
U.C. COOPERATIVE EXTENSION
SAMPLE COST TO ESTABLISH AND PRODUCE

SUGAR BEETS

IMPERIAL COUNTY – 2000

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For an explanation of calculations used for the study refer to the attached General Assumptions or call the author, Keith S. Mayberry , at the Imperial County Cooperative Extension office, (619)352-9474 or e-mail at ksmayberry@ucdavis.edu.

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FOREWORD

We wish to thank growers, pest control advisors, seed companies, transplant producers, contract harvesters, fertilizer dealers, and equipment companies for providing us with the data necessary to compile this circular. Without them we could not have achieved the accuracy needed for evaluating the dynamic and important vegetable industry in Imperial County.

The information presented herein allows one to get a "ballpark" idea of field crops production costs and practices in the Imperial County. They do not reflect the exact values or practices of any grower or shipper, but are rather an amalgamation of countywide prevailing costs and practices. Exact costs incurred by individual growers depend upon many variables such as weather, land rent, seed, choice of agrichemicals, location, etc. No exact comparison with individual grower practice is possible or intended. The budgets do reflect, however, the prevailing industry trends within the region.

Overhead usually includes secretarial and office expenses, supplies, donations, utilities, transportation, accountants, insurance, safety training, permits, etc. The amount of overhead charged depends upon the crop and the size of the labor crew, payroll, supplies, and supervision needed for culture.

Since all of the inputs used to figure production costs are impossible to document in a single page, we have included extra expense in man-hours or overhead to account for such items as pipe setting, motor grader, water truck, shovel work, etc. Whenever possible we have given the costs of these operations per hour.

Not included in these production costs are expenses resulting from loans, supervision, or return on investments. If these items were taken into account, the budget may need to be increased by 7-15%.

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**2000-2001 FIELD CROPS PREVAILING RATES
IMPERIAL COUNTY**

**HEAVY TRACTOR WORK & LAND
PREPARATION**

<u>OPERATION</u>	<u>\$/ACRE</u>
Plow.....	27.75
Subsoil, 2 nd gear.....	38.75
Subsoil, 3 rd gear.....	32.75
Landplane.....	12.00
Triplane.....	11.00
Chisel ∇ 15".....	24.75
Wil-Rich chisel.....	14.75
Big Ox.....	21.25
Slip plow.....	39.00
Pull/disc borders.....	6.00
Make cross checks (taps).....	6.00
Break border.....	5.75
Disc, stubble.....	21.75
Disc, regular.....	11.50
List 40" beds.....	13.50
Float.....	10.00
Disc, borders.....	11.25
Laser (acre).....	34.00-38.00
Dump (scraper) borders.....	14.00

PREVAILING RATES BY THE HOUR

	<u>\$/HR</u>
Motor grader.....	50.00
Backhoe.....	42.50
Water truck.....	39.00
Wheel tractor.....	32.00
Scraper.....	27.00
Versatile.....	53.00
D-6.....	46.50
D-8.....	65.00
Burn ditches.....	28.00
Buck ends of field.....	30.00
Pipe setting (2 men).....	33.00
Laser.....	70.00
Work ends.....	40.00

**PLANTING, CULTIVATING & LIGHT
TRACTOR WORK**

Power mulch dry.....	23.00
Power mulch with herbicide.....	27.00
Shape 40" beds.....	9.50
Precision plant 40" beds.....	17.50
Plant and shape sugar beet beds.....	14.50
Mulch plant wheat.....	11.25

Plant alfalfa (corrugated)..... 16.00

**PLANTING, CULTIVATING & LIGHT
TRACTOR WORK (continued)**

<u>OPERATION</u>	<u>\$/ACRE</u>
Plant bermudagrass (flat).....	12.00
Plant sudangrass.....	10.50
Cultivate 4-row 40" beds.....	13.00
Spike 40" beds.....	9.75
Spike and furrow 4-rows 40-42" beds.....	10.25
Furrow out 40-42" beds.....	9.75
Lilliston 40" beds.....	10.75
Lilliston 40" beds with/herbicides.....	14.50
Inject fertilizer and furrow out 40" beds.....	13.50
Fertilize dry and furrow out 40" beds.....	13.50
Broadcast dry fertilizer >300lb/a.....	7.00
Broadcast dry fertilizer <300lb/a.....	6.00
Ground spray 4-row.....	10.00
Ground spray 8-row.....	9.00
Layby herbicide.....	22.00
Drill with cultipacker.....	15.00
Chop cotton stalks.....	12.00

HARVEST COSTS

	<u>BY UNIT</u>
Combine alfalfa seed.....	40.00/acre
Windrow alfalfa seed.....	15.00/acre
Rake bermudagrass (heavy).....	7.00/acre
Rake bermudagrass (light).....	4.00/acre
Swath bermudagrass (heavy).....	15.00/acre
Swath bermudagrass (light).....	10.00/acre
Swath sudangrass.....	10.00/acre
Rake sudangrass.....	5.00/acre
Crimp sudangrass.....	8.00/acre
Swath alfalfa.....	7.75/acre
Rake alfalfa.....	3.75/acre
Bale (all types of hay).....	0.63/bale
Haul & stack hay.....	0.24/bale
Dig sugar beets.....	2.50/clean ton
Haul sugar beets.....	2.45/clean ton
Combine wheat.....	15/ton + 0.55/cwt over 1 ton
Haul wheat.....	5/ton

IRRIGATION

Sprinkler irrigate flat crops.....	\$125-160.00/acre
Flood irrigate flat crops.....	variable
Irrigate bed-planted crops.....	variable
1ac-ft water.....	14.56

IMPERIAL COUNTY SUGAR BEET CULTURE 2000-2001

Annual acreage, yield, and value of sugar beets in
Imperial County, CA for five consecutive years

Year	Acres	Yield/Acre (tons)	Value/Acre
1999	33,386	40.7	\$1774
1998	34,258	36.1	\$1516
1997	37,731	34.6	\$1441
1996	33,980	34.5	\$1430
1995	31,612	32.1	\$1271

(Source: I.C. Agricultural Commissioner's Reports).

YIELD Sugar beet yields and sugar levels have begun to increase due to better varieties and the absence of the sweet potato whitefly (which might have been displaced by the silverleaf whitefly). The best fields will produce over 50 tons of beets and 17 percent sugar or higher. A World's Record for both tonnage and sugar production per acre was set in 1999 with 66.8 tons of beets producing 19,774 pounds of sugar per acre.

With vegetable rotations, sugar content and purity are lower and root rot is higher than with other rotations. Also land formerly in vegetable crops tends to have high residual nitrogen.

SEEDING RATE Sugar beets are grown on either 30-inch single row or 40 inch double-row beds. Some early season fields are precision planted at a 3-inch spacing; others are planted with seed spaced 4 inches apart. Seed is now sold in units of 100,000 seed. Seed prices depend upon fungicide treatments, seed size, seed quality, variety and quick prime treatment. Precision planting improves overall stand by reducing the need for thinning and yet increases overall plant uniformity and population. Field observations indicate that yield is reduced more by too few plants than too many plants per acre. Planting depth is normally ½ inch. Many kinds of planters are used including vacuum planters.

Early plantings during extremely hot weather will require a higher seeding rate to achieve the proper stand. Planting when soil temperatures are high greatly increases the incidence of seed rot and damping-off. However, new seed treatments have reduced the problem significantly.

PLANTING / HARVEST DATE The planting season begins September 1 and continues until mid-October. Harvest starts roughly April 15 and continues into late July. Late-planted fields tend to be more expensive due to additional costs for irrigation, additional pest control, and for losses

due to root rots and sugar beet cyst nematode. However greater expenses on late fields are often offset by higher beet yields.

VARIETIES There are many sugar beet varieties approved by a seed evaluation committee for use in Imperial Valley. There are varieties that perform better early, others do well in midseason and some excel late season. Varieties should be tolerant to *rhizomania*, a destructive viral disease.

FERTILIZATION All phosphate fertilizer should be applied before listing the beds. Apply 1/3 of the required nitrogen fertilizer with phosphate preplant, 1/3 at thinning and the final 1/3 before mid-December. Late applications of nitrogen will reduce sugar percentage and purity. Many types of nitrogen fertilizer are used for sugar beet production.

Sugar company agronomists make the following recommendations:

1. Collect soil samples to a depth of 4 feet (one-foot increments) and analyze them for nitrate nitrogen. Consult the sugar company agronomists for interpretation of results.
2. The amount of nitrogen required per ton of beets is dependent upon harvest date. Spreckels Sugar Company has developed the following criteria:

Harvest Date	Actual Nitrogen per ton of beets	Total N/acre
April harvest	8 lb.	200 pounds
May harvest	7 lb.	220 pounds
June harvest	6 lb.	230 pounds
July harvest	6 lb.	250 pounds

IRRIGATION The crop is normally furrow irrigated up initially and may require watering back within 4 to 5 days to get a stand. Never allow the crop to wilt or suffer from shortage of water. Ten to 20 irrigations may be required during the season depending on soil type. Beets should not be irrigated so frequently that prolonged periods of soil saturation occur, as this practice will encourage root rot organisms. The last irrigation should be applied at least 30 days prior to harvest in April, 25 days in May, 20 days in June, and 15 days in July. Sugar company agronomists suggest early evening irrigations on a 7-9 day schedule will be successful if used in late June and July on quarter-mile irrigation runs.

Additional hourly irrigation costs have been added to account for pipe setting, grading ditches and other miscellaneous costs not shown in the budget.

PEST CONTROL Pest populations vary from year to year and pest control costs varies accordingly. A number of insects and diseases may be a problem during the growing season. Growers planting extremely early should exercise all caution against insect damage by inspecting fields frequently and carefully. Crickets, flea beetles, and armyworms occur as seedling pests and are especially damaging in early plantings. From January to March the green peach aphid is a primary pest. Spider mites and leafhoppers occur as late-season pests. Armyworms can increase the incidence of *Rhizopus* root rot (*Rhizopus stolonifer*) by creating points of entry for the fungus.

Sugar beet cyst nematode (*Heterodera schachtii*) is a serious pest that once threatened destruction of the Imperial Valley sugar beet industry. The following practices have proven effective for managing this pest. Nematode-infested fields must be rotated to non-host crops. Crops that should not be rotated with sugar beets are members of the cabbage family such as broccoli or cauliflower for a minimum of 3 years. Growers should carefully clean all nematode-infested machinery when moving between beet fields. Nematode infestations usually prevent cropping sugar beets on the same ground more often than one season in four.

Rhizomania is a viral disease caused by Beet Necrotic Yellow Vein Virus and vectored by a soilborne fungus (*Polymyxa betae*). The disease reduces sugar production significantly. The only control is to use rhizomania-resistant varieties and to meticulously clean all equipment coming into fields. Good rhizomania-resistant varieties are available.

Various types of fungal root rots (*Phytophthora drechsleri*, *Pythium aphanidermatum* and *P. ultimum*) are prevalent on sugar beets. Bacterial vascular necrosis and rot (*Erwinia carotovora*) is also very common. Root rots are extremely prevalent in late season beets and as much as 10 percent of the beet roots may be affected. Varieties with higher rot tolerance should be planted for late July harvest. Proper water management is extremely important in combating root rots. *Rhizoctonia solani* causes damping-off, as well as root and crown rot. Powdery mildew (*Erisiphe polygoni*) is a common foliar disease that can be effectively controlled with fungicides.

WEED CONTROL Most fields receive an aerial application of post emergence broadleaf herbicide shortly after the crop has emerged. A second application of the same herbicide is made about two weeks later. Grass herbicide may be included in one of the applications. Close cultivation and hand weeding is usually required during the growing season. The cost of weed control is higher on double-row sugar beet beds as there is more material per acre needed to treat the seed lines.

HARVEST Pinch-wheel beet harvesting machines recover 1-2 tons of beets more per acre than spike-wheel harvesters due to the method of root extraction. Also pinch-wheel harvesters can be used to harvest fields a few days earlier after the last irrigation than spike wheel harvesters can.

Pasturing sugar beet tops with cattle was once common practice, however, with new harvesting techniques only the leaves remain. The sugar beet crowns are taken with the sugar crop. As a result, little pasturing is done today.

IMPERIAL COUNTY SUGAR BEET PRODUCTION COSTS 2000-2001

Mechanical operations at prevailing rates. Labor at \$7.75 /hr (\$5.75 plus SS, unemployment, and fringe benefits).
Yield--40.0 tons per acre. 40-inch beds

OPERATION	Prevailing Rate	MATERIALS		HAND LABOR		COST Per Acre
		Type/Amount	Cost	Hours	Dollars	
LAND PREPARATION						
Subsoil	38.75					38.75
Disc 2x	11.50					23.00
Build & Break borders	17.75					17.75
Flood		Water 0.5 ac-ft	7.28	1	7.75	15.03
Disc 2x	11.50					23.00
Fertilize	7.00	300 lb 11-52-0	38.25			45.25
Float	10.00					10.00
List	13.50					13.50
TOTAL LAND PREPARATION COSTS						186.28
GROWING PERIOD						
Plant & shape	17.50	Seed 3" spacing	40.55			58.05
Herbicide 2x	9.00	Herbicide	29.00			47.00
Hand thin				14	108.50	108.50
Cultivate 3x	13.00					39.00
Fertilize 2x	10.00	160 lb N @ 0.23	36.80			56.80
Weed control chemical	14.50	Chemical herbicide	14.25			28.75
Weed control hand				11	85.25	85.25
Insect control 4x	8.00	Pesticide	48.00			80.00
Disease control 2x	8.00	Fungicide	18.00			34.00
Irrigate 12x		Water 5 ac-ft	72.80	8	62.00	134.80
Work ends 2x	5.00					10.00
TOTAL GROWING PERIOD COSTS						682.15
GROWING PERIOD & LAND PREPARATION COSTS						868.43
PREHARVEST COSTS						
Land rent (net acres)						175.00
Cash overhead	13 % of growing period, land prep & land rent					135.65
TOTAL PREHARVEST COSTS						1179.08
HARVEST COSTS						
Digging	2.50 per clean ton	Yield -	40 tons/acre			100.00
Hauling	2.45 per clean ton					98.00
TOTAL HARVEST COSTS						198.00
TOTAL ALL COSTS						1377.08

In order to determine the value of a ton of sugar beets, several variables must be known:

- 1) percent sugar
- 2) sugar price to grower (varies with % sugar)
- 3) contracted harvest date (premium price for early dig; price reduction for late dig),
- 4) variable trucking charges due to distance, and
- 5) grower agreements on digging pools

NSP* per cwt sugar	Projected Net Gain per acre Sugar Content					
	13%	14%	15%	16%	17%	18%
	19	25.38	27.37	29.37	31.38	33.39
20	26.68	28.77	30.87	32.98	35.09	37.21
21	27.98	30.17	32.37	34.58	36.79	39.01
22	29.28	31.57	33.87	36.18	38.49	40.81
23	30.58	32.97	35.37	37.78	40.19	42.61

Source California Beet Growers Assn. LTD *NSP = Net Selling Price