U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

ICEBERG LETTUCE

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

ICEBERG LETTUCE CULTURE 2002-2003

Annual acreage, yield, and value of wrapped iceberg lettuce in Imperial County, CA (1997-2001)

Year	Acres	Yield/Acre*	Value/Acre
2001	5,628	831	$7,229
2000	8,860	670	$4,757
1999	9,072	604	$5,021
1998	8,298	598	$5,207
1997	9,864	533	$3,660

* 40 pound cartons wrapped
Source: Imperial County Agricultural Commissioner's Reports 1997-2001

Annual acreage, yield, and value of naked pack & bulk iceberg lettuce in Imperial County, CA (1997-2001)

Year	Acres	Yield/Acre*	Value/Acre
2001	3,752**	831	$6,150
2000	5,906	726	$4,029
1999	11,087	645	$3,895
1998	10,141	552	$3,434
1997	12,056	540	$2,662

- * 50 pound cartons
- ** Naked pack only
- Bulk lettuce is also produced at a value of $5,215,00 in 2001.

Source: Imperial County Agricultural Commissioner's Reports 1997-2001

The total head lettuce acreage from all sources is listed as 12,507 acres.

PLANTING-HARVESTING DATES The planting period is from mid-September to mid-November. Early plantings (mid-September) are harvested in early December, while October plantings are harvested in January and February. Late November plantings are harvested in March.

VARIETIES "Crisphead," "iceberg" and "head" lettuce are terms used to differentiate this type of lettuce from leaf or Romaine lettuces. Varieties are adapted to specific planting periods. Planting a variety out-of-slot will result in non-heading, puffiness and bolting. As the season progresses, temperatures change from extreme heat both night and day to cool days with nights near freezing. Moderately high temperatures can occur in early spring. Early plantings mature in less than 90 days while later ones require 120 days or more.

The following are commonly planted varieties and seed producers in italics: Fall Green *Harris Moran*; Annie *Seminis*; Raider *Seminis*; Mohawk *Seminis;* QT-96 *Paragon;* Wolverine *Seminis;* Westland *Orsetti;* Cibola *Paragon;* Honcho II *Seminis*; Kofa *Synergene*; Yuma *Harris Moran*; Cool Breeze *Seminis*; Winterhaven *Various*; Red Coach 74 *Various* ; Valley Queen *Paragon,* Coyote *Seminis;* Bubba *Seminis*; Navigator Seminis; Lighthouse *Paragon*; Jupiter *Paragon*; Grizzly *Seminis*; and Coolguard *Seminis*.

Non-primed, natural lettuce seed may be susceptible to thermodormancy when ambient temperatures are above 90°F for an extended period of time. Priming will allow the seed to overcome thermodormancy and germinate well at high temperatures. Several companies offer priming. Thermodormancy can also be broken by starting the initial irrigation in the late afternoon whereby the seed imbibes water and germinates during the cooler hours of the night.

PLANTING INFORMATION Most of the lettuce is planted using pelleted seed and a precision planter. Seed are planted 2 to 3 inches apart within-rows on 40 to 42 inch beds. At a 2-inch spacing there will be 157,000 (157 M) seed per acre. Cost of seed per acre varies with variety coating, spacing, and seed enhancement or priming treatments.

SOILS Lettuce prefers silt loams and sandy soils. The lighter soils provide better drainage during cold weather and warm up more readily. Lettuce has a moderately low degree of salt tolerance. Excess salinity results in poor seed germination and small heads.

IRRIGATION Most growers use sprinklers for the first 5 to 7 days or until the seedlings emerge and the grower can identify a green line down the seed rows. The field is then converted from sprinklers to furrow irrigation for the remainder of the season.

Care must be taken not to overly saturate the beds when growing early-season lettuce. Excess moisture favors the development of bottom rot (*Rhizoctonia solanai*).

Gated pipe is also used, especially near harvest. The major benefits of gated pipe are to allow for uniform application of water down furrows and to maintain a dry head basin so that harvest equipment can turn around on hard ground. The irrigation labor costs used also include shovel work, grader work, and pipe setting.

FERTILIZERS Five hundred pounds of ammoniated phosphate 11-52-0 are usually broadcast

prior to listing. Nitrogen (N) is sidedressed just after thinning and during later growth. Early,

warm-season lettuce requires less N than that grown in January and February. About 150 pounds actual N is used early, while 200 to 250 pounds actual N are applied during cold weather.

Lettuce is very sensitive to overdoses of ammoniacal fertilizers. Seedling injury will be expressed by root burn, yellowing of the leaves, and even dead plants. Fertilizer injury later in the season is expressed by wilting of the outer leaves and a rusty reddish discoloration in the middle of the plant root.

PEST AND DISEASE CONTROL Insect pests include crickets, cutworms, leafminers, salt marsh caterpillars, and beet armyworms. Cabbage loopers can be especially serious after thinning. Aphids and thrips are late season insect pests and should be controlled.

The silverleaf whitefly has caused slow growth and delayed maturity of the crop. A preplant application of a soil applied systemic insecticide is commonly used to combat whitefly.

The most serious diseases affecting iceberg lettuce are lettuce big vein virus (LBVV), bottom rot (*Rhizoctonia solani*), grey mold (*Botrytis cinerea*), and lettuce drop (*Sclerotinia sclerotiorum* and *S. minor*). Use mosaic-free seed (i.e., no virus in 30,000 seed) to prevent lettuce mosaic virus (LMV).

Powdery mildew (*Erysiphe cichoracearum*) may need to be controlled with sulfur applications to avoid economic damage.

Freeze injury on mature lettuce will be expressed as blistering and peeling of the epidermis, followed by browning of the tissues. Normally freeze injury is confined to the cap and wrapper leaves.

Tipburn is a physiological disorder caused by the lack of mobility of calcium in the heads during warm weather and rapid growing conditions. Presently, there is no control for lettuce tipburn.

All currently used herbicides can cause crop injury under certain conditions. Avoid high rates of herbicide on sandy soils, especially during hot weather. There are several application techniques used to minimize herbicide injury.

HARVESTING Head or iceberg lettuce is field packed into cartons. Roughly 40 percent of the crop is wrapped. In most cases, cut and trimmed heads are stacked on a table of a field-harvesting machine. Workers then wrap and seal individual heads in film or plastic bags. The wrapped heads are packed either 24 or 30 heads per carton.

An alternative method is trimmed heads (with the wrappers leaves removed) are placed in

plastic bags by field workers. The heads are packed in cartons by count.

For ground harvest also called “naked pack”, crews of approximately 20 to 30 people are split up into small units called trios. There are two cutters and a packer in a trio. They often rotate jobs and are normally paid by the number of cartons packed. The solid lettuce heads are cut, trimmed to 4 to 5 wrapper leaves and packed 24 per carton. A carton weighs a minimum of 50 pounds gross weight.

Lettuce is vacuum cooled prior to storage in a cold room. Vacuum cooling removes field heat in roughly 15 minutes.

Many companies bulk harvest lettuce. Bulk harvested lettuce may be “trimmed and cored” lettuce. The heads are loaded into bulk bins, which are trucked to a processing plant. The heads are cooled, washed, and precut into various types of retail packages for the food service industry. Fast food outlets, restaurants, institutional use, airlines, and schools use large volumes of salad products.

POSTHARVEST HANDLING Lettuce is highly perishable and should be cooled as soon as possible after harvesting. Vacuum cooling will reduce product temperature to 34^{o} F and then it should be stored just above freezing at 98 percent relative humidity.

Lettuce harvested at prime maturity with no major defects may be held for 2 to 3 weeks at 34°F. At 37^{o} F, shelf life is reduced to 1 to 2 weeks.

Russet spotting is a disorder caused by storing lettuce in containers or cold rooms where there is ethylene gas present. Ripening fruits and gasoline engines can generate ethylene. Brown stain is a storage disorder caused by high carbon dioxide levels in the cold room.

For more information on iceberg lettuce, see “Iceberg Lettuce Production in California”, DANR Publication 7215 available from the Imperial County Cooperative Extension Office or for a free download from the Internet go to http://anrcatalog.ucdavis.edu/specials.ihtml

WRAPPED ICEBERG LETTUCE 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 50 lb. cartons per acre 90-120 days to maturity.

OPERATION	Cost	Materials		Hand Labor		Cost
		Type	Cost	Hours	Dollars	Per acre
LAND PREPARATION						
Stubble disc	21.00					21.00
Subsoil 2nd gear	39.00					39.00
Disc 2x	12.50					25.00
Triplane 1x	11.25					11.25
Border, cross check & break borders	19.00					19.00
Flood		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						
Power mulch beds 1x	25.00					25.00
Precision plant and	25.00	Coated seed 157M	140.00			165.00
whitefly control		Admire	75.00			75.00
Sprinkler irrigate	160.00					160.00
Herbicide	12.50	Kerb	35.00			47.50
Thin				17	157.25	157.25
Cultivate 2x	14.00					28.00
Spike 2X	11.25					22.50
Fertilize & furrow out 2x	13.00	120 lb. N @ .32	38.40			64.40
Water-run fertilizer		60 lb. N @ .32	19.20			19.20
Hand weed 1x				10	92.50	92.50
Irrigate 4x		Water 3 ac/ft.	48.00	12	111.00	159.00
Gated pipe	55.00					55.00
Insect control 5x	10.00	Insecticides	150.00			200.00
Ring roller cleanup	10.00					10.00
TOTAL GROWING PERIOD						**1280.35**
GROWING PERIOD & LAND PREPARATION COSTS						1537.85
Land Rent (net acres)						225.00
Cash Overhead-----	13 % of preharvest costs & land rent					229.17
TOTAL PREHARVEST COSTS						**1992.02**
HARVEST COST						
Cut, pack, haul, cool and sell	500 wrapped cartons @		5.25	per carton		2625.00
TOTAL ALL COSTS						**4617.02**

PROJECTED PROFIT OR LOSS PER ACRE

		Price/ 50 lb. carton (dollars)					
		5.00	6.00	7.00	8.00	9.00	**Break-even $/carton**
	500	-2117	-1617	-1117	-617	-117	9.23
Cartons	600	-2142	-1542	-942	-342	258	8.57
per	700	-2167	-1467	-767	-67	633	8.10
acre	800	-2192	-1392	-592	208	1008	7.74
	900	-2217	-1317	-417	483	1383	7.46

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