWT				50.14	
NET RETURNS ABOVE TOTAL COST				-30.58	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 3. MONTHLY CASH COSTS PER ACRE TO PRODUCE GARBANZO BEANS (Chickpeas)

Sacramento & Northern San Joaquin Valleys - 2018

	OCT 17	NOV 17	DEC 17	JAN 18	FEB 18	MAR 18	APR 18	MAY 18	JUN 18	JUL 18	Total
Pre-Plant:											
Well Test/Water Analysis	1										1
Soil Test: (NPK)	1										1
Condition Beds: Performer 2x	44										44
Fertilizer: Pre-Plant (20-0-0)		69									69
Attach Mainlines to Drip Tape			78								78
TOTAL PRE-PLANT COSTS	46	69	78								193
Planting:											
Plant Beans/Starter Fertilizer (8-24-6, 1% Zn)			155								155
TOTAL PLANTING COSTS	0	0	155								155
Cultural:											
Shape Beds/Apply Herbicides			62								62
Disease: Blight/Weeds: Cultivate						35					35
Irrigate 3x							95	39			134
Pickup ½ Ton	5	5	5	5	5	5	5	5	5	5	51
ATV	2	2	2	2	2	2	2	2	2	2	22
TOTAL CULTURAL COSTS	7	7	69	7	7	42	102	46	7	7	303
Harvest:											
Harvest: Combine/30' Header										22	22
Roadside: Bankout										7	7
Hauling/Transporting										13	13
Clean/Bag/Store/Insurance										152	152
Assessments										10	10
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	0	205	205
Post-Harvest:											
Irrigate: Drip Acid Flush										15	15
TOTAL POST-HARVEST COSTS	0	0	0	0	0	0	0	0	0	15	15
Interest on Operating Capital @5.00%	0.22	0.54	1.80	1.83	1.86	2.04	2.46	2.66	2.69	3.63	19.75
TOTAL OPERATING COSTS/ACRE	54	77	304	9	9	44	105	49	10	231	891
CASH OVERHEAD											
Liability Insurance										1	1
Office Expense	5	5	5	5	5	5	5	5	5	5	50
Sanitation Services										1	1
Land Rent- Garbanzo Beans										195	195
Crop Insurance (75%)										37	37
Property Taxes				1						1	2
Property Insurance				0						0	0
Investment Repairs	0	0	0	0	0	0	0	0	0	0	1
TOTAL CASH OVERHEAD COSTS	5	5	5	6	5	5	5	5	5	239	285
TOTAL CASH COSTS/ACRE	59	82	309	15	14	49	110	54	15	469	1,177

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 4. RANGING ANALYSIS

Sacramento & Northern San Joaquin Valleys - 2018

COSTS PER ACRE AND PER CWT AT VARYING YIELDS TO PRODUCE GARBANZO BEANS

	YIELD (CWT)						
	20.50	22.50	24.50	26.50	28.50	30.50	32.50
OPERATING COSTS/ACRE:							
Pre-Plant	193	193	193	193	193	193	193
Planting	155	155	155	155	155	155	155
Cultural	303	303	303	303	303	303	303
Harvest	168	180	193	205	217	229	242
Post-Harvest	15	15	15	15	15	15	15
Interest on Operating Capital @ 5.00%	19.59	19.64	19.69	19.75	19.80	19.85	19.90
TOTAL OPERATING COSTS/ACRE	855	867	879	891	904	916	928
TOTAL OPERATING COSTS/CWT	41.69	38.53	35.89	33.64	31.71	30.04	28.57
CASH OVERHEAD COSTS/ACRE	285	285	285	285	285	285	285
TOTAL CASH COSTS/ACRE	1,140	1,152	1,165	1,177	1,189	1,202	1,214
TOTAL CASH COSTS/CWT	55.61	51.22	47.54	44.41	41.73	39.40	37.35
NON-CASH OVERHEAD COSTS/ACRE	152	152	152	152	152	152	152
TOTAL COSTS/ACRE	1,292	1,304	1,316	1,329	1,341	1,353	1,366
TOTAL COSTS/CWT	63.00	58.00	54.00	50.00	47.00	44.00	42.00

Net Return per Acre above Operating Costs for Garbanzo Beans

PRICE ($/cwt)	YIELD (cwt/acre)						
Garbanzo Beans	20.50	22.50	24.50	26.50	28.50	30.50	32.50
43.00	27	101	174	248	322	395	469
45.00	68	146	223	301	379	456	534
47.00	109	191	272	354	436	517	599
49.00	150	236	321	407	493	578	664
51.00	191	281	370	460	550	639	729
53.00	232	326	419	513	607	700	794
55.00	273	371	468	566	664	761	859

Net Return per Acre above Cash Costs for Garbanzo Beans

PRICE ($/cwt)	YIELD (cwt/acre)						
Garbanzo Beans	20.50	22.50	24.50	26.50	28.50	30.50	32.50
43.00	-259	-185	-111	-37	36	110	184
45.00	-218	-140	-62	16	93	171	249
47.00	-177	-95	-13	69	150	232	314
49.00	-136	-50	36	122	207	293	379
51.00	-95	-5	85	175	264	354	444
53.00	-54	40	134	228	321	415	509
55.00	-13	85	183	281	378	476	574

Net Return per Acre above Total Costs for Garbanzo Beans

PRICE ($/cwt)	YIELD (cwt/acre)						
Garbanzo Beans	20.50	22.50	24.50	26.50	28.50	30.50	32.50
43.00	-410	-336	-263	-189	-115	-42	32
45.00	-369	-291	-214	-136	-58	19	97
47.00	-328	-246	-165	-83	-1	80	162
49.00	-287	-201	-116	-30	56	141	227
51.00	-246	-156	-67	23	113	202	292
53.00	-205	-111	-18	76	170	263	357
55.00	-164	-66	31	129	227	324	422

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

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

Sacramento & Northern San Joaquin Valleys - 2018

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
18	Tractor 425HP4WD	425,000	16	76,121	37,533	212	2,506	40,251
18	Combine	476,827	15	48,830	45,325	222	2,628	48,176
18	Tractor 155HP4WD	155,596	15	30,292	14,150	79	929	15,158
18	Tractor 110HP4WD HC	127,363	15	24,795	11,582	64	761	12,407
18	Combine Header 30'	57,662	15	5,905	5,481	27	318	5,826
18	Planter-Air 6-Row 15'	54,000	15	5,184	5,148	25	296	5,469
18	Bed Shaper/Power Incorporator 15	34,000	15	3,264	3,242	16	186	3,444
18	Bankout Wagon Pull Type 20 Ton	38,000	10	6,720	4,519	19	224	4,762
18	Performer-Bed Disc 3-Row 15'	33,000	10	5,836	3,925	16	194	4,135
18	Pickup ½ Ton	28,000	10	8,271	3,072	15	181	3,269
18	Cultivator Sled 3-Row 15'	11,200	10	1,981	1,332	6	66	1,404
18	Spray Boom 15'	3,100	10	548	369	2	18	388
18	ATV 4WD	8,350	8	2,914	1,018	5	56	1,079
18	Fertilizer Bar- 3-Row 15'	13,000	6	3,748	2,058	7	84	2,149
18	300 Gallon Saddle Tanks	1,660	5	541	292	1	11	304
	TOTAL	1,466,758	-	224,949	139,047	716	8,459	148,221
	60% of New Cost*	880,055	-	134,970	83,428	429	5,075	88,933

*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								
Building 2400 sqft	84,000	30	0	5,780	36	420	1,680	7,915
Fuel Storage Tanks & Pumps	39,565	20	2,770	3,231	18	212	791	4,252
Shop Tools	20,000	20	1,400	1,633	9	107	400	2,149
Drip Tape	57,600	5	0	13,489	24	288	0	13,801
TOTAL INVESTMENT	201,165	-	4,170	24,133	87	1,027	2,871	28,118

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	200	Acre	.50	100
Office Expense	200	Acre	50.00	10,000
Sanitation Services	200	Acre	.56	112
Land Rent	200	Acre	194.775	38,955
Crop Insurance- 75%	200	Acre	36.75	7,350

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 6. HOURLY EQUIPMENT COSTS

Sacramento & Northern San Joaquin Valleys - 2018

Yr.	Description	Chickpea Hours Used	Capital Recovery	Cash Overhead		Operating			Total Costs/Hr.
				Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	
18	300 Gallon Saddle Tanks	181	0.58	0.00	0.02	0.45	0.00	0.45	1.06
18	ATV 4WD	150	2.44	0.01	0.14	0.76	0.96	1.72	4.31
18	Pickup ½ Ton	133	9.22	0.05	0.54	3.38	9.00	12.38	22.19
18	Tractor 155HP4WD	124	7.96	0.04	0.52	9.35	36.43	45.79	54.32
18	Spray Boom 15'	113	1.47	0.01	0.07	0.83	0.00	0.83	2.39
18	Tractor 110HP4WD HC	93	6.52	0.04	0.43	5.98	18.64	24.62	31.60
18	Tractor 425HP4WD	71	22.52	0.13	1.50	21.32	72.02	93.35	117.50
18	Fertilizer Bar- 3-Row 15'	68	6.17	0.02	0.25	5.08	0.00	5.08	11.53
18	Performer-Bed Disc 3-Row 15'	65	11.77	0.05	0.58	6.74	0.00	6.74	19.15
18	Bed Shaper/Power Incorporator 15	56	14.62	0.07	0.84	3.80	0.00	3.80	19.34
18	Cultivator Sled 3-Row 15'	56	4.00	0.02	0.20	2.37	0.00	2.37	6.58
18	Combine	44	135.98	0.67	7.88	38.42	36.43	74.86	219.38
18	Planter-Air 6-Row 15'	40	30.89	0.15	1.78	13.93	0.00	13.93	46.75
18	Combine Header 30'	40	16.44	0.08	0.95	1.00	0.00	1.00	18.48
18	Bankout Wagon Pull Type 20 Ton	17	13.56	0.06	0.67	5.19	0.00	5.19	19.48

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 7. OPERATIONS WITH EQUIPMENT & MATERIALS

Sacramento & Northern San Joaquin Valleys - 2018

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Well Test/Water Analysis	Oct			Well Test/Water Analysis	1.00	Acre
Soil Test: (NPK)	Oct			Soil Test (NPK)	1.00	Acre
Condition Beds: Performer	Oct	Tractor 425HP4WD	Performer-Bed Disc 3-Row 15'	Equipment Operator Labor	0.39	hour
Fertilizer: Pre-Plant	Nov	Tractor 110HP4WD HC	Fertilizer Bar- 3-Row 15'	NH_4NO_3 (20-0-0)	75.00	Lb N
			300 Gallon Saddle Tanks			
Attach Main lines	Dec			Irrigation Labor	3.00	hours
				Fittings & Valves	1.00	Acre
Plant Beans/Starter Fert	Dec	Tractor 155HP4WD	Planter-Air 6-Row 15'	Equipment Operator Labor	0.24	hour
				Garbanzo Bean Seed (treated)	85.00	Lb
			300 Gallon Saddle Tanks	8-24-6-1% Zn	10.00	Gal
			Fertilizer Bar- 3-Row 15'			
Shape Beds/Apply Herb	Dec	Tractor 155HP4WD	Spray Boom 15'	Equipment Operator Labor	0.34	hour
				Chateau	3.00	Oz
			300 Gallon Saddle Tanks	Prowl EC	3.00	Pint
			Bed Shaper/Power Incorporator			
Disease/Weeds	Mar	Tractor 110HP4WD HC	Spray Boom 15'	Equipment Operator Labor	0.34	hour
				Quadris	14.00	FlOz
			300 Gallon Saddle Tanks			
			Cultivator Sled 3-Row 15'			
Irrigate 3x	Apr			Irrigation Labor	1.50	hours
				Water- Well and District	4.00	AcIn
	Apr			Irrigation Labor	0.50	hour
				Water- Well and District	4.00	AcIn
	May			Irrigation Labor	0.50	hour
				Water- Well and District	4.00	AcIn
Pickup ½ Ton	May		Pickup 1/2 Ton	Equipment Operator Labor	0.80	hour
ATV	May		ATV 4WD	Equipment Operator Labor	0.90	hour
Harvest: Combine	July		Combine	Equipment Operator Labor	0.24	hour
			Combine Header 30'			
Roadside: Bankout	July	Tractor 155HP4WD	Bankout Wagon Pull Type	Equipment Operator Labor	0.10	hour
Hauling/Transporting	July			Hauling (Ton)	2.65	Ton
Clean/Bag/Store/Insurance	July			Cleaning/Storage/Insurance	26.50	Cwt
Assessments	July			CA Dry Bean Advisory Board	26.50	Cwt
				Dry Bean Advisory Council	26.50	Cwt
Irrigate: Drip Acid Flush	July			Irrigation Labor	0.50	hour
				Acid Flush	0.10	Gal
				Water- Well and District	0.16	AcIn