
U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

ASPARAGUS



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 cost of production for the dynamic and important vegetable industry in Imperial County.

The information presented herein allows one to get a "ballpark" idea of vegetable 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. 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. For crops that require additional labor or extra operations (i.e. leaf lettuce) we used 17% overhead to account for the additional expenses.

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 management fees, loans, supervision, or return on investments. The crop budgets also do not contain expenses encumbered for cleanup discing, road and ditch maintenance, perimeter weed control. If all the above items were taken into account, the budget may need to be increased by 7-15%.

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**2000-2001 VEGETABLE 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

**PLANTING, CULTIVATING & LIGHT
TRACTOR WORK**

	<u>\$/HR</u>
Power mulch dry.....	23.00
Power mulch with herbicide.....	27.00
Shape 40" beds.....	9.50
Precision plant 40" beds.....	17.50
Cultivate 4-row 40" beds.....	13.00
Spike 40" beds.....	9.75
Spike and furrow 4-rows 40" 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

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

IRRIGATION

Sprinkler irrigate.....	\$125-160.00/acre
1 acre-foot of water.....	14.56
Sprinkler irrigate carrots.....	155.00

*Note – Cultural rates for specific crop operations listed on crop budgets.

ASPARAGUS CULTURE 2000-2001

Annual acreage, yield, and value of asparagus
in Imperial County, CA (1995-1999)

Year	Acres	Yield/Acre*	Value/Acre
1999	5,006	141	\$3,991
1998	4,548	162	\$5,937
1997	4,900	132	\$4,634
1996	4,396	166	\$6,383
1995	4,764	164	\$5,110

* 30 lb carton equivalent;

(Source: I.C. Agricultural Commissioner's Reports 1995-1999).

PLANTING-HARVESTING DATES Asparagus is a perennial crop. Once established the crop may be harvested in the early fall if market conditions warrant, or harvested in late winter and early spring. The harvest continues until the price starts to fall and the crop loses quality to opening of the tips and toughening of the spears.

VARIETIES The main varieties grown are UC Hybrid 157_{F1}, Brock Imperial, Grande, Apollo, Atlas, and Ida Lea.

PLANTING INFORMATION Asparagus may be established by three methods: direct seeding, transplanting, or planting of field-or greenhouse-grown, one-year-old crowns. Production costs presented here were determined based on the use of 10-week-old transplants because this method is becoming more popular despite its higher cost. Transplants can be planted anytime during the year, but October through March is recommended. Bed width varies from 40-60 inches depending upon grower preference. Plant spacing is usually 6-inches in-row. There is normally one row per 60-inch bed for a population of roughly 17,000 plants per acre.

Due to lower asparagus returns in recent years many fields have been installed at the least possible cost. When production dwindles the field is taken out.

SOILS Well-drained sandy loams and loams are best for asparagus production. The warmer the soil, the earlier the production. For this reason, some fields are located in the warmer zones of the valley. Careful attention should be given to field selection because it will be tied up for 8-10 years. Fields that are known to have bermudagrass or nutsedge problems are poor choices for asparagus because cultural practices allow these grasses to grow virtually unchecked and there are no effective control measures.

IRRIGATION Fifteen or more irrigations per year are not unusual. The irrigation interval during the summer is from 10 to 15 days. Because the harvesting period lasts 30-60 days, it is necessary to continue irrigation during harvesting. This makes both timing and method of water application very important. Frequent irrigation of alternate rows during harvesting maintains even production while allowing harvesting crews entrance to fields. Crews are encouraged to walk in dry furrows rather than on bed tops where they might damage emerging spears.

FERTILIZERS Between 100- 200 pounds of phosphate and 200-400 pounds of actual nitrogen are used on most plantings. All of the phosphate and at least one-third of the nitrogen are applied in winter before the cutting season. The remaining nitrogen is applied during and after the harvest season.

PEST CONTROL Weeds can become a serious problem in established asparagus. A preemergence herbicide should be applied after the fern is chopped and burned, but before harvest. During the harvesting period, spot treatments with an herbicide may be necessary. An herbicide application after cutting and before fern regrowth is common. Avoid planting in fields that have bermudagrass or nutsedge infestations.

Western yellow striped armyworm, beet armyworm, and bean thrips have been traditional pests requiring several insecticide treatments annually. The European asparagus aphid is a serious pest requiring several additional insecticide treatments. Asparagus miner may periodically need to be controlled.

Asparagus rust (*Puccinia asparagi*) and Cercospora stem and leafspot (*Cercospora asparagi*) may require control in some years, especially on new plantings. Asparagus root rot (*Fusarium oxysporum* and *F. moniliforme*) are problems present during the mid-to late-years of stand life.

Asparagus crown and spear rot (*Phytophthora megasperma* var. *sojae*) occur in soils with poor drainage and those with excessive irrigation. Asparagus purple spot (*Stemphylium vesicarium*) may occur during cool, wet weather at harvest.

HARVESTING Mature 5-foot-tall ferns are either chopped or windrowed with a swather. After drying, ferns are usually burned. Fern chopping occurs from late November to early December. Following chopping, the planting beds are reworked to loosen the surface soil, re-shaped, fertilized, and irrigated prior to the first harvest which usually occurs mid-to late-January.

Irrigation is scheduled so that alternate furrows remain dry. This allows continuous field access for harvesting crews. Workers must avoid stepping on the tips of emerging spears because this mechanical damage will cause distortion as the spear elongates, making it unmarketable.

Newly emerging spears are hand-cut from mid-January through mid-April at 1 to 3 day intervals depending upon temperature and growth rate. Early in the season, fields are harvested every two or three days, but during warm weather fields are cut daily. Spears are cut at an angle and just below the soil surface with an asparagus knife. Spindly or otherwise deformed spears are cut and discarded to allow for growth of marketable spears. Cut spears must be approximately 10 inches long to allow for a trim to 9 inches during packing. Harvested spears are placed on the beds in bunches, gathered and placed in field boxes, carried out of the field on makeshift wheel barrows, and hauled to sheds for grading, trimming, packing, and cooling.

Asparagus is packed in various containers including: 30-pound loose, 28 bunches per crate (28-lb. net wt), and 11 bunches per crate (11 lb. net wt). Sizes for these packs are Large (7/16"), Standard (5/16"), and Small (3/16"). Diameter is measured at the widest point of the spear.

Another commonly used container holds six 2.25 lb. bunches (net weight 13.5 lb.) often used for international shipment. Sizes for this pack include Colossal (no more than 14 spears per bunch), Jumbo (15-20 spears), Large (21-28 spears), and Standard (29-42 spears).

Some of the product is packed out in 30-pound wood crates chiefly for Japanese export. There are also 27-pound cartons (12- 2.25 lb. bunches) for domestic and export, 15-pound cartons of asparagus tips for domestic use, and some 15 pound cartons packed loose for export mostly to Europe. Some asparagus may be trimmed to 5½-7 inches in length and packed as tips in 15-pound cartons.

Defects and loss of production can occur for various reasons. Wind will cause spears to curve because they can grow 3-6 inches per day depending on temperature. Trampling of emerging spears, inadvertent cutting of spears during harvest, or high temperatures will cause misshapen spears. High temperatures will also cause flowering or premature break of the bracts, especially in small spears. This condition is commonly referred to as "feathering" because of the featherlike appearance of flowering spears. Flattened spears ("flats") are the result of certain varietal characteristics. Thrips feeding can cause significant reduction in the cosmetic appeal of spears.

Freezing temperatures during spear emergence can cause "frosting" or discoloration of green spears. Frosted spears may still be marketable, however, at a reduced value. If spears are cut while still frozen, damage is usually too severe to yield a marketable product. Sometimes ice formation is difficult to see because the ice is clear. This condition is known as "black ice." A field with black ice will appear darker green overall than what is normally observed.

Overharvesting will lead to a decline in production and a proliferation of small spears. During the third year, harvesting may be continued the full season (i.e. about 60 days).

Fields in their second year of production may be harvested, but the harvesting period should be limited to 2-4 weeks and should only be done in the most vigorous plantings. Asparagus fields should give good yields for 8-10 years. Asparagus is capable of a much longer production life, but it is usually limited in later years by weed infestations and *Fusarium* infections. A common rotation out of asparagus is wheat because it will do well despite weed infestations and *Fusarium*.

POSTHARVEST HANDLING. Asparagus is an extremely perishable product. It must be cooled quickly after harvest. Local packing sheds hydrocool spears to remove the field heat after packing. Cooled water (approximately 38°F) is drenched over the packed cartons for approximately 15 minutes. Asparagus needs to be stored at 32-36°F with ≥95% relative humidity.

At high temperatures, asparagus spears will lose natural sugar, flavor, and vitamin C, and become tough, and start to decay. If rapidly cooled and held at 36 F, asparagus may be kept for about 3 weeks. Desiccation can occur rapidly if asparagus spears are not placed on wet pads, since spears continue to elongate after harvest.

Bacterial soft rot will occur at either the spear tips or butts if they are not quickly brought to optimum storage temperature and humidity.

Storing asparagus in nonventilated containers will result in spear toughening.

For more information see “Asparagus Production in California”, UC Publication 7234 available from our office or on the internet at <http://anrcatalog.ucdavis.edu/specials.ihtml>

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ASPARAGUS PROJECTED PRODUCTION COST 2000-2001

Hand labor at \$7.75 per hour (\$5.75/hr plus SS, unemployment insurance, transportation, supervision and fringe benefits.)

Yield--150-30-lb. pyramid crates (4,500 lbs/ac.)		8-10 year crop life				
OPERATION	Cost	Type	Materials Cost	Hand Labor Hours	Dollars	Cost Per Acre
LAND PREPARATION						
Plow	27.75					27.75
Landplane	12.00					12.00
Disc 2x	11.00					22.00
Border,cross check & break borders	17.75					17.75
Flood irrigate		Water 1 ac/ft	14.56	1	7.75	22.31
Disc 2x	11.50					23.00
Laser level	70.00					70.00
Fertilize, double spread	8.00	500 lb. 11-52-0	63.75			71.75
List	13.50					13.50
Shape beds	9.50					9.50
TOTAL LAND PREPARATION						289.56
GROWING PERIOD						
Install transplants		Transplants	500.00	40	310.00	810.00
Move beds 3X	14.00					42.00
Cultivate 2x	13.00					26.00
Spike 2x	9.75					19.50
Fertilize & furrow out 2x	13.50	200 lb. N @ .35	70.00			97.00
Lilliston 1x	10.75					10.75
Irrigate 8x		3 ac/ft	43.68	6	46.50	90.18
Insect control 6x	8.00	Insecticides	52.00			100.00
TOTAL GROWING PERIOD COSTS (FIRST YEAR)						1195.43
GROWING PERIOD & LAND PREPARATION COSTS (FIRST YEAR)						1484.99
Land Rent (net acres)						250.00
Cash Overhead----		13 % of preharvest costs & land rent				225.55
TOTAL FIRST YEAR COSTS						1960.54
STAND MAINTENANCE (8-10 YEAR LIFE)						
Chop or swath fern 1x	25.00					25.00
Spread fern for burning				4	31.00	31.00
Burn fern	3.00					3.00
Flail scalp	11.00					11.00
Rotovate-shape beds 1x	20.75					20.75
Spike 1x	9.75					9.75
Cultivate 2x	13.00					26.00
Fertilize 2x	12.25	300 lb. N @ .35	105.00			129.50
Water run fertilizer		200 lb. N @ .17	34.00			34.00
Herbicide 2x	12.00	diuron/lorox	41.50			65.50
Irrigate 15x		8 ac/ft	116.48	10	77.50	193.98
Disease control 2x	10.50	Fungicides	40.00			61.00
Insect control 6x	10.50	Insecticide	80.00			143.00
TOTAL ANNUAL COSTS						753.48
GROWING PERIOD COSTS						
Land Rent						250.00
Overhead		15 % land rent and preharvest costs				150.52
Amortization		14 % of first year costs (excluding land rent & overhead)				207.90
TOTAL PREHARVEST COSTS						1361.90
HARVEST COSTS						
Cut, haul, pack, cool, and sell		150 -30 lb. crates @	25.00	per crate		3750.00
TOTAL OF ALL COSTS						5111.90

PROJECTED PROFIT OR LOSS PER ACRE
Price/ 30-lb. crate (dollars)

		Price/ 30-lb. crate (dollars)					Break-even \$/carton
		28.00	30.00	32.00	34.00	36.00	
Crates per acre	100	-1062	-862	-662	-462	-261.90	38.62
	125	-987	-737	-487	-237	13.10	35.90
	150	-912	-612	-312	-12	288.10	34.08
	175	-837	-487	-137	213	563.10	32.78
	200	-762	-362	38	438	838.10	31.81

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