U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

CAULIFLOWER

IMPERIAL COUNTY – 2003

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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.

FOREWORD

We wish to thank growers, pest control advisors, chemical applicators and dealers, custom farm operators, fertilizer dealers, seed companies, contract harvesters, equipment companies, and the Imperial County Agricultural Commissioners office for providing us with the data necessary to compile this circular. Without them we could not have achieved the accuracy needed for evaluating the cost of production for the field crop industry in Imperial County.

The information presented herein allows one to get a "ballpark" idea of field crop production costs and practices in the Imperial County. They do not reflect the exact values or practices of any one grower, but are rather an average 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, time of planting, 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, general farm supplies, communications, utilities, farm shop, transportation, moving farm equipment, accountants, insurance, safety training, permits, etc. In most of the crop guidelines contained in this circular we used 13 % of the total of land preparation, growing costs and land rent to estimate overhead.

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, bird and rodent control, etc. Whenever possible we have given the costs of these operations per hour listed on the cultural operations page.

Not included in these production costs are expenses resulting from management fees, loans, providing supervision, or return on investments. The crop budgets also do not contain expenses encumbered for road and ditch maintenance, and perimeter weed control. If all the above items were taken into account, the budget may need to be increased by 7-15%.

Where applicable we have used terminology that is commonly used in the agricultural industry. These terms are compiled in a glossary at the end of the circular. We feel that an understanding of these terms will be useful to entry-level growers, bankers, students and visitors.

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2002-2003 Field/Vegetable Prevailing Rate for Field Operations
IMPERIAL COUNTY

HEAVY TRACTOR WORK & LAND PREPARATION

OPERATION	$/ACRE
Plow	30.50
Subsoil, 2nd gear	39.00
Landplane	12.75
Triplane	11.25
Chisel 15”	25.00
Wil-Rich chisel	16.00
Big Ox	24.00
Slip plow	41.00
Pull/disc borders	6.75
Make cross checks (taps)	6.25
Break border	6.00
Disc, stubble	21.00
Disc, regular	12.50
Corrugate	11.00
Disc, regular with ring roller	13.50
List 30” beds 12-row	15.00
List 40” beds 8-row	15.00
Float	10.00
Disc, borders	7.00
Dump (scraper) borders	14.50

LIGHT TRACTOR WORK

Power mulch dry	25.00
Power mulch with herbicide	28.00
Shape 30” 6 row	10.75
Shape 40” 4 row	10.75
Plant 30” beds nonprecision	20.00
Plant 40” beds nonprecision	18.00
Precision plant 30” beds	22.00
Precision plant 40” beds	20.00
Mulch plant wheat	19.50
Plant alfalfa (corrugated)	17.50
Plant bermudagrass (flat)	13.75
Plant sudangrass	14.75
Cultivate 30” beds 4-row	16.00
Cultivate 40” beds 4-row	14.00
Spike 30” beds 4-row	13.25
Spike 40” beds 4-row	11.25
Spike and furrow out 30” 4-row	14.00
Spike and furrow out 40” 4-row	12.00
Furrow out 30” beds 4-row	13.25
Furrow out 40” beds 4-row	11.25
Lilliston 30” beds 6-row	13.00
Lilliston 40” beds 4-row	13.00
Lilliston 30” beds with/herbicides 6-row	15.00
Lilliston 40” beds with/herbicides 4 -row	15.00
Inject fertilizer & furrow out 30” beds 4-row	15.00
Inject fertilizer & furrow out 40” beds 4-row	13.00
Fertilize dry & furrow out 30” beds	17.00
Fertilize dry & furrow out 40” beds	15.00
Flat inject fertilizer NH_3	15.00
Broadcast dry fertilizer	7.00
Ground spray 40” 8-row	12.00
Ground spray 30” 8-row	14.00
Chop cotton stalks	13.75

HARVEST COSTS Field Crops

	BY UNIT
Combine alfalfa seed	41.75/acre
Windrow alfalfa seed	17.50/acre
Rake bermudagrass	5.00/acre
Swath bermudagrass	13.50/acre
Swath sudangrass	11.25/acre
Rake sudangrass	5.25/acre
Swath alfalfa	8.00/acre
Rake alfalfa	4.50/acre
Bale (all types of hay- small bale)	0.65/bale
Haul & stack hay – small bale	0.25/bale
Bale (large bale 4X4)	10.00/bale
Bale (large bale Jr. 3X4)	9.00/bale
Stack & load large bale	6.00/bale
Dig sugar beets	2.60/clean ton
Haul sugar beets	2.45/clean ton
Combine wheat	15 per acre + 0.55 /cwt over 1 ton
Haul wheat	5.50/ton
Combine bermudagrass seed 1st time	40.00/acre
Combine bermudagrass seed 2st time	25.00/acre
Haul bermudagrass seed (local)	175/load
Haul bermudagrass seed (Yuma)	300/load

MISCELLANEOUS OPERATIONS BY THE HOUR

Motor grader	48.00
Backhoe	45.00
Water truck	40.00
Wheel tractor	35.00
Scraper	36.00
Versatile	56.00
D-6	56.00
D-8	70.00
Buck ends of field	28.00
Pipe setting (2 men)	37.00
Laser	88.00
Work ends (disc out rotobucks)	35.00

CAULIFLOWER CULTURE 2002-2003

Annual acreage, yield, and value of fresh market cauliflower in Imperial County, CA (1997-2001)

Year	Acres	Yield/Acre*	Value/Acre
2001	4,023	570	$4,201
2000	3,943	512	$4,086
1999	4,353	559	$4,386
1998	3,313	597	$5,922
1997	3,461	572	$3,927

* 23 lb cartons
Source: Imperial County Agricultural Commissioner's Reports 1997-2001

PLANTING-HARVESTING DATES Planting starts in August and continues through early December (transplants). Cauliflower is usually grown with a single seed line on 40-or 42-inch beds. Transplants may be grown as greenhouse plugs or field-grown, bare-root seedlings. Several companies will custom install transplants. The transplant machines place seedlings into pre-moistened beds. Sprinklers are started as soon as the machines move to an adjacent area. Early season transplants are subject to "melting" by the fungus *Pythium aphanidermatum*. A chemical drench at transplanting alleviates the problem.

Natural seed is planted 2 to 3 inches apart at a ¼ inch depth using a precision planter such as a Stanhay or one of the various air planters. Seedlings are thinned to 12 to 18 inches between plants. Some late-season varieties are grown using double seed lines on 40- to 42-inch beds. Check with your seed dealer for recommendations.

The major competing areas for marketing winter cauliflower production are western Arizona, coastal California, and Texas.

VARIETIES Several cauliflower varieties are needed to produce a continuous supply throughout the season. Commonly used varieties include: Casa Blanca *Pybas*; Casper *Rijk Zwaan*; Shasta *Syngenta*; Guardian *Seminis*; Rushmore *Seminis*; Ravella *Seminis*; Incline *Sakata*; Cumberland *Seminis*; Yukon *Sakata*; Minuteman *Seminis*; Fargo *Bejo*; and Chieftan *Seminis*.

Seed is priced per units of one thousand. At a 3-inch spacing, one would need approximately 50,000 seed per acre (M's). Price per acre will vary greatly depending upon variety.

Black rot is a seed-borne bacterial disease caused by *Xanthomonas campestris*. The disease is very destructive. To control seedborne black rot, the producers often use hot water treatment. The process is not 100 percent effective. Seed known to have black rot, or hot water treatment, should never be used for growing transplants. Seed is only hot water treated if it has been found to be infested with *X. campestris* bacteria since hot water treatment reduces seed viability.

Proper varietal selection keyed to specific planting dates is crucial for cauliflower production. Varieties have internal clocks based on plant age and ambient temperature that trigger the curd to develop into a marketable product. Depending on the variety, the period of adaptation may be only a couple of weeks or more than a month. Varieties grown out-of-slot will not develop satisfactorily.

Ricing, yellowing, light weight curds, and breaking apart of the florets are common defects that occur when a mistake is made in choosing the appropriate planting period for a given variety, or when the crop grows during adverse weather.

SOILS AND IRRIGATION Cauliflower performs well on medium to medium-heavy soils provided there is adequate drainage. On sandy soils, extreme care must be taken not to stress the plants for water or premature heading may occur. Cauliflower is normally sprinkler irrigated for seedling emergence and then converted to furrow irrigation. Transplants are sprinkled until the new roots are established.

FERTILIZER A 500 pound broadcast application of 11-52-0 before listing is normal practice. Some cauliflower varieties require more nitrogen (N) than others. The standard practice is to apply 200 pounds or more actual N per acre during the growing season to promote vegetative growth of the outer jacket leaves in order to protect the curds from solar yellowing.

Many types of nitrogen fertilizer may be used for sidedress applications: dry or liquid ammonium nitrate (34-0-0), AN20 (20-0-0), UAN 32 liquid, and occasionally CAN 17 liquid.

INSECTS, DISEASES AND MISCELLANEOUS PROBLEMS Cabbage loopers, armyworms, flea beetles and aphids must be controlled. Flea beetles and worms are very active in late summer and early fall. These insects can destroy a stand in one day if not controlled.

Silverleaf whitefly will cause delayed and irregular maturity if not controlled. There are currently systemic materials for preplant application that work well on whiteflies.

Cauliflower should not be planted after sugar beets or in the same field for more than three consecutive years due to the possible infestation of sugar beet cyst nematode *(Heterodera schachtii).* Broccoli and cabbage are also hosts for sugar beet cyst nematode.

Wind whip causes girdling and death of small seedlings. Later, surviving plants may wilt and fail to make a curd. The stems of affected plants become very brittle at the soil level. Seedlings are more susceptible to wind whip after thinning or weeding due to decreased wind impedance. Check the weather forecasts to avoid wind whip injury.

Field mice may be a problem near harvest. Once the mice have become established in a field they are nearly impossible to control. Pre-bait around and destroy grassy areas around the perimeter of the field.

Sooty mold or curd smudge (*Cladosporium* sp.) is a surface curd contaminant that frequently occurs near harvest. It is held in check by the use of chlorinated water sprays before packing. Washing also helps to remove dust and debris from the curds.

Blind bud is a condition where there is no curd formation. The cause may be due to mechanical injury or a genetic defect. Insect chewing and bird feeding are common causes.

Black rot (*Xanthomonas campestris* pv. *campestris*) occurs occasionally in Imperial County. Plant disease-free seed or transplants.

Downy mildew (*Peronospora parasitica*) is a foliar fungal disease. Treat only when necessary to protect the leaf canopy.

HARVESTING All cauliflower is field harvested using tractor towed harvesting platforms. Each platform requires a crew of 18 to 21 people. Fields are normally harvested 2 to 4 times or more depending upon the market. Mature curds (6"or larger) are hand-harvested and trimmed. The field workers trimming curds say they are making a "corona" or crown cut. The curds are placed on the tables of field harvesting machines. Cauliflower should never be allowed to roll over and to touch the white curd on the table. Scuffed curds are subject to decay and browning.

The packing crew wraps curds in plastic bags, tapes the butt ends to seal and place-packs the curds according to size. Nine curds/carton (9's), 12's, 16's, and 20's are used, but shippers pack mostly 12's.

Some cauliflower is cut into florets for the food service trade. Cartons containing two 3-lb bags of 1½-3 inch florets are common.

Yields of 500 to 600 cartons per acre are possible with good fields. Market demand often drives yields up; the higher the market, the more product will be harvested per acre.

POSTHARVEST HANDLING Cauliflower is extremely perishable and should be stored for very short periods of time. The storage temperature should be 32°F and 95+ percent relative humidity. Storage at high temperature rapidly causes deterioration of cauliflower quality and shelf life. For example, at 32°F cauliflower can be stored 3 to 4 weeks, at 38°F the shelf life is two weeks, at 41°F it is 7 to 10 days, at 50°F it is 5 days, and at 59°F only 3 days! When there is an oversupply, cauliflower is often stored at too high a temperature and too low a humidity. Long term or improper storage results in bad arrivals, price adjustments and poor quality product at retail markets.

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For more information on cauliflower, see "Cauliflower Production in California", DANR Publication 7219 available from the Imperial County Cooperative Extension Office or for a free download from the Internet go to http://anrcatalog.ucdavis.edu/specials.ihtml

DIRECT SEED CAULIFLOWER PROJECTED PRODUCTION COSTS 2002-2003

Hand labor at $9.25 per hour ($6.75 plus SS, unemployment insurance, transportation, workman's compensation, supervision and fringe benefits)

Yield--500 23-lb. cartons | Direct Seed Hybrid Variety

OPERATION	Cost	Materials		Hand Labor		Cost
		Type	Cost	Hours	Dollars	Per Acre
LAND PREPARATION						21.00
Stubble disc	21.00					39.00
Subsoil 2nd gear	39.00					25.00
Disc 2x	12.50					11.25
Triplane 1x	11.25					
Border,cross check & break borders	19.00					19.00
Flood irrigate		Water 1 ac/ft.	16.00	1	9.25	25.25
Disc 2x	12.50					25.00
Triplane 1x	11.25					11.25
Fertilize, spread	7.00	500 lb. 11-52-0	58.75			65.75
List 40" beds	15.00					15.00
TOTAL LAND PREPARATION						**257.50**
GROWING PERIOD						
Precision plant and	25.00	Hybrid Seed 40M	260.00			285.00
whitefly control		Admire	75.00			75.00
Herbicide, planting	12.50	Dacthal	65.00			77.50
Sprinkler Irrigate	160.00					160.00
Insect control via sprinkler		Insecticide	20.00			20.00
Cultivate 3x	14.00					42.00
Spike 2x	11.25					22.50
Fertilize & furrow out 2x	13.00	150 lb. N @ .32	48.00			74.00
Water-run fertilizer 2x		40 lb. N @ .32	12.80			12.80
Hand weed				4	37.00	37.00
Irrigate 8x		4 ac/ft	64.00	8	74.00	138.00
Gated pipe (harvest)	20.00					20.00
Insect control 3x	10.00	Insecticides	80.00			110.00
Disease control 1x	10.00	Fungicide	20.50			30.50
Chop stalks	13.75					13.75
TOTAL GROWING PERIOD COSTS						**833.05**
GROWING PERIOD & LAND PREPARATION COSTS						1090.55
Land Rent (net acres)						200.00
Cash Overhead----		13 % of preharvest costs & land rent				167.77
TOTAL PREHARVEST COSTS						**1458.32**
HARVEST (Field pack)						
Custom harvest, pack, haul, cool, and sell		500 -23 lb. cartons @	5.00	per carton		2500.00
TOTAL OF ALL COSTS						**3958.32**

PROJECTED PROFIT OR LOSS PER ACRE
price/ 23 lb. carton (dollars)

		7.00	8.00	9.00	10.00	11.00	Break-even $/carton
	300	-858	-558	-258	42	342	9.86
Cartons	400	-658	-258	142	542	942	8.65
per	500	-458	42	542	1042	1542	7.92
acre	600	-258	342	942	1542	2142	7.43
	700	-58	642	1342	2042	2742	7.08

* Harvest varies with the shipper, the field conditions, and the market.