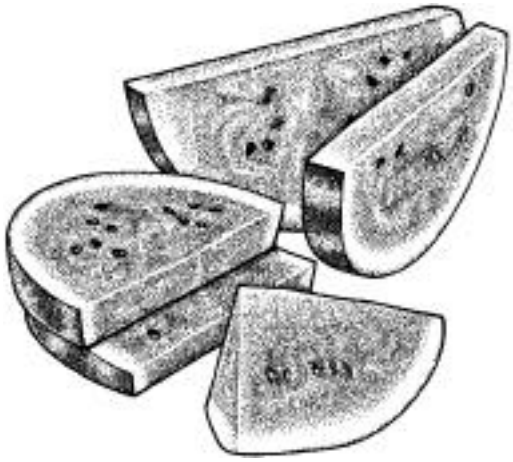
U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

WATERMELON



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

WATERMELON CULTURE 2002-2003

Annual acreage, yield (tons), and value of watermelons
Imperial County, CA (1997-2001)

Year	Acres	Yield/Acre	Gross Value/Ton
2001	769	29.2	$221
2000	1,254	30.0	$181
1999	2,315	20.7*	$149
1998	1,635	26.8*	$273
1997	2,114	24.4*	$217

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

PLANTING-HARVESTING DATES Watermelons are planted mid-December to March, and harvested between mid-May to mid-July 15. Major competition in the market comes from Mexico, Arizona, and Texas. Yields can be as high as 35 to 50 tons per acre under ideal conditions.

PLANTING INFORMATION Many seeded watermelons are grown on 80-inch south-sloped beds. The beds are slanted to the south at a 35-37^{o} angle from horizontal. This practice allows for increased heat in the seed line by capturing the incoming sunrays at a near perpendicular angle, thus increasing absorbed energy.

Seed is sown ½ inch deep using random flow or precision air planters. The thinned plant spacing varies from 2-3 feet depending upon variety.

SEEDED VARIETIES Sangria *Syngenta*; Celebration *Syngenta* and Fiesta *Syngenta* are popular "All-Sweet" hybrids. Royal Sweet *Seminis* and Carnival *Syngenta* are two other hybrid varieties used.

SEEDLESS VARIETIES Seedless varieties are usually grown using transplants, drip irrigation, plastic mulch bed cover and occasionally hooped tunnels. From 1-3 drip lines may be used per 80-inch bed. Production of seedless watermelon is very expensive for both plants and culture. Triploid, seedless watermelon needs temperatures near 80°F for germination that is best achieved in a greenhouse. Commonly used seedless varieties include: Ultrakool *Headstart*; Tri-X 313 *American Sun Melon*; Nova *Sakata*; Fandango *Shamrock*; Laurel *Takii*; AC-5244 *Abbott & Cobb*; and Millionaire *Harris Moran.*

To determine the amount of seed needed for transplants, compensate for germination percentage plus 25% more for losses in the greenhouse during the growing process.

Seedless watermelons are usually spaced 24-to 28-inches down the row. This allows for greater density of vines, higher yields and less sunburn.

Seedless watermelons need one row of pollinator for every 2 rows of seedless. Fiesta, Mardi Gras, Sangria, and Royal Sweet are used as pollinator varieties. Fruit from the pollinator rows are sold as a separate product.

Seedless transplants cost between $0.30-$0.40 per plant depending upon the variety selected. This does not include the cost of labor to install the plants.

Some growers use plastic drinking cups to protect the transplants for the first couple of weeks after installation. The cost of cups, installation and removal is estimated to be $300 per acre additional.

SOILS Watermelons are grow best on non-saline, sandy loam or silt loam soils. Some watermelons are successfully grown on dune sand when given ample moisture and fertilizer. A soil temperature of 95^{o}F is optimum for germination of seeded melons.

IRRIGATION After planting, the first irrigation should run until the beds are completely wet. Following emergence, water may be withheld for a long period of time. When the plants start to set fruit, watermelons should not be stressed for water. Insufficient irrigation will result in small melon size and increased blossom end rot. Excessive irrigation after the melons have been water stressed may result in fruit splitting.

Watermelons respond very favorably to drip irrigation. Applying water regularly will increase fruit set, fruit size, and yield. The use of drip irrigation increases growing costs roughly $600 per acre. The additional expense of the drip irrigation system must be offset by higher yields in order to justify its cost. Some fields that are not held back by virus, soilborne disease or insects may yield 35 to 40 tons of seedless watermelons per acre.

FERTILIZERS Thirty-five gallons of 10-34-0 liquid fertilizer may be applied preplant during planting-shaping. Up to 200 pounds of actual nitrogen fertilizer are later sidedressed in split applications. Less fertilizer is needed when watermelons follow a lettuce crop.

POLLINATION Bee colonies per acre should be placed in the field when male flowers begin to appear. Poor pollination is often the cause for misshapen fruit. Seldom will a watermelon plant produce more than 2-3 harvestable fruit. While it is too expensive to prune off excess fruit, often misshapen and split fruit are removed.

PEST AND DISEASE CONTROL Cutworms, aphids, spider mites, darkling ground beetles, leafhoppers, cabbage loopers, and leafminers are the most serious insect pests of watermelon. Rind scaring is a serious defect that reduces market value.

Zucchini yellow mosaic virus (ZYMV) and watermelon mosaic virus (WMV) are transmitted by aphids and can severely distort the fruit and vines, thus reducing yield. Charcoal rot (*Macrophomina phaseolina*) and powdery mildew (*Sphaerotheca fuliginea* or *Erysiphe cichoracearum*) may also require control.

Melon vine decline (*Monosporascus cannonballus)* can cause serious damage at harvest. Other than soil fumigation by methyl bromide, there is no control.

Blossom end rot is a physiological disorder that may be a problem when melons are grown under salt stress, water stress, or waterlogging. Varieties vary in their susceptibility to this disorder.

Rind necrosis may be a problem. The tissue discoloration rarely affects the flesh of the melon; however, melons with necrosis may be discounted in price. Some researchers believe a bacterium may be involved in causing the disorder.

HARVESTING A sharp knife is used to cut melons from the vines; pulled melons may crack open. Melons are picked on the basis of color change, blossom end conditions, and rind roughness. Color change is the most reliable. Harvested fruit are windrowed near roadways usually spaced about 10 beds apart. A pitching crew follows the cutters and forms a line between outside row and a truck. Melons are pitched man-to-man and loaded in bins on trucks to be transported to the shed. Melons should never be stacked on the blossom end or excess breakage may occur.

Loss of natural protection on the fruit can increase sunburn. Exposed fruit are covered with vines as they start to mature near harvest to prevent sunburn. Each time the field is harvested covering the exposed fruit with vines.

Most fields are picked at least twice and some a third or fourth time depending upon fruit prices in the market and the degree of sunburned fruit.

The seeded melons are sorted and packed in large, sturdy, "tri-wall" fiberboard containers. The melons are sorted according to grade and number. Bins hold 60 to 80 melons and will weigh 1,100 to 1,200 pounds. Two third bins hold about 800 pounds of melons. Discolored, misshapen, sugar cracked, blossom end rot, and insect damaged fruit are culls, but still may be sold to nearby markets.

The containers are loaded on flat bed, 18-wheel trucks destined for terminal market resale. The tops of the containers should be covered to prevent sunburn in transit. Watermelon sales usually are based upon a 1 to 2 percent shrink, because of breakage. The buyer is responsible for

supplying bins and lids or the shipper will bill for the cost of those items.

Seedless watermelons are sorted according to size and packed in cartons containing 4, 5, 6, or 8 fruit. "Fours" and "fives" are preferred sizes. "Sixes" and "eights" are common later in the season after the crown-set melons are removed from the vine. The rough weight of a carton is 40 to 50 pounds. Some bins and cartons have high-resolution graphics for logos that may increase overall cost.

POSTHARVEST HANDLING Watermelons are not adapted to long-term storage. Normally about three weeks is the upper limit of suitable storage, however, this will vary from variety to variety. Storage for more than two weeks triggers a loss in flesh crispness.

Watermelons store and ship better when held at temperatures of 50° to 60°F and 90 percent relative humidity. Storing melons for several weeks at room temperature will result in poor flavor. However, when fruit are held just a few days at warmer temperatures, the flesh color tends to increase. Sugar content does not change after harvest.

Chilling injury will occur after several days' storage below 41°F. Decay-causing organisms will invade the resulting pits in the rind. Watermelons flesh will tend to lose its red color if held too long at temperatures below 50°F.

For more information see “Watermelon Production in California”, DANR Publication 7213 available from the Imperial County Cooperative Extension Office or for a free download from the Internet go to http://anrcatalog.ucdavis.edu/specials.ihtml

DRIP IRRIGATED SEEDLESS WATERMELON PRODUCTION COSTS 2002-2003

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

Yield-- 25 tons per acre. 2/3 bin containers

OPERATION	RATE	Materials		Hand Labor		Cost
		Type	Cost	Hours	Dollars	Per acre
LAND PREPARATION						
Subsoil 2nd gear	39.00					39.00
Disc 2x	12.50					25.00
Border, cross check and break borders	19.00					19.00
Flood		Water 1 ac-ft	16.00	1	9.25	25.25
Disc 2x	12.50					25.00
List beds	19.00					19.00
Rerun beds 2x	13.50					27.00
TOTAL LAND PREPARATION						**179.25**
GROWING PERIOD						
Install drip irrigation		Drip system & tape	600.00	12	111.00	711.00
Install plastic mulch	55.00	Plastic mulch	82.00			137.00
Metam sodium via drip		metam sodium	145.00			145.00
Seedless transplants		S-transpants	840.00		includes labor	840.00
Pollinator transplants		P-transplants	100.00		includes labor	100.00
Cultivate 2x	13.00					26.00
Irrigate 10x		Water 3 ac/ft	48.00	20	185.00	233.00
Fertilizer via drip		200 lb. N @ .32	64.00			64.00
		100# phosphate	35.00			35.00
Drip maintenance		Chemicals	25.00			25.00
Hand weed 2x				12	111.00	111.00
Pollination		1.5 hives @ 27.00	40.50			40.50
Vine turn 2x (hand)				14	129.50	129.50
Insect control 4x	10.00	Insecticides	100.00			140.00
Disease control 2x	10.00	Fungicide	30.00			50.00
Remove mulch & tape		Disposal fee	15.00	15	138.75	153.75
Bust beds	13.00					13.00
TOTAL GROWING PERIOD						**2953.75**
GROWING PERIOD & LAND PREPARATION COSTS						3133.00
Land Rent (net acres)						225.00
Cash Overhead--	15 % of preharvest costs & land rent					503.70
TOTAL PREHARVEST COSTS						**3861.70**
HARVEST						
Pick, load, haul, sort and sell	25 tons/ acre @	80.00	/ton*	(.04 per lb)		2000.00
TOTAL OF ALL COSTS						**5861.70**

PROJECTED PROFIT OR LOSS PER ACRE

		Price/ton (dollars)					
		200	210	220	230	240	Break-even ¢/pound
	20	-1462	-1262	-1062	-862	-662	13.7
Tons	23	-1102	-872	-642	-412	-182	12.4
per	27	-622	-352	-82	188	458	11.2
acre	30	-262	38	338	638	938	10.4
	33	98	428	758	1088	1418	9.9

* Harvest cost may vary substantially depending upon the melon type, container packed, resorting and yard fees.