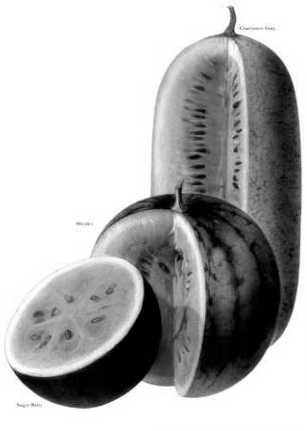
U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

MIXED MELONS



IMPERIAL COUNTY – 2004

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For an explanation of calculations used for the study refer to the attached General Assumptions or call the author, Herman Meister, at the Imperial County Cooperative Extension office, (760)352-9474 or e-mail at hmeister@ucdavis.edu.

FOREWORD

We wish to thank growers, pest control advisors, chemical applicators and chemical dealers, custom farm operators, fertilizer dealers, seed companies, contract harvesters, equipment companies, and the Imperial County Agricultural Commissioner's office for providing us with the data necessary to compile this circular. Without their cooperation 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. Most of the information was collected through verbal communications via office visits and personal phone calls. The information does 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. Eleven to 13% of the total of land preparation, growing costs and land rent was used to estimate overhead. Hourly rates vary with each crop depending on the workman's compensation percentages.

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. Some custom operators have indicated that they are instituting a "fuel surcharge" to reflect "spikes" in fuel cost.

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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2004-2005 Tillage & Harvest Rates
IMPERIAL COUNTY

HEAVY TRACTOR WORK & LAND PREPARATION

OPERATION	$/ACRE
Plow	32.00
Subsoil 2nd gear	45.00
Subsoil 3rd gear	38.00
Landplane	14.00
Triplane	12.00
Chisel 15”	26.00
Wil-Rich chisel	17.00
Big Ox	25.00
Slip plow	43.00
Mark/disc borders	10.50
Make cross checks (taps)	6.75
Break border	6.50
Stubble disc/with cultipack	22.50/24.50
Regular disc/with cultipack	13.00/15.00
List 30”-12 row/40” 8 row	16.50
Float	11.50
Dump (scraper) borders	18.25
Corrugate	14.00

LIGHT TRACTOR WORK

Power mulch dry	27.50
Power mulch with herbicide	31.00
Shape 30” 6-row / 40” 4-row	12.75/12.75
Plant sugar beets & cotton 30”/40”	17.00/15.00
Plant vegetables	20.00
Mulch plant wheat	20.25
Plant alfalfa (corrugated)	18.50
Plant alfalfa (beds)	19.00
Plant bermudagrass	13.75
Plant with drill (sudangrass, wheat)	14.75
Plant corn slope	17.00
Cultivate 30”/40” beds 4-row	16.00/14.00
Spike 30”/40” beds 4-row	13.00/11.00
Spike and furrow out 30”/40” 4-row	14.00/12.00
Furrow out 30”/40” beds 4-row	13.00/11.00
Lilliston 30” 6-row / 40” 4-row	14.00/14.00
Lilliston 30” 6 row/ 40” 4-row/ herb	15.50/15.50
Inj fert & fur out 30”/ 40” beds 4-row	16.50/14.50
Fertilize dry & fur out 30”/ 40” 4-row	17.00/15.00
Inject fertilizer flat	15.00
Broadcast dry fertilizer	8.00
Ground spray 30”/40” 8-row	12.00
Chop cotton stalks 30”/40”beds	16.00/14.00
List 80” melon beds	20.00
Plant 80” melon slope beds	22.00
Back fill furrow (melons)	9.5
Cultivate 80” melon slope beds	18.00
Center 80” melon beds	17.00
Re-run 80” melon beds	11.00
Inject fertilizer & furrow out 80” melon beds	18.00
Bust out 80” melon beds	12.00

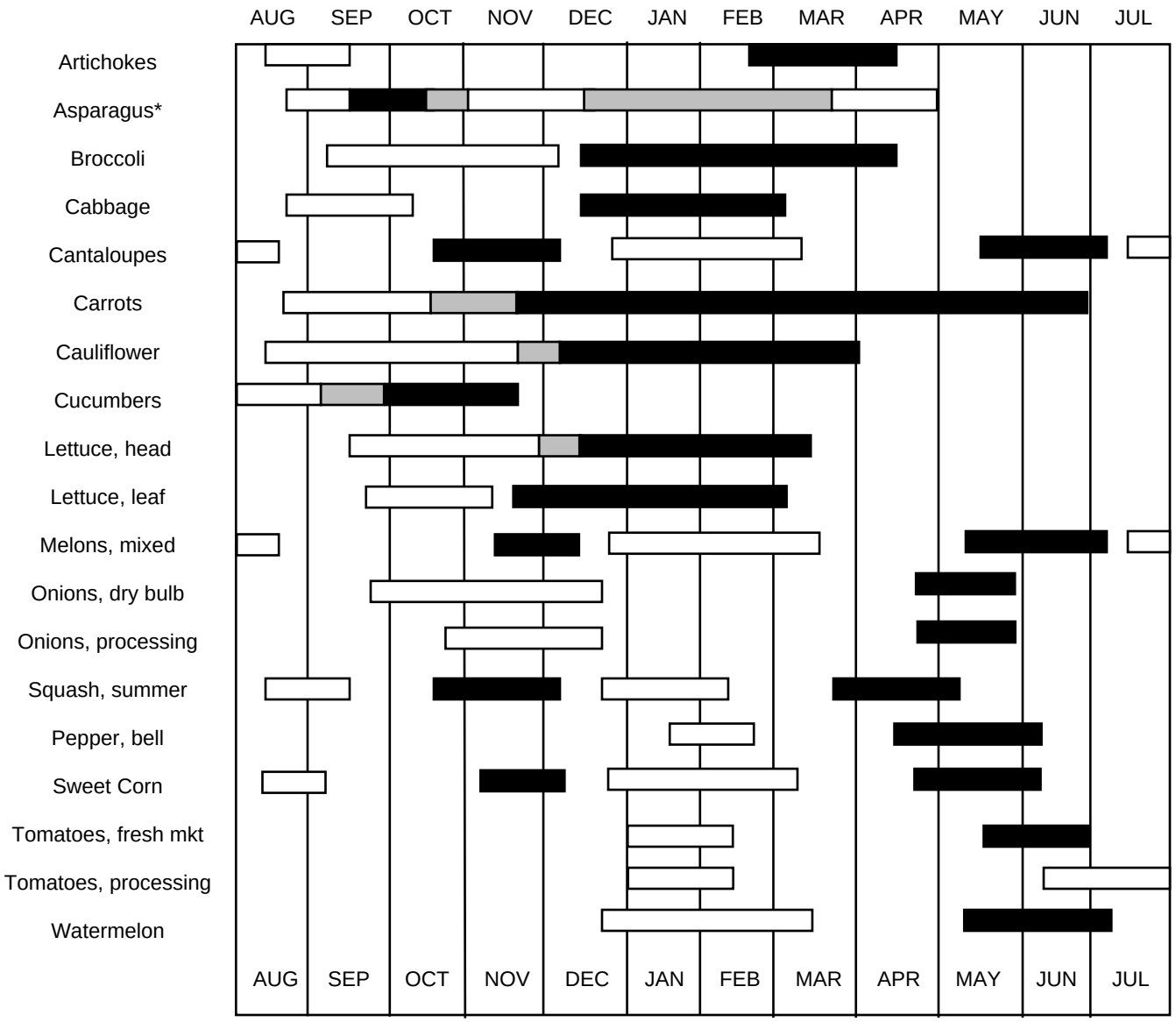
HARVEST COSTS-FIELD CROPS

	BY UNIT
Windrow alfalfa seed	17.50/acre
Combine alfalfa seed	41.00/acre
Swath bermudagrass	13.75/acre
Rake bermudagrass	5.50/acre
Swath sudangrass	11.25/acre
Rake sudangrass	6.00/acre
Swath alfalfa	8.75/acre
Rake alfalfa	5.00/acre
Bale (all types of hay- small bale)	0.70/bale
Haul & stack hay – small bale	0.27/bale
Bale (large bale 4X4)	7.50/bale
Haul & stack big bale	3.50/bale
Load with hay squeeze	62.50 / load
Dig sugar beets	2.65/clean ton
Haul sugar beets	2.50/clean ton
Combine wheat	16.00 per acre + 0.60 /cwt. over 1 ton
Haul wheat	5.00/ton
Combine bermudagrass seed 1st time	42.50/acre
Combine bermudagrass seed 2nd time	26.50/acre
Haul bermudagrass seed (local)	175/load
Pick Cotton 1st/2nd	03cts/lb/35.00/acre

MISCELLANEOUS RATES BY THE HOUR

	$/HR
Motor grader	55.00
Backhoe	50.00
Water truck	40.00
Wheel tractor	35.00
Scraper	36.00
Versatile	60.00
D-6	56.00
D-8	73.00
Buck ends of field	35.00
Pipe setting (2 men)	38.00
Laser level	90.00
Work ends (disc out rotobucks)	40.00

VEGETABLE CROPS
PLANTING & HARVESTING CALENDAR
IMPERIAL VALLEY, CALIFORNIA



MONTH

planting

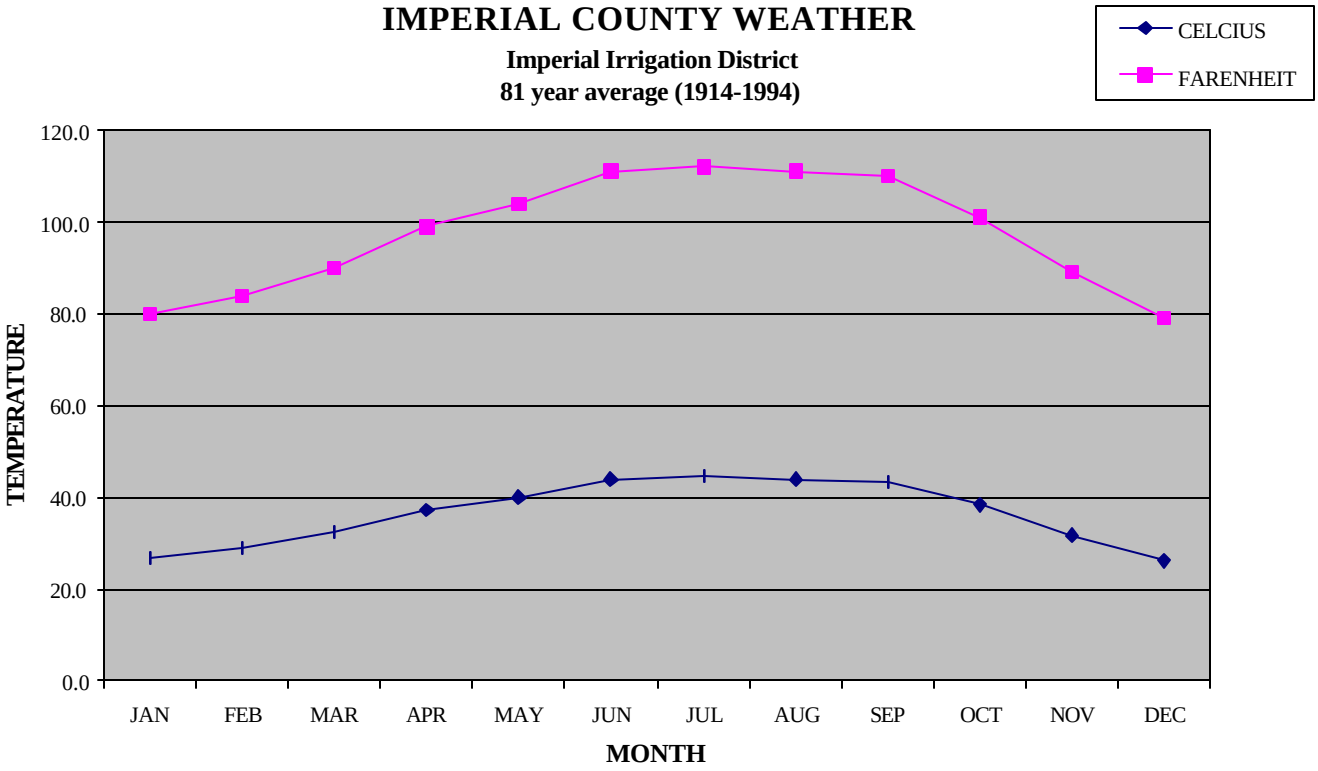
planting/harvesting

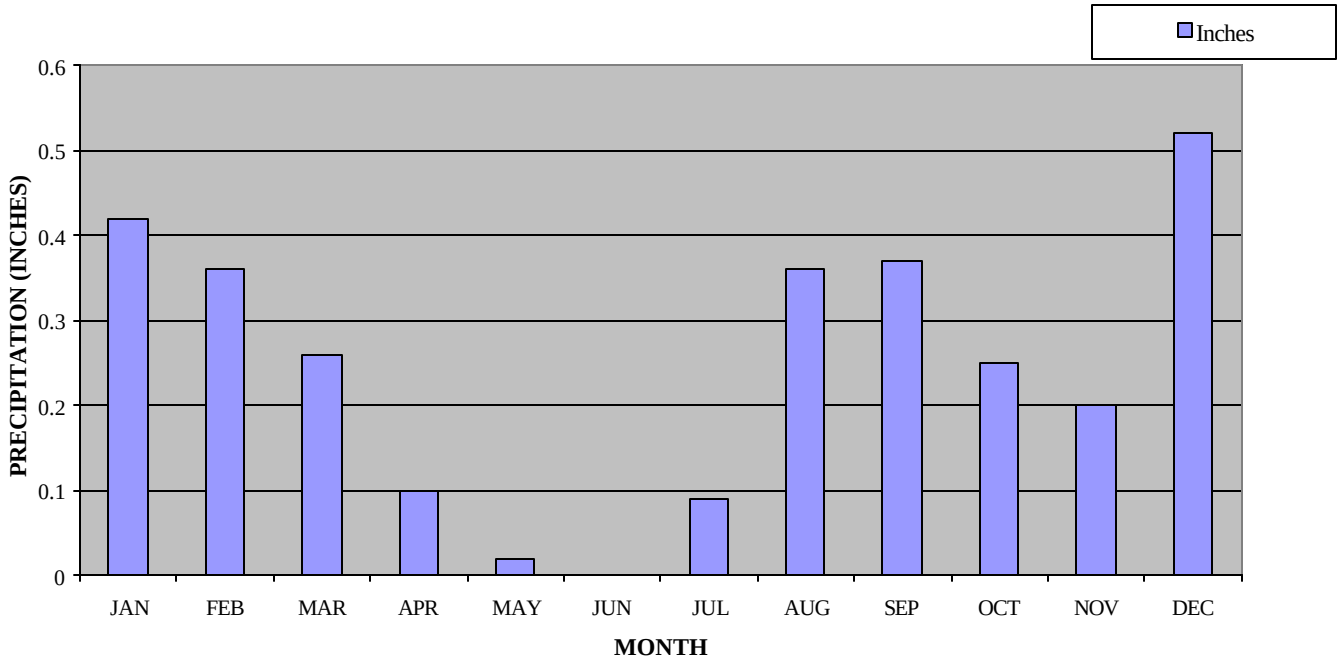
harvesting

* perennial

IMPERIAL COUNTY WEATHER

Imperial Irrigation District
81 year average (1914-1994)





DAYS REQUIRED FOR SEEDLING EMERGENCE* AT VARIOUS SOIL TEMPERATURES

Soil Temperature (°F)

Vegetable	32	41	50	59	68	77	86	95	104
Asparagus	NG	NG	53	24	15	10	12	20	28
Beet	/	42	17	10	6	5	5	5	/
Cabbage	/	/	15	9	6	5	4	/	/
Cantaloupe	/	/	/	/	8	4	3	/	/
Carrot	NG	51	17	10	7	6	6	9	NG
Cauliflower	/	/	20	10	6	5	5	/	/
Celery	NG	41	16	12	7	NG	NG	NG	/
Cucumbers	NG	NG	NG	13	6	4	3	3	/
Eggplant	/	/	/	/	13	8	5	/	/
Lettuce	49	15	7	4	3	2	3	NG	NG
Okra	NG	NG	NG	27	17	13	7	6	7
Onion	136	31	13	7	5	4	4	13	NG
Parsley	/	/	29	17	14	13	12	/	/
Parsnip	172	57	27	19	14	15	32	NG	NG
Peppers	NG	NG	NG	25	13	8	8	9	NG
Radish	NG	29	11	6	4	4	3	/	/
Spinach	63	23	12	7	6	5	6	NG	NG
Sweet Corn	NG	NG	22	12	7	4	4	3	NG
Tomato	NG	NG	43	14	8	6	6	9	NG
Watermelon	/	NG	/	/	12	5	4	3	/

*planting depth = 0.5 inches; NG = no germination; / = not tested; Source: Harrington, J. F. and P. A. Minges, Vegetable Seed Germination. California Agricultural Extension Mimeo Leaflet (1954).

SEED CALCULATIONS (M)

Number of seed (x1000) required[1] per acre for common plant spacing combinations within rows and between beds. Commonly coded as "M" or 1000 seed

	Spacing between beds[3] (inches)					
Plant spacing within rows[2] (inches)	**30**	**40**	**42**	**60**	**66**	**80**
1	209.1	156.8	149.4	104.5	95.0	78.4
1.5	139.4	104.5	99.6	69.7	63.4	52.3
2	104.5	78.4	74.7	52.3	47.5	39.2
2.5	83.6	62.7	59.7	41.8	38.0	31.4
3	69.7	52.3	49.8	34.8	31.7	26.1
4	52.3	39.2	37.3	26.1	23.8	19.6
6	34.8	26.1	24.9	17.4	15.8	13.1
8	26.1	19.6	18.7	13.1	11.9	9.8
10	20.9	15.7	14.9	10.5	9.5	7.8
12	17.4	13.1	12.4	8.7	7.9	6.5
14	14.9	11.2	10.7	7.5	6.8	5.6
24	8.7	6.5	6.2	4.4	4.0	3.3
36	5.8	4.4	4.1	2.9	2.6	2.2

[1] Seeds per acre was calculated assuming one seed per spacing combination. Factors influencing the actual amount of seed needed are seed delivery method and seed viability; [2] Values are based on beds with a single row. For multiple rows, multiply by the number of rows per bed; [3] Beds are measured from center to center.

Linear feet per acre for common bed widths

Bed width (inches)	Linear feet per acre
30	17,424
40	13,068
42	12,446
60	8,712
66	7,920
80	6,534

IMPERIAL COUNTY MIXED MELON PROJECTED PRODUCTION COSTS 2004-2005

40 Acre Field

Hand labor at $9.95per hour ($6.75 plus SS,unemployment insurance, workman's compensation,and fringe benefits).

Yield--800 40 lb.-cartons per acre. **HONEYDEWS** Hybrid variety

OPERATION	Cost	Materials		Hand Labor		Cost
		Type	Cost	Hours	Dollars	Per acre
LAND PREPARATION						
Stubble disc / ring roller	24.50					24.50
Big Ox	25.00					25.00
Disc 2x	13.00					26.00
Triplane 1x	12.00					12.00
Border, cross check and break borders	23.75					23.75
Flood		Water 1 ac-ft	16.00	1	9.95	25.95
Disc 2x	13.00					26.00
Triplane 1x	12.00					12.00
Fertilizer, spread	8.00	500 lb. 11-52-0	75.00			83.00
List beds	20.00					20.00
TOTAL LAND PREPARATION						**278.20**
GROWING PERIOD						
Shape beds, plant and inject insecticide	25.00	Hybrid seed 15M	325.00			350.00
		Admire	60.00			60.00
Weed control ground 1x	12.50	Herbicide	16.00			28.50
Back-fill furrow	9.50					9.50
Thin				7	69.65	69.65
Cultivate/move beds 3x	18.00					54.00
Center beds	17.00					17.00
Sidedress fertilizer and furrow out	18.00	80 lb. N / UAN 32	30.40			48.40
Hand weed 1x				5	49.75	49.75
Weed Control-layby	12.50	Herbicide	5.00			17.50
Pollination		2 hives @ $27 ea	54.00			54.00
Irrigate 5x		Water 4 ac/ft	64.00	3	29.85	93.85
Water-run fertilizer		40 lb.N as UAN 32	15.20			15.20
Insect Control-1x air-night 10 gpa	14.00	Insecticides	20.00			34.00
Disease control 4x	11.00	Fungicides	40.00			84.00
Bust beds (cleanup)	12.00					12.00
TOTAL GROWING PERIOD						**997.35**
GROWING PERIOD & LAND PREPARATION COSTS						**1,275.55**
Land Rent (net acres)						200.00
Cash Overhead------	13 % of preharvest costs & land rent					191.82
TOTAL PREHARVEST COSTS						**1,667.37**
HARVEST (field pack)*						
Pick, pack, haul, cool, and sell	800 cartons @	3.75 per carton				3,000.00
TOTAL OF ALL COSTS						**4,667.37**

PROJECTED PROFIT OR LOSS PER ACRE

price/ 30 lb.carton (dollars)

		5.00	6.00	7.00	8.00	9.00	Break-even $/carton
	400	-1167	-767	-367	33	433	7.92
Cartons	**500**	-1042	-542	-42	458	958	7.08
per	**600**	-917	-317	283	883	1483	6.53
acre	**700**	-792	-92	608	1308	2008	6.13
	800	-667	133	933	1733	2533	5.83

* Harvest costs vary with the shipper, the field conditions and the market value.

IMPERIAL COUNTY MIXED MELON CULTURE 2004-2005

Annual acreage, yield, and gross value of mixed melons
in Imperial County, CA (1999-2003)

Year	Acres	Yield/Acre*	Gross Value/ Acre
2003	1,466	834	$7,089
2002	1,101	824	$4,128
2001	1,226	777	$4,072
2000	2,293	368	$2,021
1999	2,306	432	$2,640

*40 pound carton equivalent
Source: Imperial County Agricultural Commissioner's Reports 1999-2003

PLANTING-HARVESTING: The term "mixed melons" includes the following muskmelons: honeydew, crenshaw, casaba, juan canary, santa claus, and persian. The greatest acreage is sown to honeydews and crenshaws.

Mixed melons are planted in January for a May to July harvest. Mixed melons may also be planted in July and early August for harvest starting in October until first frost. Yields vary with season, disease incidence, and type of melon. There is potential for a field to yield 1200-1300 cartons per acre, but usually yields are considerably less.

VARIETIES AND PLANTING: Commonly used mixed melon varieties include: Green Flesh Honeydew *Various*; Silver World *Known You*; Honey Ace *Takii*; Honeycomb *Takii;* Saturno *Seminis;* Santa Fe *Seminis*; Honey Pack *Seminis*; Honeybrew *Sakata;* and White Crenshaw *Hollar*

PLANTING INFORMATION: In spring plantings, the mid-bed trench system (hoopless tunnel) involves the use of a bed shaper to produce a trench or groove in the center of an 80-inch bed. The shape of the trench varies from grower to grower, but normally they are 6 to 10 inches wide at the bottom, 20 inches wide at the top, and 12 inches deep. Trenches are seeded at the bottom using a random flow planter or an air-type, vacuum precision planter. Pre-emergence herbicide may be sprayed in the trench. A tractor-mounted, plastic-mulch laying machine is used to stretch a 40 inch wide sheet of 1 to 1½m plastic sheet over the trench and to secure the edges with soil.

Fields are furrow irrigated to wet the seed lines. No additional irrigation is needed for the next 40 to 50 days. Water vapor inside the tunnel condenses on the plastic film and drips back to the soil recycling the

water.
After temperatures begin to rise and the plants touch the plastic, ventilation is needed to prevent injury. Holes are punched by hand or by machine, and the water vapor is allowed to escape. Plants will acclimate to the lower relative humidity. After a few days, the plastic is removed and the plants are thinned.

Unless the plastic mulch is laid on a sloping bed, rain may collect causing the plastic film to sag and stretch into trenches, thus injuring plants. Some growers have to go through the field puncturing holes in the film to let water puddles drain inside the tunnel.

An alternative method of culture for spring melon production is slant-bed or "Yuma-bed". This time-proven cultural method was developed to orient the south face of the bed toward the winter sun. The sun's rays strike the soil surface at a nearly perpendicular angle, converting light energy into heat. Flatter beds reflect a greater portion of the incoming radiation and are therefore cooler. Maximum bed heating is achieved when the bed angle is roughly 35-37 degrees from horizontal.

Seed is planted ½" deep on 80 -inch beds. Custom-built, slant-bed planters using random flow seeding units are common. Air planters may be used for precision planting. Seed lines are located midway up the slope. Care must be taken to locate the correct seed line position as the beds will be reworked and reformed during the season. Forming a bed with a depression at the crown will increase the incidence of fruit and root rotting fungi.

After the melons are thinned to approximately 12 inches in-row, the beds are worked to relocate the seed line. Soil is shaved off the top of the beds and into the furrow. After several passes with small tractor-mounted discs, the field is virtually flat with seed lines 80 inches apart. Sidedress fertilizer is applied and new furrows are made for irrigation.

SOILS: Well-drained soils are preferred for cantaloupes. Sandy or silt loams are sometimes selected for the earliest crop. Heavier soils are preferred because of their greater water holding capacity, which slows the onset of vine collapse. Beds should be left cloddy to allow for maturing melons to develop with minimal soil contact and good aeration.

Fields located in the northern portion of the Imperial Valley near the Salton Sea are preferred for the early melon crops. This area is less subject to freezing due to the influence of the sea. Spring cantaloupes are also planted in the Bard/Winterhaven area of the county.

IRRIGATION: Melons are usually furrow irrigated. Sprinkling tends to cool the soil and cantaloupes do not respond well to prolonged or frequent irrigation. Some cantaloupes are grown using drip irrigation and plastic mulched beds.

Irrigations are scheduled as needed to allow for moisture to be replaced in the beds. Excessive saturation can stimulate root rot diseases and ground spotting of fruit. The last irrigation is normally scheduled one week prior to harvest. Excessive moisture during harvest may increase ground spotting, and fruit rots.

FERTILIZERS: Most growers apply ammoniated phosphate such as 10-34-0 liquid fertilizer in the beds at planting or 11-52-0 broadcast prior to listing the beds. As much as 150 pounds of nitrogen is sidedressed. Normally UAN32 or AN20 may be used as sidedress fertilizers.

POLLINATION: At least one colony of bees per acre is recommended and 1½ colonies is better. The bees should be distributed on at least two sides of a 40-acre field; distribution of bees within fields is even better. Research has indicated that yields are increased with heavy bee saturation.

Bisexual, or fruit-producing flowers are only open for one day. On the average, a well-pollinated flower will receive at least 15 bee visits during this time. The flower will abort if insufficiently pollinated.

The highest quality, earliest maturing, and largest fruit are produced near the crown of the plant. Therefore, it is important that an adequate supply of bees be delivered to the field when the first male blossoms develop.

PEST AND DISEASE CONTROL: Spring cantaloupes are subject to a number of insect problems including silverleaf whiteflies, cutworms, aphids, mites, loopers, leafhoppers, and leafminers.

The silverleaf whitefly causes damage to late season melons by extracting massive amounts of plant fluids. The whitefly excrement is a food source for fungal growth, which is unsightly and difficult to remove from the net of mature cantaloupes. Heavy whitefly feeding may cause loss of the entire crop. Neonicitinoid insecticides applied at planting or through the drip system followed by foliar insecticide sprays are used to control whiteflies on melons.

Various *Pythium* sp. cause sudden wilt symptoms, which can kill the vine after fruit set. Careful water management can reduce the likelihood of the occurrence of this disease.

Mosaic viruses including zucchini yellow mosaic (ZYMV), watermelon mosaic II (WMV), papaya ringspot (PRSV), and cucumber mosaic (CMV) are vectored by various aphid spp. during the spring. There is no control for these viruses.

Powdery mildews caused by *Sphaerotheca fuliginea*, or *Erysiphe cichoracearum* are foliar diseases favored by warm weather and high moisture. Dusting sulfur and other fungicides are used to control these organisms.

Vine decline *(Monosporascus cannonballus)* is a serious soilborne melon disease. Fields may collapse near harvest and produce a very limited yield. Other diseases of lesser importance include charcoal rot caused by *Macrophomina phaseolina*, root rots caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia solani*, and gummy stem blight caused by *Didymella bryoniae*.

Fusarium fruit rot caused by *F. roseum* can cause severe damage. This disease can be controlled, but

preventative control measures must be applied before the onset of disease if it is to be effective. Otherwise, control measures are useless.

WEED CONTROL: Weeds are a serious problem in melon production. Few herbicides are registered on melons for weed control under desert conditions. Currently, growers rely on hand weeding and cultivation during the bed reconstruction process to kill unwanted weeds.

HARVESTING: Mixed melons are field-packed on machines, or picked and hauled to the edge of the field to small, temporary packing sheds. The melons are packed into cardboard cartons containing a partition divider. There are 5, 6, or 8 melons packed per 40-pound carton.

All cartons are packed using a partition which serves as a barrier or cushion between melons to prevent bruising, scuffing and to "tighten up the presentation of the pack".

Honeydews, orange flesh melons, persians, and casabas are mostly spherical in shape (group 1). Juan canary and santa clause types are football shaped (group 2). Crenshaws are teardrop shaped (group 3).

There are methods of packing or presenting for each fruit group. Group 1 is the easiest to pack. Fruit are oriented blossom-end-up. Group 2 is packed on the side, sometimes larger fruit have to be leaning on the carton or divider. Group 3 is the most difficult to handle and the most delicate melon. Crenshaws must be placed with the blossom end up or breakdown of the fruit will occur rapidly. The cartons are forced air cooled prior to shipping.

POSTHARVEST HANDLING: Relative humidity should be 90 percent or more to prevent fruit shriveling. This is a lower humidity level than for cantaloupes.

Mixed melons are sensitive to chilling injury and should not be stored below 41°F. Honeydews, crenshaws and persians store best at 45°F and casabas at 50°F. If temperatures are too low for storage, the rind will break down and surface decay will set in. In addition, abnormal softening and off-flavors will result when fruit are brought up to room temperature. Honeydews can be stored at temperatures as high as 65°F and will keep for 2-3 weeks.

An ethylene treatment of 5000 ppm for 18-24 hours has been used to ripen and soften physiologically mature honeydews. Immature fruit will not ripen with this treatment.

For more information on mixed melons, see “Mixed Melon Production in California”, DANR Publication 7209 available from the Imperial County Cooperative Extension Office or for a free download from the Internet go to http://anrcatalog.ucdavis.edu/specials.ihtml .

GLOSSARY

Air spray The application of chemicals by aircraft.
Back fill furrows To shave soil off the top of melon beds and place it into a furrow in order to bring the irrigation water closer to the melon seedline.
Bed Mounded soil that is shaped and used for planting; beds are separated by furrows.
Bell Bell pepper.
Big Ox A chisel with 7 shanks used to rip soil 18-24 inches deep.
Blacken the beds To wet/darken a bed with irrigation water.
Black Ice Ice formation on asparagus that is clear and therefore difficult to detect.
Blanks Lack of individual kernel formation in corn.
Brassicas Plants belonging to the genus *Brassica*, of the mustard family (Cruciferae), including cabbage, kale, broccoli, cauliflower, turnip, and mustard; all brassicas are crucifers, but not all crucifers are brassicas.
Break a field To harvest a crop the first time in a season.
Break borders To tear down flat flood borders or flat crop borders.
Breaker A tomato fruit that is beginning to show color change from green to pink on the blossom end; preceded by the *mature green* stage.
Brix A measure of sugar content, especially in tomatoes; a graduated scale, used on a hydrometer, that indicates the weight of sugar per volume of solution.
Brown bead A physiological disorder of broccoli thought to be related to lack of calcium uptake and excessive heat during head formation.
Buck ends of field The remaking of beds at the end of a field in order to channel irrigation water properly; a necessary practice when beds at the end of a field are destroyed due to insufficient turn around space for farm equipment.
Cateye A condition in broccoli where some beads begin breaking into yellow flower; also called *starring.*
Cello Poly bags which hold one or two pounds of carrots; from "cellophane".
Chisel A tractor-mounted, knife-like implement used to rip soil about 20 inches deep.
'choke Artichoke
Cole crops Any of various plants of the genus *Brassica*, of the mustard family.
Cos Romaine Lettuce
Cross checks Small dikes at perpendicular angles to borders used for water diversion into a field.
Crucifers Plants belonging to the Cruciferae or mustard family (e.g., broccoli, brussel sprouts, cabbage, cauliflower, etc.).
Cucurbits Plants belonging to the melon or gourd family (e.g., cantaloupe, watermelon, pumpkin, cucumbers, squash, etc.).
Cull To separate unwanted product from desirable product.
Cultipacker A farm implement used to break up clods of soil; consists of groups of knobbed metal rings stacked together.
Cultivate To work beds after planting in order to control weeds, loosen soil, and allow for application of fertilizer.
Curd The edible portion of marketed cauliflower.
Custom rate The value assigned to a cultural operation by farmers for cost accounting; normally includes the cost of the operator.
Damping-off A fungal disease of seedlings that causes rotting of the stem at the soil level and collapse of the plant.
Doubles The placement of two seeds rather than one when one is intended.
Drift Agrichemicals, dust or pests, which inadvertently fall on nearby (usually adjacent) non-target crops; usually the result of spraying products (especially products of small particle size) on windy days or of poor equipment operation.
Drip Irrigation The slow application of low pressure water in tubes or pipes (buried or on the surface): sometimes called trickle irrigation.
Edema (oedema) A physiological disorder of plant resulting from over-watering; numerous small bumps on the lower side of leaves or on stems divide, expand, and break out of the normal leaf surface and at first form greenish-white swellings or galls; the exposed surface

later becomes rusty colored and has a corky texture; especially common in cabbage.
Excelsior Fine wood shavings; used for stuffing, packing, etc.
Feathering Premature flowering of asparagus due to high temperatures.
Flats Flattened asparagus spears caused by certain varietal characteristics.
Float A large, wooden frame pulled with a tractor for rough leveling of the soil surface.
Flood irrigation A method of irrigation where water is applied to a field by gravity; the water is applied to a field by gravity; the water is channeled by earth borders that are usually 70 feet apart.
'flower Cauliflower
Forking The division of a tap root (especially carrots and lettuce) into branches; can be caused by nematode feeding, soil-borne pathogens, and soil texture.
Frost kissed Produce that has been frozen in the field and has a frosty appearance.
Furrow irrigation A method of irrigation where water is applied to fields by gravity flow down furrows; the water enters the bed by capillary action.
Furrow out The removal of soil from furrows by tractor-mounted shovels.
Gated pipe Large diameter pipes used to deliver low pressure water to each furrow; used to keep head end of field dry for cultivation or harvesting.
Green line A term used to describe the appearance of an emerging row crop as plants germinate and emerge above the soil line, a *green line* appears; often growers switch from sprinkler to furrow irrigation when a field can be *green-lined.*
Ground spray The application of an agrichemical by a tractor-mounted sprayer.
Hollow stem A physiological disorder in broccoli resulting from excessive plant spacing.
Honeydew Sweet excrement from aphids and whiteflies as a result of feeding on plant sap. Honeydew attracts ants and will support the growth of fungi (sooty mold).
Hydrocool To cool produce using ice cold water.
Inject fertilizer The application of liquid fertilizer in the top or sides of a bed.
Jelly Gelatinous material present in *mature-green* tomatoes (see also *locule*).
Landplane A large, tractor-pulled, land leveling machine.
Laser level A land surface leveler that uses a laser guiding device to maintain an accurate grade.
Layby To apply an herbicide or other agrichemical at the last opportunity to enter a field with a tractor prior to harvest.
Lilliston A rolling cultivator with curved tines which uses ground speed to assist in working up the soil surface in order to destroy weeds.
Listing Throwing soil in to a mound to make beds.
Locules Tomato fruit seed cavity.
Mature-green A stage of tomato fruit development when the fruit is fully grown and shows brownish ring at the stem scar after removal of the calyx; color at the blossom end has changed from light green to yellow-green and the seeds are surrounded by *jelly*.
Motor grader A large grader normally used to cut tail ditches for draining off excess surface water.
Naked pack Head lettuce packed without a wrapper.
Pegging the emergence of a *radicle* from seed and its placement in the soil.
Pipe setting Installing 2-inch plastic tubes through a soil berm with a hydraulic ram; the pipes are used to control the flow or irrigation water.
Power mulch A tractor-mounted, power rototiller.
Precision planter Planters which drop seeds at exact intervals; may function mechanically or by vacuum.
Primed seed Lettuce seed that has been *primed* for germination by soaking in *osmotic* solutions (e.g., polyethylene glycol [PEG]) as a preventative to *thermodormancy.*
Pull borders To make flood berms used to channel the water.
Punching pipe see *pipe setting.*
Putting the crop to sleep A phrase used to describe the over-watering of tomatoes by furrow irrigation following sprinkler irrigation; encourages shallow rooting and decreased plant growth.
Radicle The embryonic root.

Random flow planter A non-precision planter; seed drop is regulated by agitating the seed in a hopper over a hole; planting rate depends upon hole size and tractor speed.
Ricing Undesirable granulation of floret tips in cauliflower.
Roll beds A large, metal roller used to firm beds prior to thinning.
Rototill To mechanically mix soil.
Row A line of plants or a bed with a single line of plants.
Seedline A line down a bed in which seeds are planted.
Sidedress To place agrichemicals in a band next to a row of plants.
Silking Period of corn ear formation when silky threads emerge from the ear tip.
Slant bed A culturing technique where beds are slanted towards the winter sun (35-37 degrees from horizontal) such that the bed is perpendicular to the sun's rays.
Slip plow An implement pulled by a caterpillar and used to make deep cuts into the soil whereby soil from below is carried upward into the cut; used to improve drainage.
Slush-ice-cooling A cooling method used on broccoli; a mixture of water and ice is forced rapidly into cartons to cool the product.
Spike The running of tractor-mounted shanks into the soil or beds to improve aeration and drainage.
Sprinkler irrigate The application of irrigation water by pressurized injection into the air.
Starring see *cateye*
Stinger A root emerging from seed; a *radicle*
Stubble disc An implement used to chop crop residue and incorporate it into the soil; the blades are scalloped and operate like a pizza cutter.
Subbing Irrigation method where water is applied to a field in furrows and allowed to travel across beds by capillary action.
Subsoil The pulling of large, hard-faced shanks through the soil up to 42 inches deep; used to shatter soil layers and improve drainage.
Swamper Watermelon harvesting crew member.
Swath To cut a tall crop such as asparagus fern.
Taps See *cross checks*
Tasseling The emergence of corn inflorescence.
Thermodormancy A condition of lettuce seed where high temperatures (>86°F) make seed go dormant, thus inhibiting germination.
Thin The removal of excess crop plants and weeds in the seedline in order to achieve desired plant spacing.
Tillering Emergence of multiple stalks from the same root in corn.
Tip burn A condition, especially in lettuce, where leaf tips are burned; thought to be due to lack of calcium uptake; foliar applications of calcium do not correct the problem.
Trio A head lettuce having crew unit consisting of two cutters and a packer; only used in *naked pack* lettuce.
Triplane A smaller, three-wheeled version of a *landplane.*
Triwall cardboard Triple-layered, corrugated cardboard used to make very sturdy fiberboard containers for watermelon.
Vacuum cooling A cooling method whereby commodities are placed in a strong-walled room, air pressure is reduced and heat consumed in the process cools the product.
Versatile A large caterpillar-sized tractor with rubber tread; used to pull discs and other implements; safe for crossing asphalt roads.
Water run An application of an agrichemical in irrigation water (i.e., furrow irrigation).
White star White markings at the blossom end of tomatoes that turn from green to white as the fruit matures; an indicator of maturity in tomatoes.
Wil-rich chisel plow An implement used to work wet or moist soils prior to making beds.
Wind whip Girdling of seedling stems due to high winds. Seedlings are especially susceptible following thinning or weeding; cole crops are most susceptible.